Electrical Test Program – Test

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
1.0	P1615	**IFI control module (N3/7)** Voltage supply Circuit 87 unfused	N3/7 19 — V — 37 18 — V — 55	Ignition: **ON**	11 – 14 V	Relay module (K40) (Figure 1), Wiring, ⇒ 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, ⇒ 1.2
1.2		Holding relay activation Terminal HRL	N3/7 26 — V — X12/3	Ignition: **ON or engine at CTP (idle)** **Engine**: Shut off	11 – 14 V 11 – 14 V for approx. 4 sec. then < 1 V	Relay module (K40), IFI control module (N3/7), Wiring.
2.0	P1612	**Circuit 15U**	N3/7 18 — V — 47	Ignition: **ON**	11 – 14 V	Check voltage supply, Wiring.

Electrical Test Program – Test

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
3.0	P1610	**Relay module (K40)** Voltage supply Model 210 up to 02/67	Plug **B** 5 — K40 — Plug **B** — 4	Ignition: **OFF** Disconnect plug **B**	 11 – 14 V	Check voltage supply, Wiring, Output ground, component compartment – right (W15/1), Relay module (K40),
4.0	P0115	**ECT sensor (B11/4)** 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%	B11/4 (Figure 2), Wiring, IFI control module (N3/7) ⇒ 4.1

Electrical Test Program – Test

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
4.1		Resistance	N3/7 4 — Ω — 23	Ignition: **OFF** Disconnect plug on IFI control module (N3/7)	°C Ω 20 2500 30 1700 40 1170 50 830 60 600 70 435 80 325 90 245 ± 10%	B11/4 (Figure 2) Wiring, ⇒ 4.2
4.2		B11/4	B11/4 1 — Ω — 2	Ignition: **OFF** Disconnect plug on ECT sensor (B11/4)	Nominal values see ⇒ 4.1	B11/4 (Figure 2).
5.0	P0110 P0111	**IAT sensor (B17)** Voltage	N3/7 4 — V — 40	Engine: **At CTP**	°C V 20 3.3 30 2.9 40 2.5 ±5%	B17 (Figure 3), Wiring, IFI control module (N3/7), ⇒ 5.1

Electrical Test Program – Test

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
5.1		Resistance	N3/7 4 — Ω — 40	Ignition: **OFF** Remove plug on IFI control module (N3/7)	°C Ω 20 6060 30 3900 40 2600 ±5%	B17 (Figure 3), Wiring, ⇒ 5.2
5.2		B17	B17 2 — Ω — 1	Ignition: **OFF** Remove plug on sensor B17 (Figure 3)	Nominal values see ⇒ 5.1	B17.
6.0	P0105	**Pressure sensor (B28)** **Note for connection:** Connect pressure tester with Y-fitting to pressure sensor	N3/7 6 — V — 22	Engine: **At CTP** Slowly increase engine speed to 2500 rpm	> 2.5 V Voltage: **Drops** Vacuum: **Rises**	⇒ 6.1 Pressure lines.
6.1		B28	N3/7 6 — V — 45	Ignition: **ON**	4.8 – 5.2 V	B28 (Figure 4), Wiring, IFI control module (N3/7).

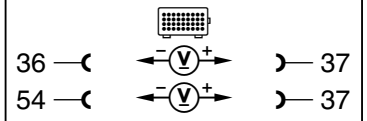
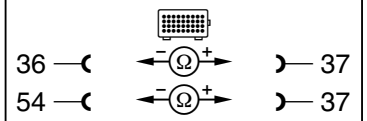
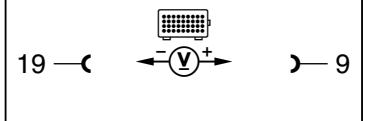
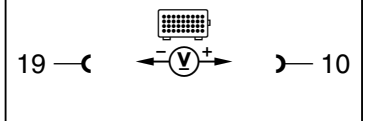
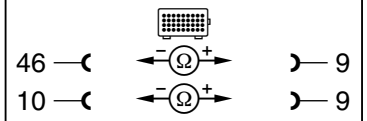
Electrical Test Program – Test

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
7.0	P1335 P0725	**CKP sensor (L5/6)**	N3/7 2) 28 — ⏚ — 20	Engine: **At CTP**	Signal see Figure 5	Installation position of sensor, Dirt on sensor (metal chips), Segments on flywheel, ⇒ 7.1
			N3/7 1) 28 — V~ — 20	Engine: **At CTP**	> 0.8 V increasing rpm = increasing voltage	
				Cranking rpm: > 200 rpm	> 0.3 V	
7.1		Resistance of sensor L5/6	N3/7 28 — Ω — 20	Ignition: **OFF**	680 – 1300 Ω	Connector L5/6x1 (Figure 6), Wiring,

1) Test with multimeter only if oscilloscope is not available.

2) Test with oscilloscope. This test can be performed at idle speed with the Bear DACE engine analyzer. Set time axis to 25 milliseconds.

Electrical Test Program – Test

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
8.0	P1220 P1614 P0200	**Fuel quantity actuator (Y23/1)** Adjustment solenoid	N3/7  36 — 37 54 — 37	Ignition: **ON**	> 4.0 V max. for 30 seconds	⇒ 8.1
8.1		Resistance	N3/7  36 — 37 54 — 37	Ignition: **OFF** Remove connector on IFI control module (N3/7)	1.2 Ω ± 0.2 1.2 Ω ± 0.2	Connector (Y23/1x1) (Figure 7), Y23/1, N3/7, Wiring.
9.0	P1223 P1614 P0200	**Fuel rack position sensor (Y23/1I1)**	N3/7  19 — 9	Ignition: **ON**	2.2 – 2.7 V	Connector (Y23/1x1) (Figure 7), ⇒ 9.1
9.1			N3/7  19 — 10	Ignition: **ON**	2.2 – 2.7 V	N3/7, Wiring, ⇒ 9.2
9.2		Resistance	N3/7  46 — 9 10 — 9	Ignition: **OFF** Remove connector on IFI control module (N3/7)	23 Ω ±5% 45 Ω ±5%	Y23/1, Wiring.

Electrical Test Program – Test

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
10.0	P1222 P0220	**IFI accelerator pedal position sensor (R25/2)**	N3/7  6 — V — 29 6 — V — 39	Ignition: **ON** CTP position: Full load position:	> 4.5 V <0.5 V >4.3 V	R25/2 (Figure 8) Wiring, IFI control module (N3/7), W16/6, ⇒ 10.1
10.1		CTP contact switch (R25/2s1)	N3/7  18 — V — 15 15 — V — 24	Ignition: **ON** CTP position: Full load position: CTP position: Full load position:	 > 4.5 V <0.5 V <0.5 V > 4.5 V	R25/2 (Figure 8) Wiring, IFI control module (N3/7), W16/6.
11.0	P1705	**Starter lock-out/backup lamp switch (S16/1)**	N3/7  18 — V — 12	Ignition: **ON** AT range: P/N → Engine: **Start** [4] R →	 0 V 11 – 14 V	S16/1, Wiring.

[4] Engine does not start

Electrical Test Program – Test

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
12.0	P0703	**Stop lamp switch (S9/1)** Signal (S9/1s1)	N3/7 18 — V — 31	Ignition: **ON** Brake pedal: not depressed → depressed →	 < 1 V 11 – 14 V	Wiring, Stop lamp switch (S9/1), (Figure 9), W16/6, ⇒ 12.1
12.1		Voltage supply Circuit 87E	S9/1x1 ⊥ — V — 2	Remove connector S9/1x1 Ignition: **ON**	 11 – 14 V	Wiring, Voltage supply, ⇒ 12.2
12.2		Stop lamp switch (S9/1)	S9/1x1 1 — Ω — 2	Ignition: **OFF** Remove connector S9/1x1 Brake pedal: not depressed → depressed →	 > 20 kΩ < 1 Ω	Stop lamp switch (S9/1) (Figure 9).

Electrical Test Program – Test

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
13.0	P0703	**Stop lamp switch (S9/1)** Signal (S9/1s2)	N3/7 18 — ◄ V ► — 27	Ignition: **ON** Brake pedal: not depressed → depressed →	 11 – 14 V < 1 V	Wiring, Stop lamp switch (S9/1) (Figure 9), ⇒ 13.1
13.1		Voltage supply Circuit 87E	S9/1x2 ⊥ ◄ V ► — 2	Remove connector S9/1x2 Ignition: **ON**	 11 – 14 V	Wiring, Voltage supply, ⇒ 13.2
13.2		Stop lamp switch	S9/1x2 1 — ◄ Ω ► — 2	Ignition: **OFF** Remove connector S9/1x2 Brake pedal: not depressed → depressed →	 < 1 Ω > 20 kΩ	Stop lamp switch (S9/1).

Electrical Test Program – Test

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
14.0	P1520	**ETS – slip recognition signal**	N3/7 18 — 7	Ignition: **ON** Engine: **at CTP** (idle)	< 1 V 11 – 14 V	ETS/SPS control module (N47-2), Wiring.
15.0	P0500	**VSS from ABS control module (N30) or ETS/SPS control module (N47-2)**	N3/7 2) 4 — 25 N3/7 1) 4 — 25	Ignition: **ON** Move vehicle approx. 3 ft. (1 m)	Signal see Figure 10 > 2.0 V	Check N30, N47-2 see DM, Chassis and Drivetrain, Volume 2, Section 6.3, Wiring.

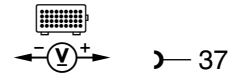
1) Test with multimeter only if oscilloscope is not available.

2) Test with oscilloscope. This test can be performed at idle speed with the Bear DACE engine analyzer. Set time axis to 25 milliseconds.

Electrical Test Program – Test

⇒		Test scope		Test connection	Test condition	Nominal value	Possible cause/Remedy
16.0	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
17.0	P1625	**CHECK ENGINE MIL (A1e26)**	N3/7  17 — 37	Ignition: **ON** Engine: **Start**	11 – 14 V Temporarily: 11 – 14 V, CHECK ENGINE MIL (A1e26) lights briefly for approx. 1 sec. [5]	CHECK ENGINE MIL (A1e26) (Figure 16 + 17), IFI control module (N3/7).
18.0		***Non-USA vehicles only.***				

[5] With malfunctions which prevent starting of engine or severely influence engine running, the voltage is continuously present or the CHECK ENGINE MIL lights continuously until the failure is eliminated.

Electrical Test Program – Test

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
19.0	P1780	**Modulating pressure switchover valve (Y3/4)** Voltage	N3/7 49 — (V) — 37	Engine: **At CTP** 6) CC in operation > 25 mph (40 km/h)	< 0.5 V >350 mbar 11 – 14 V < 35 mbar	IFI control module (N3/7), Vacuum lines, Vacuum supply, Wiring, Vacuum control valve, Throttle linkage, ⇒ 19.1
19.1		Current draw	18 — (A) — 49	Ignition: **ON**	0.40 A	Switchover valve (Y3/4) (Figure 12).
20.0		***Non-USA vehicles only.***				
21.0	P1781	**Upshift delay switchover valve (Y3/5)**	N3/7 34 — (V) — 37	Engine: **At CTP** 6) CC in operation > 25 mph (40 km/h)	< 0.5 V < 35 mbar 11 – 14 V > 350 mbar	IFI control module (N3/7), Vacuum lines, Vacuum supply, Wiring, ⇒ 21.1
21.1		Current draw	18 — (A) — 34	Ignition: **ON**	0.40 A	Upshift delay switchover valve (Y3/5) (Figure 12).

6) Briefly apply WOT, vacuum and voltage decrease. The test values are reference values.

Electrical Test Program – Test

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
22.0	P1622 P0200	**Electrohydraulic shut-off actuator (Y1/1)** Activation	N3/7  18 — 43	Engine: **At CTP**	11 – 14 V	IFI control module (N3/7), Wiring, ⇒ 22.1
22.1		Current draw	N3/7  43 — X12/3	Ignition: **OFF** Control module removed	1.4 A [4]	⇒ 22.2
22.2		Resistance	Y1/1 2 — 3	Ignition: **OFF** Remove plug from IFI control module (N3/7)	8.1 ± 0.5 Ω	Y1/1

[4] Electrohydraulic sut-off actuator clicks audibly.

Electrical Test Program – Test

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
23.0	P0180 P0181	**Fuel temperature sensor (Y1/1b1)**	N3/7 28 — (V) — 3	Engine: **At CTP**	°C V 20 3.9 30 3.5 40 3.0 50 2.6	⇒ 23.1
23.1		Resistance	N3/7 4 — (Ω) — 3	Ignition: **OFF** Remove connector on IFI control module (N3/7)	°C Ω 20 2500 30 1700 40 1170 50 830	⇒ 23.2
23.2		Y1/1b1	Y1/1b1 1 — (Ω) — 4	Ignition: **OFF** Remove connector on electrohydraulic shut-off actuator (Y1/1) (Figure 14)	Nominal values see ⇒ 23.1	Electrohydraulic shut-off actuator (Y1/1).
24.0		**IFI control module (N3/7)** Signal from automatic A/C	N3/7 18 — (V) — 33	Engine: **At CTP** Engine: Briefly apply WOT	11 – 14 V < 1 V	A/C pushbutton control module (N22), Wiring.

Electrical Test Program – Test

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
25.0	P0600	**CAN data bus**	N3/7 41 — Ω — 5	Ignition: **OFF**	59 – 61 Ω	Data line, IFI control module (N3/7). ⇒ 25.1
25.1		CAN element in RCL control module (N54) Resistance	N3/7 41 — Ω — 5	Ignition: **OFF** Remove connector on IFI control module (N3/7)	118 – 122 Ω	RCL control module (N54), Data line, ⇒ 25.2
25.2		Data bus	N3/7 — N54 41 — Ω — H 5 — Ω — L	Ignition: **OFF** Remove connectors on IFI control module (N3/7) and RCL control module (N54)	< 1 Ω	Wiring.
26.0	P1475 P0200	**Resonance intake line switchover valve (Y22/6)** Voltage	N3/7 51 — V — 37	Engine: **at CTP** (idle) 660 rpm ± 10 1500 rpm ± 10	11 – 14 V < 1 V	IFI control module (N3/7), Wiring, Resonance intake line switchover valve (Y22/7) (Figure 14), ⇒ 26.1
26.1		Current draw	18 — A — 11	Ignition: **ON**	0.4 A	Resonance intake line switchover valve (Y22/7) (Figure 14).

Electrical Test Program – Test

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
27.0	P1476 P0200	**Resonance intake manifold switchover valve (Y22/7)** Voltage	N3/7 11 — (V) — 37	Engine: **at CTP** (idle) 660 rpm ± 10 3700 rpm ± 10	11 – 14 V < 1 V	IFI control module (N3/7), Wiring, Resonance intake manifold witchover valve (Y22/6) (Figure 14), ⇒ 27.1
27.1		Current draw	18 — (A) — 51	Ignition: **ON**	0.4 A	Resonance intake manifold witchover valve (Y22/6) (Figure 14).
28.0		**Signal for tachometer TD signal**	N3/7 [2] 18 — (⏚) — 14 N3/7 [1] 18 — (V) — 14	Engine: **at CTP** (idle) Engine: **at CTP** (idle)	Signal see Figure 15 > 0.8 V Increasing rpm = increasing voltage	IFI control module (N3/7).

1) Test with multimeter only if oscilloscope is not available.

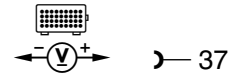
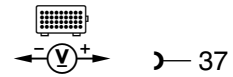
2) Test with oscilloscope. This test can be performed at idle speed with the Bear DACE engine analyzer. Set time axis to 25 milliseconds.

Electrical Test Program – Test

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
29.0		***Non-USA vehicles only.***				
30.0	P1401 P0403	**EGR lifting sender (B28/3)**	N3/7 28 — V — 21	Engine: **at CTP** (idle) [7] Accelerate briefly, then Engine: **at CTP** (idle)	< 1.5 V < 100 mbar > 1.5 V > 150 mbar	⇒ 30.1
30.1		EGR valve leakage Remove vacuum line and connect pressure tester		Ignition: **OFF** Apply 400 mbar vacuum to EGR valve. Pull off vacuum line.	 EGR valve closes audibly	EGR valve (see 31, Figure 1)

[7] If EGR was recirculated previously, a waiting time of 50 seconds must be observed, after that, the values can be checked.

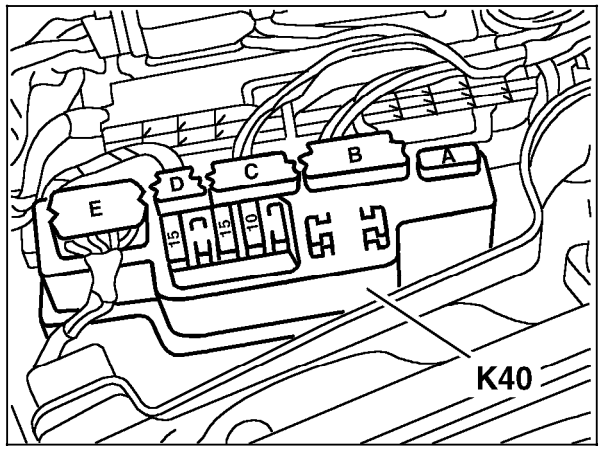
Electrical Test Program – Test

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
31.0	P0400	**EGR valve vacuum transducer (Y31/1)** Vacuum at outlet "OUT" of vacuum transducer	N3/7  35 — 37	Engine: **at CTP** (idle) [7] 660 ± 10 rpm 2000 ± 100 rpm Briefly apply WOT [6]	 < 1.0 V < 150 mbar > 2 V > 200 mbar < 1.0 V < 150 mbar	IFI control module (N3/7), Vacuum transducer (Y31/1), Vacuum lines, Wiring, Vent filter dirty.
32.0	P1470 P0120	**Pressure control flap vacuum transducer (Y31/2)** Vacuum at outlet "OUT" of vacuum transducer	N3/7  53 — 37	Engine: **at CTP** (idle) 660 ± 10 rpm [7] Accelerate briefly, then Engine: **at CTP** (idle) for approx. 50 seconds	 < 1.5 V < 150 mbar > 2.5 V >200 mbar	IFI control module (N3/7), Vacuum transducer (Y31/2), Vacuum lines, Wiring, Vent filter dirty.

6) Briefly apply WOT, vacuum and voltage decrease. The test values are reference values.

7) If EGR was recirculated previously, a waiting time of 50 seconds must be observed, after that, the values can be checked.

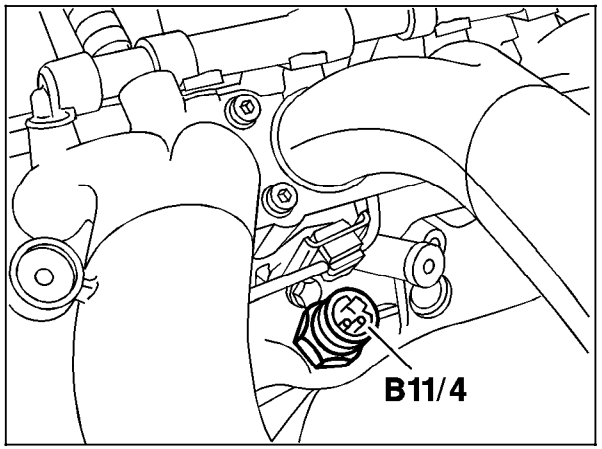
Electrical Test Program – Test



P07-6803-13

Figure 1

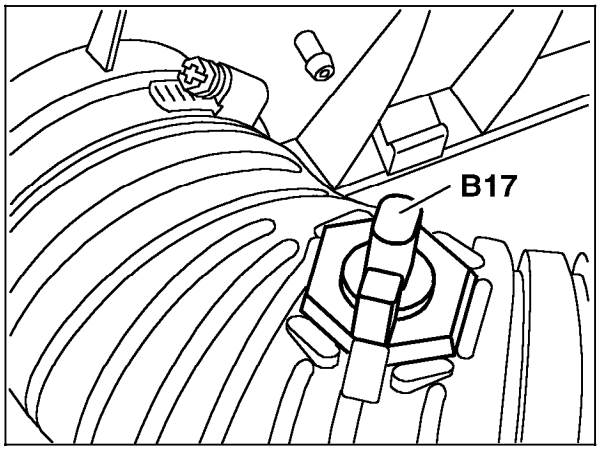
K40 Relay module



P07-6613-13

Figure 2

B11/4 ECT sensor (IFI)

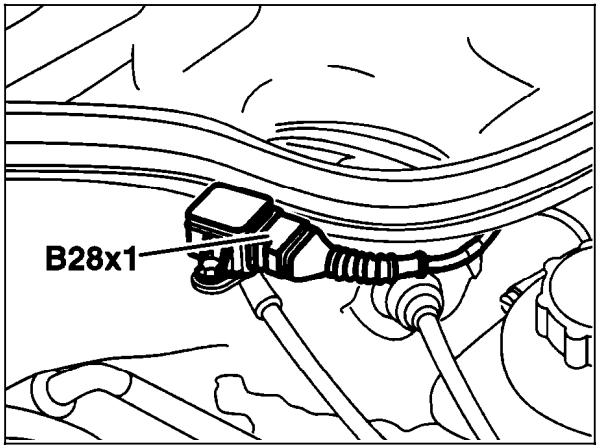


P07-6802-13

Figure 3

B17 IAT sensor

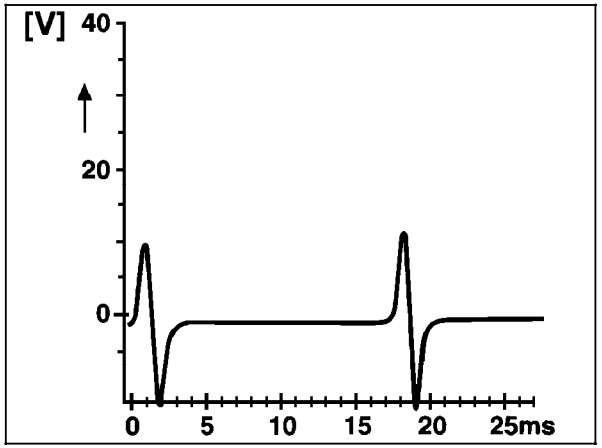
Electrical Test Program – Test



P07-6145-13

Figure 4

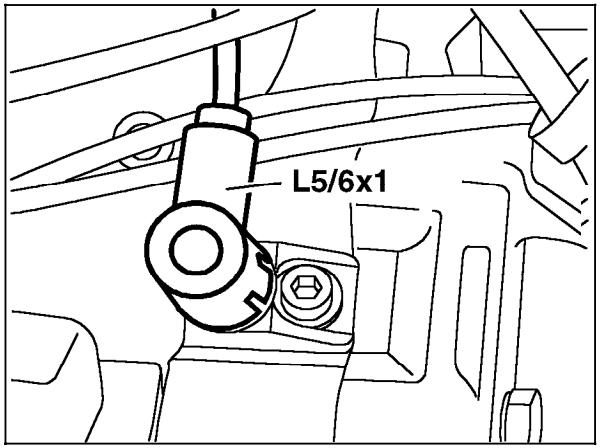
B28x1 Pressure sensor connector



P07-6154-13

Figure 5

Signal, CKP sensor (L5/6)

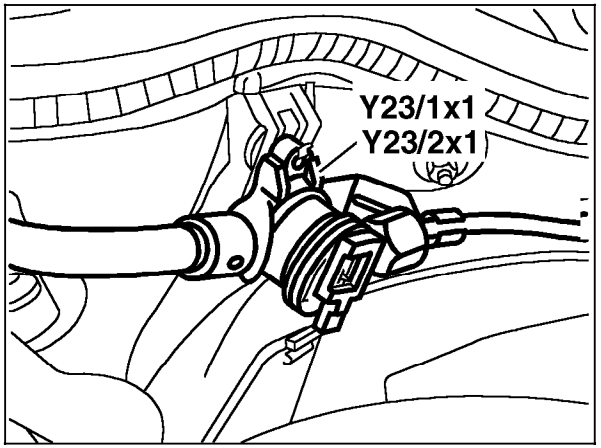


P07.12-0239-13

Figure 6

L5/6x1 CKP sensor connector (IFI)

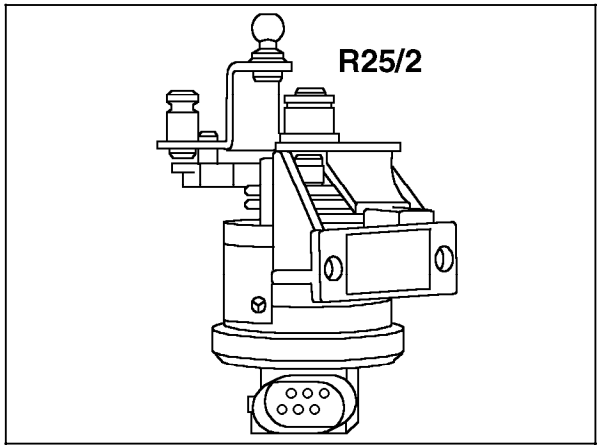
Electrical Test Program – Test



P07.12-0240-13

Figure 7

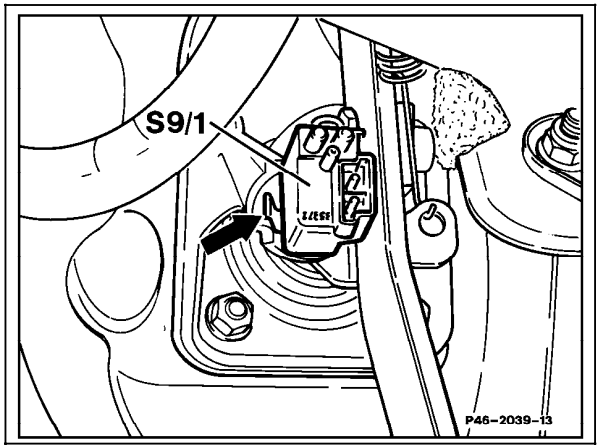
Y23/1x1 Fuel metering actuator (IFI) connector



P07-6686-13

Figure 8

R25/2 IFI accelerator pedal position sensor

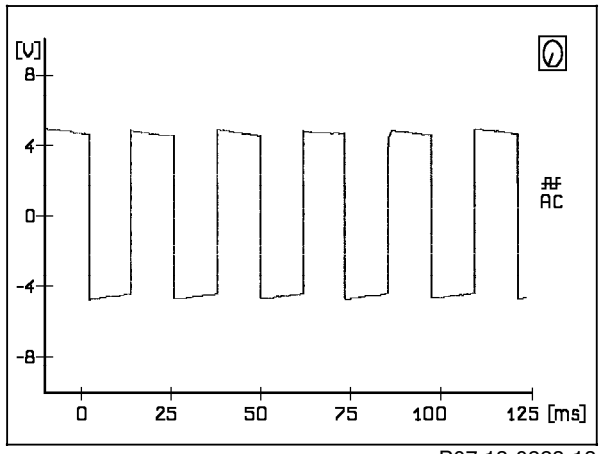


P46-2039-13

Figure 9

S9/1 Stop lamp switch (4-pole) (footwell cover panel removed)

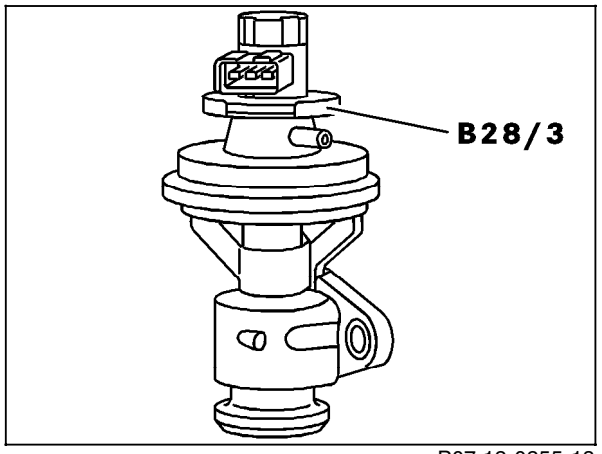
Electrical Test Program – Test



P07.13-0223-13

Figure 10

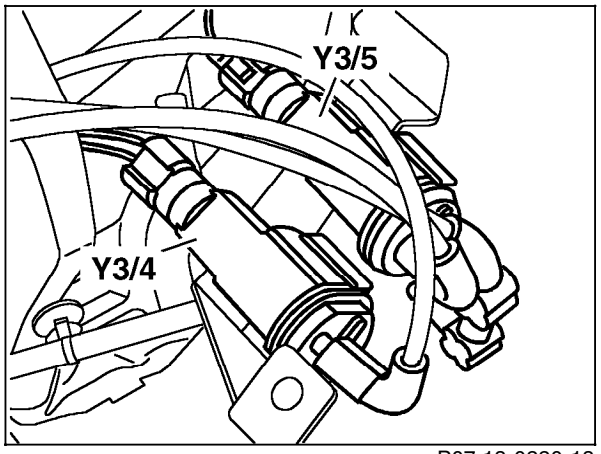
VSS from ETS control module



P07.12-0255-13

Figure 11

B28/3 EGR lifting sender



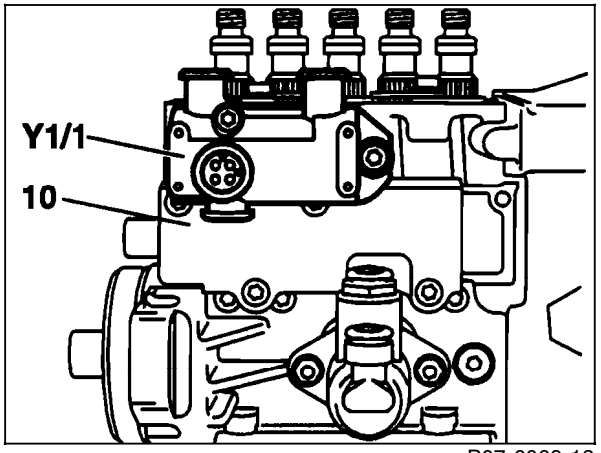
P07.13-0220-13

Figure 12

Y3/4 Modulating pressure switchover valve (AT/CC)

Y3/5 Upshift delay switchover valve (AT/CC)

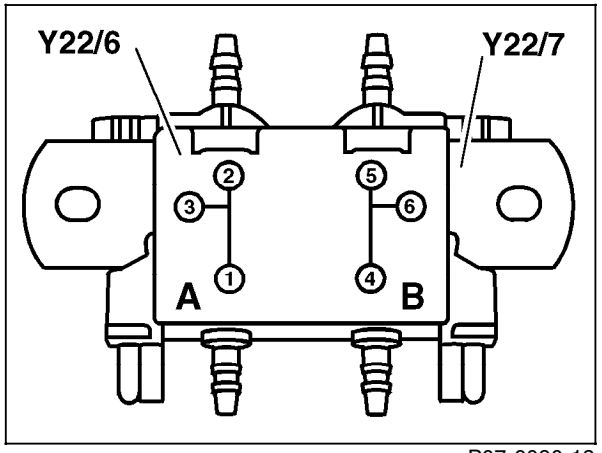
Electrical Test Program – Test



P07-6069-13

Figure 13

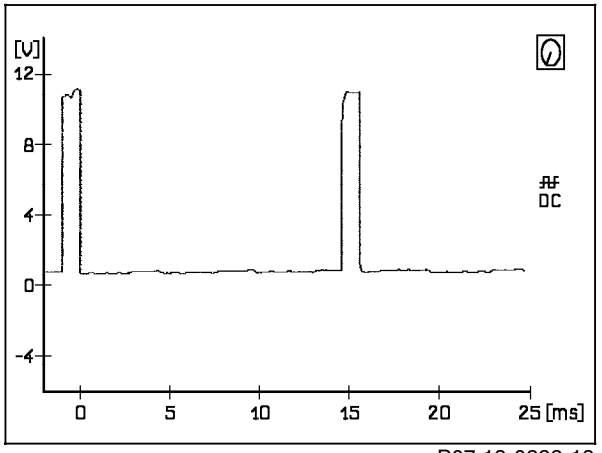
10 In-line fuel injection pump
Y1/1 IFI electrohydraulic shut-off valve



P07-6090-13

Figure 14

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.

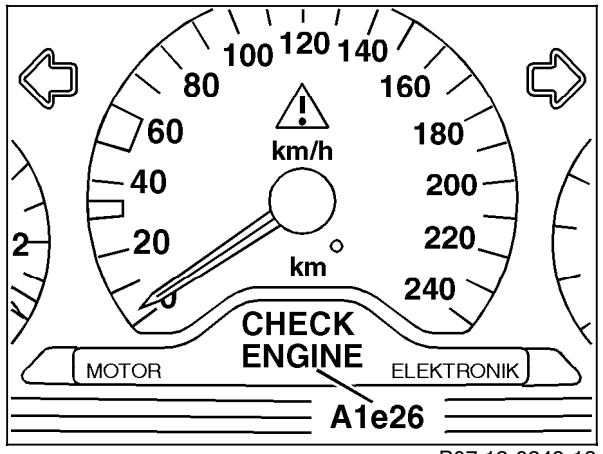


P07.13-0222-13

Figure 15

TD-signal for rpm sensor

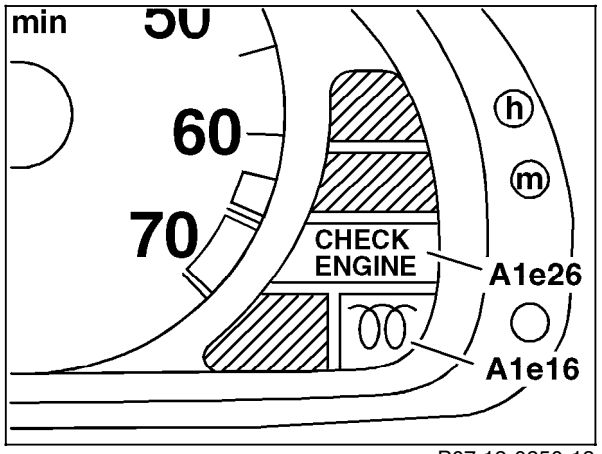
Electrical Test Program – Test



P07.12-0249-13

Figure 16

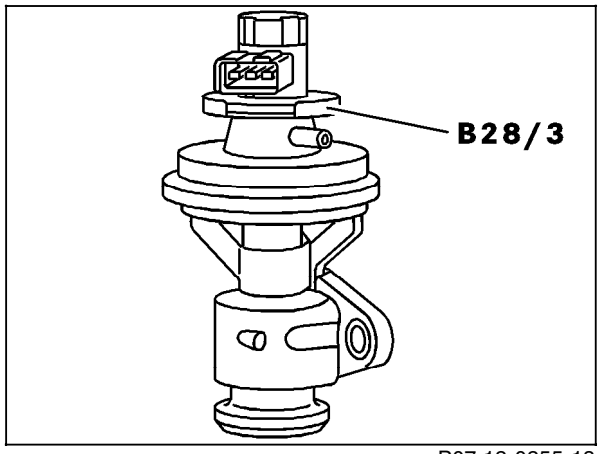
A1e26 CHECK ENGINE MIL in multi-function display



P07.12-0250-13

Figure 17

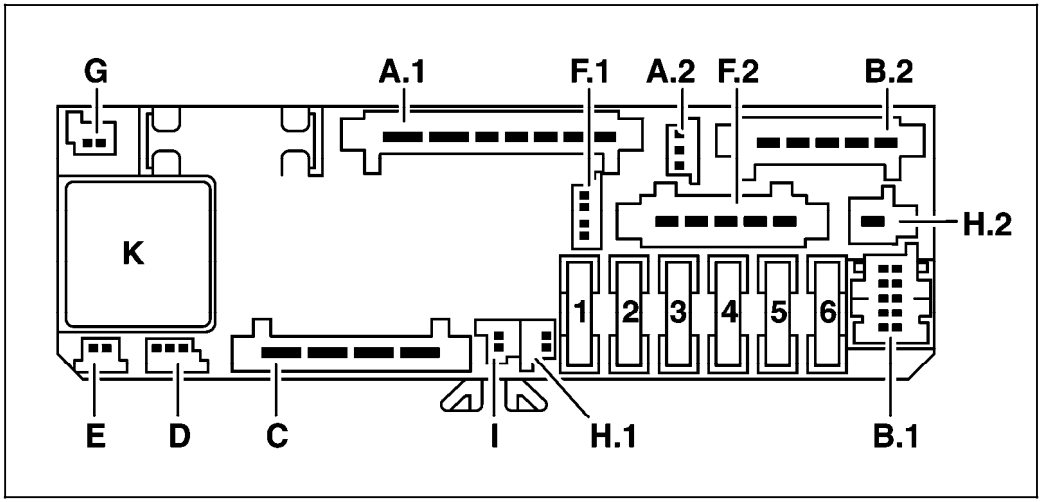
A1e16 Preglow indicator lamp
A1e26 CHECK ENGINE MIL in instrument cluster



P07.12-0255-13

Figure 18

B28/3 EGR lifting sender



P07.13-0425-10

Figure 18

Connector location for passenger side fuse and relay module box (K40/4)