

6.2 Models 124.034, 129 (HFM-SFI only), 140

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Diagnosis - Diagnostic Trouble Code (DTC) Memory

Test Preparation for DTC Readout

1. Connect impulse counter scan tool or Hand-Held Tester to data link connector (X11/4) as shown in section 0.

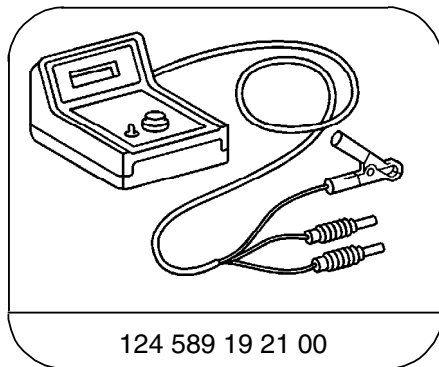
Note:

Connect yellow wire from impulse counter scan tool as follows:

ABS control module (N30)	socket 6
Base module (N16/1)	socket 8

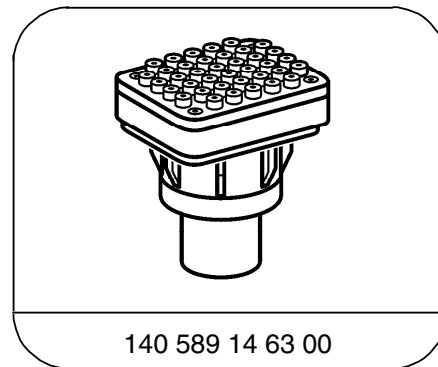
2. Ignition: **ON**.
3. Read DTC memory of ABS control module (N30), and base module (N16/1).

Special Tools



124 589 19 21 00

Pulse counter



140 589 14 63 00


Adapter

Equipment

Hand-Held Tester (HHT)



see applicable Service Information in groups 58 and 99

Diagnosis - Diagnostic Trouble Code (DTC) Memory

Diagnostic trouble code (DTC) 	Possible cause	Test step/Remedy ¹⁾
1 -	No faults recognized. In case of complaint:	23 (entire test)
2 002	Left front axle vehicle speed sensor (L6/1), open circuit	23⇒ 10.0
3 003	Right front axle vehicle speed sensor (L6/2), open circuit	23⇒ 12.0
4 004	Rear axle vehicle speed sensor (L6), open circuit	23⇒ 14.0
6 006	Left front axle solenoid valve (A7y1)	23⇒ 16.0
7 007	Right front axle solenoid valve (A7y2)	23⇒ 17.0
8 008	Rear axle solenoid valve (A7y3)	23⇒ 18.0
10 010	Return pump (A7m1) or return pump relay (A7k2)	23⇒ 6.0
11 011	Solenoid valve relay (A7k1)	23⇒ 5.0
12 012	Models 140.04/05: Master cylinder switchover valve (Y61)	23⇒ 7.0
13 013	Brake lamp switch (S9/1)	23⇒ 9.0
14 014	Models 140.04/05: Lateral acceleration sensor (B24/2)	23⇒ 8.0
15 015	ABS control module (N30)	N30

¹⁾ Observe Preparation for Test, see 22.

Diagnosis - Diagnostic Trouble Code (DTC) Memory

Diagnostic trouble code (DTC)  	Possible cause	Test step/Remedy ¹⁾
16 016	Vehicle speed sensors (L6, L6/1, L6/2), implausible signal ²⁾	23⇒ 10.0 23⇒ 12.0 23⇒ 14.0 Visual inspection
17 017	Solenoid valve relay (A7k1)	23⇒ 5.0
25 025	Left front axle vehicle speed sensor (L6/1), implausible signal ²⁾	23⇒ 10.0
26 026	Right front axle vehicle speed sensor (L6/2), implausible signal ²⁾	23⇒ 12.0
27 027	Rear axle vehicle speed sensor (L6), implausible signal ²⁾	23⇒ 14.0
29 029	Models 140.04/05: Lateral acceleration sensor (B24/2), implausible signal	23⇒ 8.0

1) Observe Preparation for Test, see 22.

2) Incorrect number of rotor teeth, dirty or damaged, incorrect rear axle ratio, tires or wheels.

Diagnosis - Complaint Related Diagnostic Chart

Complaint/Problem	Possible cause	Remedy/Test step ¹⁾
ABS malfunction indicator lamp (MIL) (A1e17) remains lit with engine running.		DTC memory 11, DTC memory for base module, see Volume 1, section 1 11,
ABS malfunction indicator lamp (MIL) (A1e17) comes on and stays on while driving.		DTC memory 11
ABS malfunction indicator lamp (MIL) (A1e17) comes on and goes out while driving.	Voltage supply < 11 V, too many electrical consumers operating	Test generator (G2), DTC memory 11
ABS malfunction indicator lamp (MIL) (A1e17) does not come on with ignition ON .	Wiring ABS malfunction indicator lamp (MIL) (A1e17)	23 ⇒ 2.0

¹⁾ Observe Preparation for Test, see 22.

Electrical Test Program - Component Locations

Electrical Components in Engine Compartment and on Front Axle (shown on model 140)

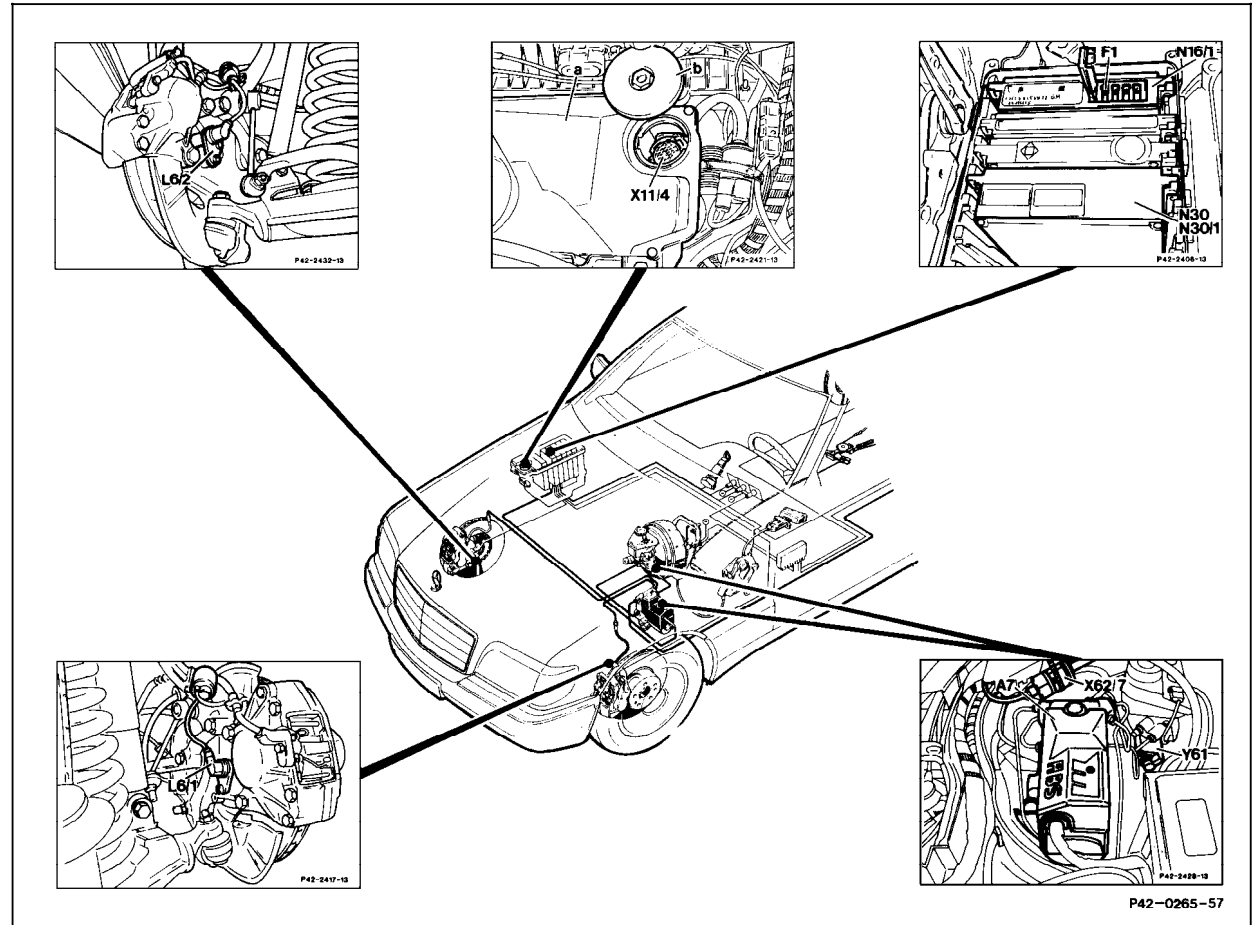


Figure 1

- A7 ABS hydraulic unit
- F1 Fuse for ABS control module (N30) in base module (N16/1)
- L6/1 Left front axle vehicle speed sensor
- L6/2 Right front axle vehicle speed sensor
- N16/1 Base module
- N30 ABS control module
- X11/4 Data link connector (DTC readout)
- Y61 Master cylinder switchover valve (ABS)

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Electrical Test Program - Component Locations

Electrical Components in Passenger Compartment and on Rear Axle (shown on model 140)

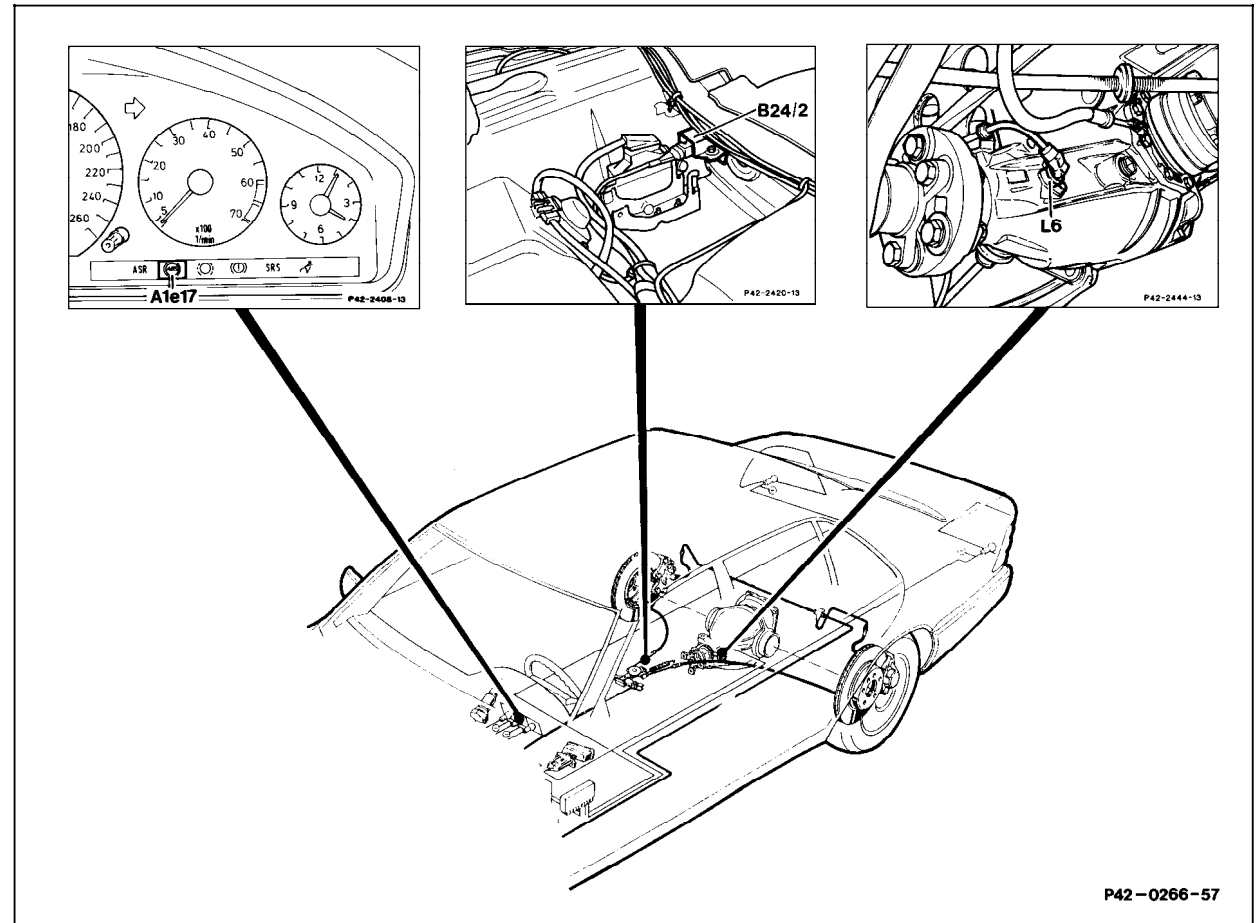


Figure 2

A1e17	ABS malfunction indicator lamp
B24/2	ABS lateral acceleration sensor
L6	Rear axle vehicle speed sensor

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6.2 Anti-lock Brake System (ABS)

Models 124.034, 129 (HFM-SFI only), 140

Electrical Test Program - Preparation for Test

Preliminary work:

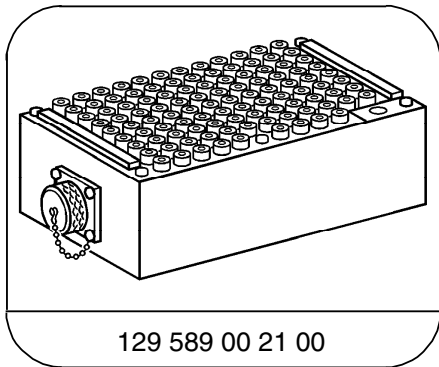
Diagnosis - Diagnostic Trouble Code (DTC) Memory 11

1. Ignition: **OFF**.
2. Remove ABS control module (N30).
3. Connect socket box (126-pole) with contact module 4 and contact box according to connection diagram.

Wiring Diagrams

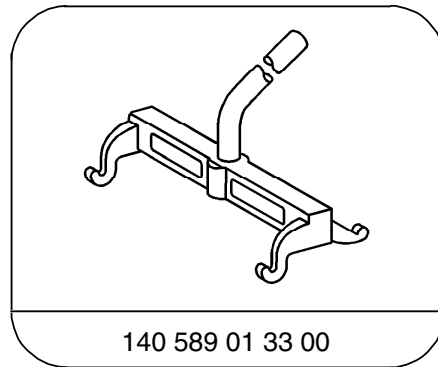
Electrical Troubleshooting Manual, Model 124 (starting Model Year 1993), 129 or 140.

Special Tools



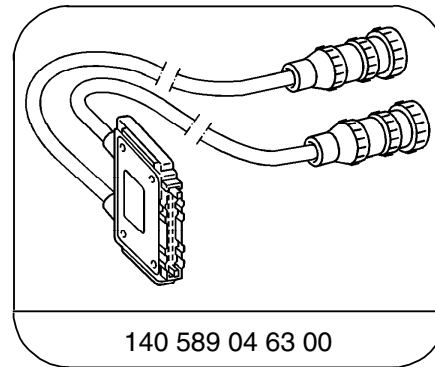
129 589 00 21 00

126-pin socket box



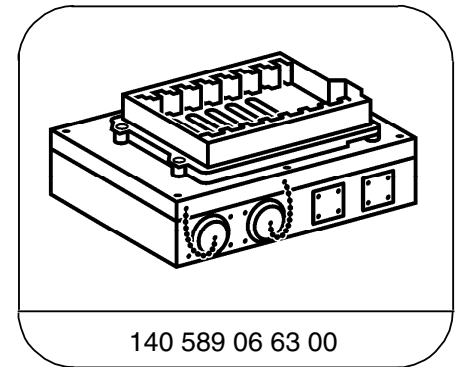
140 589 01 33 00

Mounting lever



140 589 04 63 00

Contacting module 4

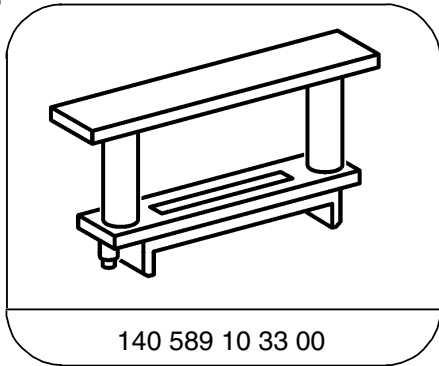


140 589 06 63 00

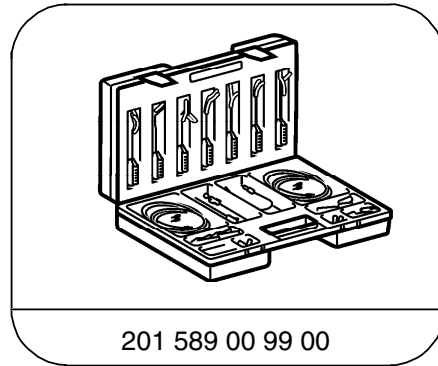
Contacting box

Electrical Test Program - Preparation for Test

Special Tools



Spacer



Electrical connecting set

Equipment

Multimeter ¹⁾

Fluke models 23, 83, 85, 87

¹⁾ Available through the MBUSA Standard Equipment Program.

Electrical Test Program - Preparation for Test

Connection Diagram – Socket box
Model 124.034

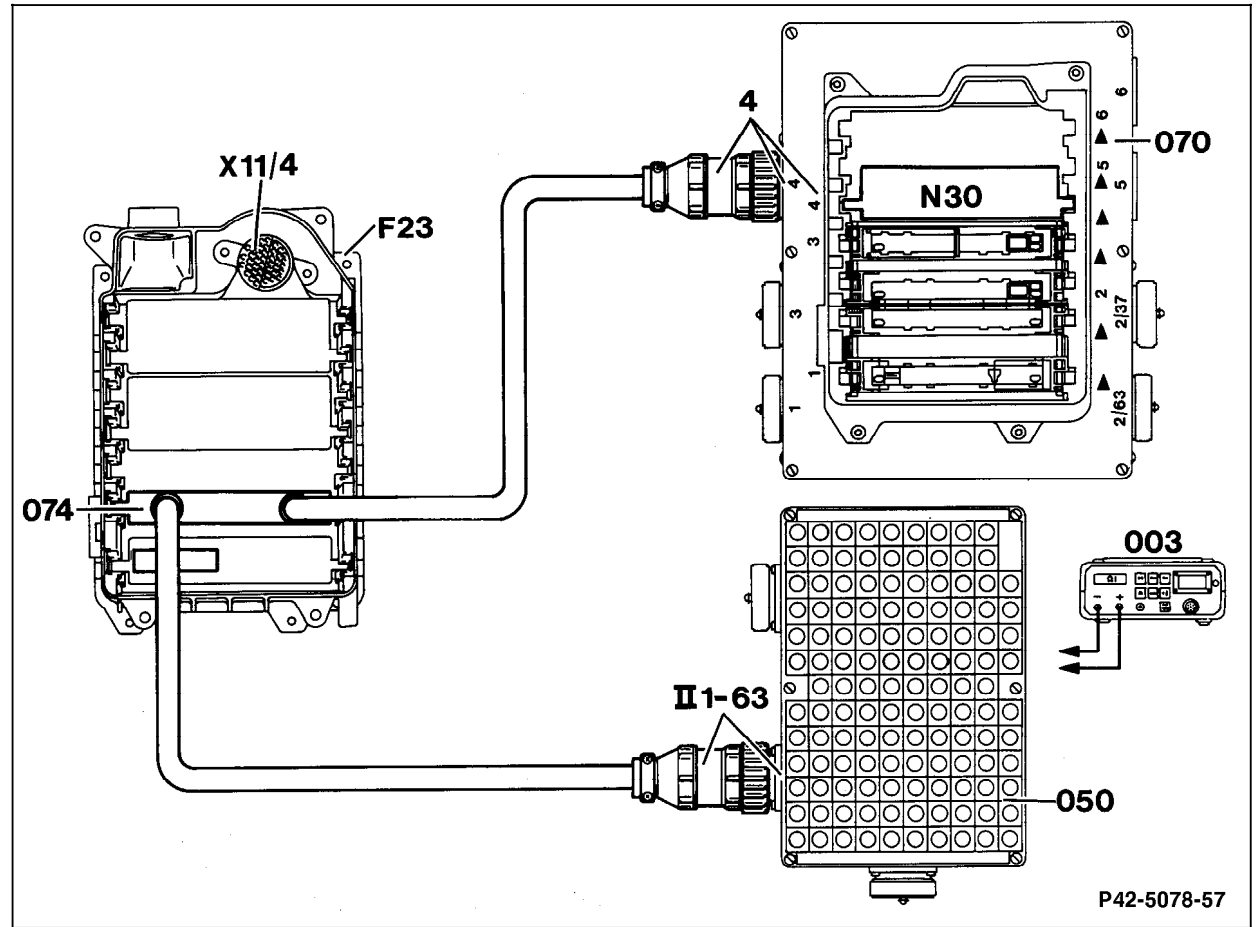


Figure 1

- 003 Multimeter
- 050 Socket box (126-pole)
- 070 Contact box
- 074 Contact module 4
- F23 Module box
- N30 ABS control module
- X11/4 Data link connector (38-pole)

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Electrical Test Program - Preparation for Test

Connection Diagram – Socket box
Model 129 (HFM-SFI only)

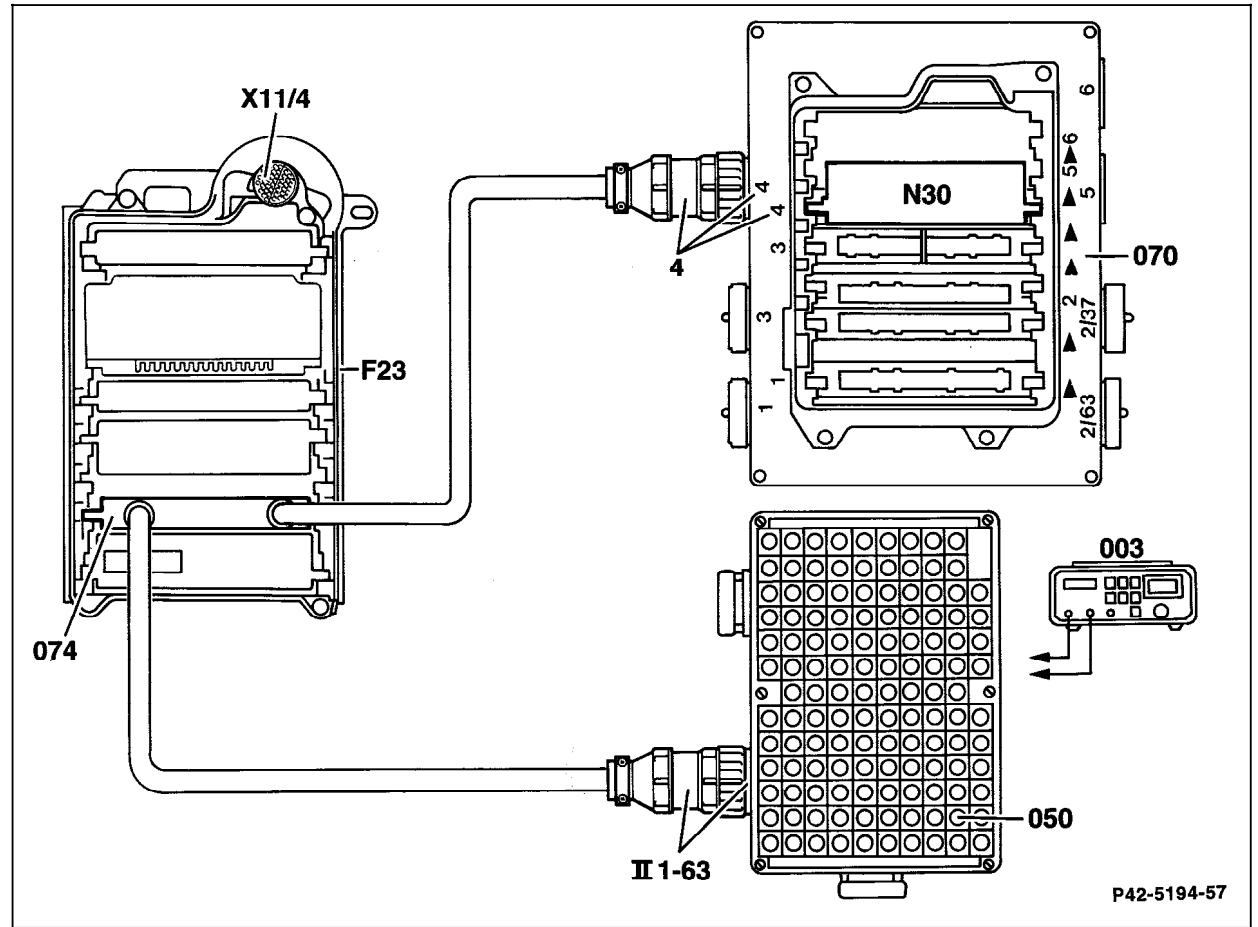


Figure 2

- 003 Multimeter
- 050 Socket box (126-pole)
- 070 Contact box
- 074 Contact module 4
- F23 Module box
- N30 ABS control module
- X11/4 Data link connector (38-pole)

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Electrical Test Program - Preparation for Test

Connection Diagram – Socket box
Model 140.0 (LH-SFI only)

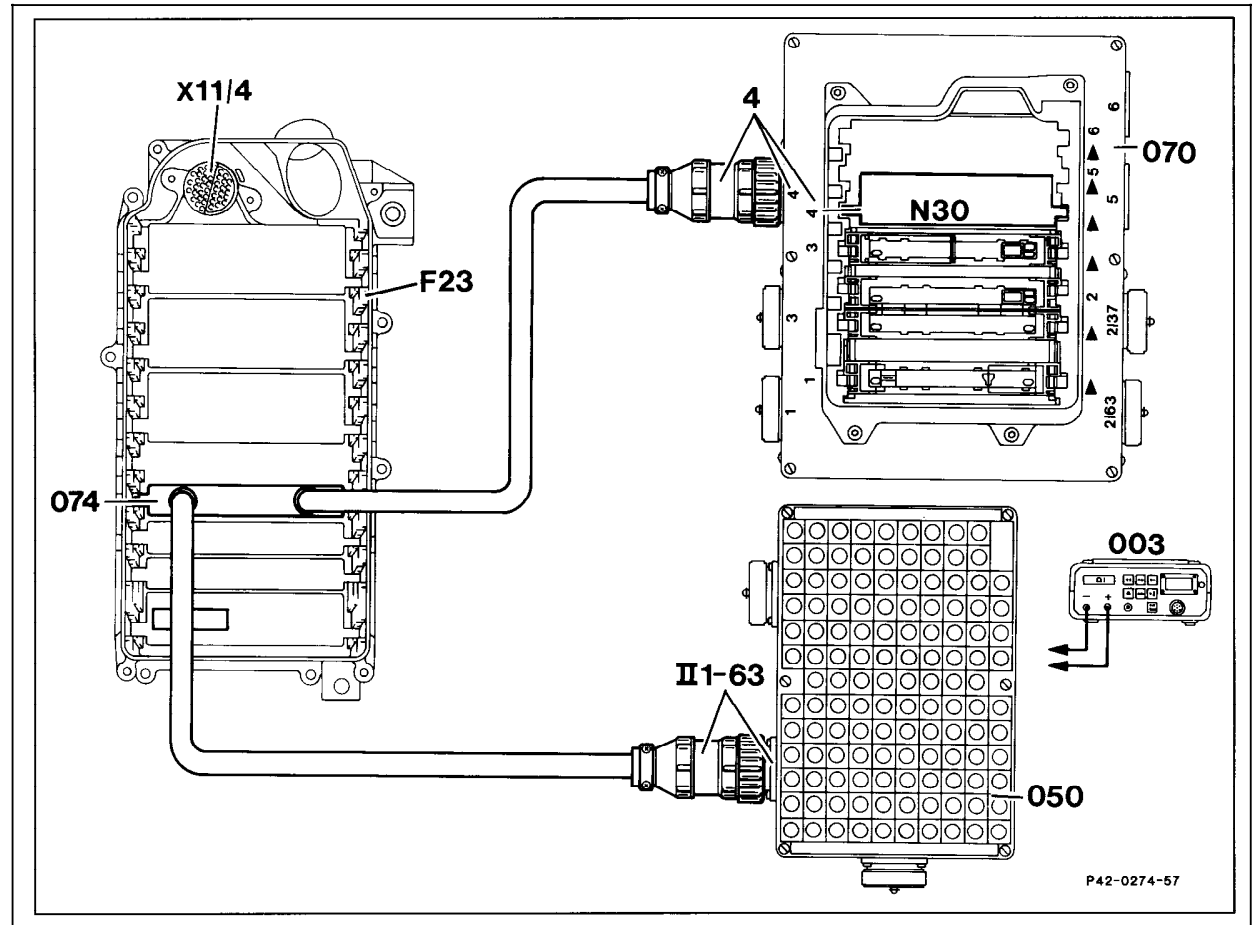


Figure 3

- 003 Multimeter
- 050 Socket box (126-pole)
- 070 Contact box
- 074 Contact module 4
- F23 Module box
- N30 ABS control module
- X11/4 Data link connector (38-pole)

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Electrical Test Program - Preparation for Test

Connection Diagram – Socket box
Model 140.0 (HFM-SFI only)

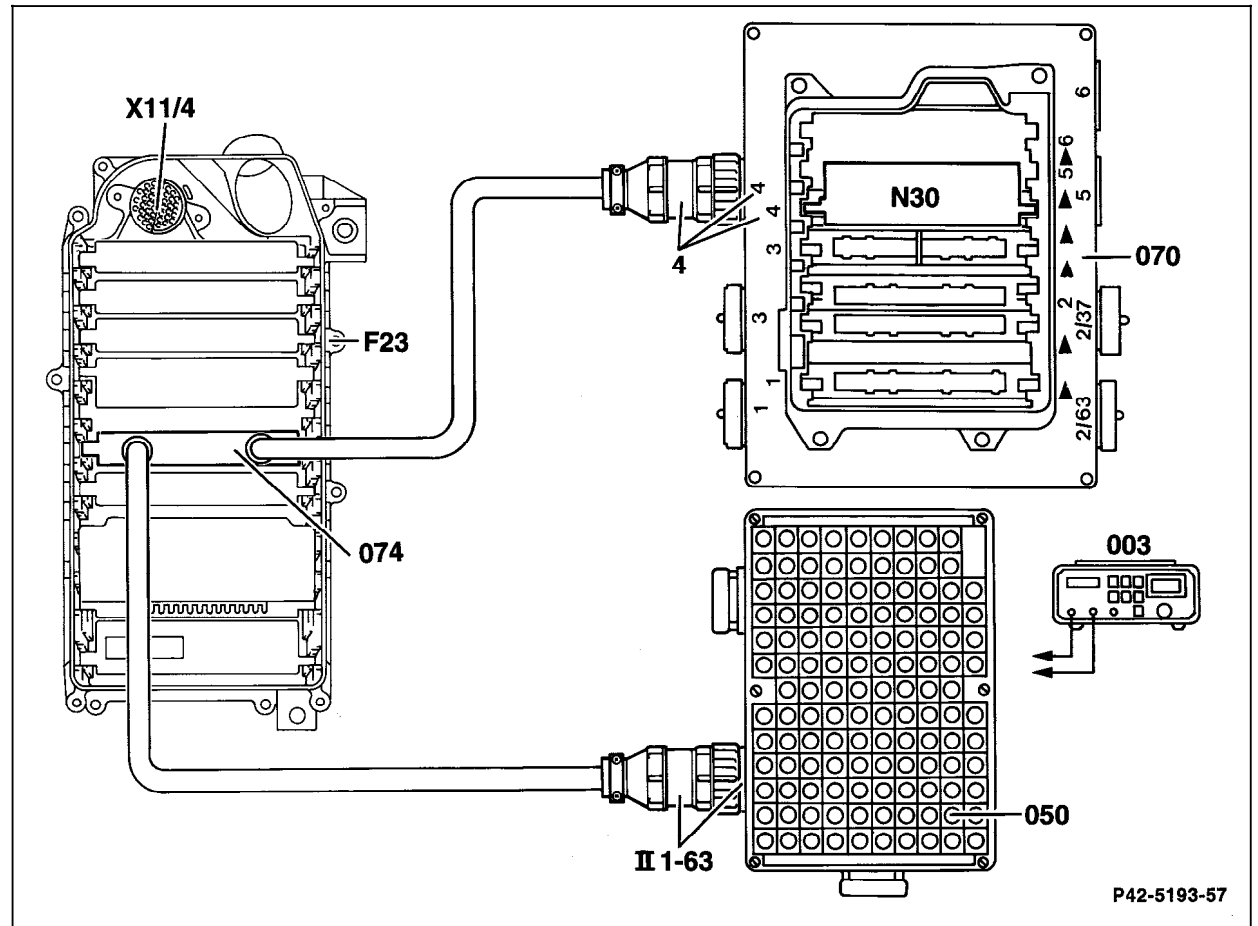


Figure 4

- 003 Multimeter
- 050 Socket box (126-pole)
- 070 Contact box
- 074 Contact module 4
- F23 Module box
- N30 ABS control module
- X11/4 Data link connector (38-pole)

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P42-5193-57

Electrical Test Program - Preparation for Test

Connection Diagram – Socket box
Model 140.1 (diesel only)

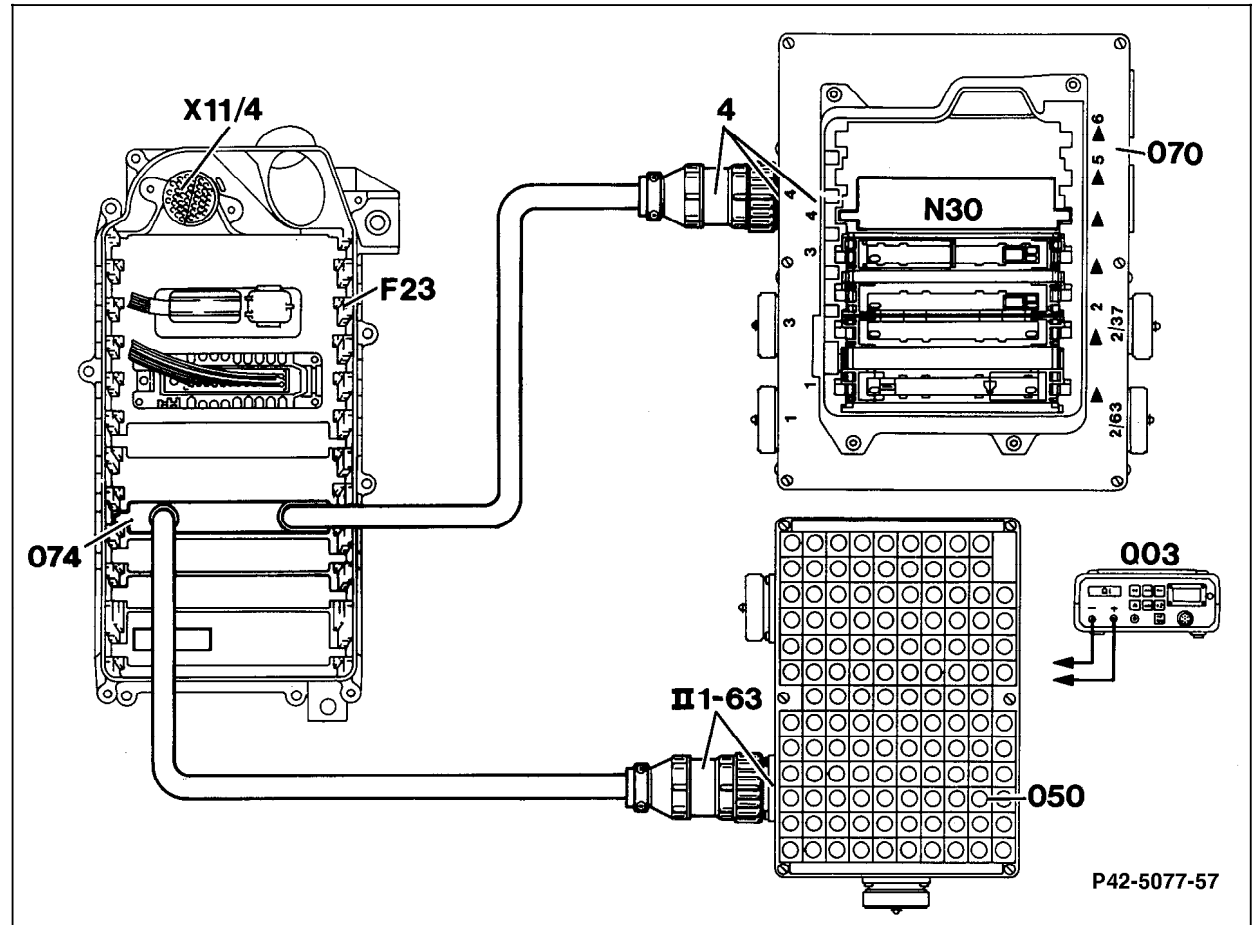


Figure 5

- 003 Multimeter
- 050 Socket box (126-pole)
- 070 Contact box
- 074 Contact module 4
- F23 Module box
- N30 ABS control module
- X11/4 Data link connector (38-pole)

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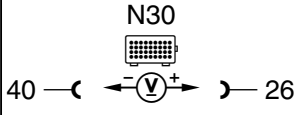
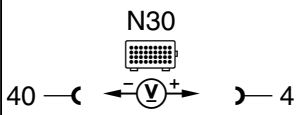
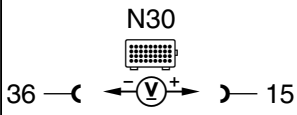
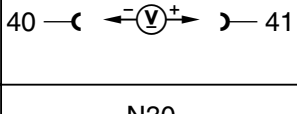
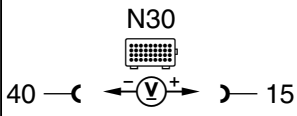
6.2 Anti-lock Brake System (ABS)

Models 124.034, 129 (HFM-SFI only), 140

Electrical Test Program - Test

Test step DTC	Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
⇒ 1.0	ABS control module (N30) Voltage supply Circuit 87 ABS	<p>N30 40 —(V)— 24 21 —(V)— 24</p>	Ignition: ON	11 – 14 V	⇒ 1.1
⇒ 1.1	Voltage supply from base module (N16/1)	<p>N30 W16/1 —(V)— 24</p>	Ignition: ON	11 – 14 V	Fuse (F1) at base module, N16/1), Volume 1, 1.1 or 1.2 23, respectively, Wiring, ⇒ 1.2.
⇒ 1.2	Ground wire	<p>Model 124.034, 129</p> <p>N30 W27 —(Ω)— 40 W27 —(Ω)— 21</p> <p>Model 140</p> <p>N30 W15 —(Ω)— 40 W15 —(Ω)— 21</p>	Ignition: ON Pull out ABS control module out of contact box	< 1 Ω	Wiring, Model 124.034, 129 Ground (module box bracket) (W27), Model 140 Ground (electronics output ground - right footwell) (W15).

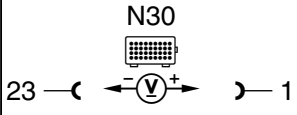
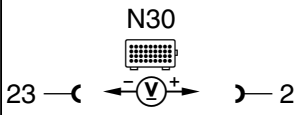
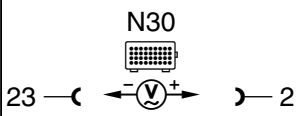
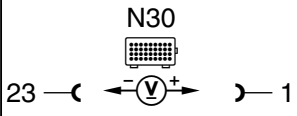
Electrical Test Program - Test

Test step DTC	Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
⇒ 3.0	Diagnosis output		Ignition: ON	10 – 14 V	Wiring, ABS control module (N30).
⇒ 4.0	Circuit 61 voltage		Ignition: ON Engine: At idle	< 1 V 11 – 14 V	Wiring, Generator (G2)
⇒ 5.0	Solenoid valve relay (A7k1)		Ignition: ON	10 – 14 V	DTC memory 11, readout DTC's, clear DTC's, ⇒ 5.1.
	Monitoring			11 – 14 V	
⇒ 5.1	Voltage supply		Ignition: ON	11 – 14 V	⇒ 1.0, Wiring, ABS control module (N30), ⇒ 5.2.

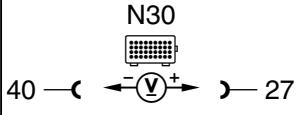
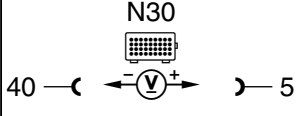
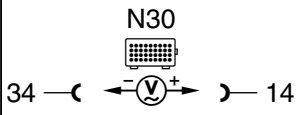
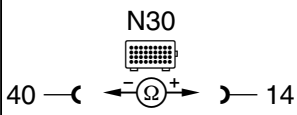
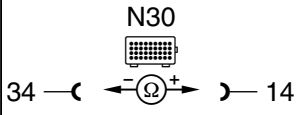
Electrical Test Program - Test

Test step DTC	Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
⇒ 5.2	Coil resistance	<p>N30 36 — Ω — 15</p>	Ignition: OFF Pull ABS control module (N30) out of contact box.	40 – 80 Ω	Wiring, Solenoid valve relay (A7k1), ⇒ 5.3.
⇒ 5.3	Operational contact	<p>N30 W14 — Ω — 41</p>	Ignition: OFF Pull ABS control module (N30) out of contact box.	< 1 Ω	Wiring, Solenoid valve relay (A7k1).
⇒ 6.0	Return pump relay (A7k2) Voltage supply	<p>N30 40 — V — 15</p>	Ignition: ON	11 – 14 V	Wiring, ⇒ 6.1, Return pump (A7m1).
⇒ 6.1	Coil resistance	<p>N30 15 — Ω — 35</p>	Ignition: OFF Pull ABS control module (N30) out of contact box.	40 – 80 Ω	Wiring, Return pump relay (A7k2).
⇒ 7.0 (Models 140.04/05 only)	Master cylinder switchover valve (ABS) (Y61) Internal resistance	<p>N30 41 — Ω — 38</p>	Ignition: OFF Pull ABS control module (N30) out of contact box.	7 – 8 Ω	Wiring, Y61.

Electrical Test Program - Test

Test step DTC	Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
⇒ 8.0 (Models 140.04/05 only)	Lateral acceleration sensor (B24/2) Voltage supply	N30 	Ignition: ON	4.75 – 5.25 V	Wiring, B24/2, ⇒ 8.1
	Sensor signal in rest position	N30 		2.35 – 2.65 V	
	Sensor signal	N30 	Vigorously shake vehicle sideways.	> 0.01 V Note: Value varies with movement.	
⇒ 8.1	Voltage supply at sensor input	N30 	Ignition: OFF Unplug connector from lateral acceleration sensor (B24/2).	4.75 – 5.25 V	Wiring, ABS control module (N30).

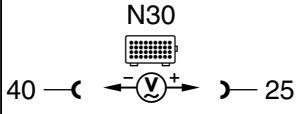
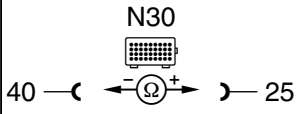
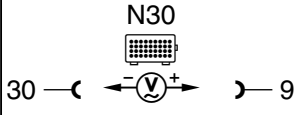
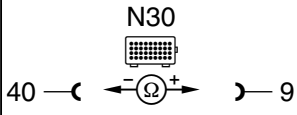
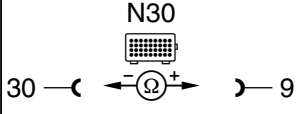
Electrical Test Program - Test

Test step DTC	Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
⇒ 9.0	Stop lamp switch (S9/1) N. O. contact N. C. contact	 	Ignition: ON Brakes not applied Brakes applied Brakes not applied Brakes applied	< 1 V 11 – 14 V 11 – 14 V < 1 V	Wiring, S9/1.
⇒ 10.0	Left front axle vehicle speed sensor (L6/1)		Lift front of vehicle. Ignition: ON Turn left front wheel by hand.	> 0.1 V	⇒ 10.1, ⇒ 10.2.
⇒ 10.1	Insulation resistance		Ignition: OFF Pull ABS control module (N30) out of contact box.	>20 kΩ	Wiring.
⇒ 10.2	Internal resistance		Ignition: OFF Pull ABS control module (N30) out of contact box.	0.8 – 3.7 kΩ	Wiring, L6/1.

Electrical Test Program - Test

Test step DTC	Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
⇒ 11.0	Left front axle vehicle speed sensor output	<p>N30 40 —(V)— 3</p>	Lift front of vehicle. Ignition: ON Turn left front wheel by hand.	> 3 V	Wiring, ⇒ 10.0, ⇒ 11.1.
⇒ 11.1	Circuit loading from connected control modules	<p>N30 40 —(Ω)— 3</p>	Ignition: OFF Pull ABS control module (N30) out of contact box.	>5 k Ω	Wiring, Connected control modules (N4/3, N10/2, N22 or A1, A2, A2/3).
⇒ 12.0	Right front axle vehicle speed sensor (L6/2)	<p>N30 13 —(V)— 33</p>	Lift front of vehicle. Ignition: ON Turn right front wheel by hand.	> 0.1 V	⇒ 12.1, ⇒ 12.2.
⇒ 12.1	Insulation resistance	<p>N30 40 —(Ω)— 33</p>	Ignition: OFF Pull ABS control module (N30) out of contact box.	>20 kΩ	Wiring.
⇒ 12.2	Internal resistance	<p>N30 13 —(Ω)— 33</p>	Ignition: OFF Pull ABS control module (N30) out of contact box.	0.8 – 3.7 kΩ	Wiring, L6/2.


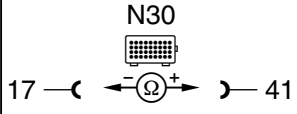
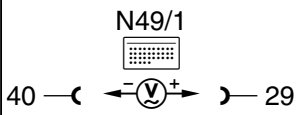

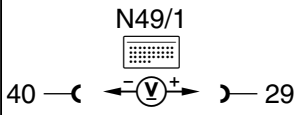
Electrical Test Program - Test

Test step DTC	Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
⇒ 13.0	Right front axle vehicle speed sensor output	 <p>N30 40 —(—(←(V)→ —(—()— 25</p>	Lift front of vehicle. Ignition: ON Turn right front wheel by hand.	> 3 V	Wiring, ⇒ 12.0, ⇒ 13.1.
⇒ 13.1	Circuit loading from connected control modules	 <p>N30 40 —(←(Ω)→ —(—()— 25</p>	Ignition: OFF Pull ABS control module (N30) out of contact box.	>5 k Ω	Wiring, Connected control modules, (N16/1, N30/2, N51).
⇒ 14.0	Rear axle vehicle speed sensor (L6)	 <p>N30 30 —(←(V)→ —(—()— 9</p>	Lift rear of vehicle. Ignition: ON Turn one rear wheel by hand.	> 0.1 V	⇒ 14.1, ⇒ 14.2.
⇒ 14.1	Insulation resistance	 <p>N30 40 —(←(Ω)→ —(—()— 9</p>	Ignition: OFF Pull ABS control module (N30) out of contact box.	>20 kΩ	Wiring,
⇒ 14.2	Internal resistance	 <p>N30 30 —(←(Ω)→ —(—()— 9</p>	Ignition: OFF Pull ABS control module (N30) out of contact box.	0.6 – 3.2 kΩ	Wiring, Rear axle vehicle speed sensor (L6).

Electrical Test Program - Test

Test step DTC	Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
⇒ 15.0	Rear axle vehicle speed sensor output		Lift front of vehicle. Ignition: ON Turn one rear wheel by hand.	> 3 V	⇒ 14.0, ⇒ 15.1.
⇒ 15.1	Circuit loading from connected control modules		Pull ABS control module (N30) out of contact box. Ignition: ON Turn one rear wheel by hand.	>5 k Ω	Wiring, Connected control modules, (N4/3, N30/2, N49/1).
⇒ 16.0	Left front axle solenoid valve (A7y1) Internal resistance		Ignition: OFF Pull ABS control module (N30) out of contact box.	0.7 – 2.2 kΩ	Wiring, ABS hydraulic unit (A7).
⇒ 17.0	Right front axle solenoid valve (A7y2) Internal resistance		Ignition: OFF Pull ABS control module (N30) out of contact box.	0.7 – 2.2 kΩ	Wiring, ABS hydraulic unit (A7).

Electrical Test Program - Test

Test step DTC	Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
⇒ 18.0	 Rear axle solenoid valve (A7y3) Internal resistance	N30 	Ignition: OFF Pull ABS control module (N30) out of contact box.	0.7 – 2.2 kΩ	Wiring, ABS hydraulic unit (A7).
⇒ 19.0 (Model 140.0 LH-SFI starting 06/93, HFM-SFI, 140.1 starting 02/93)	Speed signal output status Signal: Vehicle stationary	N49/1 	Ignition: ON	> 3 V	⇒ 19.1
⇒ 19.1	 Signal: fault	N49/1 	Ignition: ON	< 10 V	⇒ 10.0, ABS control module (N30).

Electrical Test Program - Test

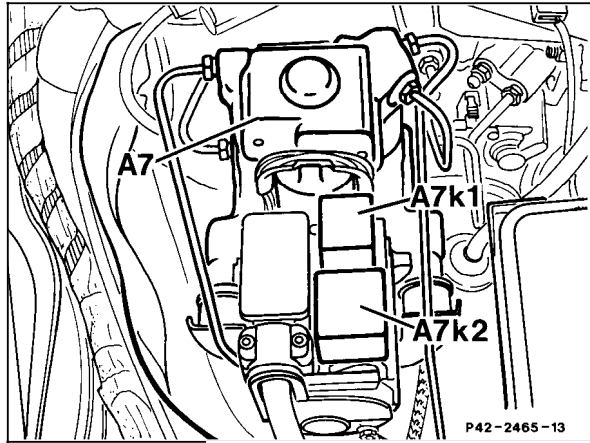


Figure 1

A7k1 Solenoid valve relay
A7k2 Return pump relay

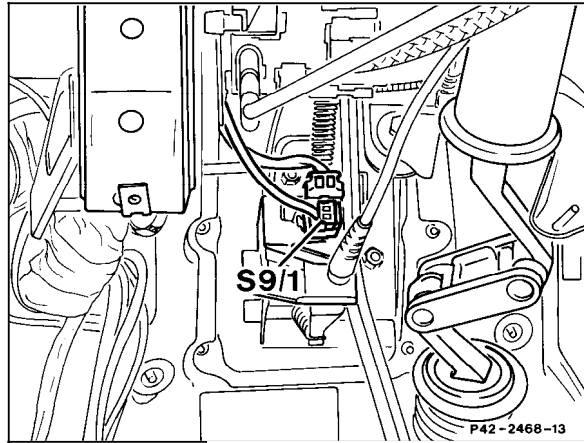


Figure 2

S9/1 Stop lamp switch

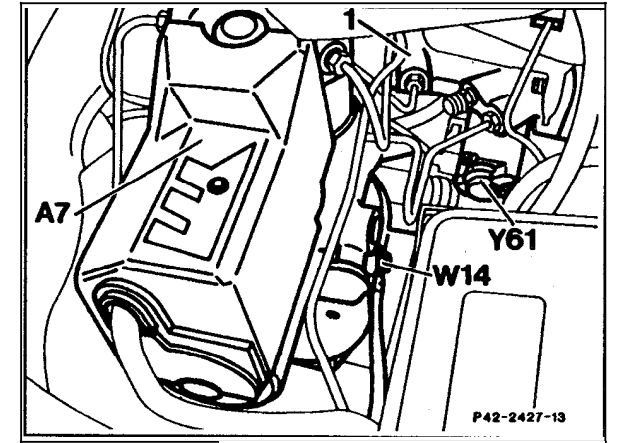
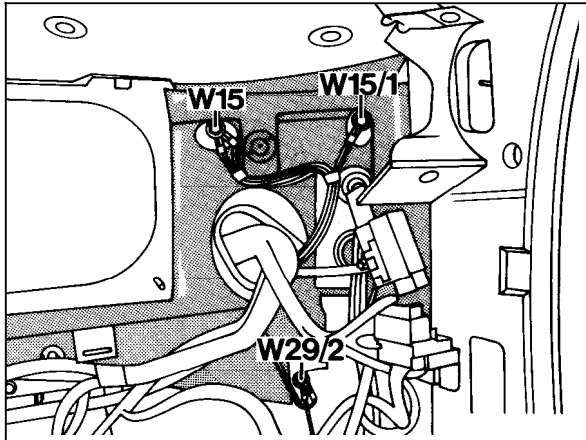


Figure 3

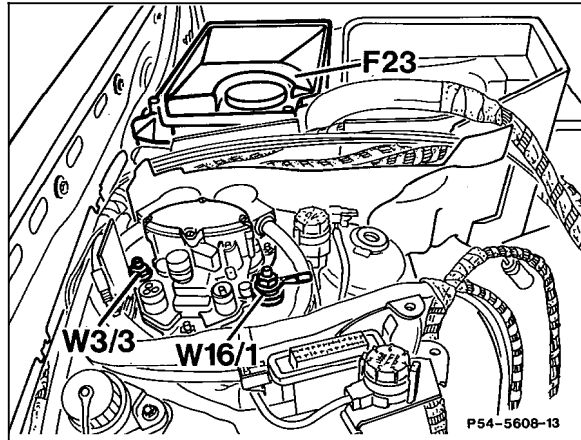
W14 Ground (ABS hydraulic unit bracket)

Electrical Test Program - Test



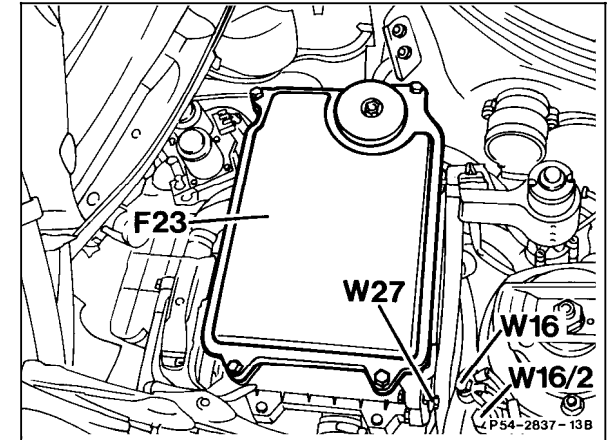
P54-2796-13

Figure 4
Model 140
W15 Ground (electronics output ground - right footwell)



P54-5608-13

Figure 5
W16/1 Ground (right front spring tower)



P54-2837-13B

Figure 6
Model 124
W16 Ground (component compartment)
W27 Ground (module box bracket)

Electrical Test Program - Test

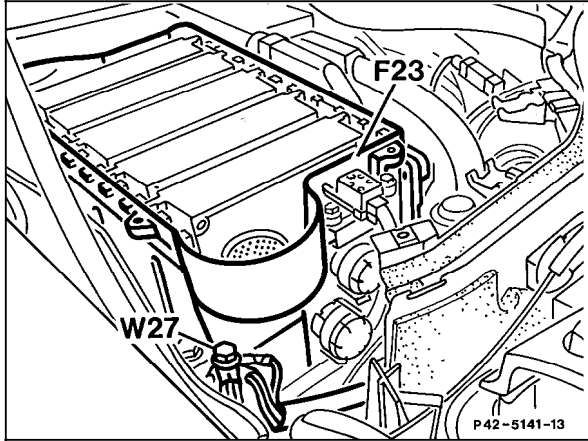


Figure 7
Model 129
W27 Ground (module box bracket)

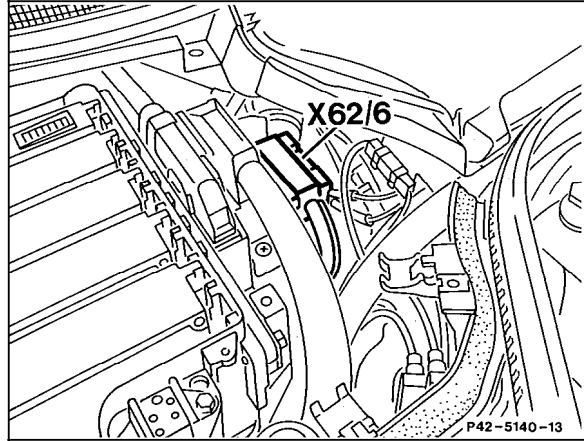


Figure 8
Model 129
X62/6 Right front axle vehicle speed sensor connector (component compartment)

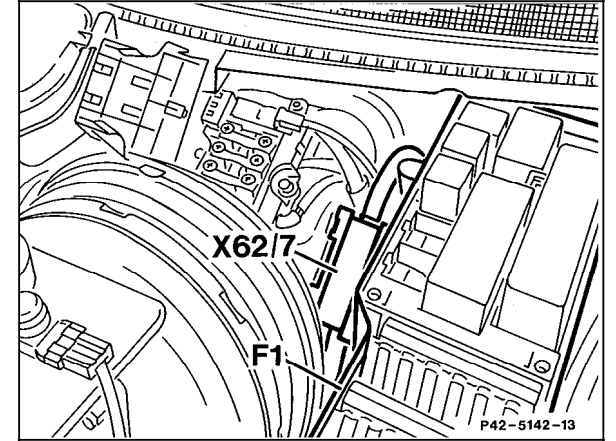


Figure 9
Model 129
X62/7 Left front axle vehicle speed sensor connector (component compartment)

Electrical Test Program - Test

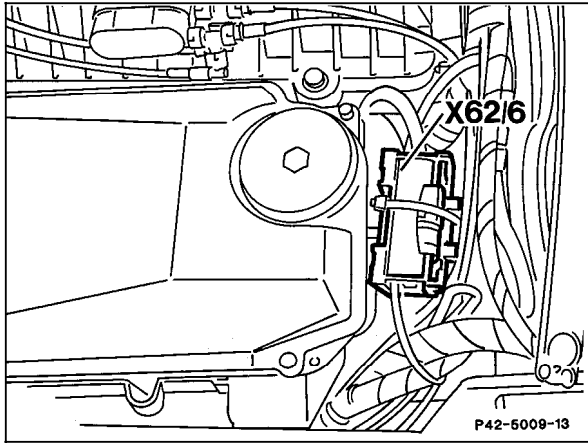


Figure 10
Model 140
X62/6 Right front axle vehicle speed sensor connector (component compartment)

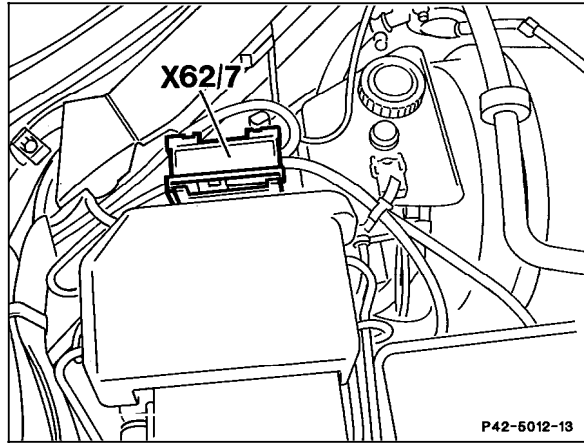


Figure 11
Model 140
X62/7 Left front axle vehicle speed sensor connector (component compartment)

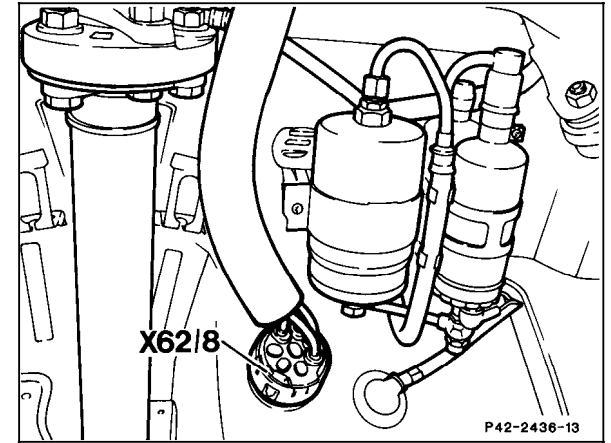


Figure 12
X62/8 Rear axle multiple circuit junction connector

Electrical Test Program - Test

Layout of connector for ABS Control Module (N30)

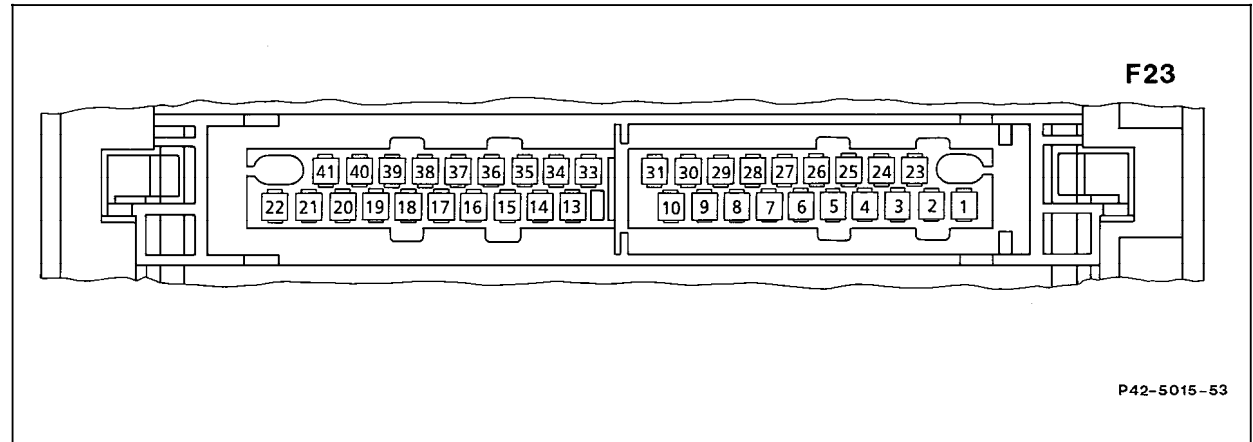


Figure 13

- | | |
|-------|---|
| F23 | Module box |
| 1 | Model 140.04/05 Voltage supply for lateral acceleration sensor (B24/2) |
| 2 | Model 140.04/05 Signal from lateral acceleration sensor (B24/2) |
| 3 | Left front axle vehicle speed sensor output |
| 4 | Circuit 61 voltage |
| 5 | Stop lamp switch (S9/1) N. C. circuit |
| 6 | Rear axle vehicle speed sensor output |
| 7 | ABS malfunction indicator lamp (A1e17) |
| 8 | Not used |
| 9 | Rear axle vehicle speed sensor (L6) (+) |
| 10-12 | Not used |
| 13 | Right front axle vehicle speed sensor (L6/2) (-) |
| 14 | Left front axle vehicle speed sensor (L6/1) (+) |
| 15 | Voltage supply for return pump relay (A7k2)
Solenoid valve relay (A7k1) |
| 16 | Not used |
| 17 | Rear axle solenoid valve (A7y3) (-) |
| 19 | Not used |
| 20 | Right front axle solenoid valve (A7y2) (-) |
| 21 | Ground (electronics output ground - right footwell) (W15) |
| 22 | Left front axle solenoid valve (A7y1) (-) |
| 23 | Model 140.04/05 Ground for lateral acceleration sensor (B24/2) |

- | | |
|-------|---|
| 24 | Voltage supply from base module circuit 87 ABS |
| 25 | Right front axle vehicle speed sensor output |
| 26 | Diagnostic output |
| 27 | Stop lamp switch |
| 28 | Not used |
| 29 | Vehicle speed sensor output status |
| 30 | Rear axle vehicle speed sensor (L6) (-) |
| 31-32 | Not used |
| 33 | Right front axle vehicle speed sensor (L6/2) (+) |
| 34 | Left front axle vehicle speed sensor (L6/1) (-) |
| 35 | Ground for return pump relay (A7k2) |
| 36 | Ground for solenoid valve relay (A7k1) |
| 37 | Monitoring of return pump relay (A7k2) |
| 38 | Model 140.04/05 activation of master cylinder switchover valve (ABS) (Y61) |
| 40 | Ground (electronics output ground - right footwell) (W15) |
| 41 | Monitoring of solenoid valve relay (A7k1) |

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