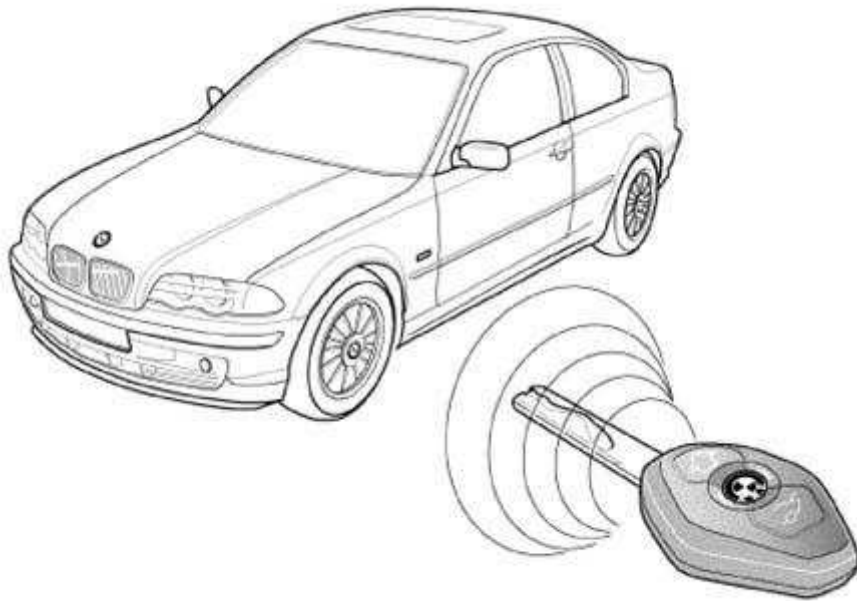


ACCESSORIES & BODY, CAB

Remote Keyless Entry - SI Techniques - All Models (Model Year 09/1999 And Up)

NEW RADIO REMOTE CONTROL (RKE)

All Models Beginning 09/99



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Fig. 1: Identifying New Radio Remote Control
Courtesy of BMW OF NORTH AMERICA, INC.

1. RADIO TECHNOLOGY

Radio technology is a comprehensive term covering all areas of cordless telecommunication such as telephone, radio, television. Transmission is by means of electromagnetic waves.

Due to the fact that the radio waves are not limited to one single direction and have a wider range than the infrared waves, this technology is also being increasingly employed in remote controls.

The same remote-control technology is used in motor vehicle construction as, for example, in construction site cranes, in model construction, alarm systems, garage-door opening systems etc.

These remote controls are operated on the same approved frequency (315 MHz or 433.92 MHz).

2. RADIO REMOTE CONTROL, GENERAL INFORMATION

The radio remote control for the central locking system (FZV) is a further development of the radio-compact

remote control, or the radio remote control which first appeared in the E38.

The radio transmitter is still located in the grip of the car key, the receiver module is installed in the vehicle. All radio telegrams are encoded by means of a constantly changing code. This ensures that the vehicle cannot be opened by someone who has eavesdropped telegrams.

Depending on vehicle type, equipment and country-specific version, in addition to the functions "opening/closing central locking system" and "central arrest" the following functions are also available: "activating/deactivating alarm system", "deactivating tilt sensor/passenger-compartment sensor", "convenient opening/closing window and sliding roof", "switching on interior lighting" and "opening/closing luggage compartment lid".

The remote control keys can be initialized at the vehicle without visiting a BMW Service point when, for example, the owner requires additional keys or, for security reasons, following the loss of a radio remote control key. The initialization procedure is described in the respective Owner's Handbooks.

The radio remote control is available as standard equipment in the models E38, E39, E46 and as an option in the E36 models (option 302).

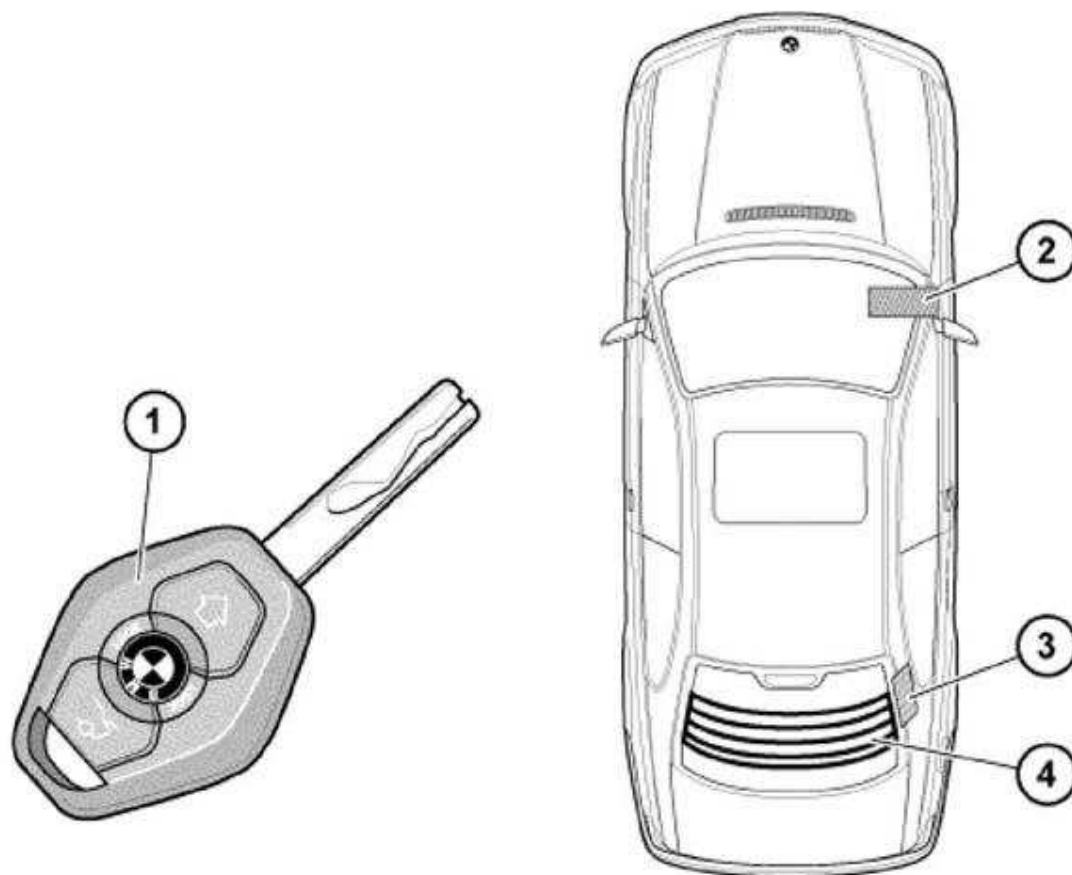
Up to 4 radio transmitters can be operated per vehicle.

In many countries, radio remote controls are subject to radio-technical registration specifications. The required designation is on the key grip.

3. SYSTEM OVERVIEW

The radio remote control consists of:

1. Radio transmitter (integrated in the key grip)
2. General module of the central body electrics (ZKE)
3. Receiver module (integrated in aerial amplifier or aerial diversity)
4. Aerial in rear window or rear side window on touring



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Fig. 2: Identifying RKE Components & Locations
Courtesy of BMW OF NORTH AMERICA, INC.

The reception of the radio signals from the transmitter varies according to location in relation to vehicle. The rear area (aerial) of the vehicle is the reference point.

External influences can cause the range or operation of the remote control to deviate from the mean distances specified below either **positively** (through reflection) or **negatively** due to sources of interference (radio-technical systems).

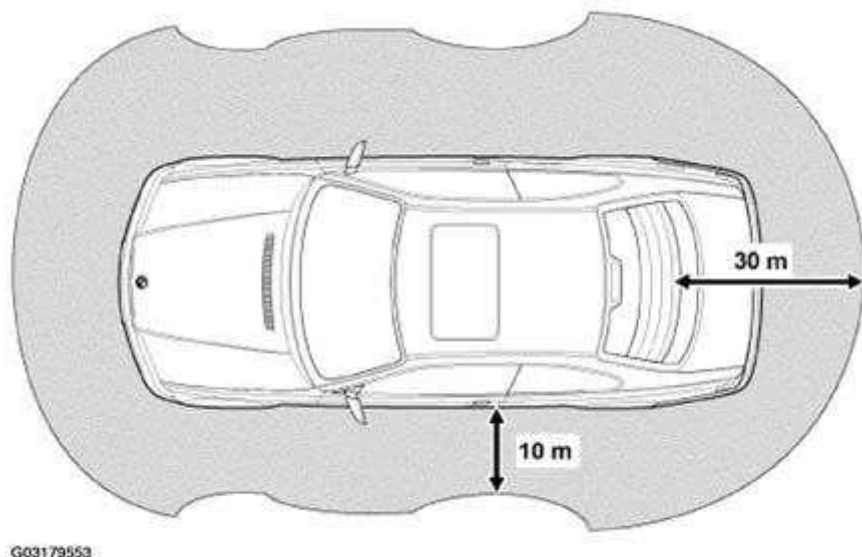


Fig. 3: Identifying RKE Range Of Operation
Courtesy of BMW OF NORTH AMERICA, INC.

External radio-technical systems/equipment that are operated on the same frequency (433.92 MHz; 315 MHz; 70 cm band) with a higher output can interfere with the remote control function. Possible sources of interference are:

- Radio Headphones (Known As Cordless Headphones)
- Radio Sets (Amateur Radio; Radio Telephone; Toy Models)
- Radio Modems
- Garage-Door Remote Controls
- Telemetry Transmitters, E.G. Weather Station With Temperature Sensor
- House Burglar Alarm Systems With Sensors
- Remote-Controlled Sockets
- Radio Bells (For Paging)
- TV Radio Systems (Reverse Channel For Television Remote Control)
- Industrial Plants
- Non-Suppressed Electric Motors

4. REMOTE CONTROL FUNCTIONS

- Opening/closing central locking system (ZV)
- Switching on interior lighting
- Activating/deactivating anti-theft alarm system (DWA)
- Activating/deactivating tilt sensor and interior protection of the anti-theft alarm system
- Opening/closing side windows

- Opening/closing sliding roof
- Opening/closing luggage compartment lid
- Activating/deactivating Panic Mode - only US models

If required, this function can be used to trip an alarm via the DWA.

5. OPERATING RELIABILITY

As of ignition lock position 1 (terminal "R", no more remote control functions are carried out.

If the ignition lock switches to position 1 following "Central arrest" of the central locking system (ZV), the ZV changes "Central arrest" to "Central locking".

If there is a key in the ignition lock which is recognised as valid by the electronic immobiliser III, the central locking system cannot be actuated in "Central arrest".

Due to the high range, "Convenient closing" of the rear vent windows is not possible on the E46 coupe as these windows do not have an anti-trap function.

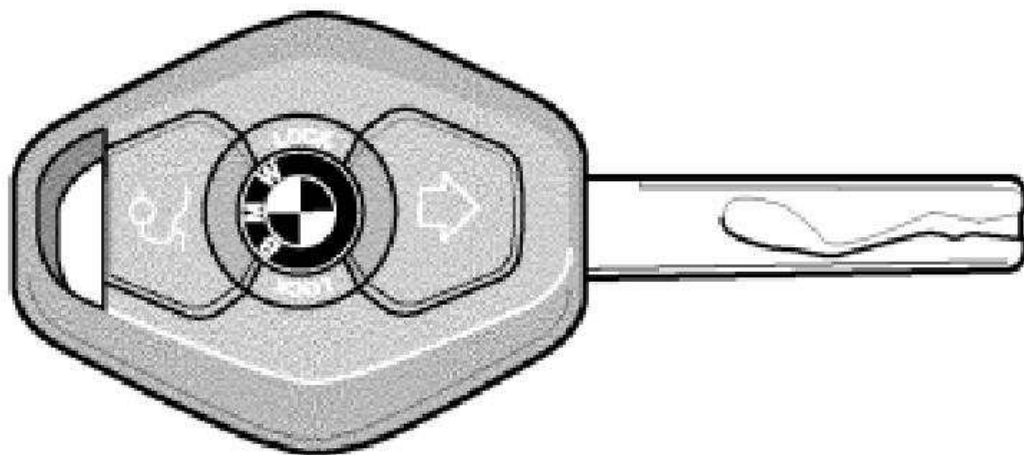
All of the comfort functions and closing of the automatic luggage compartment lid operate only as long as the appropriate button is actuated on the remote control key.

6. NEW RADIO TRANSMITTER (KEY)

Beginning in September 1999, a new generation of radio transmitters will be introduced into series production.

The most important basic functions are the same as those of the present transmitters.

The operating functions will still be actuated via three buttons.



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Fig. 4: Identifying New Radio Transmitter (Front Of Key)
Courtesy of BMW OF NORTH AMERICA, INC.

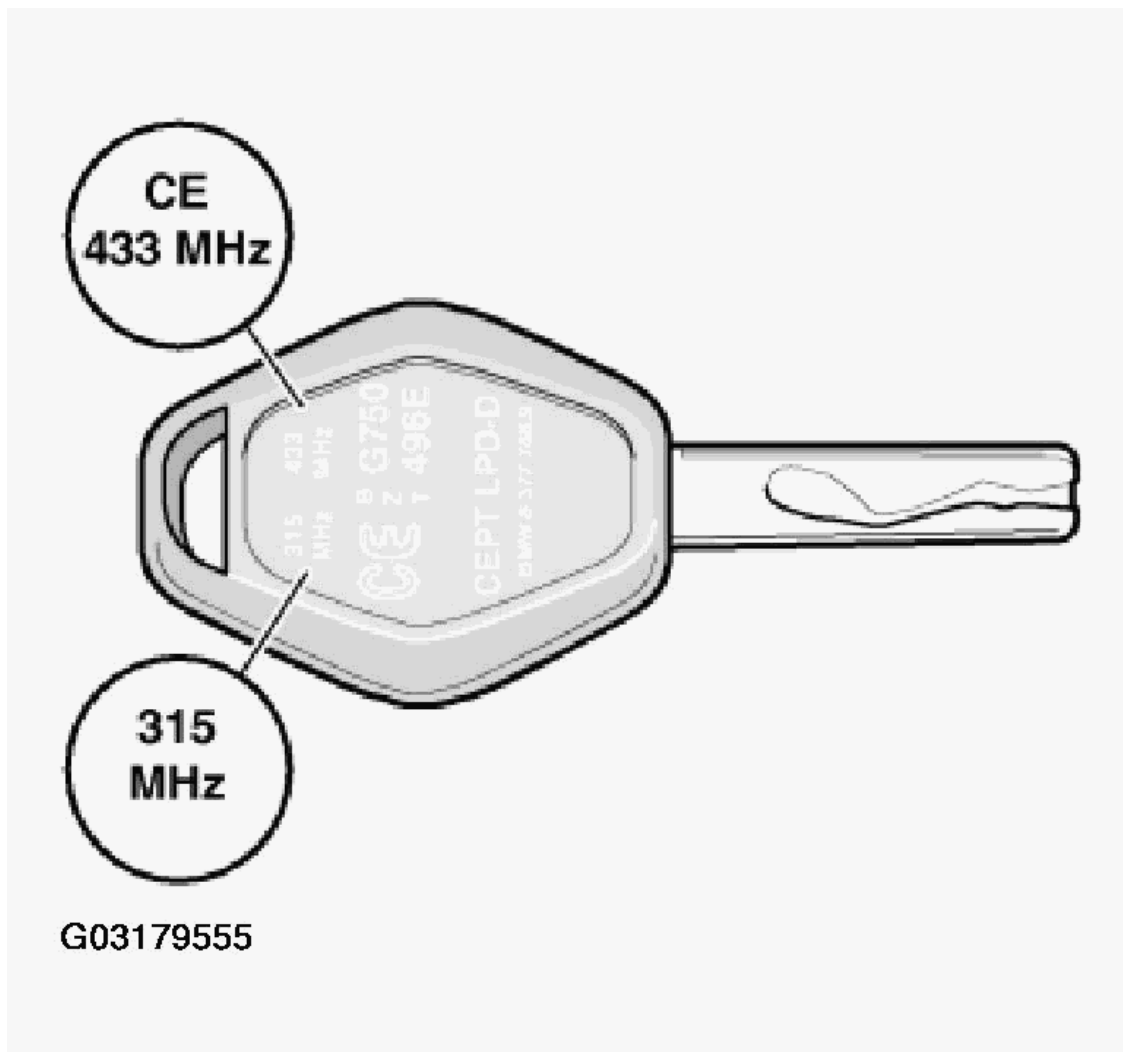


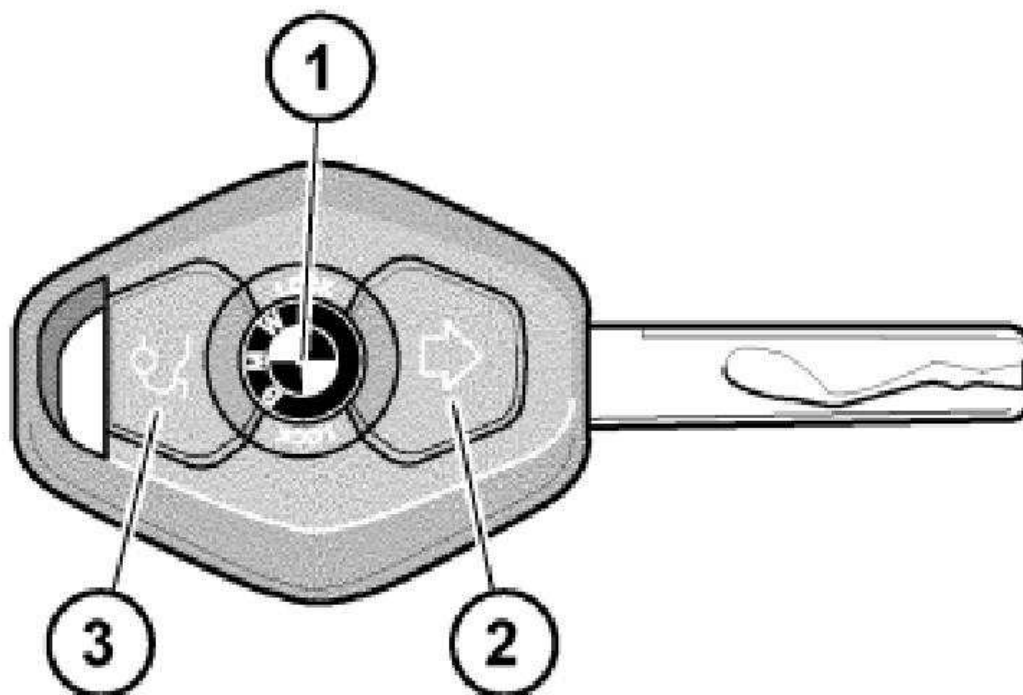
Fig. 5: Identifying New Radio Transmitter (Back Of Key)
 Courtesy of BMW OF NORTH AMERICA, INC.

Overview Of Modifications:

1. New appearance with coloured BMW logo.
2. New keyboard arrangement and larger keys.
3. A storage battery instead of a regular battery, charged via the ring aerial at the ignition lock.
4. The key casing is waterproof, dustproof, sealed and cannot be opened.
5. The function display (red LED) has been omitted.

6.1 Operating Principles Of Input Keys

(Basic Functions)



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Fig. 6: Identifying RKE Input Buttons
Courtesy of BMW OF NORTH AMERICA, INC.

Press **button 1** briefly:

- Central locking system closes, moves into central arrest, the DWA may be activated.
- The interior lighting is switched on when the vehicle is locked.
- Panic Mode (on US models) is deactivated again.

Press **button 1** a second time after a short interval:

- The interior protection and tilt sensor of the DWA are deactivated

Press **button 1** and hold in:

- Central locking system, side windows and sliding roof close ("Convenient closing").
- This function is encoded differently from country to country and is not available in all national versions.

Press **button 2** briefly:

- Central locking system opens, interior lighting switches on, the DWA may be deactivated.

Press **button 2** and hold in:

- Central locking system, side windows and sliding roof open ("Convenient opening").

Press **button 3** briefly:

- Luggage compartment lid opens.

Press **button 3** and hold in:

- Panic Mode (on US models) is active again.
- Automatic luggage compartment lid closing.

Individual functions may deviate from those described above; this depends on the respective country-specific encoding and the settings made via Car & Key Memory.

6.2 Signal Processing

Signal processing is by means of a microprocessor on the printed circuit board in the key casing. This microprocessor:

- Evaluates The Key Actuations,
- Generates The New Key Code,
- Relays The Key Code,
- Controls Transmitter Output Stage,
- Monitors Power Supply (Storage Battery) For Radio Transmitter.

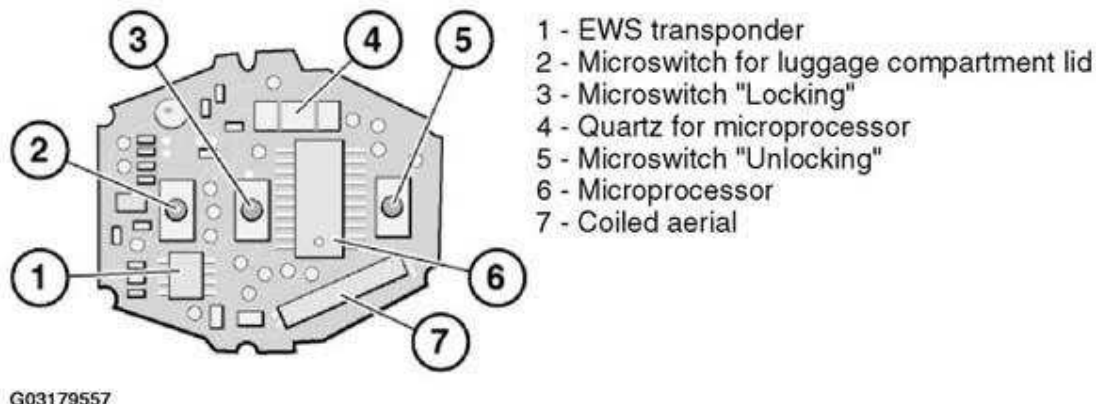


Fig. 7: Identifying RKE Components On Printed Circuit Board Of Key
 Courtesy of BMW OF NORTH AMERICA, INC.

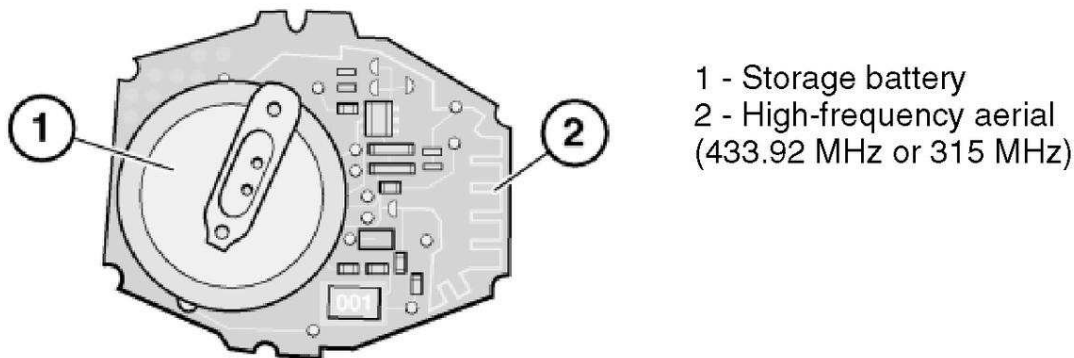
The signals transmitted via the transmitter output stage are radiated via an aerial integrated on the printed circuit board. The carrier frequency is 433.92 MHz (ECE) or 315 MHz (US), depending on country-specific registration.

When the system is being initialized, a key code is created and stored in the microprocessor of the radio transmitter. Following every key actuation at the radio transmitter, a new key code is transmitted (changing code). The codes are recalculated according to a specified process so that the receiver module can differentiate reliably between its own and external radio transmitters.

NOTE: Each transmitter can "lose" its key code if, e.g., someone inadvertently actuates buttons in the initialization sequence outside the car. In this case, all radio transmitters belonging to the car must be re-initialized.

6.3 Power Supply

The new radio transmitter does not use regular batteries but rather a rechargeable vanadium-lithium storage battery. New radio transmitters will be supplied with charged storage batteries.



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Fig. 8: Identifying Storage Battery And High-Frequency Aerial
Courtesy of BMW OF NORTH AMERICA, INC.

As of ignition lock position 1 (terminal "R"), the storage battery is charged inductively. The charging process is realized via the ring aerial of the ignition lock and via the coiled aerial integrated in the radio transmitter. An electronic charging unit on the printed circuit board controls the charging process.

The battery is designed for a very long service life. A prerequisite is that the radio transmitter is used.

If radio transmitters are not used, the storage battery is discharged after approx. 18 months.

With severely discharged storage batteries, the charging period is approx. 30 hours up to maximum capacity. After charging for approx. 30 minutes, the remote control can be actuated approx. 15 times.

6.4 Voltage Monitoring

If cell-end voltage has been reached, the central locking system, for example, can no longer be locked using the remote control. The "Convenient closing" can no longer be used, nor can the radio transmitter be initialized.

Every time a button is actuated, the storage battery voltage in the radio transmitter is monitored. Once the storage battery signal is contained in three consecutive telegrams, it is stored together with the corresponding radio transmitter key number for diagnostic purposes in the general module of the central body electrics. The entry is deleted when five consecutive radio transmitter telegrams no longer contain the storage battery signal.

In the case of E38 and E39 models, this status is already indicated by a signal in the check control.

7. SYSTEM INITIALIZATION

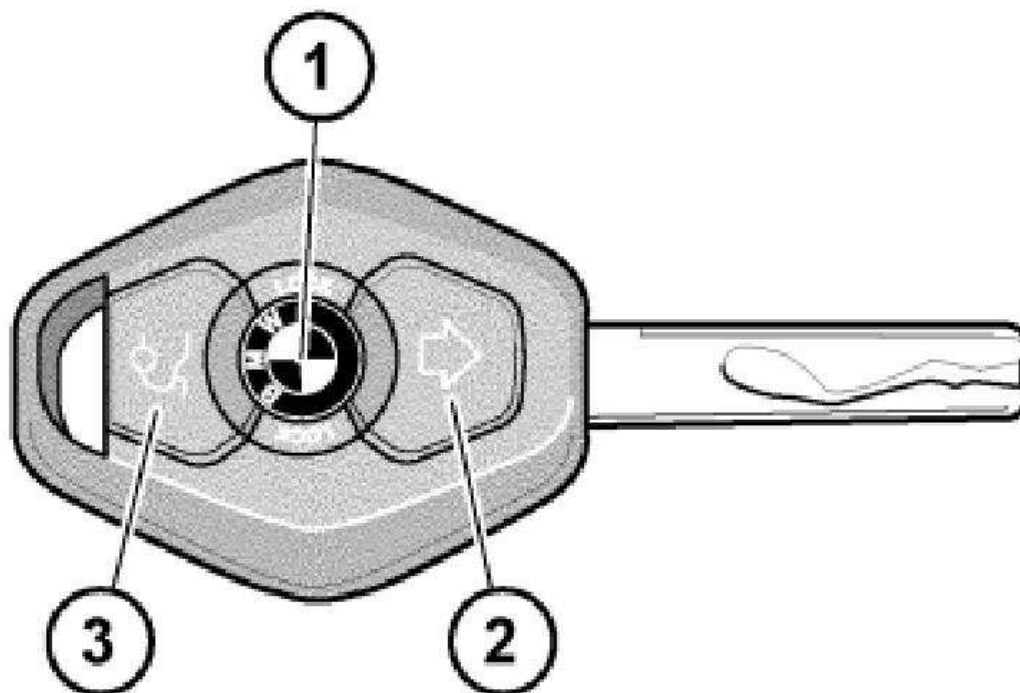
In order that the radio transmitters can communicate with the vehicle, each individual radio transmitter must be initialized with the receiver module.

Up to four radio transmitters can be initialized and used per vehicle.

Since each radio transmitter has its own key code, all existing radio transmitters must be reinitialized when, for example, a new radio transmitter is to be added.

Initialization Procedure:

1. Open central locking system (ZV) using the car key.
2. Get into the car and close all doors.
3. Using the car key, switch the ignition lock briefly to ignition lock position 1 and then switch off again. The switching time must remain under 5 seconds, otherwise the system is not ready for initialization.
4. At the radio transmitter: Press button 2 and hold in.
5. Press button 1 three times (in a space of 10 seconds). Button 2 must remain held in.
6. Release button 2.
7. The ZV signals by means of "Locking" and immediate "Unlocking" that a radio transmitter has been successfully initialized.



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Fig. 9: Identifying RKE Input Buttons

Courtesy of BMW OF NORTH AMERICA, INC.

If the ZV does not send a return signal, initialization must be restarted.

Once the first initialization process has been completed, another three radio transmitters can be initialized.

For every other radio transmitter, the procedure described under step 4) above must be repeated within 30 seconds, otherwise initialization stand-by is switched off.

During initialization, all other existing radio transmitters must be initialized. The ignition lock must never be reactivated during the initialization process. If this were to happen, then all radio transmitters would have to be re-initialized.

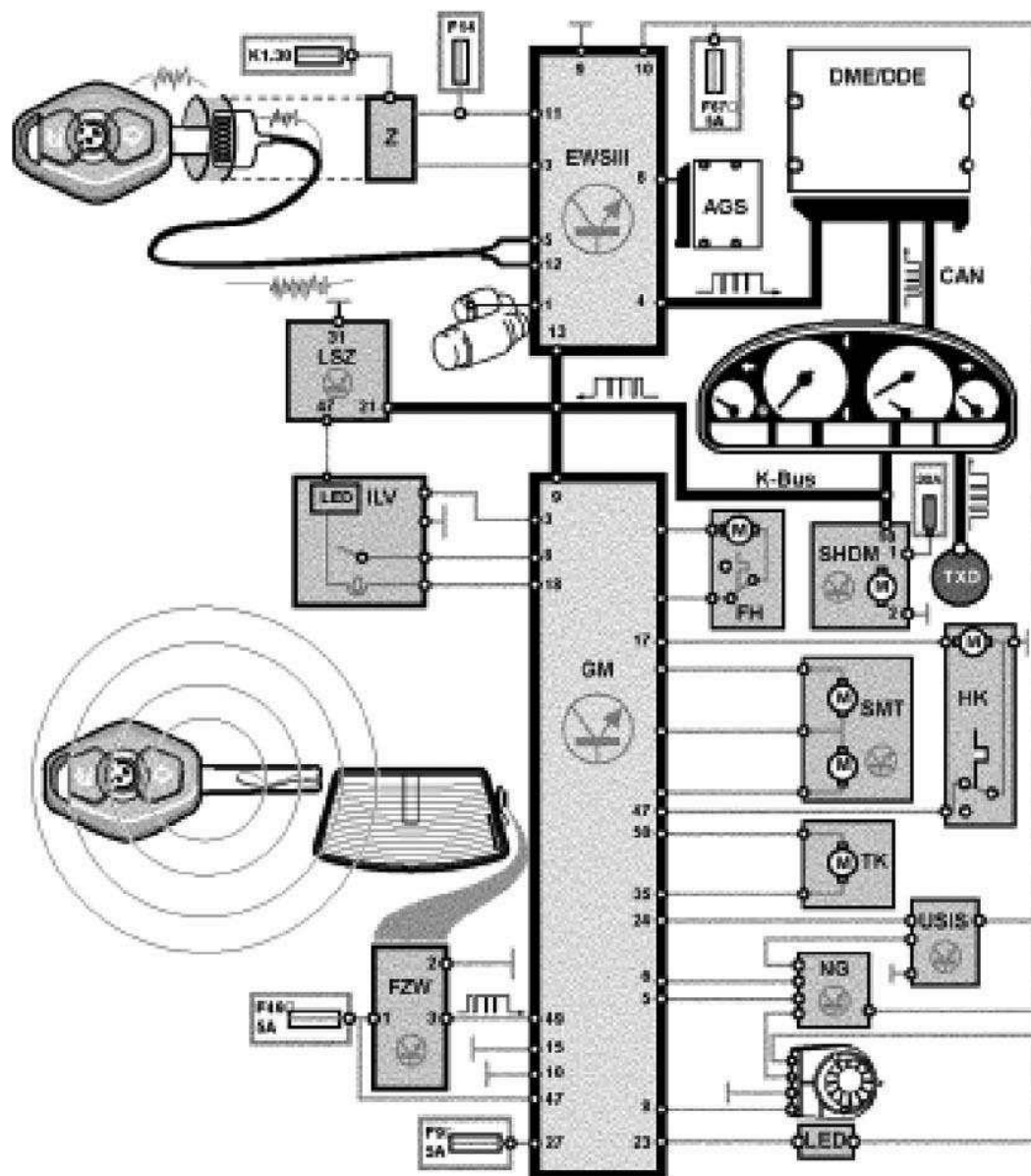
8. DIAGNOSIS

The radio remote control can be diagnosed via DIS and MoDiC under "Central body electrics - ZKE".

9. SYSTEM INTERCONNECTIONS

Various functions in the central body electrics, the anti-theft alarm system (DWA) and the electronic immobiliser (EWS) can be activated or deactivated by means of the radio transmitters.

During vehicle diagnosis, it is important to know how the radio transmitter influences the total system.



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Fig. 10: Identifying System Interconnections And Function (E46 Shown)
Courtesy of BMW OF NORTH AMERICA, INC.

SYSTEM INTERCONNECTION LEGEND

Component	Designation
Z	Ignition lock, electromechanical part
EWSIII	Electronic immobiliser, control unit
EWSIII/1	Output - starter signal (X1659)
EWSIII/3	Input - ignition/starter switch signal (X1659)
EWSIII/4	Output - engine control unit signal, uni-directional (X1659)
EWSIII/5	Output - ring coil signal (X1659)
EWSIII/6	Input - transmission control unit switch signal (X1659)
EWSIII/9	Ground/earth (X1659)
EWSIII/10	Input - terminal 30 of fuse F67 (X1659)
EWSIII/11	Input - terminal R from ignition lock via fuse F14 (X1659)
EWSIII/12	Output - ring coil signal (X1659)
EWSIII/13	Input/output - K bus signal (X1659)
F9	Terminal 30/5A fuse
F46	Terminal 30/30A fuse
F49	Terminal 30/5A fuse
F67	Terminal 30/5A fuse
LSZ	Central light switch
LSZ/21	Input/output K bus (X12)
LSZ/31	Ground/earth (X12)
LSZ/47	Output - search light signal (58g) (X12)
ILV	Interior lighting, front
ACS	Automatic transmission control unit
DME/DDE	Digital Engine Electronics/Digital Diesel Electronics
DME/33	Input - EWS release signal (X6004)
CAN	Controller Area Network (CAN bus)
K-Bus	Bodyshell bus
FH	Window lift (stands for all window lifts in vehicle)
SHDM	Sunroof module
SMT	Lock module (stands for all doors)
HK	Luggage compartment lid motor
TK	Fuel filler cap drive
USIS	Ultrasonic interior protection
NG	Tilt sensor
FZV	Radio central locking receiver
FZV/1	Input - terminal 30 signal of fuse F49 (X1143)
FZV/2	Ground/earth - (X1143)

FVZ/3	Input/output - radio transmitter signal (X1153)
GM	General module V
GM/3	Output - electric consumer cut-out signal (X332)
GM/5	Output - tilt sensor monitoring signal (X254)
GM/6	Input - tilt sensor monitoring, immobiliser signal (X254)
GM/8	Input - interior lighting switch signal, front, continuous operation (X253)
GM/8	Output - control signal, DWA emergency power siren alarm (X254)
GM/9	Input/output - K bus signal (X253)
GM/10	Ground/earth (X253)
GM/17	Output - luggage compartment lid unlocking motor signal to luggage compartment lid drive (X253)
GM/18	Input - interior lighting signal (X253)
GM/23	Output - DWA light emitting diode signal (X254)
GM/24	Input - passenger-compartment sensor signal (USIS) (X254)
GM/27	Input - terminal R of fuse F9 (X253)
GM/35	Output - fuel filler cap unlocking signal (X253)
GM/42	Input - luggage compartment lid contact signal from luggage compartment lid drive (X253)
GM/47	Input - terminal 30 signal of fuse F49 (X253)
GM/49	Input/output - radio remote control data line signal (X253)
GM/50	Output - fuel filler cap locking signal (X253)
TXD	Diagnostic bus to diagnostic connector