5.2 Engines 104, 119 with LH–SFI

Diagnosis – Diagnostic Trouble Code (DTC) Memory

Diagnostic Trouble Code (DTC) Readout with Impulse Counter Scan Tool.

The DI control module (N1/3) is equipped with DTC readout **including** malfunction memory.

Malfunctions which occur with the engine running are counted by a malfunction counter. A malfunction is recorded into memory only if the same malfunction has occurred after 8 sequential engine starts.

This prevents a malfunction from being recorded if, for example, it occurred only once. If, for example, a malfunction occurred only 7 times, then the malfunction counter will be cleared again after a certain number of engine starts.

The memory remains active even if the vehicle's battery is disconnected.

Malfunctions occurring in the following areas are stored immediately:

- CKP sensor defective (diagnostic trouble code 17).
- Magnets for CKP sensor not recognized (diagnostic trouble code 18) (Engine 119 only).

Malfunctions can be recalled from memory using the impulse counter scan tool with the engine off and the ignition "ON". Numbers ranging from 1 to 41 may appear on the display of the impulse counter scan tool.

The number 1 indicates: No malfunction recognized in system.

All further numbers refer to a particular malfunction source. If there are multiple system malfunctions, the malfunction assigned with the lowest number will be displayed first.

If the DTC readout number indicated first reappears after more than two DTC readouts, then no further malfunctions are present in the system.

After eliminating all malfunctions, the DTC's must be **cleared individually**

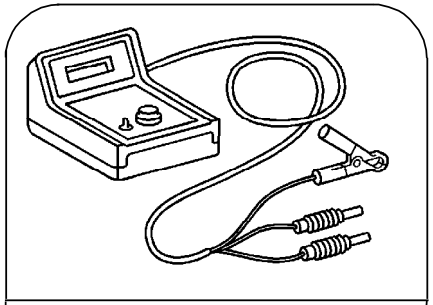
In.case of engine complaints, the DTC memory must be read and the malfunction must be eliminated before proceeding with any additional repairs.

Diagnosis – Diagnostic Trouble Code (DTC) Memory

Preparation for Test with Impulse Counter Scan Tool

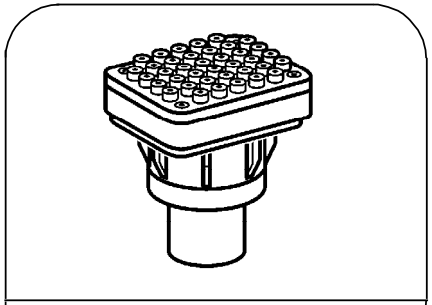
- Connect impulse counter scan tool according to connection diagram (see section 0).
- Read DTC memory (see section 0).

Special Tools



124 589 19 21 00

Pulse counter



140 589 14 63 00

Adapter

Diagnosis – Diagnostic Trouble Code (DTC) Memory

DTC  	Possible cause	Test step/Remedy [1]
1	No malfunction in system	–
2	Maximum retard setting on at least one cylinder has been reached	Increased knock tendency, i.e. due to poor fuel quality, carbon build–up, mechanical damage.
3	Not used	–
4	MAP sensor in DI control module (N1/3) defective	Check vacuum supply to N1/3, Replace N1/3.
5	Knock sensor 1 and/or 2 defective	Knock sensor not plugged in at N1/3, Replace knock sensor.
6	CMP sensor (L5/1) defective	24 ⇒ 1.0
7	Knock control–output switch in DI control module (N1/3) defective	Replace N1/3.
8	Transmission overload protection switch (S65) does not close	24 ⇒ 5.0
9	Transmission overload protection switch (S65) does not open	24 ⇒ 6.0
10	Not used	–
11	Reference resistor (DI) (R16/2) defective	24 ⇒ 4.0
12	TN–signal (engine rpm output) is outside of tolerance range	24 ⇒ 7.0
13	Not used	–

[1] Observe Preparation for Test, see 22.

Diagnosis – Diagnostic Trouble Code (DTC) Memory

DTC	Possible cause	Test step/Remedy [1]
14	Not used	–
15	Ignition coil 1 output from DI control module (N1/3) defective or primary winding of ignition coil has open circuit	23 ⇒ 7.0
16 **119 only**	Ignition coil 2 output from DI control module (N1/3) defective or primary winding of ignition coil has open circuit	23 ⇒ 8.0
17	CKP sensor (L5) defective	23 ⇒ 4.0
18 **119 only**	Magnets for CKP sensor (L5) not recognized	23 ⇒ 5.0
19	Not used	–
20	DI control module (N1/3) DTC memory defective	Replace N1/3.
21	MAP sensor in DI control module (N1/3) defective (recognized with engine running)	Replace N1/3.
22	Not used	–
23	Not used	–
24	Not used	–
25	Not used	–
26	DI control module (N1/3) data exchange malfunction	24 ⇒ 8.0 – 9.0
27	LH-SFI control module (N3/1) data exchange malfunction	24 ⇒ 8.0
28	EA/CC/ISC control module (N4/1) data exchange malfunction	24 ⇒ 8.0

[1] Observe Preparation for Test, see 22.

Diagnosis – Diagnostic Trouble Code (DTC) Memory

DTC	Possible cause		Test step/Remedy [1]
29	Not used		–
30	Not used		–
31	Not used		–
32	Not used		–
33	Not used		–
34	Ignition misfire cylinder 1 (engine 104)	cyl. 1 (engine 119)	[2]
35	Ignition misfire cylinder 5 (engine 104)	cyl. 5 (engine 119)	[2]
36	Ignition misfire cylinder 3 (engine 104)	cyl. 4 (engine 119)	[2]
37	Ignition misfire cylinder 6 (engine 104)	cyl. 8 (engine 119)	[2]
38	Ignition misfire cylinder 2 (engine 104)	cyl. 6 (engine 119)	[2]
39	Ignition misfire cylinder 4 (engine 104)	cyl. 3 (engine 119)	[2]
40 **119 only**	Ignition misfire	cyl. 7 (engine 119)	[2]
41 **119 only**	Ignition misfire	cyl. 2 (engine 119)	[2]

[1] Observe Preparation for Test, see 22.

[2] Spark plugs, ignition wire of respective cylinder, high-voltage distributor 23 = Test steps 11.0 – 12.0, ignition coil 23 = Test steps 9.0 – 10.0, DI control module.

Diagnosis – Complaint Related Diagnostic Chart

Complaint/Problem	Possible cause	Test step/Remedy [1]
Engine does not run	DI control module (N1/3) voltage supply CKP sensor (L5) DI control module (N1/3)	23 ⇒ 1.0 and 2.0 23 ⇒ 4.0

[1] Observe Preparation for Test, see 22.

Electrical Test Program – Component Locations

Engine Compartment
Model 140 with Engine 104

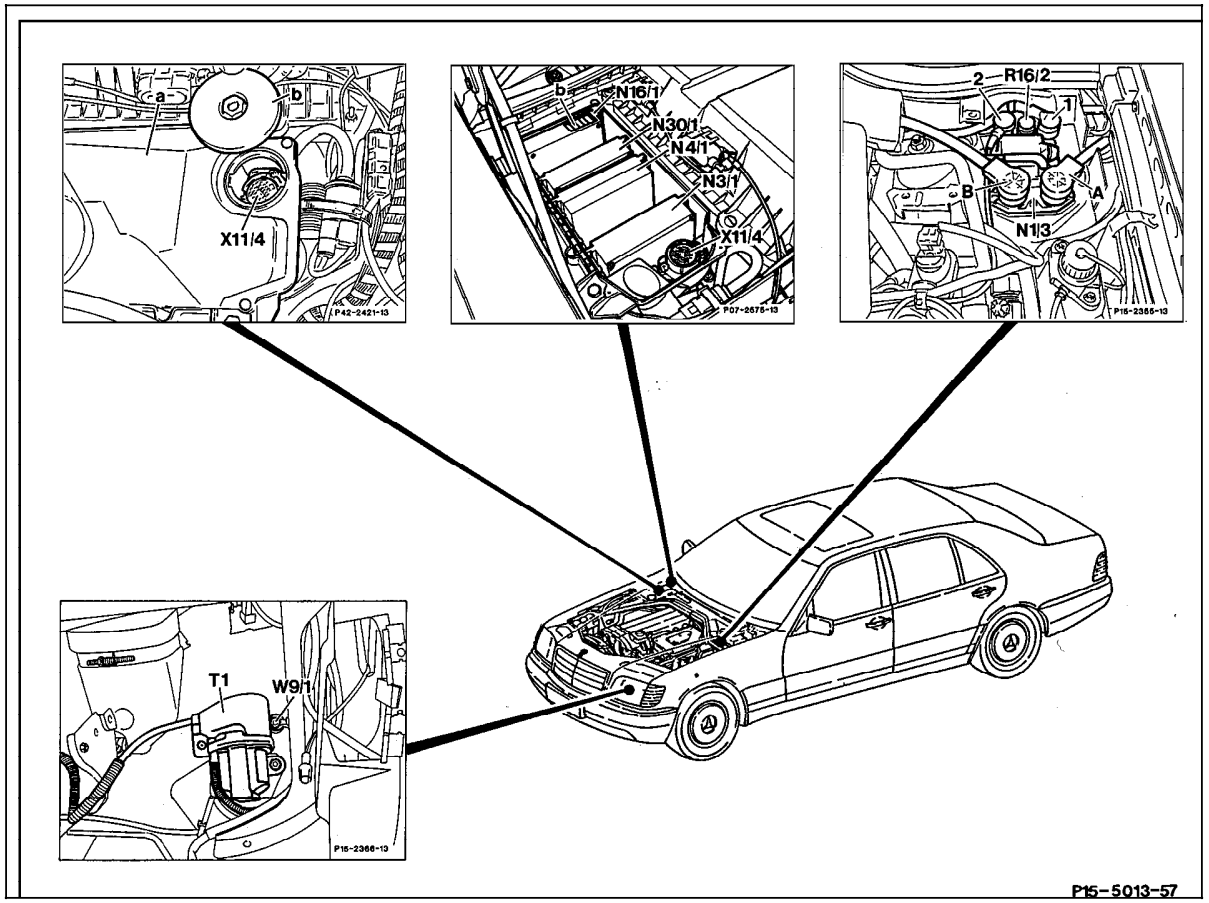


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Figure 1

N1/3	DI control module
N3/1	LH-SFI control module
N4/1	EA/CC/ISC control module
N16/1	Base module
N30/1	ASR control module
R16/2	Reference resistor (DI)
T1	Ignition coil
W9/1	Ground (at left headlamp unit – ignition coil)
X11/4	Data link connector (DTC readout)

Electrical Test Program – Component Locations

Engine 104

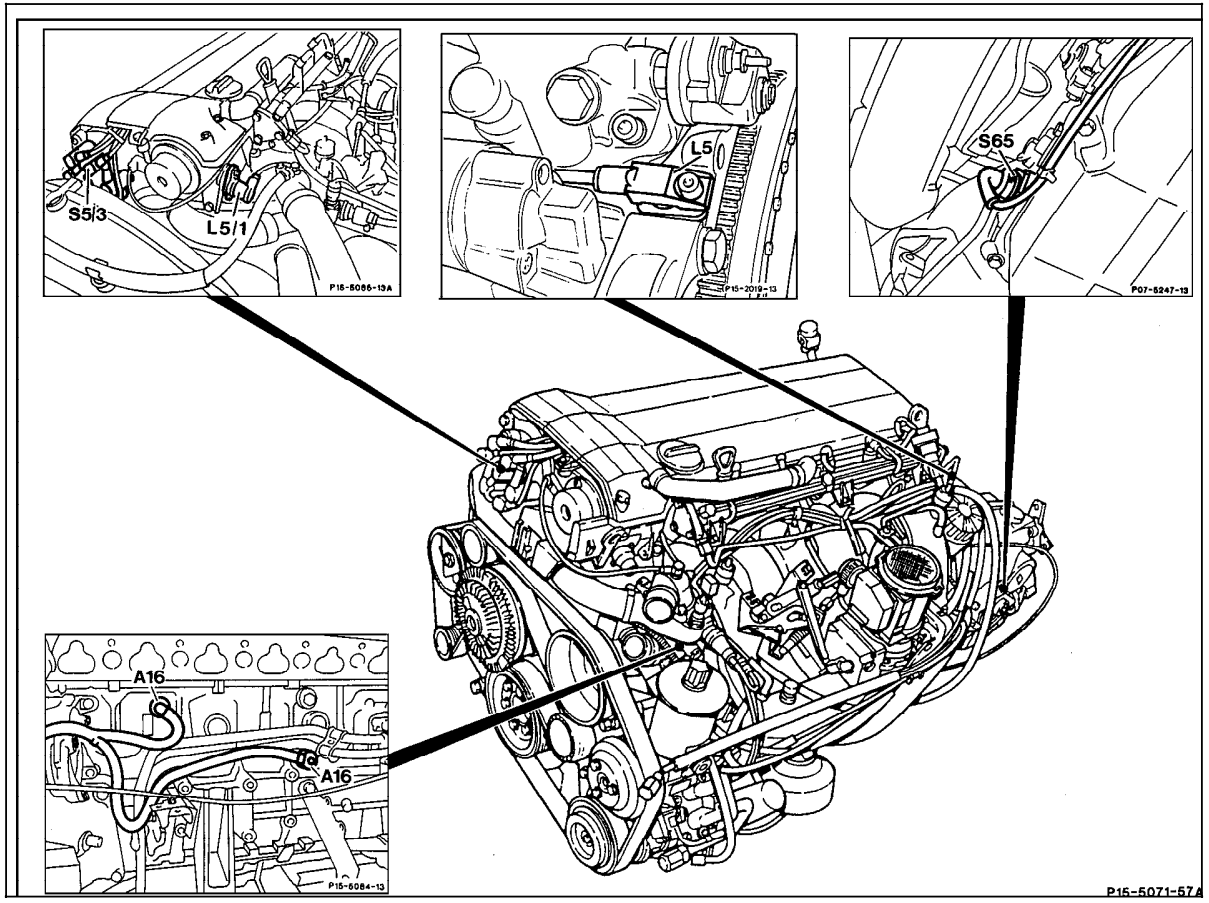

Figure 2

A16	Knock sensors
L5	CKP sensor
L5/1	CMP sensor
S5/3	High-voltage distributor
S65	Transmission overload prrotection switch

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Electrical Test Program – Component Locations

Engine Compartment
Model 124 with Engine 119

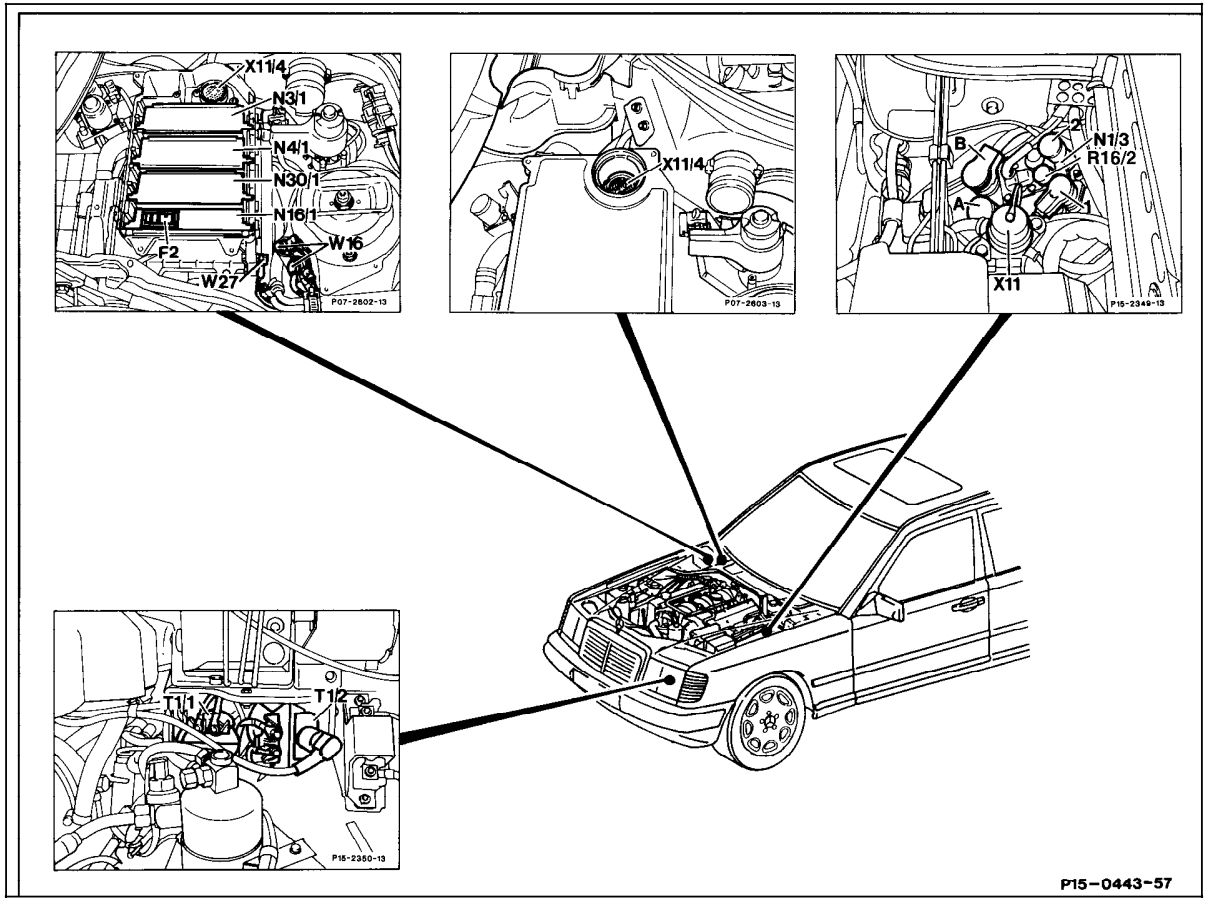

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Figure 3

N1/3	DI control module
N3/1	LH-SFI control module
N4/1	EA/CC/ISC control module
N16/1	Base module
N30/1	ASR control module
R16/2	Reference resistor (DI)
T1/1	Ignition coil 1 (right cylinder bank)
T1/2	Ignition coil 2 (left cylinder bank)
X11/4	Data link connector (DTC readout)

Electrical Test Program – Component Locations

Engine Compartment
Model 140 with Engine 119

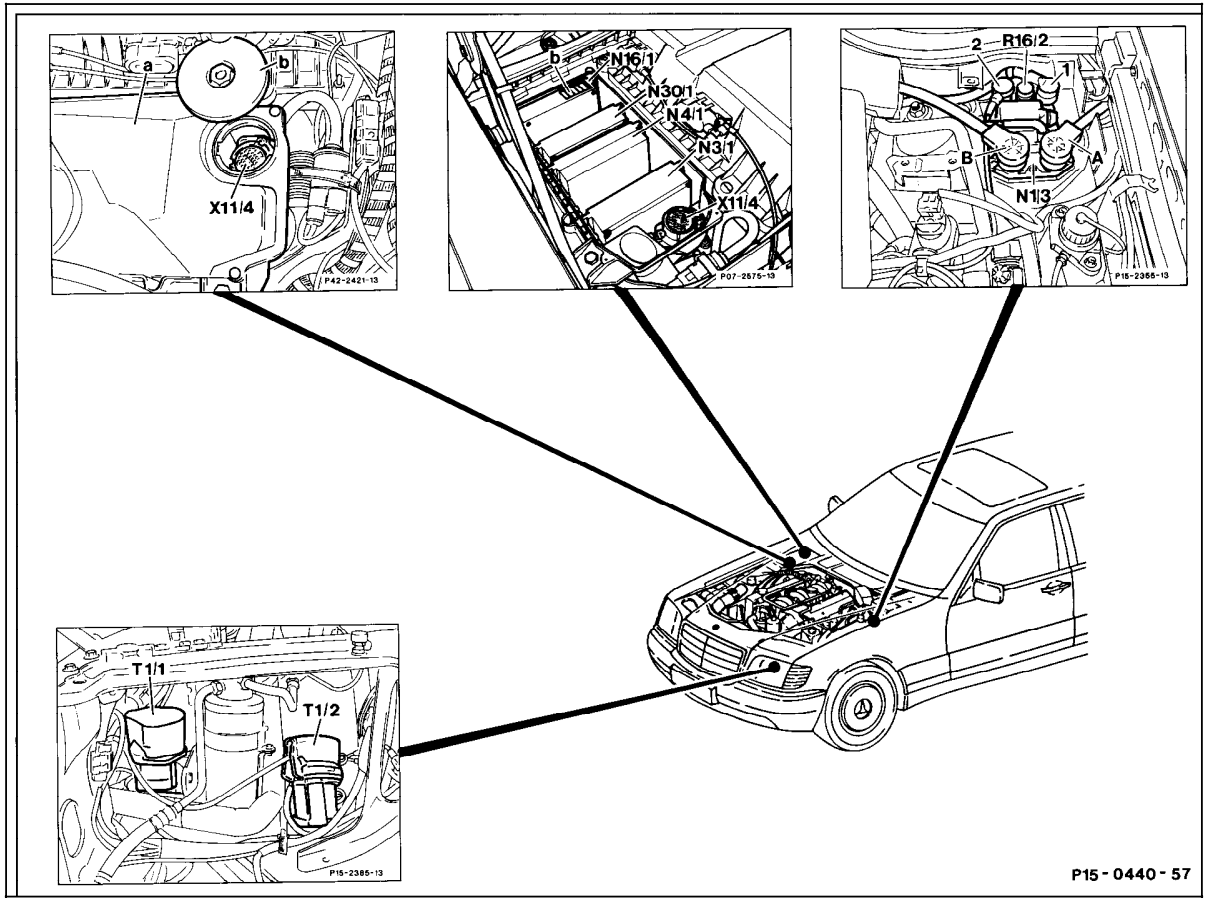

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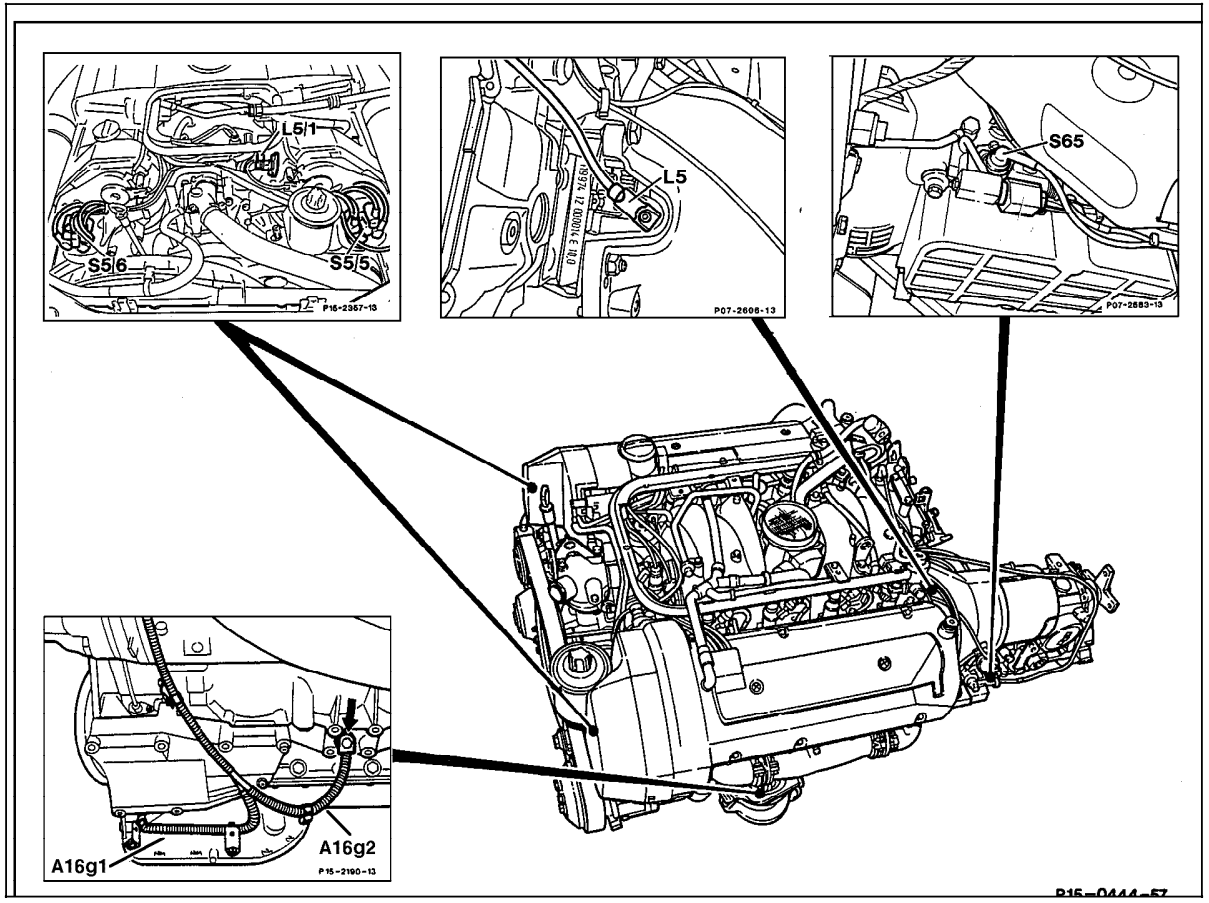
Figure 4

N1/3	DI control module
N3/1	LH-SFI control module
N4/1	EA/CC/ISC control module
N16/1	Base module
N30/1	ASR control module
R16/2	Reference resistor (DI)
T1/1	Ignition coil 1 (right cylinder bank)
T1/2	Ignition coil 2 (left cylinder bank)
X11/4	Data link connector (DTC readout)

Electrical Test Program – Component Locations

Engine 119



P15-0444-57

Figure 5

A16	Knock sensors
A16g1	KS 1 (right side of engine)
A16g2	KS 2 (left side of engine)
L5	CKP sensor
L5/1	CMP sensor
S5/5	Left high-voltage distributor
S5/6	Right high-voltage distributor
S65	Transmission overload prrotection switch

Electrical Test Program – Preparation for Test

Preliminary work:

Preparation for Test
1. Ignition: **OFF**
2. Connect socket box with test cable to DI control module (N1/3) according to connection diagram.

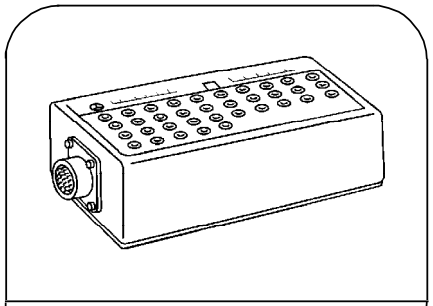
⚠
- When performing test and adjustment work, the engine rpm should only be raised using the accelerator pedal.
  If the engine speed is raised via the control linkage in the engine compartment, the “limp-home” mode will become active and will be registered in the electronic accelerator malfunction memory as a fault. The ASR MIL will also come on.

Electrical wiring diagrams :
Electrical Troubleshooting Manual.

Note regarding “Test Connection” column:
The numbers indicated in parentheses, for example, 6⇒ 1.0 (A.2) signify:
A= Connector A,
2= Socket 2 in wiring diagram.

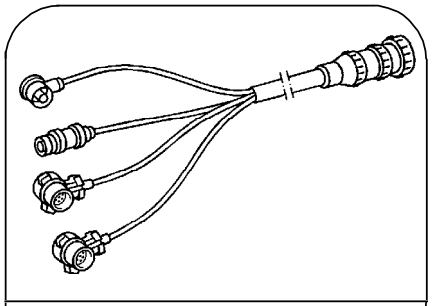
Electrical Test Program – Preparation for Test

Special Tools



124 589 00 21 00

35-pin socket box



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Test cable

Conventional tools, test equipment

Description	Brand, model, etc.
Multimeter [1]	Fluke models 23, 83, 85, 87
Engine analyzer [1]	Bear DACE (Model 40–960) Sun MEA–1500MB

[1] Available through the MBUSA Standard Equipment Program.

Electrical Test Program – Preparation for Test

Safety Precautions

The increased demands on the ignition systems of modern engines and the desire for maintenance-free operation have lead to the introduction of electronic ignition systems.
As a rule, the sparking power of an electronic system is higher than a conventional system; additional increases in performance are characteristic of this type of system.

DANGER! Contact with high-voltage components or connectors can be fatal.

⚠

Therefore, when working on the electronic ignition system (DI), the following safety precautions must be observed:

- Before performing work that requires cranking the engine (e.g. compression test) turn off ignition and disconnect connector 2 on the DI control module (N1/3) or connect safety plug, part no. 102 589 02 21 00 to diagnostic socket.
- Persons with pacemakers should not work on this type of ignition system.
- Perform installation work on the ignition system or ignition wires only when the engine/ignition is turned off (as well as connecting/disconnecting sensors only with the ignition switched off).
- No exposed metal connectors or sending units may be installed in the ignition wires (e.g. ignition wire, cylinder 1).

Electrical Test Program – Preparation for Test

To Avoid Damage to the Ignition System

- To avoid damage to the DI control module (N1/3), connect/disconnect the control module connectors only when the ignition is turned off.
- Do not connect a test lamp to circuit 1 of the ignition coil.
- Circuit 1 of the ignition coil may not be shorted to ground, e.g. theft deterrence.
- To avoid reversing polarity, the threads on the ignition coil have different diameters (M5 and M6).
- Only original equipment components should be installed in the ignition system.
- Do not operate the ignition system at cranking speed unless the ignition harness is completely connected.
- To avoid damage to the DI control module (N1/3), the high output side of the ignition system must carry at least 2 kΩ of load (distributor rotor 1 kΩ , each connection on the distributor cap 1 kΩ). Do not install a 5 kΩ distributor rotor for noise suppression.
- Do not perform any tests (grounding ignition cable 4, disconnecting a spark plug connector or pulling cable 4 out of the ignition coil) at cranking or idle speed.
- To better dissipate heat, the DI control module (N1/3) is installed with thermal paste on the wheel well. When exchanging the control module, do not remove the foil shield, it does not influence heat dissipation.
- If the circuit breaker is activated (power balance test), and the engine stalls, then the test procedure with this tester cannot be performed.
- When testing the ignition coil separately, do not load the coil with more than 28 kV in order to avoid damage to the coil.
- If assisting a disabled vehicle and it becomes necessary to perform an ignition spark test, perform this test only on one ignition cable/spark plug. Ensure good ground connection to the spark plug.

⚠

High Voltage!

Using Test Equipment

- **Ensure that the engine and ignition are turned off when connecting/disconnecting equipment such as voltage signal pick-up on ignition cable 4 and trigger pick-up on cylinder 1.**

Electrical Test Program – Preparation for Test

Connection to socket box

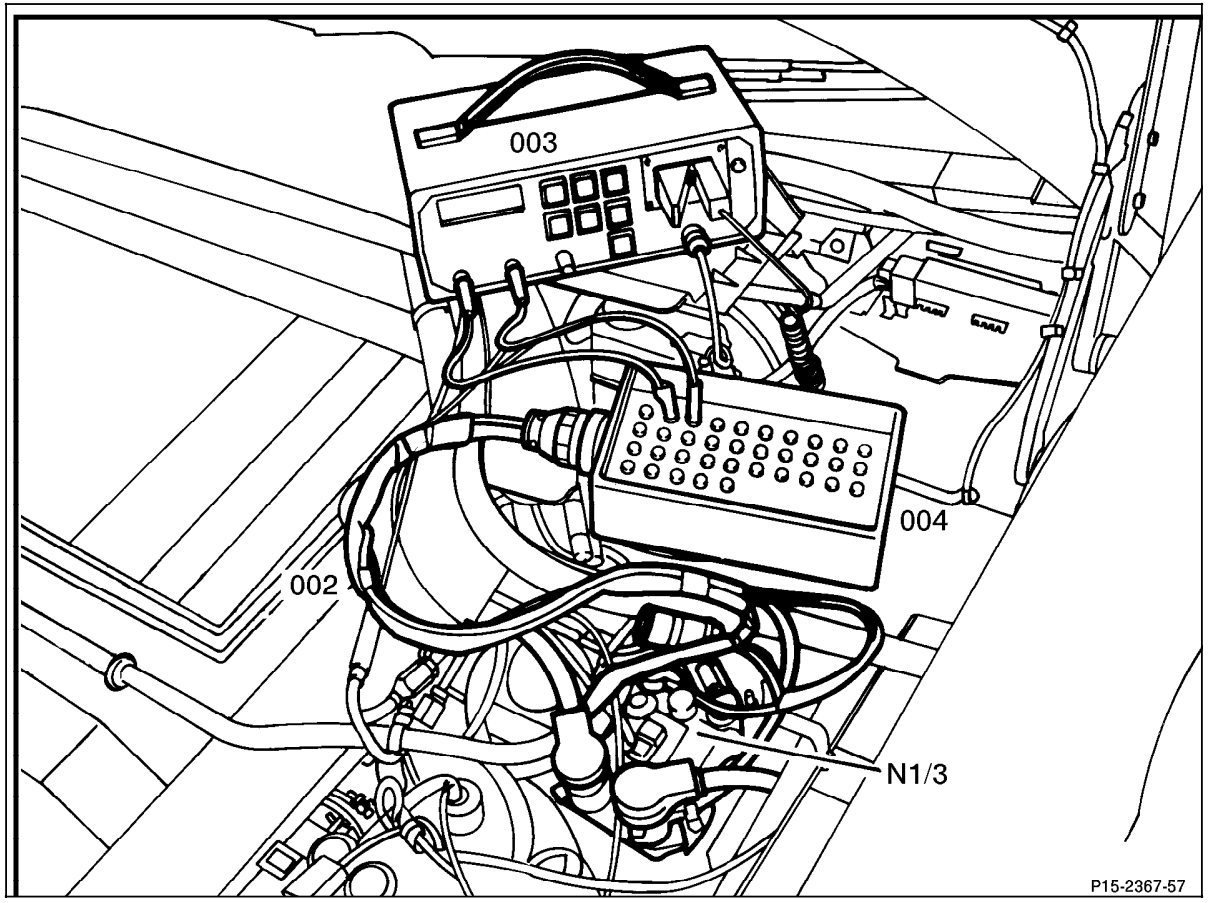

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Figure 1

002	Test cable
003	Multimeter
004	Socket box (35-pole)
N1/3	DI control module

Electrical Test Program – Test (Engine Does Not Run)

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
1.0		**DI control module (N1/3)** Voltage supply Circuit 15	N1/3 2 (A.2) — V — 3 (A.3)	Connect K to N1/3 Ignition: **ON**	11 – 14 V	Open circuit in wire to ground, left front wheel housing (W3/2), Open circuit in wire to base module (N16/1).
1.1		Ground wire at W3/2	N1/3 2 (A.2) — V — X11/4 2	Ignition: **ON**	11 – 14 V	W3/2.
2.0		**DI control module (N1/3)** Voltage supply Circuit 30	N1/3 2 (A.2) — V — 16 (B.8)	Ignition: **ON**	11 – 14 V	Open circuit in wire to ignition/starter switch (S2/1).
3.0		Ignition coil Voltage supply **Engine 104**	W3 — V — T1 Term. 15	Ignition: **ON**	11 – 14 V	Open circuit in wire from ignition coil (T1) to ignition/starter switch (S2/1),
		Engine 119	W3 — V — T1/1 or T1/2 Term. 15	Ignition: **ON**	11 – 14 V	Open circuit in wire from ignition coil (T1/1) or ignition coil (T1/2) to ignition/starter switch (S2/1).

Electrical Test Program – Test (Engine Does Not Run)

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
4.0		**CKP sensor (L5)**	N1/3 [1] 18 — (–) (+) — 17	Engine: **Start**	Signal, see 25, figure 1 and 2.	⇒ 4.1, ⇒ 4.2, Segments on starter ring gear.
			N1/3 [2] 18 — (V) — 17	Engine: **Start**	> 0.4 V ∽	
4.1		Resistance of L5	N1/3 18 — (Ω) — 17	Ignition: **OFF** Unplug connector (2) for L5 at DI control module (N1/3) (25, Figure 5).	680 – 1200 Ω	L5 defective.
4.2		Insulation of L5	N1/3 2 — (Ω) — 17		> 200 kΩ	L5 defective.
5.0		**Magnets for CKP sensor** **Engine 119 only**	N1/3 18 — (–) (+) — 17	Engine: **Start**	Signal see 25, Figure 2.	Replace flexplate with ring gear and magnets

[1] Test with oscilloscope.
[2] Test with multimeter only if oscilloscope is not available.

Electrical Test Program – Test (Engine Does Not Run)

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
6.0		**Dwell angle**	Engine analyzer	Engine: **Start**	**Engine 104** 1 – 30° or 1 – 50% **Engine 119** 9 – 49° 10 – 54%	CKP sensor (L5), ⇒ 4.0 Rest current shut-off inoperative, ⇒ 6.0 DI control module (N1/3).
6.1		Rest current shut-off **Engine 104**	T1 Term. 1 – Term. 15	Ignition: **ON**	0 V	N1/3, Ignition coil (T1),
			T1 Term. 1 – Term. 15	Engine: **Start**	0.3 – 0.5 V	**< 0.3 V:** Open circuit in wire from T1 to N1/3. **> 0.5 V:** T1
		Engine 119	T1/1 or T1/2 Term. 1 – Term. 15	Ignition: **ON**	0 V	N1/3, T1/1 or T1/2,
			T1/1 or T1/2 Term. 1 – Term. 15	Engine: **Start**	0.3 – 0.5 V	**< 0.3 V:** Open circuit in wire from T1/1 or T1/2 to N1/3. **> 0.5 V:** T1/1 or T1/2

Electrical Test Program – Test (Engine Does Not Run)

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
7.0	15	**Ignition coil (T1) or ignition coil 1 (right cylinder bank) (T1/1)** Primary voltage **Engine 104:** T1 **Engine 119:** T1/1	Engine analyzer 	Primary pattern, Measurement range 400 V, duration 100%, Voltage signal pick-up connected to T1 or T1/1. Engine: **Start**	200 – 350 V	N1/3, T1 or T1/1.
8.0	16	**Ignition coil 2 (left cylinder bank) (T1/2)** Primary voltage **Engine 119 only!**	Engine analyzer 	Primary pattern, Measurement range 400 V, duration 100%, Voltage signal pick-up connected to T1/2. Engine: **Start**	200 – 350 V	N1/3, T1/2.

Electrical Test Program – Test (Engine Does Not Run)

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
9.0	15	**Ignition coil (T1) or ignition coil 1 (right cylinder bank) (T1/1)** Firing voltage **Engine 104:** T1 **Engine 119:** T1/1	Engine analyzer 	Secondary pattern, Measurement range 20 kV, duration 100%, Voltage signal pick-up connected to T1 or T1/1. Engine: **Start**	8 – 20 kV	Primary winding of ignition coil, ⇒ 9.1, Secondary winding of ignition coil, ⇒ 9.2, DI control module (N1/3).
9.1	15	Primary winding of T1 or T1/1 **Engine 104:** T1 **Engine 119:** T1/1	T1 or T1/1 Term. 1 – Term. 15 	Ignition: **OFF** Disconnect terninals 1 and 15 from ignition coil.	0.3 – 0.6 Ω	T1 or T1/1.
9.2	15	Secondary winding of T1 or T1/1 **Engine 104:** T1 **Engine 119:** T1/1	T1 or T1/1 Term. 1 – Term. 4 	Ignition: **OFF** Disconnect cable of terminal 4 at ignition coil.	8 – 13 kΩ	T1 or T1/1.

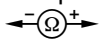
Electrical Test Program – Test (Engine Does Not Run)

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
10.0	16	**Ignition coil 2 (right cylinder bank) (T1/2)** Firing voltage **Engine 119 only!**	Engine analyzer – ⏚ +	Secondary pattern, Measurement range 20 kV, duration 100%, Voltage signal pick-up connected to T1/2. Engine: **Start**	8 – 20 kV	Primary winding of ignition coil, ⇒ 10.1, Secondary winding of ignition coil, ⇒ 10.2, DI control module (N1/3).
10.1	16	Primary winding of T1/2 **Engine 119 only!**	T1/2 Term. 1 – Ω + Term. 15	Ignition: **OFF** Disconnect terninals 1 and 15 from ignition coil.	0.3 – 0.6 Ω	T1/2.
10.2	16	Secondary winding of T1/2 **Engine 119 only!**	T1/2 Term. 1 – Ω + Term. 4	Ignition: **OFF** Disconnect cable of terminal 4 at ignition coil.	8 – 13 kΩ	T1/2.

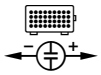
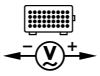
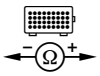
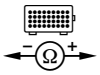
Electrical Test Program – Test (Engine Does Not Run)

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
11.0		**High-voltage distributor (S5/3) or left high-voltage distributor (S5/5)** Firing voltage **Engine 104:** S5/3 **Engine 119:** S5/5	Engine analyzer ⊖ ⏚ ⊕	Secondary pattern, Measurement range 20 kV, duration 100%, Voltage signal pick-up connected to ignition cable, cylinder 5. Engine: **Start**	8 – 20 kV	Distributor cap ⇒ 11.1, Rotor ⇒ 11.2.
11.1		Distributor cap (individual terminals)	Distributor cap inside ⊖ Ω ⊕ outside	Ignition: **OFF** Remove distributor cap. Unplug ignition cables (disconnect cables one at a time).	700 – 1300 Ω per terminal	Distributor cap defective.
11.2		Rotor	Rotor center ⊖ Ω ⊕ point	Ignition: **OFF** Remove distributor cap.	700 – 1300 Ω and visual inspection.	Rotor defective.

Electrical Test Program – Test (Engine Does Not Run)

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
12.0		**Right high-voltage distributor (S5/6)** Firing voltage **Engine 119 only!**	Engine analyzer 	Secondary pattern, Measurement range 20 kV, duration 100%, Voltage signal pick-up connected to ignition cable, cylinder 1. Engine: **Start**	8 – 20 kV	Distributor cap ⇒ 12.1, Rotor ⇒ 12.2.
12.1		Distributor cap (individual terminals)	Distributor cap inside  outside	Ignition: **OFF** Remove distributor cap. Unplug ignition cables (disconnect cables one at a time).	700 – 1300 Ω per terminal	Distributor cap defective.
12.2		Rotor	Rotor center  point	Ignition: **OFF** Remove distributor cap.	700 – 1300 Ω and visual inspection.	Rotor defective.

Electrical Test Program – Test (Engine Runs)

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
1.0		**CMP sensor (L5/1)**	N1/3 [1]  13 (B.5) — 9 (B.1)	Connect K to N1/3 Engine: **at Idle**	 Signal, see 25, figure 3.	Open circuit, ⇒ 1.1, ⇒ 1.2, Engine 119: Check distance between CMP sensor (L5/1) and contact sensor (see SMS, Repair Instructions, Group 15, Job No. 2143).
			N1/3 [2]  13 (B.5) — 9 (B.1)	Engine: **at Idle**	> 0.3 V ∽ [3]	
1.1		Resistance of L5/1	N1/3  13 (B.5) — 9 (B.1)	Unplug test cable at connector (B) on DI control module (N1/3) (25, Figure 5).	900 – 1600 Ω	L5/1.
1.2		Insulation of L5/1	N1/3  2 (A.2) — 9 (B.1)	Unplug test cable at connector (B) on DI control module (N1/3) (25, Figure 5).	> 200 kΩ	L5/1.

1) Test with oscilloscope.
2) Test with multimeter only if oscilloscope is not available.
3) Voltage increases with increasing rpm.

Electrical Test Program – Test (Engine Runs)

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
2.0		**CKP sensor (L5)**	N1/3 1) 18 — ◄ ⏚ ► — 17	Engine: **at Idle**	Signal, see 25, figure 1 and 2.	Open circuit, ⇒ 1.1, ⇒ 1.2, Starter ring gear segments.
			N1/3 2) 18 — ◄ V ► — 1	Engine: **at Idle**	> 1 V ∽ 3)	
2.1		Resistance of L5	N1/3 18 — ◄ Ω ► — 17	Ignition: **OFF** Unplug connector (2) for L5 at DI control module (N1/3) (25, Figure 5).	680 – 1200 Ω	L5.
2.2		Insulation of L5	N1/3 2 — ◄ Ω ► — 17 (A.2)	Ignition: **OFF** Unplug connector (2) for L5 at DI control module (N1/3) (25, Figure 5).	> 200 kΩ	L5.

1) Test with oscilloscope.
2) Test with multimeter only if oscilloscope is not available.
3) Voltage increases with increasing rpm.

Electrical Test Program – Test (Engine Runs)

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
3.0	18	**Magnets for CKP sensor** **Engine 119 only**	N1/3 18 —(⏚)— 17	Engine: **at Idle**	Signal see 25, Figure 2.	Segments on starter ring gear.
4.0	11	**Reference resistor (R16/2)**	R16/2 — Ω —	Ignition: **OFF** Unplug R16/2 at DI control module (N1/3) (25, Figures 4 and 5).	2.4 kΩ	R16/2.
5.0 [4]	8	**Transmission overload protection switch (S65)** Does not close	N1/3 2 (A.2) —(V)— 10 (B.2)	Depress parking brake. Engine: **at Idle** Selector lever in “D”.	< 1 V	Open circuit, S65.
6.0 [4]	9	**Transmission overload protection switch (S65)** Does not open	N1/3 2 (A.2) —(V)— 10 (B.2)	Engine: **at Idle** Selector lever in “P” or “N”.	> 4 V	Short circuit, S65.

[4] Test steps 5.0 and 6.0 cannot be performed on model 124.034 (400 E). If DTC’s 8 or 9 are displayed, proceed as follows:

- Replace transmission overload protection switch (S65),
- Clear DTC memory,
- With transmission in driving range “2”, drive vehicle for at least 2 seconds at an engine speed greater than 3000 rpm and subsequently shut engine OFF,
- Repeat DTC readout. If fault still exists, check wiring.

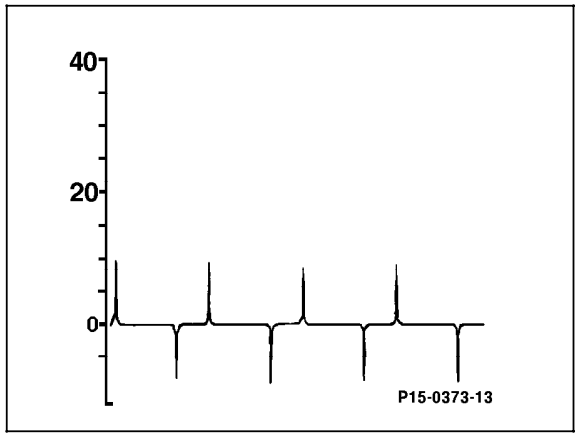
Electrical Test Program – Test (Engine Runs)

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
7.0	12	**TN-signal (engine rpm output)** Outside of tolerance range	N1/3 2 (A.2) — V — 4 (A.4)	Engine: **at Idle**	5 – 7 V	⇒ 7.1, DI control module (N1/3), LH-SFI control module (N3/1).
7.1	12	TN wire to LH-SFI control module (N3/1)	N1/3 2 (A.2) — Ω — 4 (A.4)	Unplug N3/1. Unplug test cable at connector (B) on DI control module (N1/3) (25, Figure 5).	> 200 kΩ	Short circuit.
8.0	26 27 28	**CAN databus**	N1/3 (B) 3 — Ω — 4	Ignition: **OFF** Unplug connector (B) without test cable at DI control module (N1/3) and test directly at connector (B) (25, Figure 7).	115 – 125 Ω	⇒ 8.1, Databus.
8.1	27	**CAN element in LH-SFI control module** Resistance	N3/1 — Ω —	Unplug LH-SFI control module (N3/1) and test directly at N3/1 (25, Figure 8).	115 – 125 Ω	N3/1.

Electrical Test Program – Test (Engine Runs)

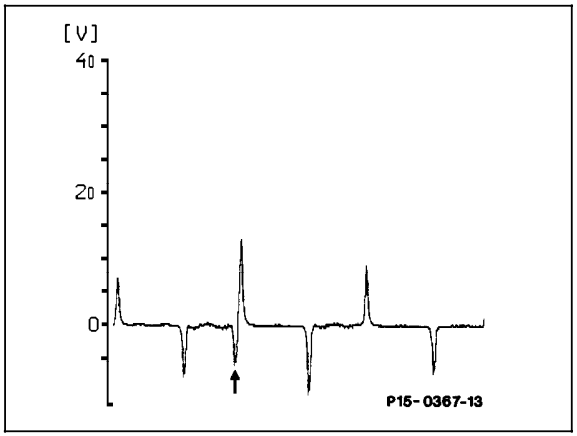
⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
9.0	26	**CAN element in DI control module** Resistance	N1/3 3 — ⁻Ω⁺ — 4	Ignition: **OFF** Unplug connector (B) without test cable at DI control module (N1/3) and test directly at N1/3 (25, Figure 9).	115 – 125 Ω	N1/3

Electrical Test Program – Illustrations



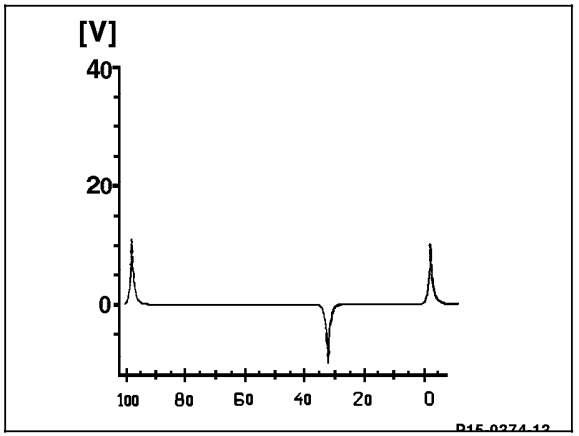
P15-0373-13

Figure 1
Engine 104
CKP sensor (L5) signal



P15-0367-13

Figure 2
Engine 119
CKP sensor (L5) signal (arrow, magnet)

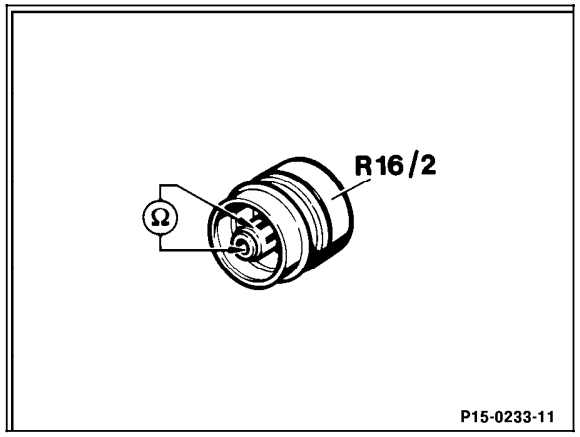


P15-0374-13

Figure 3

CMP sensor (L5/1) signal

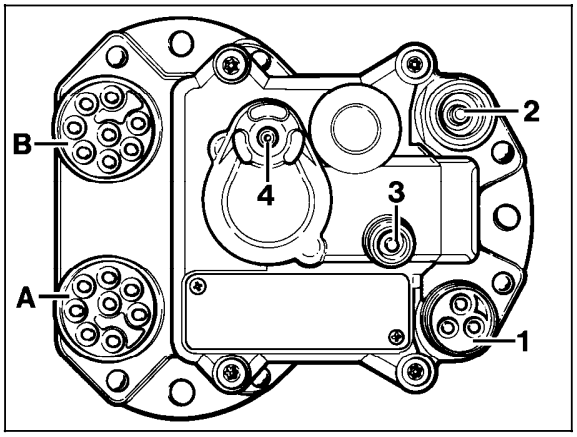
Electrical Test Program – Illustrations



P15-0233-11

Figure 4

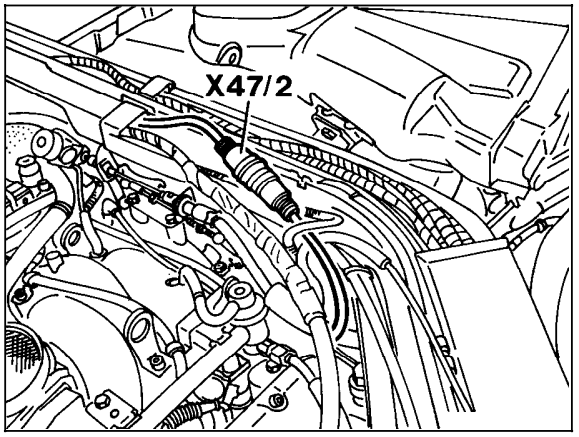
R16/2 Reference resistor (DI)



P15-2030-13A

Figure 5

1 Connection for knock sensor (A16)
2 Connection for CKP sensor (L5)
3 Connection for reference resistor (R16/2)
4 Vacuum connection
A 8-pole plug connection
B 8-pole plug connection

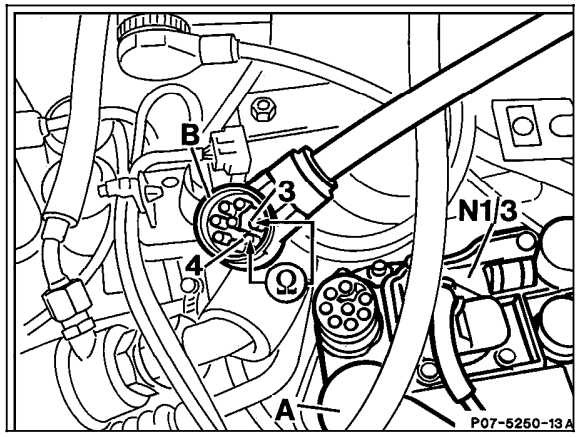


P07-2637-13

Figure 6

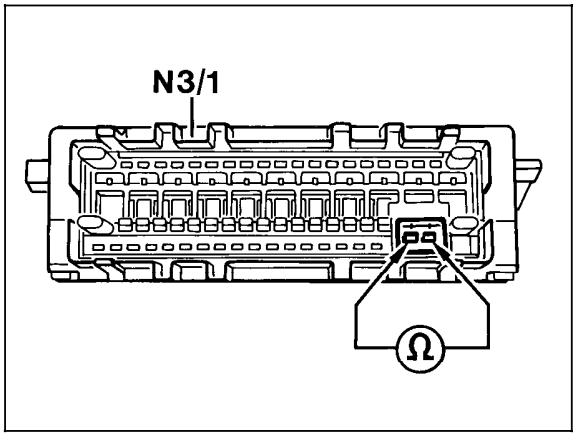
X47/2 CMP sensor intermediate connector

Electrical Test Program – Illustrations



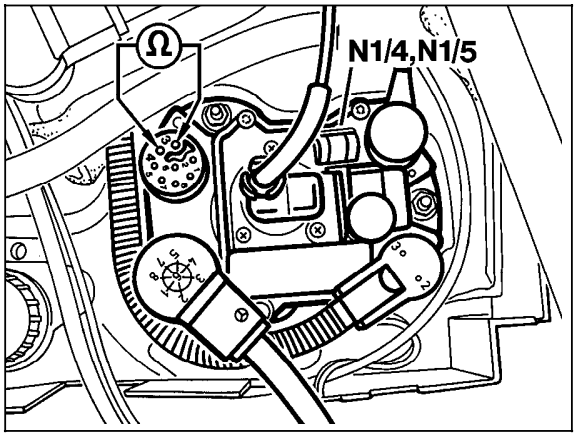
P07-5250-13A

Figure7
Model
N1/3 DI control module



P07-5159-13A

Figure 8
Model
N3/1 LH-SFI control module



P15-5058-13

Figure 9
Model
N1/3 DI control module