

### 1.2 Model 129

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### Diagnosis – Function Test

#### General Information

- There are 9 test modes available which are indicated via the outside temperature display. The test mode number is indicated after the decimal point.  
Example: Test mode 1 “Fuel tank display”, appears as “80.1”, which means 80 liters and test mode 1.
- During test mode 2, “Momentary fuel consumption in liters per hour,” consumption values of less than 9.9 l/h are shown multiplied by 10:  
Example: “34.2” corresponds to 3.4 l/h - test mode 2.  
During an momentary consumption of greater than 10 l/h, the consumption and display are identical. This is indicated by a colon (:) in front of the display figures:  
Example: “:12.2” corresponds to 12 l/h - test mode 2.

#### Note:

- The test values that are indicated during diagnostics in the outside temperature display correspond to metric units of measure. A direct comparison between analog and digital displays is not possible. A comparison is only broadly possible.  
Examples:  
Fuel tank reading:           Analog in gallons,  
                                          Digital in liters,  
Fuel consumption gauge:   Analog in miles per gallon,  
                                          Digital in liters per hour.

#### Activation of Test Modes (displayed via outside temperature indicator window)

- Ignition: **ON**
- Depress center of clock adjusting knob “A” ( 23 Fig. 7) for at least 5 seconds and the first test mode display will appear in the outside temperature display window.
- Pull out clock adjusting knob “B” and turn clockwise ( 23 Fig. 7) to activate the next test mode. For each additional test mode, the clock adjusting knob “B” must be pulled out and turned again clockwise.

#### Note:

When the ignition is turned **OFF**, the test mode routine is canceled.

### Diagnosis – Function Test

**Notes:**

Prerequisite for test modes 2 – 4 → Engine: **at Idle**

To perform all 9 test modes, it is advisable to start the engine before activating the test modes.

#### Diagnostic Test Mode Identification

Test mode no.	Function/component	Digital readout (example)	Corresponds to:
1	Fuel tank contents in liters	80.1	80 liters
2	Momentary fuel consumption in miles per gallon	34.2 12.2	3.4 liter per hour 12 liter per hour
3	Engine oil pressure in bar	20.3	2.0 bar
4	Engine rpm (x 100)	41.4	4100 rpm
5	Engine oil level	0.5 1.5	0= Oil level OK 1= Oil level not OK
6	Activation of oil pressure, fuel consumption and fuel tank gauges	0.6	Needle in first quarter of gauge dial ( 23, Figure 3)
7	Activation of oil pressure, fuel consumption and fuel tank gauges	0.7	Needle in second quarter of gauge dial ( 23, Figure 4)
8	Activation of fuel consumption and fuel tank gauges	0.8	Needle in third quarter of gauge dial, the oil pressure gauge stays in second quarter of dial ( 23, Figure 5).
9	Activation of fuel tank gauge	0.9	Needle in fourth quarter of gauge dial, oil pressure gauge remains in second quarter, fuel consumption gauge remains in third quarter of gauge dial. ( 23, Figure 6)

### Diagnosis – Complaint Related Diagnostic Chart

#### Instrument Cluster

Complaint/Problem	Possible cause	Remedy/Test step <sup>1)</sup>
Entire instrument cluster (A1) not functioning.	Power supply, Electronic circuit board.	23 ⇒ 1.0
Indicator lamps for ABS, ASR, roll bar, charge control, brake pad wear, brake fluid, parking brake and ADS are not functioning.	Power supply, Electronic circuit board.	23 ⇒ 1.0
Instrument cluster illumination not operating.	Bulbs ( 23, Figure 2), Exterior lamp switch (S1), Electronic circuit board.	23 ⇒ 2.0
Fuel tank gauge (A1p2) inaccurate or not operating.	A1p2, Fuel level sensor (B4).	23 ⇒ 3.0
Fuel consumption gauge (A1p10) inaccurate or not operating.	A1p10, Fuel consumption signal from CFI, LH-SFI, engine control module (HFM-SFI).	23 ⇒ 4.0
Engine oil pressure gauge with warning lamp (A1p3) inaccurate or not operating.	A1p3, Oil pressure sensor (B5).	23 ⇒ 5.0
Engine oil pressure gauge with warning lamp (A1p3) stays on continuously.	Oil pressure sensor (B5), Electronic circuit board.	23 ⇒ 5.0 23 ⇒ 6.0

<sup>1)</sup> Observe Preparation for Test, see 22.

### Diagnosis – Complaint Related Diagnostic Chart

#### Instrument Cluster (continued)

Complaint/Problem	Possible cause	Remedy/Test step <sup>1)</sup>
Tachometer (A1p5) inaccurate or not operating.	A1p5	23 ⇒ 7.0
Low engine oil level indicator lamp (A1e12) lights up but oil level is OK.	Oil level switch S43)	23 ⇒ 8.0
Electronic speedometer (A1p8) inaccurate or not operating.	Electronic circuit board <sup>2)</sup> , A1p8, Transmission inductive speed sensor (L2), Vehicle speed signal from ABS or ASR control module (N30 or N30/1).	23 ⇒ 9.0
Outside temperature display (A1p4) inaccurate or not operating.	Electronic circuit board <sup>2)</sup> , A1p4, Outside temperature sensor (B14).	23 ⇒ 10.0
ECT gauge (A1p1) inaccurate or not operating.	A1p1 ECT gauge sensor (B13)	23 ⇒ 11.0

<sup>1)</sup> Observe Preparation for Test, see 22.

<sup>2)</sup> Verify that correct part number/version is installed.

Electrical Test Program – Component Locations

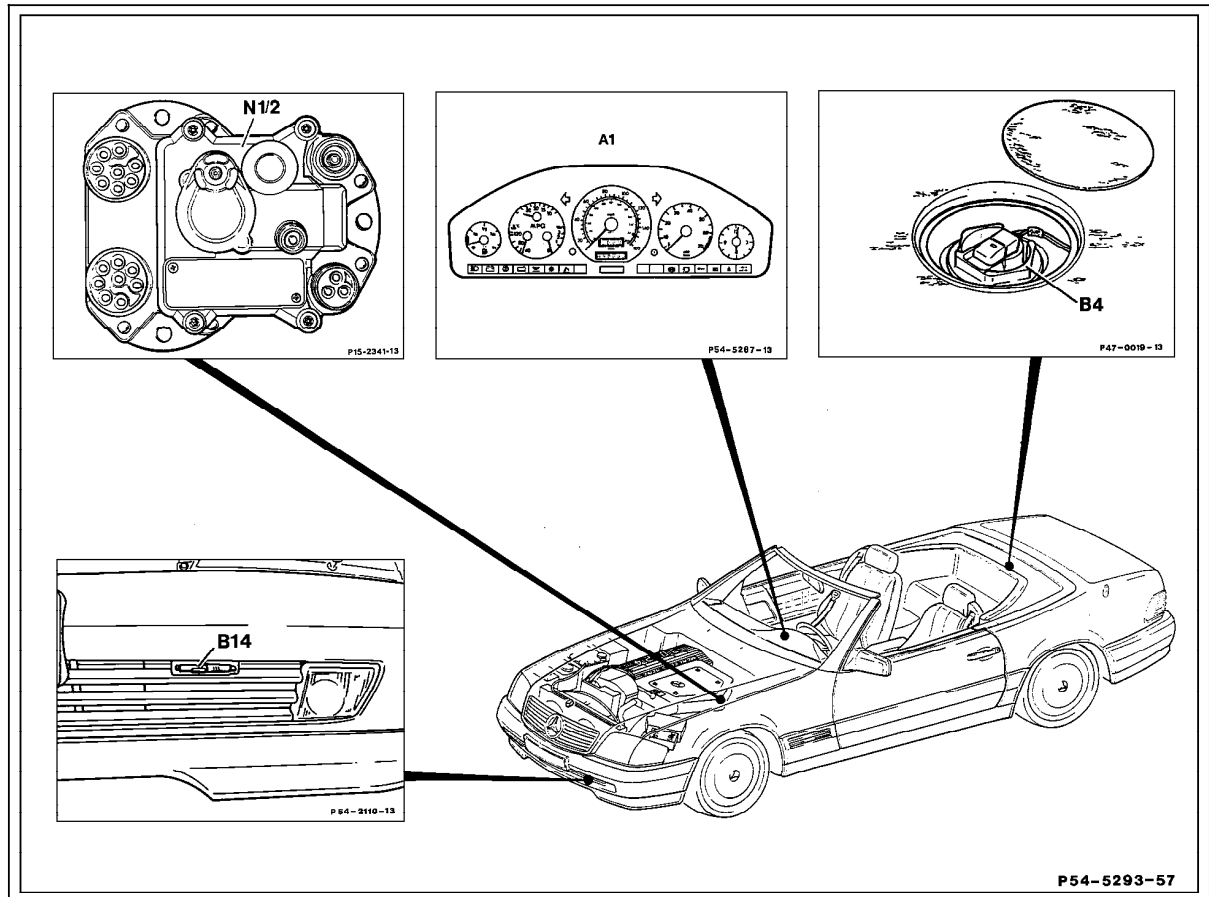


Figure 1

- A1 Instrument cluster
- B4 Fuel level sensor
- B14 Outside temperature indicator temperature sensor
- N1/3 DI control module

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## Electrical Test Program – Component Locations

### Vehicles with CFI or LH-SFI engines

(Layout of module box on vehicles with HFM-SFI engine, see 23)

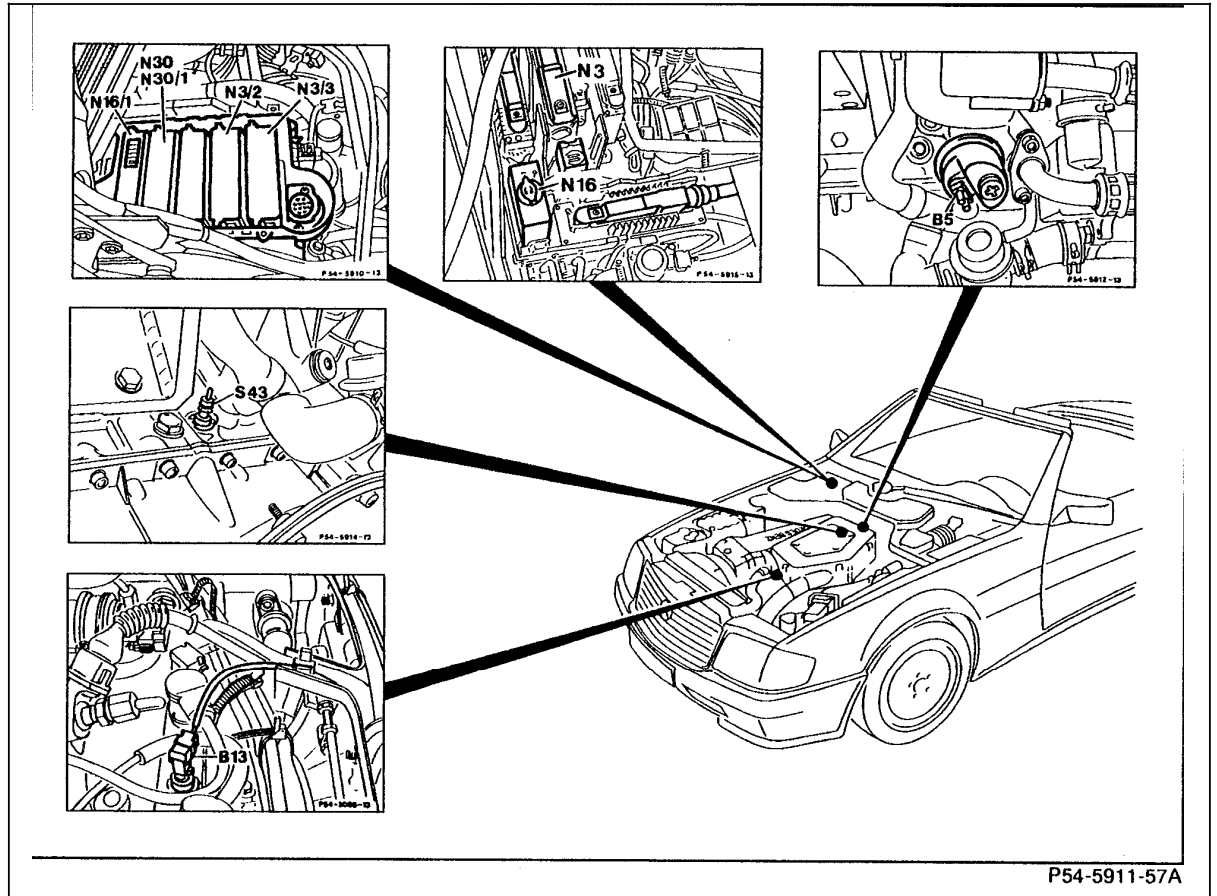


Figure 2

- B5 Oil pressure sensor
- B13 ECT gauge sensor
- N3 CFI control module
- N3/2 Left LH-SFI control module
- N3/3 Right LH-SFI control module
- N16 Engine systems control module (MAS)
- N16/1 Base module
- N30 ABS control module
- N30/1 ASR control module
- S43 Oil level switch

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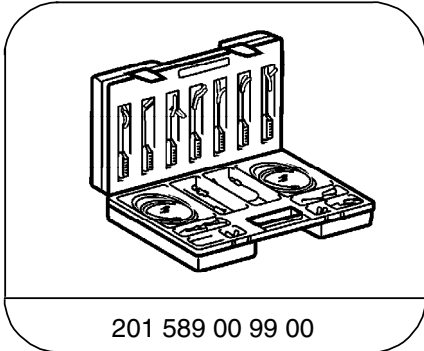
### Electric Test Program – Preparation for Test

1. Battery voltage 11 - 14 V.
2. Check fuses.
3. Systems and fluid levels in order.

#### Note:

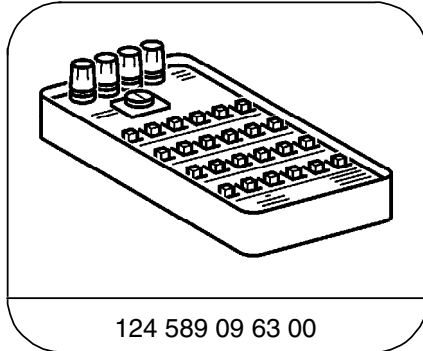
To prevent damage to the control modules referred to in 23, the connectors on the control modules must only be removed or installed with the ignition **OFF**.

#### Special Tools



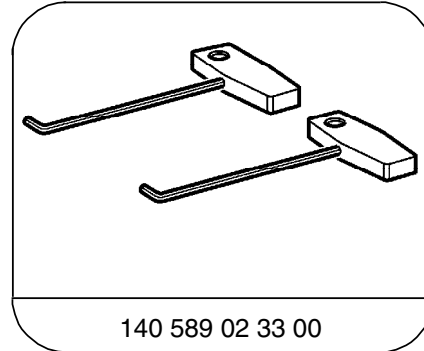
201 589 00 99 00

Electrical connecting set



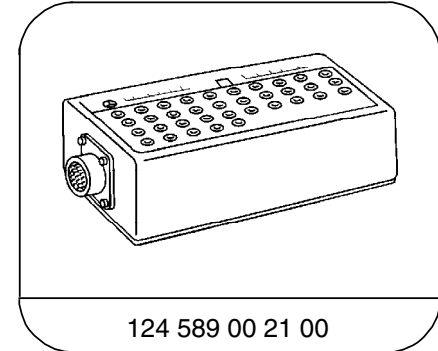
124 589 09 63 00

Ohm decade



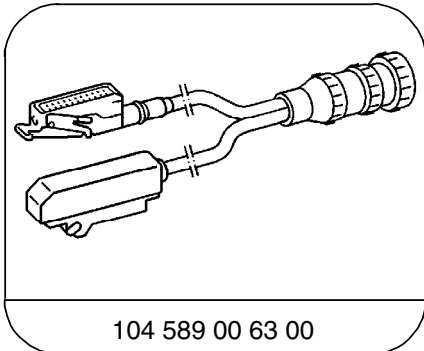
140 589 02 33 00

Extraction hook



124 589 00 21 00

35-pin socket box



104 589 00 63 00

Test cable

#### Electrical wiring diagrams

See Electric Troubleshooting Manual, Model 129, Volume 1.



### Electric Test Program – Preparation for Test

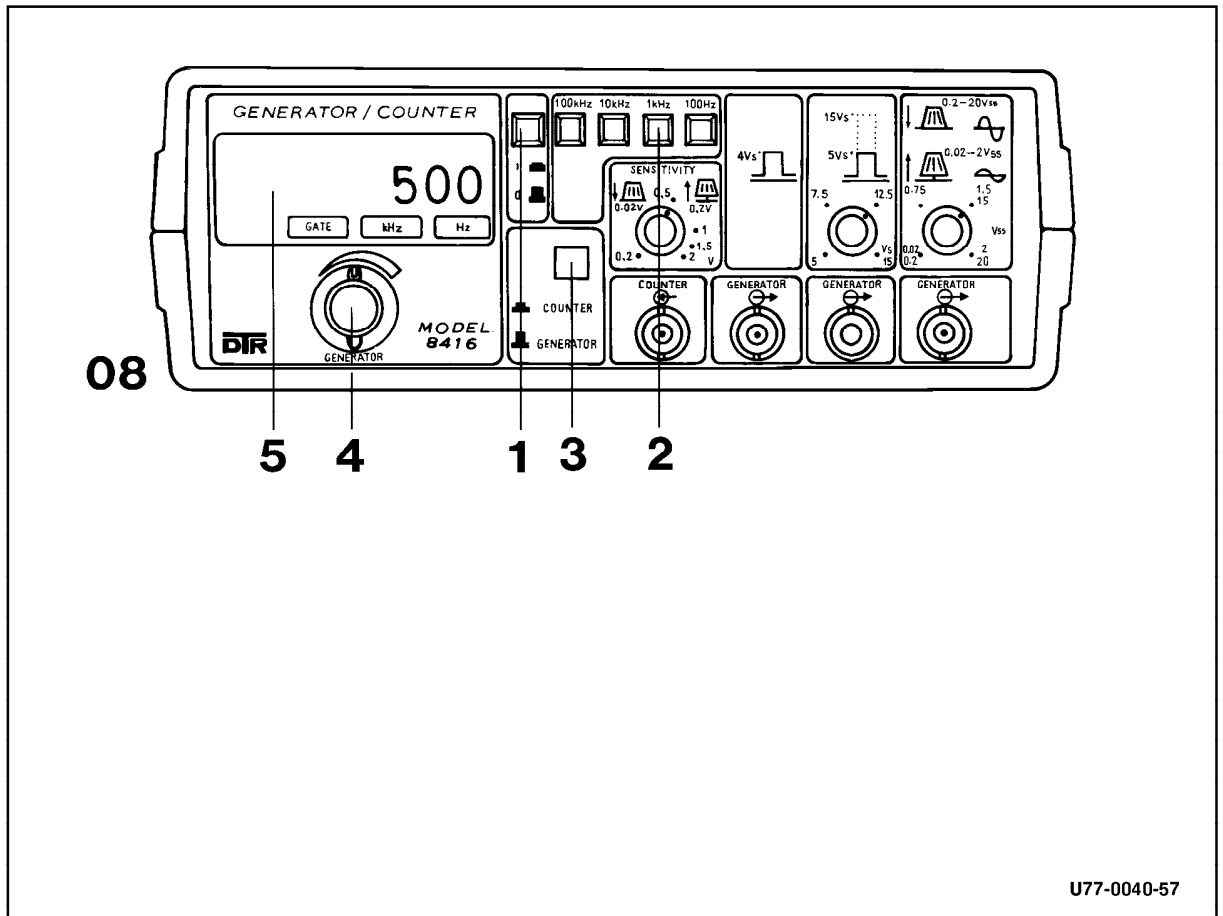
#### Equipment

Multimeter <sup>1)</sup>	Fluke models 23, 83, 85, 87
Signal generator <sup>1)</sup>	SUN DTR-8416

<sup>1)</sup> Available through the MBUSA Standard Equipment Program.

Electric Test Program – Preparation for Test

Signal Generator



- 08** Signal generator
- 1 Power switch (I = ON; O = OFF)
  - 3 Function select (in = frequency counter; out = signal generator)
  - 4 Frequency select (turn to vary frequency)
  - 5 Frequency display (read frequency here)

Use second connector from right for all tests (except test step 9), with selector knob set to 12.5 (as shown).

For test mode 9, use right most connector, with selector knob set to 1.5 and pulled out (as shown).


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### Electrical Test Program – Test

Test step Test mode	Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
⇒ 1.0	<b>Instrument cluster (A1)</b> Voltage supply Circuit 30		Remove A1 Disconnect connector 2	11 – 14 V	Wiring, ⇒ 1.1
⇒ 1.1	Voltage supply Circuit 15, unfused		Remove A1 Disconnect connector 1 Ignition: <b>ON</b>	11 – 14 V	Wiring, ⇒ 1.2
⇒ 1.2	Voltage supply Circuit 15, fused		Remove A1 Disconnect connector 1 Ignition: <b>ON</b>	11 – 14 V	Wiring, Values OK: electronic circuit board
⇒ 2.0	<b>Instrument cluster (A1)</b> Illumination		Remove A1 Disconnect connector 1 Ignition: <b>ON</b> Turn on parking lights	11 – 14 V	Wiring, Rotary light switch (S1)
⇒ 3.0	<b>1 Fuel level gauge (A1p2)</b>		Activate test mode 1	Analog fuel gauge reading digital readout	A1p2, ⇒ 3.1

Electrical Test Program – Test

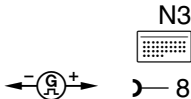
Test step Test mode	Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
⇒ 3.1 6 – 9	Fuel level gauge (A1p2)		Activate test modes 6 – 9	Figure 3 – 6	A1p2, ⇒ 3.2
⇒ 3.2	Wires and connections or fuel level sensor (B4)		Ignition: <b>OFF</b> Disconnect connector at B4. Connect resistance substitution unit. Ignition: <b>ON</b> <b>Resistance substitution unit setting:</b> $70 \pm 3 \Omega$ $62 \pm 1 \Omega$ $53 \pm 2 \Omega$ $37 \pm 2 \Omega$ $21 \pm 2 \Omega$ $5 \pm 2 \Omega$ <b>Note:</b> Before changing each resistance value, the ignition must be turned off and then turned on again.	<b>Display in A1p2:</b> = 0 <sup>1)</sup> = Res. <sup>1)</sup> = 1/4 = 1/2 = 3/4 = 1/1	Wiring, values OK: B4

<sup>1)</sup> Fuel reserve warning lamps light up.

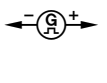
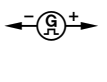
Electrical Test Program – Test

Test step Test mode	Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
⇒ 4.0 2	<b>Fuel consumption indicator (A1p10)</b>		Engine: <b>at Idle</b> Activate test mode 2 Increase engine rpm	With increasing rpm the consumption in l/h increases. <b>Note:</b> Reading on digital display only. The analog reading shows ∞.	⇒ 4.1
⇒ 4.1 6 – 8	A1p10		Activate test modes 6 – 8	See Figures 3 – 5	A1p10, ⇒ 4.2, ⇒ 4.3



Electrical Test Program – Test

Test step <b>Test mode</b>	Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
⇒ 4.2 <b>2</b>	Fuel consumption signal from CFI control module (N3)  <b>Engine 104, 119 CFI</b>	 <p>W16 ← ⊕ → 8</p> <p>N3</p>	Disconnect N3. Connect signal generator (Figure 9) and set to a voltage amplitude of approx. 10 V. Ignition: <b>ON</b> Activate test mode 2.	50 HZ = 5 l/h 100 HZ = 10 l/h 150 HZ = 15 l/h 200 HZ = 20 l/h  <b>Note:</b> The readout is only visible on the digital display. The analog reading shows ∞.	Wiring.  <b>Note:</b> If no consumption (l/h) is indicated at idle speed and connected CFI control module (N3), replace the CFI control module (N3).  If no plausible values are indicated while driving, the speed signal is missing. Replace electronic circuit board.

Electrical Test Program – Test



Test step Test mode	Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
⇒ 4.3	Fuel consumption signal from LH-SFI control module (N3/1 or N3/3)  <b>Engine 119, 120 LH-SFI</b>  <b>Engine 104 HFM-SFI</b>	<p>W16  9 (1)</p> <p>W16  7 (1)</p>	<p>Ignition: <b>OFF</b> Remove N3/1, N3/3 or N3/4 (Figure 15, 16 and 17) Connect signal generator and set to a voltage amplitude of approx. 10 V (Figure 18) Ignition: <b>ON</b> Activate test mode 2.</p>	<p>25 HZ = 5 l/h 50 HZ = 10 l/h 75 HZ = 15 l/h 100 HZ = 20 l/h</p> <p><b>Note:</b> The readout is only visible on the digital display. The analog reading shows ∞.</p>	<p>Wiring, Electronic circuit board, Values OK: N3/1, N3/3 or N3/4 Engines, Volume 2 – 1.1 23 or 3.1 23 or 3.2 23</p> <p><b>Note:</b> If no plausible values are indicated while driving and the speedometer is functioning correctly, replace electronic circuit board.</p>
⇒ 5.0	<b>3 Oil pressure gauge with warning lamp (A1p3)</b>		<p>Engine: <b>at Idle</b> Activate test mode 3. Increase engine rpm</p>	<p>Analog reading digital readout. The oil pressure increases with increasing engine rpm.</p>	<p>A1p3, ⇒ 5.1</p>

Electrical Test Program – Test

Test step Test mode	Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
⇒ 5.1 6 – 7	Oil pressure gauge with warning lamp (A1p3)		Activate test modes 6 – 7	See Figures 3 and 4	A1p3, Electronic circuit board, ⇒ 5.2
⇒ 5.2	Wires and connections or oil pressure sensor (B5)		Disconnect connector at B5. Connect resistance substitution unit. Engine: <b>at Idle</b> <b>Resistance substitution unit setting:</b> 13 Ω = 0 40 Ω = 1 90 Ω = 2 150 Ω = 3	<b>Display in A1p3:</b> = 0 = 1 = 2 = 3	Wiring, Electronic circuit board, Values OK: check oil pressure (see SMS Engine, Mechanical), B5.
⇒ 6.0	<b>Oil pressure gauge with warning lamp (A1p3)</b> Oil pressure warning lamp function		If oil pressure is OK, disconnect connector at B5. Connect resistance substitution unit. Run engine at > 1200 rpm <b>Resistance substitution unit setting:</b> 13 Ω	<b>Display in A1p3:</b> =0 Oil pressure warning lamp lights up.	⇒ 5.2, Electronic circuit board.



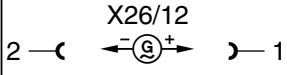

Electrical Test Program – Test

Test step Test mode	Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
⇒ 7.0 4	<b>Tachometer (A1p5)</b>		Engine: <b>at Idle</b> Activate test mode 4, increase engine rpm	Analog tachometer reading digital readout	Wiring and connections, TN - signal from ignition control module (N1/3), A1p5, Engine systems control module (N16), ⇒ 7.1 – 7.3
⇒ 7.1	Tachometer (A1p5) Engine 104 CFI	W3  N1/3 4 (A)	Disconnect plug A on N1/3 (Figure 1) Connect signal generator and set to a voltage amplitude of approx. 10 V Ignition: <b>ON</b>	Readout 50 HZ = 1000 rpm 194 HZ = 4000 rpm	Wiring, N16, Values OK: N1/3.
⇒ 7.2	Tachometer (A1p5) Engine 119 CFI	W3  N1/3 4 (A)	Disconnect plug A on N1/3 (Figure 1). Connect signal generator and set to a voltage amplitude of approx. 10 V. Ignition: <b>ON</b>	Readout 70 Hz = 1000 rpm 270 Hz = 4000 rpm	Wiring, N16, Values OK: N1/3.



Electrical Test Program – Test

Test step Test mode	Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
⇒ 7.3	Tachometer (A1p5) LH-SFI Engines  HFM-SFI Engines	<p>N16/1 W16 ← ⊗ → 13</p> <p>N3/4 W16 ← ⊗ → 18 (1)</p>	<p>Remove base module (N16/1) or engine control module (N3/4) (Figures 15, 16 and 17). Connect signal generator and set to a voltage amplitude of approx. 10 V (Figure 18) Ignition: <b>ON</b></p>	<p><b>Engine 119 LH-SFI</b> 70 Hz = 1000 rpm 270 Hz = 4000 rpm</p> <p><b>Engine 104 HFM-SFI, Engine 120 LH-SFI</b> 50Hz = 1000 rpm 194Hz = 4000 rpm</p>	<p>Wiring, Electronic circuit board, Values OK on LH-SFI engines: N16/1, DM, Chassis and Drivetrain, Volume 1 – 1.1 23,</p> <p>Values OK on HFM-SFI engines: N3/4.</p>
⇒ 8.0	5 <b>Low engine oil level indicator (A1e12)</b>		<p>Oil level correct. Engine: <b>at Idle</b> Activate test mode 5.</p>	<p>Digital readout 0.5 = oil level indicator lamp <b>OFF</b>, oil level correct. 1.5 = oil level indicator lamp <b>ON</b>, oil level incorrect</p>	<p>Wiring, Oil level switch (S43).</p>

Electrical Test Program – Test

Test step Test mode	Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
⇒ 9.0	<b>Electronic speedometer (A1p8)</b>	 <p>X26/12 2 — ◀ — ⊖ ⊕ — ▶ — 1</p>	Disconnect 6-pole connector X26/12 (Figure 11) Ignition: <b>ON</b> Connect signal generator and set to a voltage amplitude of approx. 2 V.	With increasing frequency the speed on the speedometer increases.	Wiring, Electronic circuit board, A1p8, If speedometer is OK, vehicle speed sensor (L2).  <b>Note:</b> If the electronic speedometer and the fuel consumption indicator are not operating, the vehicle speed signal is missing.
⇒ 10.0	<b>Outside temperature display (A1p4)</b>	 <p>X67 1 — ◀ — [Resistor] — ▶ — 2</p>	Disconnect connector X67 (Figure 10) Connect resistance substitution unit. Ignition: <b>ON</b> <b>Resistance substitution unit setting:</b> 53 kΩ = - 30 °C 9.8 kΩ = 0 °C 1 kΩ = + 50 °C	<b>Display in A1p4:</b> = - 30 °C = 0 °C = + 50 °C	Wiring, A1p4, Electronic circuit board, Values OK: outside temperature sensor (B14).

Electrical Test Program – Test

Test step Test mode	Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
⇒ 11.0	<b>ECT gauge (A1p1)</b>	W11—  B13 	Disconnect plug on ECT gauge sensor (B13). Connect resistance substitution unit. Ignition: <b>ON</b> <b>Resistance substitution unit setting:</b> 110 Ω = 60 °C 67 Ω = 80 °C 38 Ω = 100 °C 20 Ω = 120 °C	<b>Display in A1p1:</b>	Wiring, A1p1, Values OK: B13.

Electrical Test Program – Test

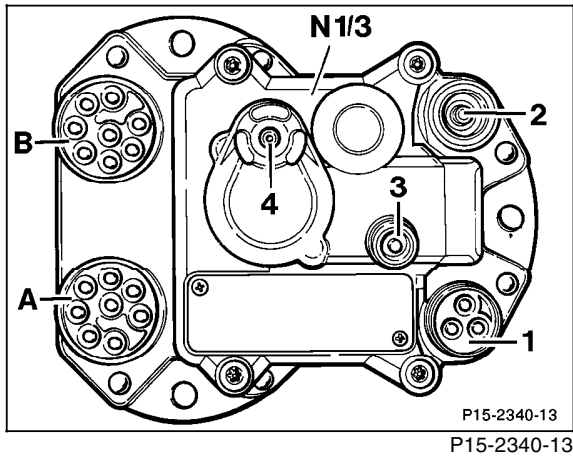


Figure 1

N1/3 Ignition control module

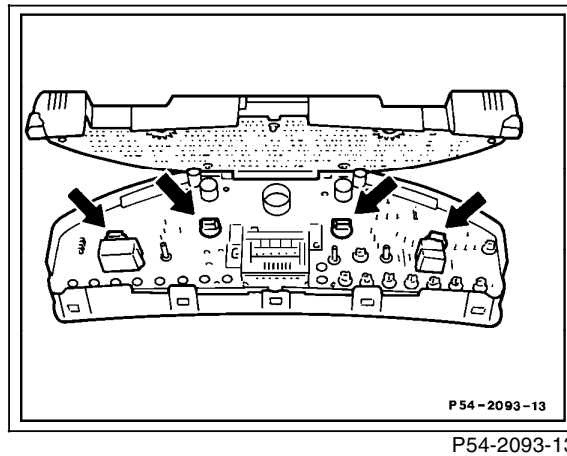


Figure 2

Instrument cluster illumination

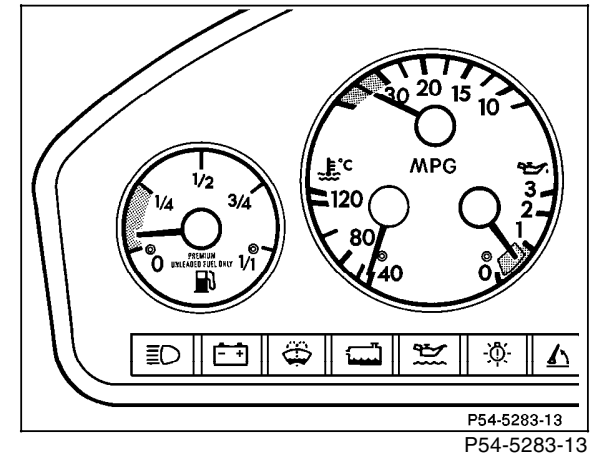


Figure 3

Activation of instruments

1st quarter: Fuel tank  
Fuel consumption  
Oil pressure

Electrical Test Program – Test

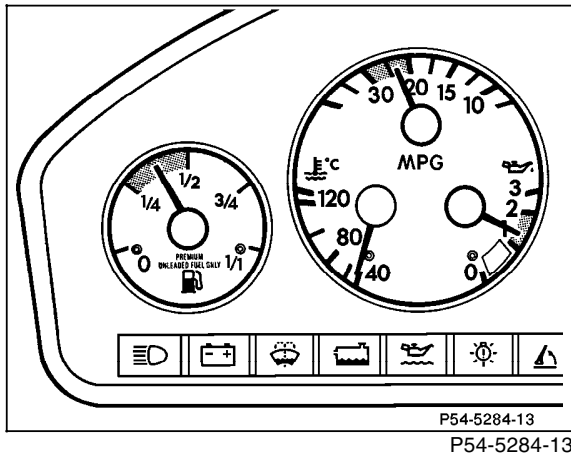


Figure 4

Activation of instruments

- 2nd quarter:
- Fuel tank
  - Fuel consumption
  - Oil pressure

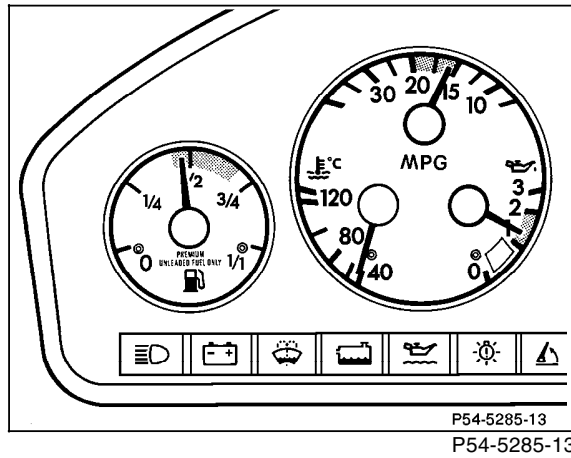


Figure 5

Activation of instruments

- 2nd quarter:
- Oil pressure
- 3rd quarter:
- Fuel tank
  - Fuel consumption

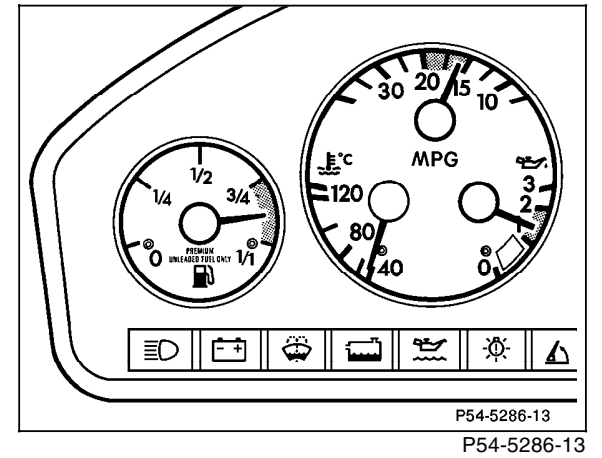
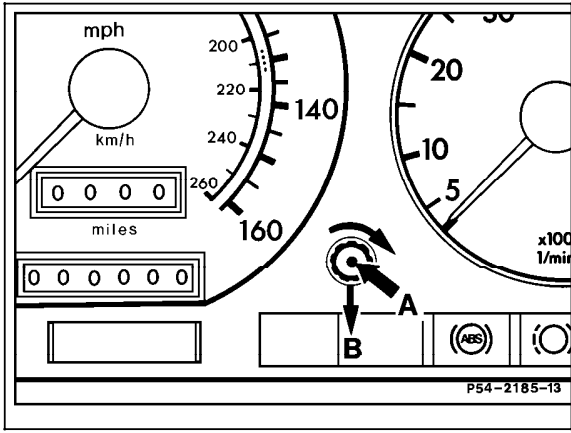


Figure 6

Activation of instruments

- 2nd quarter:
- Oil pressure
- 3rd quarter:
- Fuel consumption
- 4th quarter:
- Fuel tank

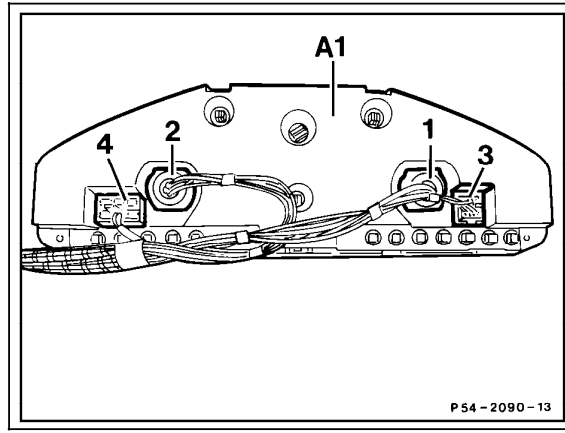
Electrical Test Program – Test



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Figure 7

Activation of test mode



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Figure 8

Instrument cluster, rear

Electrical Test Program – Test

Connection Diagram – Signal Generator  
CFI Engines

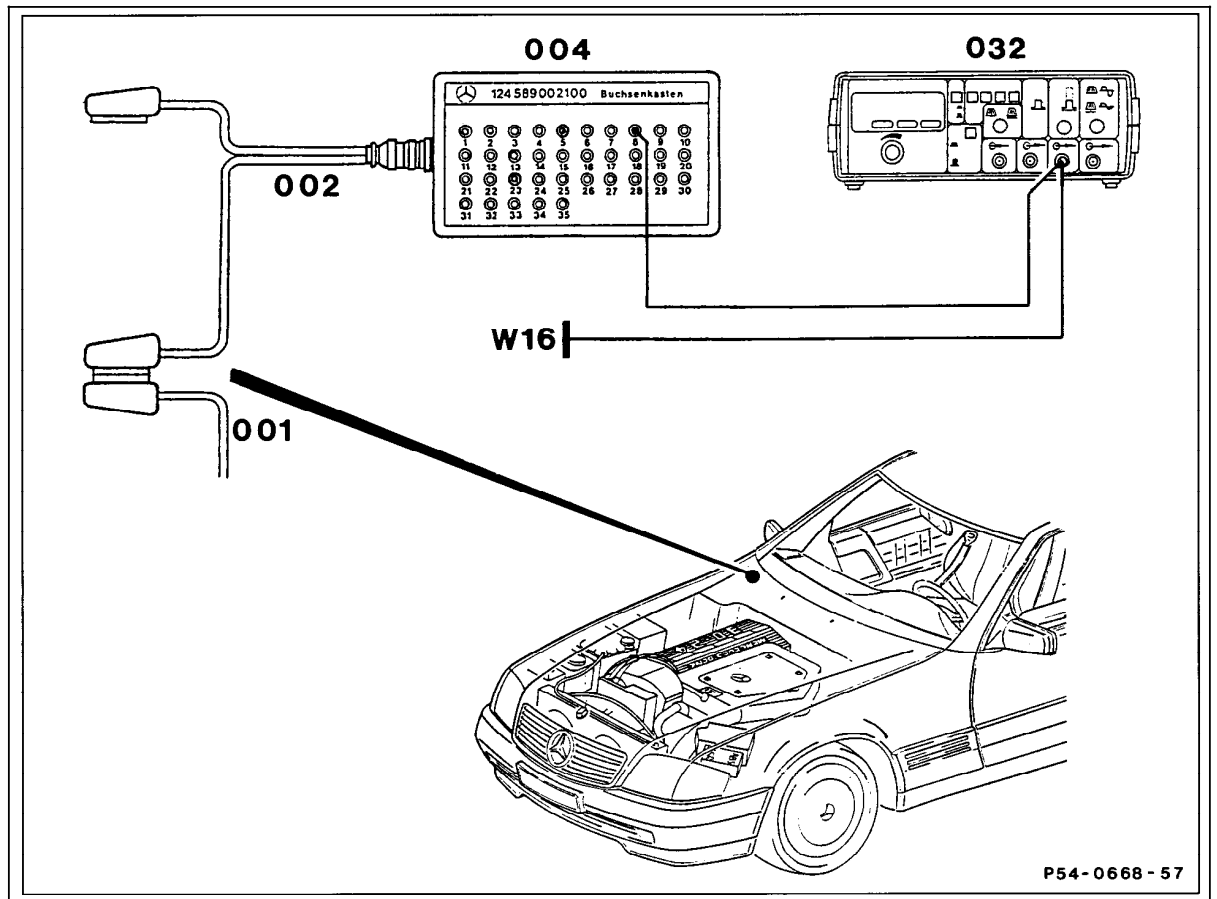


Figure 9

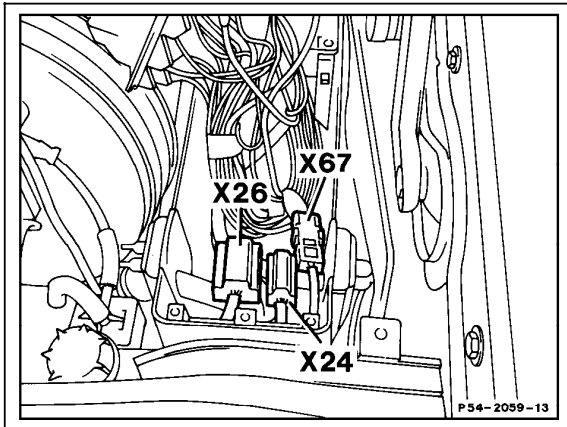
- 001 CFI control module connector
- 002 Test cable 104 589 00 63 00
- 004 Socket box
- 032 Signal generator
- W16 Ground (component compartment)

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P54-0668-57



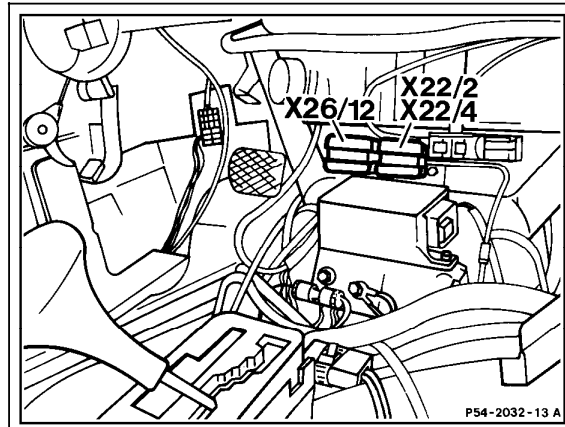
Electrical Test Program – Test



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Figure 10

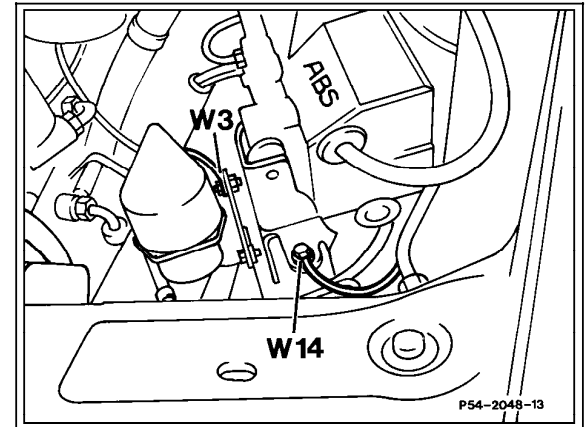
X67 Outside temperature indicator connector (2-pole)



P54-2032-13A

Figure 11

X26/12 Interior/transmission connector (6-pole)

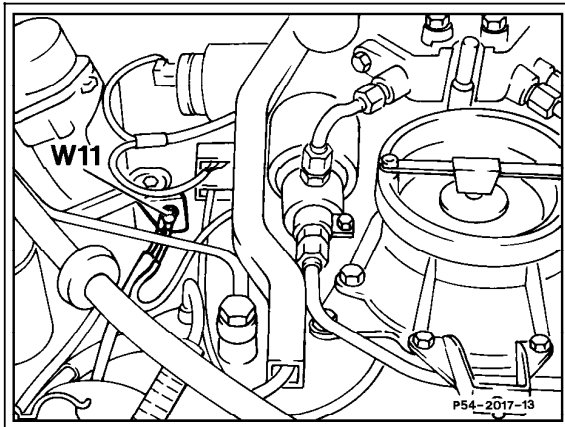


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Figure 12

W3 Ground (left front wheelhousing at ignition coil)

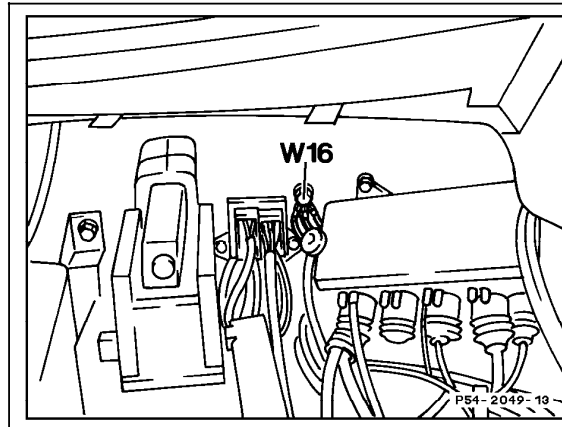
Electrical Test Program – Test



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Figure 13

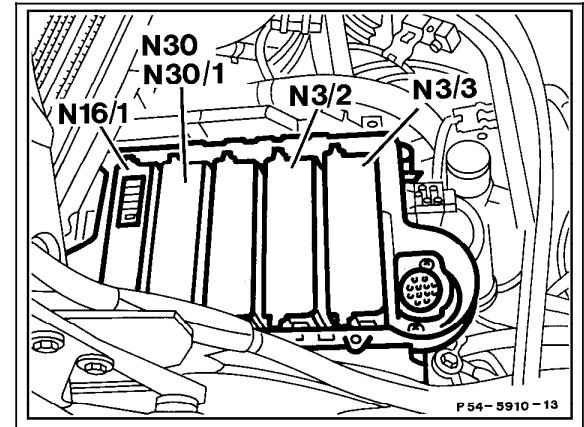
W11 Ground (engine - connection point for ground wires)



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Figure 14

W16 Ground (component compartment)

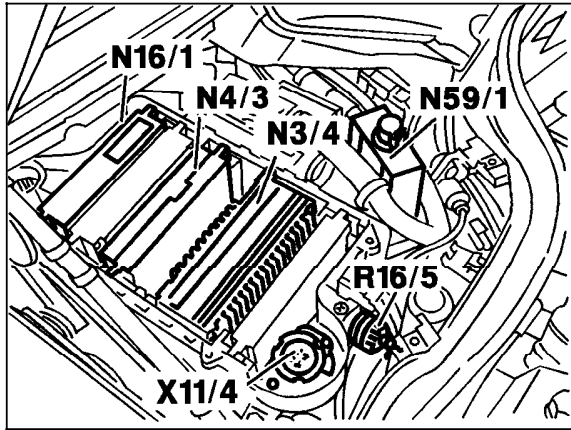


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Figure 15  
Module box on vehicles with LH-SFI engine

N16/1 Base module  
 N3/2 Left LH-SFI control module  
 N3/3 Right LH-SFI control module  
 N30 ABS control module  
 N30/1 ASR control module

Electrical Test Program – Test

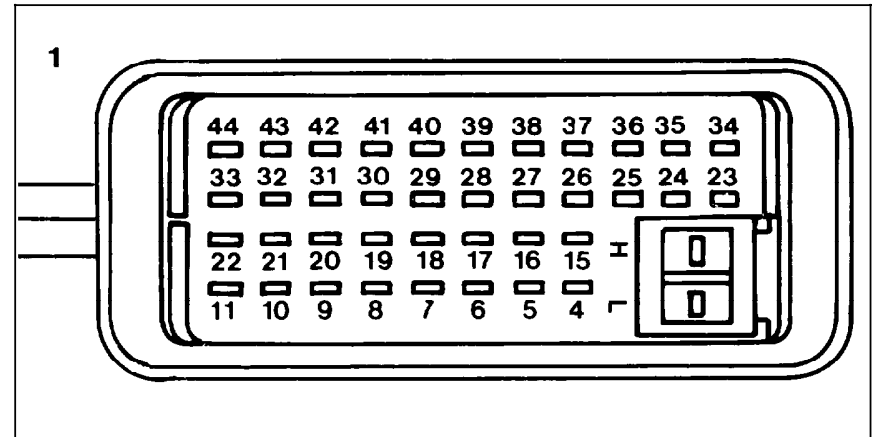


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Figure 16  
Module box on vehicles with HFM-SFI engines

N3/4 Engine control module (HFM-SFI)

Electrical Test Program – Test



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Figure 17

Engine control module (N3/4) connector "1"

- 7 Fuel consumption signal
- 18 Engine rpm output signal (TN-signal)

Electrical Test Program – Test

Connection Diagram – Signal Generator  
LH-SFI or HFM-SFI Engines

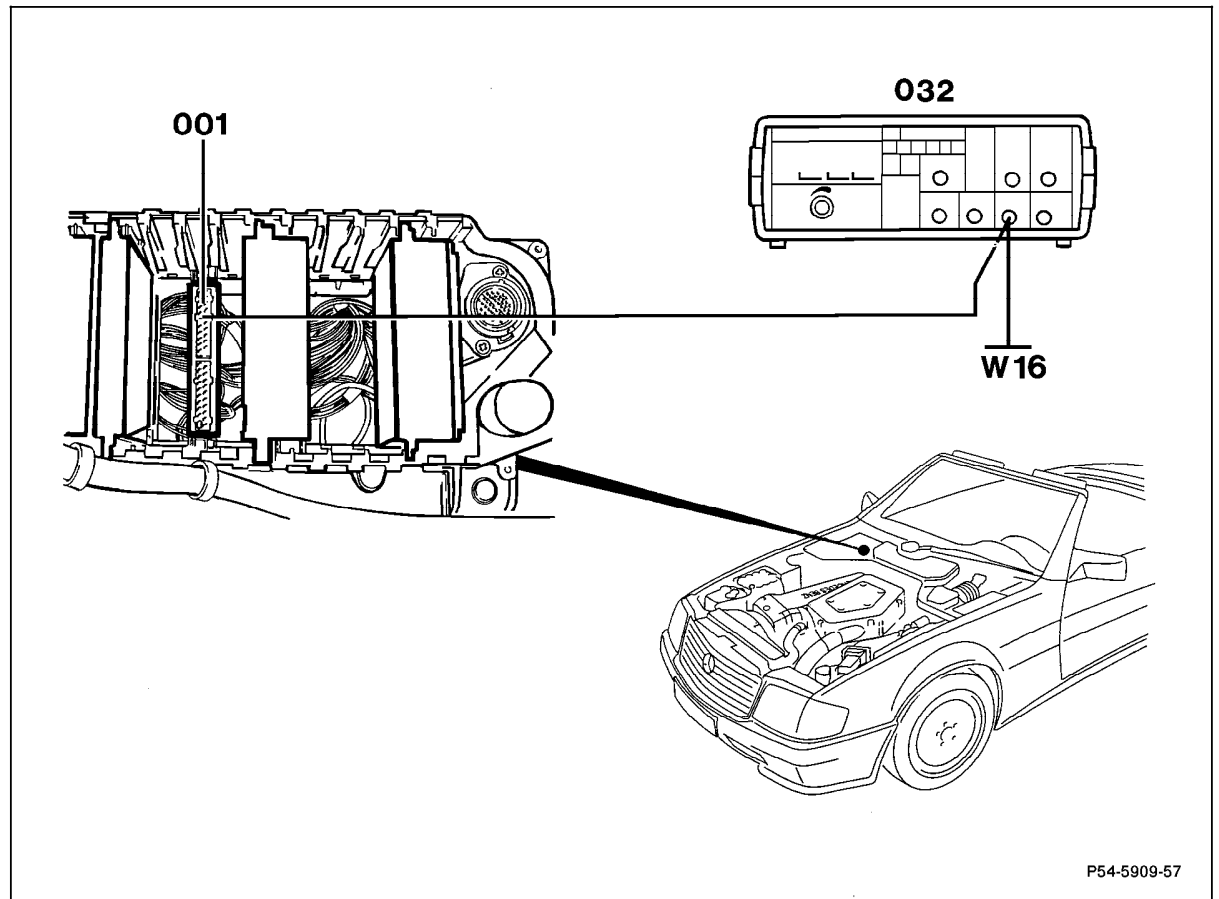


Figure 16

- 001 ABS control module connector
- 032 Signal generator
- W16 Ground (component compartment)

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