

10.4 Model 163 as of M.Y. 1999 with ESP, BAS

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10.4 Electronic Stability Program (ESP)

Diagnosis – Function Test

WARNING!

Life threatening injuries possible if following protective measures are not followed.

CAUTION!

Risk of severe injury, due to uneven placement of lift arms/lift arm supports, as well as the support and lifting of vehicle components, there is the possibility of the vehicle slipping while on the lift.

CAUTION!

Danger of vehicle toppling off of lift due to irregular weight distribution after the removal of components and axles.

Protective measures:

- Center vehicle (fore, aft and across) properly on both sides of the lift columns.
- When supporting components while the vehicle is on a lift, ensure that the vehicle is not lifted from the lift arms, therefore secure vehicle to the lift arms as well.
- Ensure that the lift arm supports are even and parallel to each other when lifting the vehicle.

Protective measures continued:

- Prior to lift vehicle completely (wheels still in contact with floor), ensure that the lift arm supports are correctly placed onto the vehicle contact points.
- Prior to removing the axles or components from the vehicle while on the lift, secure the vehicle to the lift arms or place sand bags inside the vehicle to ensure proper weight distribution to prevent toppling of the vehicle from the lift.
- Basically obey all the rules/guide lines regarding the lifting of vehicles as stated in the operator's manual by the lift manufacturer.

Preparation for Test:

1. Review section 12, 21, 22, 23



Control Module Adaption:

After the swap of the ESP/SPS/BAS or ESP/BAS control module (N47-5), it is important to perform the adaption procedure, since the control module must learn the values for the steering ratio. See HHT menu.

Additionally, after replacing either the ESP/SPS control module (N47-5) or the brake booster (A7/7), it is absolutely necessary to perform an adaption of the ESP/SPS control module (N47-5) as well.

The ESP/SPS control module (N47-5) has to learn the values for the BAS solenoid valve (A7/7y1), see HHT menu.

10.4 Electronic Stability Program (ESP)

Diagnosis – Function Test – ABS Lateral Acceleration Sensor (B43)

	Procedure	Hints
	<p>i This function test applies as of 01/2000 production only</p> <p>The following description of the driving test is to be performed only upon the replacement or swap of the ABS Lateral Acceleration sensor (B43) and/or the Rotating Speed Sensor for ESP (B45).</p>	<p>Via this driving test, the following faults can be isolated:</p> <ul style="list-style-type: none">• improperly connected connectors of the sensors.,• twisted wires of the respective sensors• sensors with implausible signals
1	<p>Activate Test:</p> <p>Release driving test via Star Diagnosis</p>	<p>i</p> <p>Engine is running (idle).</p> <p>The release of the driving test remains active even after the ignition is switched OFF or ON. The driving test is ended when the driving test procedure is completed or it is deactivated via Star Diagnosis.</p> <p>BAS/ESP MIL (A1e47) and ABS MIL (A1e17) are illuminated: Indicating to the driver: ABS: ON ESP: OFF</p> <p>Thus after the release, the ESP system is OFF , however the functions of the BAS, ABS, and ASR systems remain active.</p> <p>i</p> <p>Within the DTC fault memory the following is entered: "Driving Test Active". This DTC will be erased automatically upon completion of the Driving Test.</p>


10.4 Electronic Stability Program (ESP)

Diagnosis – Function Test – ABS Lateral Acceleration Sensor (B43) (continued)

	Procedure	Hints
	<p>i</p> <p>The following description of the driving test is to be performed only upon the replacement or swap of the ABS Lateral Acceleration sensor (B43) and/or the Rotating Speed Sensor for ESP (B45).</p>	<p>Via this driving test, the following faults can be isolated:</p> <ul style="list-style-type: none">• improperly connected connectors of the sensors.,• twisted wires of the respective sensors• sensors with implausible signals
2	<p>Stationary deviation of the ABS Lateral Acceleration Sensor (B43) and/or Rotating Speed Sensor of ESP (B45): Press ESP switch in direction: ON Vehicle is stationary and the steering wheel is pointed straight ahead.</p>	<p>i</p> <p>By pressing the ESP switch, a time window of 20 seconds is started, which can be lengthened in time span as desired. BAS/ESP MIL (A1e47) begins to blink as an indication that the stationary deviation test of the ABS Lateral Acceleration Sensor has started. Upon correct procedure, the BAS/ESP MIL (A1e47) will illuminate. This then is the signal to perform the driving test as described in point 3 of the menu. Should the vehicle be moved in any way during the stationary deviation test, the stationary deviation test of the ABS Lateral Acceleration Sensor will not be performed. The BAS/ESP MIL (A1e47) will be illuminated.</p> <p>In case of fault: Read out the DTC fault code memory.</p> <p>i</p> <p>Within the DTC fault memory the following is entered: "Driving Test Active". This DTC will be erased automatically upon completion of the Driving Test.</p>

10.4 Electronic Stability Program (ESP)

Diagnosis – Function Test – ABS Lateral Acceleration Sensor (B43) (continued)

	Procedure	Hints
3	<p>Dynamic testing of the ABS Lateral Acceleration Sensor (B43) and/or Rotating Speed Sensor of ESP (B45):</p> <p>Drive the vehicle in a forward direction at a speed between 5 to 25 km/h (3 to 15 mph).</p> <p>After approx. 20 feet, driving at a constant speed, turn the steering wheel either left or right, (but not more than 360°), continue to drive the vehicle approx. 90° degrees more (semi-circle).</p>	<p> The ESP/BAS control module (N47-5) performs an evaluation of the rotating signals and lateral acceleration signals. After a successful completion, the BAS/ESP MIL (A1e47) and ABS MIL (A1e17) will go out.</p> <p>In case of fault:</p> <p>ABS MIL (A1e17) is illuminated: Driving test not successful. Repeat the dynamic driving test (menu item 3).</p> <p>BAS/ESP MIL (A1e47) is illuminated: Driving test not successful. Readout DTC memory.</p>

10.4 Electronic Stability Program (ESP)

Diagnosis – Function Test – Rotating Speed Sensor for ESP (B45)

	Procedure	Hints
	<p>i This function test applies as of 01/2000 production only</p> <p>The following description of the driving test is to be performed only upon the replacement or swap of the ABS Lateral Acceleration sensor (B43) and/or the Rotating Speed Sensor for ESP (B45).</p>	<p>Via this driving test, the following faults can be isolated:</p> <ul style="list-style-type: none">• improperly connected connectors of the sensors.,• twisted wires of the respective sensors• sensors with implausible signals
1	<p>Activate Test:</p> <p>Release driving test via Star Diagnosis</p>	<p>i</p> <p>Engine is running (idle).</p> <p>The release of the driving test remains active even after the ignition is switched OFF or ON. The driving test is ended when the driving test procedure is completed or it is deactivated via Star Diagnosis.</p> <p>BAS/ESP MIL (A1e47) and ABS MIL (A1e17) are illuminated: Indicating to the driver: ABS: ON ESP: OFF</p> <p>Thus after the release, the ESP system is OFF , however the functions of the BAS, ABS, and ASR systems remain active.</p> <p>i</p> <p>Within the DTC fault memory the following is entered: "Driving Test Active". This DTC will be erased automatically upon completion of the Driving Test.</p>

10.4 Electronic Stability Program (ESP)

Diagnosis – Function Test – Rotating Speed Sensor for ESP (B45) (continued)

	Procedure	Hints
	<p>i</p> <p>The following description of the driving test is to be performed only upon the replacement or swap of the ABS Lateral Acceleration sensor (B43) and/or the Rotating Speed Sensor for ESP (B45).</p>	<p>Via this driving test, the following faults can be isolated:</p> <ul style="list-style-type: none">• improperly connected connectors of the sensors.,• twisted wires of the respective sensors• sensors with implausible signals
2	<p>Stationary deviation of the ABS Lateral Acceleration Sensor (B43) and/or Rotating Speed Sensor of ESP (B45): Press ESP switch in direction: ON Vehicle is stationary and the steering wheel is pointed straight ahead.</p>	<p>i</p> <p>By pressing the ESP switch, a time window of 20 seconds is started, which can lengthed in time span as desired.</p> <p>BAS/ESP MIL (A1e47) begins to blink as an indication that the stationary deviation test of the ABS Lateral Acceleration Sensor has started.</p> <p>Upon correct procedure, the BAS/ESP MIL (A1e47) will illuminate.</p> <p>This then is the signal to perform the driving test as described in point 3 of the menu.</p> <p>Should the vehicle be moved in any way during the stationary deviation test, the stationary deviation test of the ABS Lateral Acceleration Sensor will not be performed. The BAS/ESP MIL (A1e47) will be illuminated.</p> <p>In case of fault: Read out the DTC fault code memory.</p>

10.4 Electronic Stability Program (ESP)

Diagnosis – Function Test – Rotating Speed Sensor for ESP (B45) (continued)

	Procedure	Hints
3	<p>Dynamic testing of the ABS Lateral Acceleration Sensor (B43) and/or Rotating Speed Sensor of ESP (B45):</p> <p>Drive the vehicle in a forward direction at a speed between 5 to 25 km/h (3 to 15 mph).</p> <p>After approx. 20 feet, driving at a constant speed, turn the steering wheel either left or right, but not more than 360°, continue to drive the vehicle approx. 90° degrees more (semi-circle).</p>	<p>i</p> <p>The ESP/BAS control module (N47-5) performs an evaluation of the rotating signals and lateral acceleration signals. After a successful completion, the BAS/ESP MIL (A1e47) and ABS MIL (A1e17) will go out.</p> <p>In case of fault:</p> <p>ABS MIL (A1e17) is illuminated: Driving test not successful. Repeat the dynamic driving test (menu item 3).</p> <p>BAS/ESP MIL (A1e47) is illuminated: Driving test not successful. Readout DTC memory.</p>

10.4 Electronic Stability Program (ESP)

Diagnosis - Diagnostic Trouble Code (DTC) Memory

Preparation for DTC Readout



WARNING!

Life threatening injuries possible due to vehicle slipping or toppling off while on lift.

Prior to lift vehicle completely (wheels still in contact with floor), ensure that the vehicle is centered within the lift columns and lift arm supports are correctly placed onto the vehicle contact points.



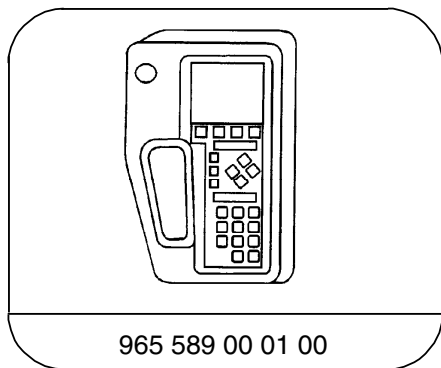
Control Module Adaption:

After the swap of the ESP/SPS/BAS or ESP/BAS control module (N47-5), it is important to perform the adaption procedure, since the control module must learn the values for the steering ratio. See HHT menu.

Additionally, after replacing either the ESP/SPS control module (N47-5) or the brake booster (A7/7), it is absolutely necessary to perform an adaption of the ESP/SPS control module (N47-5) as well.

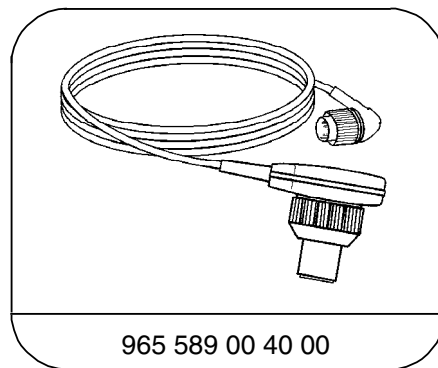
The ESP/SPS control module (N47-5) has to learn the values for the BAS solenoid valve (A7/7y1), see HHT menu.

Special Tools



965 589 00 01 00

Hand-Held-Tester



965 589 00 40 00

Test cable

1. Review: 11, 21, 22, 23 (connector connections).
2. Connect Hand-Held Tester (HHT) to data link connector (X11/4) according to connection diagram (see section 0) and read out DTC memory.
3. Ignition: **ON**




The BAS control module is integrated into the ESP control module. Read out DTC memory for the BAS, ETS, ME and ETC systems.



The replacement or swap of the **ABS Lateral Acceleration sensor (B43)** and/or the **Rotating Speed Sensor for ESP (B45)**, requires that a driving test is to be performed, see 11

10.4 Electronic Stability Program (ESP)

Diagnosis - Diagnostic Trouble Code (DTC) Memory


DTC 		Possible cause	Test step/Remedy ¹⁾
—		No fault in system	In case of complaint: 23 (entire test).
C 1000	ESP/BAS	ESP/BAS control module (N47-5) ²⁾	N47-5
C 1010	ESP/BAS	Battery voltage too low	23 ⇒ 1.0
C 1012	ESP/BAS	Battery voltage too high	23 ⇒ 1.0
C 1020	ESP	CAN communication overall faulty	Check version coding, 23 ⇒ 31.0
C 1022	ESP/BAS	CAN communication with engine control module (ME-SFI) (N3/10) interrupted.	Check version coding, Read out DTC's from (N3/10), 23 ⇒ 31.0
C 1024	ESP	CAN communication with transmission control module (N15/3) interrupted.	Read out DTC's from (N15/3).
C 1025	BAS	CAN communication with BAS control module (N47-5) interrupted ²⁾ .	N47-5
C 1030	ESP	CAN communication with transfer case control module (N78) interrupted.	Read out DTC's from (N78).
C 1032	ESP	CAN communication with instrument cluster (A1) interrupted.	Read-out DTC memory for instrument cluster (A1).

¹⁾ Observe Preparation for Test, see 22.

²⁾ After the swap of the ESP/SPS/BAS or ESP/BAS control module (N47-5), it is important to perform the adaption procedure.

10.4 Electronic Stability Program (ESP)

Diagnosis - Diagnostic Trouble Code (DTC) Memory


DTC 		Possible cause	Test step/Remedy ¹⁾
C 1100	ESP	Left front axle VSS sensor (L6/1), open circuit Left front axle VSS sensor (L6/1), loose connection Left front axle VSS sensor (L6/1), implausible ²⁾	23 ⇒ 9.0
C 1101	ESP	Right front axle VSS sensor (L6/2), open circuit Right front axle VSS sensor (L6/2), loose connection Right front axle VSS sensor (L6/2), implausible ²⁾	23 ⇒ 10.0
C 1102	ESP	Left rear axle VSS sensor (L6/3), open circuit Left rear axle VSS sensor (L6/3), loose connection Left rear axle VSS sensor (L6/3), implausible ²⁾	23 ⇒ 11.0
C 1103	ESP	Right rear axle VSS sensor (L6/4), open circuit Right rear axle VSS sensor (L6/4), loose connection Right rear axle VSS sensor (L6/4), implausible ²⁾	23 ⇒ 12.0
C 1120	ESP	Rotationing speed sensor for ESP (B45), Wiring: Signal, open circuit/short circuit Wiring: Reference, open circuit/short circuit	23 ⇒ 28.0
C 1140	ESP	Steering angle sensor (N49), Initialization, open circuit/short circuit	Turn steering wheel from lock to lock stop, in order to perform intialization. 23 ⇒ 4.0
C 1141	ESP	ESP brake pressure sensor 1 (N34/1) or ESP brake pressure sensor 2 (N34/2) Open circuit/short circuit, implausible ²⁾	23 ⇒ 27.0

¹⁾ Observe Preparation for Test, see 22.

²⁾ Rotor with incorrect tooth count, dirt accumulation on or damaged rotor, incorrect rear axle ratio, wrong wheel or tire size.
If DTC appears only after repair work, it was caused by applying the brakes or driving vehicle on a dynamometer, erase DTC.

10.4 Electronic Stability Program (ESP)

Diagnosis - Diagnostic Trouble Code (DTC) Memory


DTC 		Possible cause	Test step/Remedy ¹⁾
C 1142	ESP	ABS lateral acceleration sensor (B43) Open circuit/short circuit, voltage supply, implausible ²⁾	23 ⇒ 26.0
C 1200	ESP	Stop lamp switch (4-pole) (S9/1) Plausibility	23 ⇒ 6.0
C 1201	BAS	Release switch (BAS) (A7/7s1) Open circuit/short circuit	Readout HHT Actual values, Wiring, A7/7s1
C 1202	BAS	Release switch (BAS) (A7/7s1) Plausibility	Readout HHT Actual values, Wiring, A7/7s1
C 1203	BAS	Release switch (BAS) (A7/7s1) Redundancy	Readout HHT Actual values, Wiring, A7/7s1
C 1204	BAS	Membrane travel sensor (BAS) (A7/7b1) Open circuit/short circuit	Readout HHT Actual values, 23 ⇒ 29.0
C 1205	BAS	Membrane travel sensor (BAS) (A7/7b1) Plausibility	Readout HHT Actual values, 23 ⇒ 29.0
C 1206	BAS	Membrane travel sensor (BAS) (A7/7b1) Membrane speed	Readout HHT Actual values, 23 ⇒ 29.0

¹⁾ Observe Preparation for Test, see 22.

²⁾ Rotor with incorrect tooth count, dirt accumulation on or damaged rotor, incorrect rear axle ratio, wrong wheel or tire size.
If DTC appears only after repair work, it was caused by applying the brakes or driving vehicle on a dynamometer, erase DTC.

10.4 Electronic Stability Program (ESP)


Diagnosis - Diagnostic Trouble Code (DTC) Memory

DTC 	Possible cause	Test step/Remedy ¹⁾
C 1207	BR5 Stop lamp switch (4-pole) (S9/1) Plausibility	23 ⇒ 6.0
C 1210	ESP Brake fluid level switch (S11) open/short circuit	Readout HHT Actual values
C 1300	ESP Left front axle solenoid valve (hold) (A7/3y6), short/open circuit	23 ⇒ 14.0
C 1301	ESP Left front axle solenoid valve (release) (A7/3y7), short/open circuit	23 ⇒ 15.0
C 1302	ESP Right front axle solenoid valve (hold) (A7/3y8), short/open circuit	23 ⇒ 16.0
C 1303	ESP Right front axle solenoid valve (release) (A7/3y9), short/open circuit	23 ⇒ 17.0
C 1304	ESP Left rear axle solenoid valve (hold) (A7/3y10), short/open circuit	23 ⇒ 18.0
C 1305	ESP Left rear axle solenoid valve (release) (A7/3y11), short/open circuit	23 ⇒ 19.0
C 1306	ESP Right rear axle solenoid valve (hold) (A7/3y12), short/open circuit	23 ⇒ 20.0
C 1307	ESP Right rear axle solenoid valve (release) (A7/3y13), short/open circuit	23 ⇒ 21.0

¹⁾ Observe Preparation for Test, see 22.

10.4 Electronic Stability Program (ESP)

Diagnosis - Diagnostic Trouble Code (DTC) Memory

DTC 		Possible cause	Test step/Remedy ¹⁾
C 1314	ESP	Solenoid valves, voltage supply, open or short circuit of wiring	23 ⇒ 1.0, 13.0
C 1316	ESP	Pressure circuit 1 switchover solenoid valve (A7/3y24), open/short circuit	23 ⇒ 24.0
C 1317	ESP	Pressure circuit 1 vacuum solenoid valve (A7/3y26), open/short circuit	23 ⇒ 22.0
C 1318	ESP	Pressure circuit 2 switchover solenoid valve (A7/3y25), open/short circuit	23 ⇒ 25.0
C 1319	ESP	Pressure circuit 2 vacuum solenoid valve (A7/3y27), open/short circuit	23 ⇒ 23.0
C 1332	BAS	Solenoid valve (BAS) (A7/7y1) ²⁾ , open/short circuit	23 ⇒ 30.0
C 1401		High pressure return pump (A7/3m1) short/open circuit, will not shut off, or shuts off too soon.	23 ⇒ 3.0
C 1511	BAS	BAS version coding improper.	Perform version coding using HHT.
C 1512	ESP	Brakes overheated	Brakes were momentarily overloaded, erase DTC.
C 1528	ESP	ESP stop lamp suppression (F1k6) ²⁾	23 ⇒ 5.0
C 1529	ESP	Pressurization of system via solenoid valve (A7/7y1) for BAS not possible ²⁾ .	Readout DTC for BAS control module, 23 ⇒ 30.0

¹⁾ Observe Preparation for Test, see 2.

²⁾ After the swap of the ESP stop lamp suppression (F1k6) or solenoid valve (A7/7y1), it is important to perform the ESP/SPS/BAS or ESP/BAS control module (N47-5) adaption procedure.

10.4 Electronic Stability Program (ESP)

Diagnosis – Complaint Related Diagnostic Chart

WARNING!

Life threatening injuries possible due to vehicle slipping or toppling off while on lift.

Prior to lift vehicle completely (wheels still in contact with floor), ensure that the vehicle is centered within the lift columns and lift arm supports are correctly placed onto the vehicle contact points.

Preparation for Test


1. Review: 11, 21, 22, 23

Complaint/Problem	Possible cause	Test step/Remedy ¹⁾
ESP warning lamp (A1e41) illuminates when ignition switch is turned ON .	ESP OFF switch (S76/6) has been turned to: ESP OFF position.	Turn ESP OFF switch (S76/6) back to position: ON
ESP warning lamp (A1e41) blinks briefly while driving.	ESP action has taken place in order to stabilize vehicle (no DTC stored). Check implausibility of VSS	Read out DTC's for ESP control module using HHT, See 12
BAS/ESP MIL (A1e47) and/or ETS MIL (A1e35) and/or ABS MIL (A1e17) illuminates while driving and then goes out.	Vehicle system voltage < 11 V, too many electrical consumers in use, or Steering angle sensor (N49) was temporarily not initialized.	Check generator (G2), Read out DTC's for ESP control module, using HHT, See 12
ABS MIL (A1e17) and ETS MIL (A1e35) and BAS/ESP MIL (A1e47) illuminate with engine running after brake test or dynamometer use .	Nonplausible rpm signal due to different rpm at front and rear axles.	Read out DTC's for ESP control module, erase DTC's using HHT. See 12

¹⁾ Observe Preparation for Test, see 22.

10.4 Electronic Stability Program (ESP)

Diagnosis – Complaint Related Diagnostic Chart

Complaint/Problem	Possible cause	Test step/Remedy ¹⁾
BAS/ESP MIL (A1e47) or ETS MIL (A1e35) or ABS MIL (A1e17) or Low brake fluid level/parking brake/brake-force proportioning indicator lamp (A1e17) do not illuminate with ignition switch turned: ON	Indicator lamps, Instrument cluster (A1)  With CAN communication interruptions between the instrument cluster (A1) and the ESP/BAS control module (N47-5A), the BAS/ESP MIL (A1e47) will be illuminated.	Read out DTC's for instrument cluster (A1), Readout DTC's for ESP control module, See 12
BAS/ESP MIL (A1e47) and/or ETS MIL (A1e35) and/or ABS MIL (A1e17) and/or Low brake fluid level/parking brake/brake-force proportioning indicator lamp (A1e7) will illuminate when the engine is running and will not go out.		Read out DTC's for ESP control module. See 12

¹⁾ Observe Preparation for Test, see 22.

10.4 Electronic Stability Program (ESP)

Important CAN data outputs FROM the ESP control module (N47-5)

CAN signal	Information
ABS/ETS/ESP status	<ul style="list-style-type: none">• Increase or reduction of specified engine torque
ABS/ETS/ESP status	<ul style="list-style-type: none">• Transmission shift requirements
ABS/ETS/ESP status	<ul style="list-style-type: none">• Activation of MIL and warning lamps: Brake lining wear indicator lamp (A1e6) Low brake fluid level/parking brake/brake-force proportioning indicator lamp (A1e7) ABS MIL (A1e17) ETS MIL (A1e35) ESP warning lamp (A1e41) BAS/ESP MIL (A1e47)
ABS/ETS/ESP status	<ul style="list-style-type: none">• Stop lamp switch (S9/1): Brake not operated Brake operated No signal
ABS/ETS/ESP status	<ul style="list-style-type: none">• Cruise control function OFF

10.4 Electronic Stability Program (ESP)

Important CAN data outputs *FROM* the ESP control module (N47-5) (continued)

CAN signal	Information
Left front wheel vehicle speed signal (VSS)	Wheel speed
Right front wheel vehicle speed signal (VSS)	Wheel speed
Rear left wheel vehicle speed signal (VSS)	Wheel speed
Rear right wheel vehicle speed signal (VSS)	Wheel speed
Left front wheel speed signal for CC	Wheel speed
Right front wheel speed signal for CC	Wheel speed

10.4 Electronic Stability Program (ESP)

Important data *TO* the ESP control module (N47-5) via CAN

CAN signal	Information	From control module
Engine status	<ul style="list-style-type: none">Pedal value	<ul style="list-style-type: none">Engine control module
Vehicle code	<ul style="list-style-type: none">ModelVersion codeEngineTransmission	<ul style="list-style-type: none">Engine control module
Engine status	<ul style="list-style-type: none">Engine rpm	<ul style="list-style-type: none">Engine control module
Engine status	<ul style="list-style-type: none">Indicated engine torque	<ul style="list-style-type: none">Engine control module
Engine status	<ul style="list-style-type: none">Maximum and minimum engine torque for current operational point	<ul style="list-style-type: none">Engine control module
Engine status	<ul style="list-style-type: none">Engine friction torque	<ul style="list-style-type: none">Engine control module
Engine status	<ul style="list-style-type: none">Engine torque as specified by driver	<ul style="list-style-type: none">Engine control module
Transmission status	<ul style="list-style-type: none">Transfer case control module off-road/highway gear	<ul style="list-style-type: none">Electronic transmission control
Transmission status	<ul style="list-style-type: none">Torque converter status	<ul style="list-style-type: none">Electronic transmission control
Transmission status	<ul style="list-style-type: none">Current transmission shift stage	<ul style="list-style-type: none">Electronic transmission control

10.4 Electronic Stability Program (ESP)

Electrical Test Program – ETS/ESP Hydraulic Component Locations

Model 163

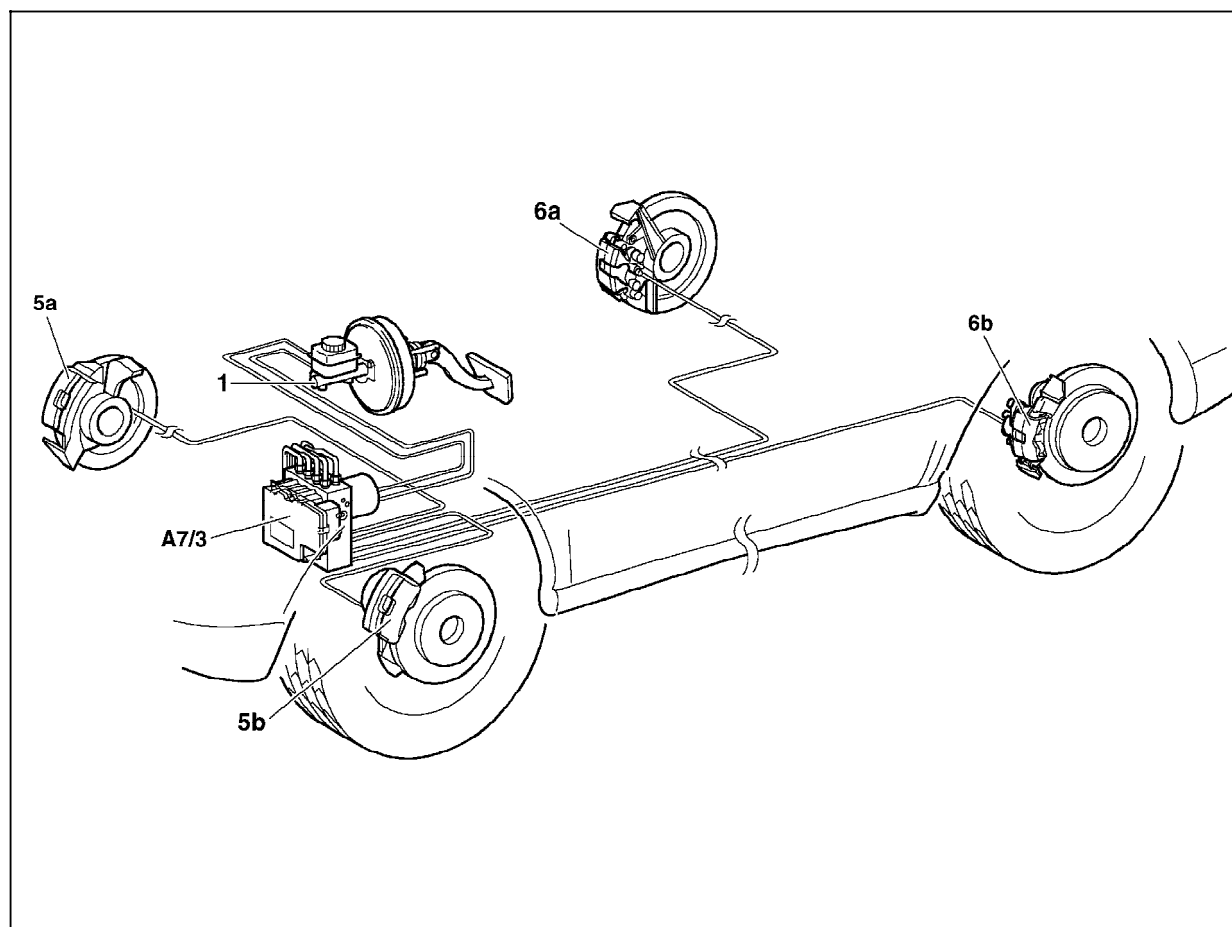


Figure 1

- 1 Tandem master cylinder
- 5a Right front brake caliper
- 5b Left front brake caliper
- 6a Right rear brake caliper
- 6b Left rear brake caliper
- A7/3 ASR/ETS/ESP hydraulic unit for traction systems

P42.35-0236-09

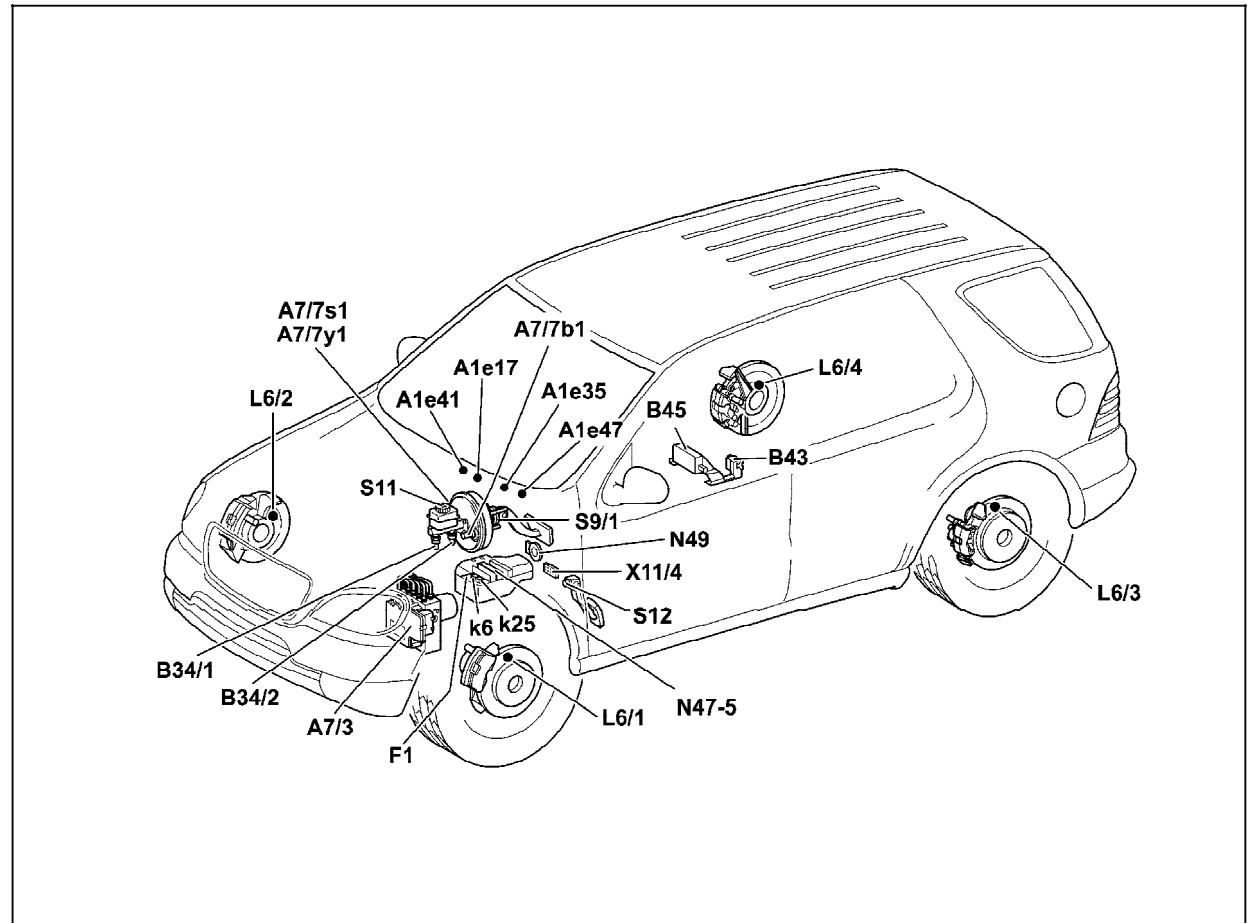
10.4 Electronic Stability Program (ESP)

Electrical Test Program – ETS/ESP Electronic Component Locations

Model 163

Figure 2

A1e17	ABS MIL
A1e35	ETS MIL
A1e41	ESP warning lamp
A1e47	BAS/ESP MIL
A7/3	ASR/ETS/ESP hydraulic unit
A7/7b1	Membrane travel sensor (BAS)
A7/7s1	Release switch (BAS)
A7/7y1	Solenoid valve (BAS)
B34/1	ESP brake pressure sensor 1
B34/2	ESP brake pressure sensor 2
B43	ABS lateral acceleration sensor
B45	Rotationing speed sensor for ESP
F1	Fuse and relay box
F1k6	ESP stop lamp suppression
F1k25	High-pressure/return pump relay
L6/1	Left front VSS
L6/2	Right front VSS
L6/3	Left rear VSS
L6/4	Right rear VSS
N47-5	ESP/SPS/BAS control module
N49	Steering angle sensor
S9/1	Stop lamp switch (4-pole)
S11	Brake fluid level switch
S12	Parking brake switch
X11/4	Data link connector (DTC readout)



P42.45-2165-09

10.4 Electronic Stability Program (ESP)

Electrical Test Program – Preparation for Test

⚠ WARNING!

Life threatening injuries possible due to vehicle slipping or toppling off while on lift.

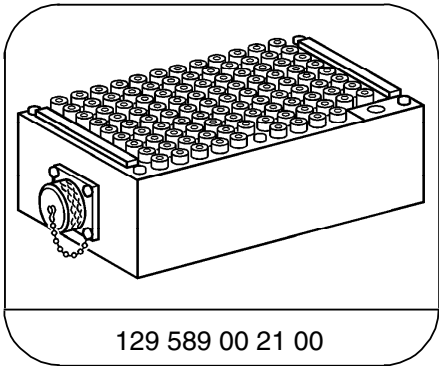
Prior to lift vehicle completely (wheels still in contact with floor), ensure that the vehicle is entered within the lift columns and lift arm supports are correctly placed unto the vehicle contact points.

- 1. Review 11, 21, 22, 23,
- 2. Additionally review section 0,
- 3. Ignition: **OFF**
- 4. Provide access to ESP control module (N47-5).

Electrical Wiring Diagrams:

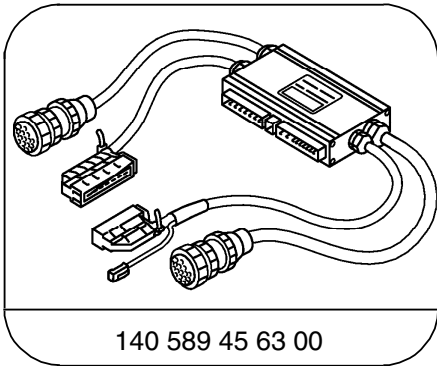
(location of grounds and connectors).
Electrical Troubleshooting Manual, Model 163, (WIS only)

Special Tools



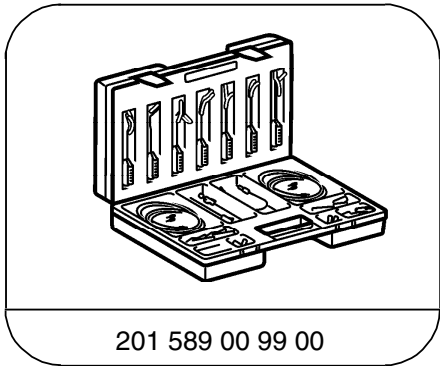
129 589 00 21 00

126-pin socket box



140 589 45 63 00

80-pin test cable



201 589 00 99 00

Electrical connecting set

Test equipment; See MBUSA Standard Service Equipment Program

Description	Brand, model, etc.
Digital multimeter	Fluke models 23, 77 III, 83, 85, 87

10.4 Electronic Stability Program (ESP)

Electrical Test Program – Preparation for Test

Connection Diagram – Socket Box

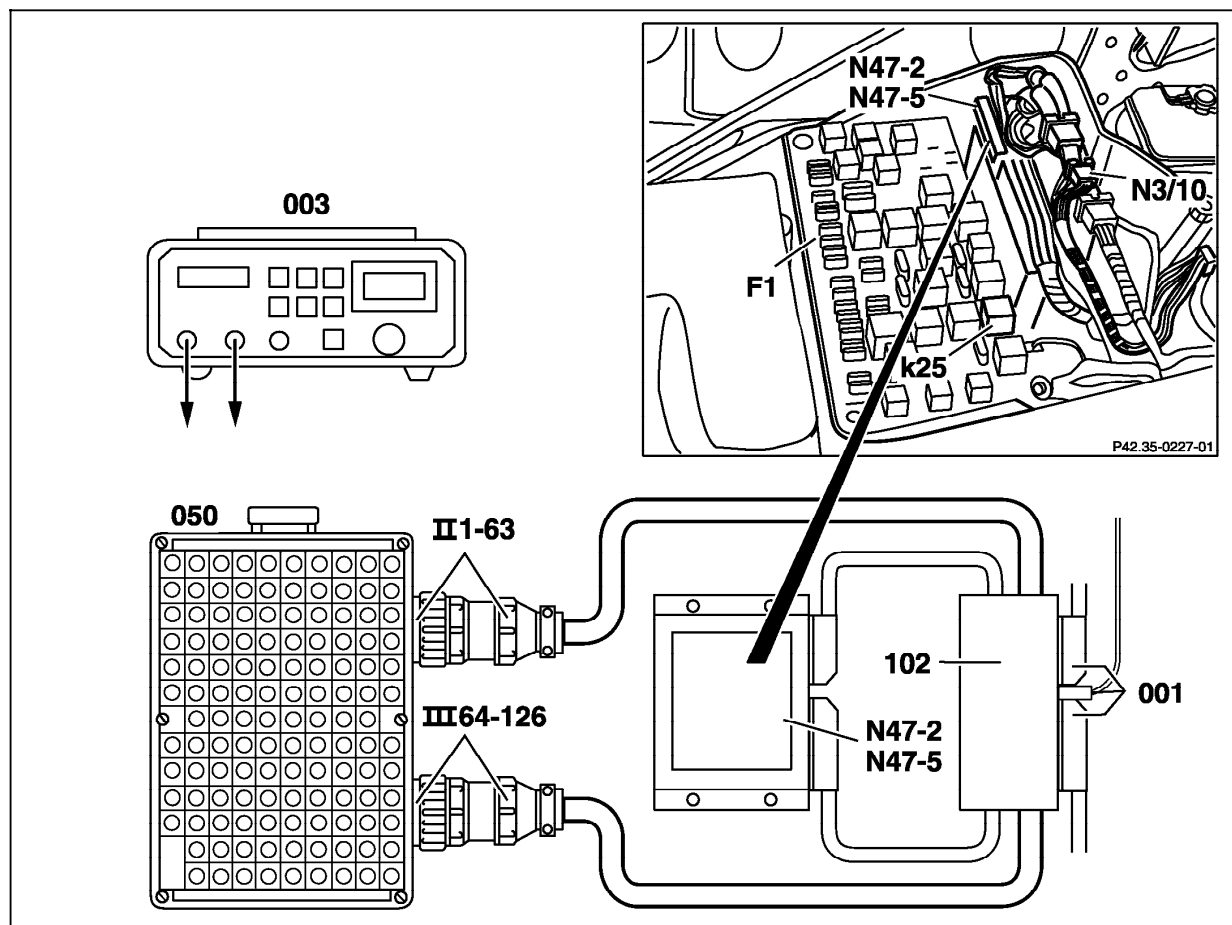
Figure 1

- 001 Control module connector
- 003 Digital multimeter
- 050 Socket box, 126-pole
- 102 Test cable
- F1 Fuse and relay box
- K25 High-pressure/return pump relay
- N3/10 Engine control module (ME-SFI)
- N47-5 ESP/BAS control module



Socket box connections:



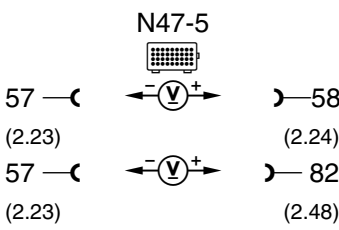


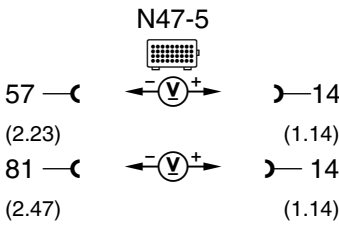
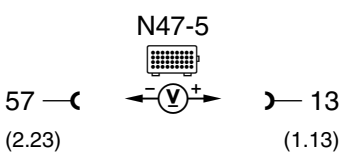
Socket box number	N47-5 (connector/PIN)
1-30	(1.1) - (1.30)
33	(3.H)
34	(3.L)
35 - 82	(2.1) - (2.48)



P42.35-0246-06




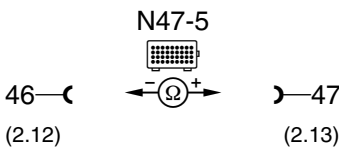
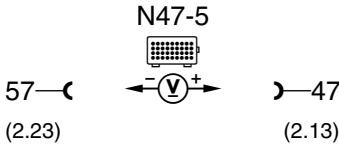


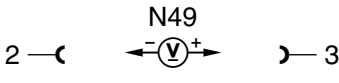
10.4 Electronic Stability Program (ESP)

Electrical Test Program – Test

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
1.0		ESP control module (N47-5) Circuit 30 Voltage supply from fuse and relay box (F1)		Ignition: OFF  With DTC  (excessive voltage) repeat the test with engine running.	11 – 14 V 11 – 14 V	Values < 11 V: Wiring, fuse f27 in F1 (fuse and relay box). Values > 14 V: check generator (G1).
1.1		Voltage supply for circuit 15 from fuse and relay box (F1).		Ignition: ON	11 – 14 V 11 – 14 V	Wiring, Fuse f22 in F1 (fuse and relay box).
2.0		Diagnostic output (ESP control module) (N47-5)		Ignition: ON	10 – 14 V	Wiring, ESP control module (N47-5).



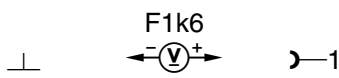

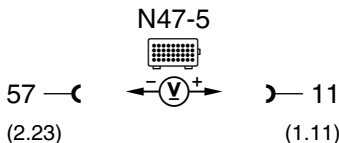
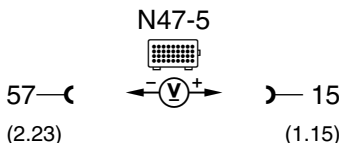
10.4 Electronic Stability Program (ESP)

Electrical Test Program – Test

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
3.0		High-pressure/return pump (F1k25) Voltage supply for circuit 30 from F1 (fuse and relay box)		Ignition: OFF Fuse F1k25 removed	11 – 14 V	F1 (fuse and relay box)
3.1		Coil resistance		Ignition: OFF Disconnect ESP control module (N47-5). Fuse f1k25 connected.	40 – 80 Ω	Wiring, F1k25, F1 (fuse and relay box).
3.2		Control circuit voltage supply of F1k25 relay from N47-5		Connect ESP control module (N47-5). Ignition: ON	11 – 14	ESP control module (N47-5).
4.0		Steering angle sensor (N49) Voltage supply circuit 30 from F1 (fuse and relay box)		Ignition: OFF Disconnect connector from N49	11 – 14 V	Fuse f13 at F1 Wiring, F1
4.1		Voltage supply circuit 15 from F1 (fuse and relay box)		Ignition: ON	11 – 14 V	Fuse f22 at F1 Wiring, F1






10.4 Electronic Stability Program (ESP)

Electrical Test Program – Test

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
5.0		ESP stop lamp supression (F1k6) relay Voltage supply circuit 30, from fuse and relay box (F1) for control circuit of F1k6		Ignition: OFF Measurement to be taken at socket for F1k6, F1k6 removed.	11 – 14 V	Fuse and relay box (F1).
5.1		Signal from stop lamp switch (S9/1) (N.C.)		Ignition: ON F1k6 removed , press service brake.	11 – 14 V	Wiring, Stop lamp switch (S9/1)
5.2		Signal from stop lamp switch (S9/1) (N.O.)		Ignition: ON F1k6 connected , service brake not pressed service brake pressed	11 – 14 V < 9 V	Wiring, Stop lamp switch (S9/1)
5.3		Signal from F1k6 for activation of the stop lamps		Ignition: ON F1k6 connected , Press service brake.	11 – 14 V	Wiring, F1k6, ESP control module (N47-5)











10.4 Electronic Stability Program (ESP)

Electrical Test Program – Test

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
6.0	ESP: C1200 BAS: C1207	Stop lamp switch (S9/1) Closed (N.C.)		Service brake: Not pressed: OFF Pressed: ON	OFF ON	Wiring, S9/1, ESP stop lamp suppression relay (F1k6), ESP control module (N47-5).
6.1		Open (N.O.)		Service brake: Not pressed: ON Pressed: OFF	ON OFF	Wiring, S9/1
7.0		Parking brake switch (S12)		Engine: at idle Press parking brake pedal: Parking brake pedal not pressed:	ON Parking brake warning lamp (A1e7): ON OFF (A1e7): OFF	Wiring, S12, A1e7
8.0		ESP OFF switch (S76/6)		S76/6 in position: ON Held pressed: At rest: S76/6 in position: OFF Held pressed:	0.75 – 3.5 V > 3.5 V < 0.75 V	Wiring, S76/6, ESP control module (N47-5)



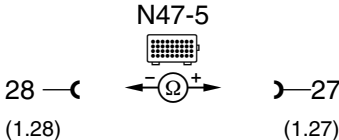
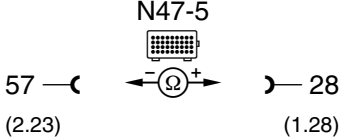

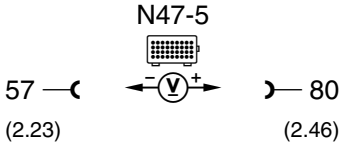

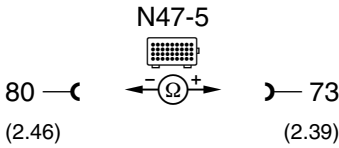

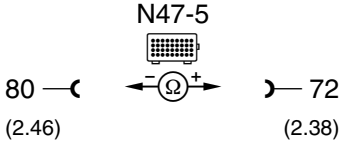
10.4 Electronic Stability Program (ESP)

Electrical Test Program – Test

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
9.0		Left front axle VSS sensor (L6/1) Internal resistance		Ignition: OFF Disconnect ESP control module (N47-5).	0.8 – 2.3 kΩ	Wiring L6/1
9.1		Insulation resistance		Ignition: OFF Disconnect (N47-5)	> 20 kΩ	Wiring, L6/1
10.0		Right front axle VSS sensor (L6/2) Internal resistance		Ignition: OFF Disconnect (N47-5)	0.8 – 2.3 kΩ	Wiring, L6/2
10.1		Insulation resistance		Ignition: OFF Disconnect (N47-5)	> 20 kΩ	Wiring, L6/2
11.0		Left rear axle VSS sensor (L6/3) Internal resistance		Ignition: OFF Disconnect (N47-5)	0.6 – 1.8 kΩ	Wiring, L6/3
11.1		Insulation resistance		Ignition: OFF Disconnect (N47-5)	> 20 kΩ	Wiring, L6/3



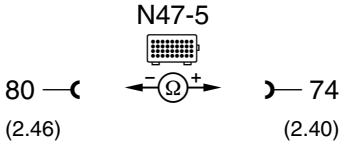

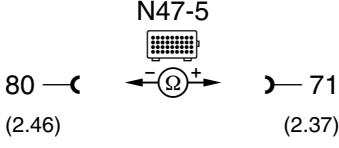

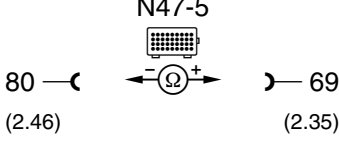

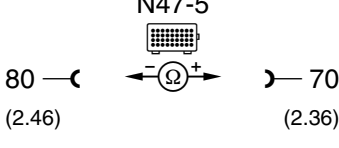

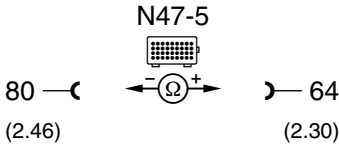
10.4 Electronic Stability Program (ESP)

Electrical Test Program – Test

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
12.0		Right rear axle VSS sensor (L6/4) Internal resistance		Ignition: OFF Disconnect ESP control module (N47-5).	0.6 – 1.8 kΩ	Wiring, L6/4
12.1		Insulation resistance		Ignition: OFF Disconnect (N47-5).	> 20 kΩ	Wiring, L6/4
13.0		ASR/ETS/ESP hydraulic unit (A7/3) (Traction systems) Solenoid valve voltage supply from N47-5		Ignition: OFF	11 – 14 V	Wiring, ESP control module (N47-5).
14.0		Left front axle solenoid valve (hold) (A7/3y6) Internal resistance		Ignition: OFF Disconnect (N47-5).	5.4 – 12.6 Ω	Wiring, A7/3
15.0		ASR/ETS hydraulic unit, left front axle solenoid valve (release) (A7/3y7) Internal resistance		Ignition: OFF Disconnect (N47-5).	2.8 – 6.6 Ω	Wiring, A7/3





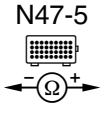

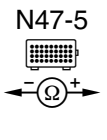

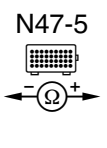

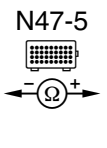
10.4 Electronic Stability Program (ESP)

Electrical Test Program – Test

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
16.0		Right front axle solenoid valve (hold) (A7/3y8) Internal resistance		Ignition: OFF Disconnect (N47-5).	5.4 – 12.6 Ω	Wiring, A7/3
17.0		Right front axle solenoid valve (release) (A7/3y9) Internal resistance		Ignition: OFF Disconnect (N47-5).	2.8 – 6.6 Ω	Wiring, A7/3
18.0		Left rear axle solenoid valve (hold) (A7/3y10) Internal resistance		Ignition: OFF Disconnect (N47-5).	5.4 – 12.6 Ω	Wiring, A7/3
19.0		Left rear axle solenoid valve (release) (A7/3y11) Internal resistance		Ignition: OFF Disconnect (N47-5).	2.8 – 6.6 Ω	Wiring, A7/3
20.0		Right rear axle solenoid valve (hold) (A7/3y12) Internal resistance		Ignition: OFF Disconnect (N47-5).	5.4 – 12.6 Ω	Wiring, A7/3


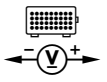
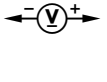
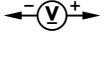
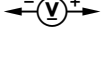
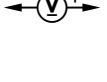
10.4 Electronic Stability Program (ESP)

Electrical Test Program – Test

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
21.0		Right rear axle solenoid valve (release) (A7/3y13) Internal resistance		Ignition: OFF Disconnect (N47-5).	2.8 – 6.6 Ω	Wiring, A7/3
22.0		Pressure circuit 1 vacuum solenoid valve (A7/3y26) Internal resistance		Ignition: OFF Disconnect (N47-5).	2.8 – 6.6 Ω	Wiring, A7/3
23.0		Pressure circuit 2 vacuum solenoid valve (A7/3y27) Internal resistance		Ignition: OFF Disconnect (N47-5).	2.8 – 6.6 Ω	Wiring, A7/3
24.0		Pressure circuit 1 switchover solenoid valve (A7/3y24) Internal resistance		Ignition: OFF Disconnect (N47-5).	5.4 – 12.6 Ω	Wiring, A7/3
25.0		Pressure circuit 2 switchover solenoid valve (A7/3y25) Internal resistance		Ignition: OFF Disconnect (N47-5).	5.4 – 12.6 Ω	Wiring, A7/3





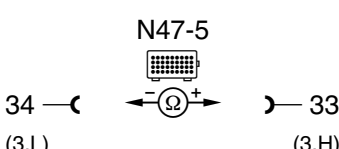

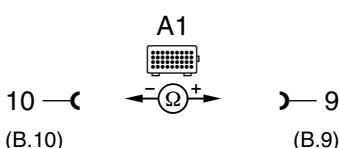

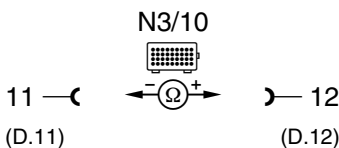
10.4 Electronic Stability Program (ESP)

Electrical Test Program – Test

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
26.0	[1142	ABS lateral acceleration sensor (B43) Supply voltage from N47-5	N47-5 	Ignition: ON	4.75 – 5.25 V	Wiring, B43, N47-5
27.0	[1141	ESP brake pressure sensor 1 (B34/1) Supply voltage from N47-5	N47-5 	Ignition: ON	4.75 – 5.25 V	Wiring, B34/1, N47-5
27.1	[1141	ESP brake pressure sensor 2 (B34/2) Supply voltage from N47-5	N47-5 	Ignition: ON	4.75 – 5.25 V	Wiring, B34/2, N47-5
28.0	[1120	Rotating speed sensor for ESP (B45) Supply voltage from N47-5	N47-5 	Ignition: ON	11 – 14 V	Wiring, B45, N47-5
29.0	[1204 [1205 [1206	Membrane travel sensor (BAS) (A7/7b1) Supply voltage from N47-5	N47-5 	Ignition: ON	4.75 – 5.25 V	Wiring, A7/7b1, N47-5

10.4 Electronic Stability Program (ESP)

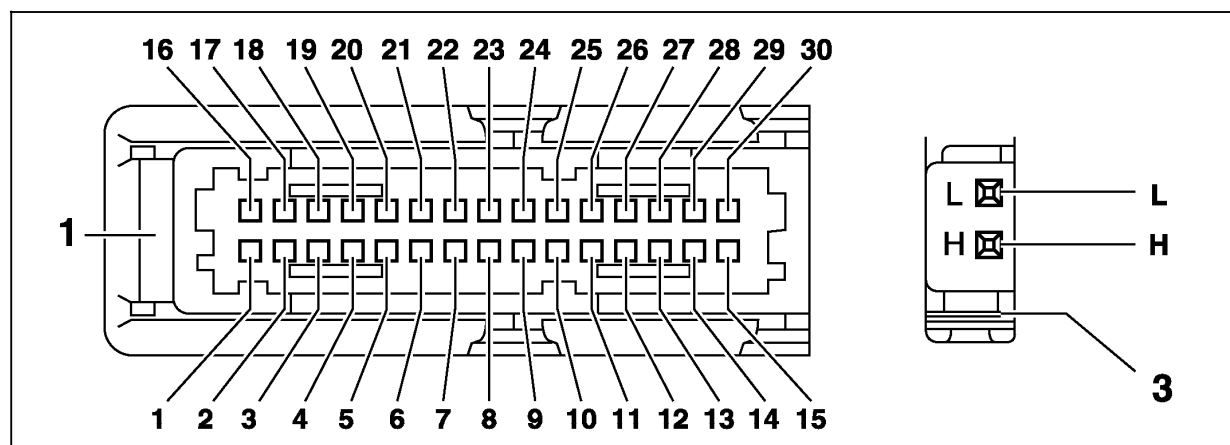
Electrical Test Program – Test

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
30.0		Solenoid valve (BAS) (B43) Resistance		Ignition: OFF Disconnect (N47-5).	1 – 2 Ω	Wiring, A7/7
31.0		CAN data line Resistance		Ignition: OFF	55 – 66 Ω	Wiring, ⇒ 31.1 ⇒ 31.2
31.1		CAN element in instrument cluster (A1) Resistance		Disconnect connector B at A1 and check directly at control module.	115 – 125 Ω	A1
31.2		CAN element in engine control module (ME-SFI) (N3/10) Resistance		Ignition: ON Disconnect connector D at N3/10 and check directly at control module.	115 – 125 Ω	N3/10, See D.M., Engines, Vol. 4, section 9.4

10.4 Electronic Stability Program (ESP)

Electrical Test Program – Test

Connector Layout - Connector 1 (interior harness) and connector 3 (CAN data bus), ESP control module (N47-5)



P42.45-0227-04

Connector 1	
1	Left front axle VSS sensor (L6/1) output
2	Right front axle VSS sensor (L6/2) output
3	Left rear axle VSS sensor (L6/3) output
4	Right rear axle VSS sensor (L6/4) output
5	VSS sensor status
6	—
7	ESP OFF switch (S76/6)
8	Parking brake switch (S12)
9	—
10	ESP stop lamp suppression relay (F1k6) (–)
11	Stop lamp switch (4 pole) (S9/1) N.O. contact
12	—
13	Diagnostic output
14	Circuit 15 voltage supply
15	Stop lamp switch (4 pole) (S9/1) N.C. contact

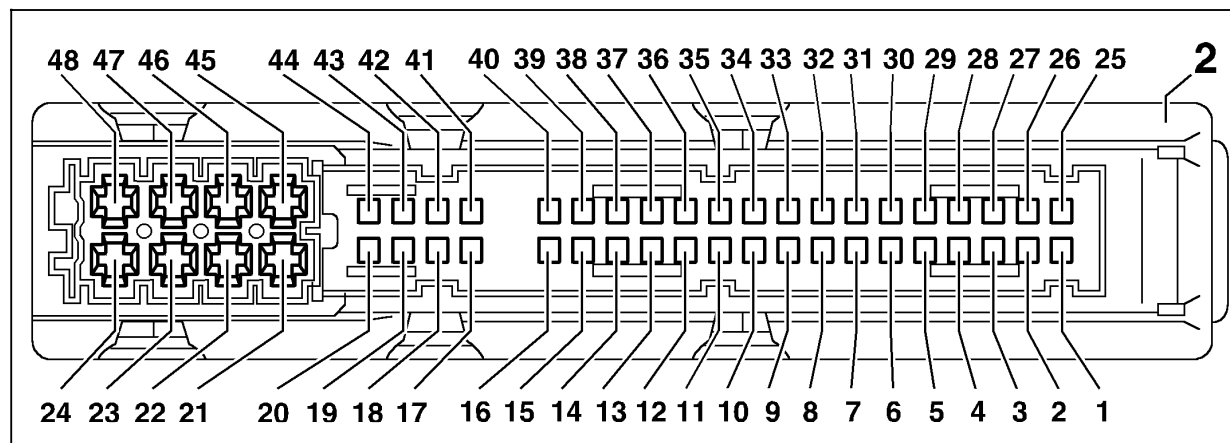
16	Steering angle sensor (N49) signal
17	Rotationing speed sensor for ESP (B45) (–)
18	Rotationing speed sensor for ESP (B45) (+)
19	—
20	Rotationing speed sensor for ESP (B45) (signal)
21	—
22	ABS lateral acceleration sensor (B43) (+)
23	ABS lateral acceleration sensor (B43) (signal)
24	ABS lateral acceleration sensor (B43) (–)
25	Left rear VSS sensor (L6/3) (+)
26	Left rear VSS sensor (L6/3) (–)
27	Right rear VSS sensor (L6/4) (+)
28	Right rear VSS sensor (L6/4) (–)
29-30	—

Connector 3	
H	CAN data bus (+)
L	CAN data bus (–)

10.4 Electronic Stability Program (ESP)

Electrical Test Program – Test

Connector Layout - Connector 2
(engine harness),
ESP control module (N47-5)



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Connector 2

1	Membrane travel sensor for BAS (A7/7b1) (–)	21	Solenoid valve (BAS) (A7/7y1) (+)	36	Left rear axle solenoid valve (release) (A7/3y11) (–)
2	Membrane travel sensor for BAS (A7/7b1) (signal)	22	Solenoid valve (BAS) (A7/7y1) (–)	37	Right front axle solenoid valve (release) (A7/3y9) (–)
3	Membrane travel sensor for BAS (A7/7b1) (+)	23	Ground (W9)	38	Left front axle solenoid valve (release) (A7/3y7) (–)
4	Release switch for BAS (A7/7s1) (open)	24	Circuit 30 voltage	39	Left front axle solenoid valve (hold) (A7/3y6) (–)
5	Release switch for BAS (A7/7s1) (close)	25	—	40	Right front axle solenoid valve (hold) (A7/3y8) (–)
6	Release switch for BAS (A7/7s1) (contact)	26	Pressure circuit 1 switchover solenoid valve (A7/3y24) (–)	41	—
7	Brake fluid level switch (S11)	27	Pressure circuit 1 vacuum solenoid valve (A7/3y26) (–)	42	Left front brake pad wear sensor (S10/1)
8	ESP brake pressure sensor 2 (B34/2) (–)	28	Pressure circuit 2 switchover solenoid valve (A7/3y25) (–)	43	Left front VSS (L6/1) (–)
9	ESP brake pressure sensor 2 (B34/2) (signal)	29	Pressure circuit 2 vacuum solenoid valve (A7/3y27) (–)	44	Left front VSS (l6/1) (+)
10	ESP brake pressure sensor 2 (B34/2) (+)	30	Right rear axle solenoid valve (hold) (A7/3y12) (–)	45	—
11	High pressure/return pump relay (F1k25) monitoring	31	Right rear axle solenoid valve (release) (A7/3y13) (–)	46	Voltage supply for solenoid valve of hydraulic unit (A7/3) for traction systems
12	High pressure/return pump relay (F1k25) (switched "–")	32 - 34	—	47	Ground (W9)
13	High pressure/return pump relay (F1k25) (+)	35	Left rear axle solenoid valve (hold) (A7/3y10) (–)	48	Circuit 30 voltage
14	ESP brake pressure sensor (B34/1) (–)				
15	ESP brake pressure sensor (B34/1) (signal)				
16	ESP brake pressure sensor (B34/1) (+)				
17	Right front VSS sensor (L6/2) (+)				
18	Right front VSS sensor (L6/2) (–)				
19-20	—				