

### 1.8 Model 129 (IC with digital odometer) up to M.Y. 1996

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**Diagnosis – Technical Changes**

**Version start dates/Changes/Innovations**

World wide Manuf. code	Model	LHS <sup>1)</sup> RHS <sup>1)</sup>	Manuf. plant	As of chassis number	Up to chassis number	As of production date	Up to production date	Type and reason for change	Reference/Remarks
WDB	129								Vehicle with control module box (plastic)
WDB	129					09/95		Instrument cluster with interface to the traction system control module (N47)	Vehicle with control module box (plastic)

<sup>1)</sup> LHS: Left hand steering  
RHS: Right hand steering

### Diagnosis – Function Test

#### General Information

- There are 9 test modes available which are indicated via the odometer display. The test mode number is indicated by the left digit in the display and the test values are the digits on the right. A comma is indicated by a low dash.  
Example: Test mode 1 “Fuel tank display”, appears as “1 80”, which means test mode 1 and 80 liters.
- During test mode 2 “Momentary fuel consumption in liters per hour”, the consumption values are indicated by a three or four digit display:  
Example: “2 3.4” corresponds to test mode 2 and 3.4 l/h or  
“2 12.0” corresponds to test mode 2 and 12.0 l/h.
- During test mode 6 “Resistance value of outside temperature gauge” the values are indicated by a three or four digit display:  
Example: “6 3.7” corresponds to test mode 6 and 3.7 kΩ.

#### Note:

- The test values that are indicated during diagnostics in the odometer 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 odometer indicator window)

- Ignition: **ON**
- Depress center of clock adjusting knob “A” ( 23 or 24 Fig. 1) for at least 5 seconds and the display “-----” will appear in the odometer display window.
- Within 5 seconds pull out clock adjusting knob “B” and turn clockwise ( 23 or 24 Fig. 1) to activate the first test mode. For each additional test mode, the clock adjusting knob “B” must be pulled out and turned again clockwise.

#### CAUTION!

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 (odometer display)	1 60	60 liters
2	Momentary fuel consumption in liters per hour	2 3.4 2 12.0	3.4 liters per hour 12 liters per hour
3	Engine oil pressure in bar	3 2.0	2.0 bar
4	Engine rpm	4 4100	4100 rpm
5	Engine oil level	5 0 5 1	0= Oil level OK 1= Oil level not OK
6	Activation of oil pressure, fuel consumption and fuel tank gauges as well as speedometer and tachometer	6	Needle in first quarter of gauge dial ( 23 or 24, Figures 2 and 3)
	Resistance value of outside temperature gauge	6 3.7	3.7 kΩ
7	Activation of oil pressure, fuel consumption and fuel tank gauges as well as speedometer and tachometer	7 3.7	Needle in second quarter of gauge dial ( 23 or 24, Figures 4 and 5)

Diagnosis – Function Test

Diagnostic Test Mode Identification

Test mode no.	Function/component	Digital readout (example)	Corresponds to:
8	Activation of fuel consumption and fuel tank gauges as well as speedometer and tachometer	8 3.7	Needle in third quarter of gauge dial, the oil pressure gauge stays in second quarter of dial ( 23 or 24, Figures 6 and 7).
9	Activation of fuel tank gauge as well as speedometer and tachometer	9 3.7	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 or 24, Figures 8 and 9)

## Diagnosis – Complaint Related Diagnostic Chart

Complaint/Problem	Possible cause	Test step/Remedy <sup>1)</sup>
Entire instrument cluster (A1) not functioning.	Power supply, Instrument cluster (A1)	<b>up to 08/95</b> 23 ⇒ 1.0 <b>as of 09/95</b> 24 ⇒ 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, Instrument cluster (A1)	<b>up to 08/95</b> 23 ⇒ 1.0 <b>as of 09/95</b> 24 ⇒ 1.0
Rhythmic blinking of warning and indicator lamps in one second intervals	Short circuit in instrument cluster (A1).	<b>up to 08/95</b> 23 ⇒ 1.0 <b>as of 09/95</b> 24 ⇒ 1.0
Non-rhythmic blinking of warning and indicator lamps	Low voltage at instrument cluster (A1).	<b>up to 08/95</b> 23 ⇒ 1.0 <b>as of 09/95</b> 24 ⇒ 1.0
Instrument cluster illumination not operating.	Bulbs, Exterior lamp switch (S1), Instrument cluster (A1).	<b>up to 08/95</b> 23 ⇒ 2.0 <b>as of 09/95</b> 24 ⇒ 2.0
Indicator lamps for ABS, ETS/ASR/ESP brake pad wear, brake fluid/parking brake do not go out after engine is started.	Instrument cluster (A1), Traction system control module (N47).	<b>as of 09/95</b> 24 ⇒ 3.0
Fuel tank gauge (A1p2) inaccurate or not operating.	Instrument cluster (A1), Fuel level sensor (B4).	<b>up to 08/95</b> 23 ⇒ 3.0 <b>as of 09/95</b> 24 ⇒ 4.0
Fuel consumption gauge (A1p10) inaccurate or not operating.	Instrument cluster (A1), Fuel consumption signal from LH-SFI, HFM-SFI or ME control module.	<b>up to 08/95</b> 23 ⇒ 4.0 <b>as of 09/95</b> 24 ⇒ 5.0
Engine oil pressure gauge (A1p3) inaccurate or not operating.	Oil pressure sensor (B5), Instrument cluster (A1).	<b>up to 08/95</b> 23 ⇒ 5.0 <b>as of 09/95</b> 24 ⇒ 6.0

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

### Diagnosis – Complaint Related Diagnostic Chart

Complaint/Problem	Possible cause	Test step/Remedy <sup>1)</sup>
Tachometer (A1p5) inaccurate or not operating.	Instrument cluster (A1), TN-signal.	<b>up to 08/95</b> 23 ⇒ 6.0 <b>as of 09/95</b> 24 ⇒ 7.0
Low engine oil level indicator lamp (A1e12) lights up but oil level is OK.	Oil level switch S43.	<b>up to 08/95</b> 23 ⇒ 7.0 <b>as of 09/95</b> 24 ⇒ 8.0
Electronic speedometer (A1p8) inaccurate or not operating.	Instrument cluster (A1), Transmission inductive speed sensor (L2), Vehicle speed signal from traction system control module (N47)	<b>up to 08/95</b> 23 ⇒ 8.0  <b>as of 09/95</b> 24 ⇒ 9.0
Outside temperature display (A1p4) inaccurate or not operating.	Instrument cluster (A1), Outside temperature indicator temperature sensor (B14).	<b>up to 08/95</b> 23 ⇒ 9.0 <b>as of 09/95</b> 24 ⇒ 10.0
ECT gauge (A1p1) inaccurate or not operating.	Instrument cluster (A1), ECT gauge sensor (B13).	<b>up to 08/95</b> 23 ⇒ 10.0 <b>as of 09/95</b> 24 ⇒ 10.0

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

Electrical Test Program – Component Locations

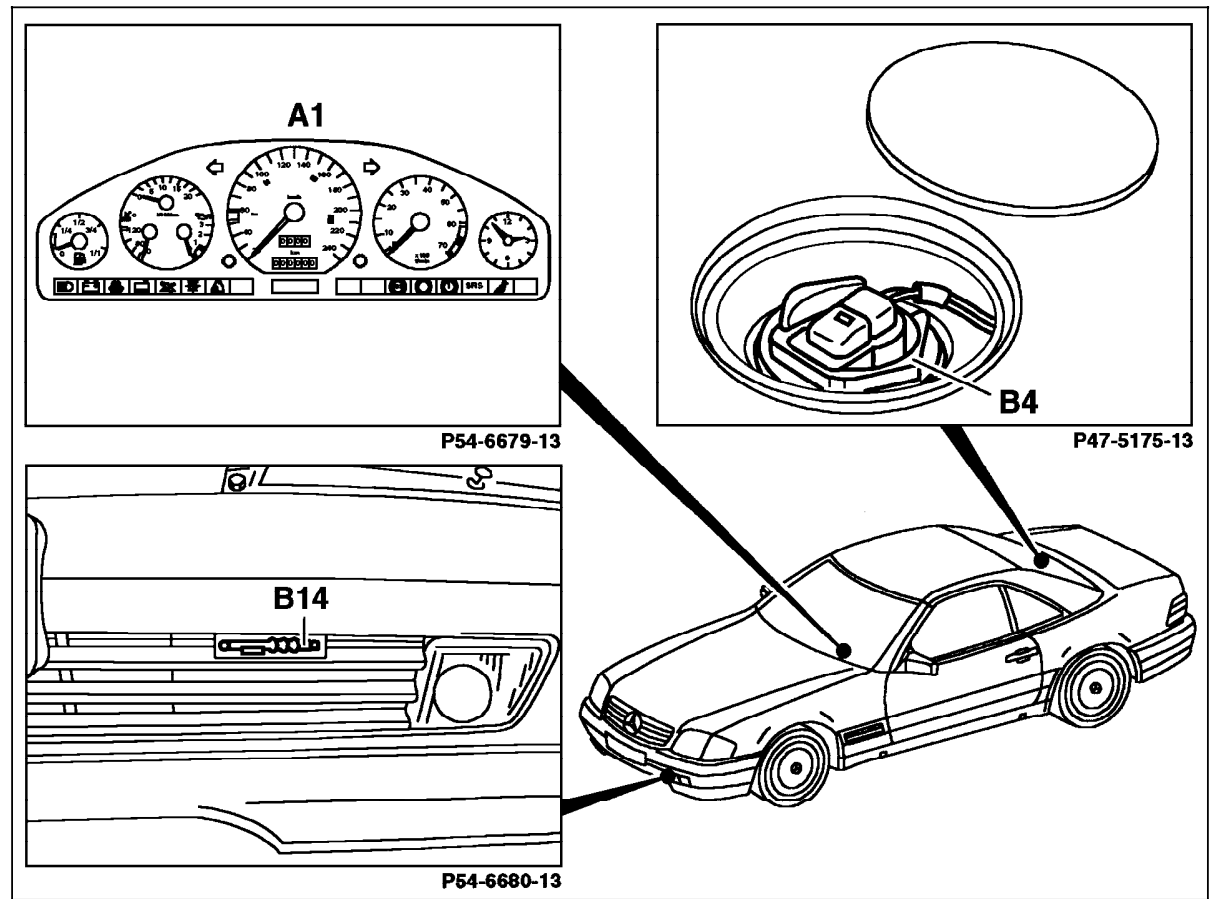


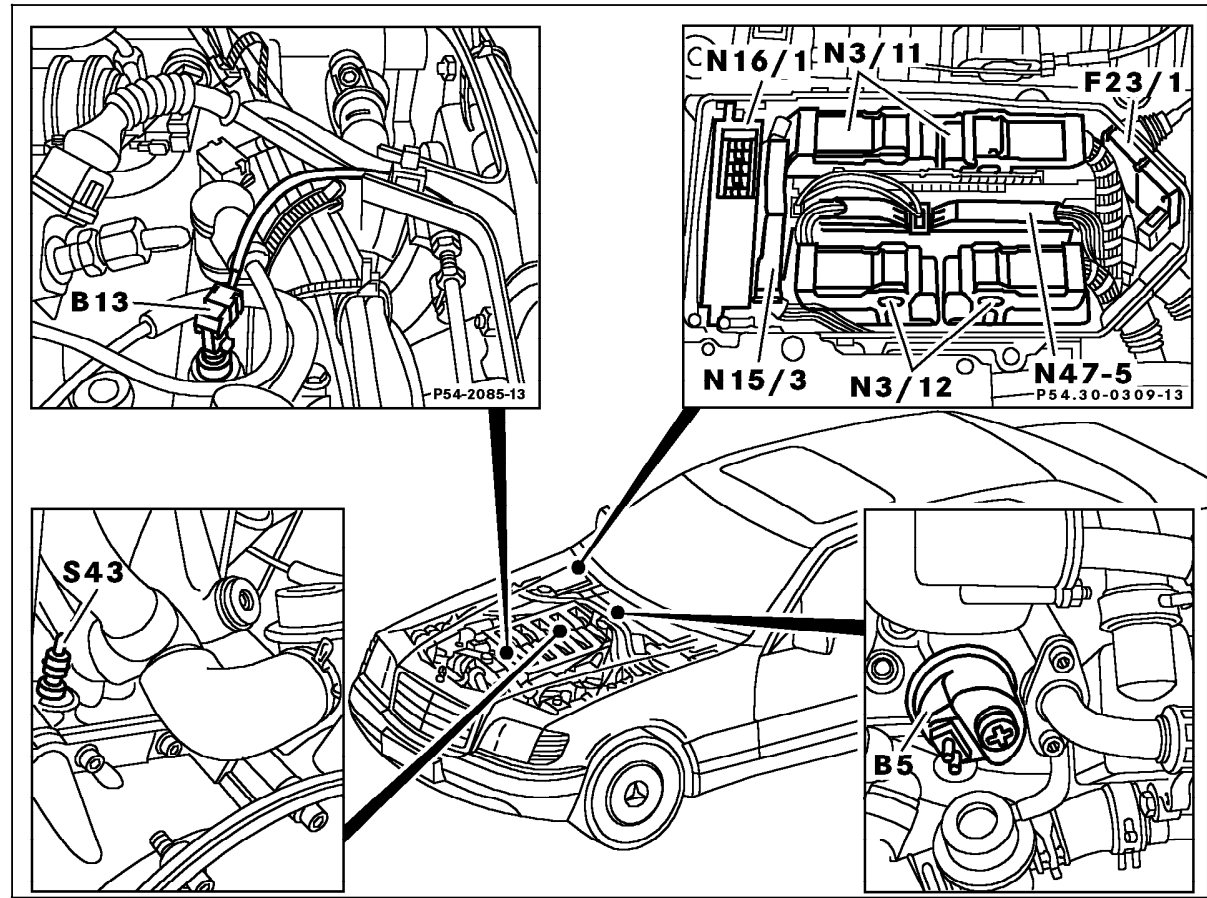
Figure 1

- A1 Instrument cluster
- B4 Fuel level sensor
- B14 Outside temperature indicator temperature sensor

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Electrical Test Program – Component Locations



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Figure 2

Vehicles with control module box (plastic)

- B5 Oil pressure sensor
- B13 ECT gauge sensor
- N3/11 Left engine control module (ME-SFI)
- N3/12 Right engine control module (ME-SFI)
- N47-5 ESP/SPS control module
- S43 Oil level switch

### Electric Test Program – Preparation for Test

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

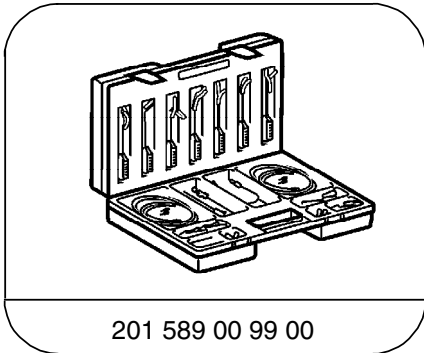
#### Electrical wiring diagrams:

See Electric Troubleshooting Manual, Model 129, Volume 1.

#### Note:

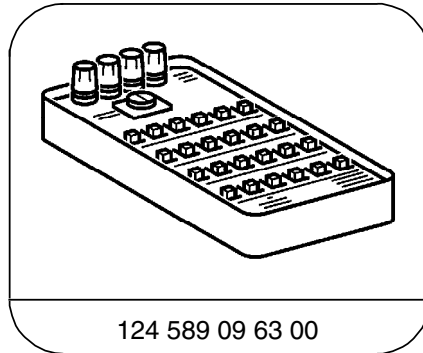
To prevent damage to the control modules referred to in 23 and 24, the connectors on the control modules must only be removed or installed with the ignition **OFF**.

#### Special Tools



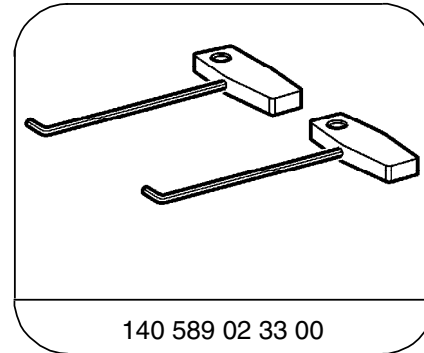
201 589 00 99 00

Electrical connecting set



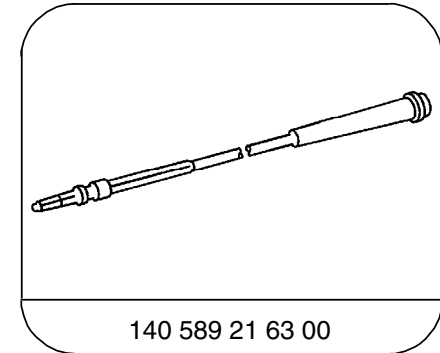
124 589 09 63 00

Ohm decade



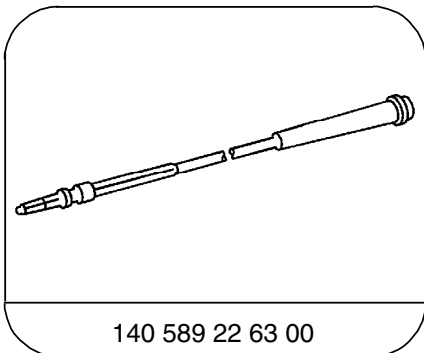
140 589 02 33 00

Extraction hook



140 589 21 63 00

Adapter cable



140 589 22 63 00

Adapter cable

### Electric Test Program – Preparation for Test

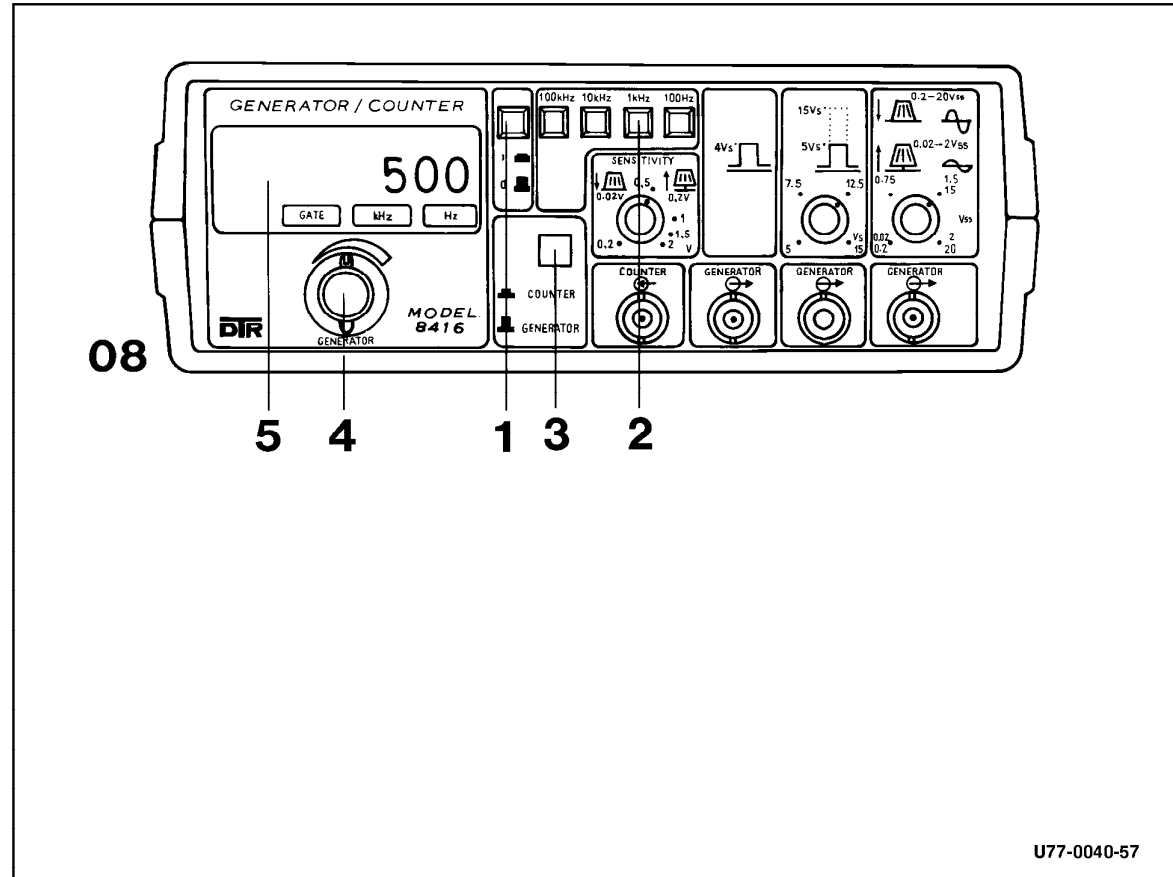
#### Conventional tools, test equipment

Description	Brand, model, etc.
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.

Electrical Test Program – Component Locations

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)

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U77-0040-57

## Electrical Test Program – Test (vehicles up to 08/95)

⇒	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: A1
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), Short circuit in circuit 58d (output from A1).
3.0		<b>Fuel level gauge (A1p2)</b>		Activate test mode 1 (see Figure 1).	Analog fuel gauge reading ≈ digital readout	A1, ⇒ 3.1

Electrical Test Program – Test (vehicles up to 08/95)



⇒	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	see Figures 2 – 9	A1, ⇒ 3.2
3.2		Wires and connections or fuel level sensor (B4)	<p style="text-align: center;">B4</p> <p>1——2</p>	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> $\approx 0$ <sup>1)</sup> $\approx \text{Res.}$ <sup>1)</sup> $\approx 1/4$ $\approx 1/2$ $\approx 3/4$ $\approx 1/1$	Wiring, Values OK: B4

1) Fuel reserve indicator lamp lights up.

Electrical Test Program – Test (vehicles up to 08/95)


⇒	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> The readout is only visible on the digital display. The analog reading shows 0.	⇒ 4.1
4.1	6 – 8	A1p10		Activate test modes 6 – 8	see Figures 2 – 7	A1, ⇒ 4.2

Electrical Test Program – Test (vehicles up to 08/95)



⇒	Mode	Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
4.2	2	Fuel consumption signal from LH-SFI control module (N3/1 or N3/3) or engine control module (N3/4)  (Vehicles with CFI, see section 1.2 23)	<p><b>LH-SFI</b></p> <p>W16  N3/1 or N3/3 9 (1)</p> <p><b>HFM-SFI</b></p> <p>W16  N3/4 7 (1)</p>	<p>Ignition: <b>OFF</b></p> <p>Disconnect N3/1, N3/3 or N3/4 (Figures 10, 15 and 16).</p> <p>Connect signal generator (Figure 17) and set to a voltage amplitude of approx. 10 V.</p> <p>Connect wire for rpm signal as follows:</p> <p><b>LH-SFI</b> N3/1 or N3/3 socket 9 to N16/1 socket 13.</p> <p><b>HFM-SFI</b> N3/4 socket 7 to socket 18.</p> <p>Ignition: <b>ON</b></p> <p>Activate test mode 2.</p>	<p><b>LH-SFI/</b> <b>HFM-SFI</b></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 0.</p>	<p>Wiring, A1, 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 in order: A1</p>
5.0	3	<b>Engine oil pressure gauge (A1p3)</b>		<p>Engine: <b>at Idle</b></p> <p>Activate test mode 3. Increase engine rpm</p>	<p>Analog reading ≈ digital readout. The oil pressure increases with increasing engine rpm.</p>	<p>A1 ⇒ 5.1</p>







Electrical Test Program – Test (vehicles up to 08/95)

⇒	Mode	Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
5.1	6 – 7	Oil pressure gauge (A1p3)		Activate test modes 6 – 7	see Figure 2 and 5	A1, ⇒ 5.2
5.2		Wires and connections or oil pressure sensor (B5)		Ignition: <b>OFF</b> Disconnect connector at B5. Connect resistance substitution unit. Engine: <b>at Idle</b> <b>Resistance substitution unit setting:</b> 13 Ω 40 Ω 90 Ω 150 Ω  <b>Note:</b> Before changing each resistance value, the ignition must be turned off and then turned on again.	<b>Display in A1p3:</b> ≈ 0 ≈ 1 ≈ 2 ≈ 3	Wiring, A1, Values OK: check oil pressure (see SMS Engine, Mechanical), B5
6.0	4	Tachometer (A1p5)		Engine: <b>at Idle</b> Activate test mode 4, increase engine rpm.	Analog tachometer reading ≈ digital readout	A1, ⇒ 6.1


Electrical Test Program – Test (vehicles up to 08/95)

⇒	Mode	Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
6.1		Tachometer (A1p5) with LH-SFI:           with HFM-SFI:	W16  N16/1 ↳ 13           W16  N3/4 ↳ 18 (1)	Disconnect plug on N16/1 or N3/4 (Figures 10, 15 and 17). Connect signal generator and set to a voltage amplitude of approx. 10 V (Figure 17). Ignition: <b>ON</b>	<b>Engine 104, 120</b> Readout: 50 Hz ≈ 1000 rpm 194 Hz ≈ 4000 rpm  <b>Engine 119</b> Readout: 70 Hz ≈ 1000 rpm 270 Hz ≈ 4000 rpm	Wiring, A1, Values OK on LH-SFI engine: N16/1 D.M., Chassis and Drivetrain, Volume 1 – 1.1 23  Values OK on HFM-SFI engine: N3/4
7.0	5	<b>Low engine oil level indicator lamp (A1e12)</b>		Oil level correct. Engine: <b>at Idle</b> Activate test mode 5. <b>Readout in odometer:</b>	0 ≈ oil level OK 1 ≈ oil level not OK	Wiring, Oil level switch (S43)



Electrical Test Program – Test (vehicles up to 08/95)

⇒	Mode	Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
8.0		<p><b>Electronic speedometer (A1p8)</b> Vehicles with VSS from transmission inductive speed sensor (L2) <b>up to approx. 12/93:</b></p> <p>Vehicles with VSS from left front axle VSS sensor (L6/1) <b>Starting approx. 01/94:</b></p> <p><b>Vehicles with ASR or ETS as of 06/94:</b> Left front axle VSS sensor (L6/1) connected to ASR/SPS or ETS/SPS control module (N47-1 or N47-2). See D.M., Chassis and Drivetrain, Vol. 3, 9.1 23</p>	<p>X26/12 2 —  — 1</p> <p><b>ABS only</b> W16  N30 3 (1)</p> <p><b>ASR/ABS</b> W16  N30/1 36 (1)</p> <p><b>ASR/SPS or ETS/SPS</b> W16  N47-1 N47-2</p>	<p>Disconnect 6-pole connector X26/12 (Figure 11). Connect signal generator and set to a voltage amplitude of approx. 2 V (Figure 17). Ignition: <b>ON</b></p> <p>Remove N30 or N30/1, or N47-1 or N47-2 (Figure 10 or 15). Connect signal generator and set to a voltage amplitude of approx. 10 V (Figure 17). Ignition: <b>ON</b></p>	<p>With increasing frequency the speed on the speedometer increases.</p>	<p>Wiring, A1, Values OK: L2.</p> <p>N30 or N30/1, D.M., Chassis and Drivetrain, Volume 2 – 5.3 23 or 6.2 23.</p> <p>N47-1 or N47-2, D.M., Chassis and Drivetrain, Volume 3 – 9.1 23</p>

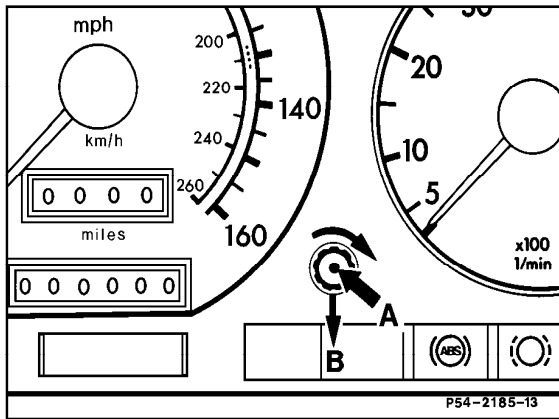
Electrical Test Program – Test (vehicles up to 08/95)

⇒	Mode	Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
9.0		<b>Outside temperature display (A1p4)</b>	 <p>X67</p>	Disconnect 2-pole connector X67 ( Figure 12). Connect resistance substitution unit. Ignition: <b>ON</b> <b>Resistance substitution unit setting:</b> 53 kΩ 9.8 kΩ 1 kΩ	<b>Display in A1p4:</b> ≈ - 30 °C ≈ 0 °C ≈ + 50 °C	Wiring, A1, ⇒ 9.1
9.1	<b>6</b>	Outside temperature indicator temperature sensor (B14)		Ignition: <b>ON</b> Activate test mode 6. 53 kΩ 9.8 kΩ 3.7 kΩ 1.6 kΩ	<b>Readout in odometer:</b> ≈ - 30 °C ≈ 0 °C ≈ 20 °C ≈ 40 °C	B14

Electrical Test Program – Test (vehicles up to 08/95)

⇒	Mode	Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
10.0		<b>ECT gauge (A1p1)</b>	W11—C 	Disconnect plug on ECT gauge sensor (B13). Connect resistance substitution unit. Ignition: <b>ON</b> <b>Resistance substitution unit setting:</b> 110 Ω 67 Ω 38 Ω 20 Ω	<b>Display in A1p1:</b> ≈ 60 °C ≈ 80 °C ≈ 100 °C ≈ 120 °C	Wiring, B13, A1
11.0			W11—C 			Wiring, B13, A1

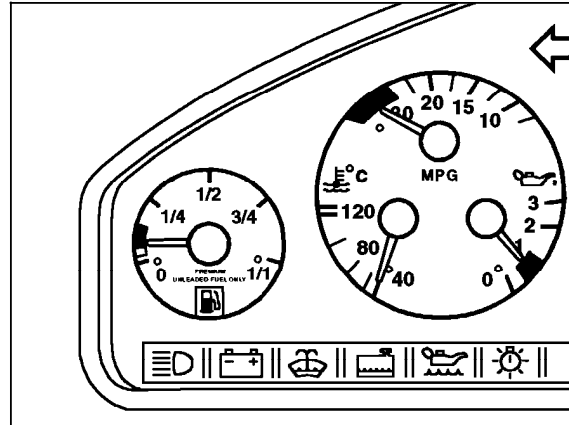
Electrical Test Program – Test (vehicles up to 08/95)



P54-2185-13

Figure 1

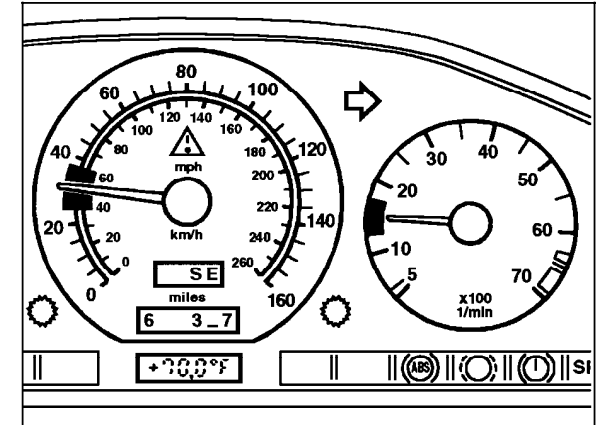
Activation of test mode



P54-6669-13

Figure 2

Activation of instruments  
 1st quarter: Fuel tank  
 Fuel consumption  
 Oil pressure

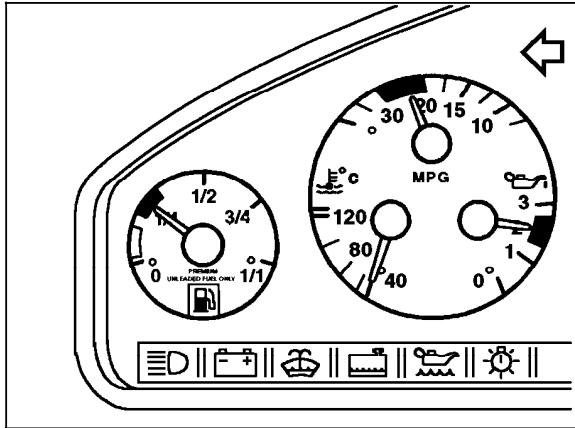


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Figure 3

Activation of instruments  
 1st quarter: Speedometer, Tachometer

Electrical Test Program – Test (vehicles up to 08/95)

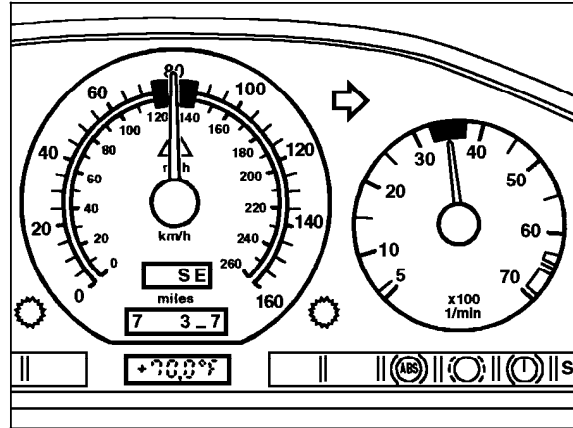


P54-6670-13

Figure 4

Activation of instruments

- 2nd quarter: Fuel tank  
 Fuel consumption  
 Oil pressure

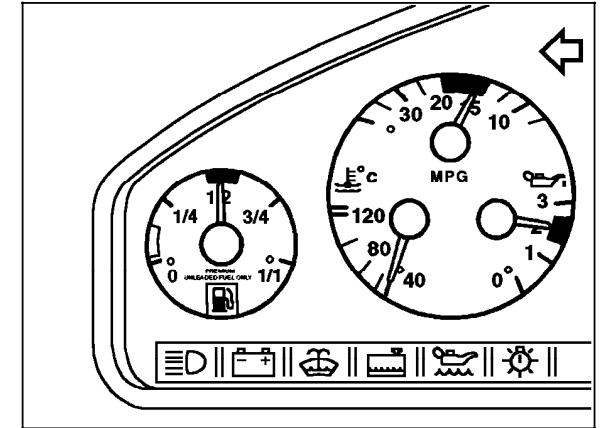


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Figure 5

Activation of instruments

- 2nd quarter: Speedometer, Tachometer



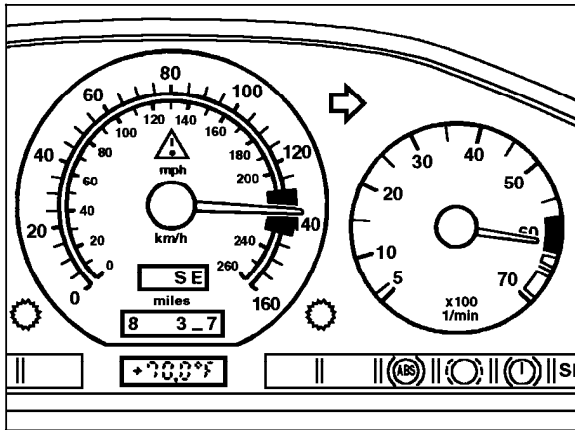
P54-6671-13

Figure 6

Activation of instruments

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

Electrical Test Program – Test (vehicles up to 08/95)

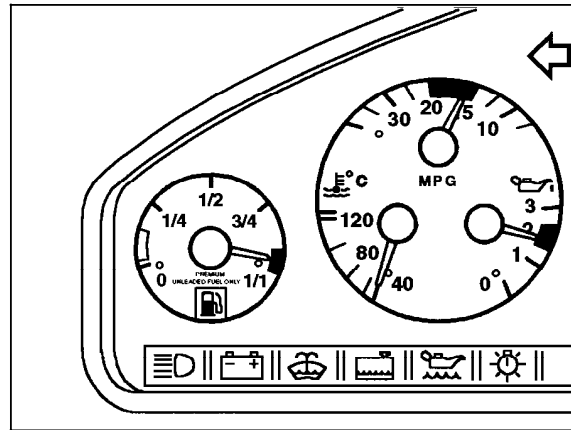


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Figure 7

Activation of instruments

3rd quarter: Speedometer, Tachometer

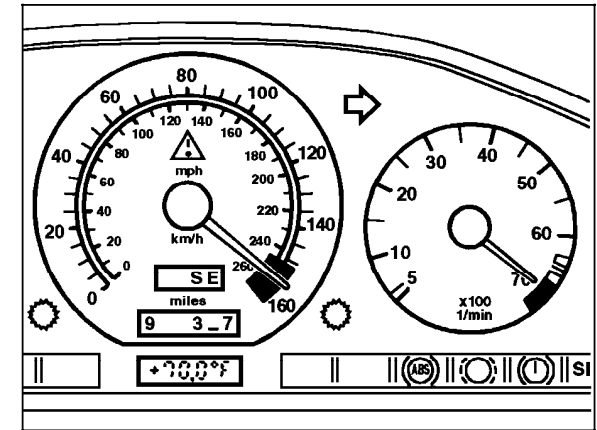


P54-6672-13

Figure 8

Activation of instruments

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



P54-6677-13

Figure 9

Activation of instruments

4th quarter: Speedometer, Tachometer



Electrical Test Program – Test (vehicles up to 08/95)

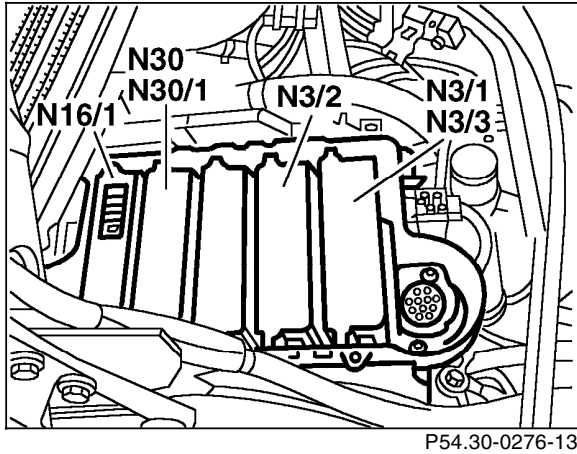


Figure 10  
Module box on vehicles with LH-SFI engine

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

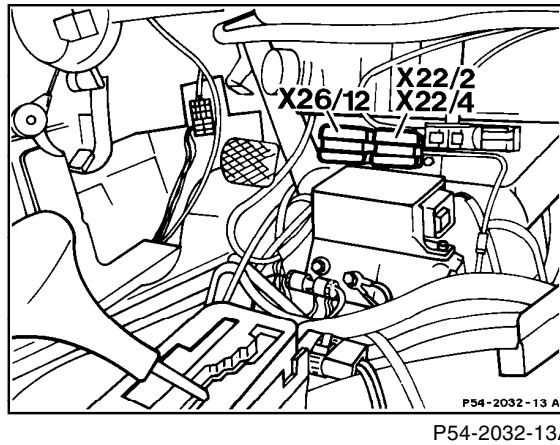


Figure 11  
X26/12 Interior/transmission connector (8-pole)

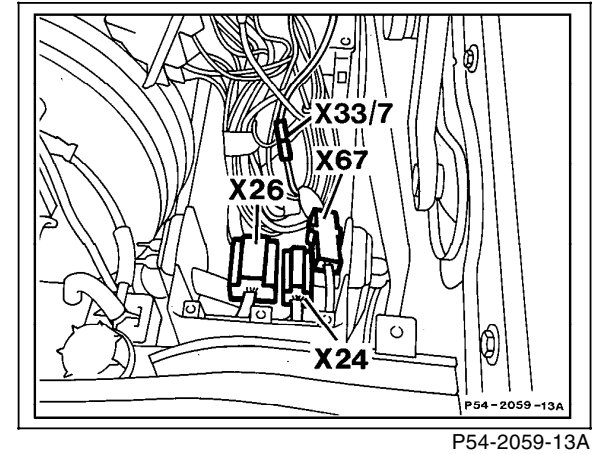
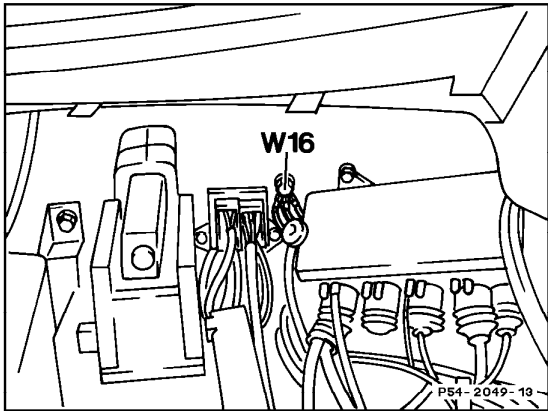


Figure 12  
X67 Outside temperature indicator connector (2-pole)

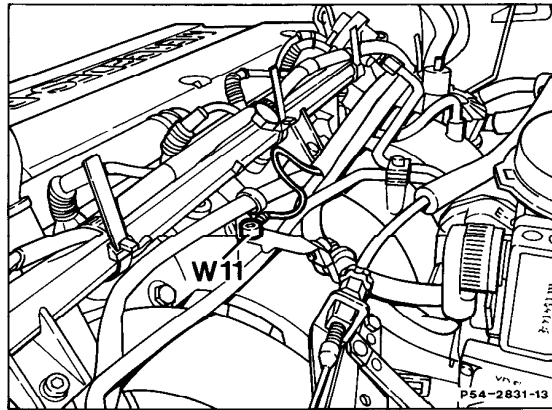
Electrical Test Program – Test (vehicles up to 08/95)



P54-2049-13

Figure 13

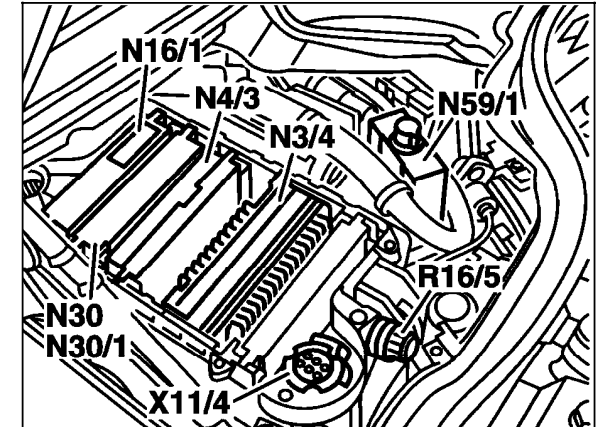
W16 Ground (component compartment)



P54-2831-13

Figure 14

W11 Ground (engine - connection point for ground wires)



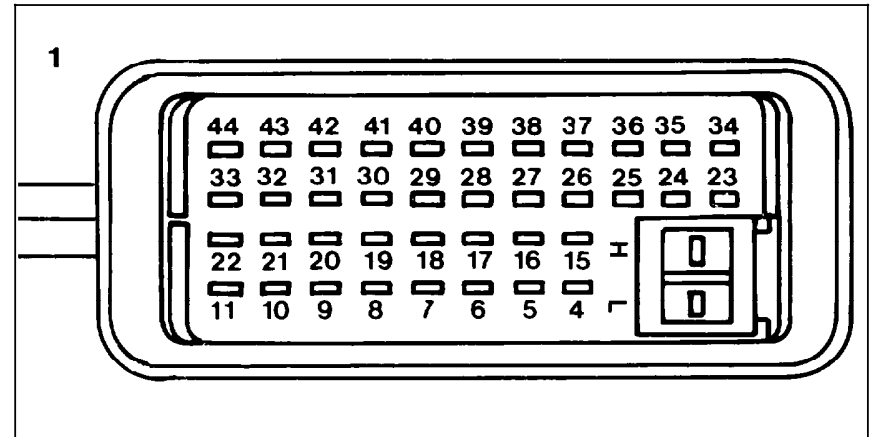
P07-6603-13

Figure 15

Module box on vehicles with HFM-SFI engine

- N3/4 Engine control module (HFM-SFI)
- N30 ABS control module
- N30/1 ASR control module

Electrical Test Program – Test (vehicles up to 08/95)



P07-5936-33

Figure 16  
Engine control module (N3/4) connector "1"

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

Electrical Test Program – Test (vehicles up to 08/95)

Connection Diagram – Signal Generator

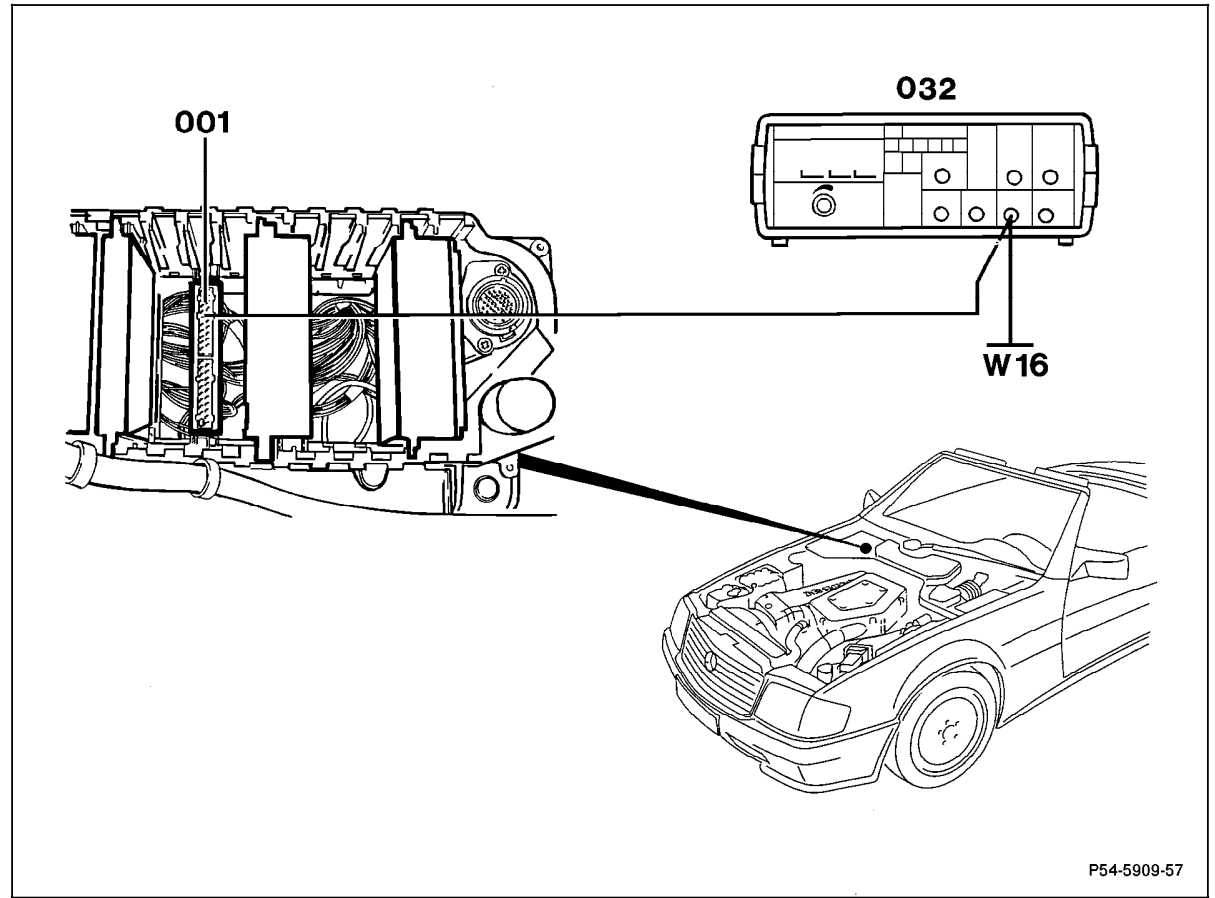



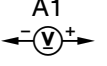


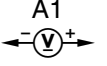

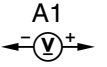

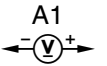

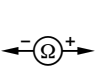

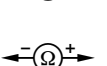
Figure 17

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


P54-5909-57

P54-5909-57

Electrical Test Program – Test (vehicles with ESP or as of 09/95)

⇒	Mode	Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
1.0		<b>Instrument cluster (A1)</b> Voltage supply circuit 30	11 —  ←  →  12 (2) (2)	Remove A1, Disconnect connector 2	11 – 14 V	Wiring, ⇒ 1.1
1.1		Voltage supply Circuit 15, unfused	10 —  ←  → 1 (1) (1)	Remove A1, Disconnect connector 1 Ignition: <b>ON</b>	11 – 14 V	Wiring, ⇒ 1.2
1.2		Voltage supply Circuit 15, fused	10 —  ←  → 5 (1) (1)	Remove A1, Disconnect connector 1 Ignition: <b>ON</b>	11 – 14 V	Wiring, Values OK: A1
2.0		<b>Instrument cluster (A1)</b> Illumination	10 —  ←  → 8 (1) (1)	Remove A1, Disconnect connector 1 Ignition: <b>ON</b> Turn on parking lights.	11 – 14 V	Wiring, Rotary light switch (S1), Short circuit in circuit 58d (output from A1).
3.0		<b>Instrument cluster (A1)</b> Data line from traction system control module (N47)	N47 A1 <b>ETS or ASR:</b> 7 —  ←  → 14 <b>ESP:</b> 9 —  ←  → 14	Remove A1, Disconnect connector 2	≤ 5 Ω	Wiring, Values OK: N47, D.M., Chassis and Drivetrain, Vol. 3, 9.1 23 or D.M., Chassis and Drivetrain, Vol. 3, 10.1 23

Electrical Test Program – Test (vehicles with ESP or as of 09/95)

⇒	Mode	Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
4.0	1	Fuel level gauge (A1p2)		Activate test mode 1 (see Figure 1)	Analog fuel gauge reading ≈ digital readout	A1, ⇒ 4.1
4.1	6 – 9	Fuel level gauge (A1p2)		Activate test modes 6 – 9	see Figures 2 – 13	A1, ⇒ 4.2
4.2		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> $\approx 0$ <sup>1)</sup> $\approx \text{Res.}$ <sup>1)</sup> $\approx 1/4$ $\approx 1/2$ $\approx 3/4$ $\approx 1/1$	Wiring, Values OK: B4

<sup>1)</sup> Fuel reserve indicator lamp lights up.

Electrical Test Program – Test (vehicles with ESP or as of 09/95)


⇒	Mode	Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
5.0	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> The readout is only visible on the digital display. The analog reading shows 0.	⇒ 5.1
5.1	6 – 8	A1p10		Activate test modes 6 – 8	see Figures 2 – 13	A1, ⇒ 5.2

Electrical Test Program – Test (vehicles with ESP or as of 09/95)



⇒	Mode	Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
5.2	2	Fuel consumption signal from HFM-SFI control module (N3/4) or ME-SFI engine control module (N3/10 or N3/12)  with HFM-SFI:  with ME-SFI:	W16  N3/4 (1) N3/10 or N3/12 (1)	Ignition: <b>OFF</b> Disconnect HFM-SFI (N3/4) or ME-SFI (N3/10 or N3/12) control modules (Figures 15 to 19). Connect signal generator (Figure 20) and set to a voltage amplitude of approx. 10 V. Connect wire for rpm signal as follows: <b>HFM-SFI</b> N3/4 socket 7 to socket 18. <b>ME-SFI</b> N3/10 or N3/12 socket 58 to socket 56 Ignition: <b>ON</b> Activate test mode 2.	<b>LH-SFI/ HFM-SFI</b> 25 HZ ≈ 5 l/h 50 HZ ≈ 10 l/h 75 HZ ≈ 15 l/h 100 HZ ≈ 20 l/h  <b>Note:</b> The readout is only visible on the digital display. The analog reading shows 0.	Wiring, A1, Values OK: N3/4 Engines, Volume 2 – 1.1 23 N3/10 or N3/12: Engines, Volume 4 – 9.5 23 or – 9.6 23  <b>Note:</b> If no plausible values are indicated while driving and the speedometer is in order: A1
6.0	3	<b>Engine oil pressure gauge (A1p3)</b>		Engine: <b>at Idle</b> Activate test mode 3. Increase engine rpm	Analog reading ≈ digital readout. The oil pressure increases with increasing engine rpm.	A1 ⇒ 6.1





Electrical Test Program – Test (vehicles with ESP or as of 09/95)

⇒	Mode	Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
6.1	6 – 7	Oil pressure gauge (A1p3)		Activate test modes 6 – 7	see Figures 2 and 7	A1, ⇒ 6.2
6.2		Wires and connections or oil pressure sensor (B5)		Ignition: <b>OFF</b> Disconnect connector at B5. Connect resistance substitution unit. Engine: <b>at Idle</b> <b>Resistance substitution unit setting:</b> 13 Ω 40 Ω 90 Ω 150 Ω  <b>Note:</b> Before changing each resistance value, the ignition must be turned off and then turned on again.	<b>Display in A1p3:</b> ≈ 0 ≈ 1 ≈ 2 ≈ 3	Wiring, A1, Values OK: check oil pressure (see SMS Engine, Mechanical), B5
7.0	4	Tachometer (A1p5)		Engine: <b>at Idle</b> Activate test mode 4, increase engine rpm	Analog tachometer reading ≈ digital readout	A1, ⇒ 7.1


Electrical Test Program – Test (vehicles with ESP or as of 09/95)

⇒	Mode	Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
7.1		Tachometer (A1p5) <b>with HFM-SFI:</b>	W16  N3/4 18 (1)	Disconnect plug on HFM-SFI (N3/4) or ME-SFI (N3/10 or N3/12) (Figures 15 to 19). Connect signal generator and set to a voltage amplitude of approx. 10 V (Figure 17). Ignition: <b>ON</b>	<b>Engine 104, 120</b> Readout: 50 Hz ≈ 1000 rpm 194 Hz ≈ 4000 rpm	Wiring, A1, Values OK on HFM-SFI engine: N3/4  Values OK on ME-SFI engine: N3/10 or N3/12
		<b>with ME-SFI:</b>	W16  N3/10 or N31/12 56 (1)		<b>Engine 119</b> Readout: 70 Hz ≈ 1000 rpm 270 Hz ≈ 4000 rpm	
8.0	5	<b>Low engine oil level indicator lamp (A1e12)</b>		Oil level correct. Engine: <b>at Idle</b> Activate test mode 5. <b>Readout in odometer:</b>	0 ≈ oil level OK 1 ≈ oil level not OK	Wiring, Oil level switch (S43)

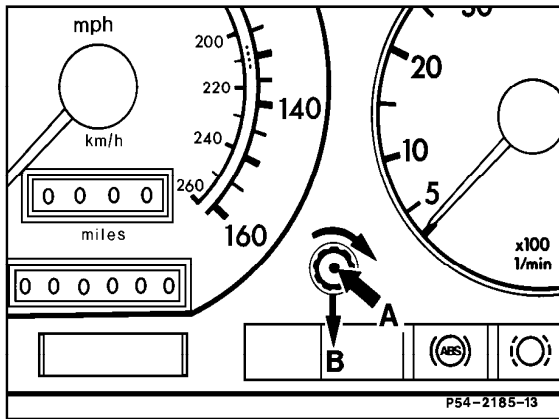
Electrical Test Program – Test (vehicles with ESP or as of 09/95)

⇒	Mode	Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
9.0		<p><b>Electronic speedometer (A1p8)</b>  <b>Vehicles with ESP and vehicles with ASR or ETS as of 06/94:</b>                      Left front axle VSS sensor (L6/1) connected to ASR/SPS or ETS/SPS control module (N47-1 or N47-2).                      See D.M., Chassis and Drivetrain, Vol. 3, 9.1 23 or Vol. 3, 10.1 23</p>	<p>W16  N47</p>	<p>Disconnect connector from traction system control module (N47) (Figures 11, 12 or 13).                      Connect signal generator and set to a voltage amplitude of approx. 2 V .                      Ignition: <b>ON</b></p>	<p>With increasing frequency the speed on the speedometer increases.</p>	<p>Wiring, A1                      Values OK: N47-1 or N47-2, D.M., Chassis and Drivetrain, Vol. 3 – 9.1 23, N47-5, D.M., Chassis and Drivetrain, Vol. 3 – 10.1 23</p>
10.0		<p><b>Outside temperature display (A1p4)</b></p>	<p>1—  X67 — 2</p>	<p>Disconnect 2-pole connector X67 (Figure 10).                      Connect resistance substitution unit.                      Ignition: <b>ON</b>  <b>Resistance substitution unit setting:</b>                      53 kΩ                      9.8 kΩ                      1 kΩ</p>	<p><b>Display in A1p4:</b>                      ≈ - 30 °C                      ≈ 0 °C                      ≈ + 50 °C</p>	<p>Wiring, A1,                      ⇒ 10.1</p>

Electrical Test Program – Test (vehicles with ESP or as of 09/95)

⇒	Mode	Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
10.1	6	Outside temperature indicator temperature sensor (B14)		Ignition: <b>ON</b> Activate test mode 6.	<b>Readout in odometer:</b> 53 kΩ ≈ - 30 °C 9.8 kΩ ≈ 0 °C 3.7 kΩ ≈ 20 °C 1.6 kΩ ≈ 40 °C	B14
11.0		<b>ECT gauge (A1p1)</b>	W11—C  B13	Disconnect plug on ECT gauge sensor (B13). Connect resistance substitution unit. Ignition: <b>ON</b> <b>Resistance substitution unit setting:</b>	<b>Display in A1p1:</b> 110 Ω ≈ 60 °C 67 Ω ≈ 80 °C 38 Ω ≈ 100 °C 20 Ω ≈ 120 °C	Wiring, Values OK; B13, A1

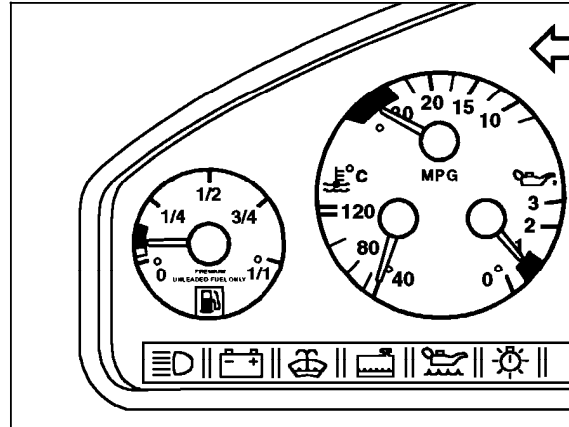
Electrical Test Program – Test (vehicles with ESP or as of 09/95)



P54-2185-13

Figure 1

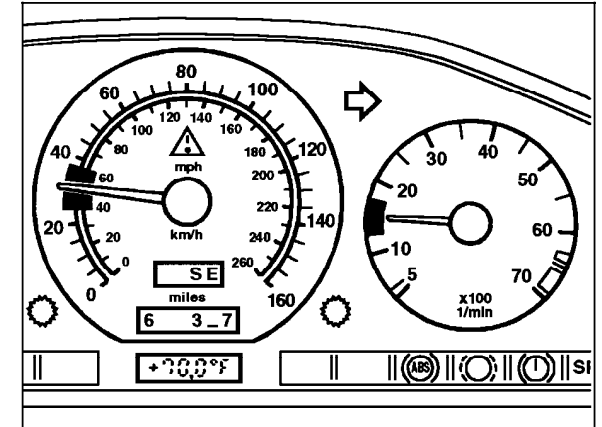
Activation of test mode



P54-6669-13

Figure 2

Activation of instruments  
 1st quarter: Fuel tank  
 Fuel consumption  
 Oil pressure



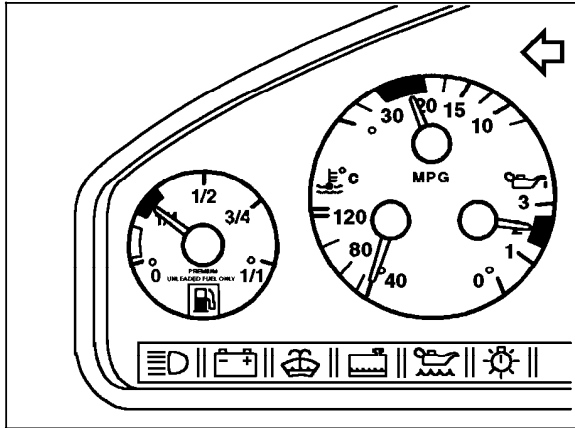
P54-6674-13

Figure 3

Activation of instruments  
 1st quarter: Speedometer, Tachometer

## 1.8 Instrument Cluster (IC) (with Digital Odometer)

### Electrical Test Program – Test (vehicles with ESP or as of 09/95)

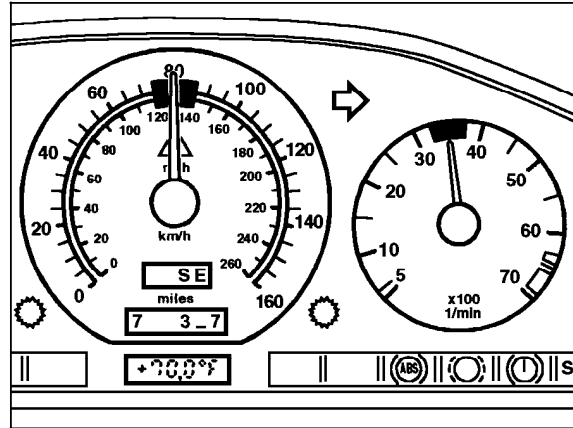


P54-6670-13

Figure 4

Activation of instruments

2nd quarter: Fuel tank  
Fuel consumption  
Oil pressure

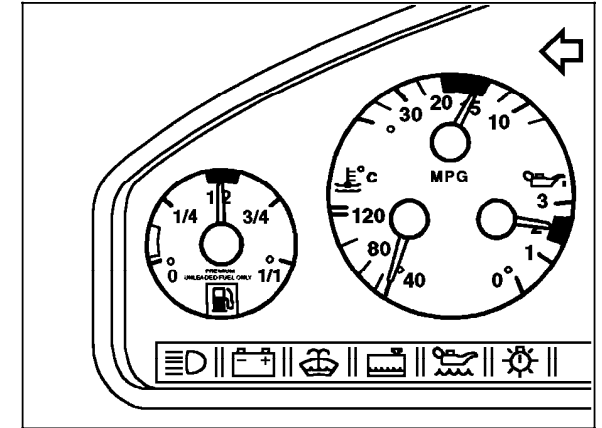


P54-6675-13

Figure 5

Activation of instruments

2nd quarter: Speedometer, Tachometer



P54-6671-13

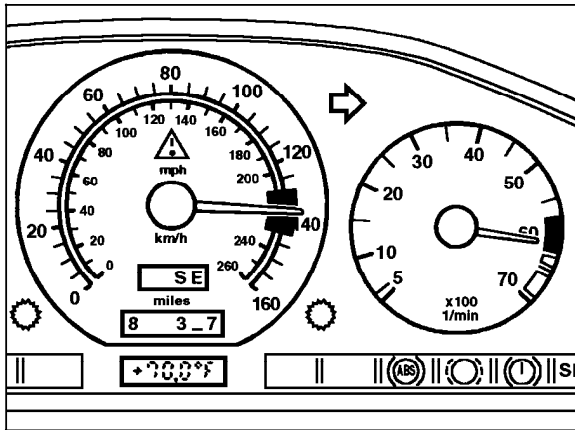
Figure 6

Activation of instruments

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

## 1.8 Instrument Cluster (IC) (with Digital Odometer)

### Electrical Test Program – Test (vehicles with ESP or as of 09/95)

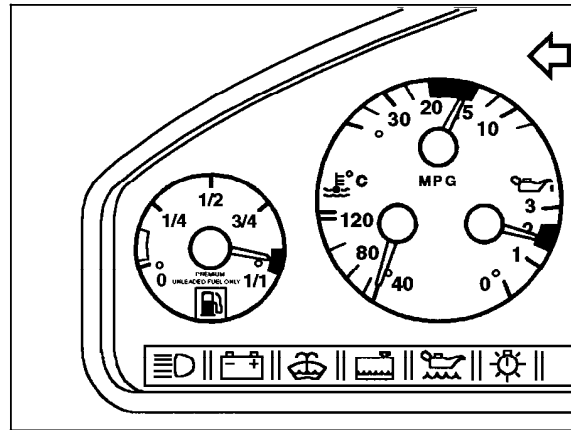


P54-6676-13

Figure 7

Activation of instruments

3rd quarter: Speedometer, Tachometer

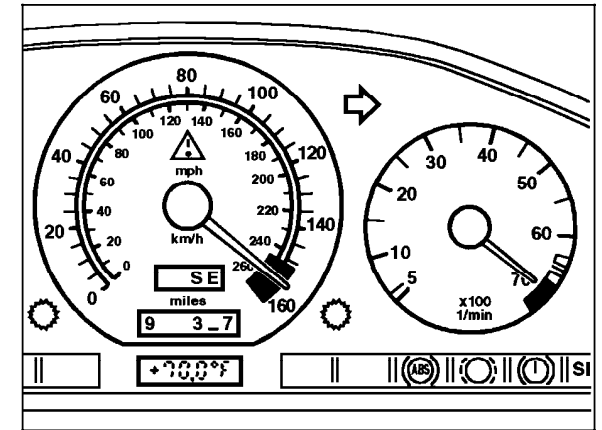


P54-6672-13

Figure 8

Activation of instruments

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



P54-6677-13

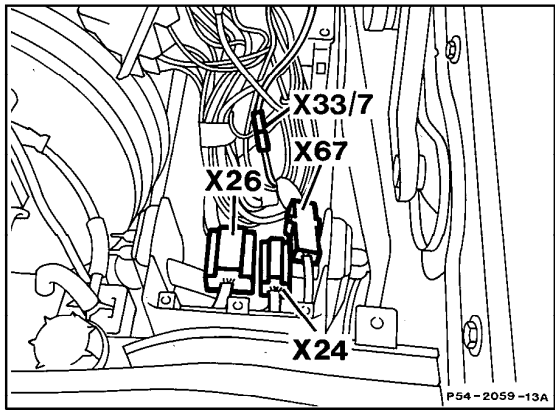
Figure 9

Activation of instruments

4th quarter: Speedometer, Tachometer

## 1.8 Instrument Cluster (IC) (with Digital Odometer)

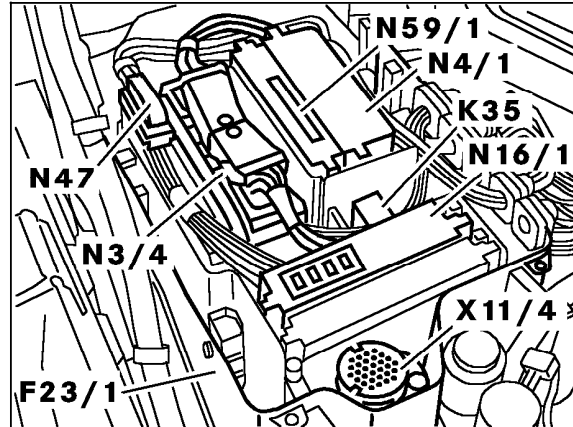
### Electrical Test Program – Test (vehicles with ESP or as of 09/95)



P54-2059-13A

Figure 10

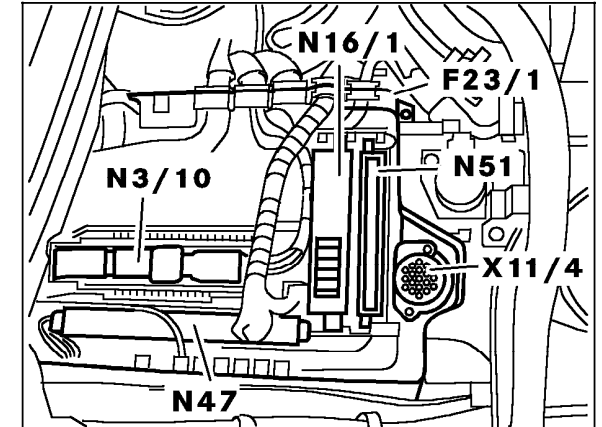
X26 Outside temperature indicator connector (2-pole)



P54.30-0306-13

Figure 11

N3/4 Engine control module (HFM-SFI)  
N47 Traction system control module



P54.30-0311-13

Figure 12

N3/10 Engine control module (ME-SFI)  
N47 Traction system control module



## 1.8 Instrument Cluster (IC) (with Digital Odometer)

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### Electrical Test Program – Test (vehicles with ESP or as of 09/95)

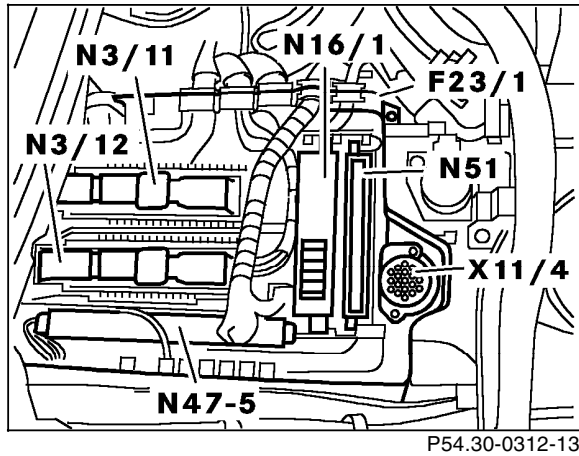


Figure 13

- N3/11 Left engine control module (ME-SFI)
- N3/12 Right engine control module (ME-SFI)
- N47-5 ESP/SPS control module

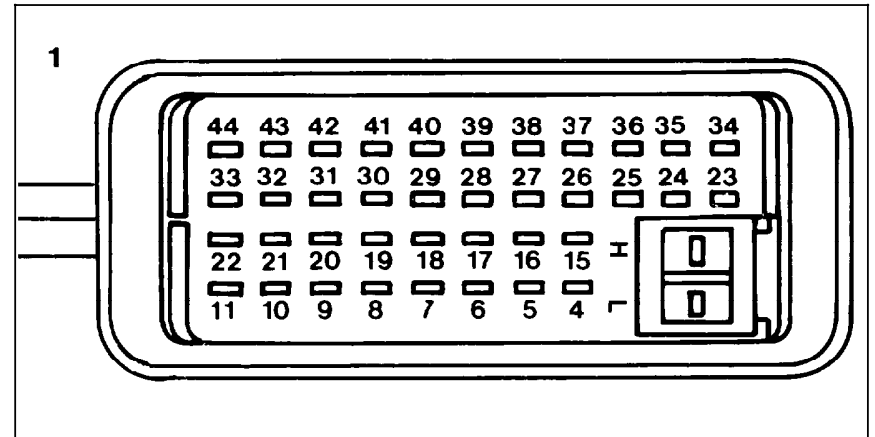
## 1.8 Instrument Cluster (IC) (with Digital Odometer)

### Electrical Test Program – Test (vehicles with ESP or as of 09/95)

Figure 14

Engine control module (N3/4) (HFM-SFI)  
connector "1"

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



P07-5936-33

## 1.8 Instrument Cluster (IC) (with Digital Odometer)

### Electrical Test Program – Test (vehicles with ESP or as of 09/95)

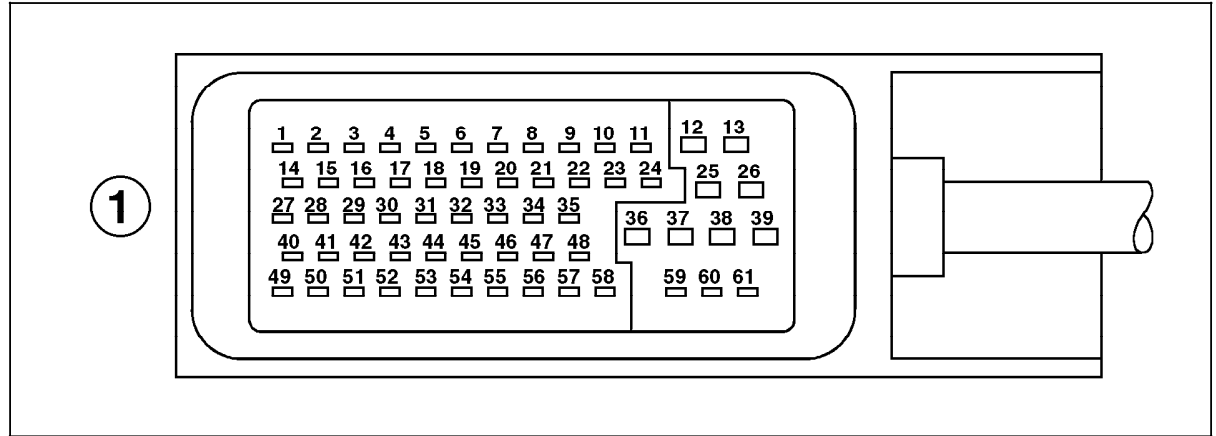


Figure 15

Engine control module (N3/10) (ME-SFI)  
connector "1"

- 56 Engine rpm output signal (TN-signal)
- 58 Fuel consumption signal

P07-6727-53

## 1.8 Instrument Cluster (IC) (with Digital Odometer)

### Electrical Test Program – Component Locations

#### Connection Diagram – Signal Generator

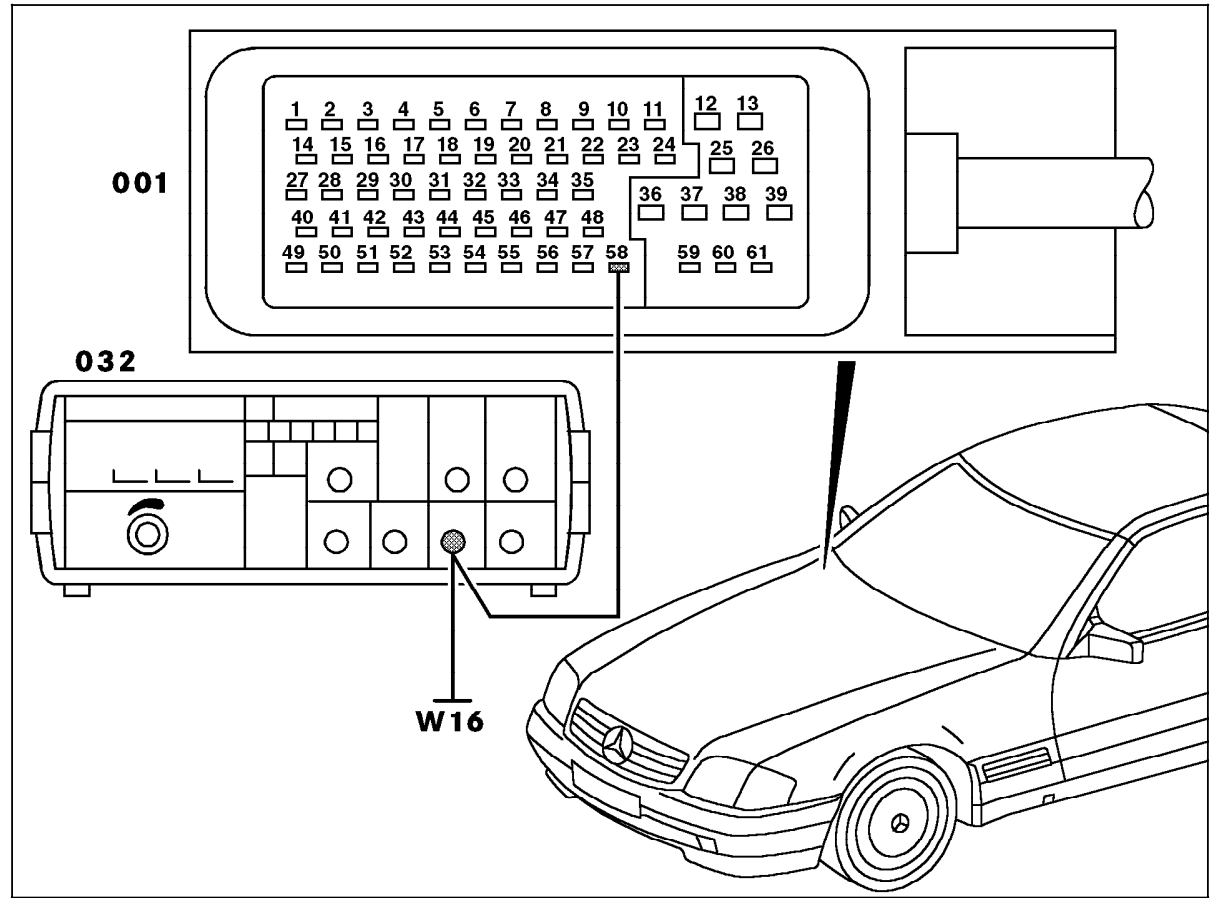


Figure 16

- 001 ME-SFI control module connector "1"
- 032 Signal generator
- W16 Ground (component compartment)

P54.30-0304-57