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F01 Rear Seat Entertainment System

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Rear Seat Entertainment System (RSE)

Model: F01/F02

Production: From Start of Production

OBJECTIVES

After completion of this module you will be able to:

- Describe the Rear Seat Entertainment System of the F01/F02
- Identify the components of the Rear Seat Entertainment System of the F01/F02
- Describe the functions of the Rear Seat Entertainment System

Introduction

History

Rear Seat Entertainment - E65

The rear seat entertainment system in the E65/E66 featured a folding rear display with a screen diagonal of 6.5" and a resolution of 400 x 240 pixels. The display was driven by the MOST control unit -rear display SG-FD. It converted the analog RGB signals into a digital LVDS signal.

In the E65/E66 it was already possible to listen to several audio sources simultaneously. For instance, while the driver listened to the radio through the speakers, the rear passenger could enjoy a CD through hard-wired headphones. The analog signals made available by the audio devices were placed on the MOST-bus. The headphone interface KHI prepared the signals separately for each headphone socket.

Hard-wired headphones could be connected to the headphone connection module.

Rear Seat Entertainment - E70

A larger rear display with a screen diagonal of 8" and a distinctly higher resolution of 800 x 480 pixels is fitted in the E70 with rear seat entertainment. The folding display is installed between the seats.

The rear display control unit and rear seat entertainment RSE are connected to the K-CAN. Picture transmission takes place directly via LVDS and the signal no longer needs to be converted. The RSE control unit features its own DVD player making it possible to conveniently change DVDs while driving.

External devices such as game consoles, video cameras and hard-wired headphones can be connected directly to the RSE control unit. A headphone interface KHI for signal processing is not required.

An infrared transmitter is integrated in the base of the rear display to allow operation of wireless infrared headphones.

The rear seat entertainment system is remote-controlled. All audio settings made with the remote control relate only to the hard-wired headphones.

Rear Seat Entertainment - F01/F02

Rear seat entertainment option (6FG) is part of the ZRP Rear entertainment Package available on the F01/F02 and is referred to as the "Mid version" in the ISTA Diagnostic Equipment.

The rear seat entertainment system F01/F02 features several innovations in terms of equipment and operation.

Two folding 800 x 480 pixel displays with an infrared transmitter are integrated into the backrests of the front seats. For the first time in a BMW vehicle, the RSE control units are integrated in the MOST-bus.

The Car Information Computer CIC serves as the master control unit of the MOST-bus. Please refer to the F01/F02 Bus Systems training material for detailed information on the MOST.

The rear seat entertainment system features:

- Two displays with a screen diagonal of 8" are fitted.
- The same program can be viewed on both screens.
- An external device (e.g. game console) may be connected to the right or left side of the RSE and the feed from the external device shown on the selected side.
- The system is controlled by remote control.

System Overview

Audio playback takes place either through the vehicle's speakers or via headphones. The volume of the speakers can be adjusted via the multifunction steering wheel, the head unit or with the remote control. The volume is controlled speed-dependent during playback through the speakers. The driving speed is registered by the wheel speed sensors.

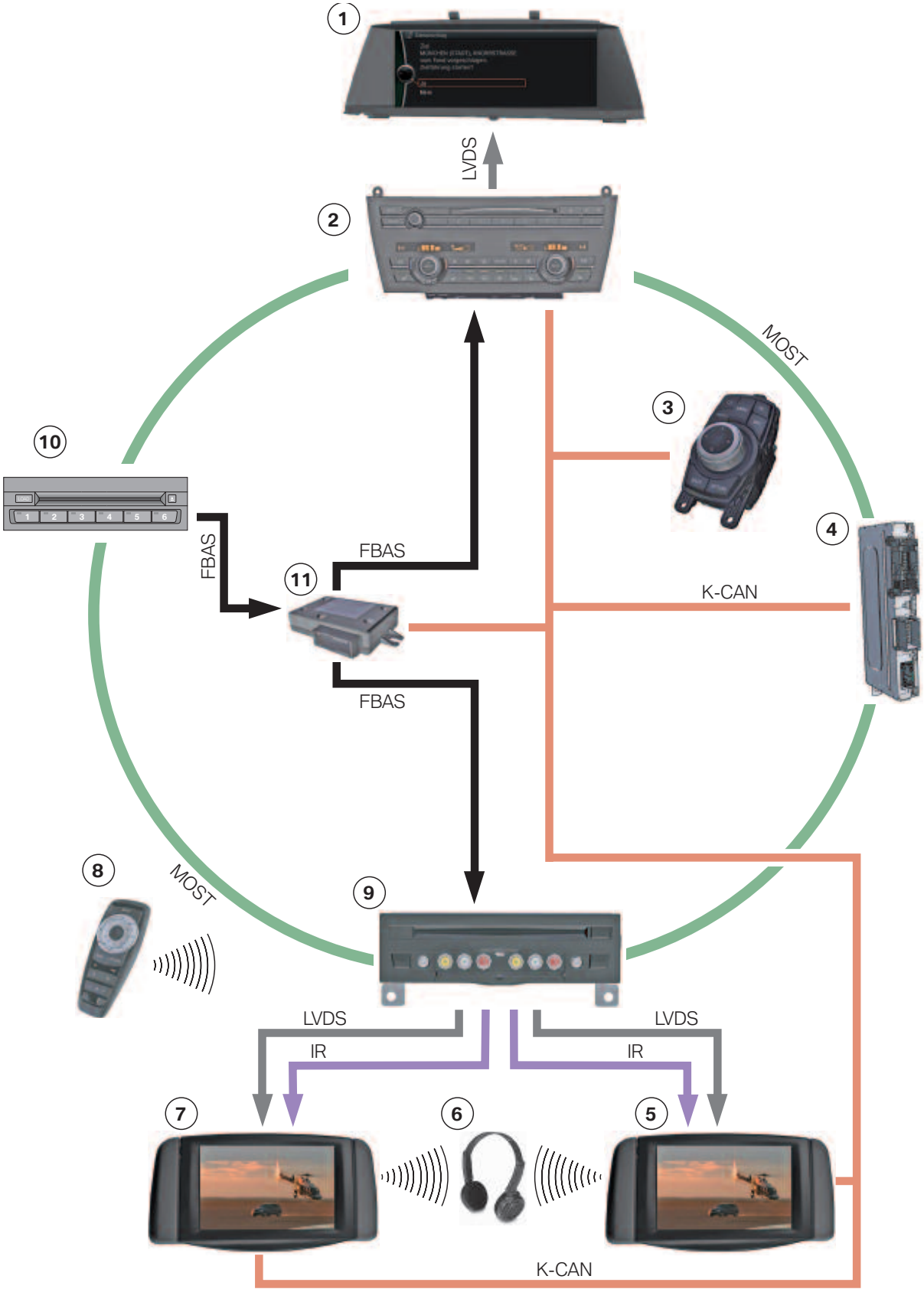
The sound settings can be configured on the CIC or with the remote control. If audio is played back via the headphones, the volume can be adjusted either on the headphones (infrared headphones) or using the remote control (hard-wired headphones). The infrared headphones receive their signals from the infrared transmitter.



Rear Seat Entertainment System (RSE)

External devices can be connected via the two AV inputs directly to the RSE control unit or via the AUX-In connection or the USB-audio interface in the center console. The USB-audio interface provides an additional jack and a USB connection for a type A USB connector.

Function diagram of the rear seat entertainment system



Index	Explanation	Index	Explanation
1	Central information display (CID)	7	Rear display FD with rear display control unit and infrared transmitter
2	Head unit, Car Information Computer (CIC)	8	Remote control
3	iDrive controller	9	Rear seat entertainment control unit (RSE MID)
4	Central gateway module (ZGM)	10	DVD changer (DVD)
5	Rear display FD2 with rear display control unit and infrared transmitter	11	Video switch (VSW)
6	Infrared headphones	12	Not for US

When playing a DVD in the CIC, the picture cannot be transmitted to the rear seat entertainment system. When playing a DVD in the RSE control unit the picture is not transmitted to the CIC. However audio playback is possible in both cases.

During playback via the DVD changer, picture and sound are transmitted to the CIC and the rear seat entertainment system.

For safety reasons, no picture is shown in the CID while the vehicle is being driven, although audio playback is still possible.

When an external device (e.g. game console) is connected to one of the AV inputs of the RSE control unit, the video signal is output on the right or left display depending on where the source is connected. A selected DVD can still be viewed on the other display.

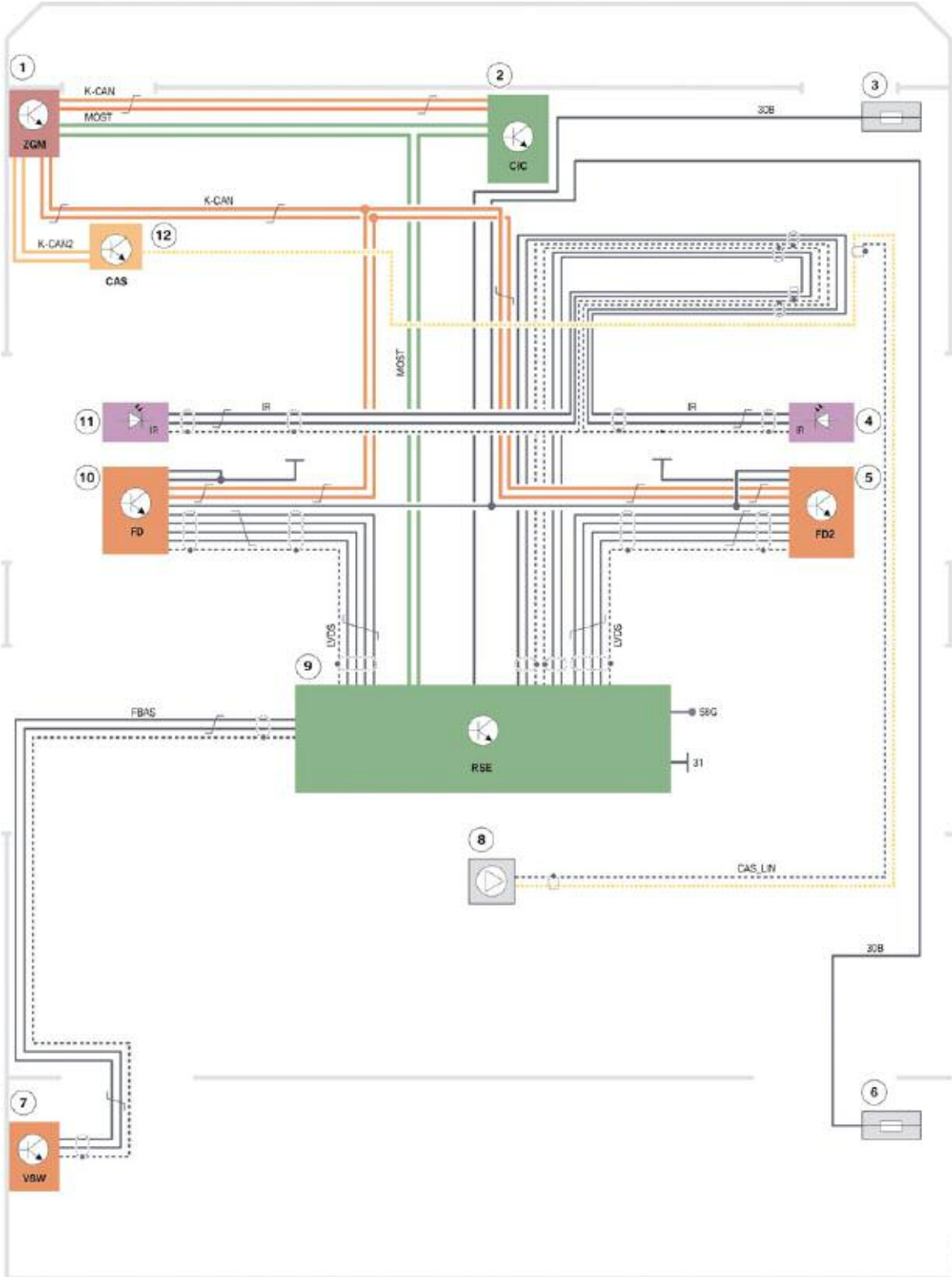
The RSE control unit features a FBAS or CVBS (composite video baseland signal) video signal input.

The RSE control unit has a CVBS video signal input connected to the DVD Changer through the video switch to display of media played in the DVD Changer on the rear screens. In this case the video switch is needed because a source with a CVBS output (e.g. DVD changer) is connected to the CIC and the RSE.

The CIC has only three CVBS inputs, If there are more than three video sources to be connected to the CIC a video switch has to be included to comply with the equipment configuration.

Note: (FBAS) Farb-Bild-Austast-Synchron is CVBS (Composite Video Baseband Signal) in which just the video signal is transmitted through a single wire with the audio signal handled separately.

RSE Circuit Diagram



Index	Explanation	Index	Explanation
1	Central gateway module (ZGM)	12	Car Access System 4 (CAS4)
2	Car Information Computer (CIC)	KL.30B	Terminal 30 basic operation
4	Infrared transmitter, right	KL.58G	Signal, footwell module light (FRM 3)
5	Rear display (FD2) with rear display control unit (SG-FD2)	FBAS	FBAS signal
6	Fuse	IR	Infrared signal
7	Video switch (VSW)	K-CAN	Body CAN
8	Aerial diversity module with aerial amplifier	K-CAN2	Body CAN2
9	Rear seat entertainment control unit (RSE)	LVDS	Low voltage differential signal
10	Rear display (FD) with rear display control unit (SG-FD)	MOST	Media Oriented System Transport
11	Infrared transmitter, left		

MOST Signals at RSE Control Unit

In/Out	Signal	Source/sink	Function
In	Control signals	FBD antenna > Antenna diversity module > CAS4 > ZGM >	RSE control (entertainment source, track selection, etc.)
In	Date, time	Instrument cluster>	Display in FD and FD2
In	RSE release	iDrive controller > CIC >	Access rights
In	Terminal status	> CAS4 > ZGM >	Activation conditions
Out	Control signals	> FD and FD2 > Display	ON/OFF, setting

K-CAN Signals at SG-FD and SG-FD2

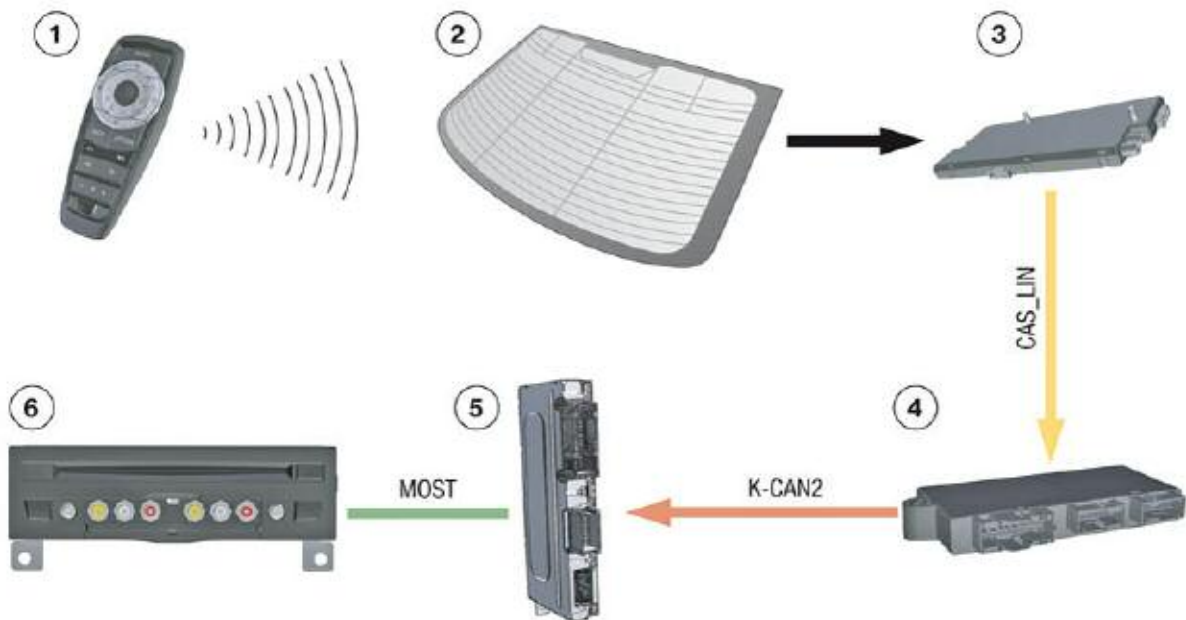
In/Out	Signal	Source/sink	Function
In	RSE status	RSE > ZGM >	RSE standby
In	FD and FD2 status	ZGM > RSE >	FD and FD2 standby

The FD and FD2 rear displays each have their own control unit. The SG-FD and SG-FD2 control units are connected to the K-CAN. The rear displays are connected via LVDS to the RSE control unit. All video information is transmitted via the LVDS link. The rear displays receive the ON/OFF signal from the RSE control unit. The ZGM places the MOST signal on the K-CAN and is sent to the rear displays.

During audio playback through the vehicle's speaker system, the RSE control unit routes the audio signal via the MOST to the head unit CIC or the Top-HiFi amplifier.

Programming, coding and diagnosis of the rear seat entertainment system (6FG) take place via MOST.

Function diagram - remote control of rear seat entertainment system



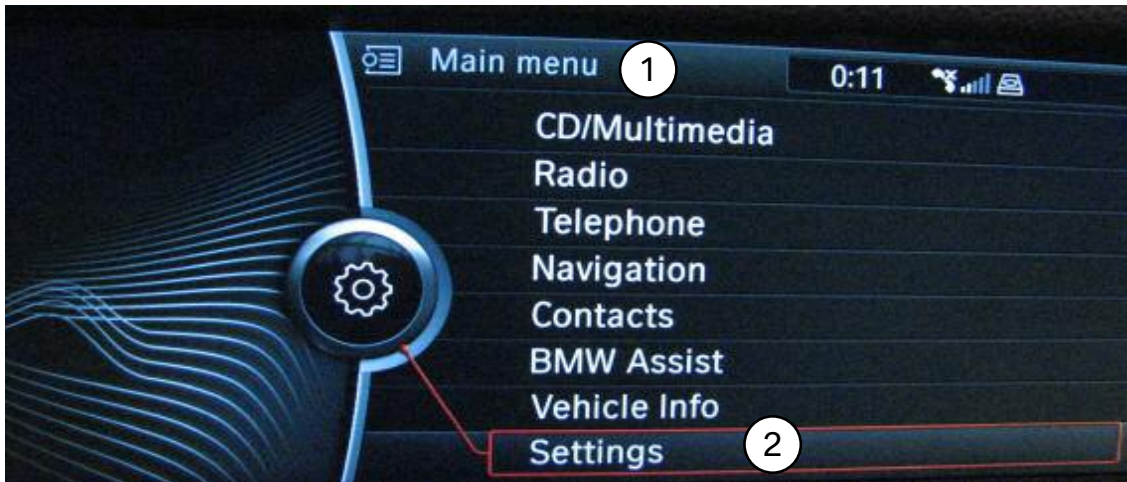
Index	Explanation	Index	Explanation
1	Remote control	4	Car access module 4 (CAS4)
2	Rear window with antenna, remote control services (FBD)	5	Central gateway module (ZGM)
3	Antenna diversity module with antenna amplifier	6	Rear seat entertainment control unit (RSE)

The commands entered by means of the remote control are transmitted by radio waves. The same frequency is also used for the radio remote control key. The frequency used is dependent on the national variant and therefore relevant for coding. The commands are received by the FBD antenna and routed via the antenna diversity module to the CAS4.

The CAS4 converts the signals into K-CAN2 messages and routes the signals to the ZGM. The ZGM places the signals on the MOST-bus. The RSE control unit receives the signals via the MOST.

System Functions

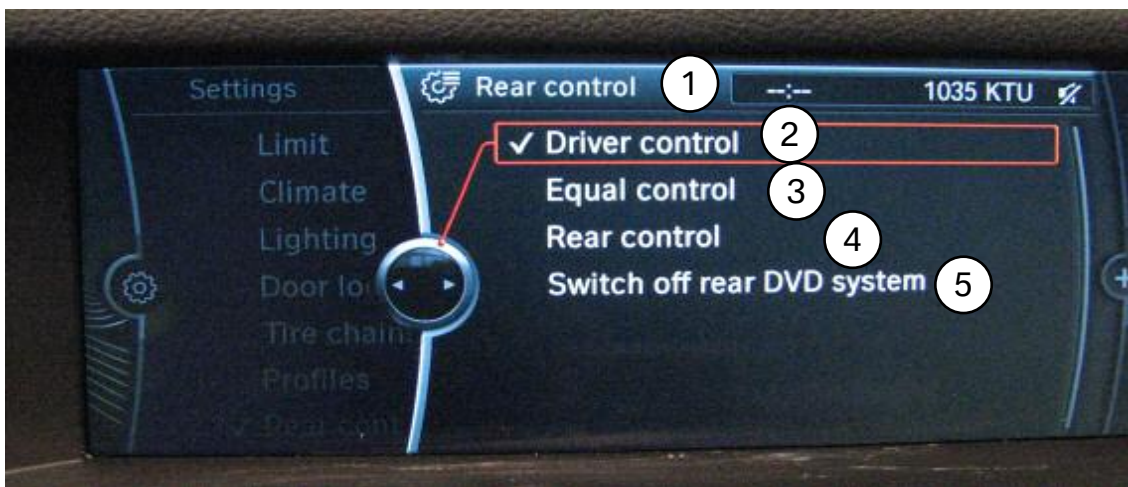
The rear seat entertainment system must be switched on to execute all its functions. The driver can use the iDrive to select the access rights for the rear seat entertainment system.



CID main menu - settings

Select submenu "Settings" (2) in Main menu (1) with the iDrive.

Select the submenu "Rear system enable" in the "Settings" menu.



CID rear system enable, driver

Four different functions can be selected in the “Rear control” menu (1):

- **“Driver control” (2):**
Everything that does not disturb the driver can be controlled in the rear compartment.
- **“Equal control” (3):**
The driver and the rear passengers can execute all functions with equal authorization.
- **“Rear control” (4):**
The driver can control everything that does not disturb the rear passengers.
- **“Switch off rear DVD system” (5):**
Switch off rear seat entertainment system. The rear seat entertainment system cannot be switched on again before any other priority is selected.

Note: The driver can control the volume of the speakers in all four settings. Audio playback is muted by pressing the (ON/OFF) rotary pushbutton on the CIC.

Speaker Control

Speaker control must be switched on to facilitate audio playback through the speakers. The hard-wired headphones are muted when speaker control is activated.

The rear displays adopt the feed from the currently active source.

The speakers can then be controlled from the rear seat entertainment system.

To switch on speaker control, select “Rear operated speakers” (2) in the “Options” menu (1).



FD Options - speakers

Connecting External AV Devices

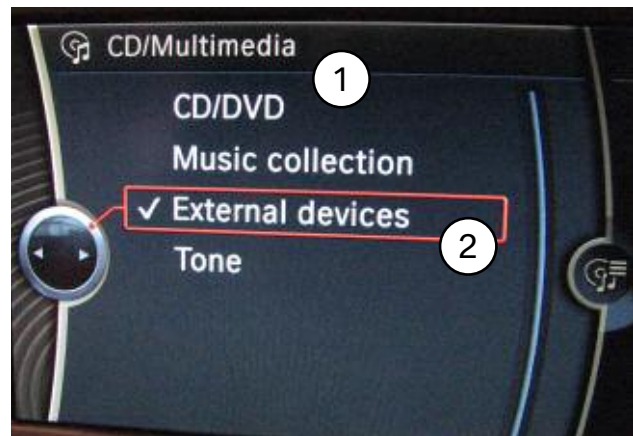
External devices can be connected to the RSE control unit via the AV inputs. External devices can also be connected via the AUX-In connection or the USB-audio interface (6FL) in the center console. Connected video devices are recognized automatically.

Note: The connection is automatically deactivated after unplugging the external video device. A blue image may be shown on the rear screen if the connection is not deactivated automatically.

The corresponding input must be activated when a pure audio device is connected.

Follow the following steps to connect an external device:

- Switch on the rear seat entertainment system.
- Open the flap on the RSE control unit when connecting to the AV inputs.
- Fold open the center armrest when connecting to the AUX-In connection or USB-audio interface (6FL).
- Connect the external audio device to the corresponding input and switch on.



FD CD/Multimedia - external devices

- Select the “CD/Multimedia” menu item (1) in the Main Menu.
- Then select the “External devices” menu item (2) in the “CD/Multimedia” menu (1).

The available connections and their status are now shown:

- USB-audio interface (1)
- AUX-In connection, Center console (2)
- RSE control unit, AV input, left (3)
- RSE control unit, AV input, right (4).



FD - activating external devices

Note: Once an external device has been connected to the RSE it remains connected until it is turned off or disconnected.

Digital and Satellite Tuners

The digital tuner and the satellite tuner can also be controlled from the rear seat entertainment system. Various satellite and digital radios are available corresponding to the national market specification.

- In Band On Channel (IBOC) is the digital tuner in the USA
- Satellite Digital Audio Radio Service (SDARS), is the satellite supported subscription radio in North America.

In the F01/F02, the digital tuners are integrated in the CIC and no longer installed externally.

The SDARS satellite tuner is installed in the luggage compartment and connected to the MOST-bus.

Proceed as described in the following to select a digital or satellite tuner.

Digital Tuner

Select the HD Radio "IBOC" menu item (2) in the "Radio" menu (1).



Digital Radio

Satellite Tuner

Select the "Satellite radio" menu item (2) in the "Radio" menu (1). The stations can be scanned and selected in the same way as terrestrial stations.



Satellite Radio

Language

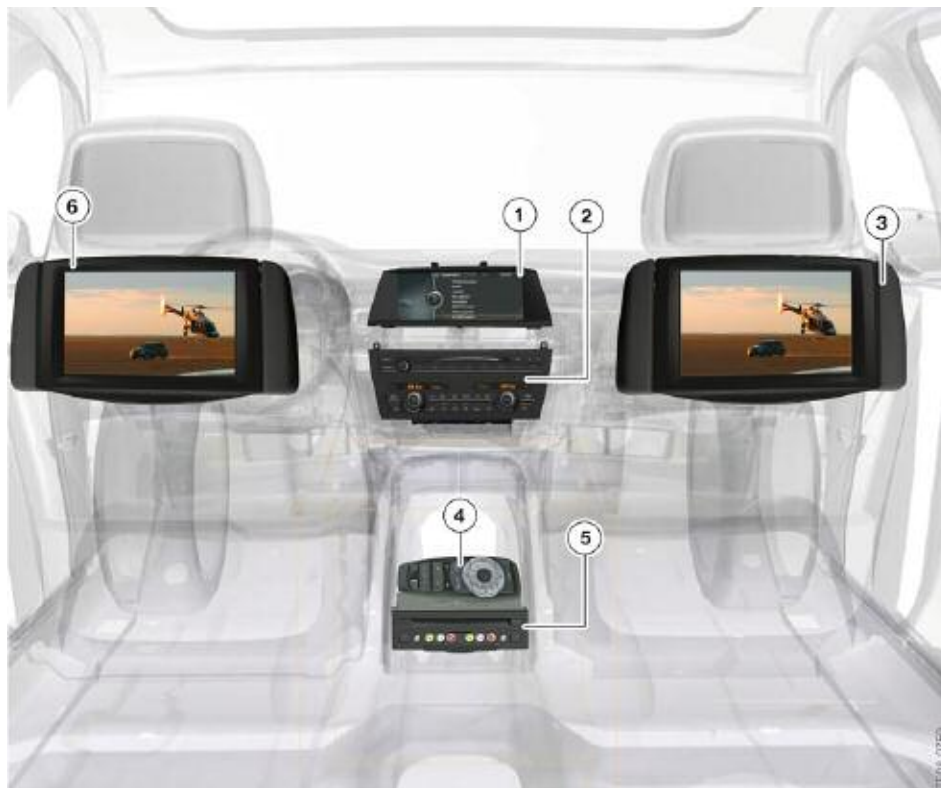
The selected language always applies to the complete vehicle. When the language is changed in the CIC, this language will also be adopted by the rear seat entertainment system. After changing the language in the rear seat entertainment system, the change will also be adopted in the CIC.

System Components

The rear seat entertainment system consists of the following components:

- RSE control unit with DVD player
- One FBAS/CVBS (composite video baseland signal) video signal input
- Two separate AV (audio video) inputs
- Headphone connections in the rear center console
- Two 8" rear displays (built into the backrests of the front seats) with incorporated rear display control units and infrared transmitters.
- Remote control

Component Location



Rear Entertainment Component Locations

Index	Explanation	Index	Explanation
1	Central information display (CID)	4	Remote control
2	Head unit (CIC)	5	RSE control unit
3	Rear display FD2 8"	6	Rear display FD 8"

RSE System

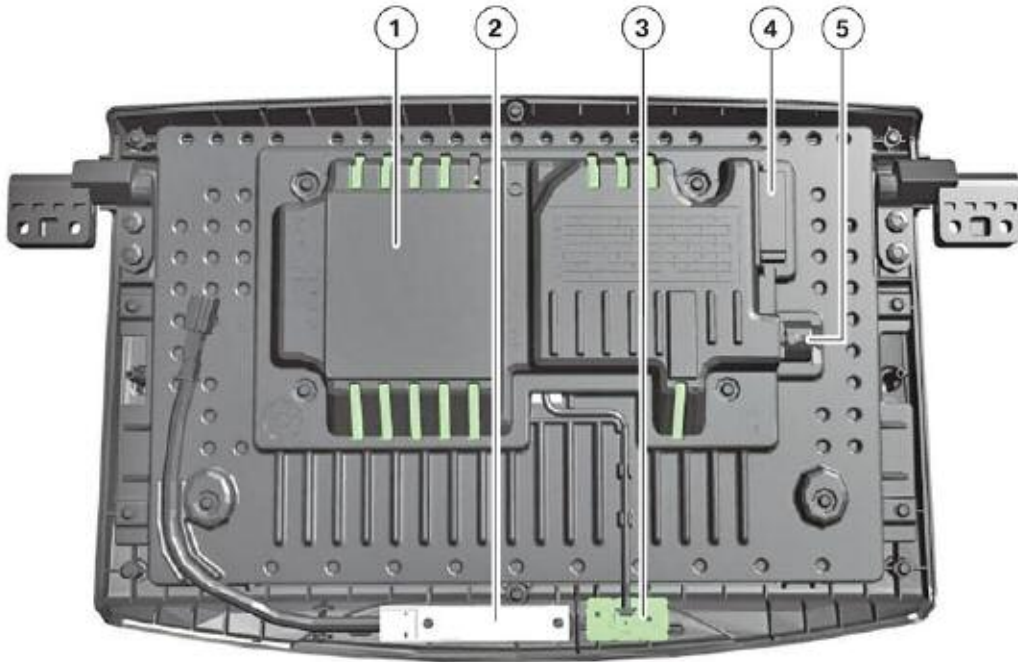
The rear seat entertainment system offers the following equipment:

- Radio tuner with RDS
- Audio playback through
 - Infrared headphones
 - Hard-wired headphones
 - Audio speakers in the vehicle
- AUX-In connection in center console (analog jack)
- Connection to external equipment via AV input, e.g. video camera, games console or portable playback equipment
- Operation through remote control.

Optional extras:

- DVD changer (above glove compartment)
- USB/audio interface in center console (for connecting media USB sticks or mp3 players e.g. Apple iPod®)
- Digital and satellite radio tuners
 - In Band On Channel IBOC
 - Satellite Digital Audio Radio Services, SDARS (with subscription)

Rear Displays



Rear View of the Rear Display

Index	Explanation	Index	Explanation
1	Rear display control unit SG-FD	4	K-CAN and power supply connection
2	Infrared transmitter	5	Rear display connection
3	Photodiode		

Both the FD and FD2 rear displays have their own control unit SG-FD. The control units are connected to the K-CAN.

The rear displays are connected via LVDS to the RSE control unit and are switched on and off by the RSE control unit via MOST > ZGM > KCAN.

In comparison to earlier systems with 8-wire LVDS cable, the signals in the F01/F02 are sent via a 2-wire LVDS cable.

Signal transmission via this 2-wire LVDS line offers four distinct advantages:

- Higher data transfer rate
- Simplified wiring
- Runtime differences between the individual lines are avoided
- Serial 2-wire LVDS data transmission is now much more cost-effective

The photodiode is used to automatically control the brightness of the rear display.

Technical data TFT-LCD Displays	Rear seat entertainment
Visible screen diagonal	8"
Resolution in pixels	800 x 480
Luminous intensity in Candela	625 Cd/m ²
Colors	WVGA 262144 (18-bit colors)
Switching time at 25°C	20-25 ms
Format	15:9

Note: For further information on the 2-wire LVDS system refer to the F01/F02 CIC training material.

Infrared Transmitters

The infrared transmitters consist of six infrared diodes. They are located behind a plastic cover in the housing of the rear display.

The RSE control unit powers the infrared transmitters which use infrared light to transmit the audio signals to the headphones. The infrared diodes begin to light as soon as the RSE control unit is switched on.

The infrared diodes then stay on for as long as at least one side of the RSE is still active. The diodes go out 5 seconds after switching off the last rear display.

The infrared transmitters use the following frequencies to send the audio signals:

Left channel	Right channel
2.3 MHz	3.2 MHz
2.8 MHz	3.8 MHz

To ensure trouble-free operation of the infrared headphones, note the following:

- An unimpeded line of sight between the receiver on the headphones and the infrared transmitter is essential.
- The cover on the infrared transmitter is clean and free from scratches.

Headphones

Headphones are not included on delivery of the F01/F02. BMW recommends the use of headphones that have been specifically designed for the rear seat entertainment system and are available to order from BMW Parts.

■ Infrared Headphones

The infrared headphones used must comply with IEC DIN 61603-2.

If infrared headphone accessories are used, they must match the frequencies of the infrared transmitter.

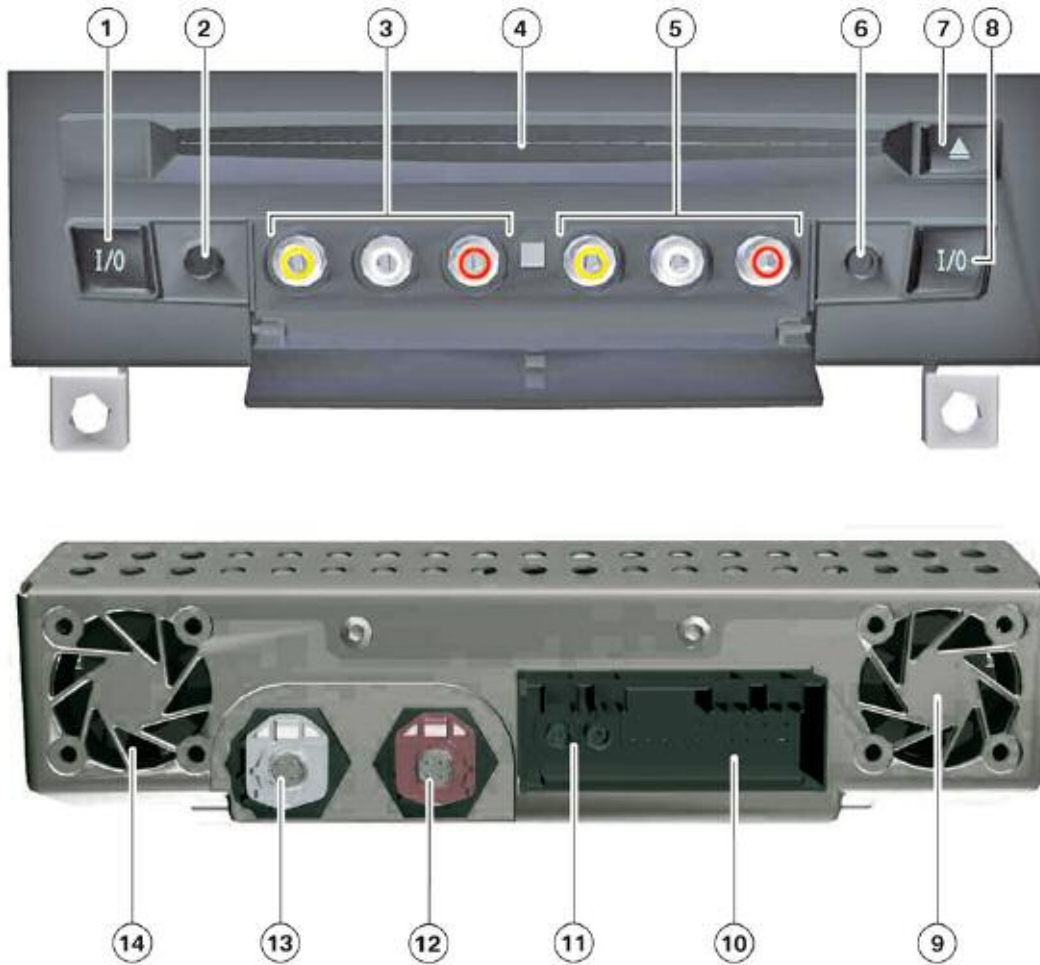
There is no restriction regarding the maximum number of infrared headphones that can be used.

■ Hard-wired Headphones

All commercially available hard-wired headphones with a minimum impedance of 8Ω can be connected.

The connection jacks have a diameter of 3.5mm. These connection jacks must be used for headphones only.

RSE Control Unit



Front and Rear View of the RSE Control Unit

Index	Explanation	Index	Explanation
1	ON/OFF switch, left	8	ON/OFF switch, right
2	Jack plug for hard-wired headphone, left	9	Fan, left
3	AV input, left (yellow: video, white: audio signal, left, red: audio signal, right)	10	Power supply, connection for infrared transmitters, one CVBS video input
4	Slot in DVD player	11	MOST connection
5	AV input, right	12	FD connection
6	Jack plug for hard-wired headphone, right	13	FD2 connection
7	DVD drive Eject button	14	Fan, right

Switch-on Conditions

The two ON/OFF switches are used to switch the rear seat entertainment system on/off. They switch the RSE control unit and the rear display on/off on the selected side.

The infrared diodes begin to light as soon as the RSE control unit is switched on. The infrared diodes then stay on for as long as at least one side of the RSE is still active. The diodes go out 5 seconds after switching off the last rear display.

The RSE control unit can be switched on as of terminal 30B. After “terminal R OFF”, the RSE control unit can be switched on within the run-on time of 30 minutes. After the control unit has been switched on, it remains active until the energy management detects the start capability limit.

Further information on terminal control and the new terminal designations can be found in the F01/F02 Energy Management training material.

The RSE control unit supports following media:

- Video DVD
- Video CD
- Super Video CD
- Audio CD
- DVD or CD with compressed data formats

The following compressed data formats are supported:

- Video
 - MPEG-1 video
 - MPEG-2 video
- Audio
 - MPEG-1 Layer 2 Audio
 - MPEG-1 Layer 3 Audio MP3 with ID3-Tags
 - MPEG-2 Layer 2 Audio
 - Windows Media Audio WMA with WMA-Tags
 - Advanced Audio Coding AAC

The DVD audio format is not supported by the RSE control units. However, if the DVD contains a video track, it is usually played.

Note: Data that is protected with Digital Rights Management DRM cannot be reproduced.

RSE Remote Control



RSE Remote Control Buttons explanation

Index	Explanation	Index	Explanation
1	Menu	7	Volume
2	Thumbwheel	8	Track search/track skip
3	Confirmation button	9	Wireless symbol
4	Option	10	Back
5	Battery symbol	11	Four-way directional controller (four buttons)
6	Selector slide, left/right		

RSE Remote Control Function

The remote control features two LED for checking operation and battery voltage. Transmission of a wireless signal is acknowledged by the green send signal lighting.

The remote control signals are only sent if the rear seat entertainment system is switched on.

If the battery voltage reaches a critical level, the red battery symbol will light instead of the green send symbol each time a button is pressed. The battery in the remote control must be replaced to ensure continued operation.

The thumbwheel, the confirmation button and the four-way directional controller mimic the iDrive controller functions:

- Turning the thumbwheel corresponds to turning the iDrive controller.
- Pressing the corresponding button on the four-way directional has the same effect as operating the iDrive controller to the left, right, forwards or back.
- Pressing the confirmation button corresponds to pressing down on the iDrive controller.

The entire remote control changes over to the selected side by operating the selector slide.

The remote control is available in a frequency of 315 MHz for the US version.

Service Information

Diagnosis

The BMW diagnostic system contains the diagnostics for the rear seat entertainment systems under "Rear seat entertainment". The RSE, the two rear display SG-FD and SG-FD2 are defined as the control units.

Fault code memory checks, testing schedules and test modules are available for following components:

- Rear seat entertainment control unit
- Rear displays
- Remote control

Component activation is also possible for the control unit:

- General
 - Reset of RSE control unit
- Display
 - Test card, test of video inputs and video outputs
- Audio
 - Sine generator (test noise)
- Drive
 - DVD emergency eject

Teaching-in the Remote Control

There is a Service Function for teaching-in the remote control in the diagnostics under Rear Seat Entertainment.

The testing schedule works through the following steps:

- The entry of the currently assigned remote control for the rear seat entertainment system is deleted in CAS4.
- The remote control for the rear seat entertainment system is taught in.
- Successful teaching-in of the remote control is acknowledged by automatic closing and opening of the central locking.

It is not possible to exchange the remote control. Only the taught-in remote control is functional in the vehicle.

Programming and Coding

■ DVD Area Code

The RSE control unit can be programmed and coded. The DVD area code can be changed during coding.

DVD area codes were introduced to restrict playback of DVDs to particular markets. DVDs are generally released earlier in one region than in another region. The earth has been divided into different regions and an area code has been assigned to each region:

Area Code	Region
1	Canada, USA and US Territories
2	Europe, Japan, Middle East, Egypt, South Africa, Greenland
3	South east Asia including Hong-Kong and South Korea
4	Australia, New Zealand, Caribbean, Central and South America, Pacific Islands
5	Former CIS States, Indian subcontinent, Mongolia, North Korea, Africa (except Egypt and South Africa)
6	China

So that the area code functions, each DVD player is equipped with its own area code, determining for which market the device is intended.

European devices are preset with area code 2, whereas American devices have area code 1. Each DVD can have one or more area codes, depending on the region(s) for which it is intended.

Area code 0 identifies DVDs that are released for all regions. A DVD may also be released for certain regions, e.g. 2, 3, 4, 5 and 6, i.e. all countries except the USA.

When inserting a DVD, the RSE control unit checks whether the region defined in the control unit matches the DVD country code. As a result, only DVDs with the area code defined in the RSE control unit can be played.

The area codes are changed by coding the RSE control unit. During the first 100km, the area code can be changed as often as desired. After the first 100km, the RSE control unit permits the area code to be changed a maximum of five times. If changes are no longer possible, the RSE control unit must be replaced when a DVD with a different area code is to be played.

■ Audio Test CD

A new audio test CD has been released for testing the drive in the RSE control unit in the F01/F02.

The audio test CD can be used to check following problems:

- Drive test
- Problems during medium playback
- Permanent or sporadic interruption in CD/ DVD operation
- Disc cannot be read by drive.

Note: Only the current version of the audio test CD must be used for testing purposes. The audio test CD can be ordered through BMW Parts.