

1.10 Model 140 (IC with digital odometer) up to M.Y. 1996

	Page
Technical changes	10/1
Diagnosis	
Function Test	11/1
Complaint Related Diagnostic Chart	12/1
Electrical Test Program	
Component Locations	21/1
Preparation for Test	22/1
Test (vehicles up to 08/95)	23/1
Test (vehicles with ESP or as of 09/95)	24/1

1.10 Instrument Cluster (IC) (with Digital Odometer)

Technical Changes

Diagnosis – Technical Changes

Version start dates/Changes/Innovations

World wide Manuf. code	Model	LL ¹⁾ RL ¹⁾	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	140							Vehicles with ESP (Electronic Stability Program)	Vehicle with control module box (plastic)
WDB	140					09/95		Instrument cluster with interface to the traction system control module (N47)	Vehicle with control module box (plastic)

- ¹⁾ LL: Left hand steering
RL: 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
“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.
- During test modes 1 – 9, the fuel tank version is displayed in the trip o odometer window.
Example: “SE” indicates the standard fuel tank,
“SR” indicates fuel tank with pass-through (non U.S.).
USA vehicles are equipped with the standard fuel tank only. The fuel tank version display can be changed in test mode 1 by depressing the reset button of the trip odometer. The fuel tank version displayed last will be stored.

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.

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.

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) Fuel tank version (trip odometer display)	1 80 5E	80 liters, Standard fuel tank
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 Resistance value of outside temperature gauge	6 6 3.7	Needle in first quarter of gauge dial (23 or 24, Figures 2 and 3) 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

Instrument Cluster

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

¹⁾ Observe Preparation for Test, see 22.

Diagnosis – Complaint Related Diagnostic Chart

Instrument Cluster (continued)

Complaint/Problem	Possible cause	Remedy/Test step ¹⁾
Tachometer (A1p5) inaccurate or not operating.	Instrument cluster (A1), TN-signal.	up to 08/95 23 ⇒ 6.0 as of 09/95 24 ⇒ 7.0
Low engine oil level indicator lamp (A1e12) lights up but oil level is OK.	Oil level switch S43.	up to 08/95 23 ⇒ 7.0 as of 09/95 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)	up to 08/95 23 ⇒ 8.0 as of 09/95 24 ⇒ 9.0
Outside temperature display (A1p4) inaccurate or not operating.	Instrument cluster (A1), Outside temperature indicator temperature sensor (B14).	up to 08/95 23 ⇒ 9.0 as of 09/95 24 ⇒ 10.0
ECT gauge (A1p1) inaccurate or not operating.	Instrument cluster (A1), ECT gauge sensor (B13)	up to 08/95 23 ⇒ 10.0 as of 09/95 24 ⇒ 11.0

¹⁾ Observe Preparation for Test, see 22.

Electrical Test Program – Component Locations

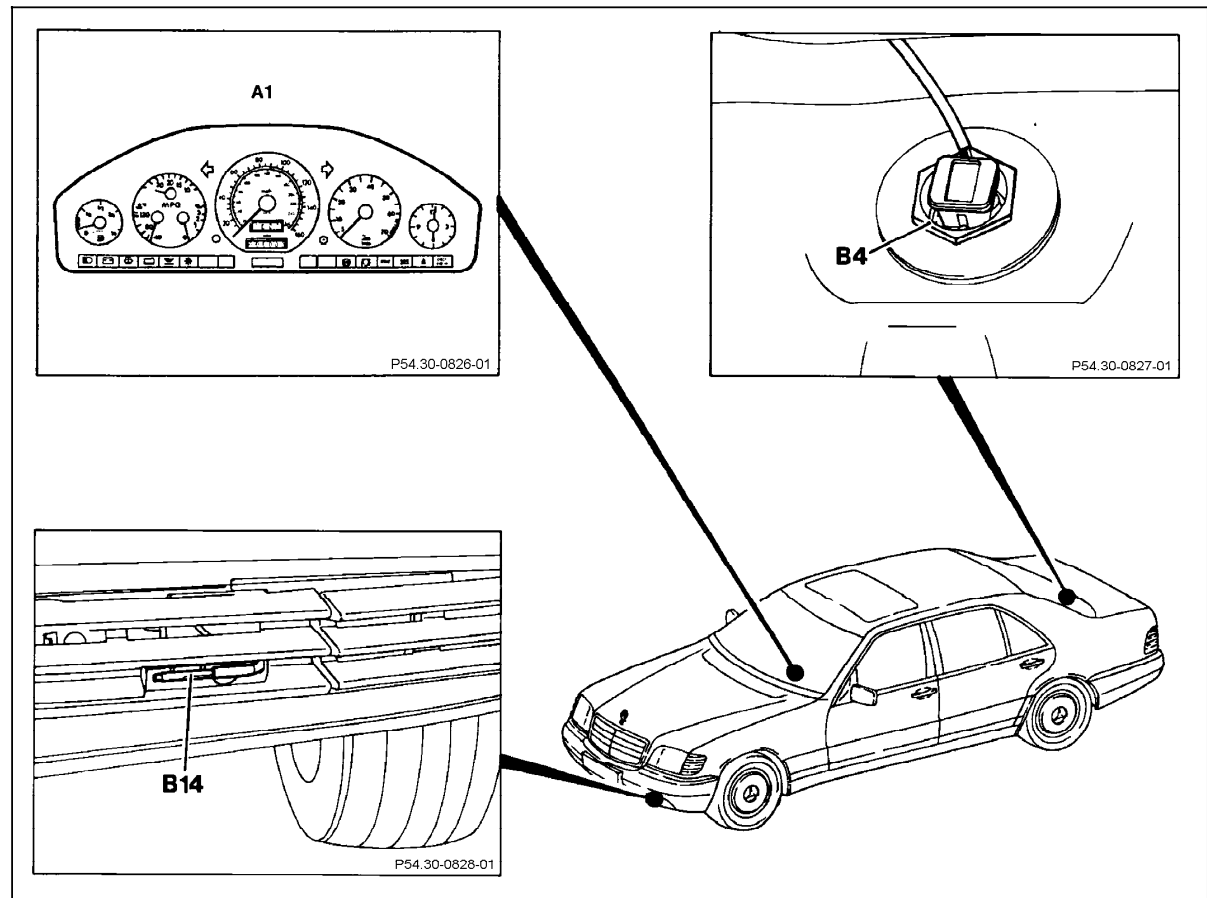


Figure 1

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

P54.30-0825-06

Electrical Test Program – Component Locations

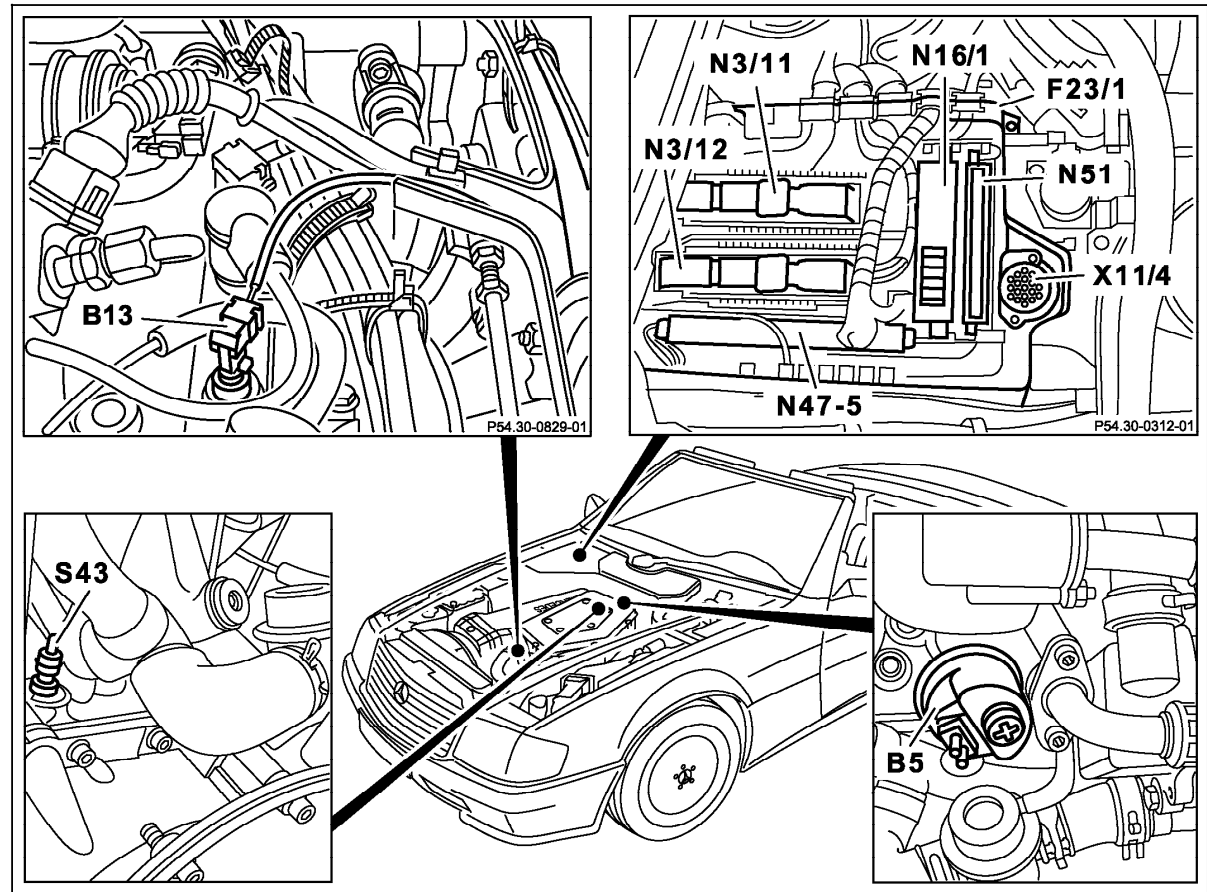


Figure 2
Vehicles with control module box (plastic)

- B5 Oil pressure sensor
- B13 ECT gauge sensor
- F23/1 Control module box
- N3/11 Left engine control module (ME-SFI)
- N3/12 Right engine control module (ME-SFI)
- N16/1 Base module (BM)
- N47-5 ESP/SPS control module
- N51 ADS control module
- S43 Oil level switch
- X11/4 Data link connector (DTC readout)

P54.30-0307-06

Electrical Test Program – Component Locations

Vehicles with diesel engine

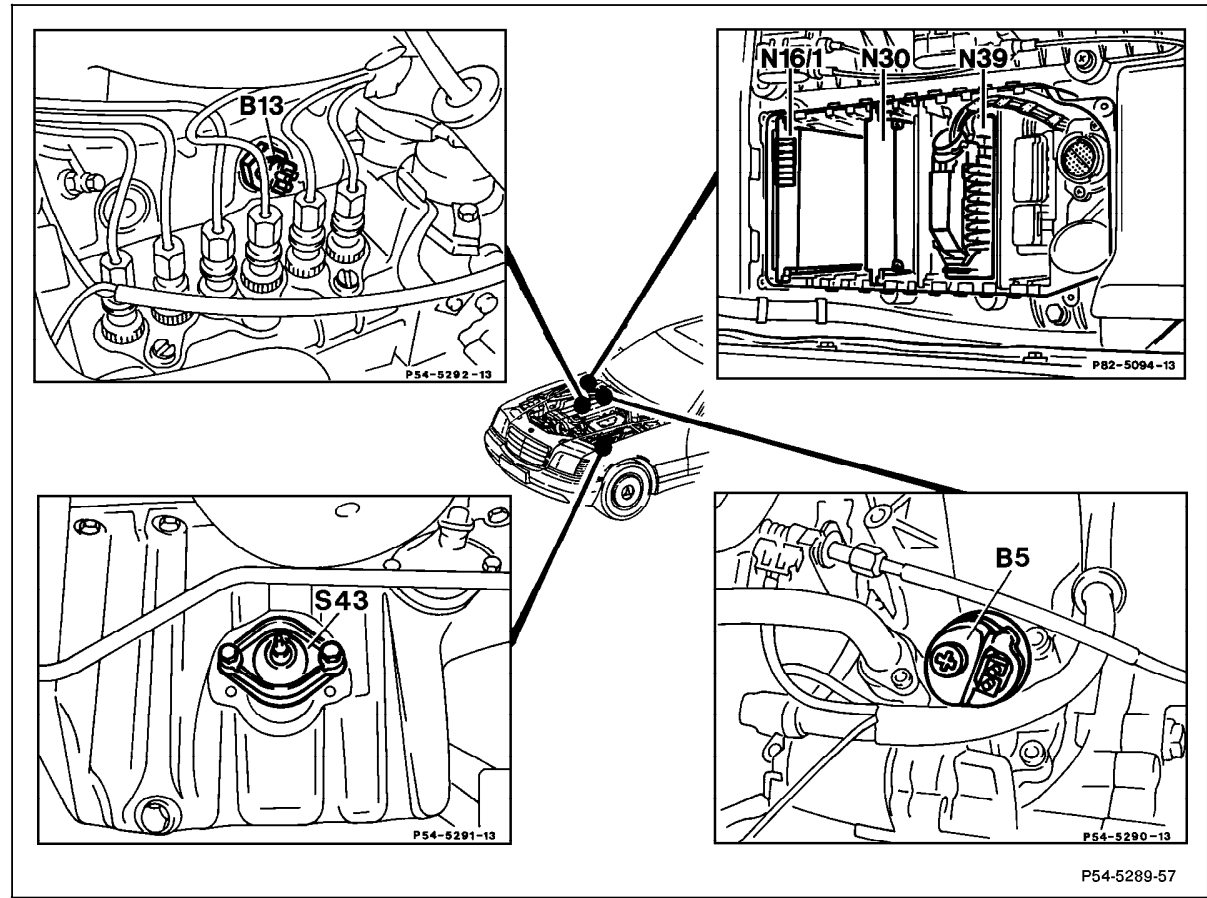


Figure 3

- B5 Oil pressure sensor
- B13 ECT gauge sensor
- N16/1 Base module
- N30 ABS control module
- N39 EDS control module
- S43 Oil level switch

P54-5289-57
P54-5289-57

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 23 and 24, the connectors on the control modules must only be removed or installed with the ignition **OFF**.

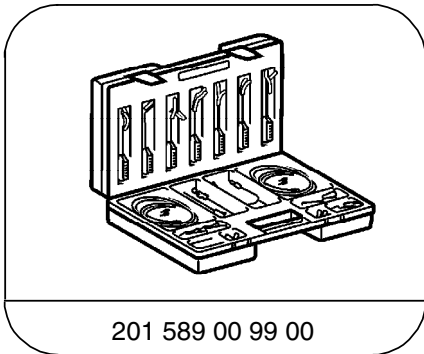
Special Tools

Electrical wiring diagrams:

See Electric Troubleshooting Manual, Model 140, Volume 2.

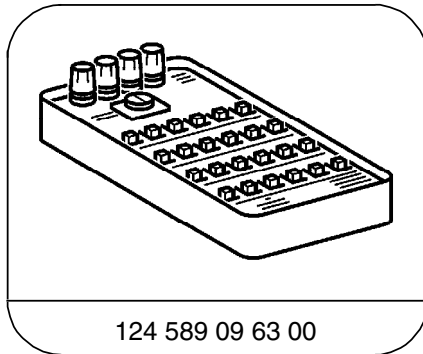
Diagnosis - work information:

Refer to group 54.30 in SMS or in WIS



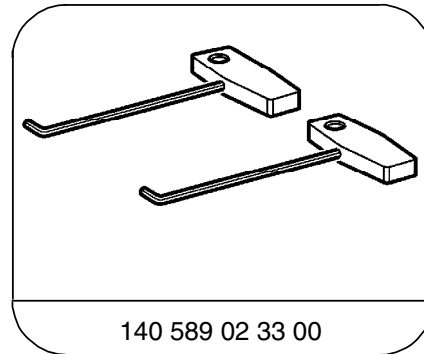
201 589 00 99 00

Electrical connecting set



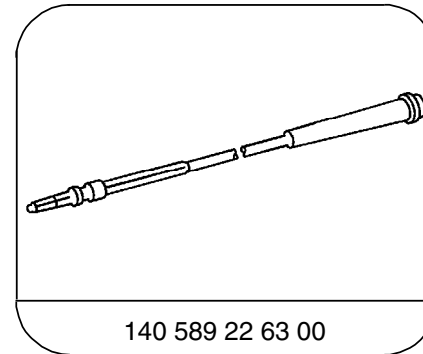
124 589 09 63 00

Ohm decade



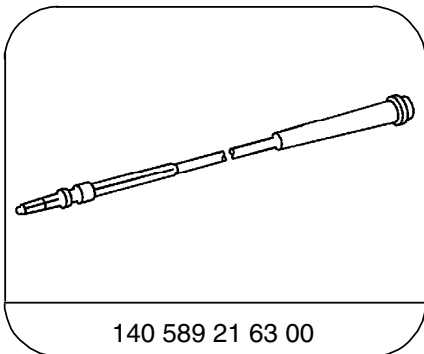
140 589 02 33 00

Extraction hook



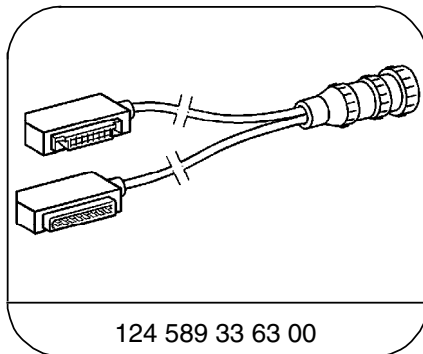
140 589 22 63 00

Adapter cable



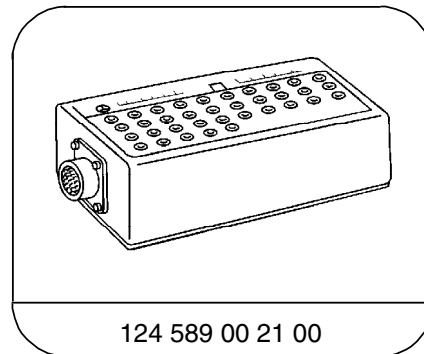
140 589 21 63 00

Adapter cable



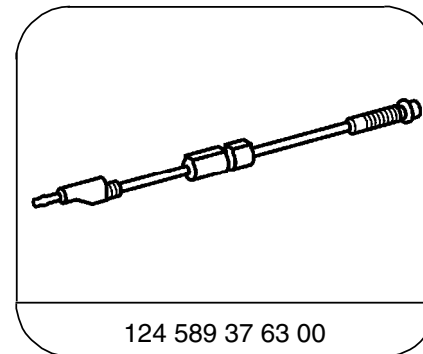
124 589 33 63 00

Test cable



124 589 00 21 00

35-pin socket box



124 589 37 63 00

Fused cable

Electric Test Program – Preparation for Test

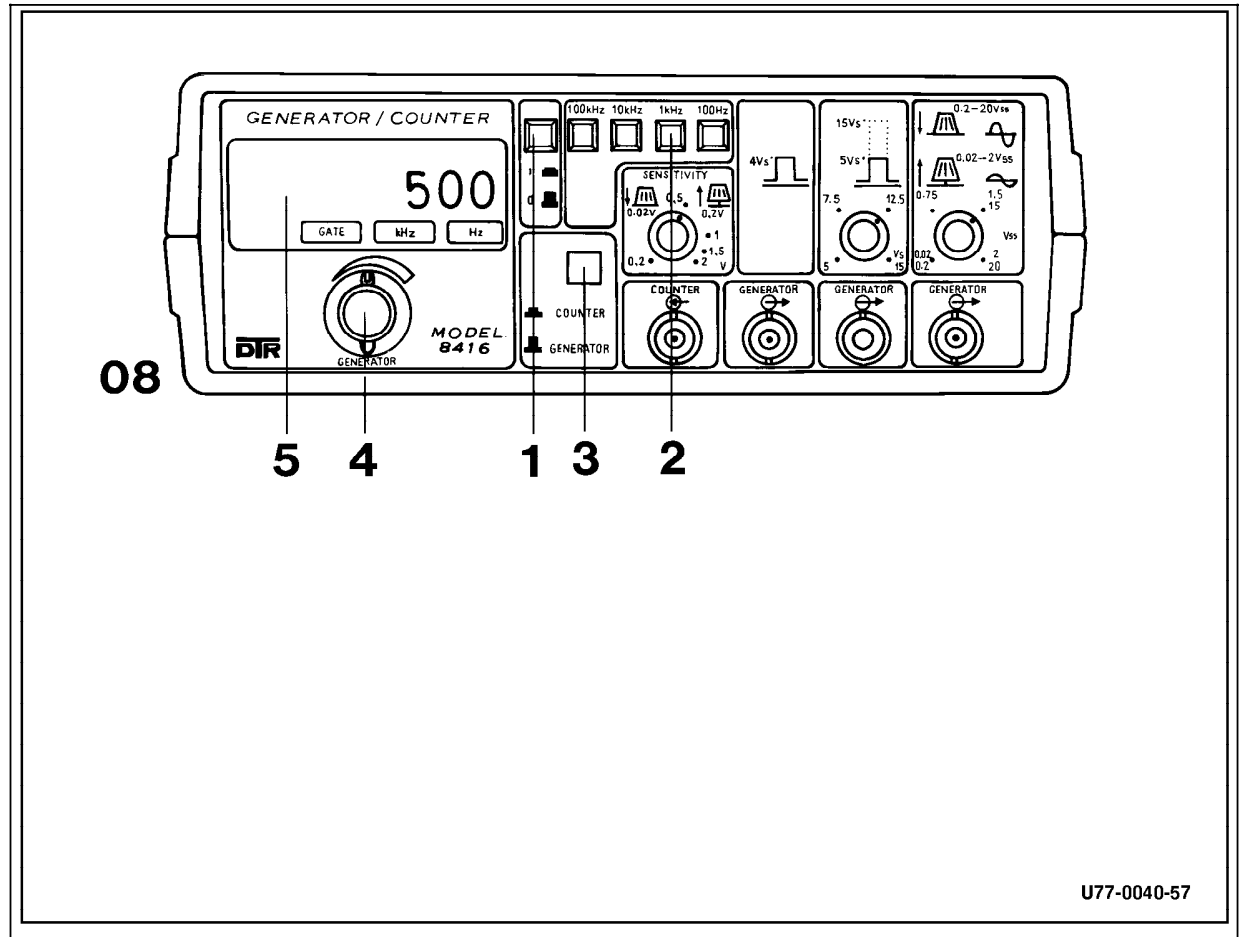
Conventional tools, test equipment

Description	Brand, model, etc.
Multimeter ¹⁾	Fluke models 23, 83, 85, 87
Signal generator ¹⁾	SUN DTR-8416

¹⁾ 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)

U77-0040-57

U77-0040-57


1.10 Instrument Cluster (IC) (with Digital Odometer)

Model 140

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

⇒	Mode	Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
1.0		Instrument cluster (A1) Voltage supply circuit 30	<p>11 —(C) ←(V)→ —(D) 12 (2) (2)</p>	Remove A1, Disconnect connector 2	11 – 14 V	Wiring, ⇒ 1.1
1.1		Voltage supply Circuit 15, unfused	<p>10 —(C) ←(V)→ —(D) 1 (1) (1)</p>	Remove A1, Disconnect connector 1 Ignition: ON	11 – 14 V	Wiring, ⇒ 1.2
1.2		Voltage supply Circuit 15, fused	<p>10 —(C) ←(V)→ —(D) 5 (1) (1)</p>	Remove A1, Disconnect connector 1 Ignition: ON	11 – 14 V	Wiring, Values OK: A1
2.0		Instrument cluster (A1) Illumination	<p>10 —(C) ←(V)→ —(D) 8 (1) (1)</p>	Remove A1, Disconnect connector 1 Ignition: ON Turn on parking lights.	11 – 14 V	Wiring, Exterior lamp switch (S1), Short circuit in circuit 58d (output from A1).
3.0	1	Fuel level gauge (A1p2)		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)		Ignition: OFF Disconnect connector at B4. Connect resistance substitution unit. Ignition: ON Resistance substitution unit setting: $87 \pm 2 \Omega$ $77 \pm 1 \Omega$ $68 \pm 3 \Omega$ $48 \pm 3 \Omega$ $27 \pm 3 \Omega$ $7 \pm 2 \Omega$ Note: Before changing each resistance value, the ignition must be turned off and then turned on again.	Display in A1p2: ≈ 0 ¹⁾ $\approx \text{Res.}$ ¹⁾ $\approx 1/4$ $\approx 1/2$ $\approx 3/4$ $\approx 1/1$	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
3.3	1	Programming fuel tank version in trip odometer		Ignition: ON Activate test mode 1	5E= Standard fuel tank 5R=Fuel tank with pass-through (non-U.S.)	Set fuel tank version to 5E by depressing reset button for trip odometer.
4.0	2	Fuel consumption indicator (A1p10)		Engine: at Idle Activate test mode 2 Increase engine rpm	With increasing rpm, the consumption in l/h increases. Note: 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 – 9	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 HFM-SFI engine control module (N3/4) or EDS control module (N39)	<p>LH-SFI</p> <p>N3/1 or N3/3 N16/1 13 (1)</p> <p>←(A)→</p> <p>W3/3</p> <p>←(A)→</p> <p>HFM-SFI</p> <p>N3/4 18 (1)</p> <p>←(A)→</p> <p>W3/3</p> <p>←(A)→</p> <p>EDS</p> <p>N16/1 13 (1)</p> <p>←(A)→</p> <p>W3/3</p> <p>←(A)→</p>	<p>Ignition: OFF</p> <p>Disconnect N3/1, N3/3, N3/4 or N39 (Figures 10, 11, 15 and 16); for LH-SFI and EDS: remove N16/1. Connect signal generator (Figures 18, 19) and set to a voltage amplitude of approx. 10 V.</p> <p>Activate test mode 2.</p> <p>Connect wire for rpm signal as follows:</p> <p>LH-SFI</p> <p>First bridge N16/1 socket 13 to N3/1 or N3/3 socket 9, then connect to signal generator (Figure 19).</p> <p>HFM-SFI</p> <p>First bridge N3/4 socket 18 to N3/4 socket 7 (Figure 16) then connect to signal generator.</p> <p>EDS</p> <p>First bridge N16/1 socket 13 to N39 socket 13 then connect to signal generator (Figure 18).</p> <p>Ignition: ON</p>	<p>LH-SFI/ HFM-SFI</p> <p>25 Hz ≈ 5 50 Hz ≈ 10 75 Hz ≈ 15 100 Hz ≈ 20</p> <p>EDS</p> <p>850 Hz ≈ 85 900 Hz ≈ 90 950 Hz ≈ 95 1000 Hz ≈ 100</p> <p>Note: The readout is only visible on the digital display. The analog reading shows 0.</p>	<p>Wiring, A1, Values OK: N3/1, N3/3, N3/4, N16/1 (for LH-SFI or EDS) or N39 Engines, Volume 2 – 1.1 23 or – 3.1 23 or – 3.2 23</p> <p>Note: If no plausible values are indicated while driving and the speedometer is in order: Check instrument cluster (A1)</p>




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

⇒	Mode	Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
5.0	3	Engine oil pressure gauge (A1p3)		Engine: at Idle Activate test mode 3. Increase engine rpm	Analog reading ≈ digital readout. The oil pressure increases with increasing engine rpm.	A1, ⇒ 5.1
5.1	6 – 7	Oil pressure gauge (A1p3)		Activate test modes 6 – 7	see Figures 2 – 9	A1, ⇒ 5.2
5.2		Wires and connections or oil pressure sensor (B5)	1—  B5  —2	Ignition: OFF Disconnect connector at B5. Connect resistance substitution unit. Engine: at Idle Resistance substitution unit setting: 13 Ω 40 Ω 90 Ω 150 Ω	Display in A1p3: ≈ 0 ≈ 1 ≈ 2 ≈ 3	Wiring, A1, Values OK: check oil pressure (see SMS Engine, Mechanical), B5


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

⇒	Mode	Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
6.0	4	Tachometer (A1p5)		Engine: at Idle Activate test mode 4, increase engine rpm	Analog tachometer reading ≈ digital readout	A1, ⇒ 6.1
6.1		Tachometer (A1p5) with LH-SFI or EDS:	W3/3  N16/1 13	Disconnect plug on N16/1 or N3/4 (Figures 10, 11, 15 and 16). Connect signal generator and set to a voltage amplitude of approx. 10 V (Figure 17). Ignition: ON	Engine 104, 120 Readout: 50 Hz ≈ 1000 rpm 194 Hz ≈ 4000 rpm	Wiring, A1, Values OK on LH-SFI or EDS engine: N16/1 D.M., Chassis and Drivetrain, Volume 1 – 1.1 23
		with HFM-SFI:	W3/3  N3/4 18 (1)		Engine 119 Readout: 70 Hz ≈ 1000 rpm 270 Hz ≈ 4000 rpm	Values OK on HFM-SFI engine: N3/4
					Engine 603 Readout: 2400 Hz ≈ 1000 rpm 9600 Hz ≈ 4000 rpm	





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

⇒	Mode	Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
7.0	5	Low engine oil level indicator lamp (A1e12)		Oil level correct. Engine: at Idle Activate test mode 5. Refer to section 11 Readout in odometer:	Digital readout: 0.5 ≈ indicator lamp: OFF Oil level OK 1.5 ≈ indicator lamp: ON Oil level not OK	Wiring, Oil level switch (S43).
8.0		Electronic speedometer (A1p8) Vehicles with ASR/SPS or ETS/SPS as of 06/94: 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	ABS W3/3  N30 3 (1) ABS/ASR W3/3  N30/1 36 (1) ASR/SPS or ETS/SPS W3/3  N47-1 N47-2	Remove N30 or N30/1, N47-1 or N47-2 (Figure 10, 11 or 15). Connect signal generator and set to a voltage amplitude of approx. 10 V (Figure 17). Ignition: ON	With increasing frequency the speed value on the speedometer increases.	Wiring, A1 Values OK: N30 or N30/1, D.M., Chassis and Drivetrain, Volume 2 – 5.2 23 or 6.2 23. N47-1 or N47-2, D.M., Chassis and Drivetrain, Volume 3 – 9.1 23

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

⇒	Mode	Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
9.0		Outside temperature display (A1p4)	<div style="display: flex; align-items: center; justify-content: center;"> 9—  —10 </div>	Disconnect 2-pole headlamp harness connector X24 (Figure 12). Connect resistance substitution unit. Ignition: ON Resistance substitution unit setting: <div style="margin-left: 40px;"> 53 kΩ 9.8 kΩ 1 kΩ </div>	Display in A1p4: <div style="margin-left: 20px;"> ≈ − 30 °C ≈ 0 °C ≈ + 50 °C </div>	Wiring, A1, ⇒ 9.1
9.1	6	Outside temperature indicator temperature sensor (B14)		Ignition: ON Activate test mode 6. <div style="margin-left: 40px;"> 53 kΩ 9.8 kΩ 3.7 kΩ 1.6 kΩ </div>	Readout in odometer: <div style="margin-left: 20px;"> ≈ − 30 °C ≈ 0 °C ≈ 20 °C ≈ 40 °C </div>	B14

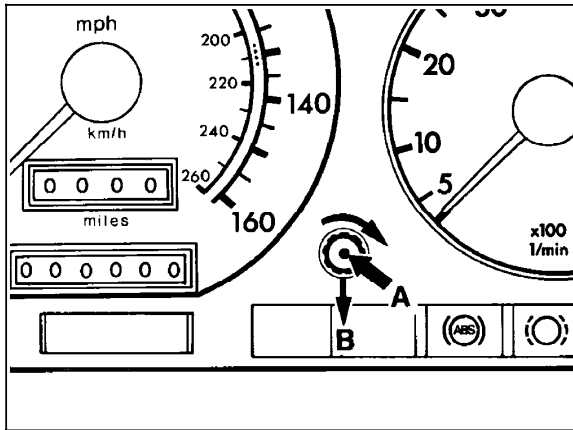
Electrical Test Program – Test (vehicles up to 08/95)

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

1.10 Instrument Cluster (IC) (with Digital Odometer)

Model 140

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

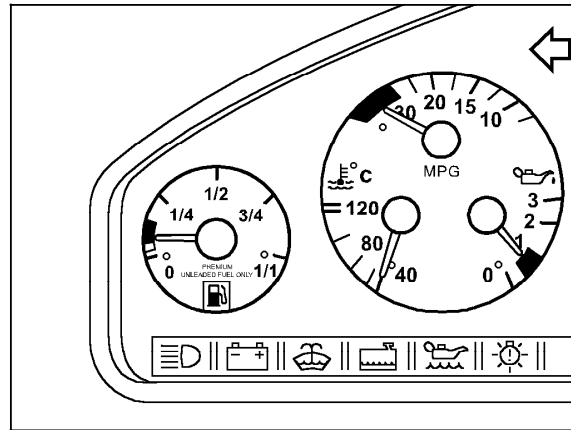


P54.30-0832-01

Figure 1

Activation of test mode

- A Clock synchronization - center of knob
- B Clock adjustment - outside of knob

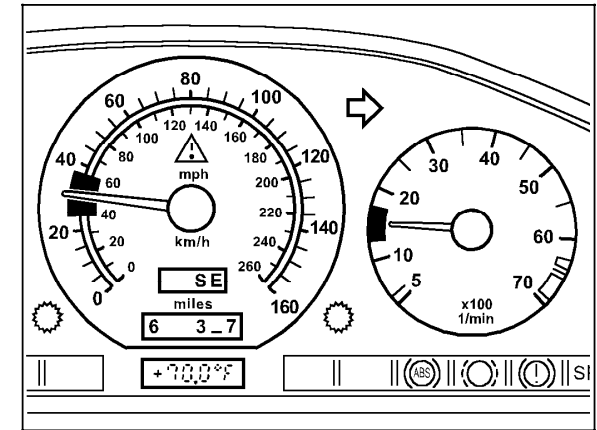


P54.30-0833-01

Figure 2

Activation of instruments

- 1st quarter: Fuel tank
- Fuel consumption
- Oil pressure



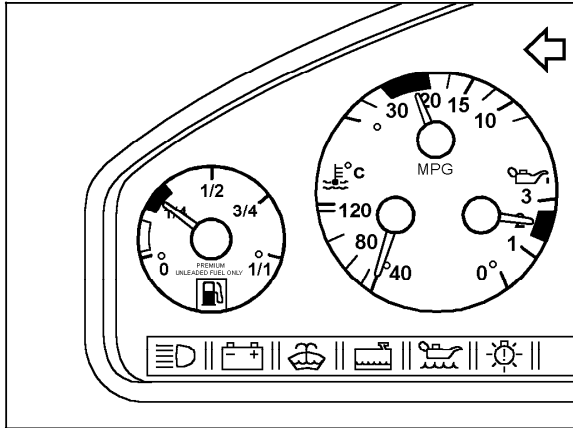
P54.30-0834-01

Figure 3

Activation of instruments

- 1st quarter: Speedometer, Tachometer

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

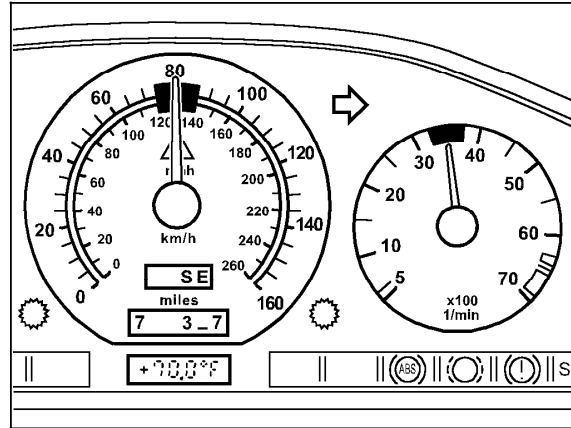


P54.30-0835-01

Figure 4

Activation of instruments

- 2nd quarter: Fuel tank
 Fuel consumption
 Oil pressure

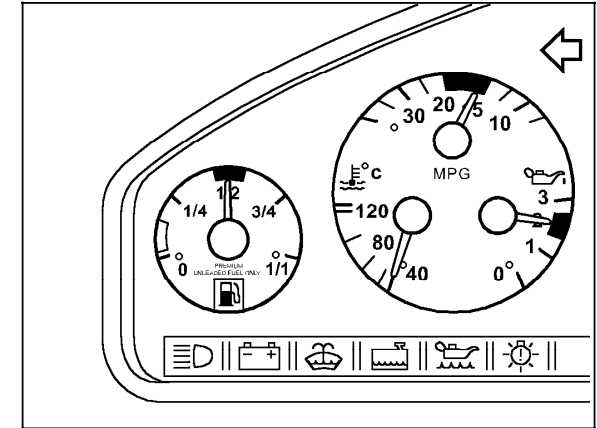


P54.30-0836-01

Figure 5

Activation of instruments

- 2nd quarter: Speedometer, Tachometer



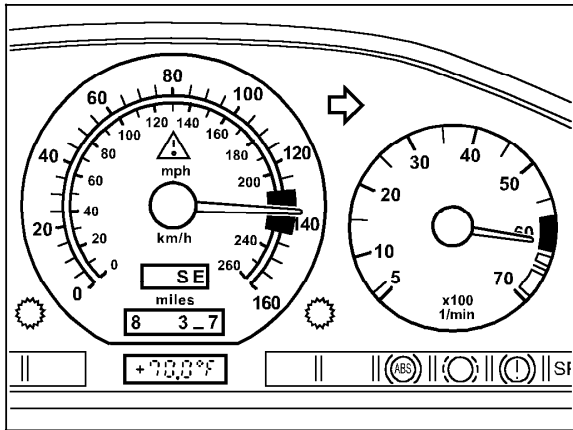
P54.30-0837-01

Figure 6

Activation of instruments

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

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

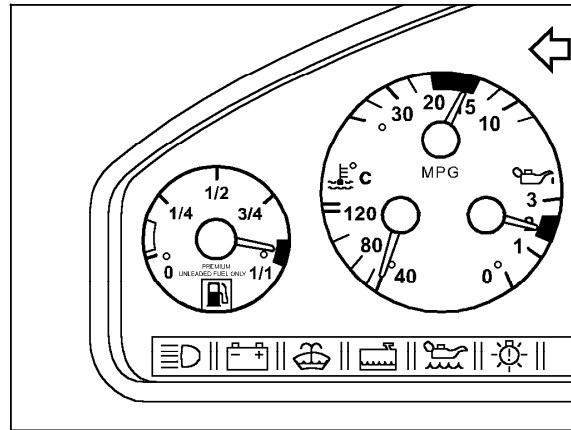


P54.30-0838-01

Figure 7

Activation of instruments

3rd quarter: Speedometer, Tachometer

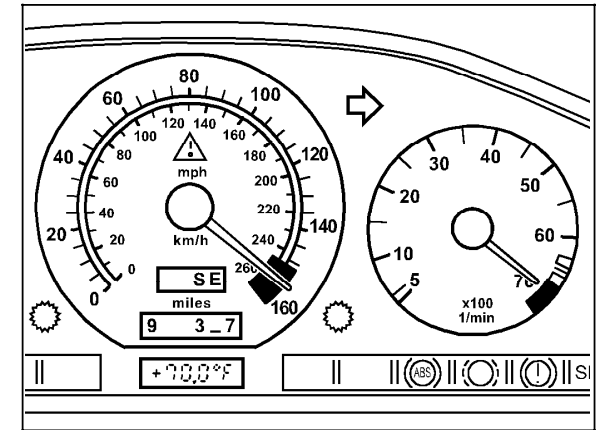


P54.30-0839-01

Figure 8

Activation of instruments

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



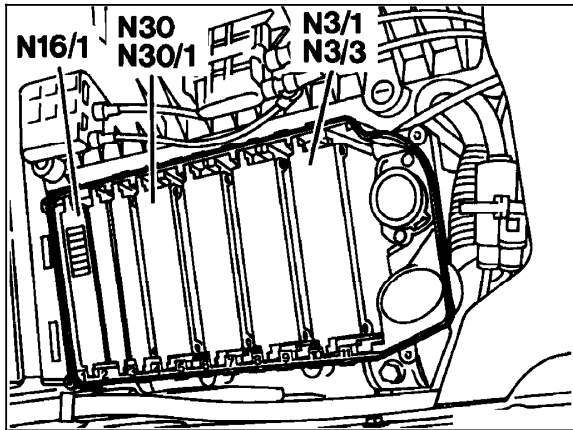
P54.30-0840-01

Figure 9

Activation of instruments

4th quarter: Speedometer, Tachometer

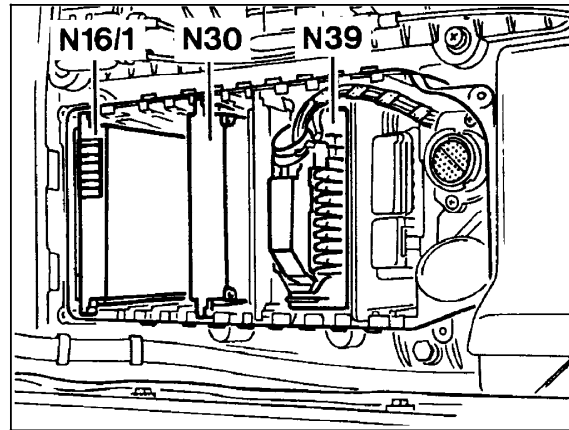
Electrical Test Program – Test (vehicles up to 08/95)



P54.30-0841-01

Figure 10
Module box on vehicles with LH-SFI engine

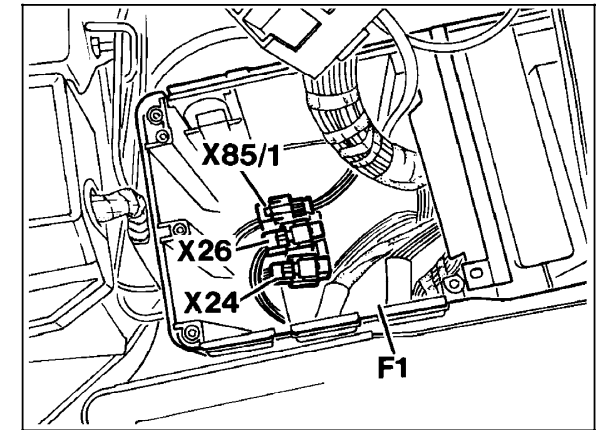
- N3/1 LH-SFI control module
- N3/3 Right LH-SFI control module
- N16/1 Base module
- N30 ABS control module
- N30/1 ASR control module



P54.30-0842-01

Figure 11
Module box on vehicles with Diesel engine

- N16/1 Base module
- N30 ABS control module
- N39 EDS control module

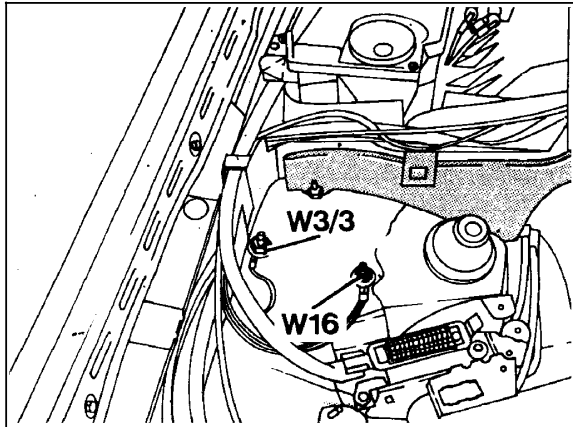


P54.30-0843-01

Figure 12

- F1 Fuse and relay box
- X24 Headlamp harness connector
- X26 Interior/engine connector
- X85/1 A/C harness/engine harness connector

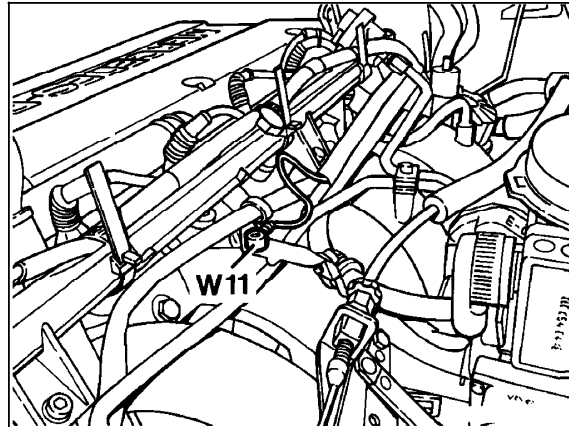
Electrical Test Program – Test (vehicles up to 08/95)



P54.30-0844-01

Figure 13

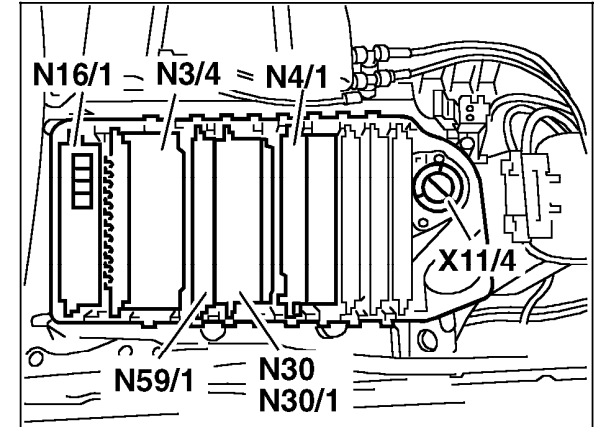
W3/3 Ground (left front wheel well housing - DI)



P54.30-0845-01

Figure 14

W11 Ground (engine - connection point for ground wires)



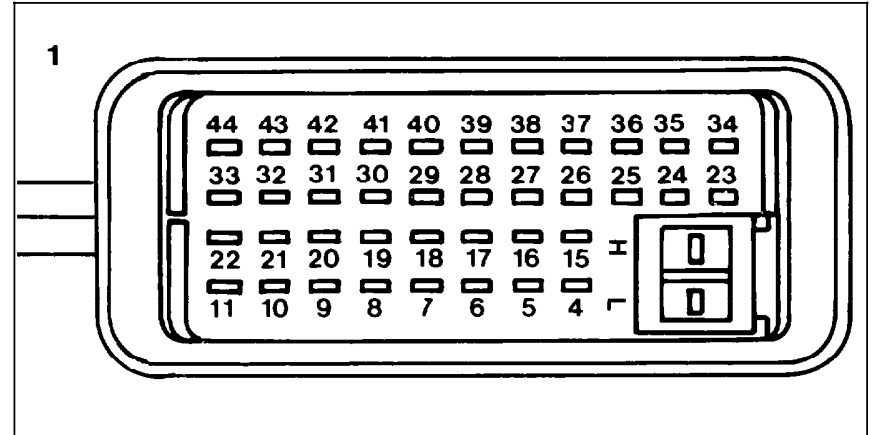
P54.30-0277-13

Figure 15

Module box on vehicles with HFM-SFI engine

- N3/4 Engine control module (HFM-SFI)
- N4/1 EA/CC/ISC control module
- N16/1 Base module (BM)
- N30 ABS control module
- N30/1 ASR control module
- N59/1 Diagnostic module (OBD II)
- X11/4 Data link connector (DTC readout)

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



P07-5936-33

Figure 16

Engine control module (N3/4) (HFM-SFI)
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

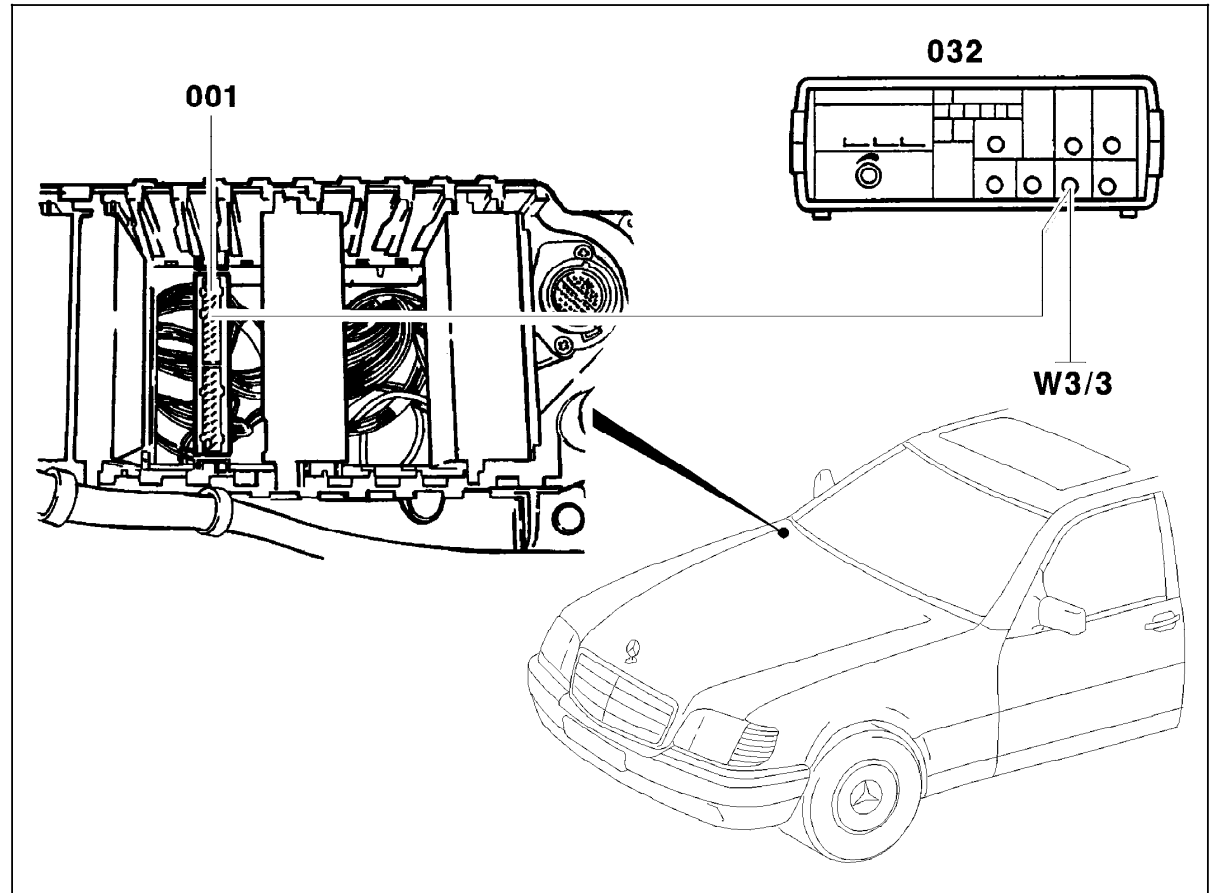


Figure 17

- 001 ABS control module connector
- 032 Signal generator
- W3/3 Ground (right front wheel well housing - DI)

P54.30-0846-06

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

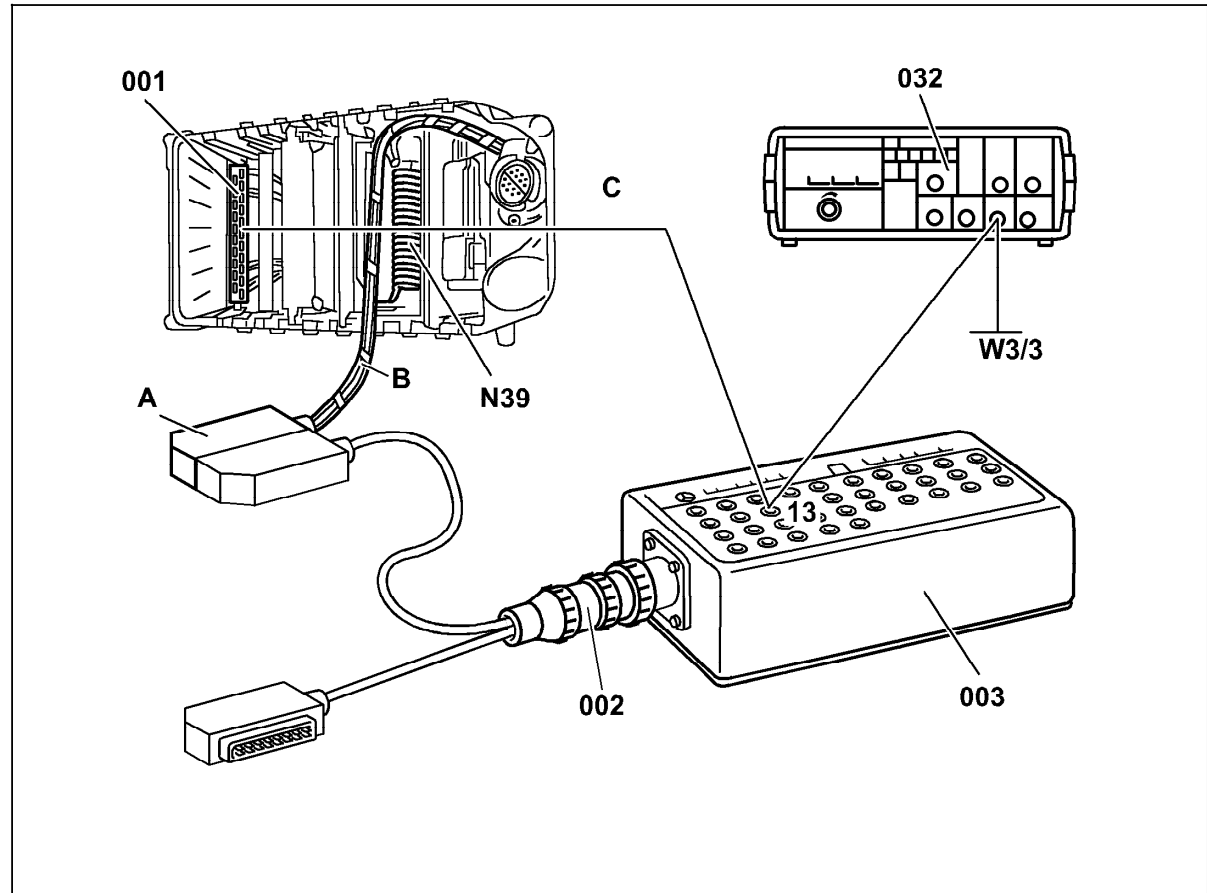
Connection Diagram – Signal Generator, socket box for vehicles with diesel engine Fuel consumption test

Note:

When testing vehicles with EDS (diesel), connect the socket box (003, Figure 18) and test cable (002) to the EDS control module connector (A), **DO NOT** connect the test harness (002) to the EDS control module.

Figure 18

- A EDS control module (N39) connector
- B Engine harness (located in the control module box)
- C Bridge from socket box socket 13 (fuel consumption signal from N39) to base module N16/1 socket 13 (engine RPM signal [TN])
- N39 EDS control module
- W3/3 Ground (right front wheel well housing)
- 001 Base module (N16/1) connector
- 002 25-pole test cable 124 589 33 63 00
- 003 35-pole socket box 124 589 00 21 00
- 032 Signal generator



P54.30-0612-06

1.10 Instrument Cluster (IC) (with Digital Odometer)

Model 140

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

Connection Diagram – Signal Generator, for vehicles with LH engine
Fuel consumption test

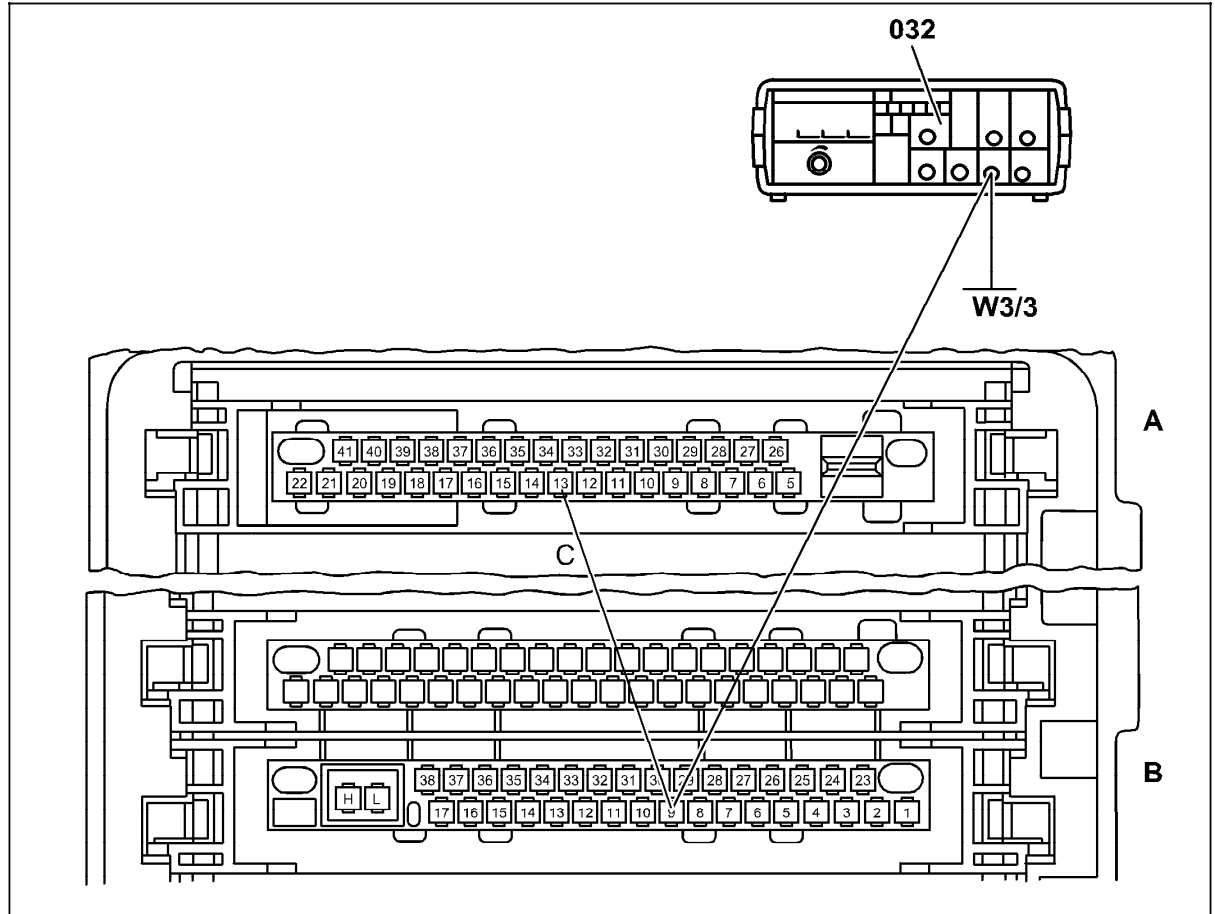


Figure 19

- A Base module (N16/1) connector
- B N3/1 or N3/3: engine control module (LH-SFI) connector "1"
- C Bridge from N16/1 connector, socket 13 (RPM signal [TN]) to N3/1 or N3/3 connector, socket 9 fuel consumption signal
- 032 Signal generator
- W3/3 Ground (right front wheel well housing - DI)

P54.30-0613-06


1.10 Instrument Cluster (IC) (with Digital Odometer)

Model 140

Electrical Test Program – Test (vehicles with ESP up to 05/96 or as of 09/95 and up to 05/96)

⇒	Mode	Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
1.0		Instrument cluster (A1) Voltage supply circuit 30	<p>11 —(2) ←(V)→ —(2) 12</p>	Remove A1 Disconnect connector 2	11 – 14 V	Wiring, Fuse F17 in Fuse box F3 ⇒ 1.1
1.1		Voltage supply Circuit 15, unfused	<p>10 —(1) ←(V)→ —(1) 1</p>	Remove A1 Disconnect connector 1 Ignition: ON	11 – 14 V	Wiring, Fuse F23 in Fuse box F3 ⇒ 1.2
1.2		Voltage supply Circuit 15, fused	<p>10 —(1) ←(V)→ —(1) 5</p>	Remove A1 Disconnect connector 1 Ignition: ON	11 – 14 V	Wiring, Fuse F24 in Fuse box F3 Values OK: A1
2.0		Instrument cluster (A1) Illumination	<p>10 —(1) ←(V)→ —(1) 8</p>	Remove A1 Disconnect connector 1 Ignition: ON Turn on parking lights	11 – 14 V	Wiring, Exterior lamp switch (S1), Short circuit in circuit 58d (output from A1).
3.0	1	Fuel level gauge (A1p2)		Activate test mode 1 (see 11 and 23 or 24 Figure 1).	Analog fuel gauge reading ≈ digital readout	A1, ⇒ 3.1

Electrical Test Program – Test (vehicles with ESP up to 05/96 or as of 09/95 and up to 05/96)





⇒	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 24 Figures 2 – 9	A1, ⇒ 3.2
3.2		Wires and connections and fuel level sensor (B4)	 <p style="text-align: center;">B4</p>	Ignition: OFF Disconnect connector at B4 Connect resistance substitution unit. Ignition: ON Resistance substitution unit setting: $87 \pm 2 \Omega$ $77 \pm 1 \Omega$ $68 \pm 3 \Omega$ $48 \pm 3 \Omega$ $27 \pm 3 \Omega$ $7 \pm 2 \Omega$ Note: Before changing each resistance value, the ignition must be turned off and then turned on again.	Display in A1p2: ≈ 0 ¹⁾ $\approx \text{Res.}$ ¹⁾ $\approx 1/4$ $\approx 1/2$ $\approx 3/4$ $\approx 1/1$	Wiring, Values OK: B4, ⇒ 3.3

1) Fuel reserve indicator lamp lights up.



Electrical Test Program – Test (vehicles with ESP up to 05/96 or as of 09/95 and up to 05/96)

⇒	Mode	Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
3.3	1	Programming fuel tank version in trip odometer		Ignition: ON Activate test mode 1	5E= Standard fuel tank 5R=Fuel tank with pass-through (non-U.S.)	Set fuel tank version to 5E by depressing reset button for trip odometer.
4.0	2	Fuel consumption indicator (A1p10)		Engine: at Idle Activate test mode 2 Increase engine rpm	With increasing rpm, the consumption in l/h increases. Note: 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 – 9	A1, ⇒ 4.2



Electrical Test Program – Test (vehicles with ESP up to 05/96 or as of 09/95 and up to 05/96)

⇒	Mode	Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
4.2	2	Fuel consumption signal from HFM-SFI control module (N3/4) or ME-SFI engine control module (N3/10 or N3/12)	<p>with HFM-SFI:</p> <p>18 (1)  N3/4</p> <p>W16  N3/4</p> <p>with ME-SFI:</p> <p>56 (1)  N3/10 or N3/12</p> <p>W16  N3/10 or N3/12</p>	<p>Ignition: OFF</p> <p>Disconnect N3/4 or N3/10 or N3/12 (Figures 11 to 14).</p> <p>Connect signal generator (Figure 15) and make connection for rpm signal as follows:</p> <p>HFM-SFI</p> <p>First bridge N3/4 pin socket 18 to pin socket 7, then connect signal generator (pin 7 and ground)</p> <p>ME-SFI</p> <p>First bridge N3/10 or N3/12 pin socket 56 to pin socket 58, then connect signal generator</p> <p>Set to a voltage amplitude of approx. 10 V.</p> <p>Ignition: ON</p> <p>Activate test mode 2.</p>	<p>HFM-SFI</p> <p>25 HZ ≈ 5 l/h 50 HZ ≈ 10 l/h 75 HZ ≈ 15 l/h 100 HZ ≈ 20 l/h</p> <p>Note:</p> <p>The readout is only visible on the digital display. The analog reading shows 0.</p>	<p>Wiring, A1, Values OK: N3/4 Engines, Volume 2 – 1.1 23</p> <p>N3/10 or N3/12 Engines, Volume 4 – 9.5 23 –9.6 23</p> <p>Note:</p> <p>If no plausible values are indicated while driving and the speedometer is in order: check instrument cluster (A1)</p>


Electrical Test Program – Test (vehicles with ESP up to 05/96 or as of 09/95 and up to 05/96)

⇒	Mode	Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
5.0	3	Engine oil pressure gauge (A1p3)		Engine: at Idle Activate test mode 3. Increase engine rpm	Analog reading ≈ digital readout. The oil pressure increases with increasing engine rpm.	A1, ⇒ 5.1
5.1	6 – 7	Oil pressure gauge (A1p3)		Activate test modes 6 – 7	see Figures 2 – 9	A1, ⇒ 5.2
5.2		Wires and connections and oil pressure sensor (B5)	1—  B5  —2	Ignition: OFF Disconnect connector at B5. Connect resistance substitution unit. Engine: at Idle Resistance substitution unit setting: 13 Ω 40 Ω 90 Ω 150 Ω	Display in A1p3: ≈ 0 ≈ 1 ≈ 2 ≈ 3	Wiring, A1, Values OK: check oil pressure (see SMS Engine, Mechanical), B5


Electrical Test Program – Test (vehicles with ESP up to 05/96 or as of 09/95 and up to 05/96)

⇒	Mode	Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
6.0	4	Tachometer (A1p5)		Engine: at Idle Activate test mode 4, increase engine rpm	Analog tachometer reading ≈ digital readout	A1, ⇒ 6.1
6.1		Tachometer (A1p5) with HFM-SFI: with ME-SFI:	W16  N3/4 18 (1) N3/10 or N3/12 W16  56 (1)	Disconnect plug on N3/4 (HFM-SFI) or N3/10 or N3/12 (ME-SFI) (Figures 11 to 14). Connect signal generator and set to a voltage amplitude of approx. 10 V (Figure 15). Ignition: ON	Engine 104, 120 Readout: 50 Hz ≈ 1000 rpm 194 Hz ≈ 4000 rpm Engine 119 Readout: 70 Hz ≈ 1000 rpm 270 Hz ≈ 4000 rpm	Wiring, A1, Values OK on HFM-SFI engine: N3/4 Values OK on ME-SFI engine: N3/10 or N3/12

Electrical Test Program – Test (vehicles with ESP up to 05/96 or as of 09/95 and up to 05/96)

⇒	Mode	Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
7.0	5	Low engine oil level indicator lamp (A1e12)		Oil level correct. Engine: at Idle Activate test mode 5.	Readout in odometer: □.5 ≈ Oil level OK, indicaor: OFF ≈ Oil level not OK, indicaor: ON	Wiring, Oil level switch (S43)
8.0		Electronic speedometer (A1p8) Vehicles with ESP or vehicles with ASR or ETS as of 9/95: For left front axle VSS sensor (L6/1) output (feed signal to A1p8) from the Traction System control module (N47). See D.M., Chassis and Drivetrain, Vol. 3, 9.3 23 or Vol. 3, 10.1 23	W16  N47 —1 (1)	Disconnect connector from N47 (Figure 11, or 12). Connect signal generator and set to a voltage amplitude of approx. 10 V Ignition: ON	With increasing frequency the speed on the speedometer increases.	Wiring, A1. Values OK: N47-1 or N47-2, D.M., Chassis and Drivetrain, Volume 3 – 9.3 23 N47-5 D.M., Chassis and Drivetrain, Volume 3 – 10.1 23

Electrical Test Program – Test (vehicles with ESP up to 05/96 or as of 09/95 and up to 05/96)

⇒	Mode	Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
9.0		Outside temperature display (A1p4)		Disconnect 2-pole connector X24 (Figure 10). Connect resistance substitution unit. Ignition: ON Resistance substitution unit setting: 53 kΩ 9.8 kΩ 1 kΩ	Display in A1p4: ≈ - 30 °C ≈ 0 °C ≈ + 50 °C	Wiring, A1, ⇒ 9.1
9.1	6	Outside temperature indicator temperature sensor (B14)		Ignition: ON Activate test mode 6. 53 kΩ 9.8 kΩ 3.7 kΩ 1.6 kΩ	Readout in odometer: ≈ - 30 °C ≈ 0 °C ≈ 20 °C ≈ 40 °C	B14

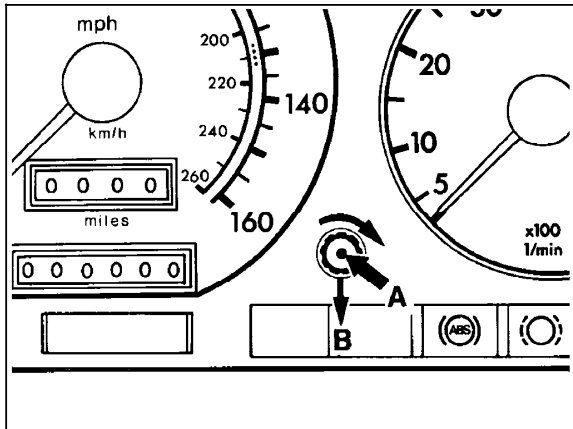
Electrical Test Program – Test (vehicles with ESP up to 05/96 or as of 09/95 and up to 05/96)

⇒	Mode	Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
10.0		ECT gauge (A1p1)	<p>W11 — — B13</p>	Disconnect plug on ECT gauge sensor (B13). Connect resistance substitution unit. Ignition: ON Resistance substitution unit setting: 110 Ω 67 Ω 38 Ω 20 Ω	Display in A1p1: ≈ 60 °C ≈ 80 °C ≈ 100 °C ≈ 120 °C	Wiring, A1 Values OK: B13
11.0		Instrument cluster (A1) Data line from traction system control module (N47)	<p> ETS or ASR: N47 7 — — A1 14 (1) (2) </p> <p> ESP: N47 9 — — A1 14 (1) (2) </p>	Remove A1 Disconnect connector 2	$\leq 5 \Omega$	Wiring, Values OK: N47, D.M., Chassis and Drivetrain, Vol. 3, 9.3 23 or D.M., Chassis and Drivetrain, Vol. 3, 10.1 23

1.10 Instrument Cluster (IC) (with Digital Odometer)

Model 140

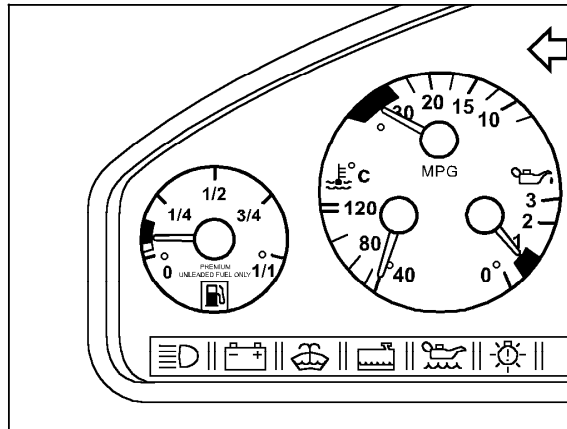
Electrical Test Program – Test (vehicles with ESP up to 05/96 or as of 09/95 and up to 05/96)



P54.30-0832-01

Figure 1

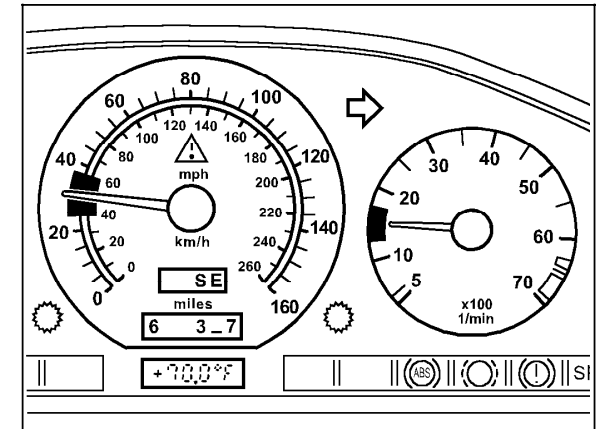
Activation of test mode



P54.30-0833-01

Figure 2

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



P54.30-0834-01

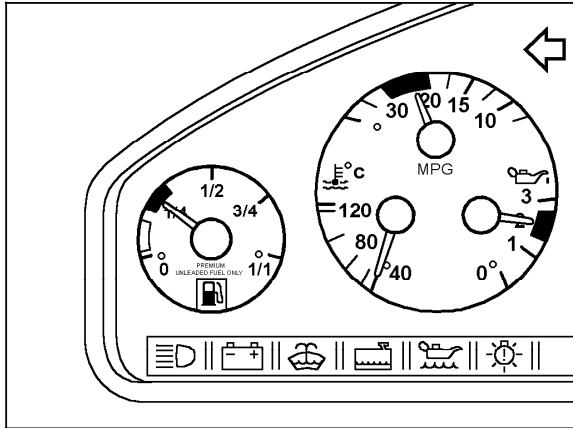
Figure 3

Activation of instruments
1st quarter: Speedometer, Tachometer

1.10 Instrument Cluster (IC) (with Digital Odometer)

Model 140

Electrical Test Program – Test (vehicles with ESP up to 05/96 or as of 09/95 and up to 05/96)

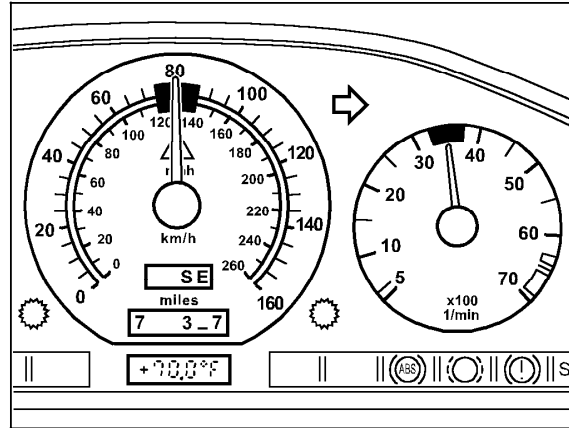


P54.30-0835-01

Figure 4

Activation of instruments

2nd quarter: Fuel tank
Fuel consumption
Oil pressure

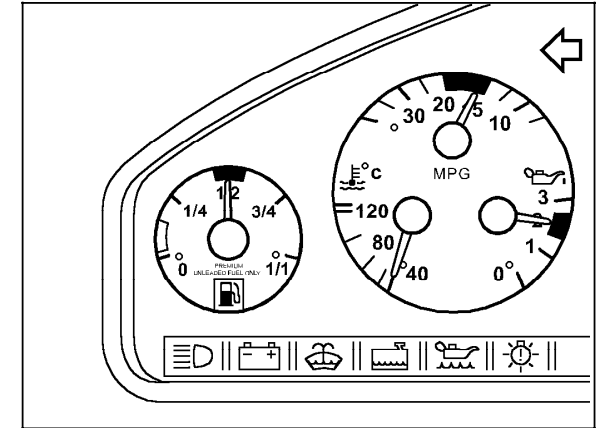


P54.30-0836-01

Figure 5

Activation of instruments

2nd quarter: Speedometer, Tachometer



P54.30-0837-01

Figure 6

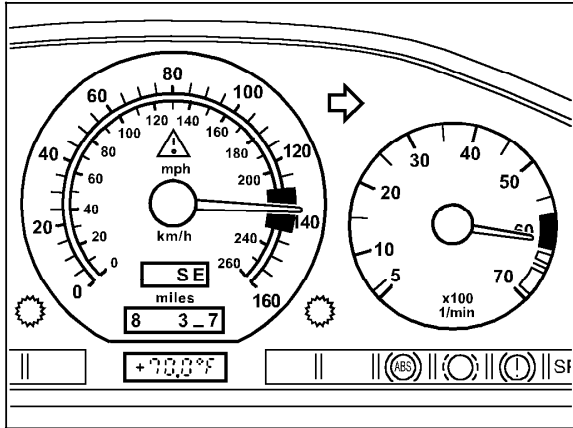
Activation of instruments

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

1.10 Instrument Cluster (IC) (with Digital Odometer)

Model 140

Electrical Test Program – Test (vehicles with ESP up to 05/96 or as of 09/95 and up to 05/96)

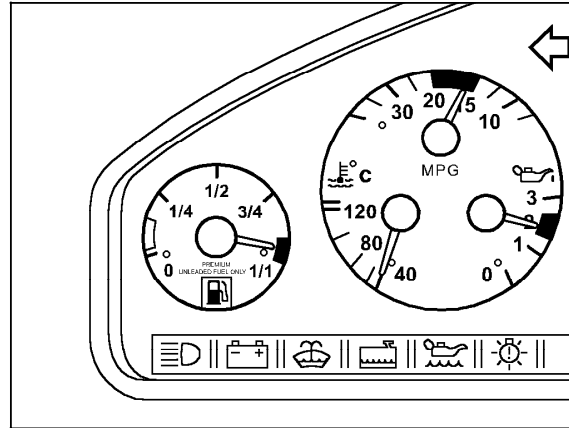


P54.30-0838-01

Figure 7

Activation of instruments

3rd quarter: Speedometer, Tachometer

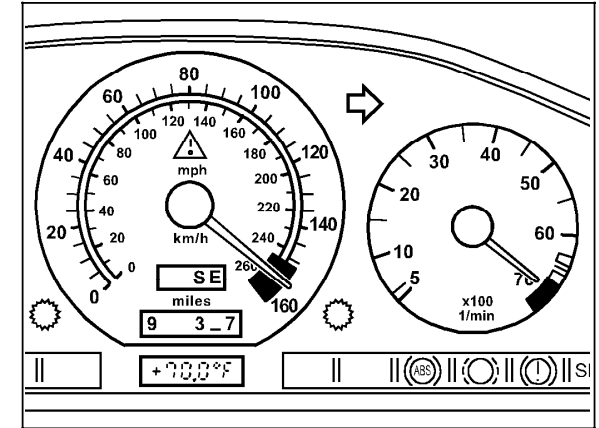


P54.30-0839-01

Figure 8

Activation of instruments

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



P54.30-0840-01

Figure 9

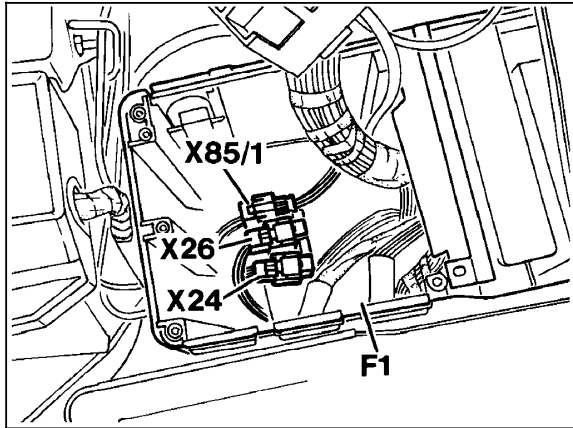
Activation of instruments

4th quarter: Speedometer, Tachometer

1.10 Instrument Cluster (IC) (with Digital Odometer)

Model 140

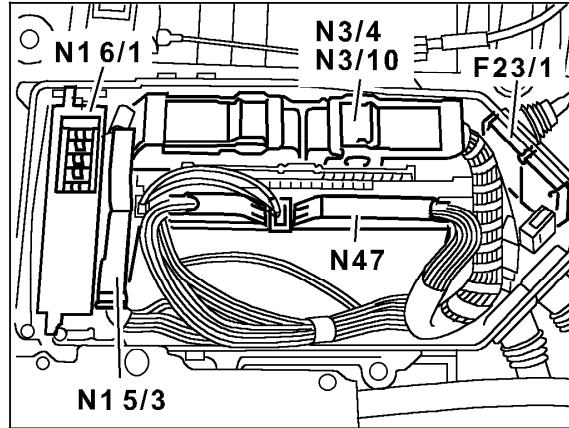
Electrical Test Program – Test (vehicles with ESP up to 05/96 or as of 09/95 and up to 05/96)



P54.30-0843-01

Figure 10

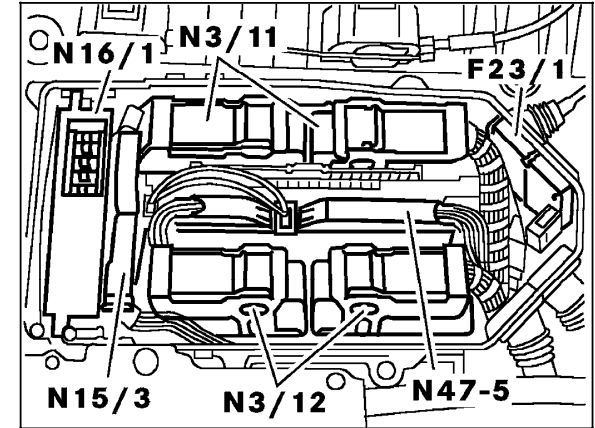
- F1 Fuse and relay box
- X24 Headlamp harness connector
- X26 Interior/engine connector
- X85/1 A/C harness/engine harness connector



P54.30-0310-01

Figure 11

- F23/1 Control module box
- N3/4 Engine control module (HFM-SFI)
- N3/10 Engine control module (ME-SFI)
- N15/3 Transmission control module
- N16/1 Base module (BM)
- N47 Traction systems control module



P54.30-0309-01

Figure 12

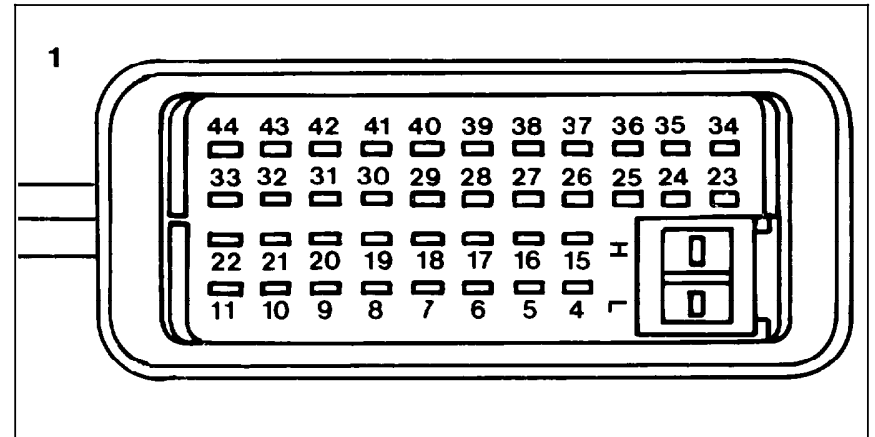
- F23/1 Control module box
- N3/11 Left engine control module (ME-SFI)
- N3/12 Right engine control module (ME-SFI)
- N15/3 Transmission control module
- N16/1 Base module (BM)
- N47-5 ESP/SPS control module

Electrical Test Program – Test (vehicles with ESP up to 05/96 or as of 09/95 and up to 05/96)

Figure 13

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

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



P07-5936-33

Electrical Test Program – Test (vehicles with ESP up to 05/96 or as of 09/95 and up to 05/96)

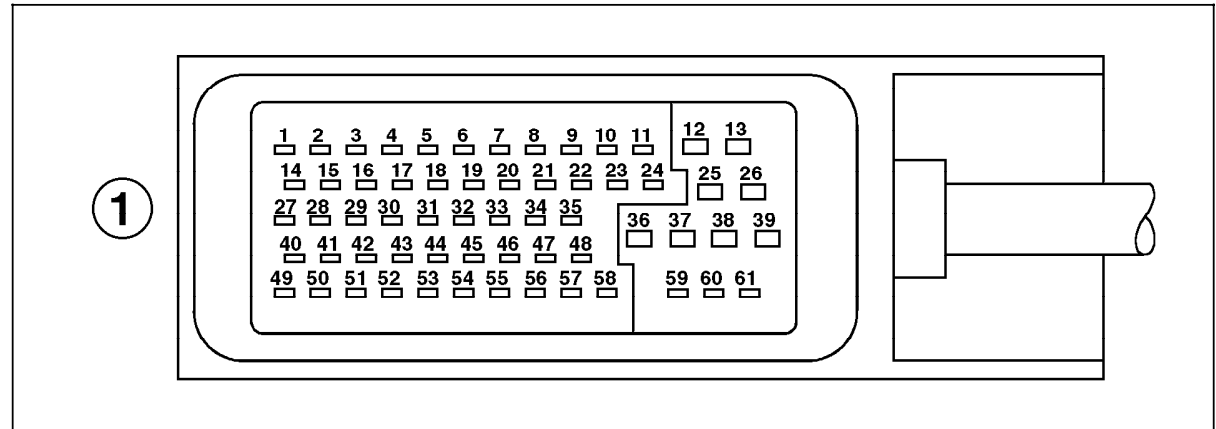


Figure 14

Engine control module (N3/10 or N3/12) (ME-SFI)
connector "1"

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

P07-6727-53

1.10 Instrument Cluster (IC) (with Digital Odometer)

Model 140

Electrical Test Program – Test (vehicles with ESP up to 05/96 or as of 09/95 and up to 05/96)

Connection Diagram – Signal Generator

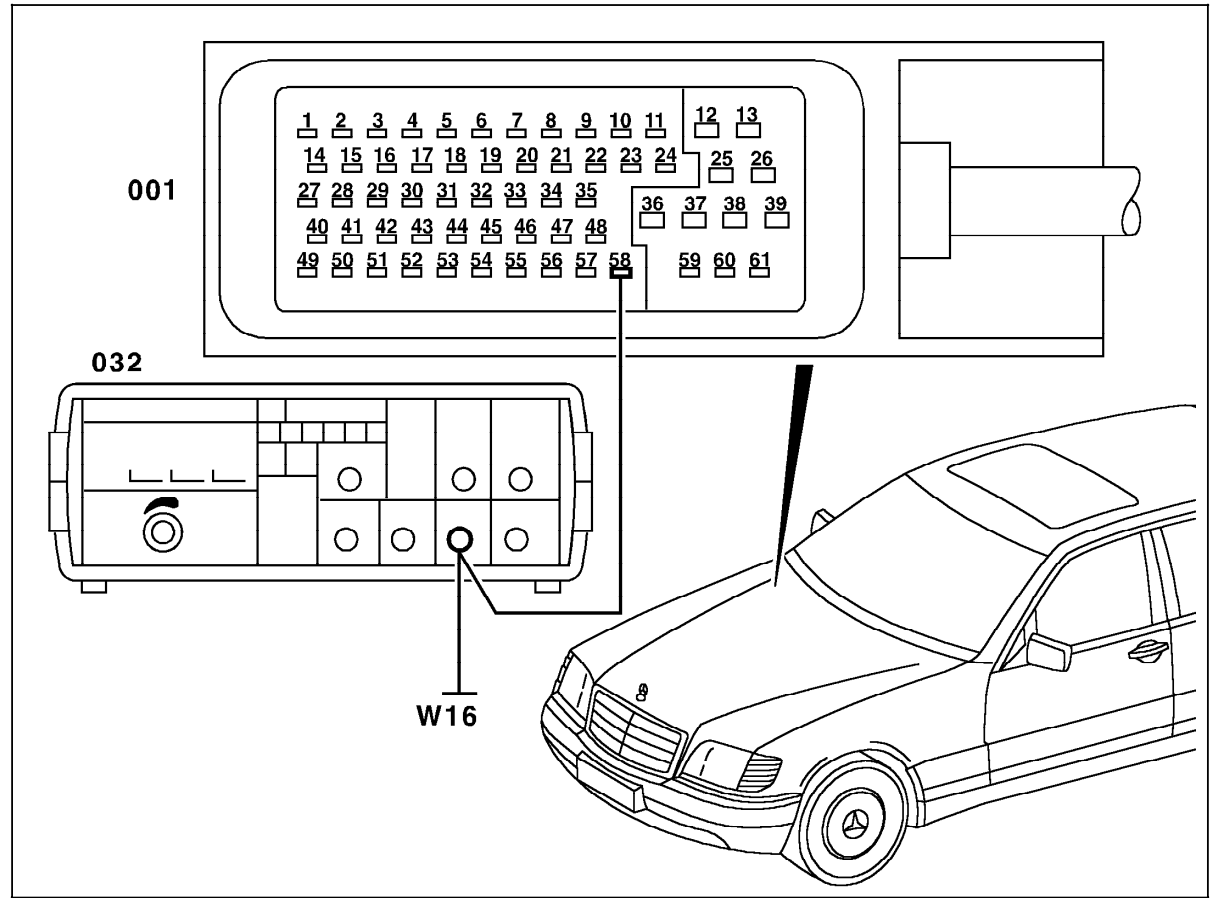


Figure 15

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

P54.30-0303-06