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E70 Central Locking

Initial Print Date: 10/06 Revision Date:

Subject Page

Central Locking

Model: E70

Production: From Start of Production

OBJECTIVES

After completion of this module you will be able to:

- Understand and explain the central locking system of the E70

Introduction

The central locking is the central vehicle access system. It is responsible for unlocking and locking the vehicle. The central locking controls all vehicle doors, the upper section of the two-piece tailgate and the fuel filler flap.

The central locking can be operated via the following components:

- Remote control
- Driver's door lock barrel (door lock)
- Center lock button
- Exterior tailgate button
- Identification transmitter and outer door handle electronic module TAGE for Comfort Access.

A correspondingly adapted electrical system taken from the E90 is used in the E70. For this reason, many components and functions stem from the E90.

The Car Access System now features the third generation of control units. The electronic vehicle immobilizer 4 is also used in connection with the Car Access System 3.

The Car Access System 3 is backwards compatible with the Car Access System 2. Therefore, the Car Access System 3 contains all the functions of its predecessor.

It is possible to open and close the vehicle both actively or passively.

Active means the vehicle is unlocked by pressing the button on the remote control and can then be opened.

After closing the doors, the vehicle can be locked by pressing the Lock button.

Option SA 322 Comfort Access is required for the passive opening and closing function.

Passive means the vehicle is unlocked by grasping the outer door handle, provided the identification transmitter is located within a radius of no more than approximately 2 m from the vehicle. The locking function is triggered by touching the sensitive area on the outer door handle.

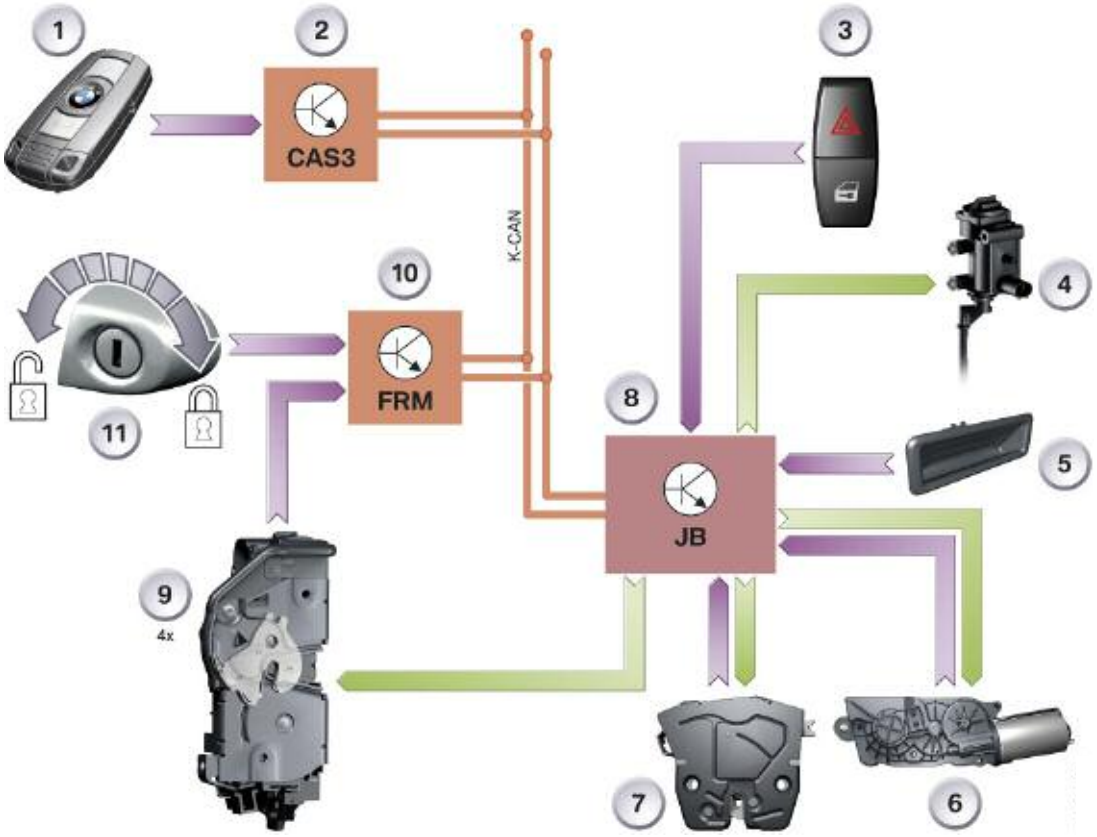
A further option is SA 323 Automatic Soft-Close Function. The automatic soft-close function is available for all vehicle doors. When equipped with the automatic soft-close function, the vehicle door needs only to be gently pulled or pushed into the lock. The automatic soft-close function then completely closes the door.

The central locking system is responsible for locking and unlocking the vehicle and incorporates the vehicle doors, tailgate and fuel filler flap.

Note: The lower section of the tailgate is fully mechanical and can be opened as soon as the upper section has been opened.

System Overview

Input/Output Central Locking

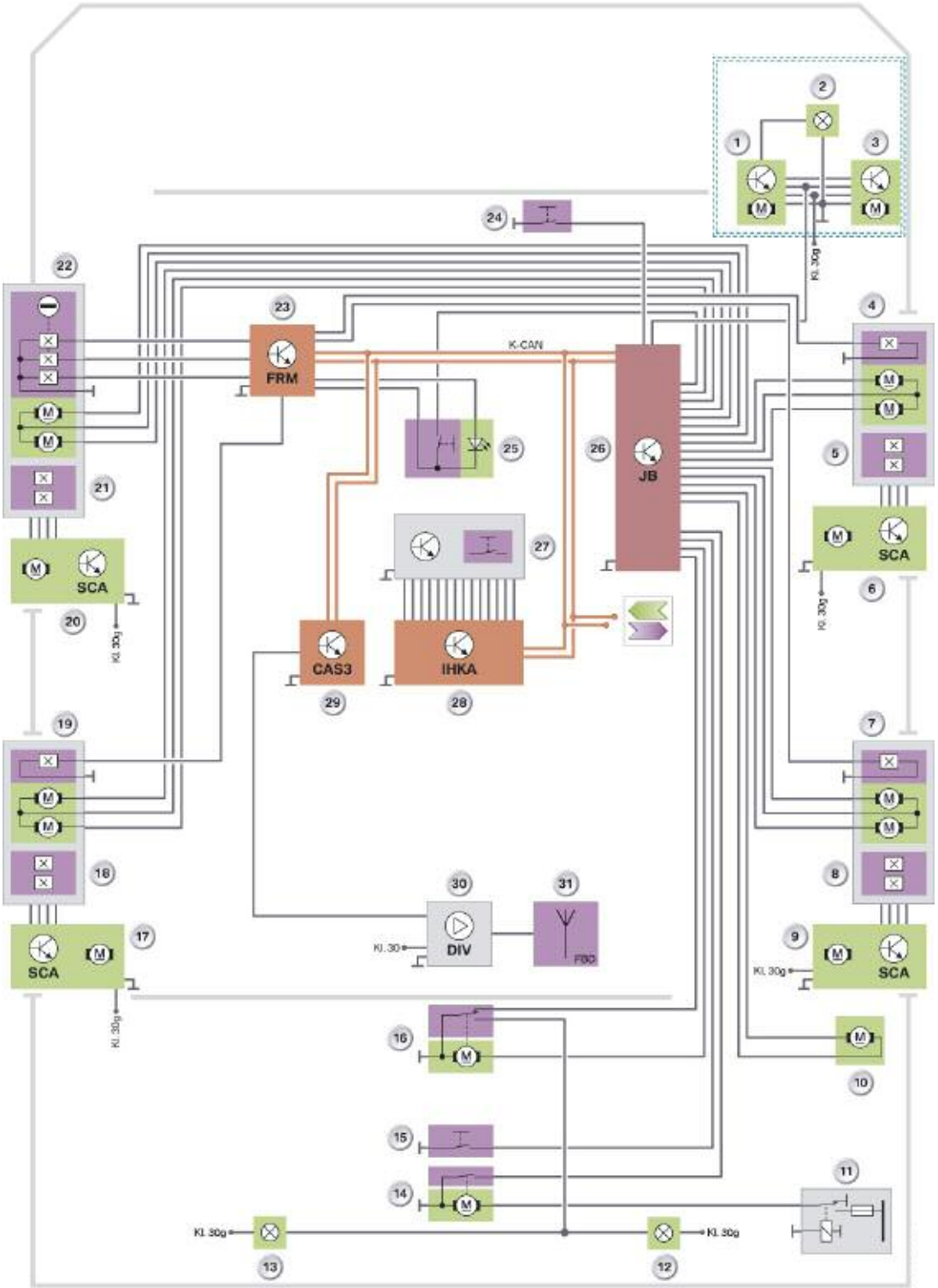


Index	Explanation	Index	Explanation
1	Remote control	7	Central locking, tailgate
2	Car Access System 3 CAS 3	8	Junction box control unit JB
3	Center-lock button	9	Lock (4x) in vehicle doors
4	Central locking, fuel filler flap	10	Footwell module FRM
5	Exterior tailgate button	11	Driver's door lock barrel
6	Automatic soft-close drive unit, tailgate	K-CAN	Bodyshell CAN

The Car Access System 3 (2) evaluates the signal from the remote control (1) and initiates the vehicle unlocking or locking procedure. The junction box control unit (8) executes the requests.

The lock barrel (11) in the driver's door is used for mechanically unlocking or locking the door. The footwell module (10) evaluates the movement (status of Hall sensors) of the lock barrel.

System Schematic Circuit Diagram



Legend for System Schematic Circuit Diagram

Index	Explanation	Index	Explanation
1	Unlocking glove compartment, inside vehicle	18	Hall sensors for automatic soft-close, rear driver's side
2	Glove compartment lighting	19	Door contact, central locking, rear driver's side
3	Unlocking glove compartment, outside vehicle	20	Automatic soft-close SCA, driver's door
4	Door contact, central locking, front passenger's door	21	Hall sensors for automatic soft-close, driver's door
5	Hall sensors for automatic soft-close, front passenger's door	22	Lock barrel, door contact, central locking, driver's door
6	Automatic soft-close SCA front passenger's door	23	Footwell module FRM
7	Door contact, central locking, rear passenger's side	24	Unlock button for glove compartment
8	Hall sensors for automatic soft-close, rear passenger's side	25	Center-lock button
9	Automatic soft-close SCA, rear passenger's side	26	Junction box control unit JB
10	Central locking, fuel filler flap	27	Center console switch cluster with tailgate button, inside
11	Relay, automatic soft-close, tailgate	28	Integrated automatic climate control IHKA
12	Luggage compartment light	29	Car Access System 3 CAS 3
13	Luggage compartment light	30	Remote control receiver in diversity module
14	Automatic soft-close drive unit, tailgate	31	Rear window antenna, remote control services
15	Button, tailgate, exterior	K-CAN	Bodyshell CAN
16	Central locking, tailgate	Kl. 30g	Terminal 30 switched
17	Automatic soft-close SCA, rear driver's side	Kl. 30	Terminal 30

K-CAN signals at Car Access System 3			
In/out	Information	Source/sink	Function
In	Crash signal	Crash sensor > Advanced crash safety management	Unlock central locking in the event of a crash
In	Vehicle speed	Rotation rate sensor > Dynamic stability control	Lock as from a defined vehicle speed
Out	Hall sensor status, driver's door lock barrel	Driver's door lock barrel > Footwell module	Convenient opening of vehicle
Out	Hall sensor status, driver's door lock barrel	Driver's door lock barrel > Footwell module	Convenient closing of vehicle

The signal from the remote control is received via the rear window antenna (31). The remote control receiver integrated in the diversity module (30) forwards the signal to the Car Access System 3 (29). After successfully checking the signal, the Car Access System 3 initiates activation of the central locking. The Car Access System 3 is the central control unit for the central locking.

The junction box control unit (26) executes the vehicle unlocking and locking functions.

The footwell module (23) evaluates the status of all door contacts (4, 7, 19 and 22). It makes available the respective status via the K-CAN. In this way, the Car Access System 3 can prevent the vehicle being locked with the driver's door open.

The junction box control unit evaluates the status of the center lock button (25). The junction box control unit activates the central locking corresponding to the status. The junction box control unit is also responsible for registering the status and activating the central locking in the tailgate.

In addition, the junction box control unit drives the fuel filler flap (10).

The footwell module evaluates the signals from the Hall sensors for the lock barrel (22) and makes this information available on the K-CAN.

Based on this information, the Car Access System 3 is informed of the status of the door lock in the driver's door. This is important for the case when a request to unlock or lock the vehicle is triggered via the remote control.

System Components

Control Units

Footwell Module (FRM)

The footwell module is installed at the left-hand A-pillar. It evaluates the status of the door contacts and reads in the Hall sensor signals of the lock barrel in the driver's door and transfers the information via the K-CAN to the junction box control unit or Car Access System 3.

Car Access System 3

The Car Access System 3 is installed on the left next to the steering column. It assumes the master function for the central locking. The Car Access System 3 has the exclusive system authorization and is simply supported by the other control units.

Junction Box Control Unit (JB)

The junction box control unit is plugged into the front power distribution box.

The junction box control unit contains the relays for activating the central locking drive units.

The tailgate central locking is activated via a power output stage in the junction box control unit. The drive unit for the automatic soft close function is powered by a relay in the rear power distribution box. The junction box control unit activates the relay.

The signals from the exterior tailgate button and center-lock button are also sent to the junction box control unit and transferred to the Car Access System 3.

The remote control receiver is powered by the rear power distribution box.

Note: The power distribution box and the junction box control unit are two separate components. Keep this in mind when performing service work.

Controls

The central locking can be operated from the following controls:

- Remote control
- Identification transmitter (Comfort Access only)
- Driver's door lock barrel
- Center-lock button

Remote Control

Each vehicle is delivered with one spare key and two remote control units. The adapter for the spare key is located in the glove compartment.

The remote control has three buttons for operating the central locking system.

There is a rechargeable battery in the remote control that is charged by means of a transponder coil in the remote control holder. The mechanical key is integrated in the remote control.

Index	Explanation
1	Unlock/convenient open button
2	Lock/convenient close button
3	Button for OPEN tailgate
4	Mechanical key

The remote control has a 512 MB data memory. The following data can be stored in the remote control:

Data	Explanation
km reading (mileage)	Current km reading of vehicle
VIN	
Key number	Number of remote control
Fault code memory entries	from SAM 2.5, the fault entries are indicated linked to possible measures in PuMA
NAVI-DVD version	Data status of navigation DVD
Engine oil	Information on topping up or draining the engine oil, e.g. overfilling
Battery condition	Battery charge status
Integration stages	Integration stage that left the factory, last programmed or currently available

Note: The remote control receiver is integrated in the antenna diversity facility and forwards the remote control signal to the Car Access System 3.

Driver's Door Lock Barrel

The lock barrel is connected mechanically via a linkage to the door lock. Hall sensors for the lock barrel are integrated in the door lock.

The footwell module evaluates the signals from the Hall sensors for locking/unlocking purposes.

Central Locking Button

The center-lock button is installed between the center of the outlets in the dashboard. The center-lock button forms one unit together with the hazard warning lights button.

Central Locking Drive Units

A central locking drive unit consists of an electric drive unit and the unlocking/locking mechanism.

Doors

The central locking drive units in the doors are equipped with two motors to facilitate the unlocking/locking and central arrest functions of the vehicle.

Central arrest means that the locking button in the doors is separated mechanically from the central locking drive unit.

As a result, the vehicle cannot be opened by pulling the locking button.

The Hall sensor for the door contact is additionally integrated in the central locking drive unit.

Tailgate and Fuel Filler Flap

The central locking drive units for the tailgate and fuel filler flap are each equipped with a motor for unlocking/locking purposes.

The central locking drive unit in the tailgate contains the tailgate contact. The tailgate contact serves the purpose of signalling tailgate "OPEN" or "CLOSED".

The tailgate is additionally equipped with the drive unit for the automatic soft-close function. This drive unit also features a motor.

The automatic soft-close drive unit also has a contact for the automatic soft-close function.

Manually Releasing the Fuel Filler Flap

The fuel filler flap can be unlocked manually in the event of an electrical defect. The release device is located in the luggage compartment on the right behind the luggage compartment cover.

1. Remove cover
2. Pull green knob with fuel pump symbol.

Mechanical Release of Lower Tailgate

The E70 features a fully mechanical release function for the tailgate.

Locking of the lower tailgate is not monitored.

The left and right lock are released by turning the handle (2). The rotary motion of the handle is transferred to the lock/unlock mechanism and in turn to the bowden cables. The tailgate can be folded down after releasing the locks.

Fully Mechanical Release E70

Index	Explanation	Index	Explanation
1	Bowden cable release, left	4	Lock on right in lower tailgate
2	Release handle	5	Lock/unlock mechanism
3	Bowden cable release, right	6	Lock on left in lower tailgate

Principles of Operation

Unlocking/locking the Vehicle

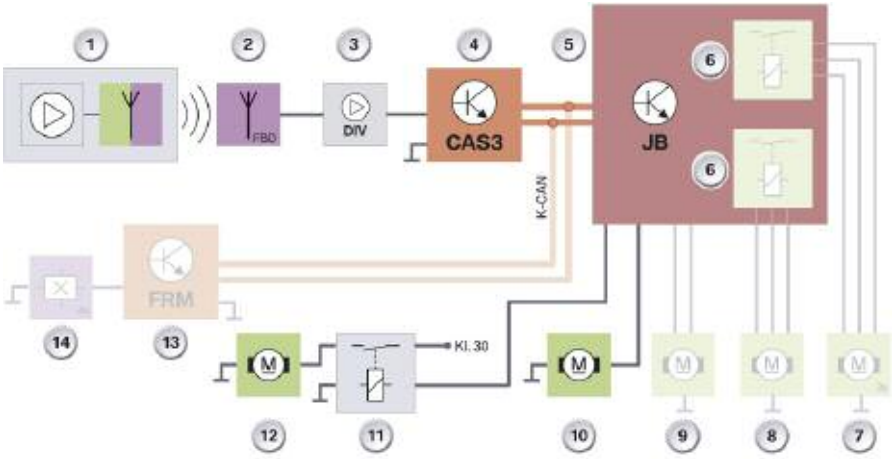
The central locking system can be activated only when the driver's door is closed.

The vehicle unlocking/locking system is composed of the following system components:

- Remote control/identification transmitter
- Center-lock button
- Mechanical key/spare key
- Comfort Access - Outer door handle and exterior tailgate button (tailgate only)

The central locking system activates the following system components:

- Central locking, driver's and front passenger's door
- Central locking, rear doors
- Central locking, fuel tank
- Central locking, tailgate



The procedure for unlocking the tailgate by pressing the tailgate symbol on the identification transmitter is shown in this diagram.

Index	Explanation	Index	Explanation
1	Identification transmitter	8	Central locking, driver's door
2	Rear window antenna	9	Central locking, fuel filler flap
3	Remote control receiver in diversity module	10	Central locking, tailgate
4	Car Access System 3 CAS 3	11	Relay, automatic soft-close, tailgate
5	Junction box control unit JB	12	Automatic soft-close drive unit, tailgate
6	Relay for central locking	13	Footwell module
7	Central locking, front passenger's and rear doors	14	Door contacts

Unlocking

As soon as the unlock button on the remote control is pressed, the signal initially reaches the rear window antenna followed by the remote control receiver. The remote control receiver is located in the diversity module and forwards the signal to the Car Access System 3. The signal from the remote control is verified in the Car Access System 3. If the signal is recognized as valid, the junction box control unit is enabled for the purpose of unlocking the central locking drive units. The junction box control unit now activates the relay as well as the power output stages to trigger the vehicle unlocking procedure.

Locking

The vehicle can be locked only after the footwell module has evaluated the door contacts and the Car Access System 3 signals that the doors are closed.

The further signal progression for locking the vehicle corresponds analogously to the signal progression of the unlocking procedure.

All central locking drive units are moved to the "lock" position while the vehicle is being locked.

The central locking drive units in the doors additionally assume the "central arrest" position. Following the central arrest procedure, the locking buttons in the doors are mechanically separated from the central locking drive system.

The vehicle can now no longer be unlocked using the locking buttons in the doors.

Central Locking Button

The vehicle can be locked/unlocked with the center-lock button.

The junction box control unit receives a high signal (battery voltage approximately. 12 V) when the center-lock button is not pressed. The high signal changes to a low signal (approximately. 0 V) as soon as the center-lock button is pressed.

The junction box control unit evaluates the change from the high signal to the low signal and locks/unlocks the vehicle.

Mechanical Key

The footwell module evaluates the Hall sensors for the lock barrel in the driver's door. The Car Access System 3 is informed of the change in status via the K-CAN.

The Car Access System 3 enables the vehicle unlocking/locking procedure. The junction box control unit initiates the vehicle unlocking/locking procedure.

Locking Button on Vehicle Doors

All four doors can be mechanically locked separately with the locking button.

To unlock the vehicle door, it is necessary to pull twice on the inner door handle.

However, the junction box control unit does not activate the central locking.

Car Access System 3

As soon as the Car Access System 3 receives the signal from the remote control receiver, it checks whether the remote control is valid and belongs to the vehicle. Only if the check is successful will the Car Access System 3 forward the request to the central locking.

The check, also referred to as authentication, takes in the order of milliseconds.

Serving as the master control unit of the central locking system, the Car Access System 3 issues the enable to activate the central locking.

The junction box control unit receives the enable via the K-CAN.

Junction Box Control Unit

The junction box control unit is the executing control unit and locks/unlocks the complete vehicle. The relays for the unlocking/locking operations are located in the junction box control unit. The following relays are activated:

- Relay for unlocking/locking central locking
  - Driver's door
- Relay for unlocking/locking central locking
  - Rear doors
  - Front passenger's door
  - Fuel filler flap

The central locking for the tailgate is activated directly via a power output stage. The relay for the automatic soft-close function of the tailgate is also controlled by the junction box control unit.

Footwell Module FRM

The footwell module monitors the Hall sensors of the door contacts. A status change occurs in the door contacts when a door is opened or closed.

The junction box control unit receives the current status of the door contacts from the footwell module via the K-CAN. The junction box control unit forwards the status of the door contacts to the Car Access System 3.

The request to lock the vehicle, for example, is not executed while the driver's door is open.

Opening the Upper Tailgate

The upper tailgate can be unlocked via the remote control, the exterior or interior tailgate release button and then opened.

Remote Control

The tailgate is opened with the remote control by pressing on the tailgate symbol. The upper tailgate unlocks and can be opened.

Note: The motor in the tailgate lock and the relay for the automatic soft-close drive unit are activated via power output stages in the junction box control unit.
The upper tailgate can also be opened by pressing the tailgate symbol on the identification transmitter.

Exterior Tailgate Button

As soon as the vehicle is unlocked, the upper tailgate can be opened by pressing the exterior tailgate button. The button switches to ground when the exterior tailgate button is pressed.

The junction box control unit monitors the button. The upper tailgate is unlocked and can be opened when the signal from the button goes to low.

Interior Tailgate Button

As soon as the vehicle is unlocked, the upper tailgate can be unlocked and opened by pressing the interior tailgate button.

The button is located in the center console switch cluster SZM and switches to ground. The center console switch cluster evaluates the button. The signal is made available to the control unit of the air conditioning systems.

The air conditioning system sends the signal via the K-CAN to the junction box control unit.

The junction box control unit evaluates the message and triggers the tailgate unlocking procedure.

Closing the Tailgate

Closing the tailgate starts the automatic soft close drive unit via a microswitch for the tailgate. The microswitch is located in the tailgate lock. The junction box control unit evaluates the microswitch. The microswitch signal has a high level when the tailgate is open.

The signal changes to low level when the tailgate is closed. The junction box control unit activates the automatic soft-close drive unit until it generates a low signal via its own switch contact. Activation ceases and the automatic soft-close drive unit assumes it original position.

E70 Tailgate

Index	Explanation	Index	Explanation
1	Top left tailgate hinge	4	Tailgate lock and SCA drive unit
2	Top right tailgate hinge	5	Tailgate latch, left
3	Tailgate latch, right		

Note: Closing the tailgate with the automatic soft-close drive unit ensures that it is closed reliably while also increasing the vehicle rigidity. The drive unit of the automatic soft close function pulls the tailgate into the latch mechanism.

The vehicle body and the tailgate are now firmly connected, thus reducing the torsional motion or vibration of the tailgate to a minimum.

Opening and Closing the Lower Tailgate

The lower tailgate is locked mechanically. It can only be unlocked and opened fully mechanically when the upper tailgate is opened.

Special Features

Automatic Locking (personal profile)

The vehicle is locked automatically when driving at a speed in excess of 16 km/h. The speed signal is made available by the dynamic stability control.

The vehicle is unlocked in connection with Comfort Access as soon as terminal 15 is switched off.

On vehicles without Comfort Access, the unlocking procedure is triggered by removing the remote control from its holder.

Unlocking After a Crash

A locked central locking system is unlocked as soon as the Car Access System 3 receives a crash message from the advanced crash safety management.

On receiving the crash signal, the center-lock button and the remote control receiver are inhibited for the central locking functions. The center-lock button and the remote control receiver are enabled again only after the change "terminal R OFF/terminal R ON".

Selective Unlocking

With corresponding coding, the vehicle can also be unlocked selectively.

In this case, initially the driver's door is unlocked.

The rest of the vehicle is unlocked in response to a renewed unlock request.