Electrical Test Program – Ignition System Test

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
1.0	P0 560	**Engine control module (N3/10)** Voltage supply circuit 30	N3/10 26 (1.26) — V — 35 (1.35)	Ignition: **ON**	11 – 14 V	⇒ 1.1
1.1		Ground wire	N3/10 26 (1.26) — V — X11/4 2 39 (1.39) — V — 2	Ignition: **ON**	11 – 14 V	Wiring, **Model 129** Ground (W27), module box bracket. **Model 140** Output ground (W15), right footwell. **Model 210** Electronic ground (W16/6), right component compartment, ⇒ 1.2
1.2		Voltage supply circuit 30	X11/4 1 — V — N3/10 35 (1.35)	Ignition: **ON**	11 – 14 V	Wire, **Model 129, 140** base module (N16/1) or fuse on base module, **Model 210** relay module (K40).

Electrical Test Program – Ignition System Test

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
2.0	P0 560	**Engine control module (N3/10)** Voltage supply circuit 87M	N3/10 38 — (1.38) 25 — (1.25)	Ignition: **ON**	11 – 14 V	⇒ 2.1
2.1		Electronics ground	N3/10 38 — (1.38) X11/4 2	Ignition: **ON**	11 – 14 V	Wiring, **Model 129, 140** Electronics ground (W15/1), right footwell, **Model 210** Electronics ground (W16/6), right component compartment, ⇒ 2.2
2.2		Voltage supply circuit 87	X11/4 1 — N3/10 25 — (1.25)	Ignition: **ON** Ignition: **OFF**	11 – 14 V < 1 V	Wiring, **Model 129, 140** base module (N16/1) or fuse on base module, **Model 210** relay module (K40).
3.0	P0 560	**Engine control module (N3/10)** Voltage supply circuit 87M	N3/10 39 — (1.39) 36 — (1.36)	Ignition: **ON** Ignition: **OFF**	11 – 14 V < 1 V	Wiring, **Model 129, 140** base module (N16/1) or fuse on base module, **Model 210** relay module (K40).

Electrical Test Program – Ignition System Test

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
4.0		**Ignition coil (T1/1)** Voltage supply	N3/10  26 (1.26) — 83 (2.83)	Ignition: **ON** Starter: **Crank**	11 – 14 V > 10 V	Wiring. Model 210, 129 as of 09/95 and Model 140 as of 06/96 fused as follows: Model 129 fuse 34 Model 140 fuse 22 Model 210 fuse 19
5.0		**Ignition coil (T1/2)** Voltage supply	N3/10  26 (1.26) — 117 (2.117)	Ignition: **ON** Starter: **Crank**	11 – 14 V > 10 V	Wiring. Model 210, 129 as of 09/95 and Model 140 as of 06/96 fused as follows: Model 129 fuse 34 Model 140 fuse 22 Model 210 fuse 19
6.0		**Ignition coil (T1/3)** Voltage supply	N3/10  26 (1.26) — 115 (2.115)	Ignition: **ON** Starter: **Crank**	11 – 14 V > 10 V	Wiring. Model 210, 129 as of 09/95 and Model 140 as of 06/96 fused as follows: Model 129 fuse 34 Model 140 fuse 22 Model 210 fuse 19

Electrical Test Program – Ignition System Test

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
7.0		**Ignition coil (T1/4)** Voltage supply	N3/10  26 (1.26) — 85 (2.85)	Ignition: **ON** Starter: **Crank**	11 – 14 V > 10 V	Wiring. Model 210, 129 as of 09/95 and Model 140 as of 06/96 fused as follows: Model 129 fuse 34 Model 140 fuse 22 Model 210 fuse 19
8.0		**Ignition coil (T1/5)** Voltage supply	N3/10  26 (1.26) — 84 (2.84)	Ignition: **ON** Starter: **Crank**	11 – 14 V > 10 V	Wiring. Model 210, 129 as of 09/95 and Model 140 as of 06/96 fused as follows: Model 129 fuse 34 Model 140 fuse 22 Model 210 fuse 19
9.0		**Ignition coil (T1/6)** Voltage supply	N3/10  26 (1.26) — 94 (2.94)	Ignition: **ON** Starter: **Crank**	11 – 14 V > 10 V	Wiring. Model 210, 129 as of 09/95 and Model 140 as of 06/96 fused as follows: Model 129 fuse 34 Model 140 fuse 22 Model 210 fuse 19

Electrical Test Program – Ignition System Test

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
10.0		**Ignition coil (T1/7)** Voltage supply	N3/10 26 (1.26) — V — 116 (2.116)	Ignition: **ON** Starter: **Crank**	11 – 14 V > 10 V	Wiring. Model 210, 129 as of 09/95 and Model 140 as of 06/96 fused as follows: Model 129 fuse 34 Model 140 fuse 22 Model 210 fuse 19
11.0		**Ignition coil (T1/8)** Voltage supply	N3/10 26 (1.26) — V — 95 (2.95)	Ignition: **ON** Starter: **Crank**	11 – 14 V > 10 V	Wiring. Model 210, 129 as of 09/95 and Model 140 as of 06/96 fused as follows: Model 129 fuse 34 Model 140 fuse 22 Model 210 fuse 19
12.0	P0 335	**CKP sensor (L5)**	N3/10 [2] 78 (2.78) — ⏚ — 89 (2.89) N3/10 [3] 78 (2.78) — V — 89 (2.89)	Starter: **Crank** Engine: **at Idle** Starter: **Crank** Engine: **at Idle**	Signal, see Figure 1 and 3. > 2.5 V > 5 V [4]	⇒ 12.1, Teeth on starter ring gear.

2) Test with oscilloscope.
3) Test with multimeter only if oscilloscope is unavailable.
4) Voltage increases with increasing rpm.

Electrical Test Program – Ignition System Test

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
12.1		Resistance of CKP sensor (L5)	N3/10 78 (2.78) — Ω — 89 (2.89)	Ignition: **OFF** Unplug connector 2 on engine control module (N3/10).	700 – 1400 Ω	L5
13.0	P0 341	**Camshaft Hall-effect sensor (B6/1)** Hall-effect signal	N3/10 [2] 87 (2.87) — ⏚ — 66 (2.66)	Engine: **at Idle**	Signal, see Figure 2 and 3.	⇒ 13.1, B6/1
			N3/10 [3] 66 (2.66) — V — 25 (1.25)	Engine: **at Idle**	1.2 – 1.7 V Value changes	
13.1		Voltage supply to camshaft Hall-effect sensor (B6/1)	B6/1 1 — V — 3	Ignition: **ON** Disconnect connector from Hall-effect sensor (B6/1) and test directly on sockets 1 and 3 of connector.	11 – 14 V	Wiring.

[2] Test with oscilloscope.
[3] Test with multimeter only if oscilloscope is unavailable.

Electrical Test Program – Ignition System Test

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
14.0		**Closing duration for ignition coil (T1/1)**	N3/10 83 (2.83) — 25 (1.25)	Starter: **Crank** Engine: **at Idle**	20 – 100 ms 2 – 4 ms	⇒ 12.0, ⇒ 14.1, N3/10
14.1		Rest current shut-off: T1/1	N3/10 83 (2.83) — 25 (1.25)	Ignition: **ON** Starter: **Crank**	0 V 0.3 – 0.6 V	T1/1, N3/10, < 0.3 V: wire from T1/1 to N3/10, > 0.6 V: T1/1.
15.0		**Closing duration for ignition coil (T1/2)**	N3/10 117 (2.117) — 25 (1.25)	Starter: **Crank** Engine: **at Idle**	20 – 100 ms 2 – 4 ms	⇒ 12.0, ⇒ 15.1, N3/10
15.1		Rest current shut-off: T1/2	N3/10 117 (2.117) — 25 (1.25)	Ignition: **ON** Starter: **Crank**	0 V 0.3 – 0.6 V	T1/2, N3/10, < 0.3 V: wire from T1/2 to N3/10, > 0.6 V: T1/2

Electrical Test Program – Ignition System Test

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
16.0		**Closing duration for ignition coil (T1/3)**	N3/10 115 (2.115) — 25 (1.25)	Starter: **Crank** Engine: **at Idle**	20 – 100 ms 2 – 4 ms	⇒ 12.0, ⇒ 16.1, N3/10
16.1		Rest current shut-off: T1/3	N3/10 115 (2.115) — 25 (1.25)	Ignition: **ON** Starter: **Crank**	0 V 0.3 – 0.6 V	T1/3, N3/10, < 0.3 V: wire from T1/3 to N3/10, > 0.6 V: T1/3.
17.0		**Closing duration for ignition coil (T1/4)**	N3/10 85 (2.85) — 25 (1.25)	Starter: **Crank** Engine: **at Idle**	20 – 100 ms 2 – 4 ms	⇒ 12.0, ⇒ 17.1, N3/10
17.1		Rest current shut-off: T1/4	N3/10 85 (2.85) — 25 (1.25)	Ignition: **ON** Starter: **Crank**	0 V 0.3 – 0.6 V	T1/4, N3/10, < 0.3 V: wire from T1/4 to N3/10, > 0.6 V: T1/4

Electrical Test Program – Ignition System Test

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
18.0		**Closing duration for ignition coil (T1/5)**	N3/10 84 (2.84) — (1.25) 25	Starter: **Crank** Engine: **at Idle**	20 – 100 ms 2 – 4 ms	⇒ 12.0, ⇒ 18.1, N3/10
18.1		Rest current shut-off: T1/5	N3/10 84 (2.84) — (1.25) 25	Ignition: **ON** Starter: **Crank**	0 V 0.3 – 0.6 V	T1/5, N3/10, < 0.3 V: wire from T1/5 to N3/10, > 0.6 V: T1/5.
19.0		**Closing duration for ignition coil (T1/6)**	N3/10 94 (2.94) — (1.25) 25	Starter: **Crank** Engine: **at Idle**	20 – 100 ms 2 – 4 ms	⇒ 12.0, ⇒ 19.1, N3/10
19.1		Rest current shut-off: T1/6	N3/10 94 (2.94) — (1.25) 25	Ignition: **ON** Starter: **Crank**	0 V 0.3 – 0.6 V	T1/6, N3/10, < 0.3 V: wire from T1/6 to N3/10, > 0.6 V: T1/6

Electrical Test Program – Ignition System Test

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
20.0		**Closing duration for ignition coil (T1/7)**	N3/10 116 (2.116) — 25 (1.25)	Starter: **Crank** Engine: **at Idle**	20 – 100 ms 2 – 4 ms	⇒ 12.0, ⇒ 20.1, N3/10
20.1		Rest current shut-off: T1/7	N3/10 116 (2.116) — 25 (1.25)	Ignition: **ON** Starter: **Crank**	0 V 0.3 – 0.6 V	T1/7, N3/10, < 0.3 V: wire from T1/7 to N3/10, > 0.6 V: T1/7
21.0		**Closing duration for ignition coil (T1/8)**	N3/10 95 (2.95) — 25 (1.25)	Starter: **Crank** Engine: **at Idle**	20 – 100 ms 2 – 4 ms	⇒ 12.0, ⇒ 21.1, N3/10
21.1		Rest current shut-off: T1/8	N3/10 95 (2.95) — 25 (1.25)	Ignition: **ON** Starter: **Crank**	0 V 0.3 – 0.6 V	T1/8, N3/10, < 0.3 V: wire from T1/8 to N3/10, > 0.6 V: T1/8

Electrical Test Program – Ignition System Test

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
22.0	P0 300 P0 301	**Primary voltage** Ignition coil (T1/1)	N3/10 83 (2.83) — 25 (1.25)	**Test connection Note:** Individual primary pattern Range 400 V Duration 100% Starter: **Crank**	200 – 350 V	⇒ 22.1, N3/10
22.1		Primary winding of T1/1 and T1/2	N3/10 83 (2.83) — 117 (2.117)	Ignition: **OFF**	0.9 – 1.4 Ω [6]	Wiring T1/1 or T1/2
23.0	P0 300 P0 302	**Primary voltage** Ignition coil (T1/2)	N3/10 117 (2.117) — 25 (1.25)	**Test connection Note:** Individual primary pattern Range 400 V Duration 100% Starter: **Crank**	200 – 350 V	⇒ 23.1, N3/10
23.1		Primary winding of T1/2 and T1/1	N3/10 117 (2.117) — 83 (2.83)	Ignition: **OFF**	0.9 – 1.4 Ω [6]	Wiring T1/2 or T1/1

[6] The resistance of a single coil is 0.5 – 0.7 Ω

Electrical Test Program – Ignition System Test

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
24.0	P0 300 P0 303	**Primary voltage** Ignition coil (T1/3)	N3/10 115 (2.115) — 25 (1.25)	**Test connection Note:** Individual primary pattern Range 400 V Duration 100% Starter: **Crank**	200 – 350 V	⇒ 24.1, N3/10
24.1		Primary winding of T1/3 and T1/4	N3/10 115 (2.115) — 85 (2.85)	Ignition: **OFF**	0.9 – 1.4 Ω 6)	Wiring T1/3 or T1/4
25.0	P0 300 P0 304	**Primary voltage** Ignition coil (T1/4)	N3/10 85 (2.85) — 25 (1.25)	**Test connection Note:** Individual primary pattern Range 400 V Duration 100% Starter: **Crank**	200 – 350 V	⇒ 25.1, N3/10
25.1		Primary winding of T1/4 and T1/3	N3/10 85 (2.85) — 115 (2.115)	Ignition: **OFF**	0.9 – 1.4 Ω 6)	Wiring T1/4 or T1/3

6) The resistance of a single coil is 0.5 – 0.7 Ω

Electrical Test Program – Ignition System Test

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
26.0	P0 300 P0 305	**Primary voltage** Ignition coil (T1/5)	N3/10 84 (2.84) — 25 (1.25)	**Test connection Note:** Individual primary pattern Range 400 V Duration 100% Starter: **Crank**	200 – 350 V	⇒ 26.1, N3/10
26.1		Primary winding of T1/5 and T1/6	N3/10 84 (2.84) — 94 (2.94)	Ignition: **OFF**	0.9 – 1.4 Ω 6)	Wiring T1/5 or T1/6
27.0	P0 300 P0 306	**Primary voltage** Ignition coil (T1/6)	N3/10 94 (2.94) — 25 (1.25)	**Test connection Note:** Individual primary pattern Range 400 V Duration 100% Starter: **Crank**	200 – 350 V	⇒ 27.1, N3/10
27.1		Primary winding of T1/6 and T1/5	N3/10 94 (2.94) — 84 (2.84)	Ignition: **OFF**	0.9 – 1.4 Ω 6)	Wiring T1/6 or T1/5

6) The resistance of a single coil is 0.5 – 0.7 Ω

Electrical Test Program – Ignition System Test

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
28.0	P0 300 P0 307	**Primary voltage** Ignition coil (T1/7)	N3/10 116 (2.116) — 25 (1.25)	**Test connection Note:** Individual primary pattern Range 400 V Duration 100% Starter: **Crank**	200 – 350 V	⇒ 28.1, N3/10
28.1		Primary winding of T1/7 and T1/8	N3/10 116 (2.116) — 95 (2.95)	Ignition: **OFF**	0.9 – 1.4 Ω 6)	Wiring T1/7 or T1/8
29.0	P0 300 P0 308	**Primary voltage** Ignition coil (T1/8)	N3/10 95 (2.95) — 25 (1.25)	**Test connection Note:** Individual primary pattern Range 400 V Duration 100% Starter: **Crank**	200 – 350 V	⇒ 29.1, N3/10
29.1		Primary winding of T1/8 and T1/7	N3/10 95 (2.95) — 116 (2.116)	Ignition: **OFF**	0.9 – 1.4 Ω 6)	Wiring T1/8 or T1/7

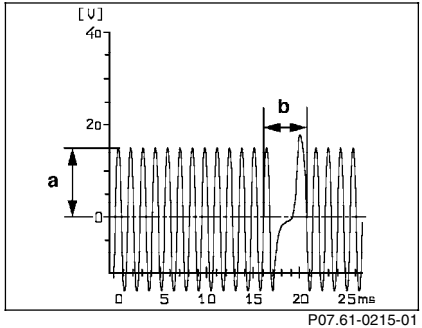
6) The resistance of a single coil is 0.5 – 0.7 Ω

Electrical Test Program – Ignition System Test

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
30.0	P0 300 P0 301 P0 302 P0 303 P0 304 P0 305 P0 306 P0 307 P0 308	**Firing voltage** Ignition coil (T1/1) to (T1/8)	Engine analyzer	**Test connection Note:** Individual secondary pattern Range 20 kV Duration 100% Connect kV pick-ups successively to T1/1 through T1/8. Starter: **Crank**	8 – 20 kV [5]	Spark plugs, T1/1 to T1/8, N3/10

[5] The resistance of the secondary winding can not be measured due to an installed diode.

Electrical Test Program – Ignition System Test

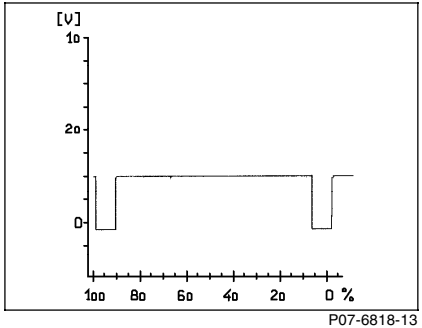


P07.61-0215-01

Figure 1

CKP sensor (L5) signal

b=2 missing teeth for cylinder 1 recognition



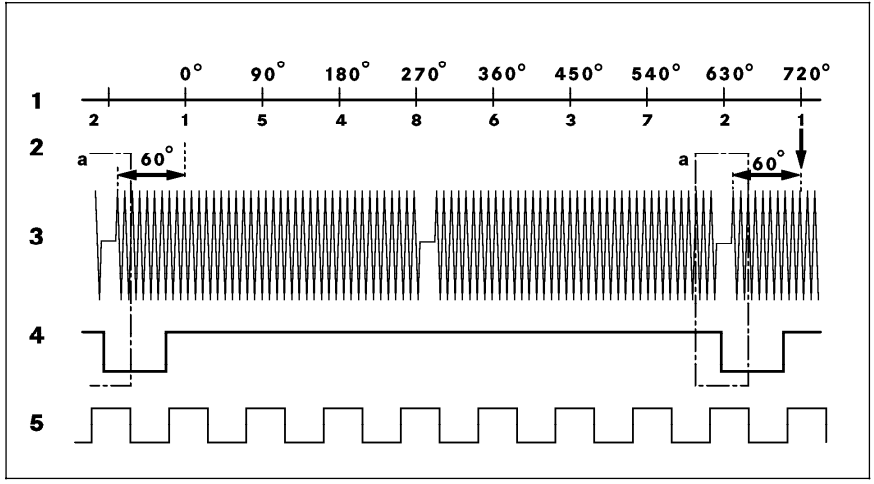
P07-6818-13

Figure 2

Camshaft Hall-effect sensor (B6/1) signal

Electrical Test Program – Ignition System Test

Signal survey



P07.61-0217-55

Figure 3

1 Crank angle (CKA)
2 Cylinder
3 CKP sensor (L5) signal
4 Camshaft Hall-effect sensor (B6/1) signal
5 Engine rpm signal TNA
a Cylinder 1 recognition