












SPRINTER

Learning & Performance
ACCELERATING ACHIEVEMENT



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History

The first MB – Sprinter came in 1994 with a 4-cylinder petrol- (M111) and two Diesel engines:

OM601, 4-cylinder with mech. in-line-pump and OM602, 5-cylinder direct injection, with electronic controlled distributor pump.

This was the first van with a CAN-Bus, - only between the DAS and engine control unit.

The internal designation is “T1N”, the successor of the former model “T1”.

The Baumuster (Bm) of this vehicle is **901.0/3/4 – 904.0/3/4**



Calendar Year 2000

In 2000 there was a face-lift as you can see.

The important technical modifications were the CDI engines OM611 and OM612 and a network system via high speed CAN (Motor CAN Bus).

130,000 units were sold in this year.

The Baumuster (Bm) of this vehicle is **901.6 - 905.6**



Calendar Year 2001

In 2001 there was the Sprinter market launch in USA. The brand name was not Mercedes-Benz but Freightliner.

The available engine was the OM612, the 5 cylinder CDI.



Calendar Year 2003

In 2003 after the merger of Daimler and Chrysler the Sprinter was also available in another version.

The same vehicle but the brand was Dodge.

In 2004 the engine was changed. The OM612 became OM647. A very similar engine but with a modified CDI system and exhaust gas recirculation.



Calendar Year 2006

2006 Mercedes-Benz had in Europe the market launch of the successor of the T1N which is called NCV3 (New Concept Van).

This was a newly developed van which is technically closer to the cars than its predecessor. We had new engines, an extended network system and a lot of new features.

The Baumuster (Bm) is **906**.



Calendar Year 2007

2007 the new Sprinter Bm906 came also for NAFTA states (Frightliner and Dodge).

The available engines were:

- OM642, 6 Cylinder v-engine with CDI

and, only up to 2008 the

- M272, 6 cylinder petrol v-engine.



Calendar Year 2010

With MY 2010 there are some modifications.

The most important one is on the engine OM642. Due to exhaust regulations the DEF system is integrated.

From 2010 the Sprinter is distributed by select Mercedes-Benz and Freightliner dealers.



Product Offerings



Welcome to the New Sprinter

Product offerings – 4 classes, 10 models



Cargo Van

Variations:

2500 Cargo Van (Standard Roof / High Roof)

3500 Cargo Van (High Roof)



Dimensions:

Wheelbase: 144.3" / 170.3"

Overall Length: 232.5" / 273.2"

Overall Height: 96.3"/107.5"

Engine: 3.0-L V6 Turbo Diesel Engine

5 Speed Automatic Transmission

Base Curb Weight: 5081 lbs - 6085 lbs

Extended Cargo Van

Variations:

2500 Cargo Van Extended (High Roof)

3500 Cargo Van Extended (High Roof)



Dimensions:

Wheelbase: 170.3"

Overall Length: 289.2"

Overall Height: 107.5"

Engine: 3.0-L V6 Turbo Diesel Engine

5 Speed Automatic Transmission

Base Curb Weight: 5678 lbs - 6196 lbs

Passenger Van

Variations:
2500 Passenger Van (High Roof)



Dimensions:
Wheelbase: 144.3" / 170.3"
Overall Length: 232.5" / 273.2"
Overall Height: 107.5"
Engine: 3.0-L V6 Turbo Diesel Engine
5 Speed Automatic Transmission
Base Curb Weight: 5820 lbs / 6228 lbs

Chassis Cab

Variations:
3500 CAB Chassis



Dimensions:

Wheelbase: 144.3" / 170.3"

Overall Length: 239.6" / 269.5"

Overall Height: 95.5"

Engine: 3.0-L V6 Turbo Diesel Engine

5 Speed Automatic Transmission

Base Curb Weight: 4761 lbs / 4851 lbs

Baumuster





Translation

906	1	5	3	1	3
					Model 3=> Complete vehicle / Chassis
				Steering 1=> Left hand	
			Wheelbase 3=> 144 in 5=> 170 in 7=> 170 in (Extended Cargo Van)		
		Gross weight rating 3=> 2500 5=> 3500			
	Body 1=> Chassis 6=> Cargo Van and Extended Cargo Van 7=> Passenger Van				
Type series New Sprinter					

Code

M	2	CA	144	E
				Version E=> Extended
			Wheelbase 144=> 144" 170=> 170"	
		Class CA=> Cargo Van PV=> Passenger Van CC=> Chassis		
		Gross weight rating 2=> 2500 3=> 3500		
Brand M => Mercedes F => Freightliner				

Overview

	Typ	Code Mercedes	Code Freightliner	Body	Baumuster	Wheelbase	Overall Length	Overall Height	Base CW	GVWR*
	2500	M2CA144	F2CA144	Std. Roof	90663313	144"	232.5"	96.3"	5081 lbs	8550 lbs
		M2CA170	F2CA170	High Roof	90663513	170"	273.2"	107.5"	5545 lbs	8550 lbs
	3500	M3CA144	F3CA144	High Roof	90665313	144"	232.5"	107.5"	5666 lbs	9990 lbs ¹
		M3CA170	F3CA170	High Roof	90665513	170"	273.2"	107.5"	6085 lbs	9990 lbs ¹
<hr/>										
	2500	M2CA170E	F2CA170E	High Roof	90663713	170"	289.2"	107.5"	5678 lbs	8550 lbs
	3500	M3CA170E	F3CA170E	High Roof	90665713	170"	289.2"	107.5"	6196 lbs	9990 lbs ¹
<hr/>										
	2500	M2PV144	F2PV144	Std. Roof	90673313	144"	232.5"	96.3"	5754 lbs	8550 lbs
		M2PV170	F2PV170	High Roof	90673513	170"	273.2"	107.5"	6228 lbs	8550 lbs
<hr/>										
	3500	M3CC144	F3CC144	Std. Roof	90615313	144"	239.6"	95.5"	4761 lbs	11030 lbs
		M3CC170	F3CC170	Std. Roof	90615513	170"	269.5"	95.5"	4851 lbs	11030 lbs

¹ Optional: GVWR extension up to 11030 lbs

* GVWR= Gross vehicle weight rating



Special Equipment

The development and promotion of body builders or body up-fits are integral factors to the success of Sprinter sales in the USA & Canada.

About 70–80% of Sprinters sold are being modified or up-fitted with special equipment.

The sole product responsibility for the Sprinter lies with the head of Van Development (Dr. Sascha Paasche), as such Sprinter Engineering & Compliance division of Mercedes-Benz USA has the leading role providing technical, Engineering & Compliance support to Sprinter up-fitters, dealers and customers.

Special Equipment

More than 80,000 up-fitted Sprinters are currently on the roads in the USA & Canada. Here is a brief list of very successful applications:

- Campers (RV): Class A (Cowl-Chassis), Class B (Van) & Class C (Cutaway)
- Expeditors
- Shuttles: Integral bodies (Cutaway) & van
- Ambulance: Integral box & van
- Vocational vehicles: Service bodies, van bodies, platform bodies, crane bodies, shelving, etc.
- Refrigeration
- Mobility
- Armoured vans
- Custom conversions: Mobile office, dog groomers, luxury limousine, mobile repair shops, mobile-X ray units, etc.

Sprinter Shuttle Conversions



- Van based shuttle
- Integral shuttle body

Sprinter Ambulance Conversions



Sprinter Vocational Vehicles

- Service body
- Van body



Sprinter Vocational Vehicles

- Custom shelves & interior equipment
- Service body



Sprinter Refrigeration Vehicles



Sprinter Armored Vehicles

- Money transporter
- Armoured SWAT team command.



Sprinter Custom Conversion Vehicles



- Mobile office insurance adjuster.
- Mobile store for eye glasses.
- Golf event van

Sprinter Custom Conversion Vehicles

- Mobile broadcast vehicle



Sprinter Custom Conversion Vehicles

- Mobile X-ray unit
- Scans buildings & vehicles for weapons or explosives





Sprinter Custom Conversion Vehicles



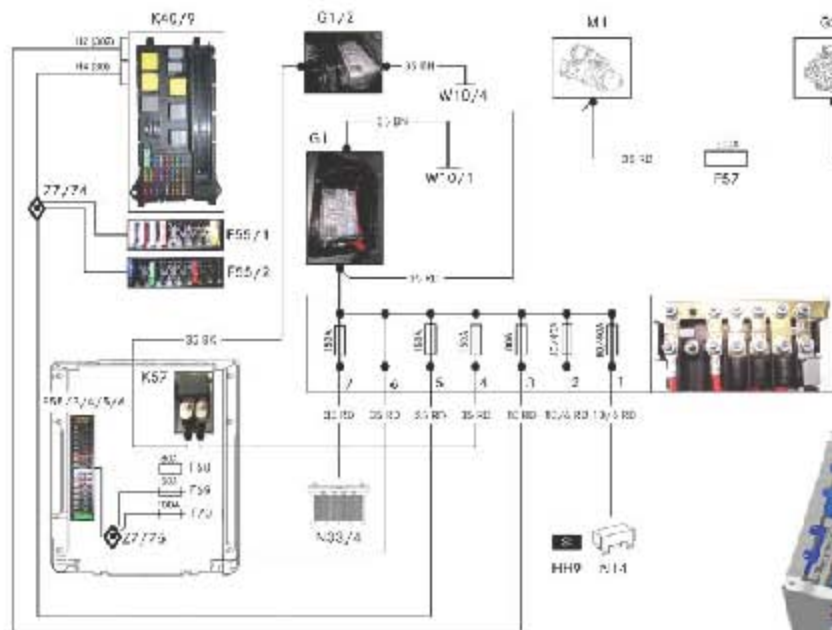
Sprinter Custom Conversion Vehicles



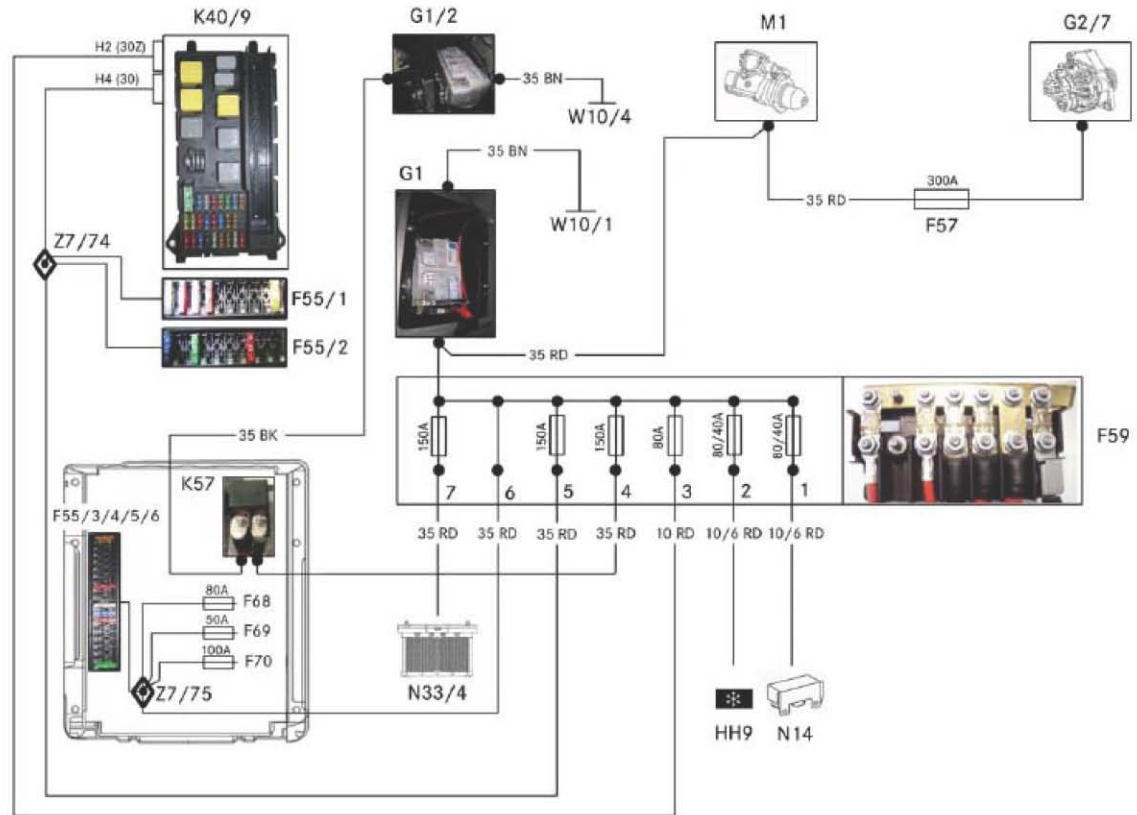
Acronyms / Terms

- CCC – Cargo Carrying Capacity
- CW – Curb Weight
- GAWR – Gross Axle Weight Rating
- GCWR – Gross Combination Weight Rating (includes towed vehicle)
- GTWR – Gross Trailer Weight Rating
- GVWR – Gross Vehicle Weight Rating
- SCWR – Sleeping Capacity
- UVW (Base CW) – Unloaded Vehicle Weight

Chassis Electrics



Voltage Supply



Legend

- M1** Starter
- G2/7** Alternator
- G1** Starter battery
- G1/2** Additional battery
- K40/9** Fuse and relay block SRB
- K57** Battery cutoff relay
- N33/4** el. PTC heater booster
- HH9** Air conditioning (additional fan)
- N14** Glow time output stage

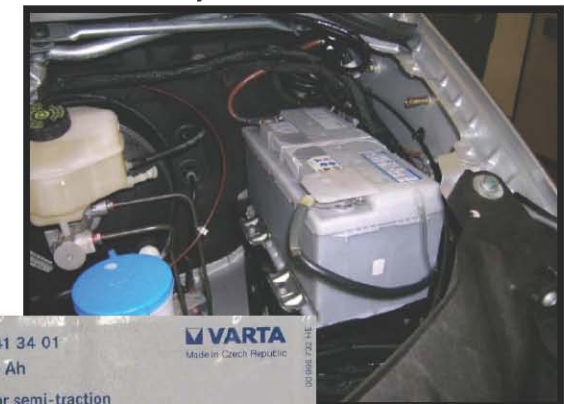
Power Supply

- Main battery
 - Located left cab floor
 - Tested with Midtronics tester
- Additional battery
 - Located left engine compartment
 - Factory or add on option
 - Connected to starter battery via cut off relay
 - 2 types
 - Traction battery up to 08/2008
 - Normal starter battery from 08/2008

Note: Cold cranking amps and standard not listed on traction battery can not be tested with Midtronics tester



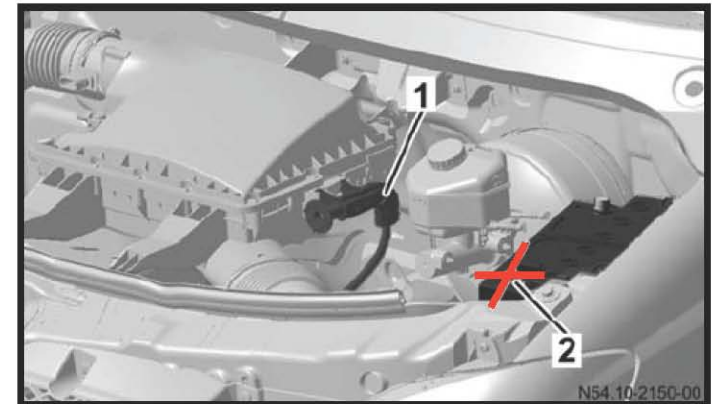
Main battery



Traction battery

Jump Starting / Charging

- Traction battery designed for smaller currents over long time periods
 - Not suitable for jump starting another vehicle
 - Connection to main battery open via relay when main battery power is low
- Jump starting / charging permitted at terminal points on air filter housing (+) and fender liner (-) for main battery

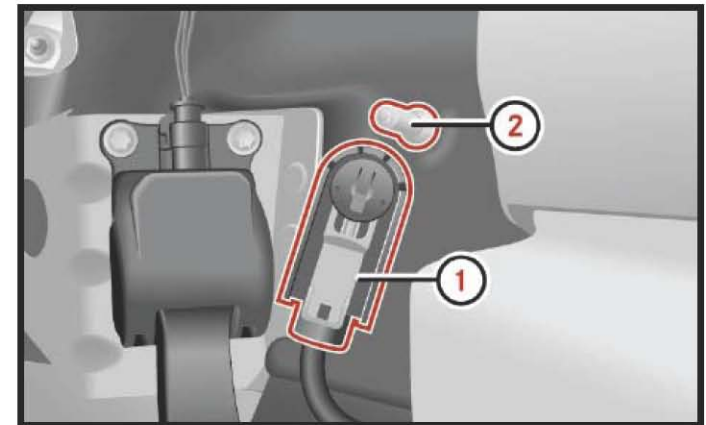


- 1 Terminal point (+)
- 2 Traction battery terminal



Main Battery Switch

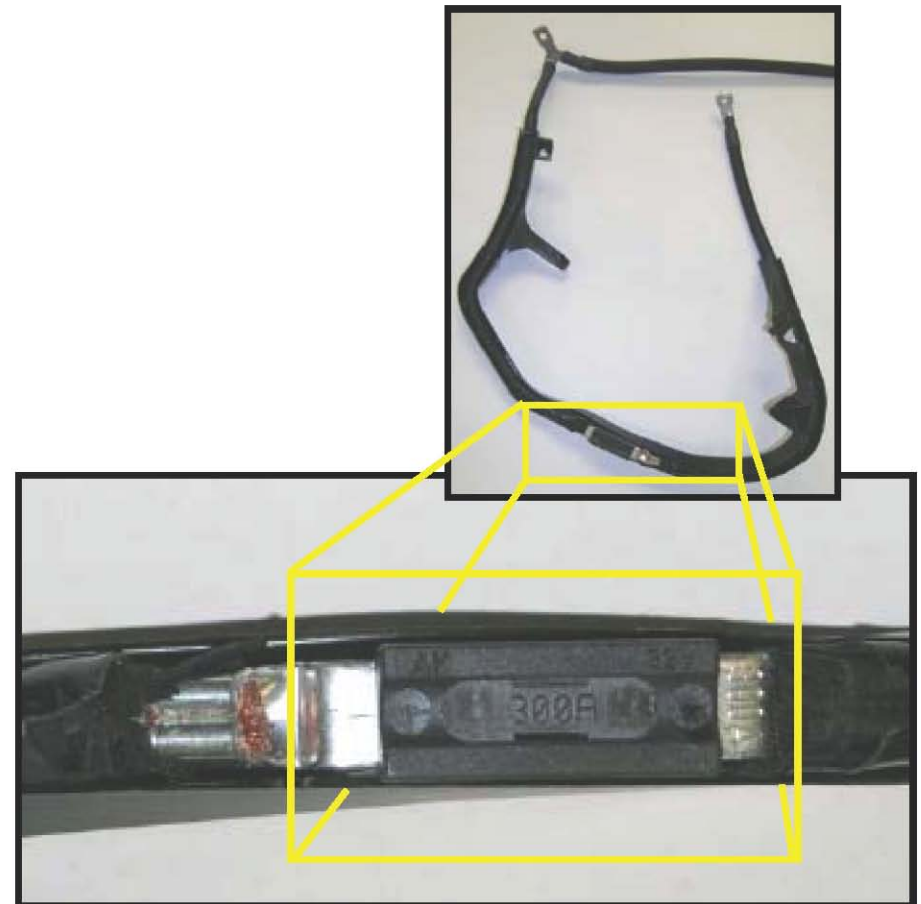
- Main battery ground point disconnect
 - Allows for quick interruption of voltage supply
- Located to the right of the accelerator pedal
- Normalizations after disconnect
 - Clock
 - Sliding roof



- 1 Main battery switch
- 2 Ground stud

300 Amp Safety Fuse

- 300 amp fuse in Batt + connector lead between starter and alternator for greater safety in accidents
- Located in wiring harness at top of bell housing area
- If fuse is defective, the complete B+ lead must be replaced



B+ line battery-starter-alternator with fuse

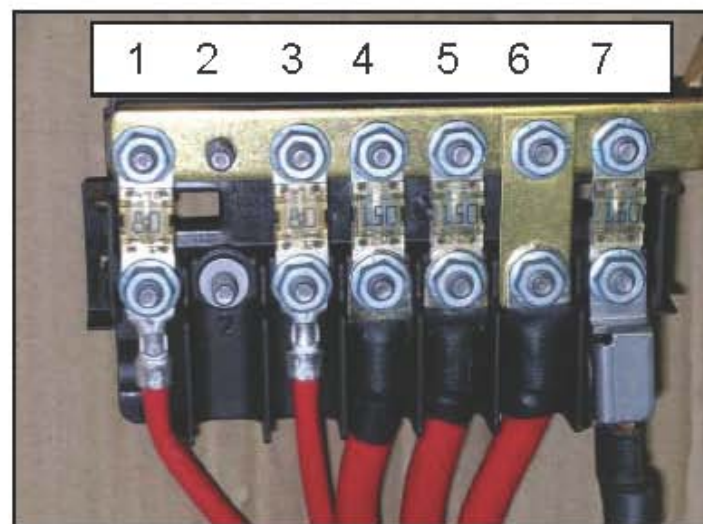
F59 Prefuse Box

- High current consumer protection
- Located next to starter battery
- Open fuse slot to be utilized by upfitter body modifiers for additional power circuits

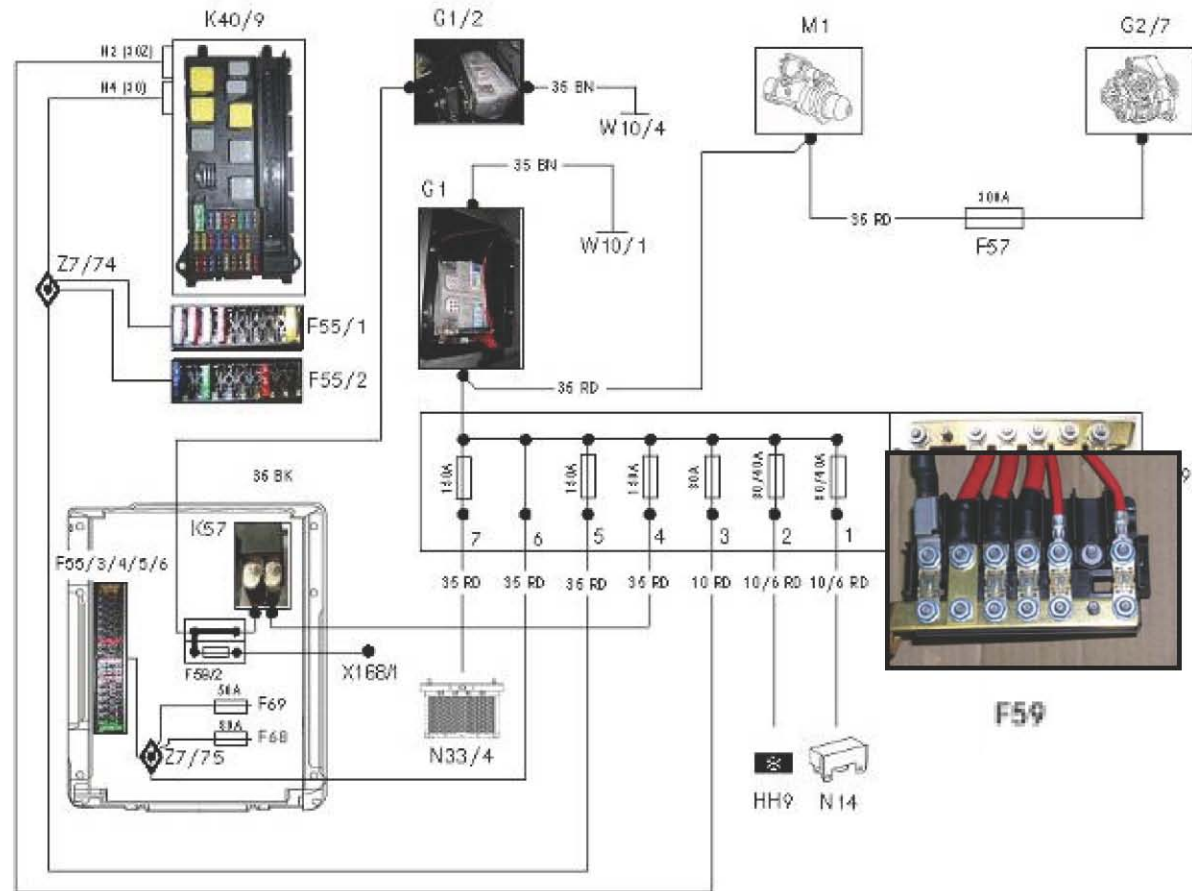


F59

/1- Glow output stage/secondary air pump	80/40A
/2- Air conditioning additional fan	80/40A
/3- SRB	80A
/4- Additional battery cutoff relay	150A
/5- Z7/74 Cockpit	150A
/6- Z7/75 Seat box	bridge
/7- PTC heater booster	150A



Voltage Supply

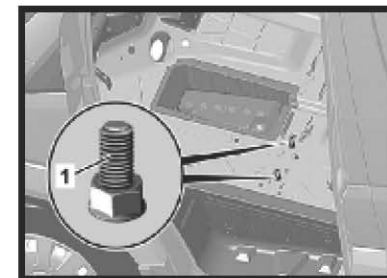
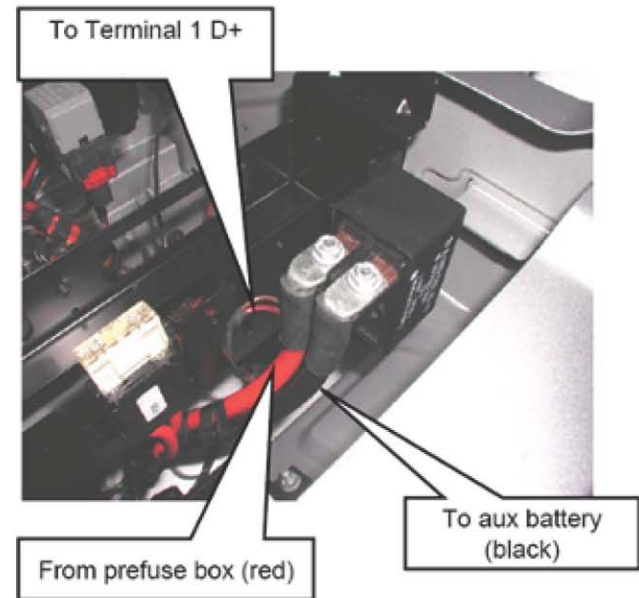


Legend

- M1** Starter
- G2/7** Alternator
- G1** Starter battery
- G1/2** Additional battery
- K40/9** Fuse and relay block
- K57** Battery cut-off relay
- N33/4** EI. PTC heater booster
- HH9** Air conditioning (additional fan)
- N14** Glow time output stage
- F 57** Alternator fuse B+
- F 59** Prefuses
- F 59/2** Mega fuse
- F55/1-6** 9-fold fuse holder
- F68-69** Maxi fuse fuses for special equipment
- X168/1** Cargo lift connector

Battery Cutoff Relay for Auxiliary Battery

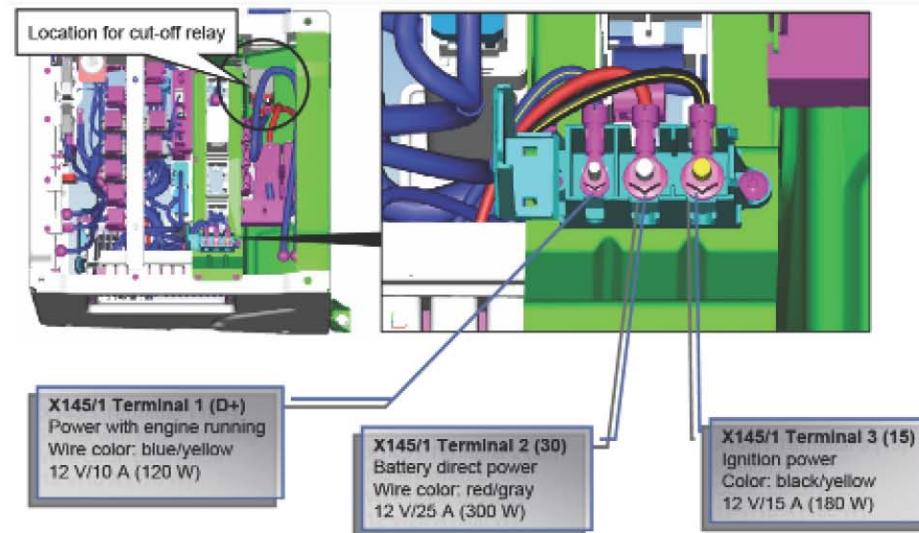
- Located under drivers seat
- Connect additional battery to F59 prefuse box
- Controlled by terminal 1 of auxiliary electrical terminal strip (X145/1)
 - Power with engine running only
- Relay ground located under driver seat



1 Ground point

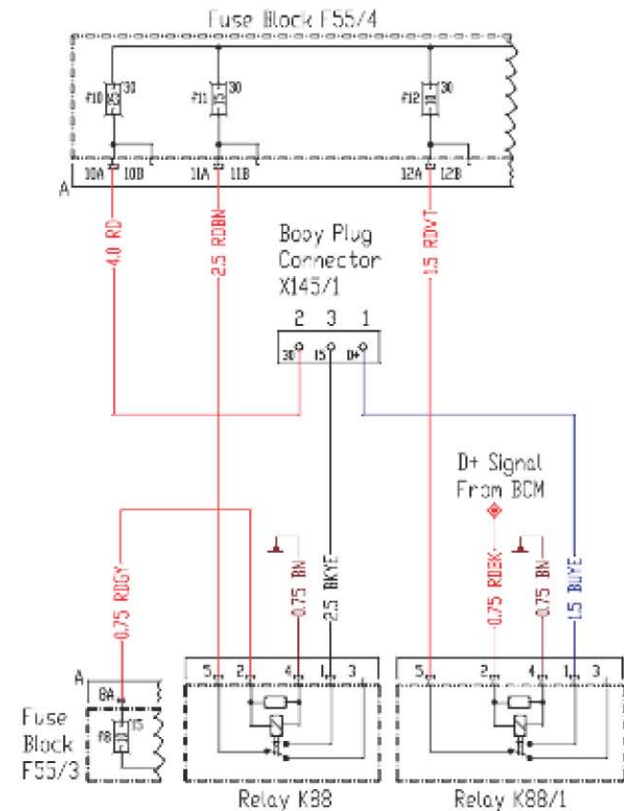
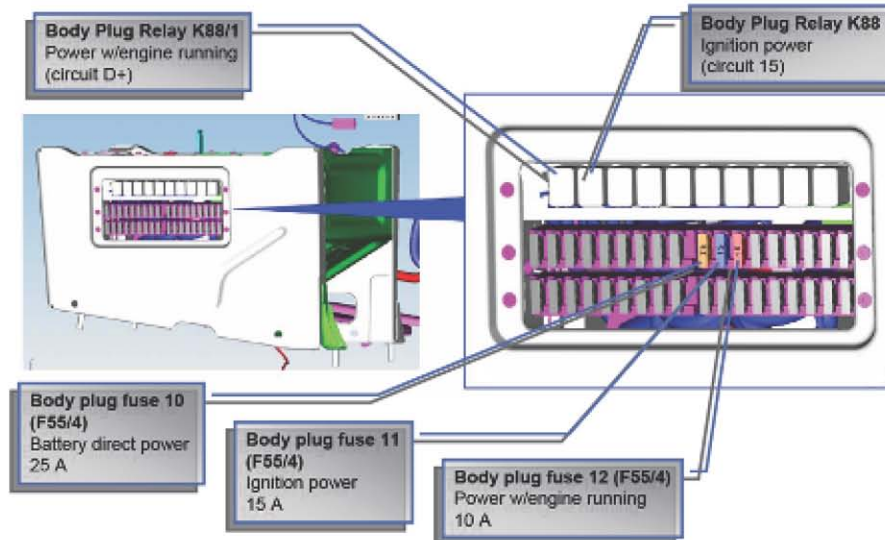
Auxiliary Electrical Consumer Terminal Strip (X145/1)

- Option code EK1
- Additional electrical components must be connected using this strip
- Located under driver seat
- 3 terminals with different power inputs



Body Builder Electrical Connectors

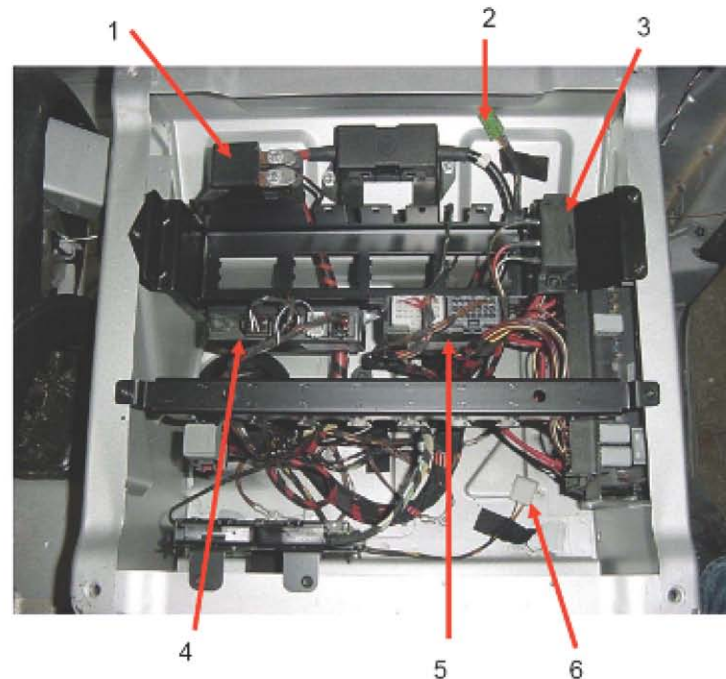
- Connection points for fuses and relays to be used by vehicle upfitters provided on side of drivers seat in F55/4 fuse box



Note: reference only, consult specific vehicle information

Body Builder Electrical Connectors

- Additional connection points for upfitters located under drivers seat



- 1- cut off relay aux battery
- 2- connector for aftermarket trailer brake control module
- 3- EK1 connector for body builder
- 4- trailer control module with 4 connectors
- 5- PSM with white and grey connector
- 6- 3rd brake light prewire for 1.8W LED light (black/yellow)
- 6- clearance/ident. light prewire (red/yellow)
- 6- ground (brown)

Front Signal Acquisition and Actuation Module (SAM)

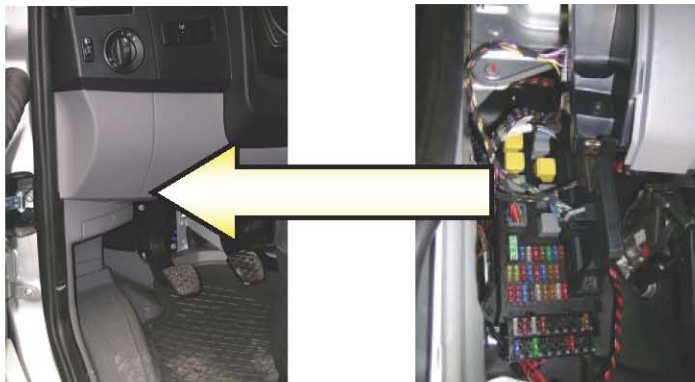
- Located left side of dash under headlight switch
- Only 1 SAM on vehicle
- 4 variants
- Replacement SAM only available in High line



Min version (standard cab)		
Discrete inputs		Discrete outputs
<ul style="list-style-type: none"> • Front passenger door power window switch • Exterior light switch • Stop lamp switch • Backup switch (manual transmission) • Front passenger power window switch • Parking brake • Brake lining wear • Coolant, washer fluid, and brake fluid level • Fuel tank sensor • Ambient temperature • Passenger door CL acknowledgment • Power supply • Alternator D+ (L) EURO 3 without LIN 		<ul style="list-style-type: none"> • Exterior lights with lamp check (backup lights with warning buzzer 2-stage) • Standard front interior lights • Switch illumination • Passenger door central locking • Front passenger door power window • Front wipe/wash system and headlamp • Horn (only with MRM)
Low (standard panel van)	Mid	High
<i>Min and:</i> <ul style="list-style-type: none"> • Right sliding door • Hinged rear door • 3rd brake lamp • Rear lighting 	<i>Low and:</i> <ul style="list-style-type: none"> • Rain/light sensor • Front fog lamps • Headlamp cleaning • Rear wipe/wash • Rear window defroster • D+ relay • EDW1 • Motion sensor • Sliding door/hinged door (crewcab) left • Auxiliary turn signal module 	<i>Mid and:</i> <ul style="list-style-type: none"> • Electric vent windows • EDW2 • Xenon headlamp • Multipurpose vehicle convenience interior light • Windscreen heater

Fuse and Relay Block

- Connected to Front SAM
- Bracket with 2 additional fuse blocks attached
 - F55/1 fuses 1-9
 - F55/2 fuses 10-18

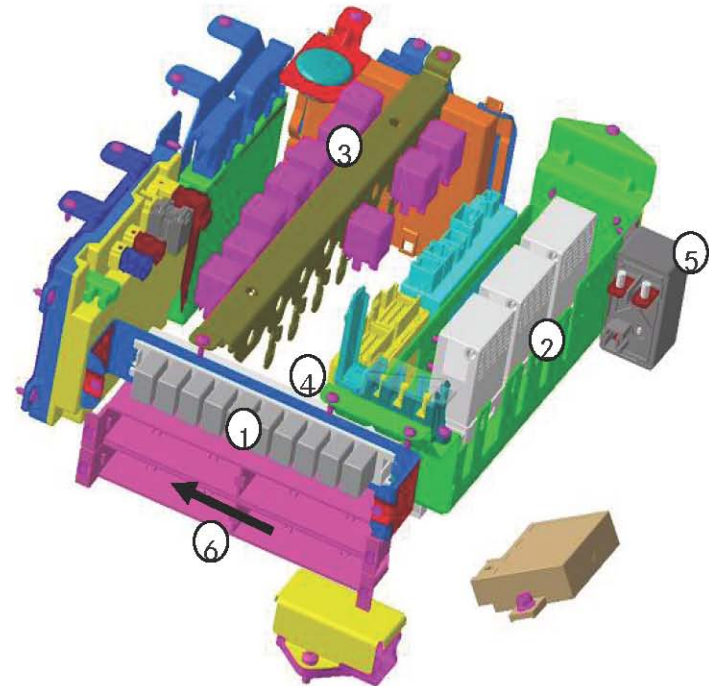
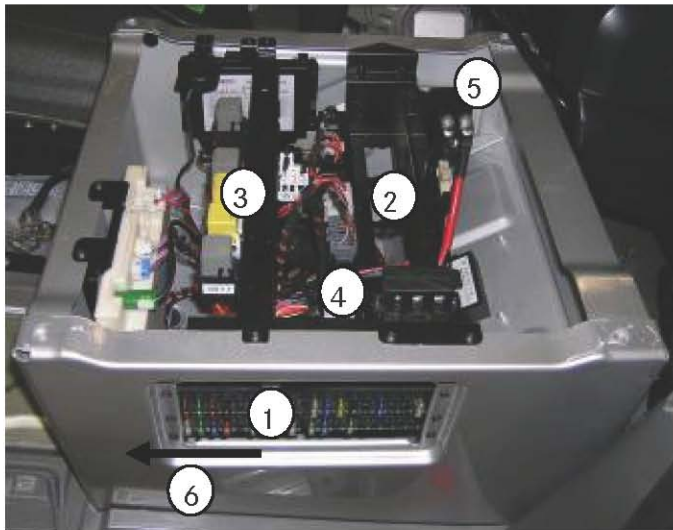


GT54_15_0077_072

Legend

- 1 SRB K40/9
- 2 SRB fuse K40/9 f...
- 3 SRB relay K40/9 k...
- 4 Fuse blocks F55/1 and F55/2
- 5 SAM

Drivers Seat Pedestal Electrical Components



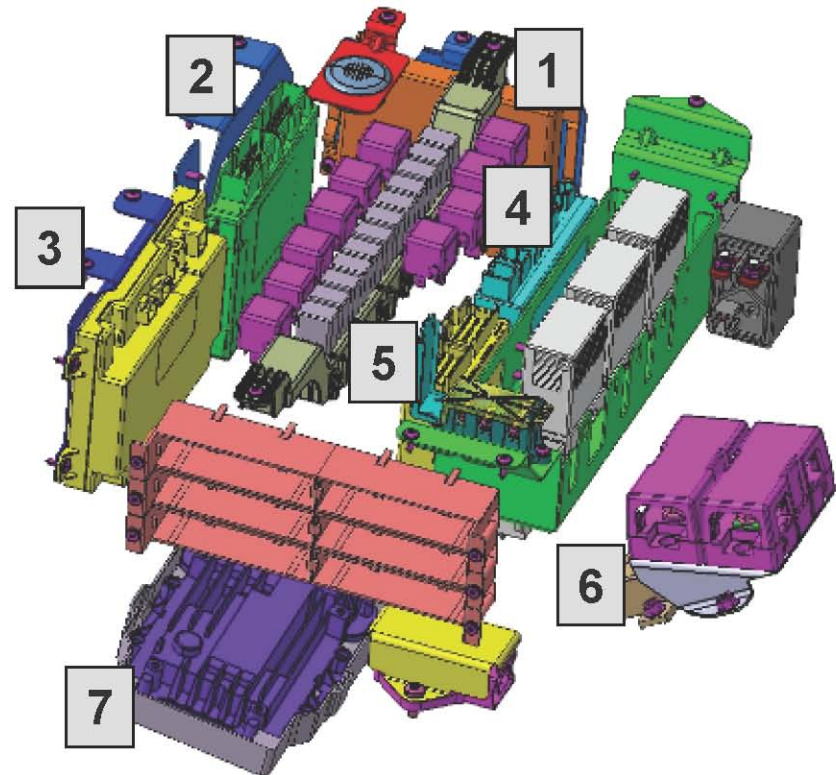
Up to 3/2009

Legend:

- 1 Fuse blocks F55/3, F55/4, F55/5, F55/6
- 2 Maxi-fuse fuses for special equipment:
F68 80 A Windshield heater
F69 50 A High-performance air conditioning (roof)
- 3 Cube relay
- 4 Micro relays
- 5 Battery cut-off relay
- 6 Direction of travel

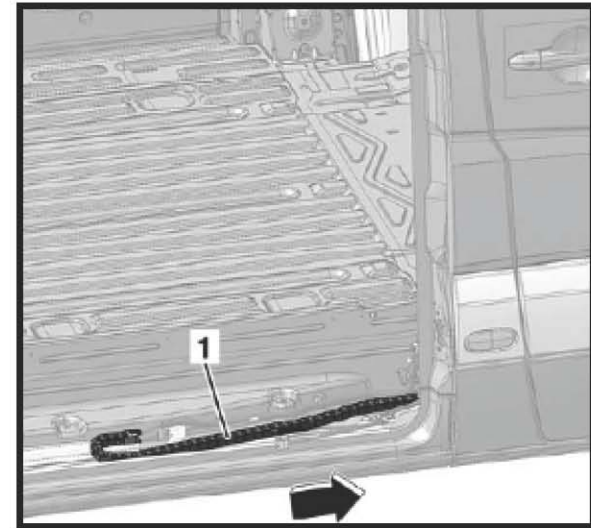
Drivers Seat Pedestal Electrical Components

- 1 Parktonic
- 2 ETC
- 3 Keyless entry (not available for USA)
- 4 AAG
- 5 PSM
- 6 TPM
- 7 SCR



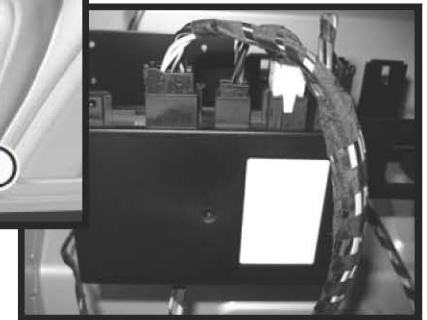
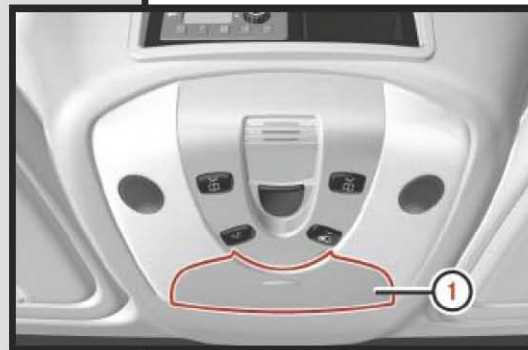
Energy Chain

- Specially designed cabling to move with the sliding door
- Carries electrical wiring for sliding door, door contacts and speaker



1 Energy chain
Arrow = front of vehicle

Control Units



Overhead Control Panel (OCP)

- Lamp on command via SAM from door contact switch
- OCP with anti-theft alarm (ATA)
 - Incorporates interior motion sensor and off switch
 - Interior CAN component
 - Included on all vehicles with ATA, rain/light sensor or tilting roof
- Standard OCP
 - Not networked
- All lamps are switched off by SAM after 20 minutes



Overhead control panel with anti-theft alarm system II



Overhead control panel

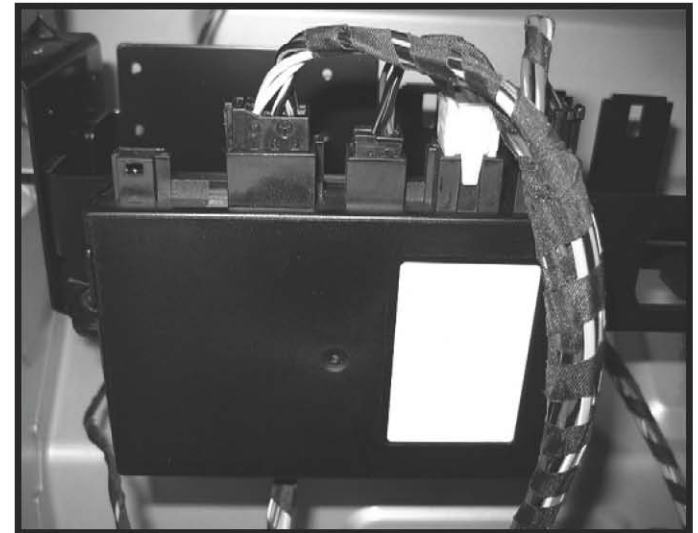
Upper Control Panel (UCP)

- CAN B component
- Currently 4 variants
- Unused switches covered with neutral panel
- Heated front seat switches are hard-wired (not CAN signals)



Trailer Module (AAG)

- Special module for controlling trailer illumination
- Located in the drivers seat box
- Connection for aftermarket trailer brake control module provided under driver seat
- Controls
 - Function of the lamps
 - Checking the circuit for opens and shorts



Steering Column Module (SCM)

- Located on the jacket tube of the steering column
- Variant 1:
 - Simplest version
 - Contains
 - steering column switch (without/with rear wiper)
 - clock spring contact, establishes electrical connection to the steering wheel (airbag and horn button).
- Voltage-coded signals of the steering column switch are discretely conducted to the EIS [EZS] control unit
- This version of the steering column module (without electronics and CAN) is only possible if no steering angle sensor (no ESP), no multifunction steering wheel and no cruise control are installed.



Steering column module with cruise control

Steering Column Module (SCM)

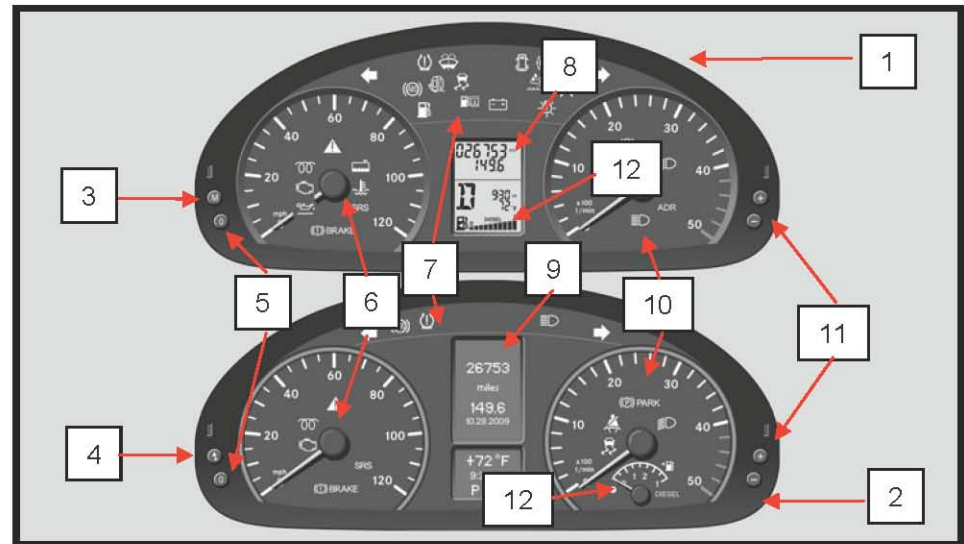
- Variant 2:

The considerably more frequent version with steering angle sensor (ESP) always has separate electronics with a connection to the M-CAN. The signals from the multifunction steering wheel, horn button, steering column switch and cruise control switch are forwarded as CAN messages.

Instrument Cluster (IC)

2 variants

- High line
 - Separate analog style fuel gauge
 - Additional message display functionality
- Low line
 - Limited display functionality
 - Additional indicator lights



- 1 Instrument cluster in vehicles without steering wheel buttons
- 2 Instrument cluster in vehicles with steering wheel buttons
- 3 In vehicles without steering wheel buttons
 - Change standard display
 - Select menus
- 4 In vehicles with steering wheel buttons:
 - Inspect engine oil level
- 5 Reset button

- 6 Speedometer with warning and indicator lamps
- 7 Warning and indicator lamps
- 8 Display in vehicles without steering wheel buttons
- 9 Display in vehicles with steering wheel buttons
- 10 Tachometer with warning and indicator lamps
- 11 Instrument illumination lighter/darker
- 12 Display for tank capacity with
 - Fuel reserve warning lamp
 - Tank cap position display

Resetting of Maintenance Interval

- Currently not available via SDS
- High line cluster Workshop Menu access
 - Ignition “on”
 - Arrow button up until “Service scope in XXX” appears
 - Press “O” button on IC and hold, release after the beep
 - Press lower left steering wheel button “Menu back” once
- Resetting after service
 - Select “Service scope in XXX” with arrow buttons
 - Press “O” button on IC, menu “To be carried out appears
 - Select “Full service” using + and – buttons
 - Confirm with upward arrow (used as enter button)
 - “Oil Type” menu appears
 - Select 229.51
 - Confirm with upward arrow button
 - Press “O” button on IC for 3 seconds



- 1 high line cluster display
- 2 +/- button
- 3 answer/hang up –phone
- 4 menu forward/backup
- 5 up/down arrow

Resetting of Maintenance Interval

- Low line cluster
 - Ignition on
 - Depress “O” button until beep sound
 - Release after beep
 - Press “M” button
 - Scroll thru workshop menu items using the “M” button
 - Following display information appears



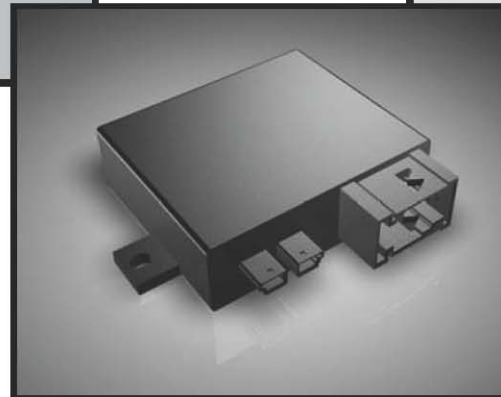
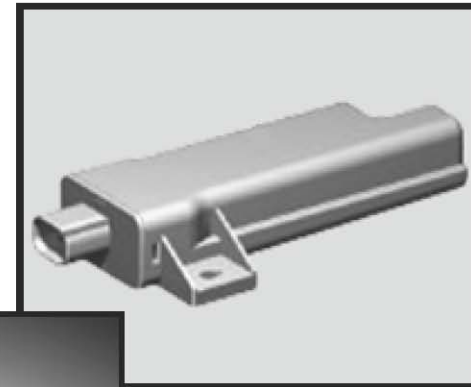
“O” and “M” buttons

“+” and “-” buttons

Display (diesel)	Meaning	Info:
Reset Std	Reset following oil change with standard oil	Not used in MB workshops
Reset .31	Reset with oil quality according to sheet 229.31	Press O button for approx. 5 s -Display: "2" Briefly press O button again -Display: "done"
Reset .51	Reset with oil quality as per sheet 228.51/229.51	
Reset wrench	Reset for new vehicles with longer service life	
Reset stop	Undo an inadvertent reset	

- Reset for .51 only (only displays last 2 digits)

Tire Pressure Monitoring

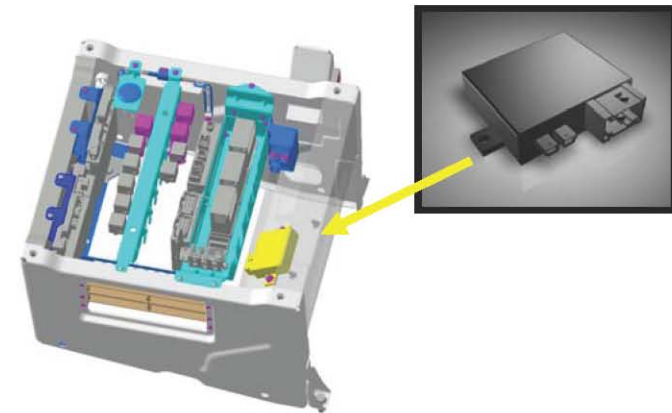
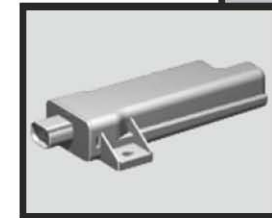


Tire Pressure Monitor (TPM)

- Equipped on 2500 series vehicles
- Siemens system
 - Separate control module, front and rear antenna's
- Tire air pressure and temperature measuring
- Warning at a fixed low pressure threshold ($p < 1.5/1.7$ bar)
- No pressure / location display information in IC
 - Display of “soft warning” at end of trip for minor pressure loss
 - Display of “hard warning” during trip for significant pressure loss according to current NHTSA specification
 - “tire defect” warning if there is a rapid loss of pressure
 - Sudden depressurization can not be detected (i.e. blown tire)

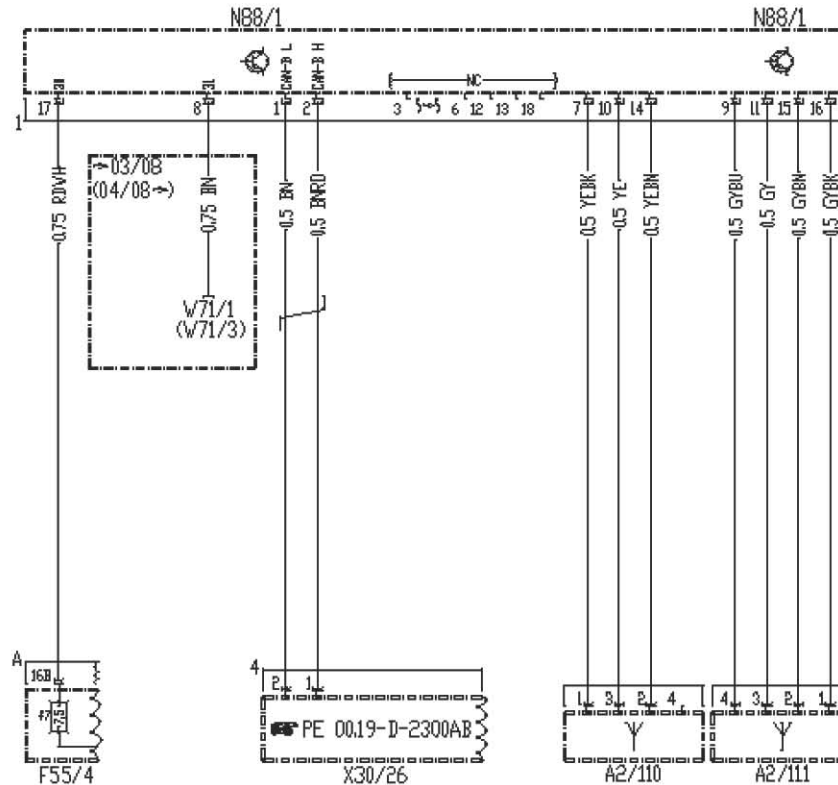
Tire Pressure Monitor (TPM)

- TPMS wheel sensors (A69/1, A69/2, A69/3, A69/4)
- Measures and transmit tire & sensor values
 - Tire pressure
 - Tire air temperature
 - Sensor I.D.
 - Sensor status (i.e. mode, battery condition...)
 - Sensor acceleration
- Front and Rear tire pressure monitor system antennas (A2/110, A2/111)
 - Receive high frequency signals from wheel sensors
- Tire pressure monitor system control unit (N88/1)
 - Located under driver's seat
- Instrument Cluster (A1)
 - Display warning messages and interface to driver



Note: 315 MHz system

Tire Pressure Monitor (TPM)



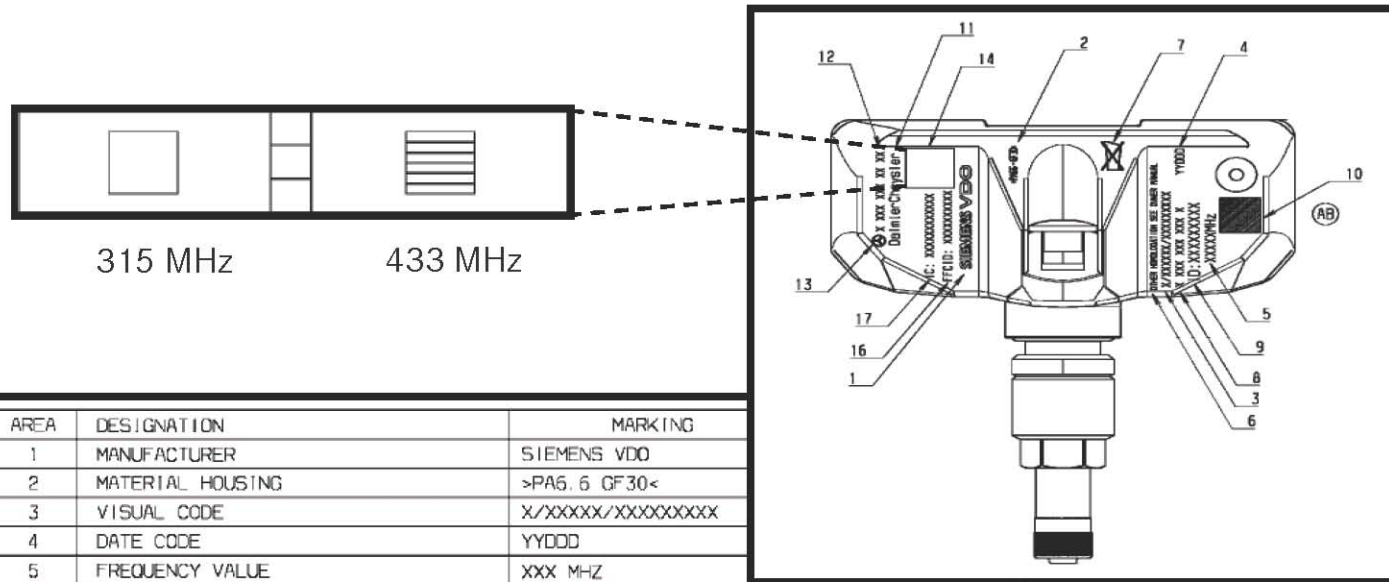
A2/110
A2/111
F55/4
N88/1

Front decoder antenna
Rear decoder antenna
Fuse block
TPM control module

W71/1
W71/3
X30/26

Driver seat frame ground point 1
Driver seat frame ground point 3
Interior CAN bus connector

Siemens Wheel Sensor



AREA	DESIGNATION	MARKING
1	MANUFACTURER	SIEMENS VDO
2	MATERIAL HOUSING	>PA6.6 GF30<
3	VISUAL CODE	X/XXXXX/XXXXXXXXXX
4	DATE CODE	YYDD
5	FREQUENCY VALUE	XXX MHZ
6	OTHER HOMOLOGATION SEE OWNER MANUAL	OTHER HOMOLOGATION SEE OWNER MANUAL
7	RECYCLING	LOGO 'NO TRASH'
8	SV PRODUCT REFERENCE	S XXX XXX XXX
9	MICRO IDENTITY	ID:XXXXXXXX
10	DATA MATRIX	
11	CUSTOMER	DaimlerChrysler
12	DAIMLERCHRYSLER REFERENCE	X XXX XXX XX XX
13	MERCEDES LOGO	
14	FREQUENCY FOOLL-POOFING	EMPTY = 315MHz HORIZ.LINES = 433M-hz
15	CE LOGO	
16	US HOMOLOGATION LABEL	FFC ID: XXXXXXXXXXX
17	CANADIAN HOMOLOGATION LABEL	IC: XXXXXXXXXXXXX

Labeling Specification

TPM Antenna Strategy

- 2 antenna system utilized
- Antenna locations
 - Front – behind right front head lamp on longitudinal member
 - Rear – left hand longitudinal member near rear axle
- Signal strength limitations due to:
 - Vehicle length
 - Extra steel belting and reinforcement of high load rating tires

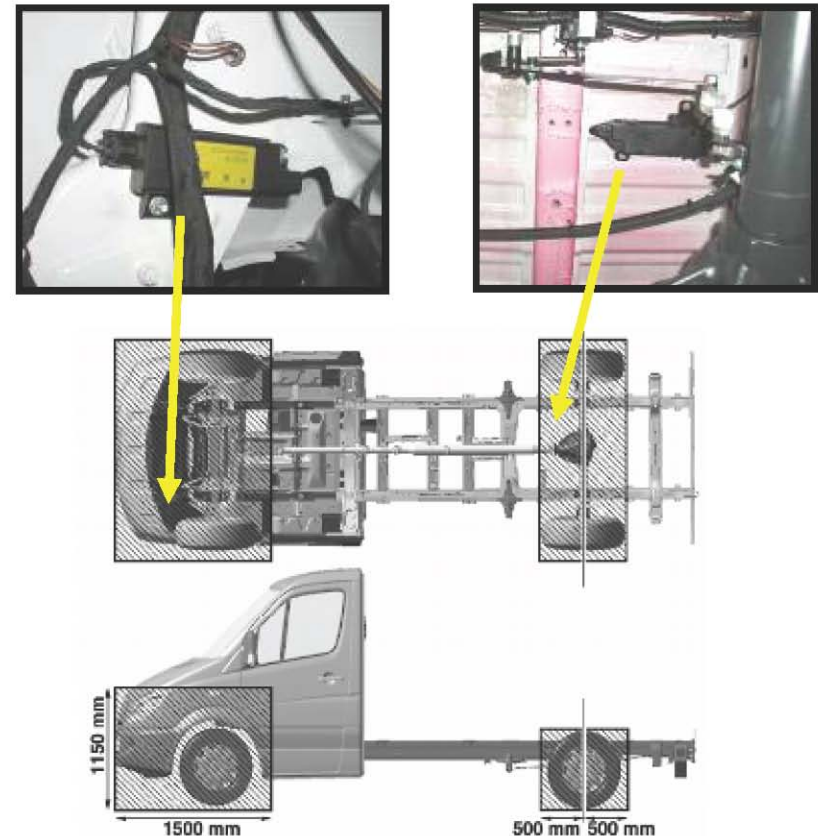


Diagram for representation of signal area of TPM sensor to respective antenna

Sensor Operating Modes

- Park Mode
 - Enters into “park mode” if sensor acceleration $<5g$ for 15 minutes
 - Reduced pressure reading and transmission rates
 - Pressure reading every minute
 - Transmits if pressure lose $>$ threshold
 - Ends all transmissions after 13 hours
- Drive Mode
 - Enters into “drive mode” from “park mode” if sensor acceleration $>5g$ for 20 seconds
 - Initially enters learn-in mode (also known as 30 block mode)
 - Pressure reading every 5 seconds
 - Transmits 1 data block every 15 seconds until 30 blocks of data have been transmitted (approx. 7 – 9 minutes)

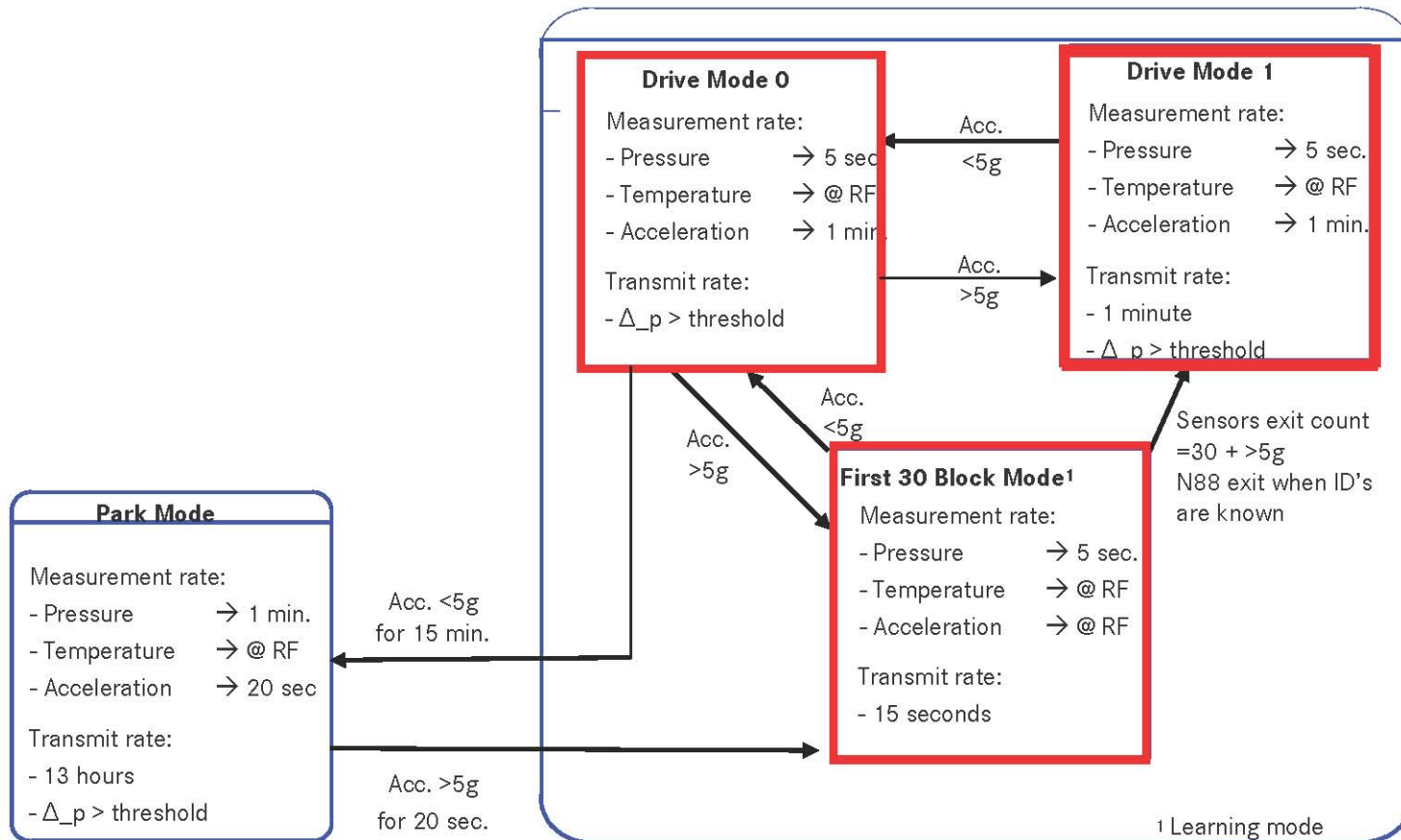
Sensor Operating Modes

- Drive Mode
 - Enters into “drive mode 1” (normal operation) from “30 block mode” after learn-in is completed if sensor acceleration $>5g$
 - Transmits once a minute or if pressure loss $>$ threshold
 - Enters into “drive mode 0” (stationary mode) if sensor acceleration $<5g$ regardless if sensor was in “30 block mode” or “drive mode 1”
 - Transmits only if pressure loss $>$ threshold
 - Reenters “park mode” if vehicle $<5g$ (stationary mode) for 15 minutes

TPMS Control Module Modes

- Learn-in (30 block) mode
 - Enters into learn-in mode if the control module is woke up
 - Takes approximately 20 minutes for control module to go to sleep once K15 is off and CAN is asleep
 - If sensor ID's are found to be known, control module will exit out of learn-in mode even though sensors are still transmitting at an increased rate
- Drive Mode
 - Receives and evaluations data from individual sensor transmissions each minute or if pressure decrease > threshold

TPM Operational Diagram



TPM Warning Algorithm

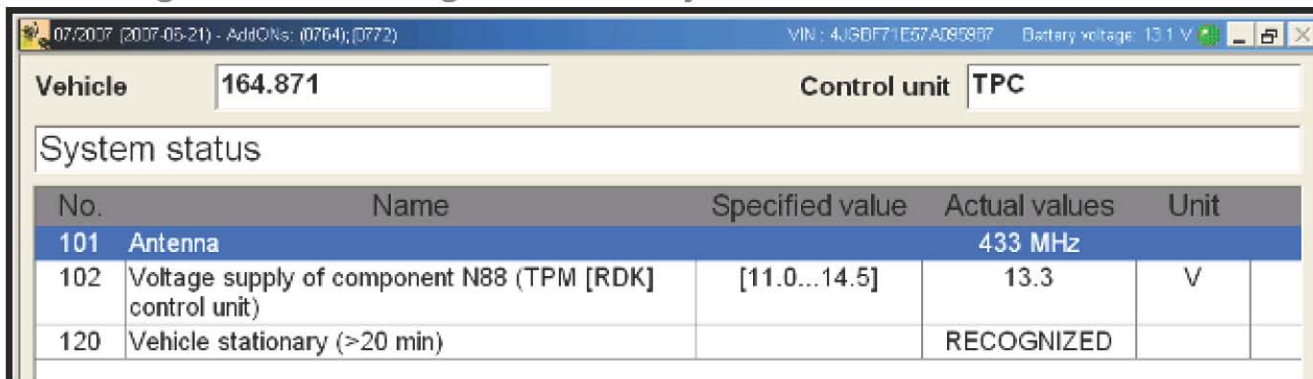
- Basis for warning algorithm are the specified pressure values
 - Isochoric line created based on a calibration point (pressure and temp.)
- Capable of 4 different warning types
 - Value below limit of temperature compensated pressure threshold (soft warning) based on a calibration point
 - Value below limit of additional (lower) temperature compensated pressure threshold (hard warning) based on a calibration point
 - Rapid pressure loss (hard warning)
 - Value below the limit for minimum pressure required by NHTSA
- Warning thresholds *example* at 29 psi set pressure
 - Soft Warning @ 1.75 bar (25.4 psi) – temperature compensated
 - Hard warning 'Check Tires' @ 1.6 bar (23.2 psi) – **not** temperature compensated
 - Hard warning 'Tire Defect' @ Δ pressure > 0.25 bar (3.6 psi) / minute – temp. compensated
 - Hard Warning NHTSA 'Check Tires' @ 1.5/1.7 bar (21.7/24.9 psi) – fixed min. pressure

TPM System Reactivation (Setting New Specified Pressures)

- Initiated by TPMS reactivation request in IC
 - “Tire Pressure Monitoring System reactivated” displayed in IC
 - Current SW level remembers request for 20 minutes only
 - Sensor ID’s are not erased or relearned during this process
- Current pressure values are adopted as new specified values if:
 - Pressures are above the “minimum set value” set in TPMS control module
 - Vehicle must be driven >16mph within 20 minutes or system reactivation
 - Monitors pressure for 3 minutes, pressure must not vary by >0.1bar (1.5psi)
 - Plausibility check of pressures
 - Above minimum “set value” and NHTSA minimum pressure
 - Pressure difference between 4 tires <1.5bar (22psi)
 - Log created in “Activation Memory”

TPM SDS Diagnosis

- Improved Repair Verification (VRV) compliant ECU
 - Fault memory split into Fault and Event memory
 - Event memory may not be a problem (i.e. over temperature) or may be a problem associated with another system or (i.e. CAN fault)
 - Limited freeze frame data associated with fault code
- Actual Values (sensor transmission ends >15minutes)
 - “System Status” identifies antenna frequency, control module recognized voltage and if system is in “Park Mode”



No.	Name	Specified value	Actual values	Unit
101	Antenna		433 MHz	
102	Voltage supply of component N88 (TPM [RDK] control unit)	[11.0...14.5]	13.3	V
120	Vehicle stationary (>20 min)		RECOGNIZED	

TPM SDS Diagnosis

- Actual Values cont.
 - Identification numbers DO NOT correlate to positions
 - Use MB 2000E if needed to identify sensor positions

No.	Name	Actual values
084	Wheel electronics identification number 1	80B283CC
085	Wheel electronics identification number 2	80B2A253
086	Wheel electronics identification number 3	80B2A1BF
087	Wheel electronics identification number 4	80B2A0E9

- Tire pressure set values can not be changed in Actual value screen

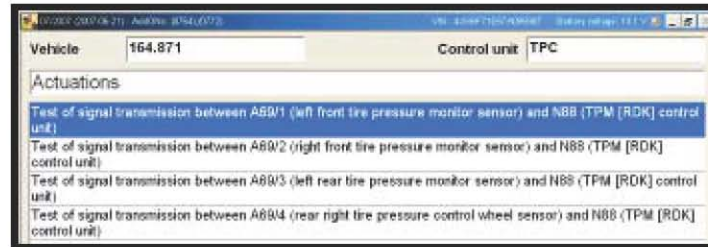
“Specified Pressures” –
set during system
reactivation

“Set pressure” – system can
NOT be reactivated below
this pressure (can be
changed via Initial start-up)

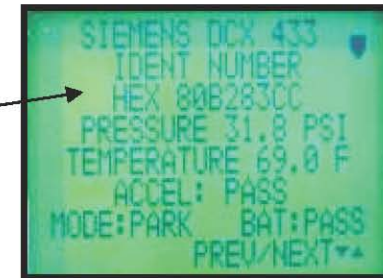
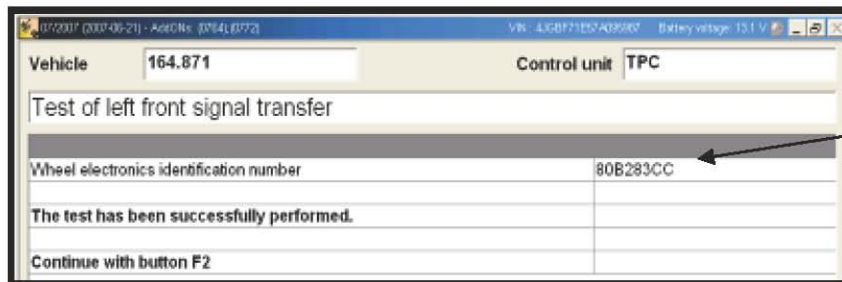
No.	Name	Actual values	Unit
110	Tire pressure specified value at front axle	32.2	psi
111	Tire pressure specified value at rear axle	33.2	psi
130	Type of tire	NORMAL LOAD (Standard)	
131	Tire pressure specified value (MINIMUM VALUE)	32	psi

TPM SDS Diagnosis

- Actuations Menu
 - Allows for testing of signals between individual sensors and N88



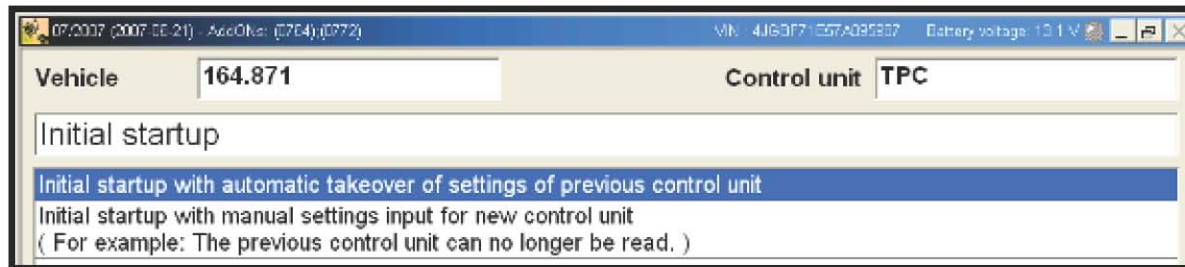
- Transmission can be initiated by either rapid pressure drop or using the MB 2000E (125kHz signal used to initiate sensor transmission)



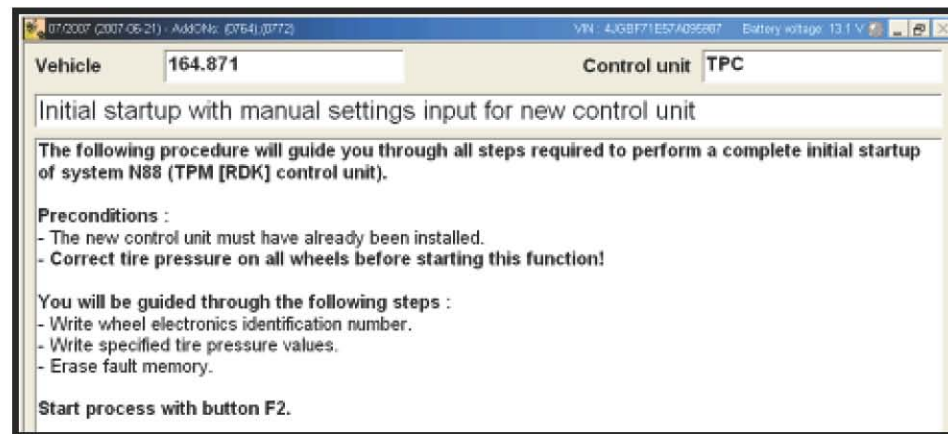
- Recommend using MB 2000E tool, always compare sensor ID numbers

Note: It will take a moment for the Siemens wheel sensors to transmit when using MB 2000E.

TPM Control Module Replacement

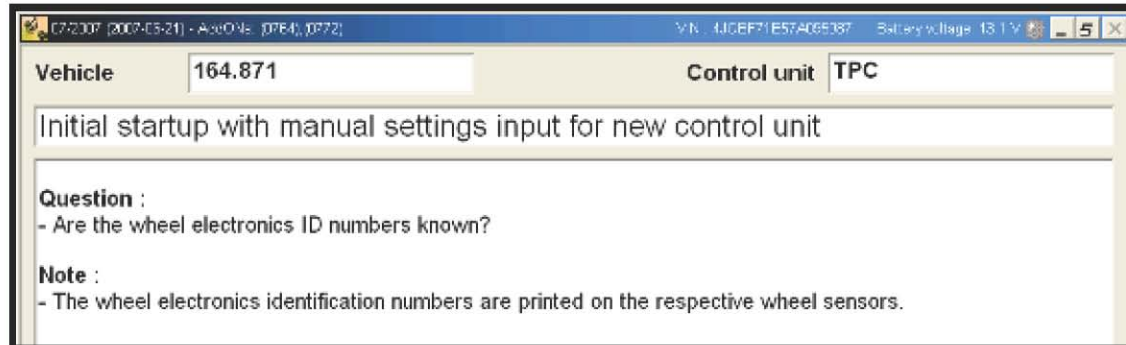


- Automatic takeover is preferred method (all vehicle, wheel and pressure values are transferred)



- Manual input will require you to input selected values
- This is also used to correct inaccurate values (i.e. set value, tire type)

TPM Control Module Replacement



072007 [2007-05-21] - Address: [0764], [0772] V.N.: 4J0BF71E57A065387 Battery voltage: 13.1 V

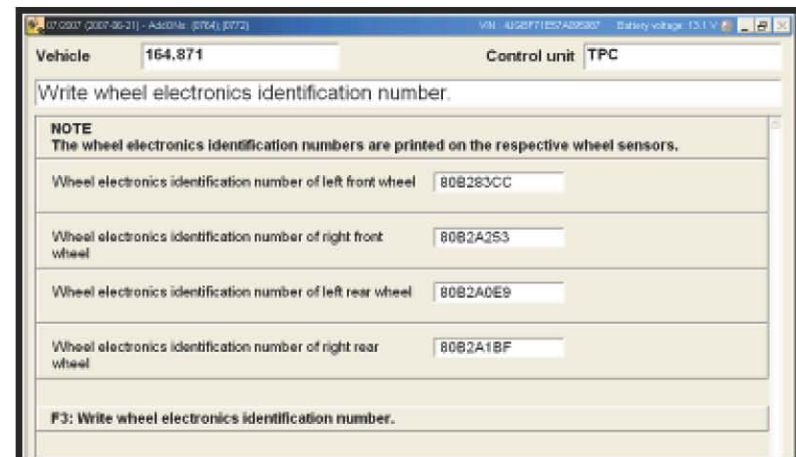
Vehicle: 164.871 Control unit: TPC

Initial startup with manual settings input for new control unit

Question :
- Are the wheel electronics ID numbers known?

Note :
- The wheel electronics identification numbers are printed on the respective wheel sensors.

- Recommended using MB 2000E to obtain sensor ID's (LF, RF, LR, RR) and select "yes"
- Manually input ID's
- This screen can also be used if a sensor has been replaced



072007 [2007-05-21] - Address: [0764], [0772] V.N.: 4J0BF71E57A065387 Battery voltage: 13.1 V

Vehicle: 164.871 Control unit: TPC

Write wheel electronics identification number.

NOTE
The wheel electronics identification numbers are printed on the respective wheel sensors.

Wheel electronics identification number of left front wheel: 80B283CC

Wheel electronics identification number of right front wheel: 80B2A253

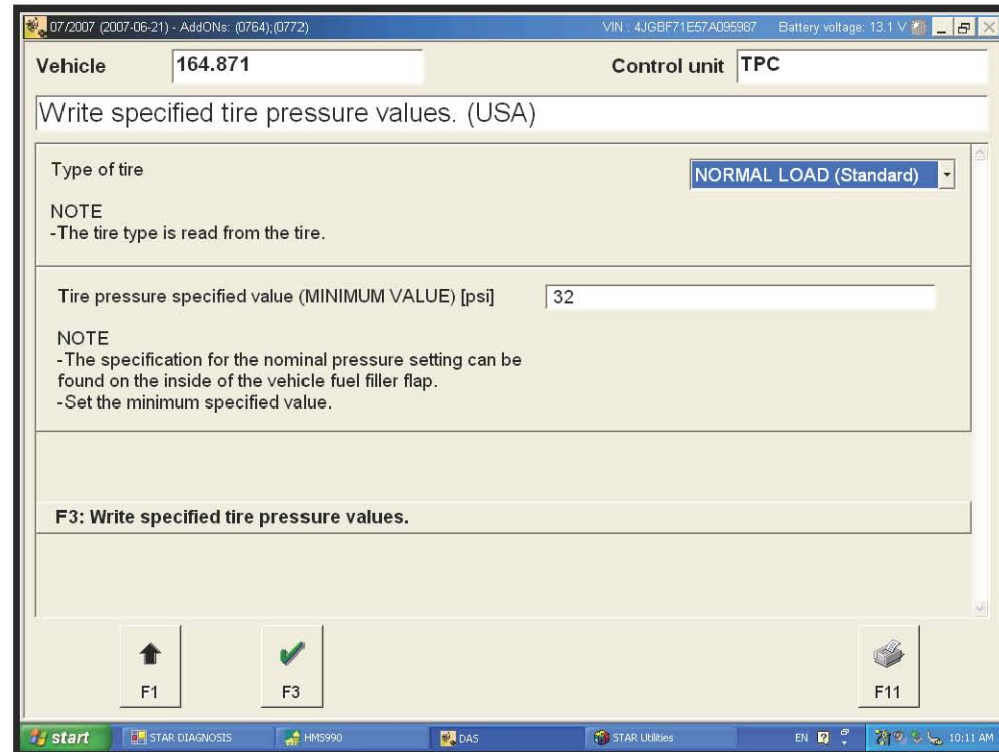
Wheel electronics identification number of left rear wheel: 80B2A0E9

Wheel electronics identification number of right rear wheel: 80B2A18F

F3: Write wheel electronics identification number.

TPM Control Module Replacement

- Select tire type from drop down menu
- Even though this screen says “tire pressure specified value” this is the ‘set value” which is the minimum specified value
- Reactivation is not possible below this value
- This value should be set to the lowest value given on the placard driver’s door A pillar



Note: 164 shown
906 would show high load tires

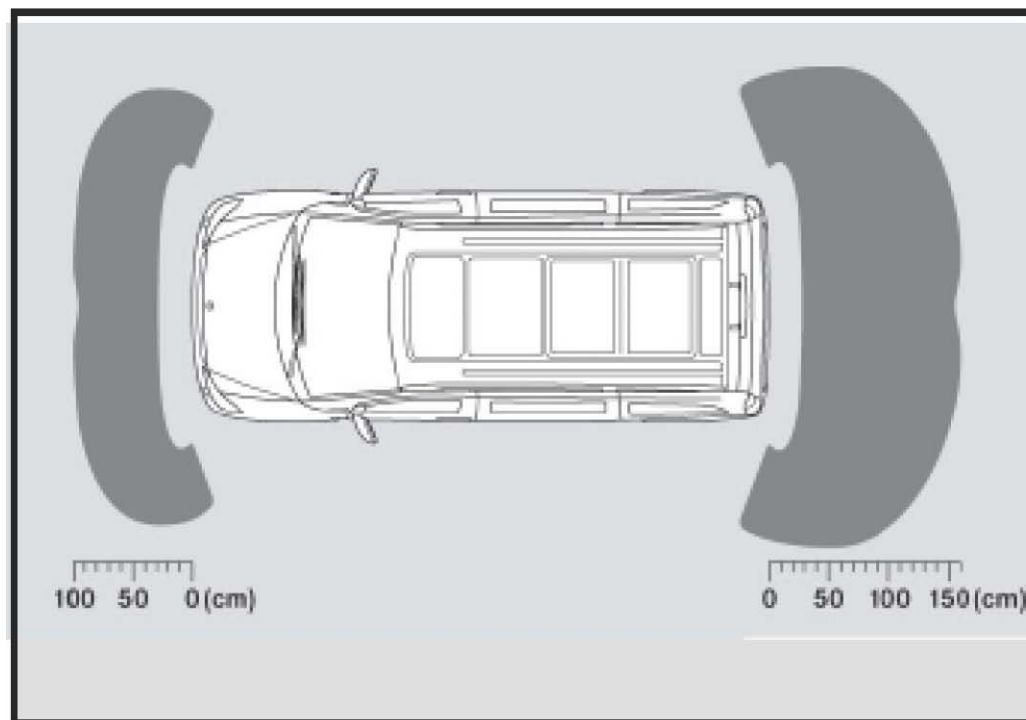
Wheel Sensor Replacement Procedure

- Install sensor in tire, fill to specified pressure and balance wheel/tire
- During wheel balancing sensor electronics is activated by acceleration value $>5g$
- Install tire on vehicle and **wait** for sensor to transition into Park mode
 - **20 minutes** from removing the tire/wheel from balancer
 - Control module will also need to transition into 30 Block mode (20 minutes after K15 removed and no CAN communication)
- Verify sensor operation / frequency using MB 2000E
- Drive vehicle for >10 minutes @ speed >16 mph
 - Required for verification purposes
- System Reactivation is not necessary
 - Unless specified pressures and warning threshold are to be reset

Operational and Diagnostic Notes

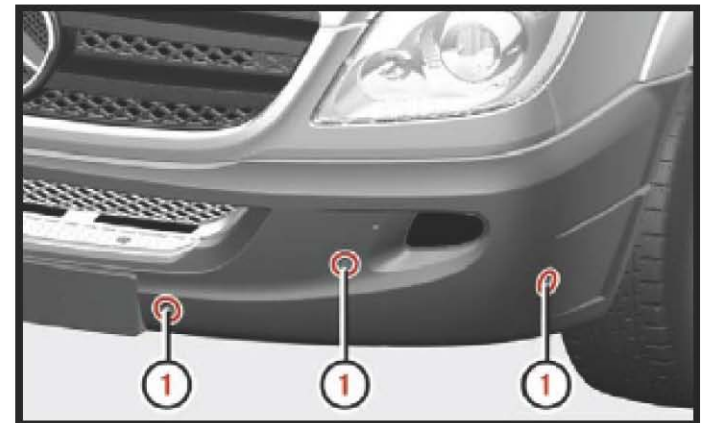
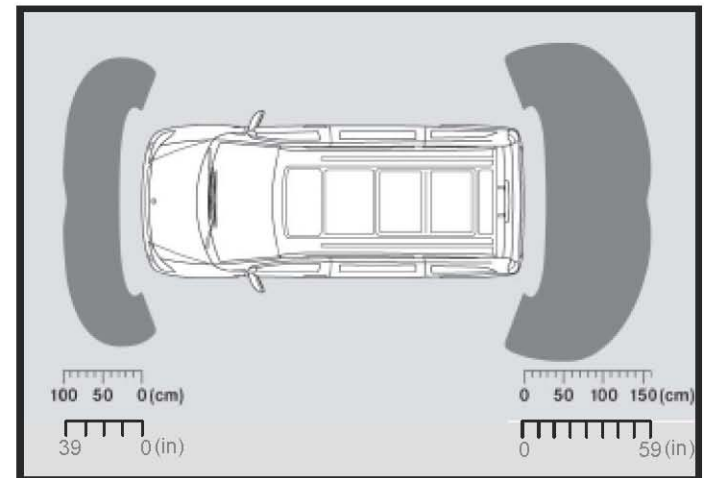
- System inoperative or unavailable
 - MIL will flash for 60 seconds following ignition cycle, then stays “on”
 - Function message in TPMS menu according to fault/event
 - No log in Malfunction menu of Instrument Cluster
 - System self resets as soon as conditions permit
- Wheel sensors
 - If a fault code is received for low battery voltage on a sensor use the MB 2000E to confirm position and condition
 - Missing sensor (or wrong ID) detected in about 10 minutes ($v > 16\text{mph}$)
 - Sensor learn in will not take place until sensors in Park Mode and ECU has been asleep
 - Sensor learn in after Park Mode took just over 3 minutes ($v > 16\text{mph}$)
 - If a new sensor is not recognized, use the MB 2000E to check if correct frequency sensor is installed

Parktronic



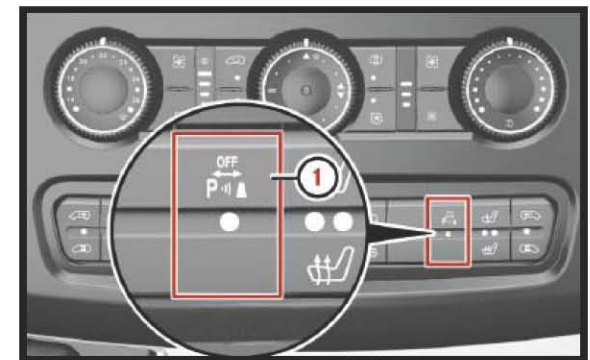
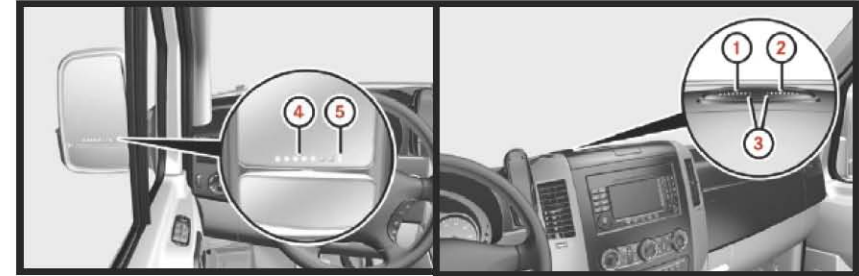
Parktronic (PTS)

- Monitors front and rear areas at maneuvering and parking speeds up to 11 mph (18km/h)
- Provides optical and/or acoustical warnings of obstruction along with relative distance to obstruction
- Uses a total of 10 ultrasonic sensors
 - 6 front
 - 4 rear



Parktronic (PTS)

- Warning Elements
 - Outside rear view mirrors
 - Rear area
 - Acoustical buzzer in driver seat box
 - Center of cockpit
 - Front area
 - Acoustical buzzer center dash area
- On/off switch located on Upper Control Panel (UCP)
- Relevant CAN messages
 - Bumper coding / step,
 - Trailer hitch
 - Steering angle (affects sensitivity)
 - Gear
 - Wheel speed sensor pulse count / direction
 - PTS on/off
 - Vehicle speed



Exterior Lighting



Exterior Lighting

- Halogen headlamp (standard)
 - 55W H7 bulb
- Bi-xenon headlamps (option)
 - Larger illumination range
 - Greater visibility
- Optional fog lamps (option)
 - 55W H7
 - Installed in low beam reflector (halogen)



Halogen headlamp



Bi-xenon headlamp

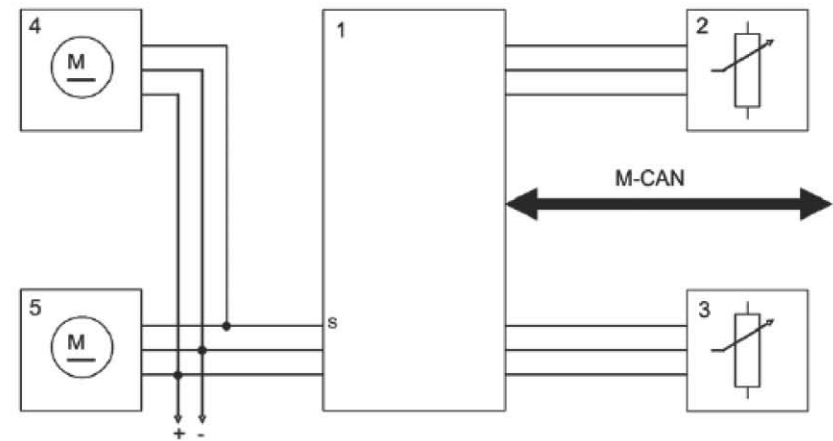
Exterior Lighting

- When the low beam is switched on, the control unit activates the ignition module within a few milliseconds with the control voltage. A high voltage surge of approx. 20 kV from the ignition system of the control module creates an arc of light between the electrodes and the xenon lamps are ignited.
- If an arc of light with sufficient stability is recognized the control electronics switches to limited power mode. The electrical power is stabilized at 35 W. A voltage converter generates the voltage of approx. 85 W required for the xenon bulb to function safely.
- The bi-xenon headlamp generates low and high beam with one xenon bulb. This is possible with a movable screen. It ensures the corresponding light distribution as required.



Head Lamp Range Adjustment (HRA)

- Legally required for xenon lamps
- HRA control module located front passenger footwell
- HRA level sensors on left side
 - Rear axle
 - Front lower control arm



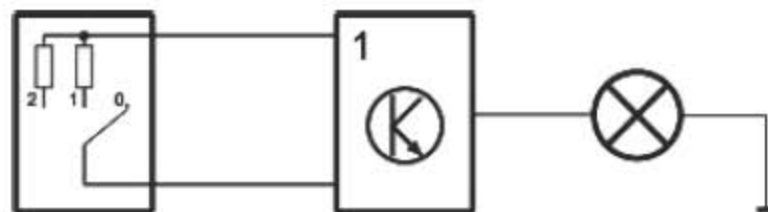
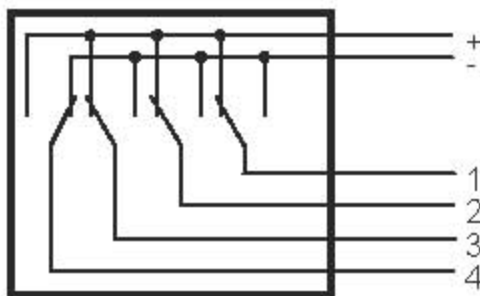
- 1 HRA control module
- 2 Front left sensor
- 3 Rear left sensor
- 4 Right actuator motor in head lamp
- 5 Left actuation motor in head lamp
- S Signal
- + Circuit 15
- Ground
- M-CAN = CAN C

Turn Signals (outside mirror)

- HPS lamp
 - High Pressure Sodium lamp aka sodium vapor high pressure lamp
- Designed to last lifetime of vehicle
- In case of replacement:
 - Remove upper mirror glass
 - Remove turn signal glass
 - Replace bulb assembly



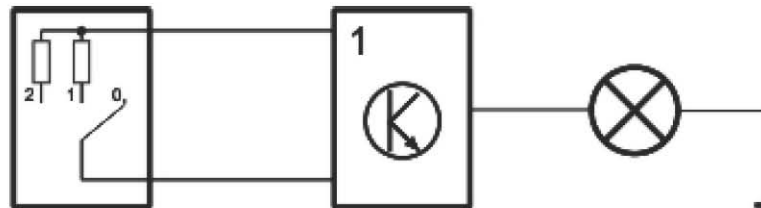
Signal transmission in the networked vehicle



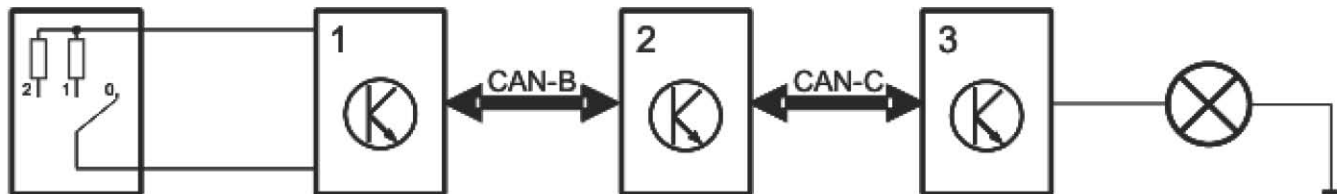
Signal Transmission



The signal therefore travels from a switch (A) to a control unit (B), from there via a data bus (C) to another control unit (D); this switches on the actuator (E), which is a lamp in this case.



Of course, it is also possible for the switch to lie at a control unit input and for an output to switch the actuator directly.



It is also possible for the switch signal to be conducted via 2 bus systems, i.e. via a gateway.

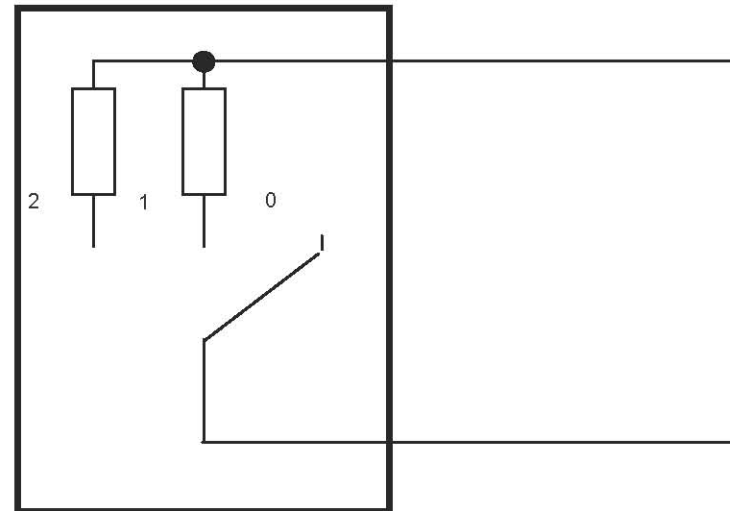
Voltage Coded Switches

In the *Sprinter* model designation 906, there are hardly any load switches, which switch the current directly to a consumer.

Wherever multistage switches are required, **voltage-coded switches** are used.

These are supplied with voltage via a line, and conduct several different voltage signals to the control unit via a second line.

This detects the voltage-coded signals and switches the corresponding actuator.



Bit-Coded Switches

A second variant which is used are **bit-coded switches**.

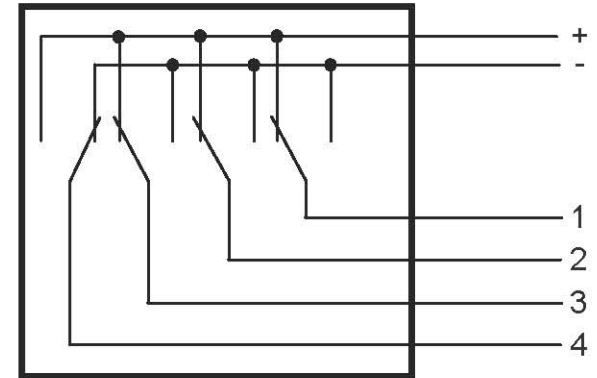
The example of the light switch is shown here.

Here, several separately working switches are switched either to positive or to negative.

In digital technology, this is called "1" or "0".

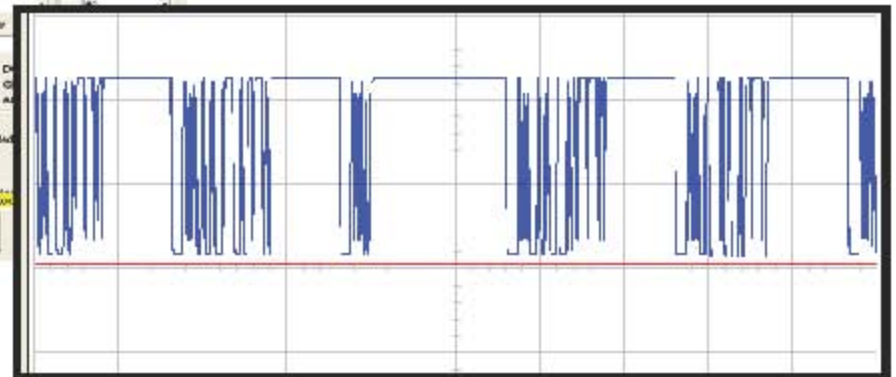
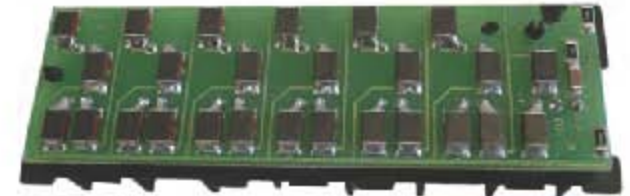
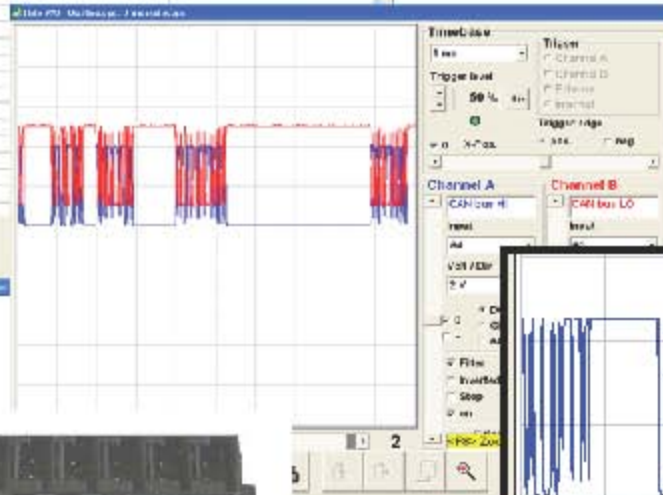
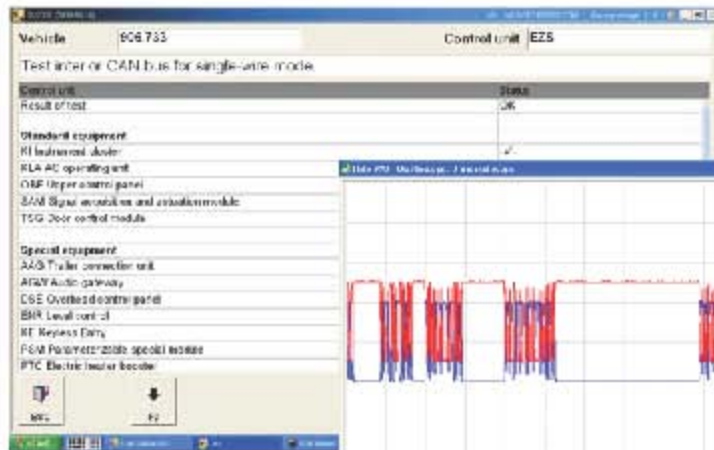
As the outputs, this leads to a combination of 1 and 0 (in the example of the light switch,

there are 4 switches or outputs). This combination of "ones" and "zeros" tells the control unit which lamp has to be switched on. Bit-coded switches are a little more complex, but very reliable.



In the example, the bit coding is 1 - 1 - 1 - 0

Networking

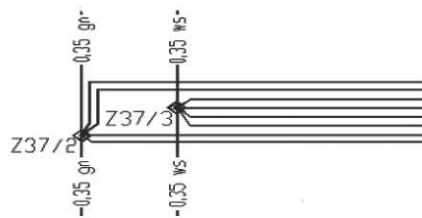


Controller Area Network (CAN)

- A digital communication link between multiple control modules
- A 2 wire, bi-directional communication link with data transmitted according to priority
- Message specific addressing
- Divided up into 4 networks
 - Interior CAN (CAN B)
 - 83.3 kBits/s
 - Motor (Engine) CAN (CAN C)
 - 500 kBits/s
 - SCR CAN
 - 500 kBits/s
 - Diagnostic CAN
 - 500 kBits/s

CAN Basics

- CAN wiring is designed with 2 wires:
 - One is referred to as the CAN High (CAN H) wire
 - One is referred to as the CAN Low (CAN L) wire
- CAN wires connected to control modules using voltage distributors (Bm906) or Z splices (Bm901.6 - 905.6, T1N)



Z-splices



83.3 kBit/s distributor



500 kBit/s distributor

MY10 →



500 kBit/s distributor

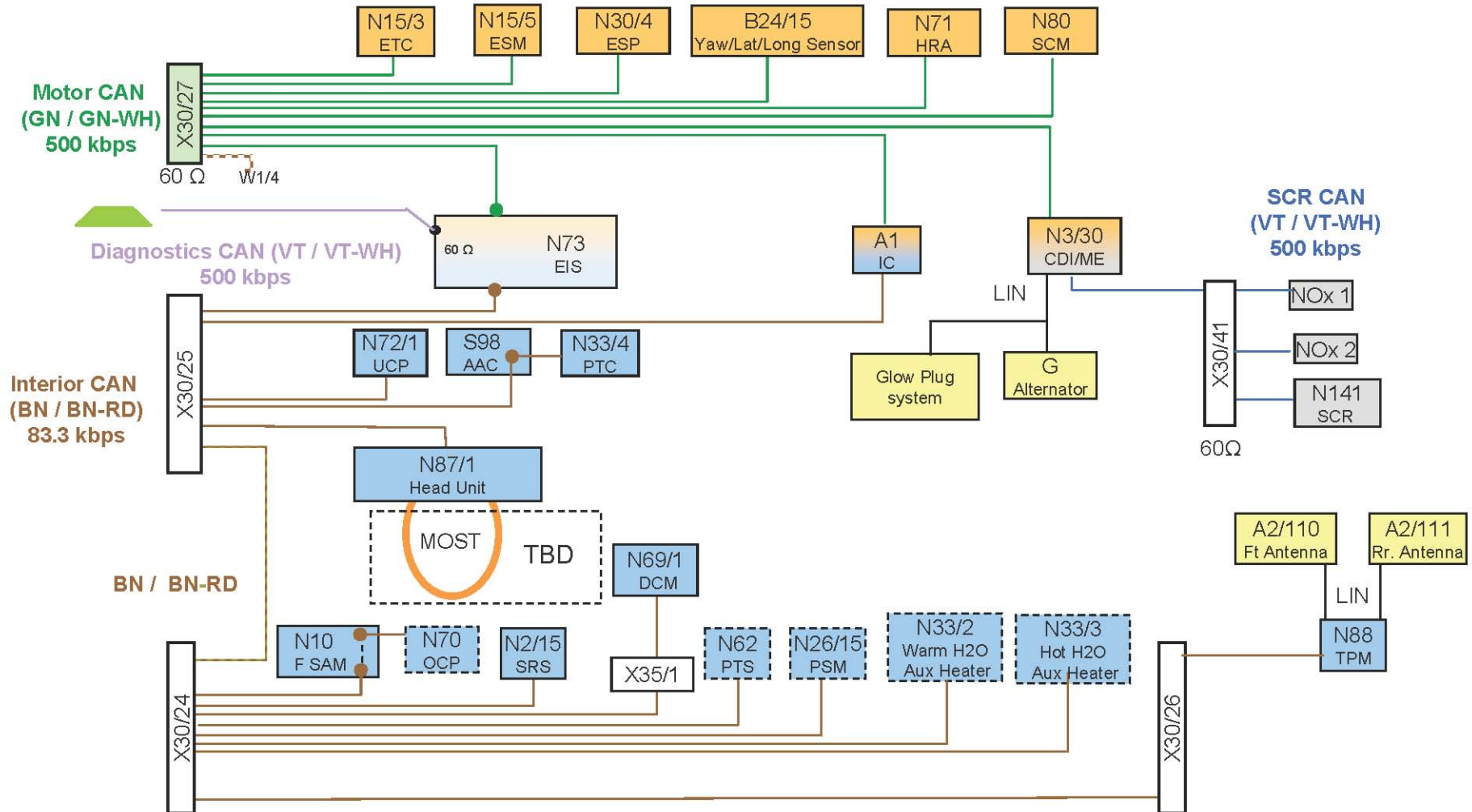
MY09 and previous

Network Overview

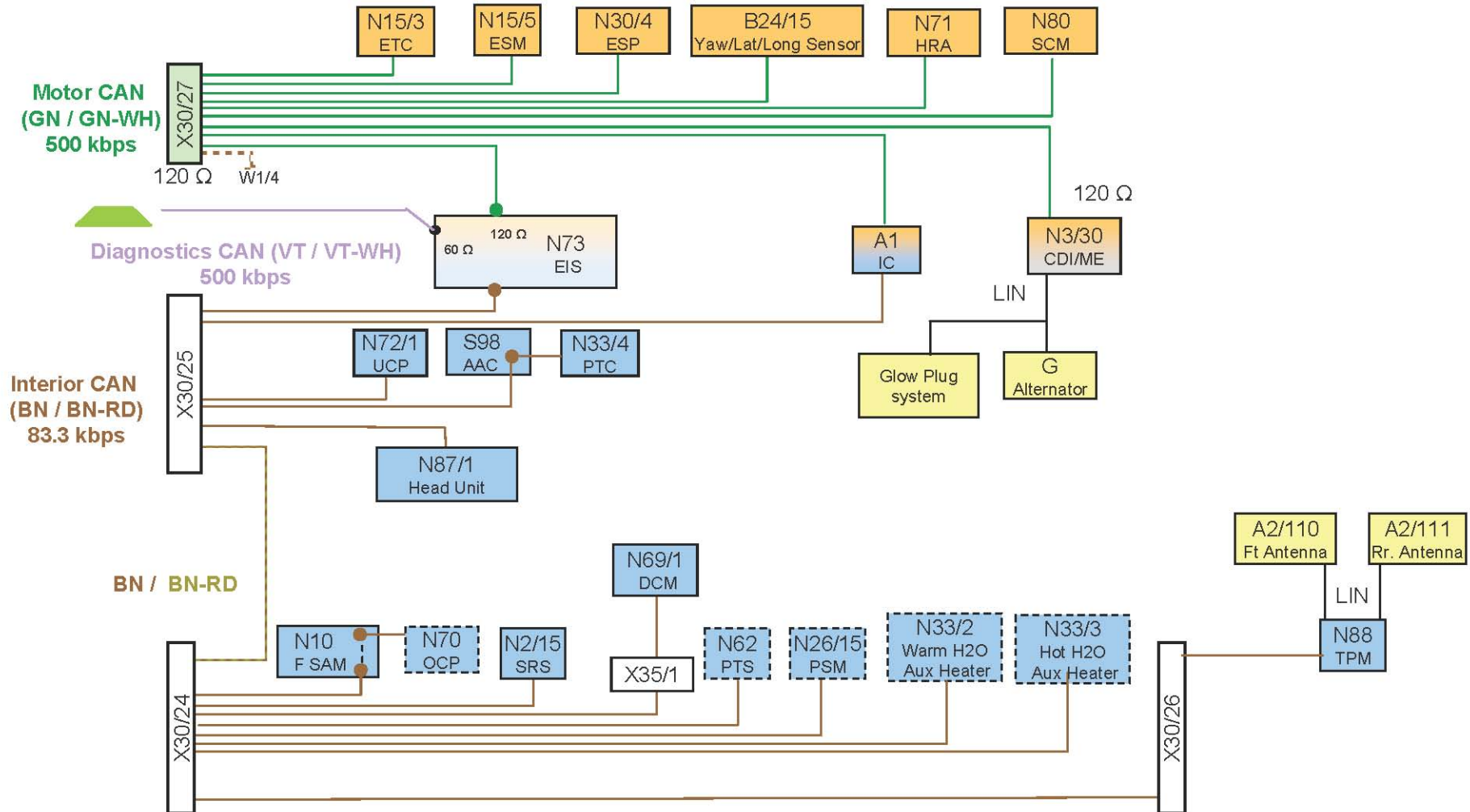
Bus system	Wiring	Speed	Special features
Interior CAN BUS I CAN CAN class B	2 lines twisted CAN high brown/red CAN low brown	83,3 kbit/s Low speed CAN Bus	The bus subscribers are connected to a total of 3 potential distributors. The I CAN is a class B CAN bus. This is why it is also designated with CAN-B. The I CAN is single-wire capable.
Engine CAN BUS M CAN CAN class C	2 lines twisted CAN high green/white CAN low green	500 kbit/s High speed CAN bus	Terminating resistors in the voltage distributor (120 ohm) and in the engine control unit (120 ohm). The M CAN is a class C CAN bus. This is why it is also designated with CAN-C. The M-CAN is not one wire-capable.
Diagnostic CAN bus D-CAN CAN class C	2 lines twisted <i>SPRINTER (VITO/VIANO):</i> CAN high violet/white (sw/ws) CAN low violet (sw)	500 kbit/s High speed CAN bus	Supersedes the K-line, which is too slow for the large amounts of data. Terminating resistor in the EZS [EIS] or CGW (60 ohm). The D-CAN is a class C CAN bus. It is also designated with CAN-D. The D-CAN is not one wire-capable
MOST Media Oriented Systems Transport	Optical fiber bus, ring shaped	22 Mbit/s	For communications systems. The bus subscribers (HU, AGW, TEL, CDC) must be fitted in the correct sequence and parameterized.
LIN bus Local Interconnect Network	1 line	Approx. 10 kBit/s	Simple serial bus for data exchange between control units.
Body manufacturer CAN bus ABH bus CAN class C	2 lines twisted	250 kbit/s	Terminating resistors 2-times 120 ohm. Refer to body/equipment mounting directives for a precise description.

Data on CAN C (M CAN) can be sent to control modules on the CAN B (I CAN) or vice versa through the Electronic Ignition Switch (EIS). EIS is then referred to as a gateway.

906 Network MAP (MY10)

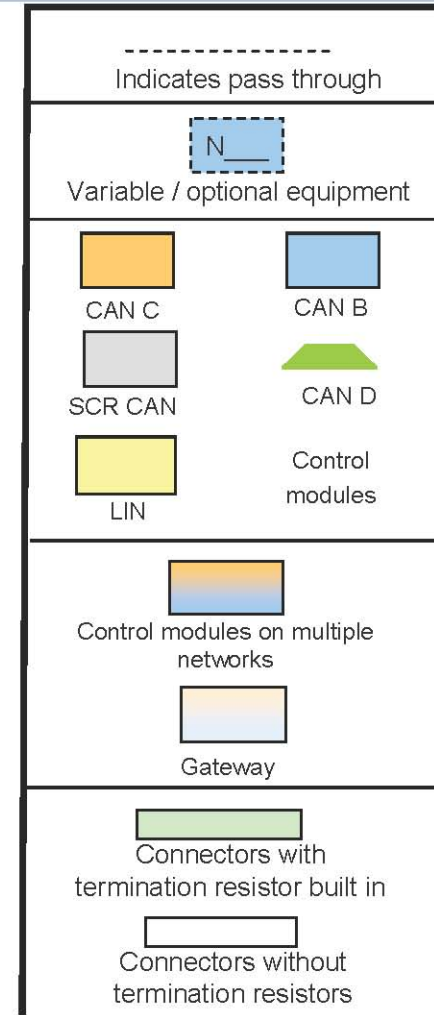


906 Network MAP (MY09)



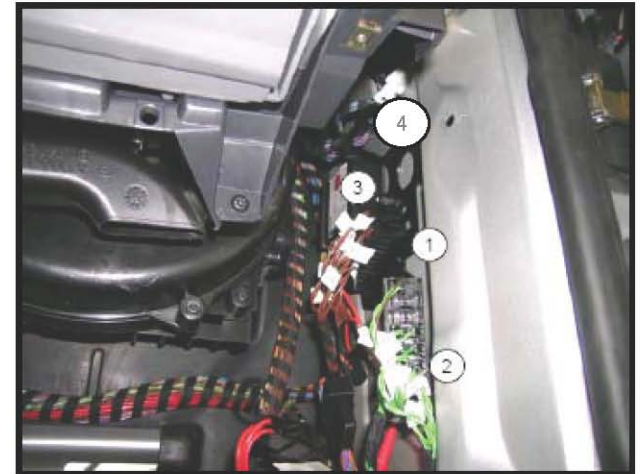
906 Network Legend

- A1 - Instrument cluster (IC)
- B24/15 - Sensor Cluster (yaw, lateral, longitudinal)
- N2/15 - Airbag control module (SRS)
- N3/30 - Common Rail Diesel Injection (CDI)
- N10 - Front Signal Acquisition Module (SAM)
- N15/3 - Electronic transmission control module (ETC)
- N15/5 - Electronic Shifter Module (ESM)
- N26/15 - Paramiterizable Special Module (PSM)
- N33/2 - Hot water auxiliary heater control unit 2
- N33/3 - Hot water auxiliary heater control unit
- N30/4 - Electronic stability program (ESP)
- N62 - Parktronic (PTS)
- N69/1 - LF door control module (DCM)
- N70 - Overhead control module (OCP)
- N71 - Headlamp Range Adjustment (HRA)
- N72/1 - Upper control panel (UCP)
- N73 - Electronic ignition switch (EIS)
- N80 - Steering column module (SCM)
- N88/1 - Tire pressure monitoring control module (TPMS)
- S98 - Automatic air conditioning control module (AAC)
- X11/4 - Diagnostic connector
- X30/24 - Interior CAN network connector
- X30/25 - Interior CAN network connector
- X30/26 - Interior CAN network connector
- X30/27 - Motor CAN network connector

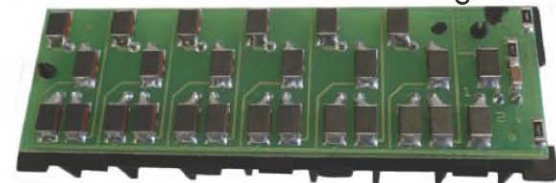


Engine CAN and SCR Voltage Distributor (CAN C or M CAN)

- X30/27 (CAN C)
- Located right side passenger kick panel area
- Termination resistors and condenser incorporated into distributor
- Ferrit beads incorporated into distributor
 - passive electric component used to suppress high frequency noise in electronic circuits
- Ground point connection from 1 connector slot to W1/4
- X34/41(SCR CAN) located by X30/27
 - Similar construction to X30/27 only smaller



- 1 X30/24 and X30/26
- 2 X30/27
- 3 HRA control module
- 4 X30/41 SCR CAN voltage distributor

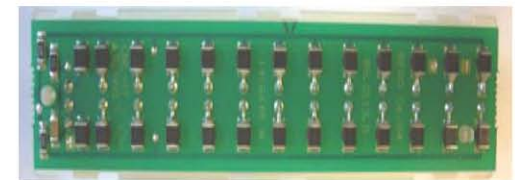


MY09 and previous shown

Termination Resistors

- High speed networks require termination resistors (acting like electrical dampers) to prevent erratic operation
- Termination resistors placed in CAN C voltage distributor for Motor CAN (120Ω thru MY09 / 60Ω MY10 →)
- Termination resistors placed in EIS for Diagnostic CAN
- Termination resistor (120Ω) placed in CDI control module in parallel with 120Ω in M CAN voltage distributor (thru MY09)
- Total circuit resistance between CAN H and CAN L should measure:
MY10 → and previous (white cover)

MY09 and previous (black cover)
120Ω at distributor if disconnected from CDI
60 Ω at distributor with CDI connected

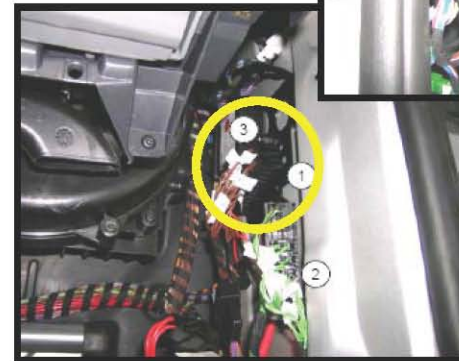


Interior CAN Voltage Distributors (CAN B or I CAN)

- No noise suppression material incorporated
- X30/25 located left under dash side below headlight switch
- X30/24 and X30/26 located passenger side kick panel area



X30/25



X30/24 and X30/26



83.3 kBit/s distributor

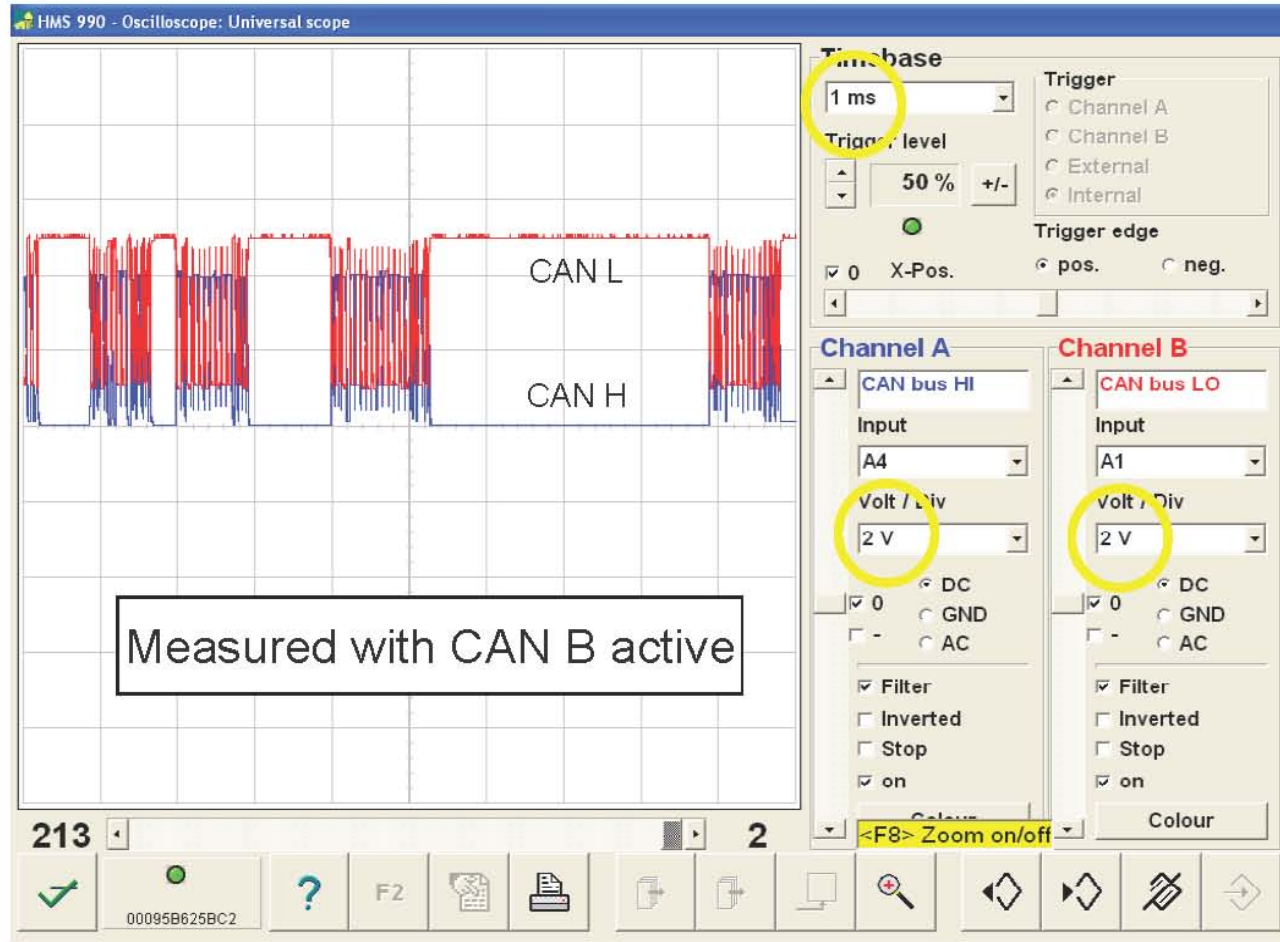
CAN B & C Voltages

Description	Speed	Voltages
CAN C High CAN C Low	500 kbps	~2.6 volts ~2.4 volts
CAN B High CAN B Low (active)	83 kbps	~0.65 volts ~4.5 volts
CAN B High CAN B Low (sleep)	83 kbps	~0.1 volts ~batt voltage

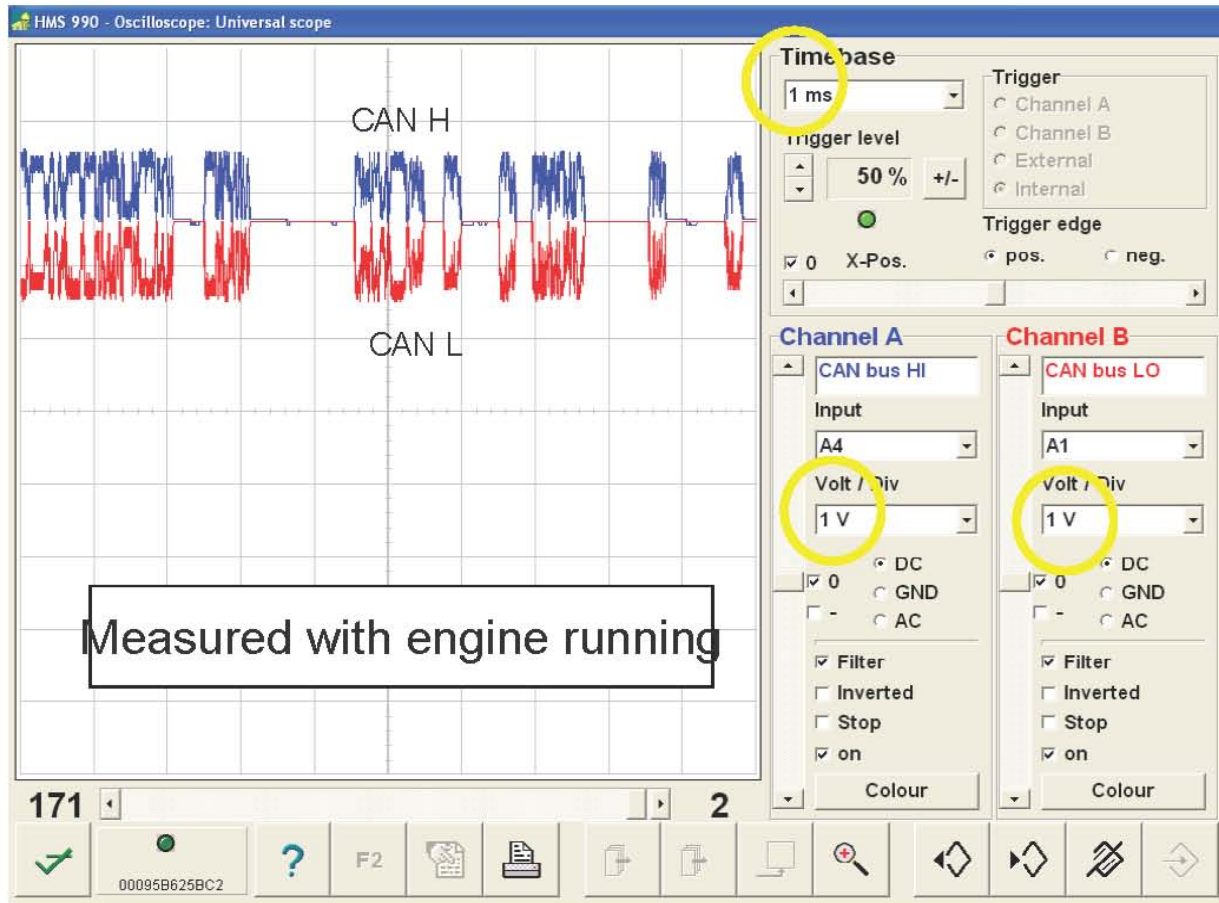
CAN B will go to sleep within 2 minutes (usually 30-40 seconds) with ignition key removed and no CAN B activity

Note: When testing remember that CAN voltage can be affected slightly by number of control modules on network

CAN B Voltages



CAN C Voltages



Electronic Ignition Switch (EIS)

- Master of central locking, drive authorization and typically known as the master of the CAN network
- CAN C/ CAN B gateway
- Connection for all control units to diagnostic connector via Can D
- Stores vehicle variant level and sends this data via CAN
 - Storing variant coding data takes place via SCN (software calibration number)

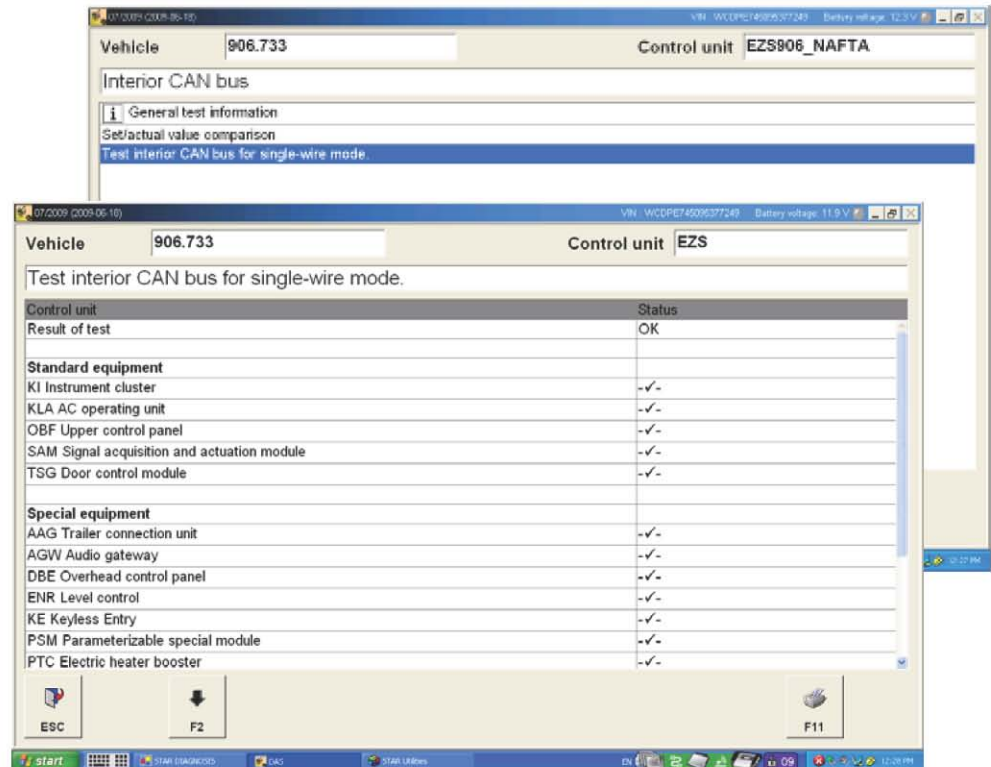


CAN Faults

- If a control unit in the CAN B keeps sending a signal the EIS will not request the CAN B to go into a “sleeping” state
- If CAN H **and** CAN L are shorted to power = no communication
 - Faulty control module
 - Damaged wiring harness
- Can B capable of single line operation
 - Communication occurs on the non-faulty line
 - EIS will open one node if CAN H and CAN L shorted together allowing communication

CAN B Single Line SDS/DAS Test

- Used it identify if a control module is communicating in single line mode



The screenshot shows two windows from a diagnostic software. The top window displays 'Interior CAN bus' test information for vehicle 906.733 and control unit EZS806_NAFTA. The bottom window shows the test results for 'Test interior CAN bus for single-wire mode'.

Control unit	Status
Result of test	OK
Standard equipment	
KI Instrument cluster	-✓-
KLA AC operating unit	-✓-
OBF Upper control panel	-✓-
SAM Signal acquisition and actuation module	-✓-
TSG Door control module	-✓-
Special equipment	
AAG Trailer connection unit	-✓-
AGW Audio gateway	-✓-
DBE Overhead control panel	-✓-
ENR Level control	-✓-
KE Keyless Entry	-✓-
PSM Parameterizable special module	-✓-
PTC Electric heater booster	-✓-

Faulty Module Identification

- If an individual module is causing a fault on the CAN network (i.e. shorted to power/ground or putting corrupt data on network) diagnosis would include either removing CAN connectors from distributors individually until fault goes away or unplug all connectors from distributors and reconnect individually until fault reoccurs (pay attention to jumpers between distributors) Once connection for faulty module is identified, use SDS/DAS to identify module

Vehicle: 906.733 Control unit: EZS

Set/actual value comparison

Control unit	Specified value	Actual value	Status
Result of test		OK	
Standard equipment			
CDI Common Rail Diesel Injection	YES	YES	-/-
ESP Electronic stability program	YES	YES	-/-
KI Instrument cluster	YES	YES	-/-
Special equipment			
ASG Automated manual transmission	NO	NO	-/-
EGS Electronic transmission control	YES	YES	-/-
EWM Electronic selector module	YES	YES	-/-
LWR Headlamp range adjustment	NO	NO	-/-
MRRM Steering column module	YES	YES	-/-
VG Transfer case	NO	NO	-/-

ESC F2 F11

Vehicle: 906.733 Control unit: EZS

Set/actual value comparison

Control unit	Specified value	Actual value	Status
Result of test		OK	
Standard equipment			
KI Instrument cluster	YES	YES	-/-
KLA AC operating unit	YES	YES	-/-
OBF Upper control panel	YES	YES	-/-
SAM Signal acquisition and actuation module	YES	YES	-/-
TSG Door control module	YES	YES	-/-
Special equipment			
AAG Trailer connection unit	NO	NO	-/-
AGW Audio gateway	YES	YES	-/-
DBE Overhead control panel	NO	NO	-/-
ENR Level control	NO	NO	-/-
KE Keyless Entry	NO	NO	-/-
PSM Parameterizable special module	YES	YES	-/-
PTC Electric heater booster	YES	YES	-/-

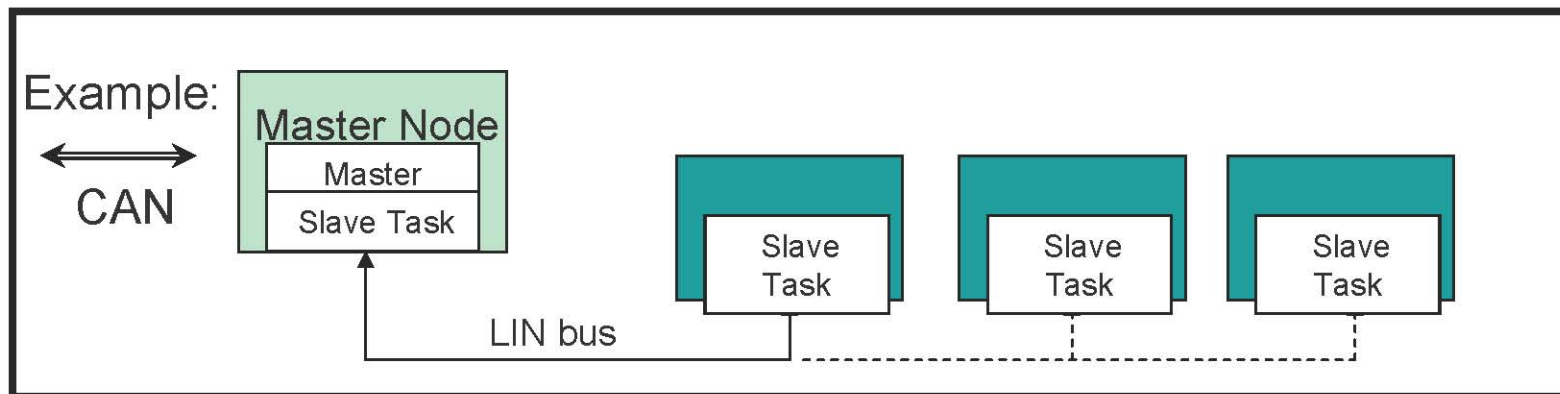
ESC F2 F11

Local Area Network (LIN)

- 2 LIN buses on 906
 - Alternator LIN
 - CDI control module → alternator and glow time output stage
 - TPM LIN
 - TPM control module → TPM antenna(s)

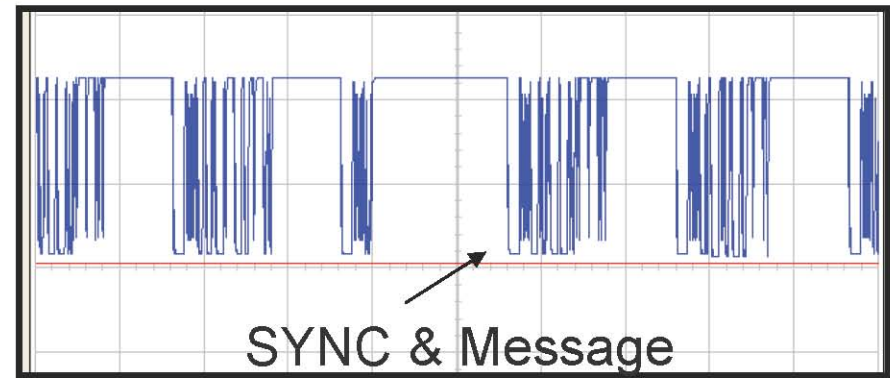
LIN BUS Overview

- LIN – Local Interconnect Network
 - Low cost network that compliments multiplex CAN networks
 - Single wire bi-directional communication system
 - Connects control units to additional components
- Low speed – data transfer rate between 1kbit/s – 20kbit/s
- Supports sleep and wake-up mode
- Either master or slave may initiate a wake-up
- Single Master (control unit) and multiple slaves (16 max)



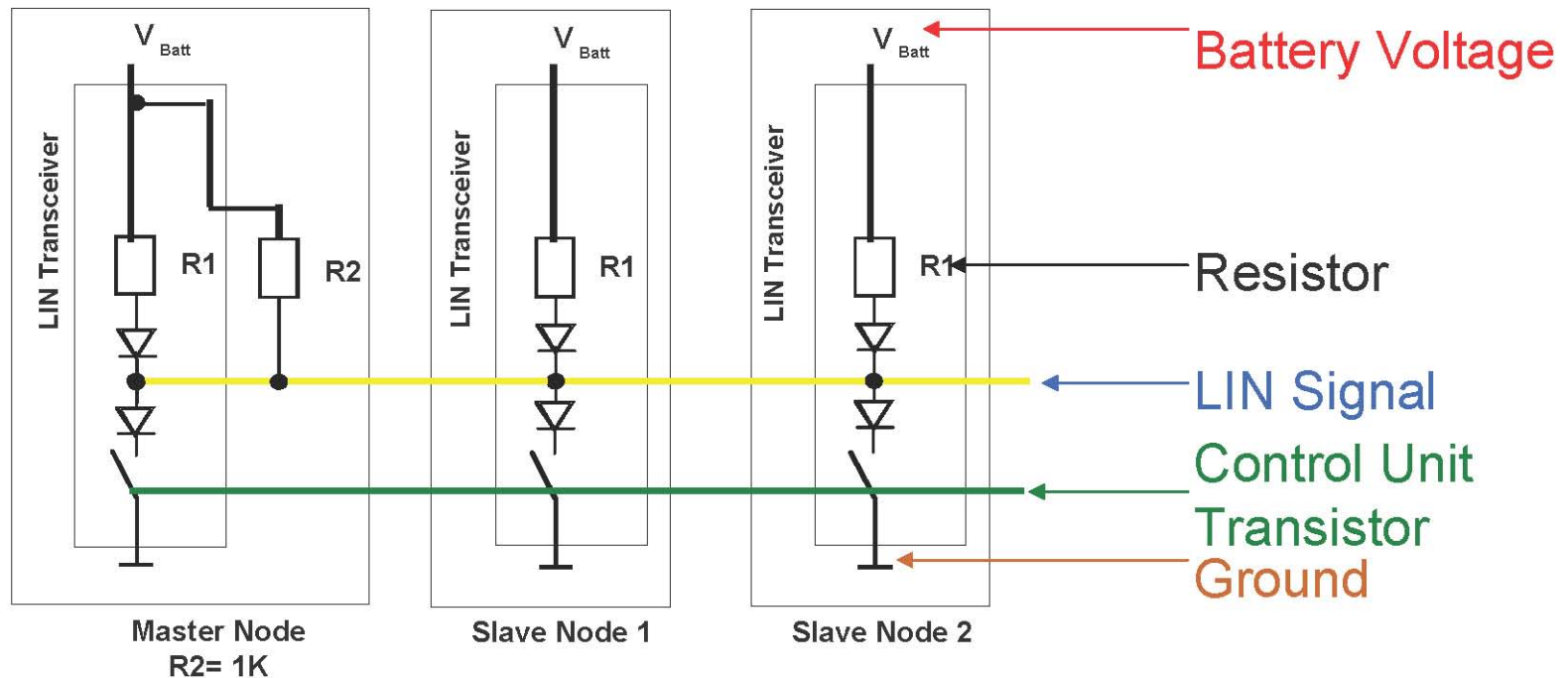
LIN BUS Overview

- LIN Timing
 - Master components contain a quartz or ceramic resonator
 - Very fast and accurate timing
 - Slave components contain an internal RC resonator (not Quartz or Ceramic)
- Resonance -
 - Resistor and Capacitor (RC) dissipate electrical resonance
 - Fast startup
 - Low cost
 - A SYNC field within one LIN frame message ensures stability



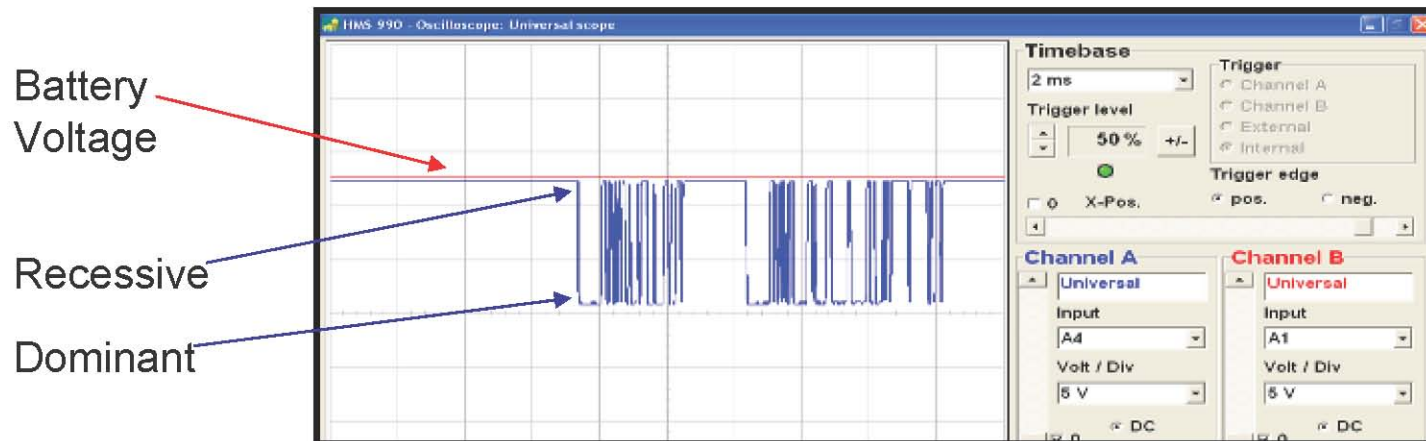
LIN BUS Overview

- BUS termination resistors contained inside each component for voltage regulation between power and LIN signal line (cannot test)
 - Master – R1 = 30k Ohm & parallel R2 = 1k Ohm
 - Slave – 30k Ohm



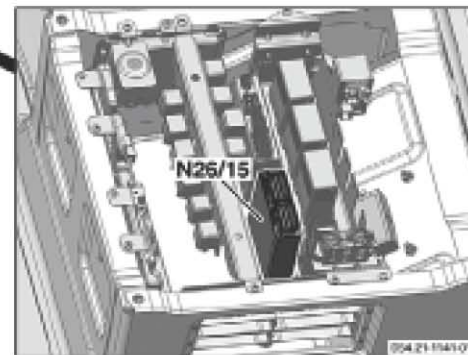
LIN BUS Overview

Logical Value	Bit Value	BUS Voltage
Dominant	0	Ground*
Recessive	1	Battery Voltage**



- Dominant Voltage does not drop completely to ground, due to the electrical structure of each component's transceiver
- Recessive Voltage typically between 0.2 – 1.5 Volts below actual battery voltage, due to amperage reduction of the LIN signal achieved in each component's transceiver

Paramiterizable Special Module (PSM)



Parameterizable Special Module (PSM)

Why PSM?

In modern networked vehicles it is increasingly difficult after modifications or retrofitting not planned by the plant to intervene in the on-board electrical system. The classical circuitry, 12V voltage supply → switch → actuator no longer exists in these vehicles.

Today, switches are connected very close to the fitted control unit. They also no longer supply +12V or -12V, instead, they deliver e.g. voltage-coded or bit-coded signals over very thin lines (0.35 - 0.5 mm²). In the control unit these signals are usually transformed into CAN messages and transmitted to a CAN bus system. A second control unit installed close to the actuator (lamp, motor, valve ...) receives this signal and energizes the actuator with the operating current.

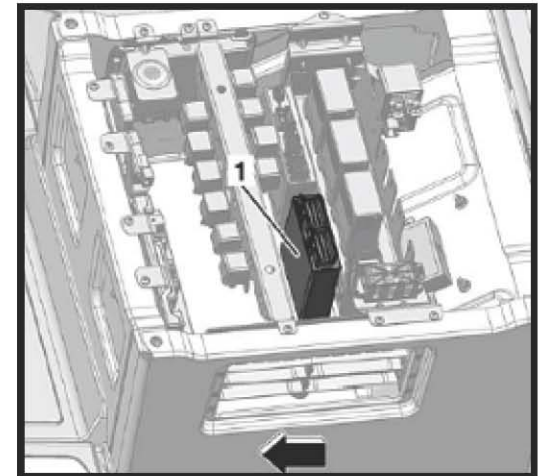
The control units monitor their own inputs and outputs, mostly also for short circuit to positive and minus, interruption and overload (lamp failure checking).

A difficult intervention from outside with a second switch or a second actuator would lead to error messages, limp-home, malfunctions etc.



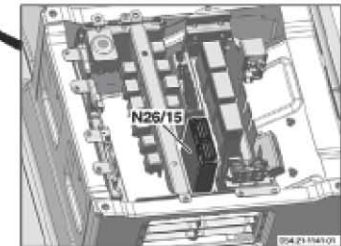
Paramiterizable Special Module (PSM)

- Also known as Programmable special module
- Used to program special vehicle functions for vehicle upfitters
- CAN B component
- Receives and transmits CAN data for input / output control of customer specific functions
- Located under drivers seat



Paramiterizable Special Module (PSM)

- In addition to CAN B a second body builder CAN (CAN ABH) can be added to the PSM
- ABH CAN (Class C)
 - PSM - 120 Ω terminating resistor
 - Last control module also has 120 Ω terminating resistor
 - Has to be programmed
 - Baud rate selectable
 - 500 kBit/s, 250kBit/s or 125 kBits/s



Parameterizable Special Module (PSM)

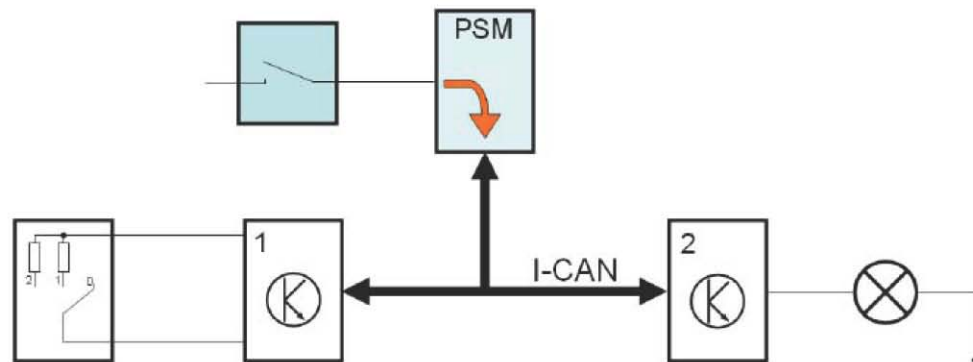
An intervention in the on-board electrical system is only possible without problem with the parameterizable special module PSM. This control unit can transmit and receive messages of the on-board CAN bus system.

The PSM is connected to the I CAN (CAN class B). Access to the M CAN (CAN class C) can also take place with the gateway function of the EZS. This means that many messages containing

- Commands (e.g. switch on rear fog lamp)
- Status messages (e.g. right sliding door open)
- Measured values (e.g. outside air temperature is 21°C)

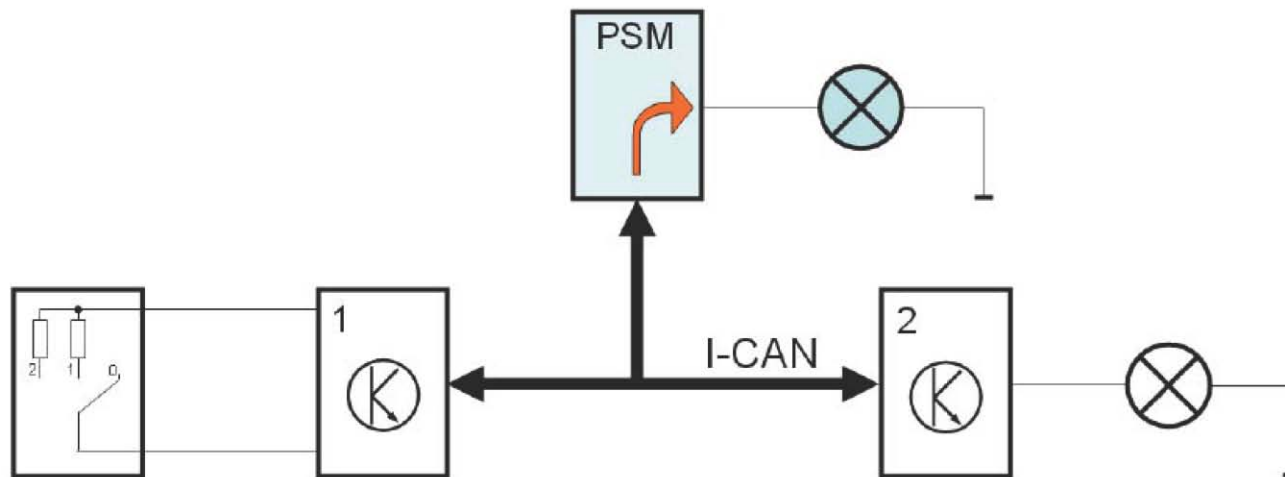
etc., can be received and transmitted by the PSM. All signals available to the PSM, over CAN, over the inputs and outputs and internal signals, are summarized and numbered in a list. This list is also called the "signal pool". On parameterization of the PSM, this signal pool is used to select the correct signals based on the numbers (ID).

Example 1: The lamp installed as standard should be switched via a retrofitted external switch connected to a PSM input. After closing the external switch, the PSM transmits the message "switch on rear fog lamp" on the CAN bus. Control unit 2 switches the lamp and the entire monitoring functions (e.g. lamp check) remain unaffected.



Parameterizable Special Module (PSM)

Example 2: The standard fitted switch is operated. Control unit 1 transmits the message "switch on lamp". Control unit 2 receives the message and switches the lamp on. The PSM control unit also receives the "switch on lamp" message and can thus simultaneously switch on a second external lamp.

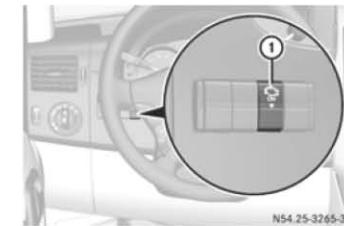


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The PSM has 10 switch inputs and 20 switch outputs (which can also be used as input by reparameterization) for this purpose and, as already mentioned, the signal pool. Furthermore, the PSM can receive, evaluate and transmits messages signals from the accessory manufacturer CAN and messages over a further bidirectional interface (RS4859).

Paramiterizable Special Module (PSM)

- Continuous engine operation feature (MWS)
 - Allows engine to run with ignition key removed and doors locked
 - Designed for rescue vehicles
 - New for MY09 PSM
 - PSM actives circuit 15 and 15R
 - Preconditions
 - Parking brake applied
 - Trans in “P”
 - Vehicle at standstill
 - RPM >500



1 MWS push button



MWS symbol

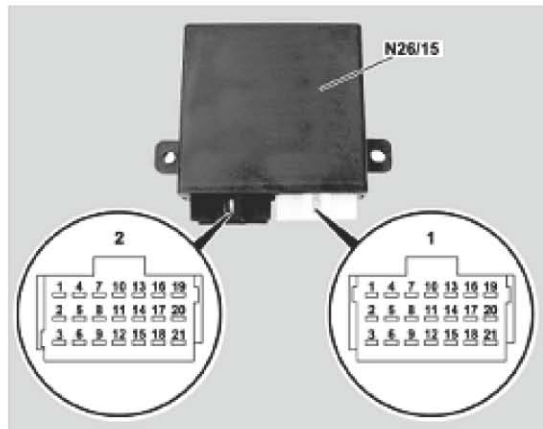
Activate the MWS:

- Engine running
- Set hand brake, shift manual transmission to neutral or automatic to "P"
- Press and hold MWS button (LED on)
- Within 3 s the key must be removed (the button must be held down the entire time while turning back and removing the key).
- The activated status is signaled by the LED in the MWS button.
- The vehicle can now be locked/unlocked.

Deactivate the MWS:

- Insert key in ignition lock and turn to position 2
- Press MWS switch and the LED goes out
- The vehicle is then ready to be driven again.

Parameterizable Special Module (PSM)



Inputs:

- 3 Digital inputs, plus active (H)
- 3 Digital inputs, ground active (L)
- 4 Analog inputs

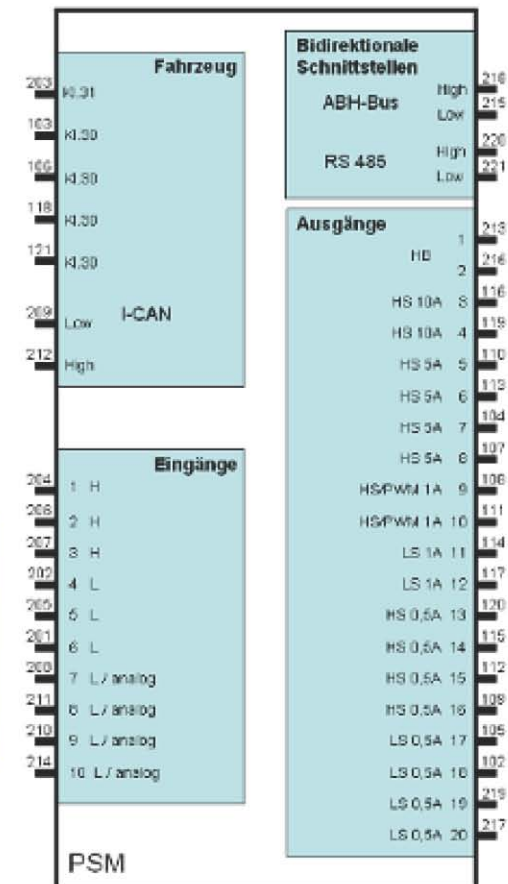
Outputs:

- 2 Half-bridges (HB)
- 10 Plus outputs (HS)
- 6 Ground outputs (LS)
- 2 Plus/PWM outputs

When plug 1 or 2 is disconnected from the PSM control unit, none of the outputs on the PSM control unit must be active. Disconnect plug 1 (plug with terminal 30 supplies) first, and then plug 2.

For reasons of contact reliability, only MCP 2.8 contacts (silver, not sealed) manufactured by Tyco are to be used if required

All outputs can be used as inputs through parameterization.



Parameterizable Special Module (PSM)

- 235 page booklet provided on USB drives for additional reference information regarding PCM. However the option for specific reprogramming of PCM currently not provided via SDS/DAS

