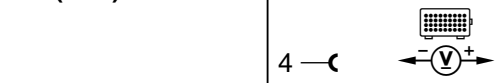
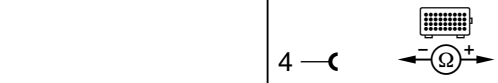
Electrical Test Program – Test

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
1.0	P1610	**Engine control module (IFI) (N3/7)** Voltage supply Circuit 87 unfused	N3/7 19 — V — 37 18 — V — 55	Ignition: **ON**	11 – 14 V	Wiring, Relay module (K40) (see Figure 1), ⇒ 1.1
1.1		Ground, component compartment – right (W16/6)	N3/7 18 — V — X12/3 19 — V — X12/3	Ignition: **OFF**	11 – 14 V	Ground W16/6, Activation of holding relay, see ⇒ 2.0
2.0		**Holding relay activation** Terminal HRL	N3/7 26 — V — X12/3	Ignition: **ON** **Engine at: CTP (idle)** **Engine**: Shut off	11 – 14 V 11 – 14 V for approx. 4 sec. then < 1 V	Wiring, Relay module (K40), Engine control module (IFI) (N3/7)

Electrical Test Program – Test

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
3.0	P0115	**ECT sensor (B11)** Voltage	N3/7  4 — 23	Ignition: **ON**	°C V 20 3.7 30 3.4 40 3.0 50 2.6 60 2.1 70 1.8 80 1.5 90 1.2 ± 10%	Engine control module (IFI) (N3/7) ⇒ 3.1
3.1		Resistance	N3/7  4 — 23	Ignition: **OFF** Disconnect connector on engine control module (IFI) (N3/7)	°C Ω 20 2500 30 1700 40 1170 50 830 60 600 70 435 80 325 90 245 ± 10%	Wiring, ⇒ 3.2

Electrical Test Program – Test

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
3.2		B11	B11 1 — Ω — 2	Ignition: **OFF** Disconnect connector on ECT sensor (B11)	°C Ω 20 2500 30 1700 40 1170 50 830 60 600 70 435 80 325 90 245 ± 10%	B11 (Figure 2)
4.0	P0110	**IAT sensor (B17)** Voltage	N3/7 4 — V — 40	Engine: **At CTP (idle)**	°C V 20 3.8 30 3.3 40 2.9 ±5%	Engine control module (IFI) (N3/7), ⇒ 4.1
4.1		Resistance	N3/7 4 — Ω — 40	Ignition: **OFF** Remove connector on engine control module (IFI) (N3/7)	°C Ω 20 6060 30 3900 40 2600 ±5%	Wiring, ⇒ 4.2

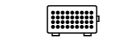
Electrical Test Program – Test

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
4.2		B17	B17 2 — Ω — 1	Ignition: **OFF** Remove connector on sensor B17 (Figure 3)	°C Ω 20 6060 30 3900 40 2600 ±5%	B17
5.0	P0105	**Pressure sensor (B28)** ⓘ Connect pressure tester with Y-fitting to pressure sensor	N3/7 4 — V — 22	Engine: **At CTP** Slowly increase engine speed to 2500 rpm	Voltage: **Drops** Vacuum: **Rises**	Pressure line, B28 (Figure 4), ⇒ 6.1
5.1		Voltage supply	N3/7 4 — V — 45	Ignition: **ON**	4.8 – 5.2 V	Engine control module (IFI) (N3/7), Wiring.

Electrical Test Program – Test

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
6.0	P1335	**CKP sensor (L5/6)**	N3/7 28 — ⏚ — 20	Engine: **At CTP** i 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**.	Signal: see document: AD07.12-P-2000-07B	Installation position of sensor, Dirt on sensor (metal chips), Segments on flywheel, ⇒ 6.1
			N3/7 28 — V — 20	Engine: **At CTP** i Test with multimeter only if oscilloscope is not available. Cranking rpm: > 200 rpm	> 0.8 V increasing rpm = increasing voltage > 0.3 V	
6.1		Resistance of sensor L5/6	N3/7 28 — Ω — 20	Ignition: **OFF** Remove connector on engine control module (N3/7)	680 – 1300 Ω	Connector L5/6x1 (see Figure 5), Wiring.

Electrical Test Program – Test

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
7.0	P1220 P1614	**Fuel quantity actuator (Y23/1)** Adjustment solenoid	N3/7  36 — 37 54 — 37	Ignition: **ON**	> 4.0 V max. for 30 seconds	⇒ 7.1, N3/7
7.1		Resistance	N3/7  36 — 37 54 — 37	Ignition: **OFF** Remove connector on engine control module (IFI) (N3/7)	1.0 – 1.4 Ω	Connector (Y23/1x1) (Figure 6), Wiring, Y23/1
8.0	P1223 P1614	**Fuel rack position sensor (Y23/1I1)**	N3/7  19 — 9 N3/7  19 — 10	Ignition: **ON** Ignition: **ON**	2.2 – 2.7 V 2.2 – 2.7 V	N3/7, ⇒ 8.1
8.1		Resistance	N3/7  46 — 9 10 — 9	Ignition: **OFF** Remove connector on engine control module (IFI) (N3/7)	21 – 25 Ω 43 – 47 Ω	Connector (Y23/1x1) Wiring, Y23/1

Electrical Test Program – Test

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
9.0	P1222	**IFI/DFI accelerator pedal position sensor (R25/2)**	N3/7 6 — V — 39	Ignition: **ON** CTP position: Full load position:	 0.3 ± 0.5 V 3.75 ± 4.75 V	Wiring, R25/2 (Figure 7), Engine control module (IFI) (N3/7)
9.1		CTP contact switch (R25/2s1)	N3/7 18 — V — 15 15 — V — 24 15 — V — 29	Ignition: **ON** CTP position: Full load position: CTP position: Full load position: CTP position: Full load position:	 > 4.5 V <0.5 V <0.5 V > 4.5 V <0.5 V > 4.5 V	Wiring, R25/2 (Figure 7), Engine control module (IFI) (N3/7)

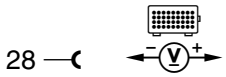
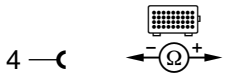
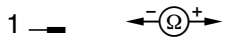
Electrical Test Program – Test

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
10.0	P1520	**CC switch (S40)**	N3/7	Ignition: **ON**		Wiring,
				Switch S40s1 not actuated	< 1 V	CC switch (S40).
		SP Resume	18 — (V) — 42	Position: **RESUME**	11 – 14 V	
			N3/7	S40s2		
		V Decelerate/set	18 — (V) — 38	Position: **DECELERATE**	11 – 14 V	
			N3/7	S40s3		
		B Accelerate/set	18 — (V) — 8	Position: **ACCELERATE**	11 – 14 V	
			N3/7			
		A Off	18 — (V) — 44	Switch S40s4 not actuated	11 – 14 V	
				Position: **OFF**	< 1 V	
			N3/7	Switch S40s5not actuated	< 1 V	
		Safety contact	18 — (V) — 30	Position: **DECELERATE, ACCELERATE, RESUME, OFF**	11 – 14 V	

Electrical Test Program – Test

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
11.0	P1622	**Electrohydraulic shut-off actuator (Y1/1)** Activation	N3/7 18 — (V) — 43	Engine: **At CTP (idle)**	11 – 14 V	Engine control module (IFI) (N3/7), ⇒ 11.1
11.1		Current draw	N3/7 43 — (A) — X12/3	Ignition: **OFF** Control module removed	1.46 A Electro-hydraulic shut-off actuator clicks audibly.	Wiring, Connector, ⇒ 11.2
11.2		Resistance	N3/7 18 — (Ω) — 43	Ignition: **OFF** Remove connector from engine control module (IFI) (N3/7)	7.6 ± 8.6 Ω	Y1/1 (Figure 10).

Electrical Test Program – Test

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
12.0	P0180	**Fuel temperature sensor (Y1/1b1)**	N3/7  28 — 3	Engine: **At CTP (idle)**	°C V 20 3.9 30 3.5 40 3.0 50 2.6	Engine control module (IFI) (N3/7), ⇒ 12.1
12.1		Resistance	N3/7  4 — 3	Ignition: **OFF** Remove connector on engine control module (IFI) (N3/7)	°C Ω 20 2500 30 1700 40 1170 50 830	Wiring, ⇒ 12.2
12.2		Y1/1b1	Y1/1b1  1 — 4	Ignition: **OFF** Remove connector on electrohydraulic shut-off actuator (Y1/1) (Figure 10)	°C Ω 20 2500 30 1700 40 1170 50 830	Replace: Electrohydraulic shut-off actuator (Y1/1).

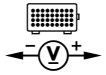
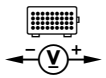
Electrical Test Program – Test

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
13.0	P0600	**CAN data bus**	N3/7 41 — Ω — 5	Ignition: **OFF**	58 – 62 Ω	Engine control module (IFI) (N3/7), Data line, ⇒ 13.1
13.1		CAN element in DAS control module (N54/1) Resistance	N3/7 41 — Ω — 5	Ignition: **OFF** Remove connector on engine control module (IFI) (N3/7).	115 – 125 Ω	Data line, DAS control module (N54/1).
14.0	P1480	**Preglow control** Communication wire between engine control module (IFI) (N3/7) and preglow control module (N14/2) Resistance	N3/7 33 — Ω — N14/2x1 2 (1.2)	Ignition: **OFF** Remove connector N14/2x1 from preglow control module (N14/2) (Figure 15).	< 1 Ω	Wiring, N14/2, N3/7

Electrical Test Program – Test

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
15.0	P1482	**Preglow control module (N14/2)** Voltage supply Circuit 30	W16/3 ⊥ — V — N14/2x3 (3)	Ignition: **OFF**	11 – 14 V	Wiring, ⇒ 15.1
15.1		Ground, left component compartment (W16/3)	W16/3 ⊥ — Ω — N14/2x1 (1.1)	Ignition: **OFF** Remove connector on preglow control module (N14/2) (Figure 13)	< 1 Ω	Wiring, Preglow control module (N14/2) (Figure 14).
16.0	P1481	**Glow plug failure** Glow plug and harness test	N14/2x2 ⊥ — A — 1 (2.1) ⊥ — A — 2 (2.2) ⊥ — A — 3 (2.3) ⊥ — A — 4 (2.4) ⊥ — A — 5 (2.5) ⊥ — A — 6 (2.6)	Measure with DC current pickup. Pull back protective sleeve. For each measurement, turn ignition key back to position 2 again.	7 – 25 A The current draw is dependent on the coolant temperature.	Glow plugs, Wiring, Preglow output (N14/2) (Figure 14), Engine control module (IFI) (N3/7).

Electrical Test Program – Test

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
17.0	P1401	**EGR lifting sender (B28/3)**	N3/7  20 — 21	Engine: **at CTP (idle)** i If EGR was recirculated previously, a waiting time of 50 seconds must be observed, after that, the values can be checked. Accelerate briefly, then Engine: **at CTP** (idle) for approx. 50 seconds	< 1.5 V < 100 mbar > 1.5 V > 150 mbar	B28/3, (Figure 12).
17.1			N3/7  20 — 24	Ignition: **ON**	4.8 – 5.2 V	Wiring N3/7

Electrical Test Program – Test

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
18.0	P1615	**Relay module (K40)** Voltage supply	Plug **B** 5 — K40 — Plug **B** 4	Ignition: **OFF** Disconnect connector **B**	 11 – 14 V	Check voltage supply, Wiring, Output ground, component compartment – right (W15/1), Relay module (K40).
19.0	P1612	**Control module Circuit 15E**	N3/7 18 — 47	Ignition: **ON**	11 – 14 V	Check voltage supply, Wiring, X12/5
20.0	P1470	**Pressure control flap vacuum transducer (Y31/2)** Vacuum at outlet “OUT” of vacuum transducer (Y31/2)	N3/7 53 — 37	Engine: **at CTP (idle)** 1500 rpm Accelerate briefly, vacuum and voltages drop. The test values are reference values.	 < 1.5 V < 150 mbar > 3 V >300 mbar < 1 V < 100 mbar	Vent filter dirty, Vacuum lines, Wiring, Y31/2 (see 21/2), Engine control module (IFI) (N3/7)

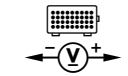
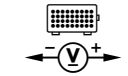
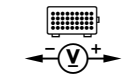
Electrical Test Program – Test

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
21.0	P1475	**Resonance intake manifold switchover valve (Y22/6)/resonance intake manifold flap** Voltage	N3/7 11 — (V) — 37	Engine: **at CTP (idle)** 1300 – 2800 rpm	11 – 14 V < 1 V	Engine control module (IFI) (N3/7), ⇒ 21.1.
21.1		Current draw	11 — (A) — 18	Ignition: **ON**	0.36 A	Wiring, Resonance intake manifold witchover valve (Y22/6) (Figure 11).
22.0		**Resonance intake manifold switch (S35)** Voltage	N3/7 18 — (V) — 32	Engine: **at CTP (idle)** 1400 – 1600 rpm	11 – 14 V < 1 V	N3/7, ⇒ 22.1
22.1		Resistance	18 — (Ω) — 32	Remove connector on engine control module (IFI) (N3/7)	> 20 kΩ	Wiring, Resonance intake manifold switch (S35) (Figure 13).

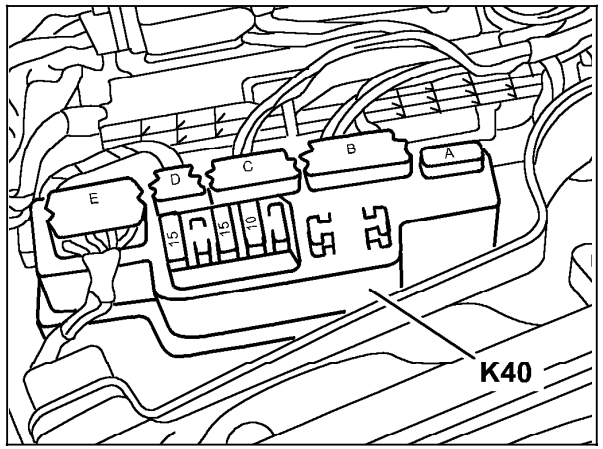
Electrical Test Program – Test

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
23.0	P1476	**Resonance intake line switchover valve (Y22/7) /resonance intake line flap** Voltage	N3/7 51 — (V) — 37	Engine: **at CTP (idle)** 3600 – 3800 rpm	11 – 14 V < 1 V	Engine control module (IFI) (N3/7), ⇒ 23.1
23.1		Current draw	N3/7 51 — (A) — 18	Ignition: **ON**	0.36 A	Resonance intake line switchover valve (Y22/7) (Figure 11), Wiring.
24.0		**Resonance intake line switch (S35/1)** Voltage	N3/7 18 — (V) — 12	Engine: **at CTP (idle)** 3600 – 3800 rpm	11 14 V < 1 V	N3/7, ⇒ 24.1
24.1		Resistance	18 — (Ω) — 12	Remove connector on engine control module (IFI) (N3/7)	> 20 kΩ	Wiring, S35/1 (Figure 8).

Electrical Test Program – Test

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
25.0		**Oil level switch (S43)**	N3/7  7 — 37	Ignition: **ON** **Note:** Engine oil level above minimum	11 – 14 V	Wiring, S43
26.0		**Circuit 50**	N3/7  13 — 18	Start engine.	> 6 V	Wiring, X26, S2/2
27.0	P1404	**EGR valve vacuum transducer (Y31/1)** Vacuum at outlet “OUT” of vacuum transducer	N3/7  35 — 37	Engine: **at CTP (idle)** 660 ± 50 rpm i If EGR was recirculated previously, a waiting time of 50 seconds must be observed, after that, the values can be checked. 2000 ± 100 rpm Accelerate briefly, vacuum and voltages drop. The test values are reference values.	< 1.0 V < 150 mbar > 2 V > 200 mbar < 1.0 V < 150 mbar	Vent filter dirty, Vacuum lines, Vacuum supply, Wiring, Vacuum transducer (Y31/1) (Figure 10), Engine control module) (IFI) (N3/7).

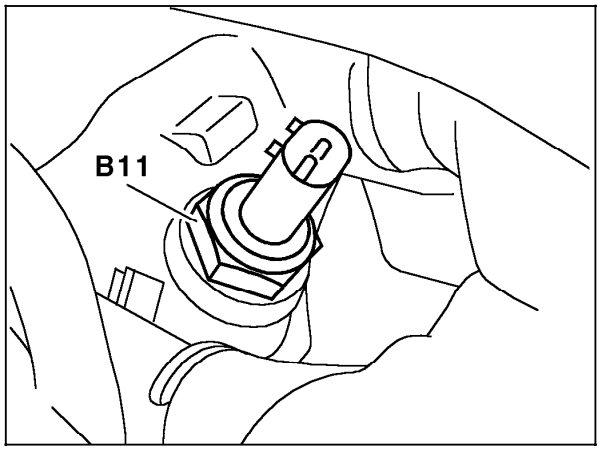
Electrical Test Program – Test



P07.12-0457-01

Figure 1

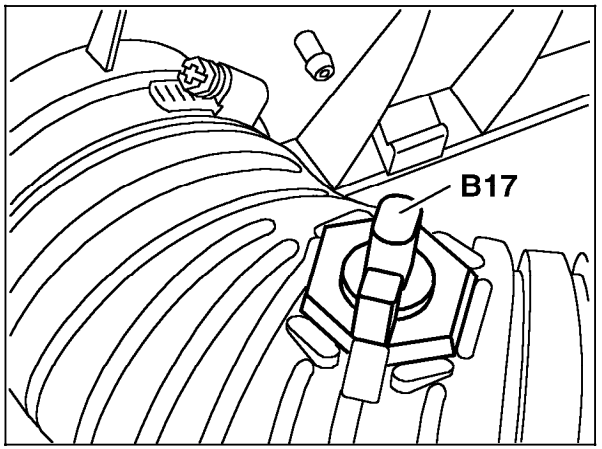
K40 Relay module



P07.13-0413-01

Figure 2

B11 ECT sensor (IFI)

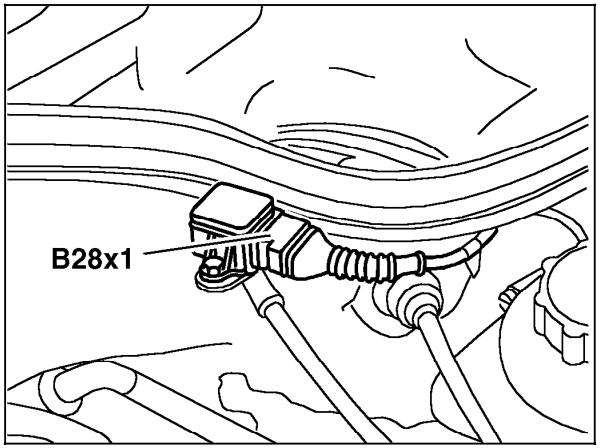


P07-6802-13

Figure 3

B17 IAT sensor

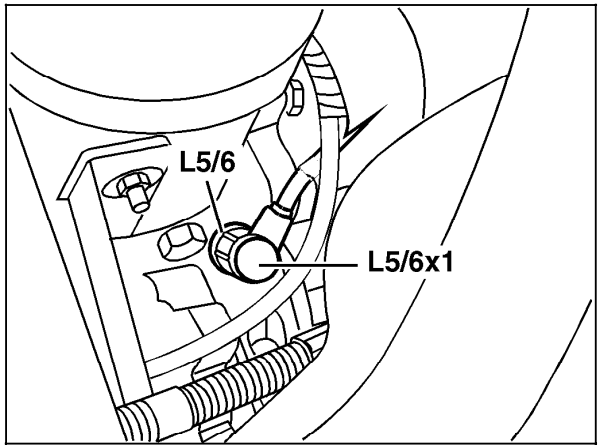
Electrical Test Program – Test



P07.12-0445-01

Figure 4

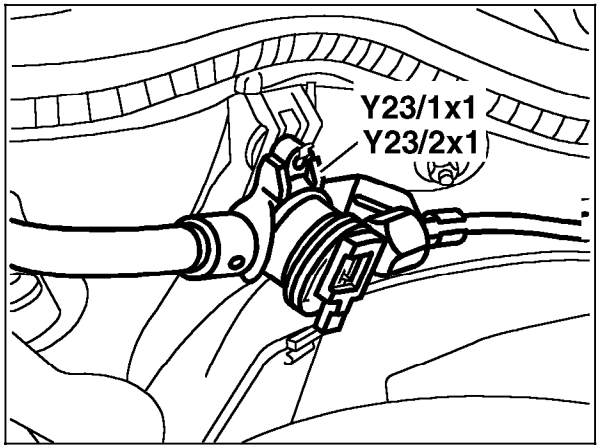
B28x1 Pressure sensor connector



P07.13-0355-01

Figure 5

L5/6x1 CKP sensor connector (IFI)

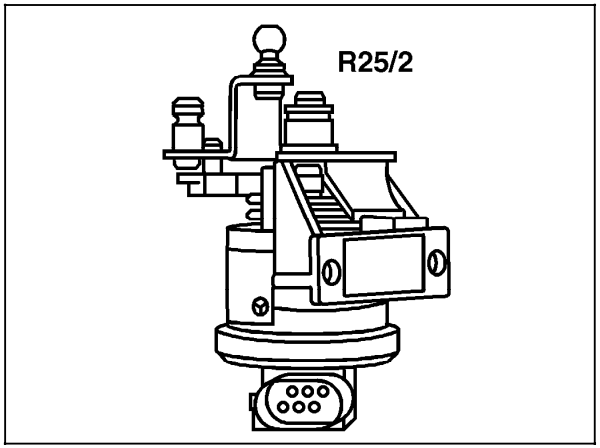


P07.12-0240-13

Figure 6

Y23/1x1 Fuel metering actuator (IFI) connector

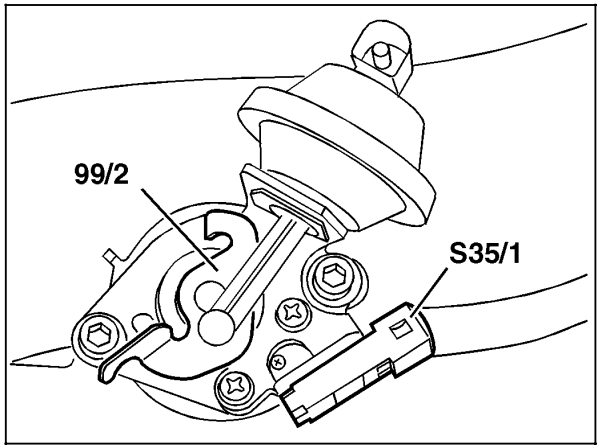
Electrical Test Program – Test



P07.12-0447-01

Figure 7

R25/2 IFI/DFI accelerator pedal position sensor (connector located on sensor)

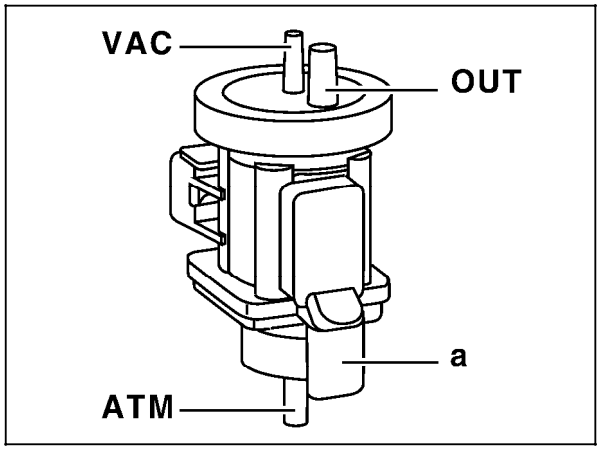


P07.12-0360-01

Figure 8

S35/1 Resonance intake line switch

99/2 Resonance intake manifold flap

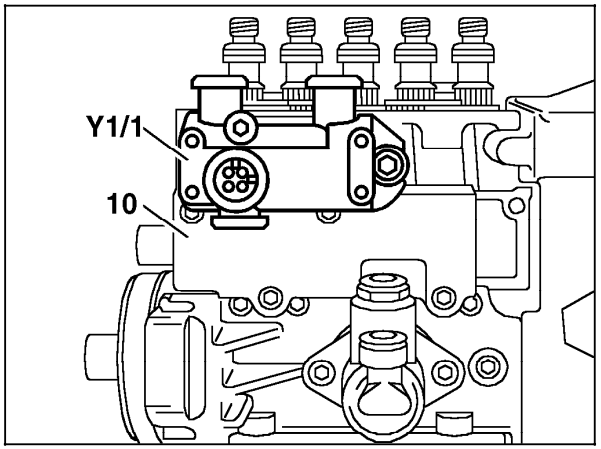


P07.13-0374-13

Figure 9

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

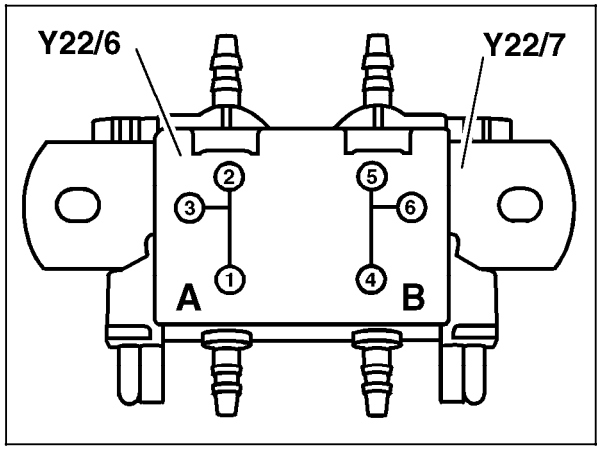
Electrical Test Program – Test



P07.12-0448-01

Figure 10

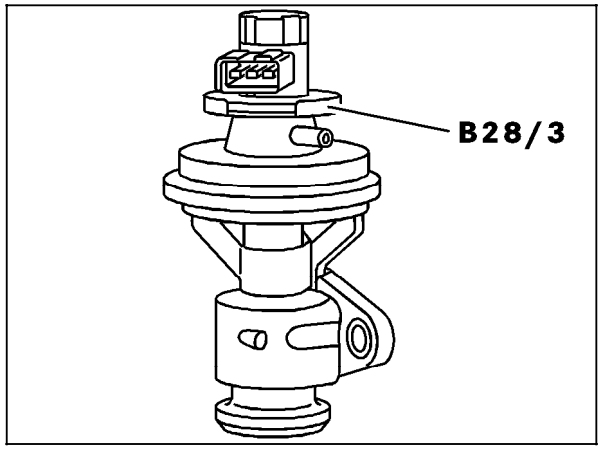
10 In-line fuel injection pump
Y1/1 IFI/DFI electrohydraulic shut-off valve



P07-6090-13

Figure 11

Y22/6 Resonance intake manifold switchover valve
Y22/7 Resonance intake line switchover valve
Note: The resonance intake line switchover valve (Y22/7) is installed towards the engine.

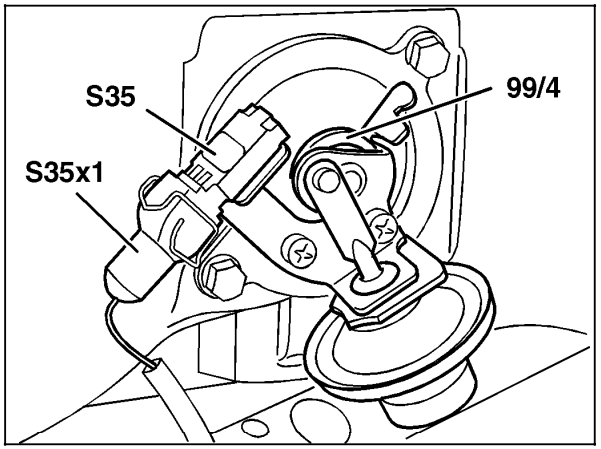


P07.12-0255-13

Figure 12

B28/3 EGR lifting sender

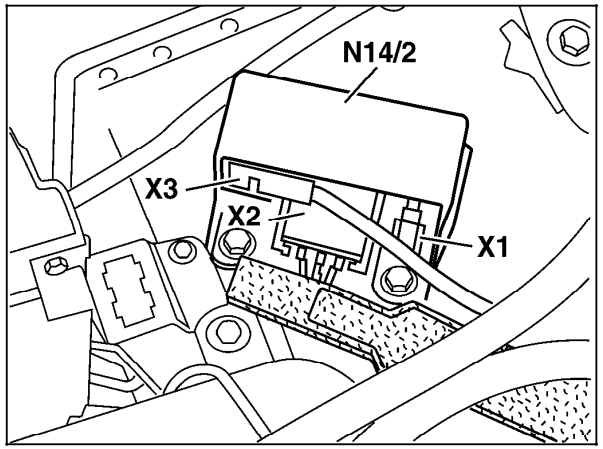
Electrical Test Program – Test



P07.12-0359-01

Figure 13

S35 Resonance intake manifold switch
S35x1 Resonance intake manifold switch connector
99/4 Resonance intake manifold flap



P15.20-0226-01

Figure 14

N14/2 Preglow output
N14/2x1 Preglow output connector
a) Connection for control wire from engine control module (IFI) (N3/7)
b) Connection for vehicle ground

N14/2x2 Preglow output glow connector
N14/2x3 Preglow output circuit 30 connector