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# E65/66 Comfort Access

Model: 750i, 750Li, 760i and 760Li

Production: From March 2005

# OBJECTIVES

After completion of this module you will be able to:

- Familiarize yourself with the components used in the system.
- Familiarize yourself with the operation of the capacitors in the door handles.

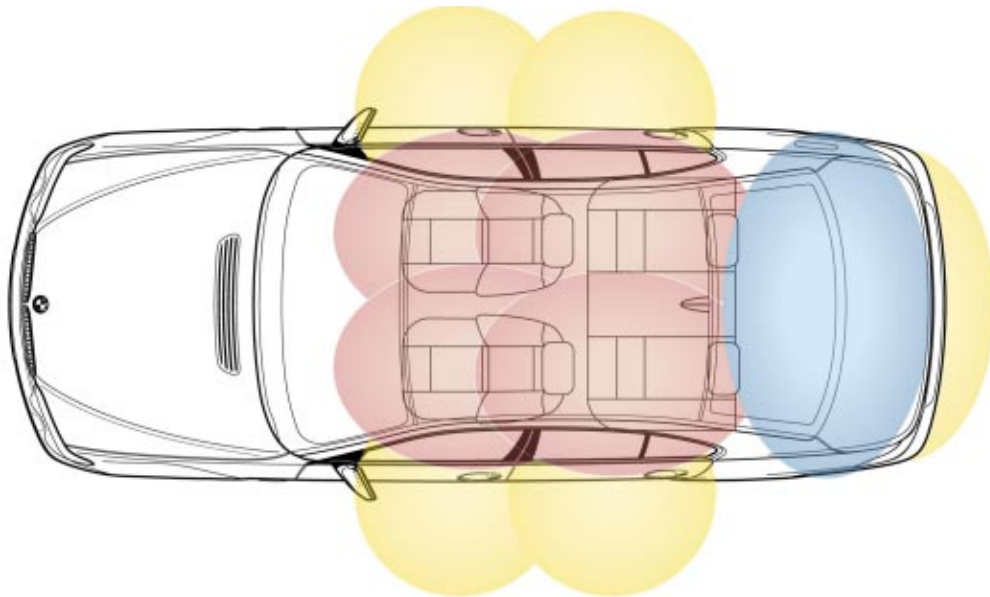
## Introduction to Comfort Access

Comfort Access (SA 322) is offered as an option for the 750i/iL & 760i/iL.

"Comfort access" is a passive access system. This means the vehicle can be unlocked by grasping the outer door handle, provided the identification transmitter is located within a radius of no more than approx. .5 - 1.5 m from the vehicle.

With Comfort Access it is sufficient for the driver to simply carry the identification transmitter on his/her person in order to unlock, lock or start the vehicle.

With this system the operation/functions are distributed among several control modules. Comfort Access system utilizes the same modules that are utilized for the Central Locking function plus a Comfort Access module specifically for monitoring the systems antennas, activation of the remote receiver and monitor status of the Electronic Outer Door Handle.



# System Overview

With regard to the Comfort Access System the remote control is referred to as an Identification Transmitter since the remote is transmitting ID data to the vehicle without any action being performed by the user (buttons on the remote do not need to be pressed).

## Passive Entry

Passive Entry enables access to the vehicle without operating the ID Transmitter/remote control.

### Unlocking

As the customer approaches the vehicle with the ID Transmitter located on his/her person and places their hand between the door handle and the door panel or depresses the button on the trunk lid, the system "wakes up" and a signal is transmitted via K-TAGE Bus to CAS. CAS in turn requests a verification that a valid ID transmitter is located within the radius of the transmitting antenna, via K-TAGE Bus to the door modules or antenna located on the rear bumper.

The request is made by transmitting a signal from the respective door handle module or antennas located in the rear bumper to the ID Transmitter, which returns an ID signal that is received by the antenna located on the rear window.

The signal received by the antenna on the rear window is transmitted to the CAS and the ID information is verified. If the ID is valid the door can be unlocked by pulling up on the door handle or trunk will be unlocked by depressing the button.

## Passive Go

The passive go function makes it possible to start the vehicle without the ID transmitter being inserted in its holder.

**Note: The vehicle cannot be started without a valid ID transmitter being located in the interior of the vehicle.**

### Starting

Upon entering the vehicle the engine can be started by pressing the start button with the brake pedal depressed, as long as the valid ID transmitter is located in the interior of the vehicle.

The presence of a valid ID transmitter is determined by the interior antennas and validated by the CAS which will release the start enable signal.

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## Passive Exit

The passive exit function makes it possible to lock the vehicle without actively using the ID transmitter/remote control.

**Note: The vehicle cannot be unlocked without a valid identification transmitter within a radius of .5 - 1.5 m from the respective antenna.**

## Locking

On exiting the vehicle the doors can be locked by pressing on the door handle, as long as all doors are closed and a valid ID transmitter is determined to be located outside of the vehicle. In the event that the system detects a valid ID transmitter inside the vehicle and/or the system does not detect the presence of a valid ID transmitter on the outside of the vehicle, the doors will unlock and display a message on the check control display.

## Special Comfort Access Functions

The Comfort Access System offers additional special functions that are determined by the actions of the user such as:

### ID Transmitter Remains in Vehicle

If another ID transmitter is detected on the inside of the vehicle and a valid ID transmitter is detected/determined to be located on the outside, then the transmitter located on the inside is ignored/deactivated and the vehicle is secured. Once the vehicle is unlocked again the key that was deactivated is reactivated.

### ID Transmitter Remains in Trunk

When the trunk lid is closed/locked a status signal is received by the power module which transmits the information to the Comfort Access module. The Comfort Access module starts a search for an ID transmitter in the trunk, if a valid transmitter is located by the antenna in the trunk a signal is sent to the CAS, which in turn transmits a request to the power module to open the trunk.

In order to lock the trunk with a spare key located inside:

- It must be determined that a valid ID transmitter is located on the outside of the vehicle within the radius of the antenna.
- Valet switch must be active

## Engine Start Disable

The engine cannot be started if the identification transmitter is located in the luggage compartment of the unlocked vehicle.

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### **Starting Engine without ID Transmitter**

The function makes it possible to start the vehicle within 10 s after "engine OFF" without detecting the identification transmitter. This function is intended for cases where the identification transmitter is not detected due to high frequency interference, as an example.

### **Check Control Message, Terminal 15**

The Comfort Access System enables terminal selection without the ID transmitter being inserted in its holder. It is possible that terminal 15 is selected by pressing the START-STOP button. A corresponding check control message is shown in the instrument cluster after the door is opened. An audible signal also sounds.

**Note: The battery may be discharged if the driver ignores the warnings and locks the vehicle.**

### **Unintentional Wake-up Function**

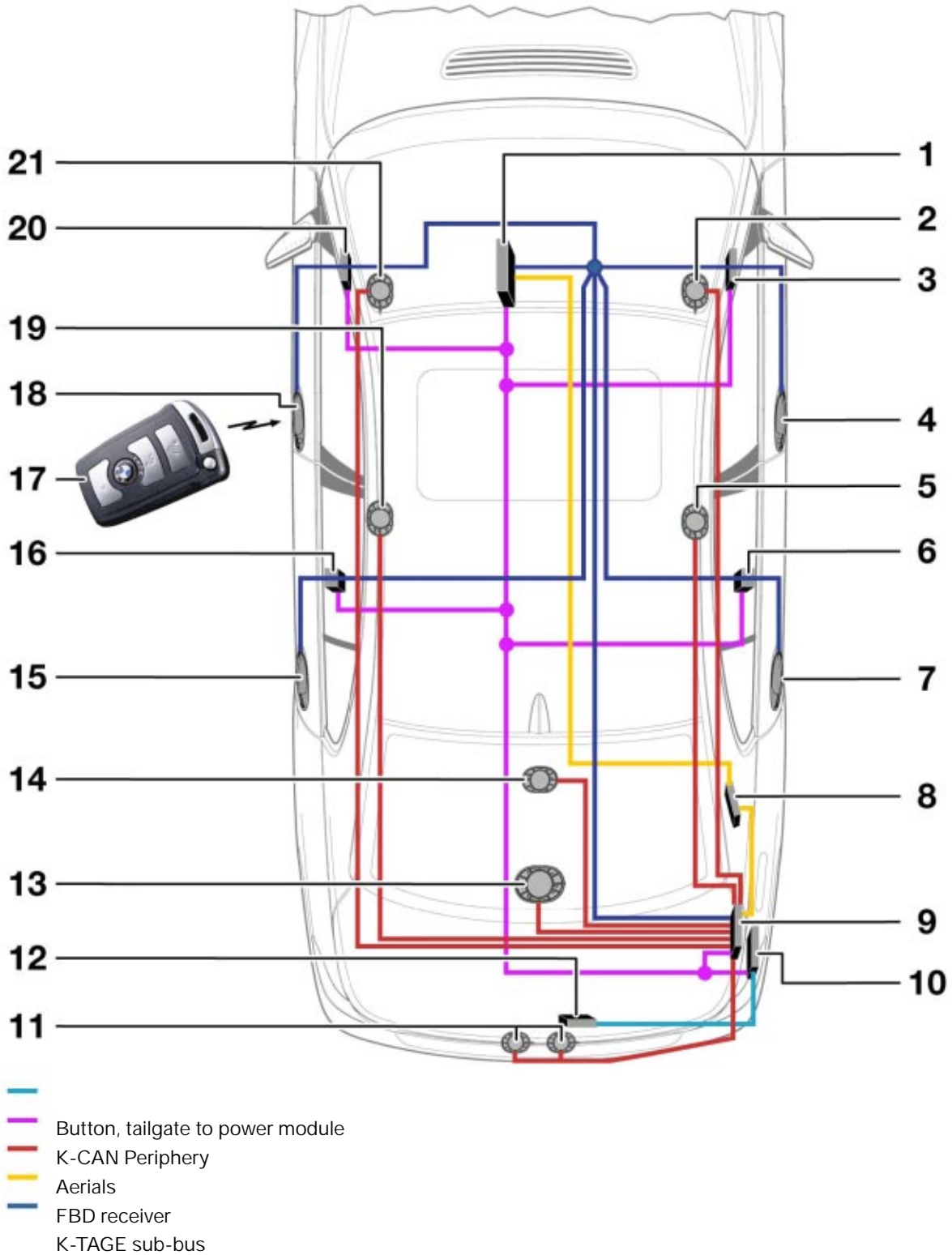
In order to avoid waking the electronic outer door handle module by touching the outer door handle without a valid identification transmitter. The outer door handle module is requested by CAS to send a signal to the ID Transmitter requesting the transmission of a valid/authentication signal.

If no valid ID transmitter is detected, the electronic outer door handle module receives this information from the CAS and in this case, the electronic outer door handle module remains inactive until a valid identification transmitter is detected.

### **Locking with Engine Running**

The vehicle can also be unlocked with the engine running if the engine was started with passive go. When leaving the vehicle, the ID transmitter must also be taken and the vehicle locked from the outside.

# System Components





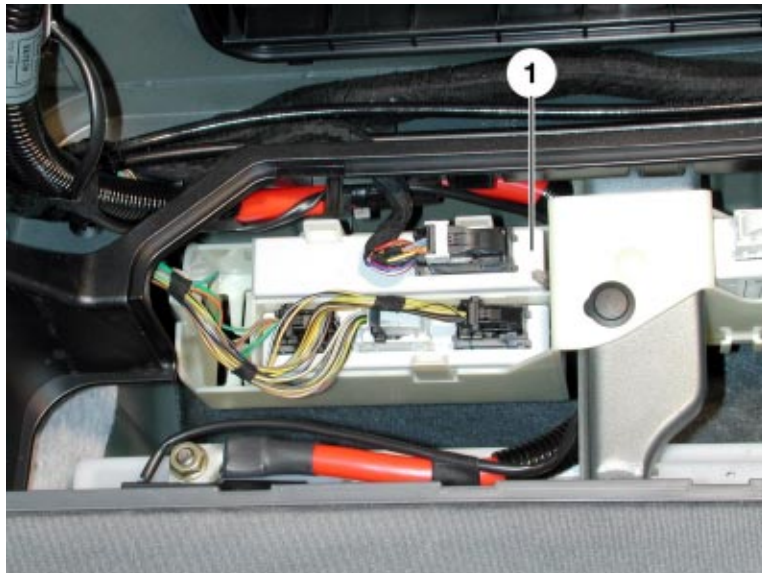
## Legend for System Components

Index	Explanation	Index	Explanation
1	Car Access Control Module (CAS)	12	Trunk Release/Open Button
2	Antenna, Interior, Right Front Footwell	13	Trunk Antenna
3	Door Module, Passenger Door	14	Antenna, Rear Parcel Shelf
4	Electronic Outer Door-Handle, Passenger Door	15	Electronic Outer Door-Handle, Rear Door Driver's Side
5	Antenna, Interior, Right Rear Footwell	16	Door Module, Rear Driver's Door
6	Door Module, Rear Passenger Door	17	Identification Transmitter
7	Electronic Outer Door-Handle, Rear Door Passenger Side	18	Electronic Outer Door-Handle, Driver's Door
8	Remote Control Receiver (FBD)	19	Antenna, Interior, Left Rear Footwell
9	Comfort Access Control Module	20	Door Module, Driver's Door
10	Power Module	21	Antenna, Interior, Right Front Footwell
11	Antennas, Rear Bumper		

## Comfort Access Module (CA)

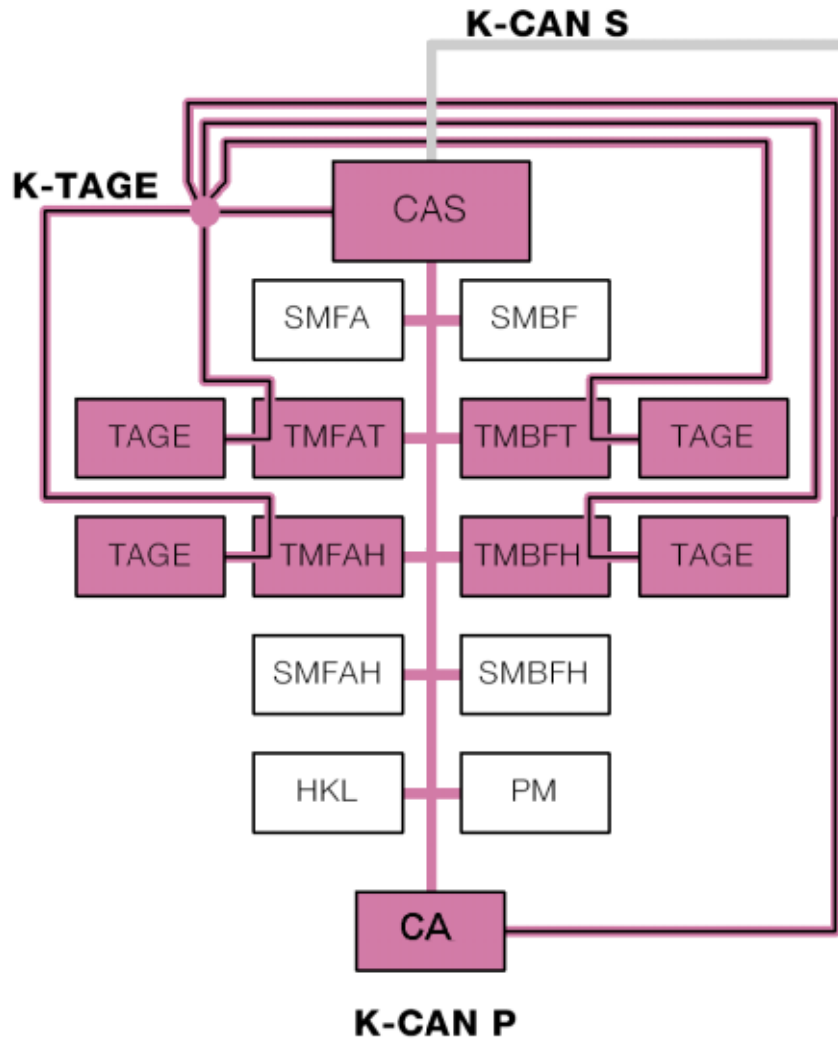
The Comfort Access Module located in the right side of the trunk near the Power Module provides the following functions:

- CAN Bus Interface (K-CAN Periphery & K-TAGE)
- Electronic Outer Door Handle (TAGE) interface
- Activation of the 8 inductive antennas
  - Initiates scan for ID Transmitter on interior of vehicle using the interior antennas (5)
  - Initiates scan for ID Transmitter in trunk of vehicle using the trunk antenna (1)
  - Initiates scan for ID Transmitter on exterior rear of vehicle using the bumper antennas (2)
- Simultaneous activation of Remote Control Receiver (FBD) during scan for ID Transmitters
- Stores fault memory for Electronic Outer Door Handle (TAGE) and inductive antennas
- Diagnostic Gateway for Electronic Outer Door Handles (TAGE)



Index	Explanation
1	Comfort Access Module (CA)

With the introduction of the Comfort Access system the K-CAN Periphery has been extended as shown below:



Index	Explanation	Index	Explanation
CA	Comfort Access Control Module	TAGE	Electronic Outer Door Handle
CAS	Car Access System	TMBFT	Door Module, Passenger Door
HKL	Trunk Lid Lift	TMBFTH	Door Module, Passenger Side Rear Door
PM	Power Module	TMFAT	Door Module, Driver's Door
SMBF	Seat Module, Passenger Seat Adjustment	TMFATH	Door Module, Driver Side Rear Door
SMBFH	Seat Module, Passenger Side Rear Seat Adjustment	K-CAN P	K-CAN PERIPHERY
SMFA	Seat Module, Seat Adjustment	K-CAN S	K-CAN SYSTEM
SMFAH	Seat Module, Driver Side Rear Seat Adjustment	K-TAGE	Sub-Bus, Electronic Outer Door Handle

**Note:** The K-TAGE Sub-Bus is only looped through the door modules, no exchange of information occurs.

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## Car Access Module (CAS)

The CAS is responsible for:

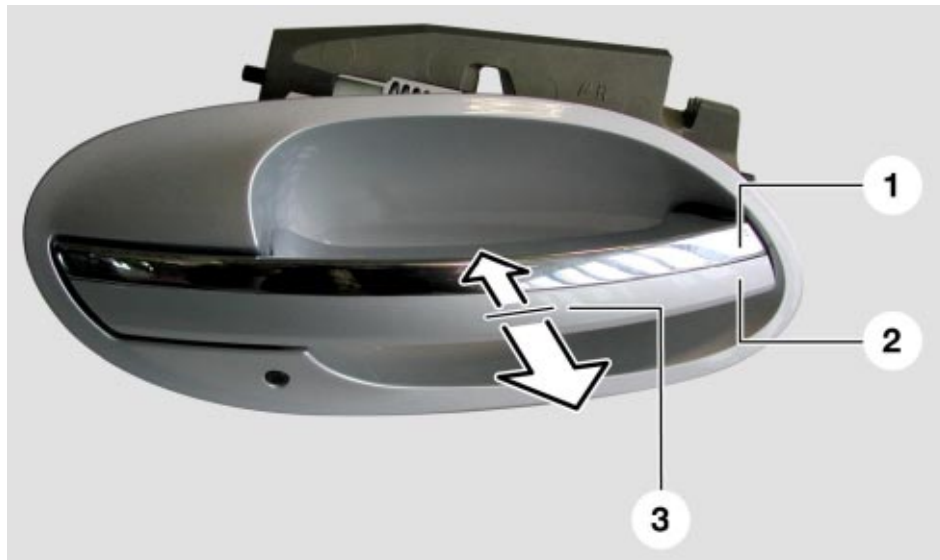
- Validation/authentication of ID Transmitter data
- Storing faults regarding ID Transmitter
- Activation of the validation process from trunk switch or starter switch

## Electronic Outer Door Handle (TAGE)

The Electronic Outer Door Handles are responsible for:

- Detection of a pull on the outer door handle via an integrated hall sensor
- Detection of a push on the outer door handle via an integrated hall sensor
- Monitoring the capacitive sensor integrated in the door handle to detect the presence of a hand between the door handle and the door panel
- Activation of the transmit antenna located in the handle to provide an activation signal to the ID Transmitter
- Transmission of sensor data by way of the K-TAGE Bus from the door handle to the door module (pass through function only)

On vehicles equipped with Comfort Access the top half of the door handle has a chrome insert.



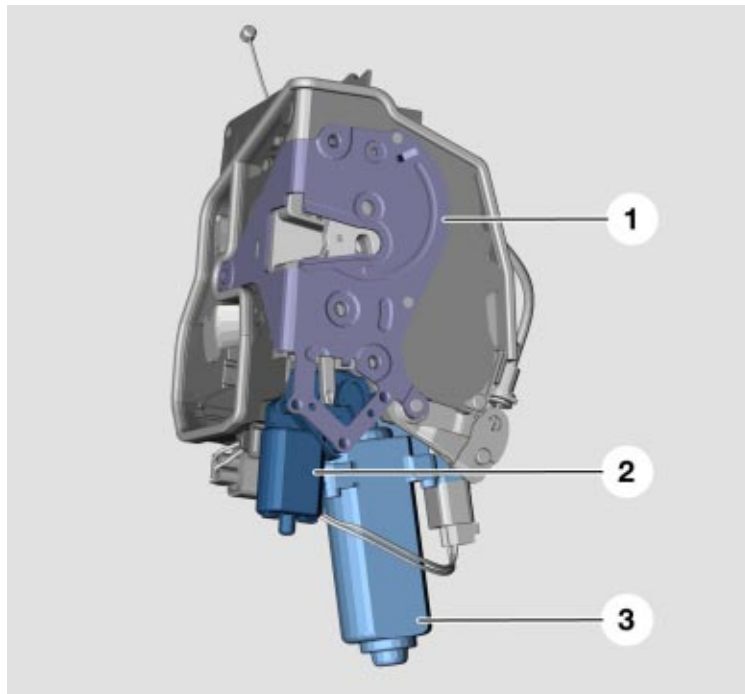
Index	Explanation
1	Chrome Insert
2	Door Handle
3	Rest/Zero position (Handle can be pushed in or pulled out approx. 3 mm)

Each Door Handle Module can be woken-up by pulling or pushing on the handle, when this occurs the status of the handle is transmitted to the door module and then onto the CAS and CA module via the K-CAN Periphery. The door handle also transmits a signal to the ID transmitter requesting it to transmit a validation signal, which is acquired by the remote Receiver antenna in the rear window and forwarded to the CAS for authentication. If the signal is recognized an enable signal is sent from the CAS to the respective door handle and the door can be unlocked.

Each door handle module is connected by a 4-wire connection to a respective door module.

### Electronic Unlock Motor

Each lock in the vehicles doors incorporates an electric unlock motor. The motor assists in unlocking the locking pawl of the door in a timely manner after authentication of the ID transmitter and the handle being pulled.



Index	Explanation
1	Door Lock
2	Electric Unlock Motor
3	Motor for Automatic Soft Close

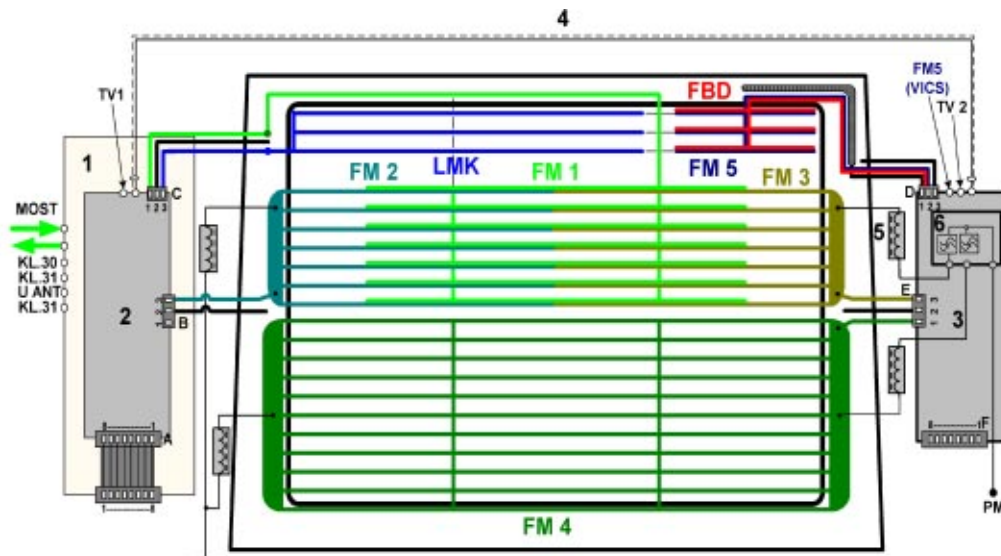
## ID Transmitter

The Remote Control/ID Transmitter is responsible for:

- Transmission of encrypted high frequency messages
- Reading/receiving of transmitted signals from inductive antennas
- Standard remote control functions via push button

## Remote Control Receiver (FBD)

Incorporated into the rear window is an antenna that is used to receive the transmitted signal from the remote Control/ID transmitter. The signal is automatically transmitted from the ID transmitter upon relieving a request for validation from one of the exterior antennas.



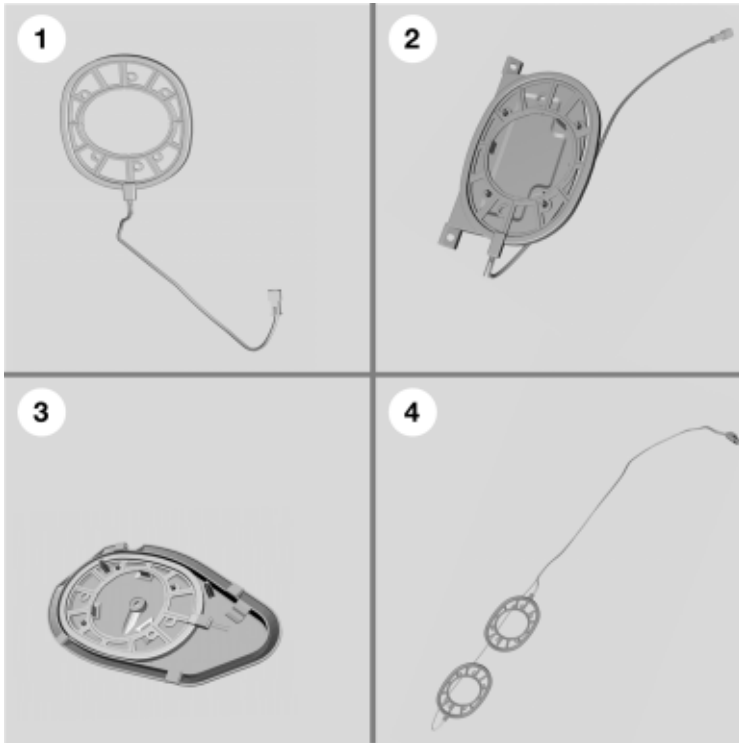
Index	Explanation
3	Antenna Amplifier
F	8-Pin Connector on Antenna Amp for wake-up signal for FBD Receiver
FBD	Antenna for Remote Control
KL. 30	Voltage Supply B+
KL.31	Ground

## Antennas

On the 7 series a total of 12 antennas are used to monitor/communicate with the ID transmitter.

- 1 in each Door Handle (4)
- 1 in each Footwell (4)
- 1 in the Trunk
- 2 on the rear Bumper Cover
- 1 on rear Parcel Shelf

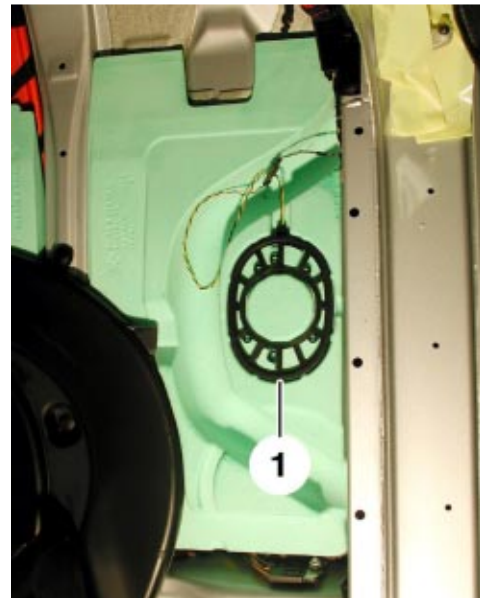
The antennas on the interior of the vehicle are inductive air core coil antennas that must be more than 15 mm from the surface that they are mounted to.



Index	Explanation
1	Antenna in each Footwell
2	Antenna in Rear Parcel Shelf
3	Antenna in Trunk
4	Antenna Attached to Rear Bumper Cover

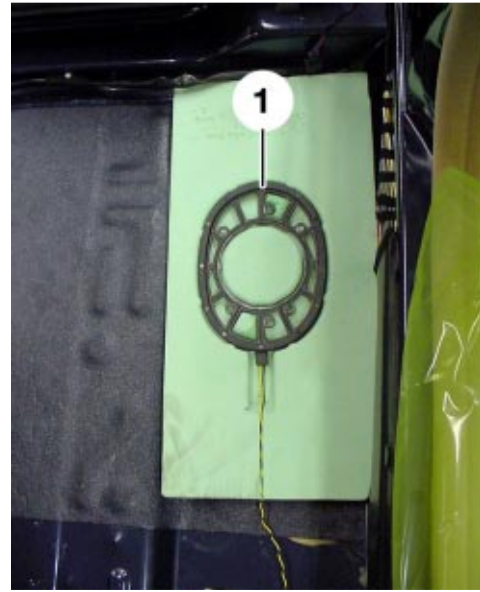
### Footwell Antenna Location

The antennas are embedded in the insulating material located beneath the carpet.



Index	Explanation
1	Right Front Footwell
2	Left Front Footwell

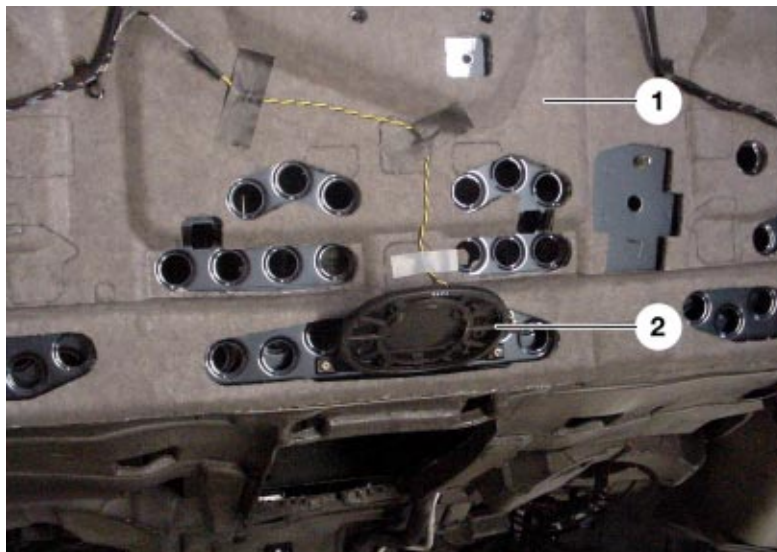




Index	Explanation
1	Right Rear Footwell
2	Left Rear Footwell

### Rear Parcel Shelf Antenna Location

The antenna is installed at angle in a holder and secured to the front edge of the rear parcel shelf



Index	Explanation
1	Rear Parcel Shelf
2	Antenna



### Trunk Antenna Location

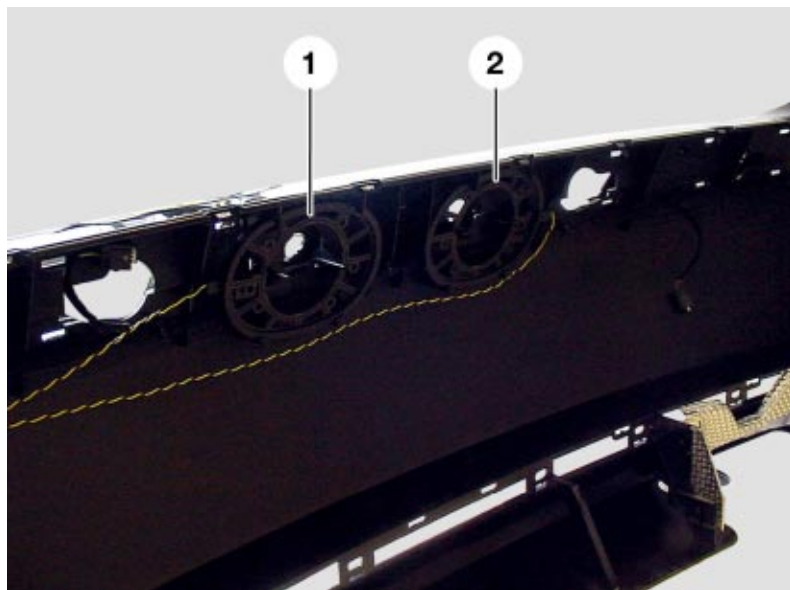
The antenna in the trunk is clipped into a housing and secured underneath the rear parcel shelf.



Index	Explanation
1	Antenna below Rear Parcel Shelf

### Bumper Antenna Location

Two antennas are installed on the inside of the rear bumper cover.



Index	Explanation
1	Right Rear Bumper Antenna
2	Left Rear Bumper Antenna

# ID Transmitter/Remote Control

The ID transmitter contains the following functions:

- Incorporates the normal remote control buttons
- Able to receive signal from transmitting vehicle antennas
- Signal encryption
- Transmission of encrypted high frequency information
- Mechanical Keys

Since the key does not need to be inserted into the holder to start the vehicle the battery of the remote control/ID Transmitter is no longer chargeable, therefore requiring the battery to be replaced. Under "average" usage the the battery may need to be replaced once a year.



Index	Explanation
1	Integrated Mechanical Key
2	Battery
3	Battery Cover

## Service Information

### Car Wash

If the vehicle is to be taken through a Car Wash the ID transmitter must be inserted into the 'Key' holder slot of the ignition switch while the engine is running in order to keep the parking gear from engaging automatically.

By inserting the ID transmitter with the engine running and gear engaged the Comfort Access functions are deactivated. If the engine is switched off via the start/stop button the "N" position is automatically engaged.

### CBS Data

At this time the transmission of Condition Based Service (CBS) data to the identification transmitter via the radio interface for the E65 is not possible.

In order to update the CBS data residing in the ID Transmitter, if the Passive Go function is being used (ID Transmitter is not being inserted into the "Key" holder slot on the ignition switch):

- Insert the ID Transmitter into the slot of the ignition switch
- Hold the central-lock rocker switch for approx. 10 seconds in the "Unlock" position
- An audible gong will indicate that the key data has been updated

### Door-Selective Unlocking

Door unlocking is performed selectively if "selective unlocking" is coded in the key-memory function (otherwise "global unlocking").

To unlock the remaining doors with door-selective unlocking, press the center-lock rocker switch into the "Unlock" position.

### Missing ID Transmitter

If the engine is started and the ID transmitter is removed from the passenger compartment of the vehicle as a result of a person leaving the vehicle while in possession of the ID Transmitter (driver change, someone is being dropped-off etc.):

- The engine is not automatically switched-off, as this is not permitted by law
- A Check Control message appears if a door is opened and then closed again
- Once the engine has been switched off, it can be restarted within 10 seconds even if there is no identification transmitter inside the car (i.e. without valid drive authorization). This is important in the event the engine stumbles/stops on a railroad crossing and there is no identification transmitter inside the car.

For safety reasons the owner should carry the wallet key. The wallet key in conjunction with the adapter permits drive authorization; this enables the car to be driven even when the identification transmitter is missing.

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## Component Replacement

Despite being of the same design, the front and rear outside door handles on the passenger side are not interchangeable. Each Electronic Outer Door Handle must be installed in the correct installation location (note part numbers) so that the motor for unlocking the locking pawl (electric opening motor) operates properly.

In addition, each Electronic Outer Door-Handle has a logical bus address.

## Diagnosis

### Comfort Access Fault Memory

The following possible faults are stored in the fault memory of the Comfort Access Module:

- Overvoltage or undervoltage, terminal 30 (functional limits, Comfort Access)
- Short circuit to positive or open circuit or contact break in relays for all 5 interior antennas, trunk antenna and both bumper mounted antennas
- Faulty relay coil at all relays, sticking relay contact at all relays with antenna outputs
- Faulty output stage
- Excess temperature at output stage
- Faulty K-bus interface
- Sticking Hall sensor (TAGE)
- Faulty capacitive sensor (TAGE)

### Fault Memory, Electronic Outer Door-Handle

Faults detected by the Electronic Outer Door-Handle are stored in a non-volatile memory which is able to store a maximum of 16 faults.

The faults are stored in the order in which they occurred.

Flash programming for the Electronic Outer Door-Handle is not planned.

### Initialization

For the Comfort Access System, the following components must be initialized after being replaced:






- Comfort Access Module
- Electronic Outer Door Handles

The initialization is triggered by switching ignition to Term R, which results in the CAS transmitting the initialization automatically to the Comfort Access Module. The Comfort Access Module then transmits a signal to the Electronic Outer Door Handles.

Initialization can also be performed via a test module for Comfort Access Initialization.

## Check Control Messages

There are five Check Control Messages that can be displayed pertaining the the Comfort Access system:

Control unit	Fixed indicator lamp	Variable indicator lamp	Check Control message	Note in control display
CAS		 KT-9202	Identification transmitter does not respond!	Identification transmitter not present or malfunctioning, see Owner's Handbook.
CAS		 KT-9164	Identification transmitter battery flat!	Replace battery of identification transmitter with integrated key, see Owner's Handbook.
CAS		 KT-9114	Identification transmitter!	Comfort access deactivated. AUTO P is not possible with engine OFF. Take identification transmitter with you when exiting car.
CAS		 KT-9114	Identification transmitter in car interior!	Double locking of car not possible. Remove identification transmitter from car interior.
CAS		 KT-9114	Identification transmitter not present!	Identification transmitter not in vicinity of car, therefore double locking not possible. Carry identification transmitter with you.