4 ASIC data bus system

The previously familiar ASIC data bus system is also used in the new Actros.
The ASIC data bus (ASIC) belongs to the so-called subbuses. In contrast to conventional switches which switch via their own contacts and are connected to their components via separate electrical lines (e.g. motors, solenoid valves, switch inputs, lighting devices), the ASIC data bus performs these tasks.
The electronics installed in the ASIC signal switches notifies the modular switch panel (MSF) control unit (A43) the following via the ASIC data bus (ASIC):

- switch position (open, closed, operated, not operated)
- Functionality (normally closed contact, normally open contact, changeover contact)
- System affiliation (e.g. headlamp cleaning system button, power take-off 1 button, etc.)

Each ASIC signal switch is connected over three contacts (pins) to the ASIC data bus (ASIC), and it is evaluated by the modular switch panel (MSF) control unit (A43). It is thus possible to install each ASIC signal switch at any arbitrary point on the individual switch modules.
For currents up to a maximum of 20 A there continues to be load switches which as before switch via their own contacts and are connected to their components through electrical lines.
These load switches are only connected to the switch panel via the ASIC contacts for separate background lighting.

5 Virtual control units

Virtual control units are not equipped with their own housing. They are integrated into the hardware and software of other control units. In Star Diagnosis and the instrument cluster control unit (ICUC) (A1) they appear as independent control units.
Among the virtual control units are the central data memory (CDS) (A2 a1), the communications interface (COM) control unit (A2 a2) and the maintenance system (MS) control unit (A2 a3), which are all integrated into the central gateway control unit (CGW) (A2).

With the aid of the central data memory (CDS) (A2 a1) the parameters for the electronic control units can be reset to manufacturer default settings.

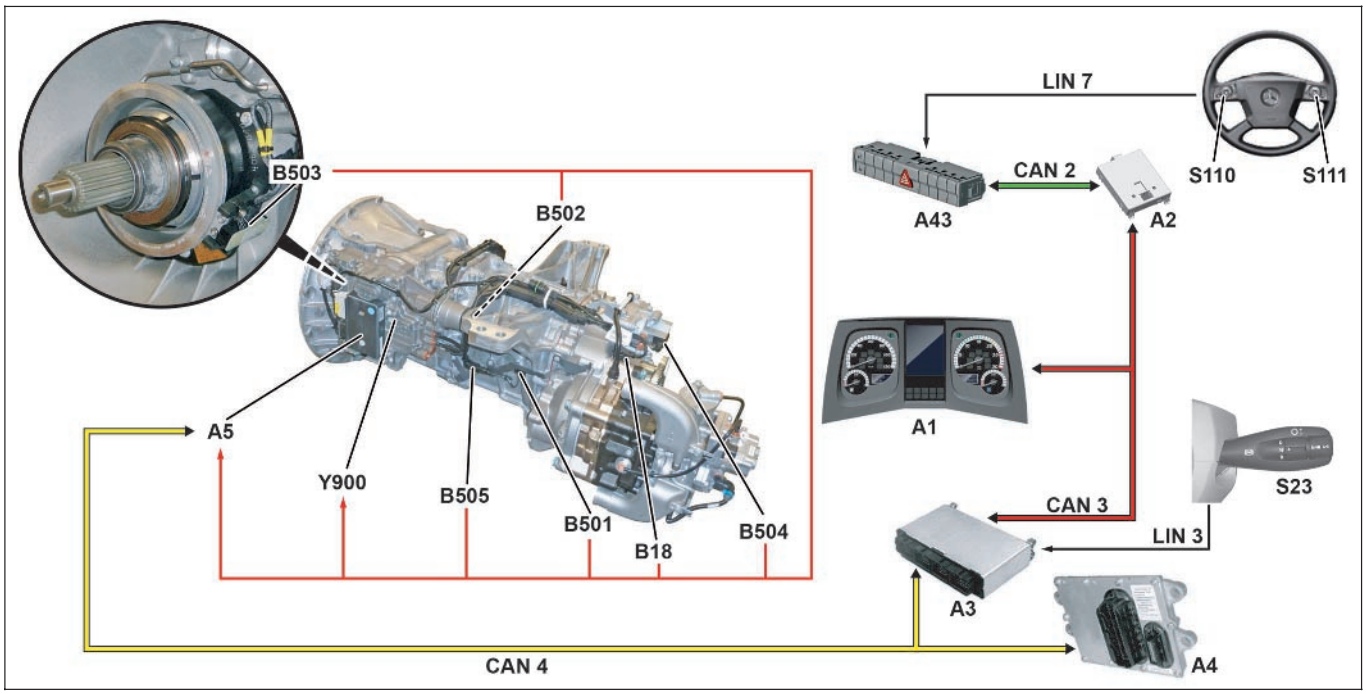
6 Safety strategy

Several control units have a redundant connection over LIN or CAN data buses. The redundant connection serves as an emergency communication, if the actual CAN connection malfunctions. The use of redundant LIN or CAN data buses is dependent on the safety relevance of each system.
The service brake system, for example has a redundant CAN data bus connection between the axle modulators.
LIN data buses serve as redundancies between the sensor and actuator module, cab (SCA) control unit (A7) and the sensor and actuator module, chassis (SCH) control unit (A8) as well as between the instrument cluster control unit (ICUC) (A1) and the Electronic Air-Processing Unit (EAPU) control unit (A18).

	Instrument cluster control unit (ICUC), component description	A1	**Page 331**
	Central gateway control unit (CGW), component description	A2	**Page 333**
	Component description drive control (CPC) control unit	A3	**Page 334**
	Component description for engine management (MCM) control unit	A4	**Page 335**
	Transmission control (TCM) control unit. component description	A5	**Page 337**
	Antitheft alarm system control unit (ATA), component description	A6	**Page 338**
	Cab signal acquisition and actuation module control unit (SCA), component description	A7	**Page 339**
	Signal acquisition and actuation module control unit, frame (SCH), component description	A8	**Page 340**
	Electronic Brake Control (EBS) control unit, component description	A10b, A10c	**Page 341**
	Retarder control unit (RCM), component description	A11 i Only in vehicles with code (B3H) Secondary water retarder.	**Page 342**

GF26.21-W-0002H	Transmission automation, function	2.8.11

TRANSMISSION 715 in MODEL 963 with CODE (G5G) Mercedes PowerShift 3
TRANSMISSION 715 in MODEL 964 with CODE (G5G) Mercedes PowerShift 3



W26.21-1121-79

A1 *Instrument cluster (ICUC) control unit*
A2 *Central gateway control unit (CGW)*
A3 *Drive control (CPC) control unit*
A4 *Engine management control unit (MCM)*
A5 *Transmission control (TCM) control unit*
A43 *Modular switch panel (MSF) control unit*
B18 *Travel and speed sensor*
B501 *Main shaft rpm sensor*
B502 *Countershaft rpm sensor*
B503 *Clutch travel sensor*
B504 *Range group travel sensor*
B505 *Transmission oil temperature sensor*
CAN 2 *Interior CAN*
CAN 3 *Frame CAN*
CAN 4 *Drive train CAN*
LIN 3 *Multifunction control lever-LIN on the right*
LIN 7 *Button group LIN*
S23 *Right multifunction control lever*
S110 *Left multifunction steering wheel button group*
S111 *Right multifunction steering wheel button group*
Y900 *Transmission positioner*

1 General

With transmission automation there a convenience shifting system available over which gear selection as well as declutching and engaging of the clutch take place automatically. It contains a fully automated manual transmission, based on a constant-mesh transmission, with automated clutch operating system. The clutch operation takes place over a pneumatically actuated centrally located clutch operator.

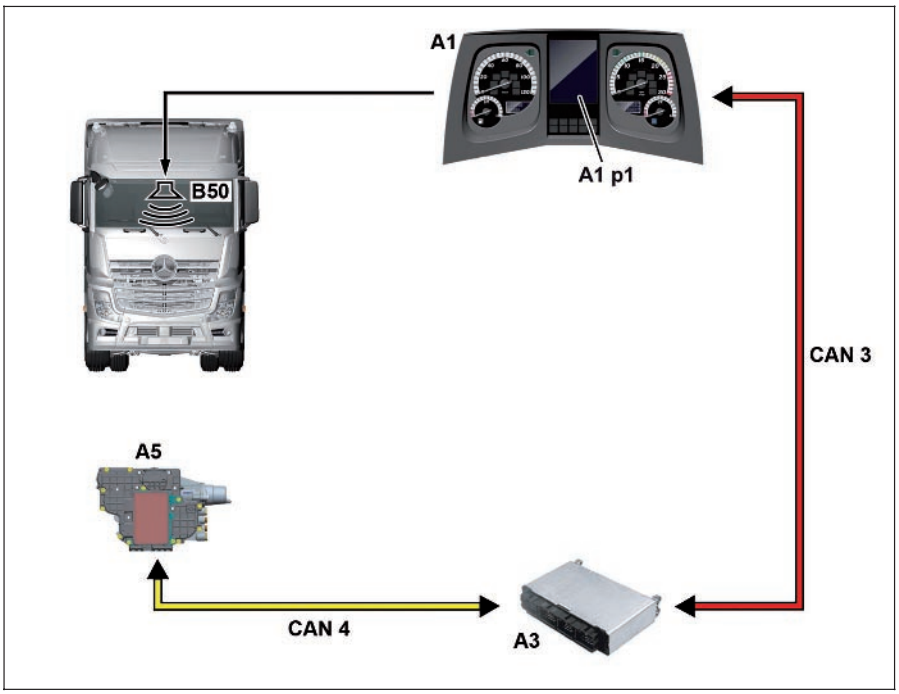
Synchronization does not take place via a blocking synchronization as on a synchromesh transmission but is realized instead by braking or accelerating the countershaft in a controlled manner. As a result can be widened for the same dimensions of the transmission gears and thus higher torques and outputs transmitted. Passive safety is also increased due to reducing the burden for the driver.

Optimum gear selection supports an economic and fuel-saving driving style. All the shift operations take place in the optimum rpm range, minimizing wear on the transmission and engine. Faults during shifting are ruled out and it is no longer possible to over rev the engine. After switching on the ignition the automatic mode of transmission automation is always activated irrespective of which mode was last selected (manual or automatic). The option of activating a manual or automatic shift mode with the transmission mode button (M/A) (S23 s3) on the RH multifunction control lever (S23) has been retained. 12 forwards gears, 4 reverse gears and neutral can be engaged.

GF26.21-W-3005H	Driver information, function	2.8.11

TRANSMISSION 715 in MODEL 963 with CODE (G5G) Mercedes PowerShift 3
TRANSMISSION 715 in MODEL 964 with CODE (G5G) Mercedes PowerShift 3

A1 *Instrument cluster (ICUC) control unit*
A1 p1 *Multifunction display*
A3 *Drive control (CPC) control unit*
A5 *Transmission control (TCM) control unit*
B50 *Center speaker*
CAN 3 *Frame CAN*
CAN 4 *Drive train CAN*



W26.21-1118-76

Displaying shift status
The drive control (CPC) control unit (A3) transmits the information for indication of the switching condition to the IC (ICUC) control unit (A1) via the frame CAN (CAN 3).

To do this the transmission (TCM) control unit (A5) permanently transmits the CAN messages with information about the condition of the transmission (for example the engaged gear, the possible gear) to the drive control (CPC) control unit (A3) via the drive train CAN (CAN 4). Before execution of the shift operation the drive control (CPC) control unit (A3) transmits the targeted gear request (determined from the automatic gear selection or the gear selected by the driver) to the transmission (TCM) control unit (A5). The transmission (TCM) control unit (A5) transmits the confirmed targeted gear and the engaged current gear to the drive control (CPC) control unit (A3) .

Emit warning tones acoustically
The transmission (TCM) control unit (A5) transmits CAN messages with information concerning the condition of the transmission (for example on the switched gear, the possible gear, temperature of the transmission oil) to the drive control (CPC) control unit (A3) via the drive train CAN (CAN 4).

The IC (ICUC) control unit (A1) receives the CAN messages and generates the following displays in the multifunction display (A1 p1):

- display of the direction of travel and / or the engaged gear
- display of the gearshift recommendation or to engaged gear
- display of the transmission mode

The previous display is retained during the shift operation. The current display only takes place when the shift operation is concluded.

i During the teach-in process appropriate CAN messages are transmitted with information for display of the active teach-in process. Also in back-up mode all CAN messages are transmitted, as in normal mode, via the drive control (CPC) control unit (A3) and the frame CAN (CAN 3) to the IC (ICUC) control unit (A1).

The drive control (CPC) control unit (A3) decides over a warning emission to the driver. If a warning emission is necessary, the drive control (CPC) control unit (A3) transmits an appropriate CAN message with the information for output of warning tones to the IC (ICUC) control unit (A1) via the frame CAN (CAN 3).
The IC (ICUC) control unit (A1) receives the CAN messages from the drive control (CPC) control unit (A3) and generates acoustic messages whose output takes place over the center speaker (B50).

	Component description for instrument cluster control unit (ICUC)	A1	**Page 331**
	Component description drive control (CPC) control unit	A3	**Page 334**
	Component description for transmission control (TCM) control unit	A5	**Page 337**

The LH drive axle position sensor (B24), the LH drive axle position sensor (B25) or the front axle position sensor (B27) send the change in frame height to the level control (CLCS) control unit (A26).

As soon as the level control (CLCS) control unit (A26) recognizes the signals from the LH drive axle position sensor (B24), the RH drive axle position sensor (B25) or the front axle position sensor (B27) that the upper or lower frame height limit has been reached then it independently interrupts raising or lowering of the vehicle frame. The vehicle frame therefore remains in the uppermost or lowest maximum position.

If the vehicle frame, and therefore also the cargo area, has reached the desired height, raising or lowering of the vehicle through actuation of the stop button (4) ends.

The level control (CLCS) control unit (A26) receives the stop signal from the level control operating unit (S22) connected to the modular switch panel (MSF) (A43) via the central gateway control unit (CGW) (A2) and actuates the level control for 2-axle vehicles valve unit (Y21) or the level control for 3-axle vehicles valve unit (Y21a) on the drive axle as well as the front axle level control valve unit (Y20) for full air suspension according to the stop signal. The air spring bellows are no longer aerated or ventilated.

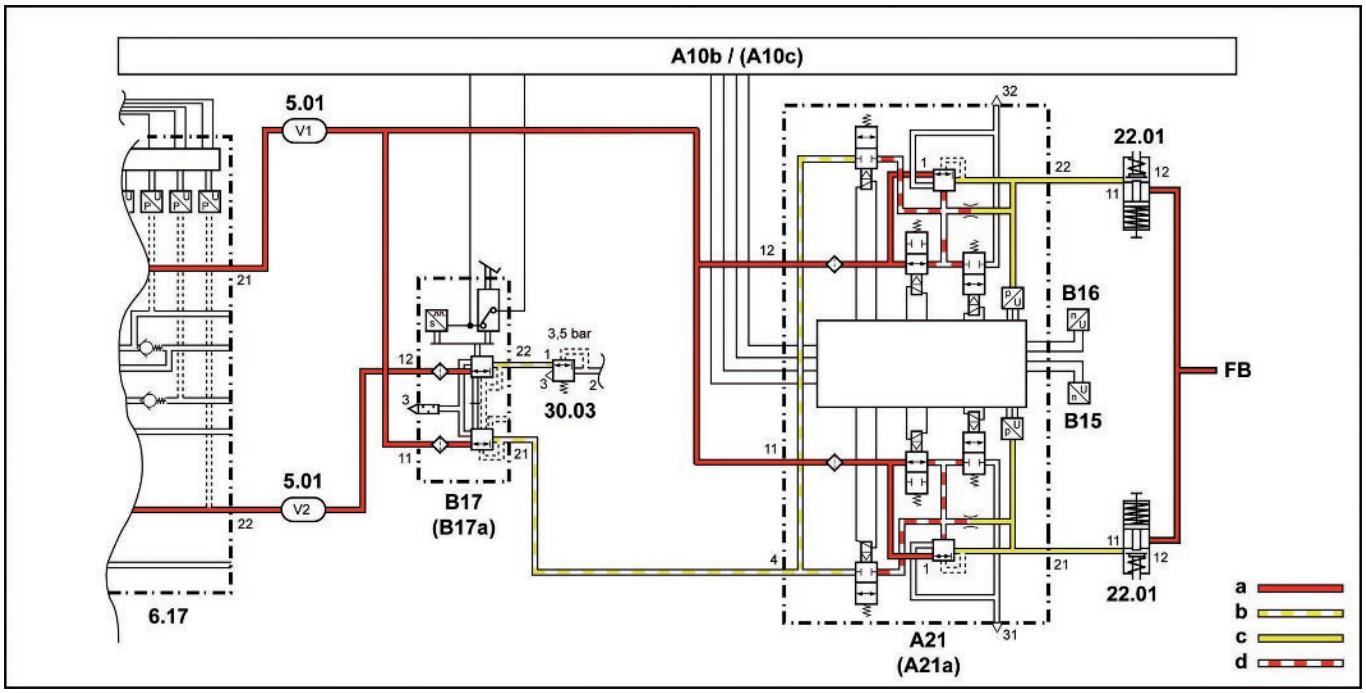
The frame height is stored through holding down the memory button M1 (5) or the memory button M2 (6).

The level control operating unit (S22) confirms saving of the frame height by flashing all arrows in the function indicator.

	Component description for instrument cluster control unit (ICUC)	A1	**Page 331**
	Component description for central gateway control unit (CGW)	A2	**Page 333**
	Component description for level control (CLCS) control unit	A26	**Page 358**
	Component description for modular switch panel control unit (MSF)	A43	**Page 370**
	Component description for position sensor	B24, B25, B27	**Page 410**
	Component description for level control operating unit	S22	**Page 461**
	Component description for front axle level control valve unit	Y20	**Page 483**
	Component description for level control for 2-axle vehicles valve unit	Y21	**Page 485**
	Component description for level control for 3-axle vehicles valve unit	Y21a	**Page 487**

GF42.25-W-3010H	Brake application on rear axle without Electronic Brake Control, function	29.6.11

MODEL 963
with CODE (Z1H) Electronic brake control (EBS) from Wabco
with CODE (Z1G) Electronic brake control (EBS) from Knorr



W42.25-1287-79

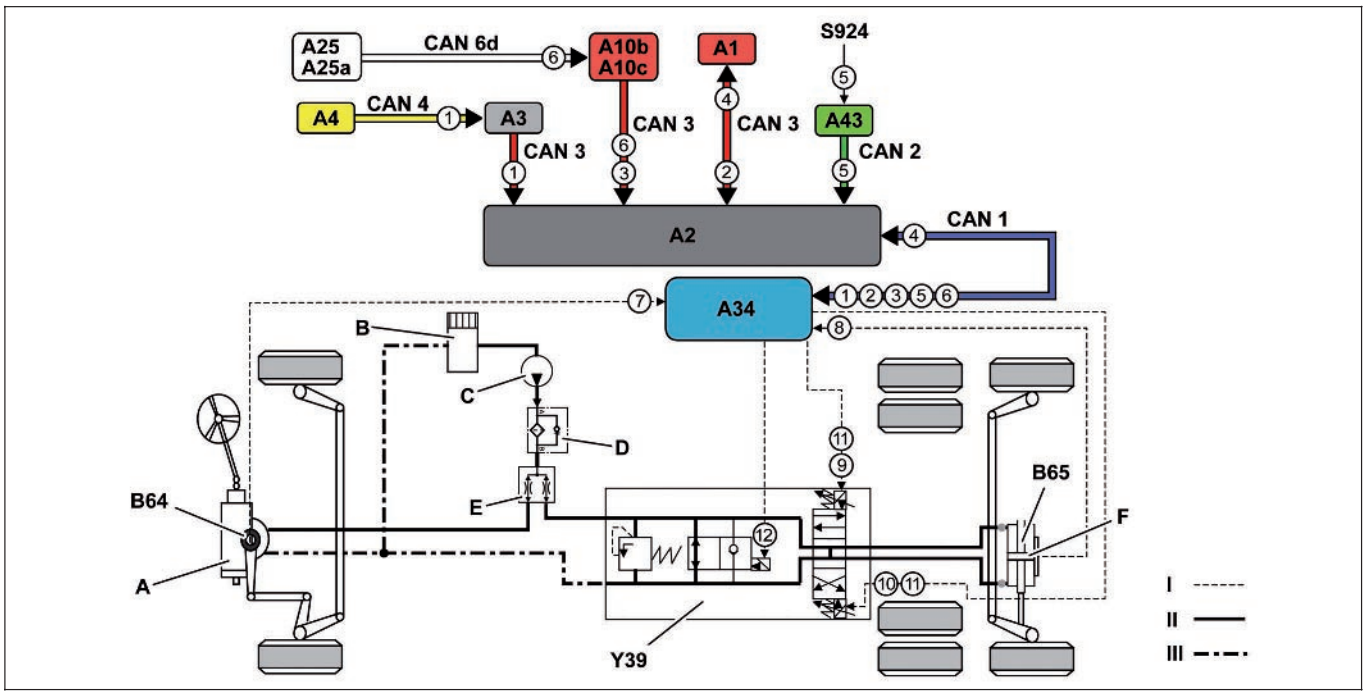
5.01 *Compressed air reservoir*
6.17 *Electronic Air Processing Unit (EAPU)*
22.01 *Combination brake cylinder*
30.03 *Pressure limiting valve with ventilation (only with model 963.403)*

A10b *Electronic Brake Control control unit (EBS) (Wabco)*
A10c *Electronic Brake Control control unit (EBS) (Knorr)*

A21 *Rear axle axle modulator (Wabco)*
A21a *Rear axle axle modulator (Knorr)*
B15 *Left rear axle speed sensor*
B16 *Right rear axle speed sensor*
B17 *Brake value sensor (Wabco)*
B17a *Brake value sensor (Knorr)*
FB *Parking brake*

V1 *Rear axle service brake system reservoir pressure*
V2 *Front axle service brake system reservoir pressure*

a *System pressure*
b *Redundant brake pressure*
c *Brake pressure*



W46.80-1135-79

1 Engine speed, signal
2 Vehicle speed, signal
3 Wheel speed, signal
4 Additional steering axle warning message, requirement
5 Centering auxiliary steering button (S924), status
6 Stability Control Assist, status (with code (S1D) Stability Control Assist)
7 Front axle steering angle sensor (B64), signal
8 Additional axle steering angle sensor (B65), signal
9 Additional right steer steering axle steering cylinder, actuation
10 Additional left steer steering axle steering cylinder, actuation
11 Additional steering axle shutoff valve, actuation
12 Centering additional steering axle, actuation

A1 Instrument cluster (ICUC) control unit
A2 Central gateway control unit (CGW)
A3 Drive control (CPC) control unit
A4 Engine management control unit (MCM)
A10b Electronic brake control (EBS) control unit (Wabco)
A10c Electronic brake control (EBS) control unit (Knorr)
A25 Electronic Stability Program (ESP®) control unit (Wabco) (with code (S1D) Stability Control Assist)
A25a Electronic Stability Program (ESP®) control unit (Knorr) (with code (S1D) Stability Control Assist)
A34 Additional steering axle (ASA) control unit
A43 Modular switch panel (MSF) control unit
B64 Front axle steering angle sensor
B65 Additional axle steering angle sensor

CAN 1 Exterior-CAN
CAN 2 Interior CAN
CAN 3 Frame CAN
CAN 4 Drive train CAN
CAN 6d ESP® brakes CAN

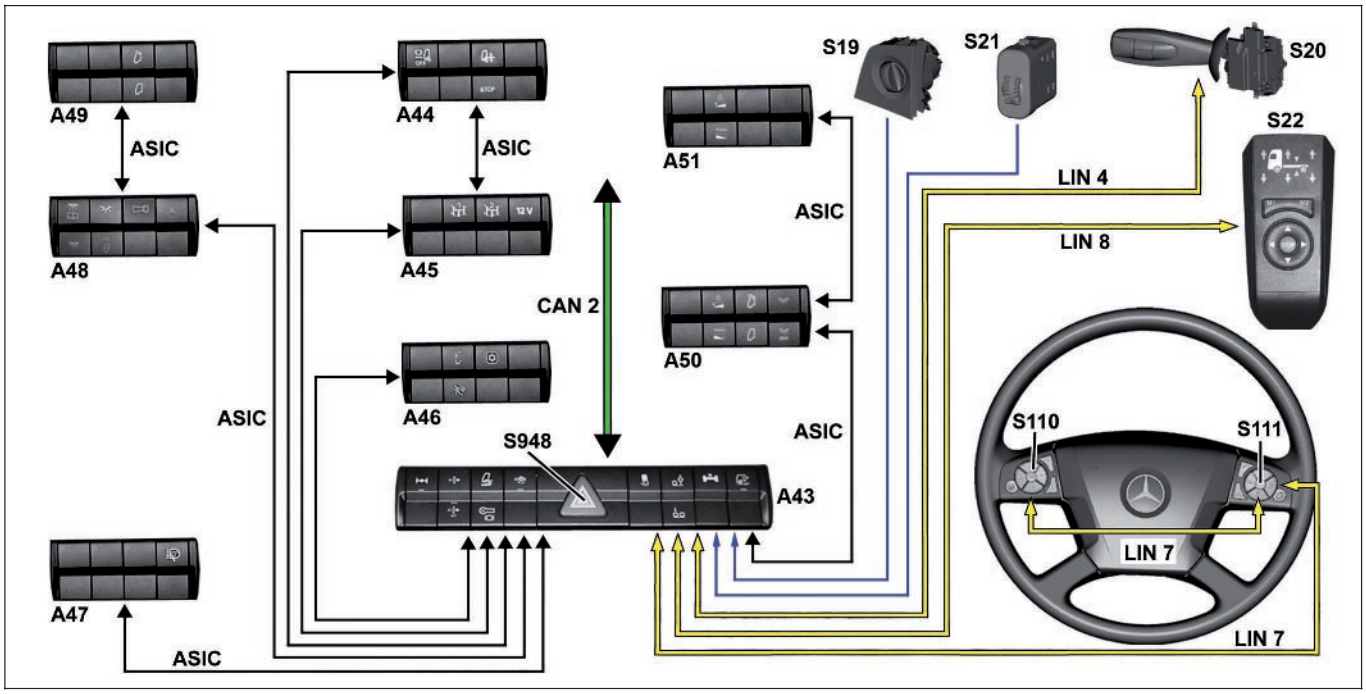
Y39 Additional axle valve unit
S924 Center auxiliary steering button

I Electrical line
II Hydraulic line (high pressure)
III Hydraulic line (return)

A Front axle steering gear
B Steering oil reservoir
C Power steering pump
D High pressure filter
E Flow dividing valve
F Additional steering axle steering cylinder

GF54.25-W-0002H	Modular switch panel function	6.7.11

MODEL 963, 964



W54.25-1156-79

A43 Modular switch panel (MSF) control unit
A44 Instrument panel switch module 1
A45 Instrument panel switch module 2
A46 Instrument panel switch module 3
A47 Switch module special equipment
A48 Roof switch module 1
A49 Roof switch module 2
A50 Lower driver bunk switch module
A51 Upper driver bunk switch module
CAN 2 Interior CAN
LIN 4 Left multifunction control lever-LIN
LIN 7 Button group LIN
LIN 8 Level control LIN
S19 Exterior lights switch
S20 Left multifunction control lever
S21 Headlamp range adjustment switch
S22 Level control operating unit
S110 Left multifunction steering wheel button group
S111 Right multifunction steering wheel button group
S948 Hazard warning system switch
ASIC ASIC data bus (Application System Integrated Circuit)

General information

The modular switch panel (MSF) is an advanced development of the familiar MFS in the ACTROS MP III.
The modular switch panel (MSF) control unit (A43) remains the master module to which the switch module and the other switches are connected. The connection to the interior CAN (CAN 2) connects it to all the other electronic systems.

The following two different type of data bus are used:

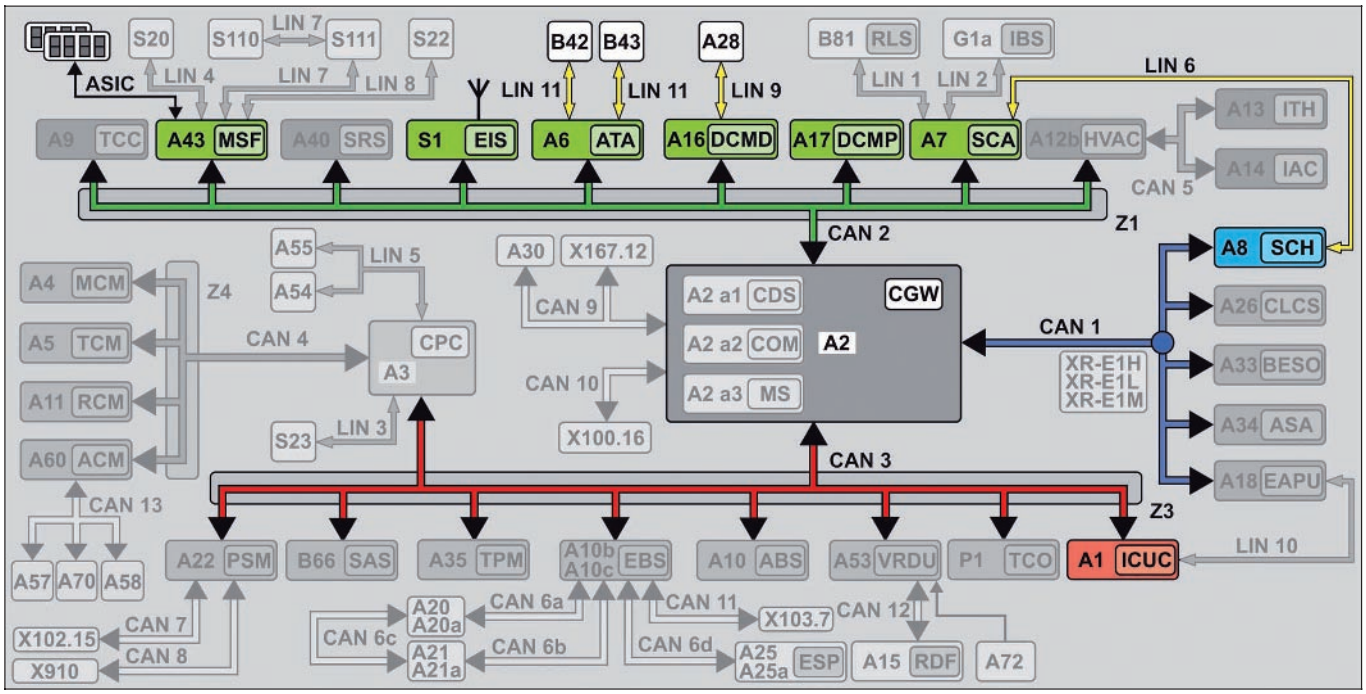
- ASIC data bus (ASIC)
- LIN data bus (LIN), split up into:
  - Left multifunction control lever-LIN (LIN 4)
  - Button group-LIN (LIN 7)
  - Level control-LIN (LIN 8)

Connected to the ASIC data bus (ASIC) are the switch modules with the signal and load switches.
Connected to the left multifunction control lever-LIN (LIN 4) is the left multifunction control lever (S20).
The button group-LIN (LIN 7) is equipped with the left and right multifunction steering wheel button groups (S110, S111).
Connected to the level control-LIN (LIN 8) is the level control operating unit (S22).

Conventional electrical lines are used to connect the following switches to the modular switch panel (MSF) control unit (A43):

- of the exterior lights switch (S19)
- of the headlamp range adjustment switch (S21)
- of the hazard warning system switch (S948)

GF80.50-W-0003-01H	Anti-theft alarm system, overall network		GF



W80.50-1087-79

A1 *Instrument cluster (ICUC) control unit*
A2 *Central gateway control unit (CGW)*
A6 *Anti-theft alarm system (ATA) control unit*
A7 *Cab signal acquisition and actuation module control unit (SCA)*
A8 *Frame signal acquisition and actuation module control unit (SCH)*
A16 *Driver door module (DCMD) control unit*
A17 *Front passenger door module (DCMP) control unit*
A28 *Driver switch group*
A43 *Modular switch panel (MSF) control unit*
B42 *Alarm siren*
B43 *Interior protection sensor*
CAN 1 *Exterior-CAN*
CAN 2 *Interior CAN*
CAN 3 *Frame CAN*
LIN 6 *LIN SCA/SCH redundance*
LIN 9 *Driver switch panel LIN*
LIN 11 *ATA-LIN*
S1 *Electronic ignition lock (EIS)*
Z1 *Cab instrument panel CAN bus star point*
Z3 *Frame CAN bus star point*

ASIC *ASIC data bus (Application System Integrated Circuit)*

Most of the interior illumination lighting equipment is not directly actuated by the controls and actuators, but indirectly by the SCA sensor and actuator module, cab control unit (A7).

Included in the lighting devices actuated indirectly are:
- Interior illumination
- Reading lamps
- Night light
- Ambiance illumination
- Load compartment illumination
- The switch and controls illumination in the switches, the switch panels and the ashtray
- Exit illumination
- Step illumination

In comparison directly actuated lighting devices are:
- Upper and lower bunk lighting
- Stowage space lamps

In the case of the directly actuated lighting devices the switches and lamps mostly form one unit.

Power supply

The power supply for the interior illumination is provided by the SCA sensor and actuator module, cab control unit (A7).
If the battery voltage drops below 22 V, the entire interior illumination is automatically switched off by the SCA sensor and actuator module, cab control unit (A7).
It us thus ensured that the engine can still be started at least once, if the user of the vehicle had not switched off lights which had been switched on manually.
The last switch condition is not stored, in other words all the lights are off after the battery voltage has risen.

Light dimming

The following lighting devices can be dimmed separately:
- Interior lighting,
- ambiance illumination,
- reading light and
- switch and controls illumination.

The interior illumination, the ambiance illumination and the reading light are dimmed by pressing the relevant button for a longer period, and is "rolling".

This means if the relevant button is pressed for a long period, the brightness of the respective illumination is regulated from a dimming value of 0% (illumination "OFF") to a dimming value of 100% (illumination "ON") and, after a pause, is regulated again to a dimming value of 0%. This procedure is repeated until the button is released again.
The dimming of the switch and controls illumination in the switches, the switch panels and the ashtray takes place via the relevant main menu "Settings" in the instrument cluster control unit (ICUC) (A1).

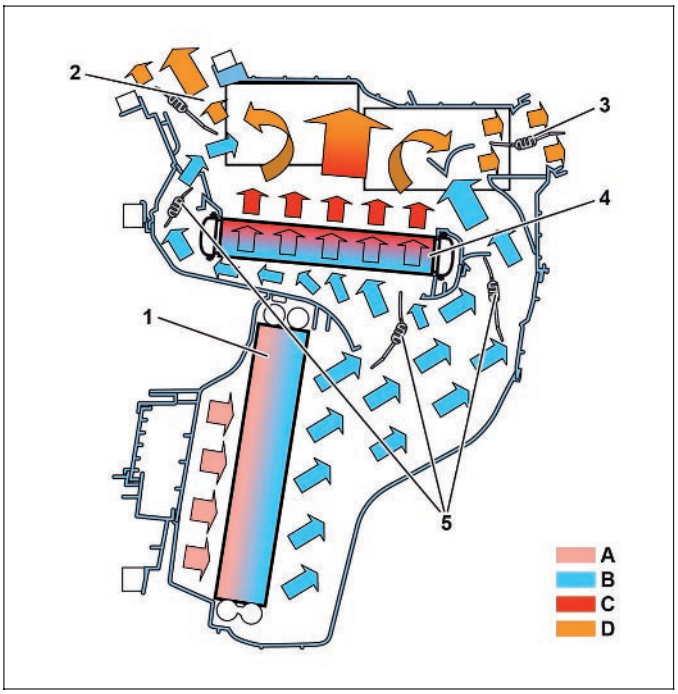
	Interior illumination, overall network		**Page 259**
	Ambient lighting actuation, function	ⓘ Only on vehicles with code (D5B) Ambiance illumination	**Page 260**
	Interior lights actuation function		**Page 261**
	Reading light actuation function		**Page 264**
	Night light actuation function		**Page 266**
	Exit light actuation function		**Page 267**

GF83.10-W-3000H	Air supply in normal operation, function	20.7.11

MODEL 963, 964 with CODE (D6G) Automatic air conditioning

1 Evaporator
2 Defroster flap
3 Air distribution flap
4 Heating system heat exchanger
5 Temperature control flaps

A Fresh air
B Cooled air
C Heated air
D Blend air



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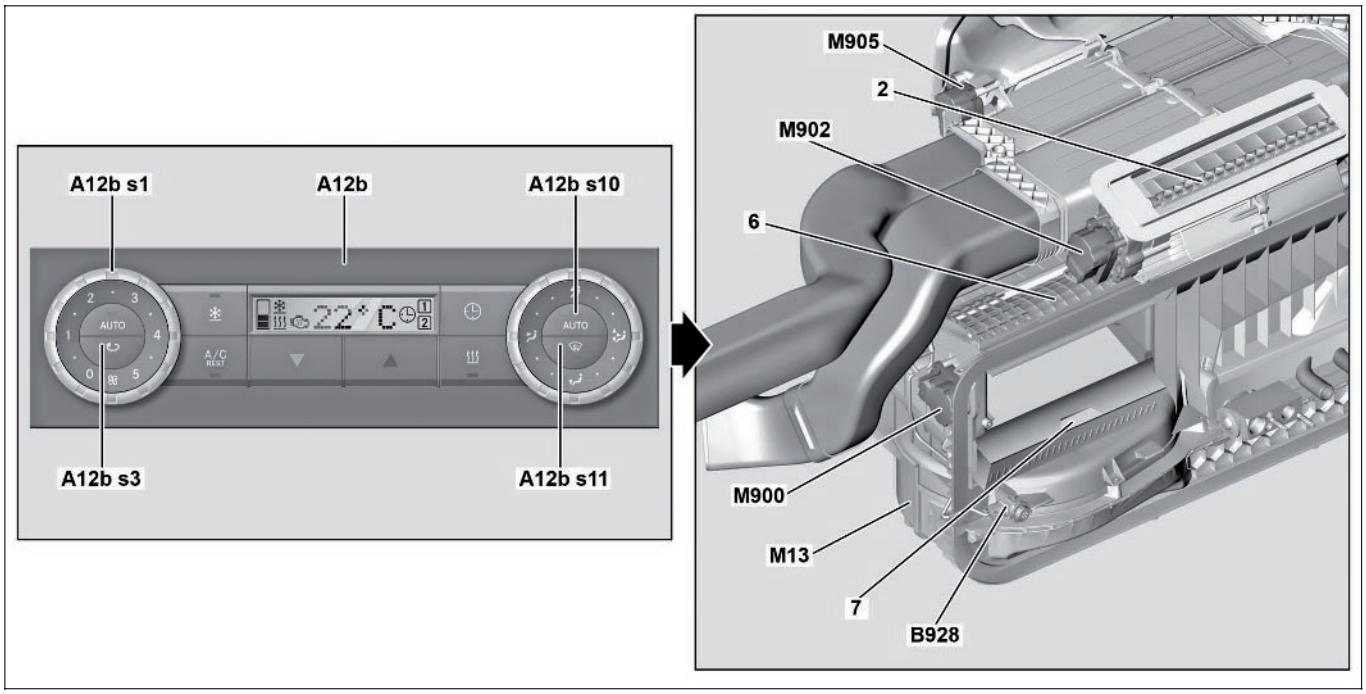


W83.10-1032-09

2 Defroster flap
6 Fresh air/recirculated air flap
7 Particulate filter

A12b Heating, ventilation and air conditioning control unit (HVAC)

A12bs1 Blower regulator
A12b s3 Air recirculation mode button
A12b s10 Automatic air distribution button
A12b s11 Defrost mode button
B928 Air quality sensor

M13 Blower motor
M900 Fresh air/recirculated air flap actuator motor
M902 Defroster vent flap actuator motor
M905 Air distribution flap actuator motor

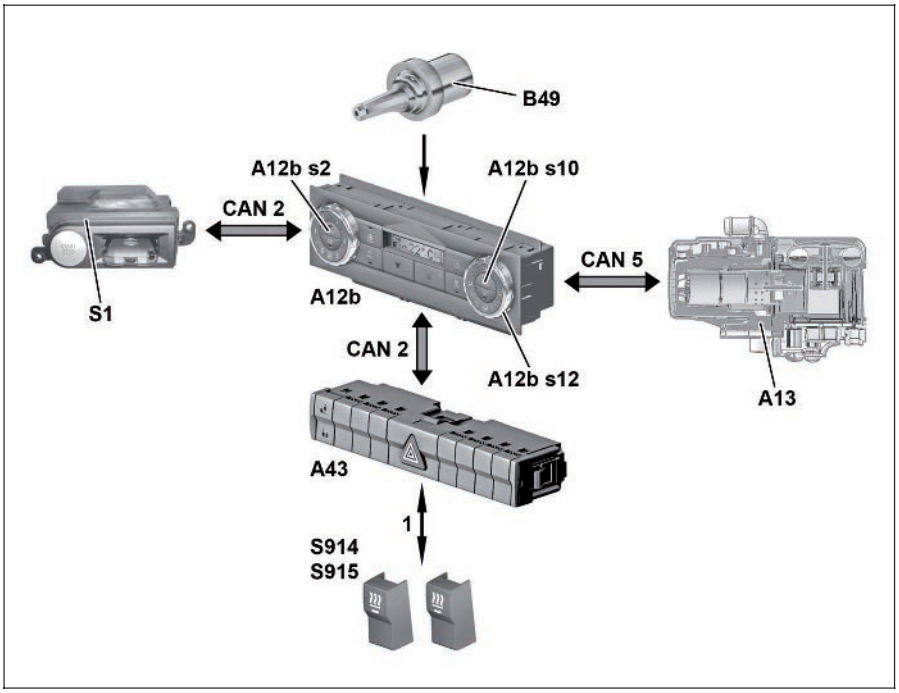
GF83.70-W-3073H	Automatic triggering of heat mode, function	20.7.11

MODEL 963, 964
with CODE (D6G) Automatic air conditioning
with CODE (D6M) Cab hot water auxiliary heater
except CODE (E5T) ADR model class EX/II, including AT
except CODE (E5U) ADR model class EX/III, including EX/II and AT
except CODE (E5V) ADR model class FL including EX/II, EX/III and AT
except CODE (E5X) ADR model class AT
except CODE (E5Z) Accessories, ADR
except CODE (E9D) Preinstallation, double-pole battery disconnect switch
except CODE (E9E)
MODEL 963, 964
with CODE (D6G) Automatic air conditioning
with CODE (D6N) Cab and engine hot water auxiliary heater
except CODE (E5T) ADR model class EX/II, including AT
except CODE (E5U) ADR model class EX/III, including EX/II and AT
except CODE (E5V) ADR model class FL including EX/II, EX/III and AT
except CODE (E5X) ADR model class AT
except CODE (E5Z) Accessories, ADR
except CODE (E9D) Preinstallation, double-pole battery disconnect switch
except CODE (E9E)

Shown on vehicle with code (D6M) Cab hot water auxiliary heater, without code (D6H) Stationary air conditioner

1 *ASIC data bus (Application Specific Integrated Circuit)*

A12b *Heating, ventilation and air conditioning control unit (HVAC)*
A12bs2 *Automatic blower control button*
A12b s10 *Automatic air distribution button*
A12b s12 *Air distribution controller*



W83.70-1463-06

A13 *Truck auxiliary heater (ITH) control unit*
A43 *Modular switch panel (MSF) control unit*
B49 *Outside temperature sensor*
CAN 2 *Interior CAN*
CAN 5 *Climate control CAN*
S1 *Electronic ignition lock (EIS)*
S914 *Lower bunk auxiliary heater button*
S915 *Upper bunk auxiliary heater button*

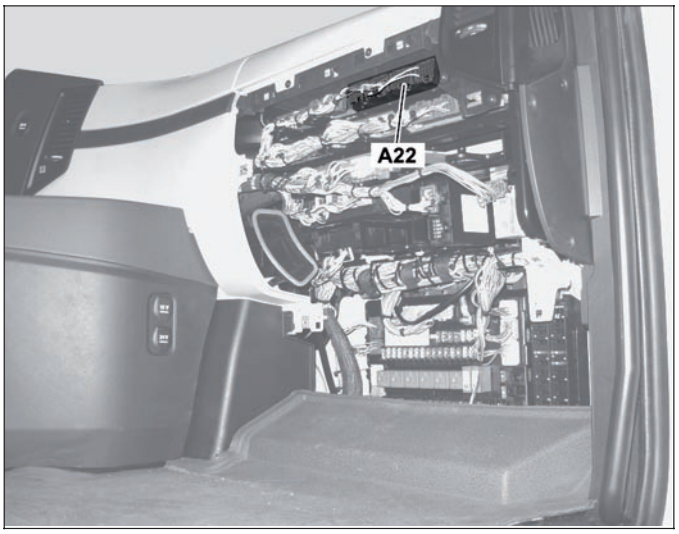
GF54.21-W-5005H	Parameterizable special module (PSM) control unit, component description	29.6.11

MODEL 963, 964

Location

A22 Parameterizable special module (PSM) control unit

The parameterizable special module (PSM) (A22) control unit is located on the passenger side in the electronics compartment.



W54.21-1432-11

Task

The parameterizable special module control unit (PSM) (A22) is integrated in the overall network on the vehicle side via the frame CAN (CAN 3). The trailer CAN (PSM) (CAN 7) and the body CAN (PSM) (CAN 8) serve as external interfaces.
The parameterizable special module control unit (PSM) (A22) allows for the implementation of complex controls and functions.

Full access to data from the entire vehicle CAN enables multiple applications to be carried out with a minimum of additional hardware components. Several functions are performed entirely without additional parts. They only need to be parameterized.
42 equations are available at the factory as preinstalled applications. These can be individually adapted (parameterization) to their respective use in the vehicle.

GF14.40-W-3020H	Exhaust aftertreatment (ACM) control unit, component description	20.7.11

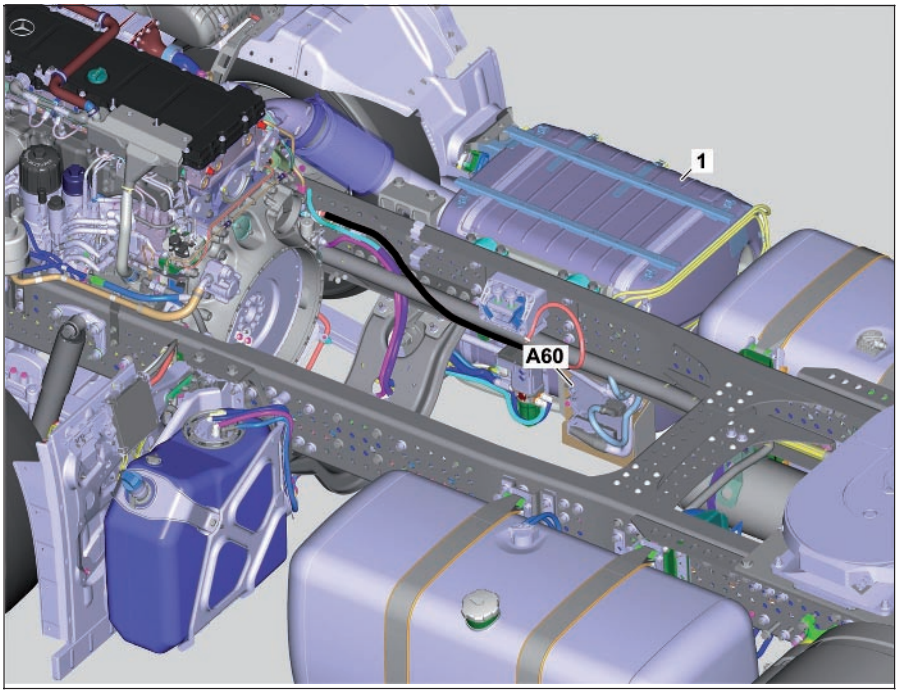
ENGINE 471.9 in MODEL 963 with CODE (M5Z) Engine version Euro VI

Location

1 *Exhaust aftertreatment unit*

A60 *Exhaust aftertreatment (ACM) control unit*

The exhaust aftertreatment (ACM) control unit (A60) is fastened to a bracket on the inside of the EATU (1).



W14.40-1568-76

Task

The exhaust aftertreatment (ACM) control unit (A60) regulates and controls practically all the exhaust aftertreatment system functions.

It also processes the incoming digital and analog signals of the connected sensor system and communicates over CAN connections with the connected control units.

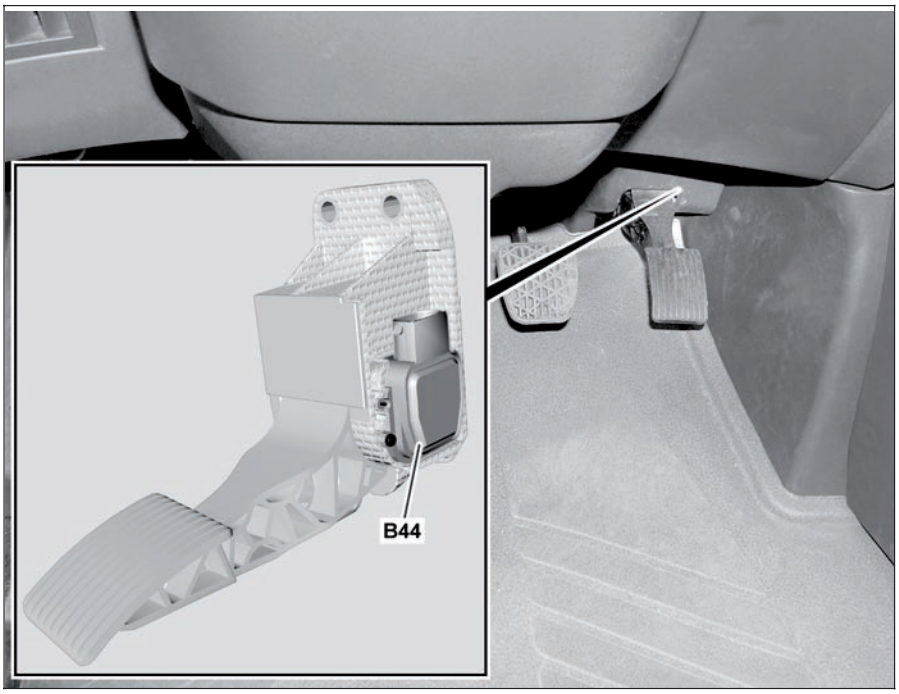
GF30.20-W-2012H	Component description for accelerator pedal sensor	1.7.11

MODEL 963, 964

Location

B44 Accelerator pedal sensor

The accelerator pedal sensor (B44) is located on the accelerator pedal in the driver footwell at the front right.



W30.20-1005-06

Task

The accelerator pedal sensor (B44) detects the accelerator pedal position.

Design

The accelerator pedal sensor (B44) consists of two Hall sensors.

Function

The Hall sensors integrated in the accelerator pedal sensor (B44) transmit a respectively anticyclical signal. In this way perfect position recognition of the accelerator pedal is achieved at any time. This information is read in and appropriately processed by the drive control (CPC) control unit (A3) by means of direct lines as a pulse width modulation signal.

GF80.57-W-6010H	Transmitter key, component description	1.7.11

MODEL 963, 964

Location

S1 Electronic ignition lock
S953 Transmitter key

W80.57-1024-11

Task

The transmitter key (S953) in combination with the electronic ignition lock (EIS) (S1) is the central DAS controller unit.

Design

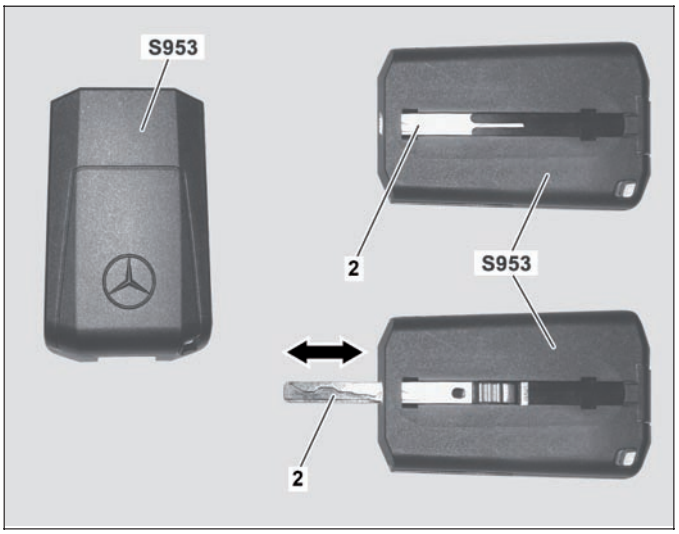
The following transmitter key (S953) versions are available:

- **LOW** Code (F8A) 2 vehicle keys
  - no radio transmitter
- **Default** Code (F8B) 2 remote control keys
  - with unidirectional radio signal receiver
- **Multifunction** Code (F8C) 1 Multifunction and 1 remote control key
  - with bidirectional radio signal receiver/transmitter

ⓘ The transmitter key versions "Low" and "Standard" have an integrated, slide-out mechanical key.
The "Multifunction" version has a removable mechanical key.

Low version

- *Infrared interface*
- *Integrated slide-out mechanical key (2) in the transmitter key (S953)*



W80.57-1012-11