Remote control services (FBD)

- Introduction

Remote control services are standard features of today's automobiles. Services of this type in the current product line-up include:

- Telestart hand transmitter for independent heating/ independent ventilation (SA) and independent air conditioning
- Remote control of the central locking system (FZV)
- Integrated universal remote control (SA)

- Functional description

In this system, the various transmitters, e.g. Telestart and FBD transmitter, act on a central inboard FBD receiver which relays the data to the CAS control unit via a separate interface to be evaluated and executed. The system comprises the following components:

Depending on equipment fitted and encoding, the following functions are possible:

- Remote control of the central locking system (ZV)
- Arm and disarm anti-theft alarm system (DWA) (SA 302)
- Deactivate passenger-compartment sensor
- Activate panic mode*
- Unlock tailgate
- Open/lock tailgate*
- Switch on interior lighting
- Activate/deactivate Telestart of independent heating/ independent ventilation
- Activate/deactivate Telestart independent air conditioning
- Telestart alarm

* country-specific

Evaluation of telegrams received by the FBD key

The remote-control telegrams are broadcast as high-frequency signals (HF signals) after pressing a button on the radio-control key or Telestart hand transmitter.

The signals are received by the rear window antenna, relayed to the FBD receiver, demodulated and encoded. The operating prompt, e.g. "Open central locking," is sent via a separate data interface to the CAS. The function requested by the operator is then implemented in the vehicle electrical system via the K-CAN SYSTEM and K-CAN PERIPHERY.

FBD range

The range of the remote control services can vary to a great extent. This is dependent on the location of the remote control in relation to vehicle and other physical conditions.

The radio-control key has a minimum range of approx. 10 m. The Telestart hand transmitter has a maximum range of approx. 220 m.

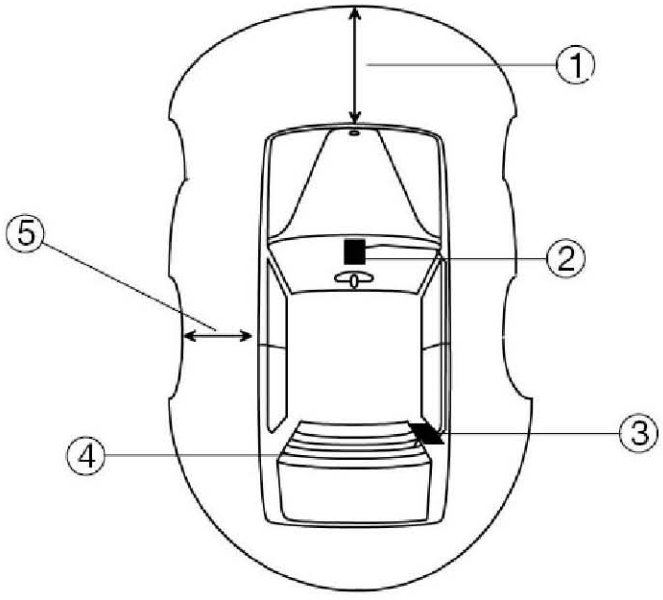

Fig. 17: Range profile of radio-control key

Index	Description	Index	Description
1	Maximum	3	FBD receiver
2	CAS control unit	4	Rear window aerial
5	Minimum		

- Components

FBD key

The FBD key comprises a transponder (transmitter + responder) and an electronic evaluation unit. The voltage supply of the FBD key is provided by an integrated rechargeable battery which is charged during vehicle operation via a 125 kHz interface in the ignition and steering wheel lock (CAS receptacle) as from terminal R. The rechargeable battery voltage is monitored independently by the radio-control key and transferred to the vehicle.

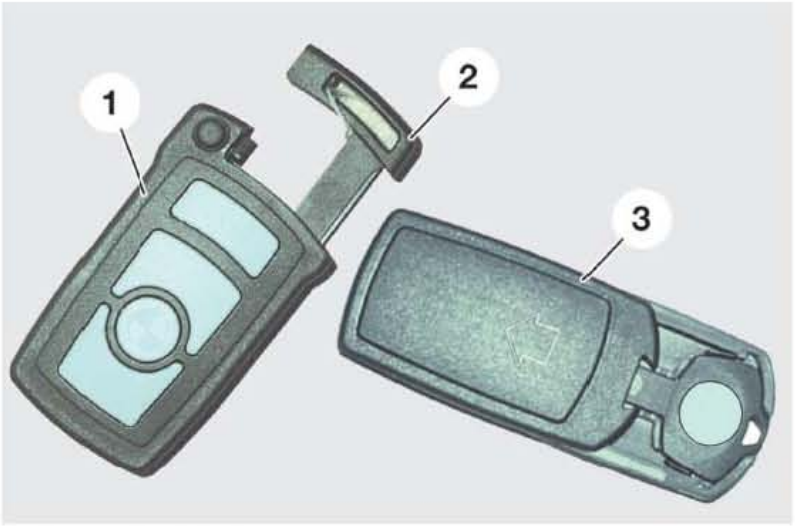

Fig. 18: FBD key and wallet key

Index	Description	Index	Description
1	FBD key	3	Wallet key with adaptor
2	Plug-in key		

FBD receiver

The FBD receiver is located in the aerial amplifier. As is the case with the radio-control key, various FBD receivers exist on account of the different national telecommunication regulations which apply. The FBD receivers differ from one another in terms of their carrier frequency. The Low Power country version (Japan, Korea) uses amplitude modulation.

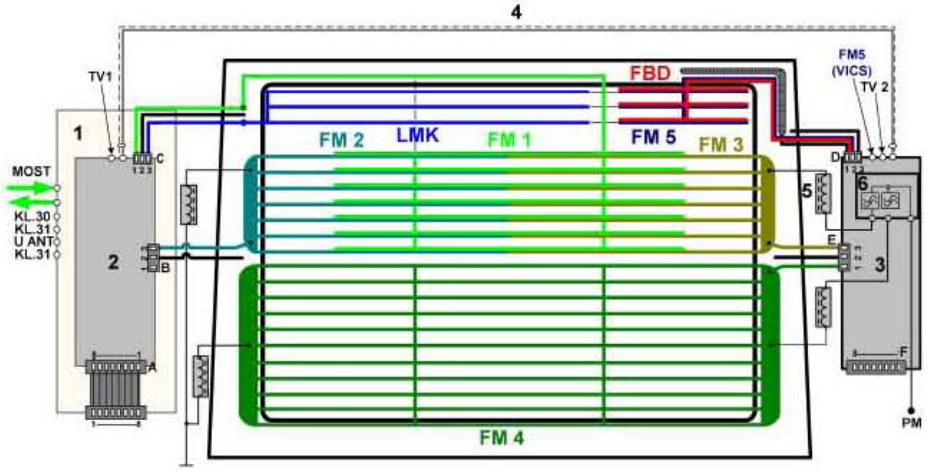

Fig. 19: Installed position of aerial amplifier with an integrated electronic receiver

Index	Description
1	Aerial tuner
2	Aerial diversity
3	Aerial amplifier
4	Coaxial cable
5	Rejector circuit chokes are integrated in the connecting leads
6	Blocking circuit
LMK	AM aerial for long, medium and short waves
FM 1	First FM aerial for very high frequency waves
FM 2	Second FM aerial for very high frequency waves
FM 3	Third FM aerial for very high frequency waves
FM 4	Fourth FM aerial for very high frequency waves
FM 5	FM aerial for traffic information announcements - Japan VICS
FBD	Aerial for remote control services
TV 1	TV aerial for television reception worldwide
TV 2	TV aerial for television reception worldwide
PM	Power module
U ANT	Power supply for aerial modules

Telestart hand transmitter

The Telestart hand transmitter is available in two variants, depending on vehicle equipment. If the vehicle is equipped with independent air conditioning (SA 539), the Telestart hand transmitter has a second operator control level.

The Telestart hand transmitter comprises the following components:

- 3 buttons
- 3 light emitting diodes (LEDs)
- Microcontroller
- Battery/battery compartment with polarity reversal protection
- Transmitter unit
- Aerial
- Quartz crystal

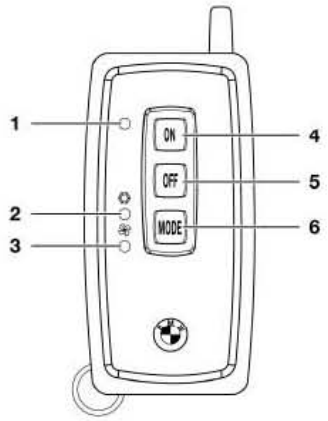

Fig. 20: Hand transmitter

Index	Description
1	LED 1: status indicator flashes if independent air conditioning or independent heating/independent ventilation is switched on
2	LED 2: engine start-up and independent air conditioning "on"
3	LED 3: independent heating/independent ventilation "on"
4	Level 1: engine start-up and independent air conditioning "on" Level 2: independent heating/independent ventilation "on"
5	Level 1: engine shutdown and independent air conditioning "off" Level 2: independent heating/independent ventilation "off"
6	Level 1 and 2 function buttons

- Initialization and encoding

Initialization of the FBD key in the CAS

The FBD key is initialized automatically via the transponder interface.

Initialization of the Telestart hand transmitter

Unlike the FBD key, the Telestart hand transmitter is required to be initialized manually. Two transmitters can be initialized and used simultaneously per vehicle.

The initialization procedure is as follows:

1. Insert the key into the ignition and steering wheel lock (CAS receptacle) of the unlocked vehicle.

   A valid key must be identified by the CAS. Following this, the CAS is ready for initialization for a period of 30 s.

   Remove the key from the ignition and steering wheel lock.
2. Hold down the stop button on the Telestart hand transmitter for max. 15 s. At the same time, briefly press the start button three times within 10 s.
3. Release both buttons. The LED flashes for max. 10 s.

   The central locking indicates the successful initialization of the Telestar hand transmitter by immediately locking and unlocking the vehicle.
4. If no feedback is received from the central locking system, the initialization procedure must be repeated.

After initializing the first Telestart hand transmitter, another Telestart hand transmitter can be initialized. During the initialization procedure, care should be taken to ensure that all Telestart hand transmitters which belong to the vehicle and/or are being used by the customer are initialized. For each additional Telestart hand transmitter, the sequence of operations must be repeated as from step 2.

- Integrated universal remote control

Introduction

The integrated universal remote control replaces up to three hand transmitters for various devices, e.g. door openers, alarm systems or door locking systems. It recognizes and "learns" the signal transmitted by each individual original hand transmitter.

The signal of an original hand transmitter can be programmed to one of the three channel buttons. The device in question is operated with the channel button programmed in this way.

The integrated universal remote control uses radio frequencies only. Transmission of the signal is indicated by the indicator lamp.

During the programming procedure and prior to remote activation of a programmed device by means of the integrated universal remote control, it is important to ensure that no persons, animals or objects are located within the range of the device in question (e.g. garage door) as a precaution against injury.

The safety precautions for the original hand transmitter must also be heeded.

Original hand transmitter

If the symbol below is depicted on the packaging or in the instructions for use of the original hand transmitter, it may be assumed that this original hand transmitter is compatible with the integrated universal remote control.

Fig. 21: Symbol on original hand transmitter

Check for random code

The instructions for use of the original hand transmitter describe how to check whether or not the original hand transmitter is equipped with a random code system. Alternatively, a channel button can be programmed to carry out this check.

Now hold down the programmed channel button on the integrated universal remote control. If the indicator lamp on the integrated universal remote control flashes quickly for two seconds and then stays on, this means that the original hand transmitter is equipped with a random code system and that the channel buttons can be programmed accordingly.

- Programming

Programming the integrated universal remote control

Fig. 22: Integrated universal remote control

Index	Description
1	Program buttons

To program a channel button with the signal of the original hand transmitter, follow this procedure:

1. Ignition lock position (terminal 15).
2. For initial operation, follow this procedure: press the two outer buttons (1) until the indicator lamp (on the left of the program button) begins to flash, then release the buttons. The three channel buttons are cancelled.
3. Hold the original hand transmitter max. 5 cm away from the channel buttons.
4. At the same time, press the transmit button on the original hand transmitter and the desired channel button on the integrated universal remote control. Release both buttons when the indicator lamp begins to flash quickly.
5. To program additional original hand transmitters, repeat steps 3 and 4.

Programming a random code

For instructions for programming the integrated universal remote control, refer to the operating manual of the device. To use the integrated universal remote control with a random code system, additional programming steps are necessary.

A second person simplifies the programming procedure.

1. Program the integrated universal remote control as described previously.
2. Hold down the programming button on the receiver of the equipment for approx. two seconds until the programming lamps on the device come on.
3. Press the desired channel button on the integrated universal remote control three times.

Programming an individual channel

1. Press the channel button to be programmed. The indicator light either flashes quickly for 2 s and then remains on permanently (random code system) or it comes on permanently straightaway. After 20 s the indicator lamp begins to flash slowly. Do not release the button yet.
2. Hold the handheld transmitter approx. 5 cm away from the integrated universal remote control, then press and hold down the key on the handheld transmitter.
3. If the indicator lamp begins to flash quickly, release both buttons.

Cancelling the channel buttons

Individual channel buttons cannot be cancelled. The three channel buttons can be jointly cancelled by following the procedure described below.

Press the two outer channel buttons on the integrated universal remote control until the indicator lamp begins to flash, then release these buttons.

All channel buttons are cancelled.

- Service information

Meaning of LED indications

LED indication	Universal remote control
LED is permanently lit	Signal is being transmitted (programmed signal or predefined code)
LED is slowly flashing	Programming (teach-in) mode
LED is flashing quickly	Programming acknowledge
LED flashes quickly (1 - 2 s) then stays on	Random code is being programmed
LED is off	No voltage supply or default code reloaded

Programming

The most frequent source of error is programming error.

Another common fault source is the use of weak batteries in the handheld transmitter.

Frequency range

The system operates in the frequency bands 27-40 MHz and 433.2 MHz. Faults and malfunctions are attributable to radio waves emitted by other transmitters at these frequencies.

If the customer does not know the frequency range of his original hand transmitter, then he should use the compatibility tester.

Compatibility tester

The compatibility tester is used primarily as auxiliary equipment. If the original transmitter can be programmed on the compatibility tester, then the frequency is within the above parameters. If it cannot be programmed, the customer should be offered an additional receiver. This additional receiver is connected to the original system and "translates" the incoming radio telegrams.

The compatibility tester is plugged into the cigarette lighter and is programmed in the same way as the universal remote control.

If the compatibility tester can be programmed but the universal remote control cannot, then the inboard unit is probably defective. In this case, the customer should check the function in question (e.g. garage door) using the compatibility tester.

If both systems are not capable of executing a particular function (e.g. open garage door), the following causes of error are possible:

- The original system uses random code
- The original system is incompatible with the universal remote control (offer the customer an additional receiver)