Electrical Test Program – Ignition System Test

⚠ WARNING!
Risk of severe injury when touching ignition parts which produce high voltages. Do not touch ignition components.
Persons with heart pacemakers are not to perform repairs on this type of ignition system.

1. Review **WARNING!** on pages 11/1 and 11/2,
2. Review 11, 21, 22, 23, 24, 31, 33,
3. Review section 0,
4. Connect HHTand readout DTC memory, see 11,
5. Ignition: **OFF**
6. Connect test cable with socket box as per "Connection Diagram - Socket Box", see 22/5.

Connector with red marking is not required at this time since the engine control module has presently no function installed for it. When disconnecting the connectors on the engine control module remove center connector (D) first, when reconnecting connectors install center connector (D) last.

Note regarding "Test Connection" column:
The numbers indicated in parentheses, for example, ⇒ 1.0 (2A) signify:
2 = Socket 2 on wiring diagram.
A = Connector A on wiring diagram

⇒		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 3 (3A) — V — 12 (4B)	Ignition: **ON**	11 – 14 V	⇒ 1.1 – 1.2

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⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
1.1		Ground wire	N3/10 3 — (3A) 7 — (7A) 112 — (8F) 119 — (15F) X11/4 — 2	Ignition: **ON**	11 – 14 V	Wiring, **Model 129:** Ground (W27), module box bracket. **Model 140:** Output ground (W15), right footwell. **Model 202, 210:** Output ground (W16/6), right component compartment,
1.2		Voltage supply circuit 30	N3/10 X11/4 1 — (4B) 12	Ignition: **ON**	11 – 14 V	Wiring, **Model 129, 140:** Base module (N16/1) or fuse on base module, **Model 202:** Passenger-side fuse and relay module box (K40/4), **Model 210:** Relay module (K40).

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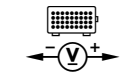
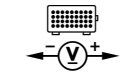
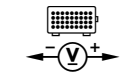
⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
2.0	P0 560	**Engine control module (N3/10)** Voltage supply circuit 87	N3/10  8 (8A) — 2 (2A)	Ignition: **ON**	11 – 14 V	⇒ 2.1 – 2.2
2.1		Electronics ground	N3/10  8 (8A) — X11/4 — 2	Ignition: **ON**	11 – 14 V	Wiring, **Model 129:** Ground (W27), module box bracket, **Model 140:** Output ground (W15), right footwell, **Model 202, 210:** Output ground (W16/6), right component compartment.
2.2		Voltage supply circuit 87	N3/10  X11/4 1 — 2 (2A)	Ignition: **ON** Ignition: **OFF**	11 – 14 V < 1 V	Wiring, **Model 129, 140:** Base module (N16/1) or fuse on base module, **Model 202:** Passenger-side fuse and relay module box (K40/4), **Model 210:** Relay module (K40).

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⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
3.0		**Ignition coil (T1/1)** Cylinder 2 and 5 Voltage supply	N3/10 3 (3A) — (V) — 117 (13F)	Ignition: **ON** Starter: **Crank**	11 – 14 V > 10 V	Wiring, Fuses: Model 129, fuse 34, Model 140, fuse 22, Model 202, fuse and relay module box fuse 6, Model 210, fuse 19 Ignition coil (T1/1).
4.0		**Ignition coil (T1/2)** Cylinder 3 and 4 Voltage supply	N3/10 3 (3A) — (V) — 110 (6F)	Ignition: **ON** Starter: **Crank**	11 – 14 V > 10 V	Wiring, Fuses: Model 129, fuse 34, Model 140, fuse 22, Model 202, fuse and relay module box fuse 6, Model 210, fuse 19, Ignition coil (T1/2).
5.0		**Ignition coil (T1/3)** Cylinder 1 and 6 Voltage supply	N3/10 3 (3A) — (V) — 124 (20F)	Ignition: **ON** Starter: **Crank**	11 – 14 V > 10 V	Wiring, Fuses: Model 129, fuse 34, Model 140, fuse 22, Model 202, fuse and relay module box fuse 6, Model 210, fuse 19, Ignition coil (T1/3).

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⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
6.0	P0 335	**CKP sensor (L5)** Signal	N3/10 93 (37E) — 94 (38E)	Test with oscilloscope. Starter: **Crank** Engine: **at Idle**	Signal, see Figure 1 and 3.	⇒ 6.1, Teeth on starter ring gear.
		Voltage	N3/10 93 (37E) — 94 (38E)	Test with multimeter only if oscilloscope is unavailable. Starter: **Crank** Engine: **at Idle**	> 2.5 V > 5 V Voltage increase = rpm increase.	
6.1		CKP sensor (L5) Resistance	N3/10 93 (37E) — 94 (38E)	Ignition: **OFF** Unplug connector **E** on engine control module (N3/10).	(at 20°C): 600 – 1200 Ω	Wiring, L5.

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⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
7.0	P0 341	**Camshaft Hall-effect sensor (B6/1)** Hall-effect signal	N3/10 95 (39E) — 96 (40E)	Test with oscilloscope. Engine: **at Idle**	Signal, see Figure 2 and 3.	⇒ 7.1, Wiring, B6/1.
		Voltage	N3/10 96 (40E) — 2 (2A)	Test with multimeter only if oscilloscope is unavailable. Engine: **at Idle**	1.2 – 1.7 V Value changes	
7.1		Camshaft Hall-effect sensor (B6/1) Voltage supply	B6/1 1 — 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.

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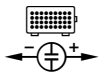
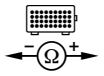
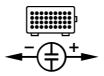
⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
8.0	P0 300 P0 302 P0 305	**Primary voltage** Ignition coil (T1/1), Cylinders 2 and 5	N3/10  117 (13F) — 2 (2A)	**Test connection Note:** Individual primary pattern: Range 400 V Duration 100% Starter: **Crank**	200 – 350 V	⇒ 8.1
8.1		Primary winding of T1/1 and T1/2	N3/10  117 (13F) — 110 (6F)	Ignition: **OFF**	0.9 – 1.6 Ω The resistance of a single coil at 20°C is approx. 0.6 Ω.	Wiring, T1/1 or T1/2
9.0	P0 300 P0 303 P0 304	**Primary voltage** Ignition coil (T1/2) Cylinders 3 and 4	N3/10  110 (6F) — 2 (2A)	**Test connection Note:** Individual primary pattern: Range 400 V Duration 100% Starter: **Crank**	200 – 350 V	⇒ 9.1

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⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
9.1		Primary winding of T1/2 and T1/1	N3/10 110 (6F) — Ω — 117 (13F)	Ignition: **OFF**	0.9 – 1.6 Ω The resistance of a single coil at 20°C is approx. 0.6 Ω .	Wiring, T1/2 or T1/1
10.0	P0 300 P0 301 P0 306	**Primary voltage** Ignition coil (T1/3) Cylinders 1 and 6	N3/10 124 (20F) — ⏚ — 2 (2A)	**Test connection Note:** Individual primary pattern: Range 400 V Duration 100% Starter: **Crank**	200 – 350 V	⇒ 10.1
10.1		Primary winding of T1/3 and T1/2	N3/10 124 (20F) — Ω — 110 (6F)	Ignition: **OFF**	0.9 – 1.6 Ω, The resistance of a single coil at 20°C is approx. 0.6 Ω .	Wiring, T1/3 or T1/2

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⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
11.0	P0 300 P0 301 P0 302 P0 303 P0 304 P0 305 P0 306	**Firing voltage** Ignition coil (T1/1) to (T1/3)	Engine analyzer	**Test connection Note:** Individual secondary pattern: Range 20 kV Duration 100% Connect kV pick-ups successively to T1/1 through T1/3. Starter: **Crank**	8 – 20 kV	⇒ 11.1, Spark plugs, N3/10.
11.1		Secondary winding of T1/1, T1/2 and T1/3	T1/1 T1/2 T1/3 cir. 4a Ω cir. 4b	Disconnect both ignition cables on T1/1, T1/2 or T1/3	6 – 8.5 kΩ	T1/1, T1/2 or T1/3

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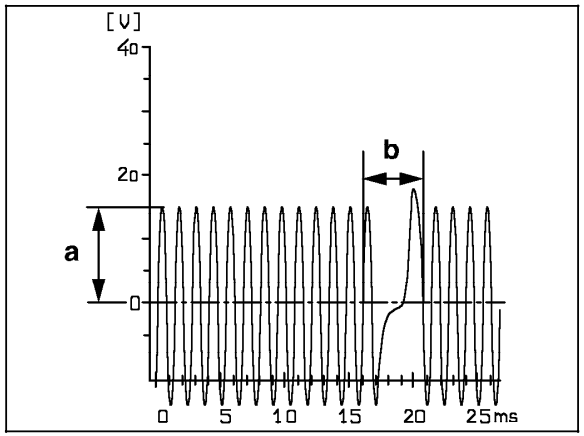

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Figure 1

CKP sensor (L5) signal, shown at idle

b=2 missing teeth for cylinder 1 recognition

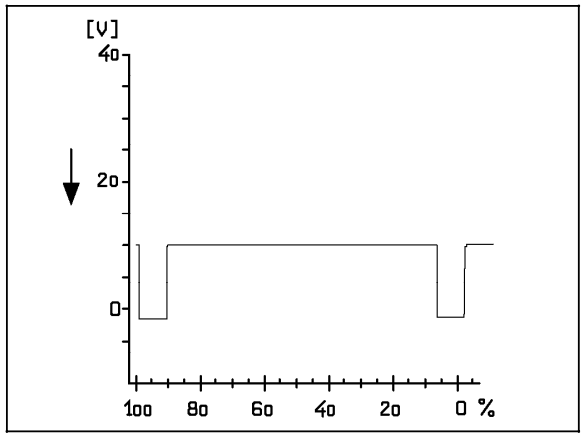

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Figure 2

Camshaft Hall-effect sensor (B6/1) signal

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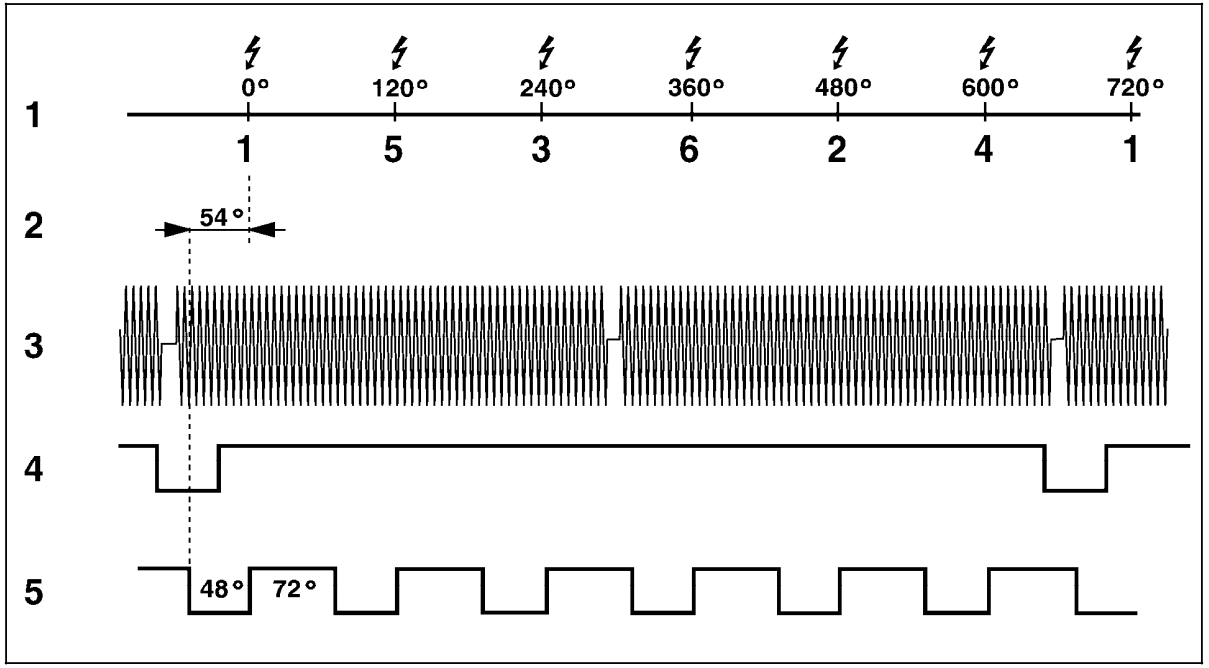
Signal survey



P07.61-0256-55

Figure 3

a Voltage

b Two missing teeth for identfication of cylinder #1

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