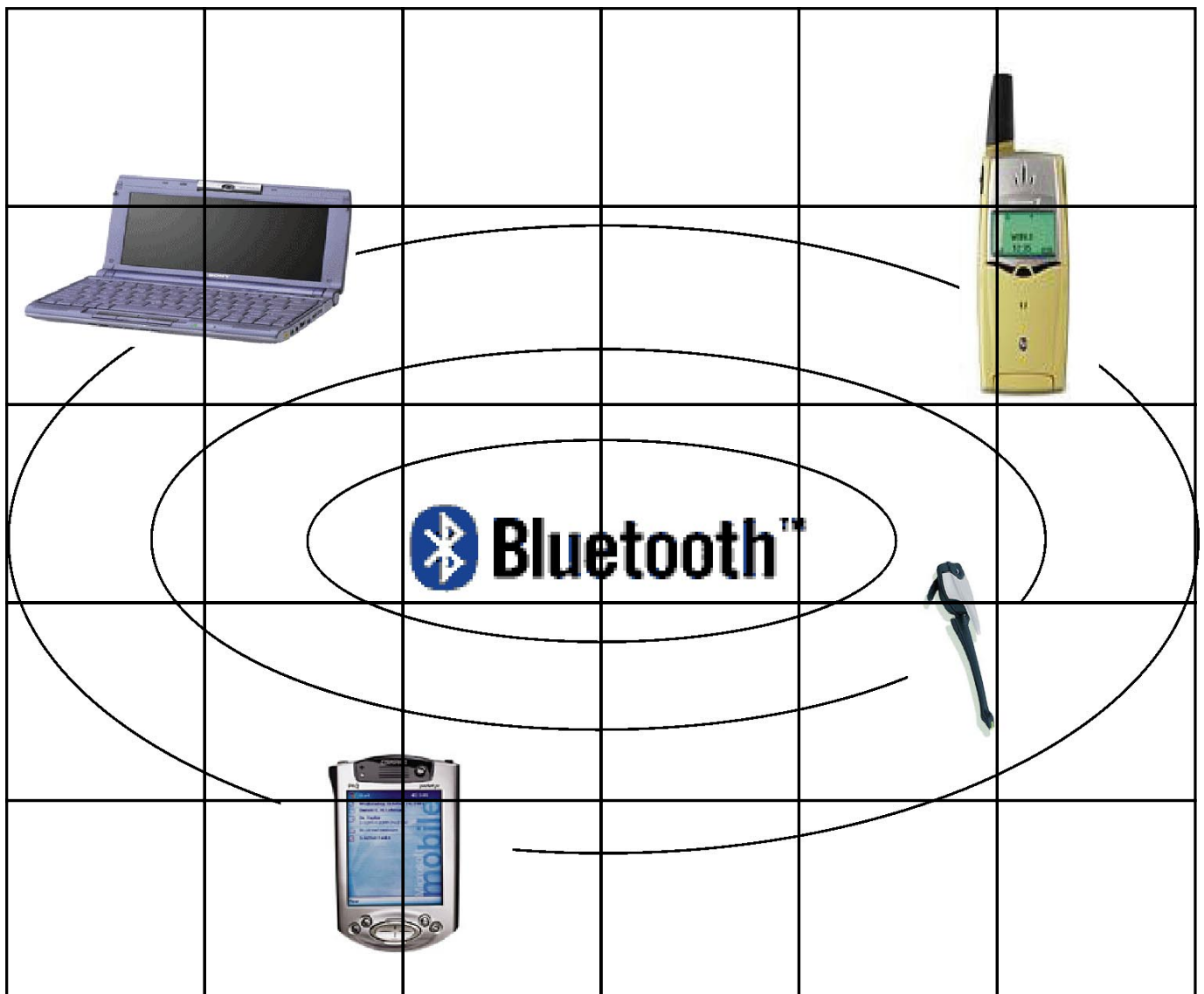




E85 Information/Communication Seminar Working Material



NOTE

The information contained in this training course manual is intended solely for participants of the BMW Service Training course.
Refer to the relevant "Technical Service" information for any changes/supplements to the Technical Data.

© 2001 BMW AG

München, Germany. Reprints of this manual or its parts
require the written approval of BMW AG, München
VS-42 MFP-HGK-BRK-E85-0900-0950

Contents

	Page
CHAP 1 Information / Communication	1
Introduction	1
- New features in the E85	2
CHAP 2 Radio and CD changer	6
Introduction	6
- New features of the system	6
System overview	7
- System diagram	8
Components	9
- BMW radio-CD	10
- BMW Business radio-CD	11
- Multi-information radio MIR	12
- BMW central information display radio CID radio	13
- CD changer	19
- BMW aerial systems	19
Operation	25
- Service mode for radios	25
Notes for Service	27
- FM aerial	27
- Diagnosis	28
- Coding	28
- Car & key memory	28
CHAP 3 Audio systems	29
Introduction	29
- Systems	29
- New features of systems	29
- System comparison - sound pressure	30
- System comparison - linearity	31
- Advantages of the systems	31
System overview - Stereo	32
System diagram - Stereo	33
Components of Stereo audio system	34
- Low-range speakers (woofers)	34
- High-range speakers (tweeters)	35
- Mid-range speakers, rear	36
- Stereo audio system	36
System overview - HiFi	37
System diagram - HiFi	38
Components of HiFi audio system	39

- HiFi amplifier	39
- Low-range speakers (woofers)	40
- High-range speakers (tweeters)	40
- Mid-range speakers	40
- HiFi audio system	41
System overview - Top-HiFi	42
System diagram - Top-HiFi	43
Components of Top-HiFi audio system	44
- Top-HiFi amplifier	44
- Front low-range speaker (woofer)	45
- High-range speakers (tweeters)	45
- Mid-range speaker	46
- Carver woofers (low-range speakers), rear	47
- Top-HiFi audio system	51
Operation	53
- HiFi amplifier	53
- Top-HiFi amplifier	54
Notes for Service	57
- Diagnosis	57
- Coding	57
CHAP 4 Telephone systems E85	58
Introduction	58
- Telephone versions	58
- New features of systems	59
CHAP 5 Car phone, "Professional"	60
System overview	60
System circuit diagram	61
Components	62
- Telematic Control Unit TCU	63
- Eject box	64
- Cordless handset	65
- Hands-free microphone	65
- GSM aerial	66
- Bluetooth aerial	67
System functions	68
- Modem function	69
- Emergency call functions	70
- Power management	71
CHAP 6 Universal charging and hands-free unit, ULF	72
Introduction	72
- What is Bluetooth?	73
- Transmission	75
- Data and voice	76

- Interception security	76
System overview	77
System diagram	78
Components	79
- ULF control unit	79
- Bluetooth mobile phone cradle	82
- Bluetooth mobile phone	85
- GSM aerial and hands-free unit	86
- Compensator	86
- Bluetooth aerial	87
System functions	87
- Telephoning	87
- Charging	91
Operation	92
- Initial operation	92
CHAP 7 Notes and diagnosis	98
Diagnosis	98
Coding	98
Car & key memory	98
CHAP 8 TV	99
Introduction	99
System overview	100
System diagram	101
Components	102
- Central information display CID	102
- CID control panel	102
- Video module	103
- TV aerials	104
- Aerial diversity	106
CHAP 9 Navigation system	107
Introduction	107
- System advantages	107
System overview - Navigation High	108
System diagram - Navigation High	109
System overview - Radio navigation EU	111
System diagram - Radio navigation EU	112
Components	113
- Central information display	114
- CID control panel	114
- Navigation computer DVD	115
- GPS aerial	116
- Wheel speed sensor	116

- Reversing light switch	116
- Video module	117
- Multi-information radio MIR	117
System functions	118
- Introduction	118
- Additional destination inputs	118
- More accurate calculation of arrival time	118
- Improved direction	119
- Improved map presentation	119
- New map presentation	119
Operation	122
- Main menu	122
- Settings selection	122
- Settings Page 1	122
- Settings selection, Page 2	123
- Map and arrow presentation	123
- Settings	123
- Destination input main menu	124
- Destination input submenu	124
- Route selection	124
- Destination input	125
- New route	126
Country-specific version	127
- Country-specific version US	127
Notes for Service	131
- Service information	131
- Service mode	131
- Diagnosis	134
- Coding	134
- Car & key memory	134

Information / Communication

Introduction

The E85 has soared to be the new dynamic leader in the market segment of premium roadsters. Thanks to its breathtaking design and even sportier handling place it distinctly higher than the E36/7.



Fig. 1: BMW Z4

KT-10553

In keeping with its top-of-the-range status, the Z4 offers new features in the field of information and communication systems.

- New features in the E85

New features: radio systems

The radios have been redesigned and equipped with a CD drive in line with the vehicle's premium status. It features a new central information display radio specifically designed for the menu in the central information display.



Fig. 2: Central information display radio

KT-10044

New features: audio systems

In addition to the "Stereo" and "HiFi" audio systems, a "Top-HiFi" system is offered in the Z4. This system satisfies the most demanding requirements with regard to sound quality and sound impression. This is achieved by the consistent use of Carver low-range speakers or woofers. This new speaker technology enables high sound pressures and distortion-free basses in conjunction with compact speaker dimensions.

New features: telephone systems

A new telephone generation is introduced for the first time on the Z4. The customer has the option of selecting between several systems.

The customer can order a fixed installation car phone with cordless keypad handset that is connected to the vehicle based on Bluetooth technology.

Alternatively, the vehicle can be equipped with equipment providing the connection for Bluetooth mobile phones.



Fig. 3: Possible Bluetooth mobile phones for the Z4 1959_02
KT-10576

New features: TV system

In the EU version, the Z4 features a TV function. When the vehicle is stationary, TV pictures or video text can be shown on the central information display. This function is legally permitted only when the vehicle is stationary and, as in other BMW model series, it is therefore automatically deactivated while driving.



Fig. 4: E85 Central information display with TV function

1979_02
KT-10631

New features: navigation systems

A further highlight is the high navigation system. The Z4 is the first BMW roadster equipped with a display for presenting maps for the navigation system. The navigation information is shown on a central information display located in the middle of the instrument panel. The central information display features a folding function and is folded away neatly in the instrument cluster when not in use.



Fig. 5: E85 Central information display with navigation map

1978_02
KT-10603

Radio and CD changer

Introduction

This technical documentation describes the various radios and CD changers used in the E85.

The following radios are available for the E85:

- BMW radio-CD (basic in EU)
- BMW Business radio-CD (basic in US)
- BMW Business radio-MD (basic in Japan)
- BMW multi-information radio MIR (EU only)
- BMW central information display radio CID radio

All radios are new generation radios (NG radios). The radios feature a K-bus connection via which they communicate with other control units.

The AF input (audio signals) of the CD changer was increased from 0.5 V to 2.0 V in order to increase the signal-to-noise ratio. The new generation radios detect whether they communicate with a 0.5 V CD changer (old) or a 2.0 V CD changer (new) and switch over the input accordingly.

A 6-CD changer is additionally available for the E85.

A radio with a cassette drive can no longer be ordered.

- New features of the system

New features compared to previous BMW developments

The central information display radio is a new feature on the E85 and serves as the control panel for the CID.

The CID radio combines the radio functions with operation of the navigation system, TV, on-board computer, DSP amplifier, telephone, settings as well as deactivation of the CID.

System overview



Fig. 6: Overview of the radios in the E85

KT-10037

Index	Explanation
1	Radio-CD (basic EU)
2	Business radio-CD (basic EU/US)
3	Multi-information radio MIR (navigation Low EU)
4	Central information radio-CD CID (navigation High EU/US)
5	Central information radio-MD CID (navigation High Japan)

- System diagram

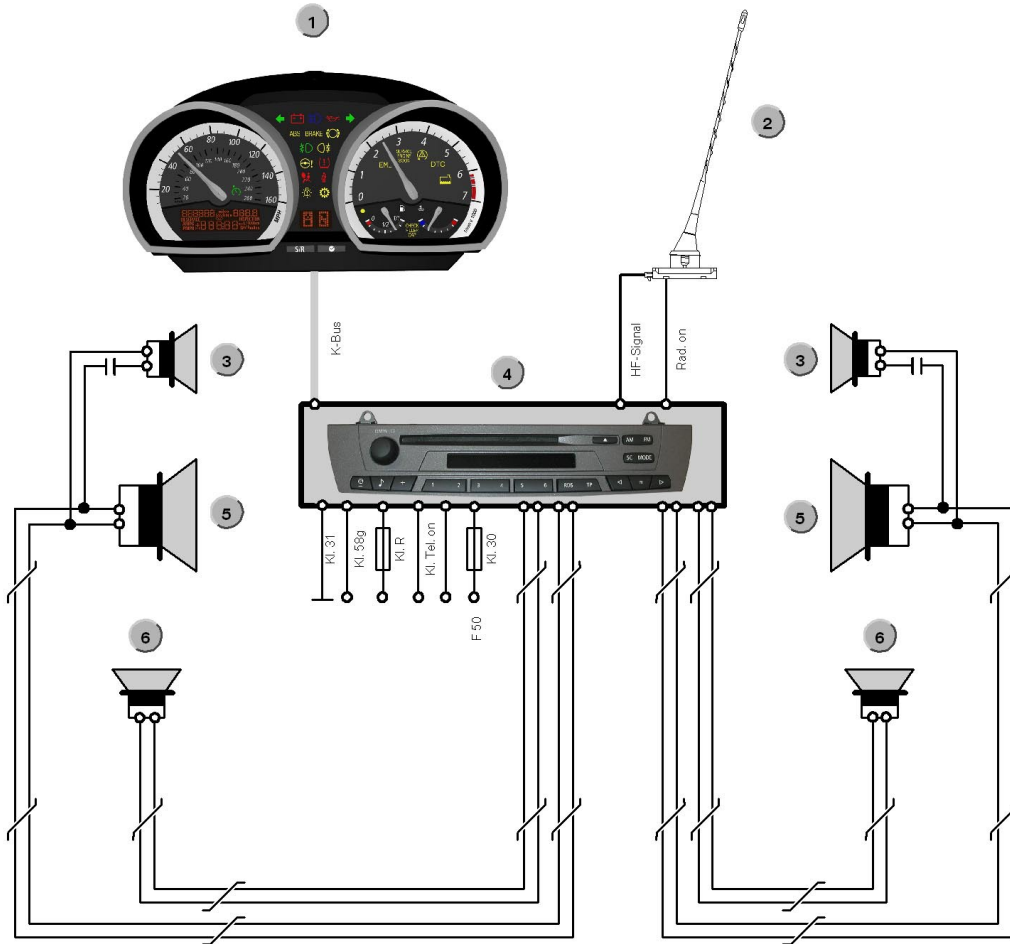


Fig. 7: System diagram, radio

KT-10008

Index	Explanation	Index	Explanation
1	Instrument cluster	4	BMW radio-CD
2	Radio aerial	5	Low-range speaker, front
3	High-range speaker, front	6	Mid-range speaker, rear

Components

The radios can be optionally fitted in the following 4 combinations: BMW radio-CD, BMW Business radio-CD, BMW multi-information radio (MIR), BMW central information display radio (CID radio).

The CD changer can be ordered as option 672 (not for BMW radio-CD).

- BMW radio-CD:
The BMW radio-CD is the basic equipment in the EU version in connection with the stereo audio system. No CD changer is available for the BMW radio-CD.
- BMW Business radio-CD:
The BMW Business radio-CD can be ordered worldwide together with the HiFi or Top-HiFi system.
A CD changer can be additionally connected.
In connection with the HiFi audio system, the BMW Business radio-CD is the basic unit in the US version.
- BMW multi-information radio (MIR):
The MIR is the Low navigation system and corresponds to the previous radio navigation system in the E46. The BMW multi-information radio is offered in the EU version only. The MIR can be ordered only in connection with the HiFi or the Top-HiFi audio system. A CD changer can be additionally connected.
- BMW central information display radio (CID radio):
The CID radio is the control panel for the central information display. The CID is the High navigation system. The CID radio is offered together with a CD drive or optionally with MD drive (Japan). The CID radio is offered worldwide and can be ordered together with the HiFi or Top-HiFi system. A CD changer can be additionally connected.

- CD changer:
The CD changer can be ordered as option 672 for following radios: BMW Business radio-CD, MIR, CID radio.
- Aerials:
Two different aerial systems can be used corresponding to the radio system. The BMW radio-CD features the rod aerial of the E46 convertible. The other radios use an aerial diversity consisting of rod aerial and additional FM aerial in the rear bumper.

- BMW radio-CD

The BMW radio-CD is the basic unit in the EU version and is offered only in connection with the stereo audio system. The radio functions correspond to the previous BMW Reverse radio. The only difference is in the drive. The radio is now equipped with a CD drive. The radio has no aerial diversity.



Fig. 8: BMW radio-CD (basic radio in EU)

KT-10041

In the system network, the BMW radio-CD facilitates the display and control of following components:

- Stereo settings
- AUX socket if fitted (option)
The AUX socket is an additional connection for auxiliary devices such as MP3 player, CD player. The source changeover takes place in the radio.

- BMW Business radio-CD

The BMW Business radio-CD is a world radio and can be coded for the different regions.

The Business radio-CD is the basic radio in the US version.

The radio functions correspond to the previous BMW Business radio. The only difference is in the drive. The radio is now equipped with a CD drive. The BMW Business radio-CD features aerial diversity.



Fig. 9: BMW Business radio-CD

KT-10042

In the system network, the BMW Business radio-CD facilitates the display and control of following components:

- CD changer
- Settings for HiFi and Top-HiFi
- AUX socket if fitted (option)

- Multi-information radio MIR

The multi-information radio is offered in the EU version only as the display and operating unit for the Low navigation system. The radio has no CD drive and should therefore be ordered together with the CD changer. The MIR radio features aerial diversity.



Fig. 10: Multi-information radio MIR

KT-10043

In the system network, the multi-information radio facilitates the display and control of following components:

- Navigation computer
- Telephone
- CD changer
- Settings for HiFi and Top-HiFi
- On-board computer functions
- AUX socket if fitted (option)

- **BMW central information display radio CID radio**

The central information display radio is offered worldwide as the display and operating unit for the High navigation system.

The CID radio consists of the control panel with the radio functions in the centre console and the central information display in the instrument panel.

The CID radio features a CD drive and optionally an MD drive.

A CD changer can be ordered additionally.

The CID radio features aerial diversity.



Fig. 11: Central information display radio (CID radio)

KT-10044

In the system network, the central information radio facilitates the display and control of following components:

- Central information display (CID)
- Navigation computer
- Telephone
- Video module
- CD changer
- Settings for HiFi and Top-HiFi
- On-board computer functions
- AUX socket if fitted (option)

Design

The design of the CID radio is shown in the illustration below.

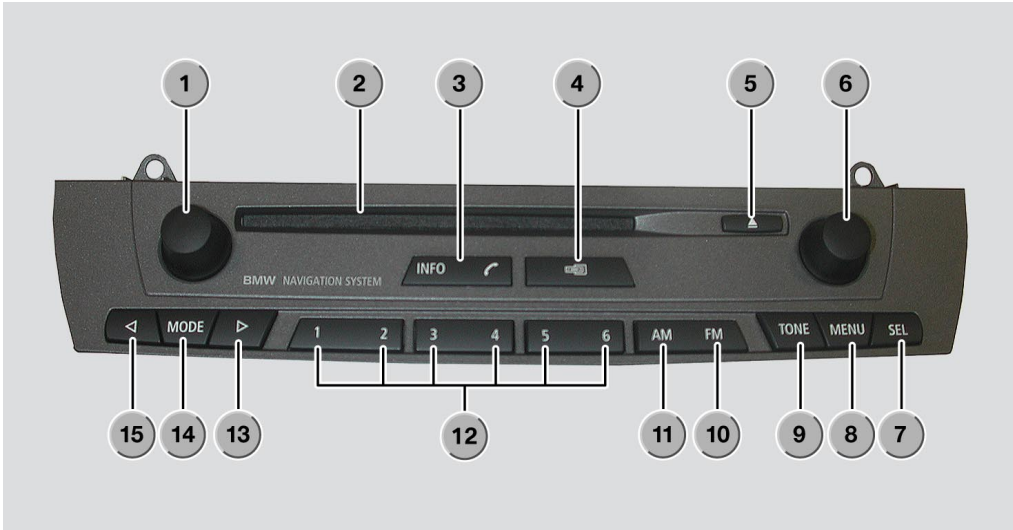


Fig. 12: Functions of the CID radio

KT-10051

Index	Explanation	Index	Explanation
1	ON/OFF/volume control	9	Button for sound settings
2	CD compartment	10	FM button
3	Telephone acceptance/info button	11	AM (medium wave) button (as well as long wave button in EU)
4	Selector button for audio and last menu	12	Station buttons
5	CD eject button	13	Forward scan
6	Push-button/rotary knob	14	Mode button
7	SEL button	15	Backward scan
8	Menu button		

Installation location of the central information display

The central information display is located in the centre of the instrument panel above the ventilation outlet.

Design of the central information display

The central information display (CID) comprises following components: advanced TFT display, crossed-coil motor and mounting trough with switches.

- **Advanced TFT display:**
The LC display is designed as a 6.5" advanced TFT display. The display is of identical design as the 6.5" display of the on-board monitor in the E46.
The advanced TFT display adapts automatically to the brightness of the ambient light. The display has a visible range of 144 mm x 79.5 mm and a resolution of 400 x 240 Pixels. The display is an analogue unit and is controlled by RGB signals.
The display is mounted such that it can rotate and is moved by a crossed-coil motor.
- **Crossed-coil motor with gear mechanism:**
The crossed-coil motor is a brushless DC motor. The positions of the display are detected by Hall sensors on the gear mechanism.
- **Mounting trough:**
The display and the crossed-coil motor are accommodated in a mounting trough. The trough is located in the centre of the instrument panel so that the same component can be used for left-hand drive and right-hand drive vehicles. The trough is screwed flush with the surface of the instrument panel.
- **Switch:**
Left and right switches are integrated in the trough. The left switches serves the purpose of finely setting the display to improve the readability corresponding to the seat position and light conditions.
The right switch serves to fold the display in and out.

E85 Information/Communication

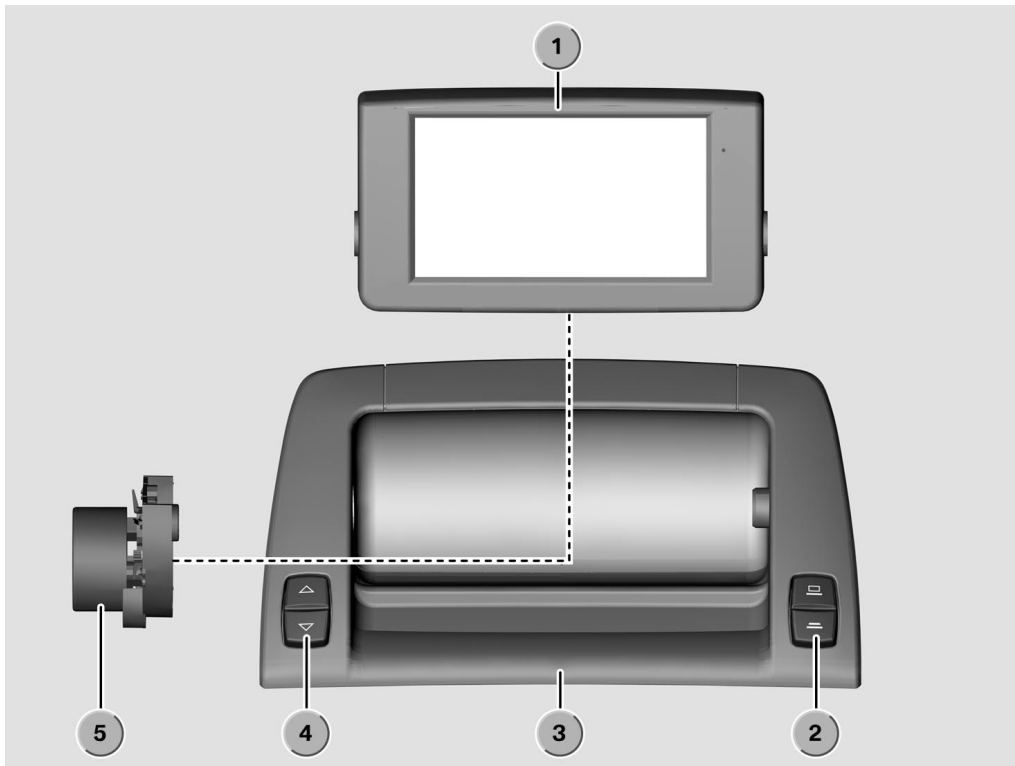


Fig. 13: Design of the central information display

KT-10095

Index	Explanation
1	Screen
2	Switch for moving the screen in and out
3	Mounting trough
4	Switch for screen fine adjustment
5	Crossed-coil motor with gear mechanism

Operation of the central information display

When folded out, the position is between 85-108 degrees. The position last stored (last function memory position) is raised. The display can now be finely adjusted in steps (1 step = 1.2 degrees) using the left-hand switch. The signal from the switch is sent directly to the stepper motor and is not transferred via the K-bus.

Manual fine adjustment of the display is also possible in a range from 85-108 degrees. In an area below this range (< 85 degrees), the CID is folded in automatically as it can no longer be read effectively in this position.

The right-hand switch can be used to fold in the display. Navigation directions are not interrupted if the display is folded in while the navigation system is active.

When terminal R is switched off, the CID is always folded in and the last position stored. The display can be switched off by means of a button in the main menu.

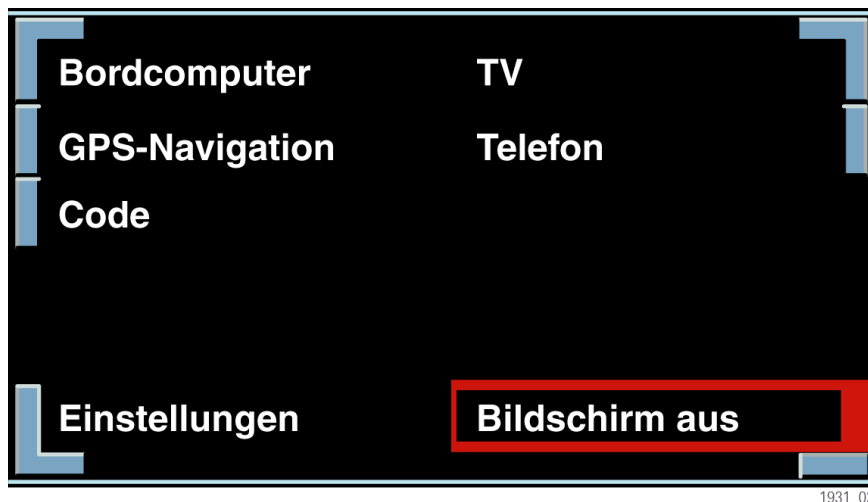


Fig. 14: Switching off the display

KT-10535

E85 Information/Communication

If the display is closed manually or electrically while driving, the display will remain closed at the start of the next trip (last function memory position). The display must first be raised again by pressing the switch.

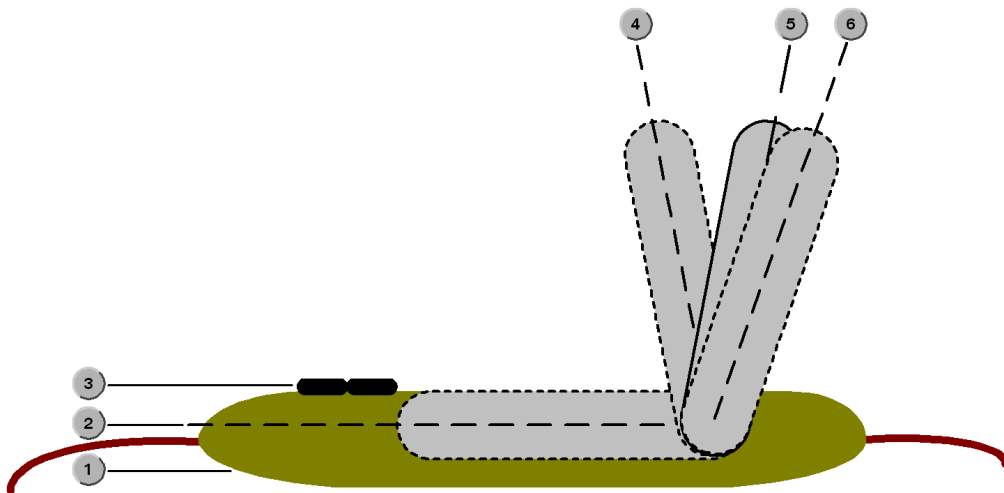


Fig. 15: Positioning the central information display

KT-10123

Index	Explanation	Index	Explanation
1	Mounting trough	4	85 degree position (minimum)
2	Folded down in 0 degree position	5	100 degree position (normal)
3	ON/OFF fold switch	6	108 degree position (maximum)

- CD changer



KT-10048

Fig. 16: Installation location of CD changer

The CD changer is the standard 6-CD changer as fitted on the E46.

The CD changer is adapted to the new generation radios. The CD changer features a 2.0 V AF output.

The CD changer is located in the lockable cubby in the centre of the partition. The cubby is locked with the central locking system.

- BMW aerial systems

The radio aerials for AM/FM are described in the following. The other aerials are described in the respective chapters.

The E85 features the following aerial systems:

- Rod aerial for AM/FM
- FM aerial in rear bumper
- Telephone aerial
- TV aerial
- GPS aerial for navigation system

Rod aerial

The rod aerial is a common part from the E46 convertible. The aerial is designed for AM/FM reception and additionally features an integrated telephone aerial.

Installation location

The rod aerial is mounted on the rear left side panel. The aerial amplifier is screwed to the aerial from below.



Fig. 17: E85 Installation location of rod aerial

KT-10641

Design

The rod aerial consists of the aerial rod, aerial head and aerial base with integrated aerial amplifier.

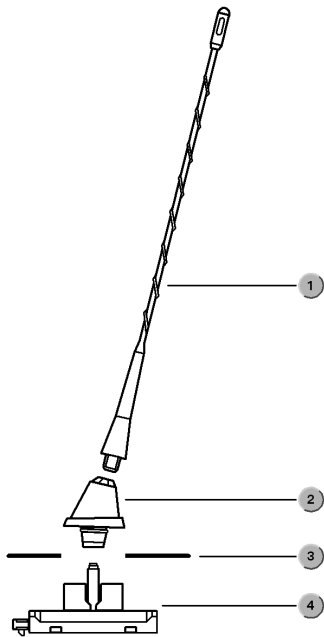


Fig. 18: Design of rod aerial

KT-10121

Index	Explanation	Index	Explanation
1	Aerial rod	3	Body panel
2	Aerial head	4	Aerial amplifier

Aerial diversity

The E85 features aerial diversity for the higher grade radios.

Aerial diversity comprises following components:

- Rod aerial with amplifier
- FM aerial in bumper
- FM aerial amplifier
- Aerial diversity

Installation location

The aerial amplifier and aerial diversity are fitted in the rear left of the luggage compartment.

The second FM aerial is located on the rear left in the bumper.

Design

The design of aerial diversity is shown in the illustration below.

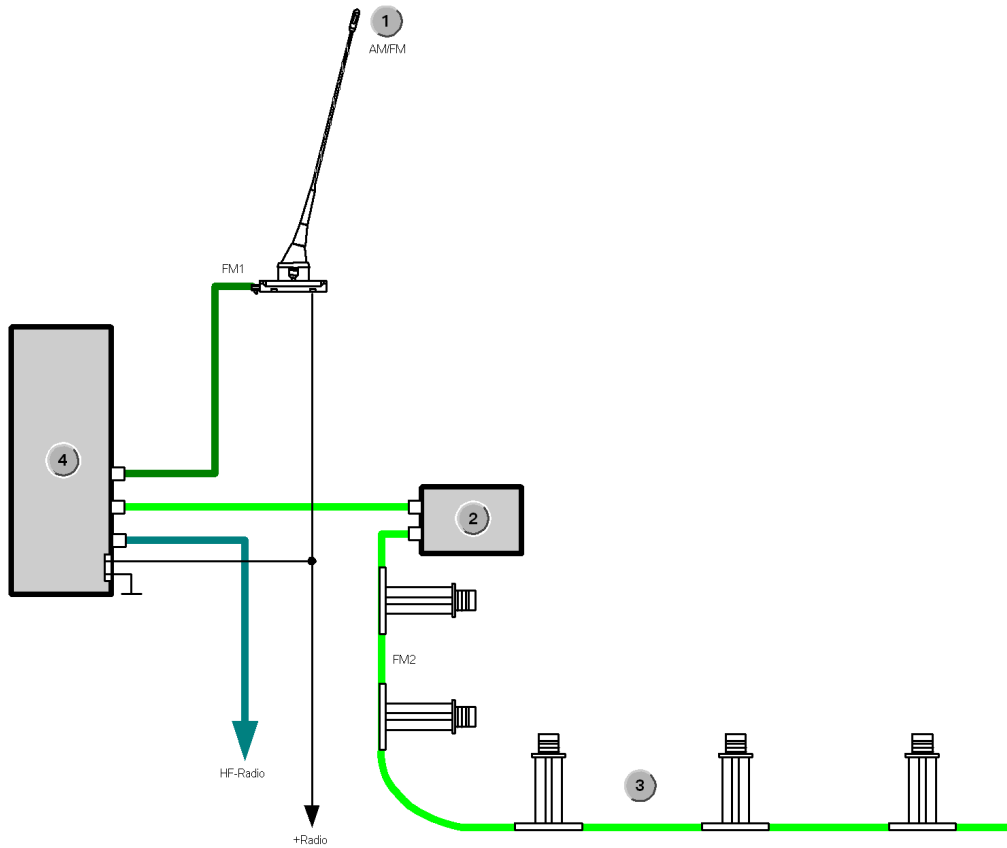


Fig. 19: System diagram of aerial diversity

KT-10124

Index	Explanation	Index	Explanation
1	AM/FM radio aerial	3	FM aerial in bumper
2	FM aerial amplifier	4	Aerial diversity

Components of aerial diversity

The aerial diversity system includes the rod aerial with amplifier and the FM aerial in the bumper.

Rod aerial

The rod aerial is identical to that of the E46 convertible. The rod aerial is designed for the following wavebands:

- Long wave 153 kHz - 279 kHz
- Medium wave 522 kHz - 1710 kHz
- Short-wave 5900 kHz - 6250 kHz
- FM 87.5 MHz - 108 MHz
- FM 76 MHz - 90 MHz (Japan)

FM aerial in bumper

The FM aerial consists of a 73 cm long line. The FM aerial is mounted in the bumper on adjustable clips. The FM aerial is adapted precisely to the vehicle. For this reason, no changes must be made to the aerial. The FM aerial is connected to an aerial amplifier.

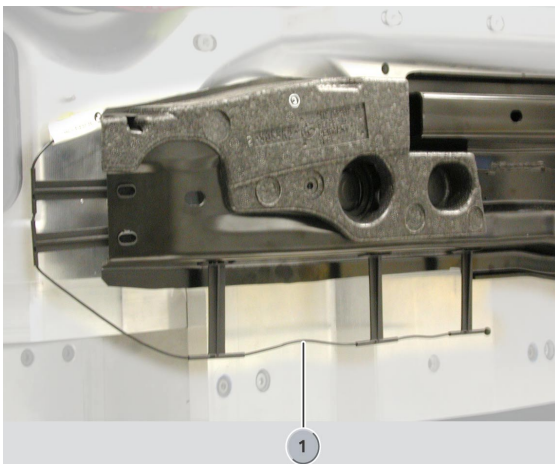
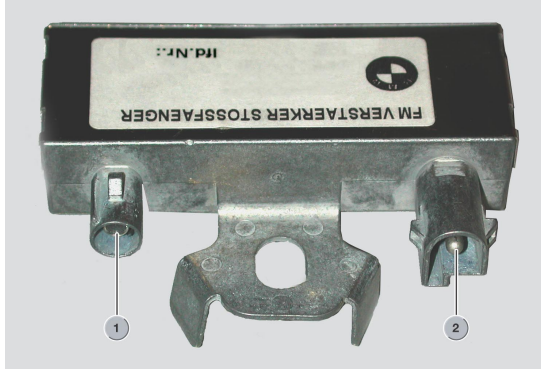


Fig. 20: FM aerial

KT-10064

Index	Description
1	FM aerial in bumper

FM aerial amplifier



The aerial amplifier is designed for FM reception. The aerial amplifier is connected to the aerial diversity by means of a coaxial cable.

Fig. 21: Aerial amplifier

KT-10572

Index	Description
1	Connection for FM aerial in bumper
2	Connection to aerial diversity

Aerial diversity

In the E85, 2 physical aerials are connected to the radio aerial diversity, i.e. the rod aerial and the aerial in the bumper. The aerial diversity function switches over to another aerial as soon as the system undershoots a defined threshold.

Changeover takes place in such a way that no interruption can be heard.

Depending on the reception situation, reception on both aerials simultaneously is also possible.

Operation

- Service mode for radios

Service mode is used for a quick check of the most important radio functions.

In the event of a customer complaint or malfunction, several important functions can be checked directly at the radio with the aid of the service function. It is necessary to access service mode for this purpose.

Accessing service mode for radio-CD, Business-CD

Service mode is selected differently depending on the type of radio.

The following procedure applies to BMW radio-CD and Business-CD:

- Switch on radio
- Press the **"m"** button within 8 seconds and hold for at least 8 seconds
- The functions listed in the following table are now possible via the service menu
- Switch off the radio to exit service mode

Accessing service mode for radios MIR, CID

The following procedure applies to BMW radio MIR and CID:

- Switch on radio
- Press the **"SEL"** button within 8 seconds and hold for at least 8 seconds
- The functions listed in the following table are now possible via the service menu
- Switch off the radio to exit service mode

E85 Information/Communication

Service mode table

Menu	Screen contents	Explanation
Serial number	e.g. X1001035	Serial number of device
Software version	e.g. 37-99 30	Software status of device (calendar week 37, year 1999, version 3.0)
GAL	e.g. 3	Set stage of speed-dependent volume control can be adjusted with the station buttons 1 to 6 from 1 to 6
FM	Frequency ...	Frequency of station currently received
	Station identifier ...	Station identifier of station currently received
	F ...	Field strength of station currently received
	Q ...	Quality of station currently received
	e.g. D210	RDS identifier of station currently received
DSP	0	Information as to whether DSP is available; display 1 shows DSP is fitted. (The radio receives the information via the K-bus)
TP volume	e.g. 0	Setting of minimum volume for traffic information in range from -9 to +9 with the station buttons 1 and 2
AF Alternative frequencies	e.g. AUTO	Corresponding AF tracking can be set with the station buttons 1 to 4 1 = RDS OFF 2 = AF OFF (RDS ON, AF OFF corresponding to country) 3 = AF MAN (RDS ON, AF manual corresponding to country) 4 = AF AUTO (RDS ON, AF automatic)
Area	e.g. Europe	The corresponding country variants can be set with the station buttons 1 to 4 1 = Europe 2 = USA 3 = Japan 4 = Oceania
Index	e.g. 03	Revision index, e.g. 03

Notes for Service

- FM aerial

Inspection and mounting after accidents

The FM aerial must be checked in the event of damage to the bumper (accident).

The aerial line must neither be shortened nor lengthened.

The correct position of the spacers for the aerial must be ensured.

The aerial is matched to the metallic body structure. Changes to the body structure greatly influence the aerial function.

- Diagnosis

Diagnosis of the radio without CID comprises the following:

- Read identification
- Read fault code memory
- Delete fault code memory
- Activate components, e.g. button functions, individual channels
- Diagnosis query, e.g. field strength, setting of speed-dependent volume control

Diagnosis of the multi-information radio differs in that:

- There is no component activation
- The rotary push-button is additionally checked during diagnosis

- Coding

Coding in the radio comprises the following functions:

- New coding (country-specific functions)
- Retrofitting
- Conversion

- Car & key memory

The following functions can be stored in the car & key memory:

- Sound settings
- Audio source
- The last station is stored

Audio systems

Introduction

- Systems

The various audio systems of the E85 are described in this technical documentation.

The following audio systems are available for the E85:

- Stereo audio system
- HiFi audio system
- Top-HiFi audio system

- New features of systems

New features compared to previous BMW developments

For the first time at BMW, binding audio standards have been defined for the E85 which will also be adopted in successor models.

In addition to the minimum requirements relating to the systems, Carver speaker technology is used for the first time worldwide in a motor vehicle (Top-HiFi audio system). This system achieves substantial improvements in the low frequency range.

The audio standards stipulate the following requirements:

- Classification in 3 audio systems: Stereo, HiFi and Top-HiFi
- Symmetry of sound field: All systems ensure uniform distribution of the sound field in the vehicle and convey the overall acoustic impression that the source of the music is in front of the driver and passenger.
- Sound pressure
- Linearity of stereo signal

With the aid of the Carver speaker technology, high sound pressures can be achieved although there is only a low resonance volume (space behind the speakers) available in the roadster.

- System comparison - sound pressure

The sound pressure in the vehicle is the measure for establishing the total volume up to which distortion-free sound reproduction is possible.

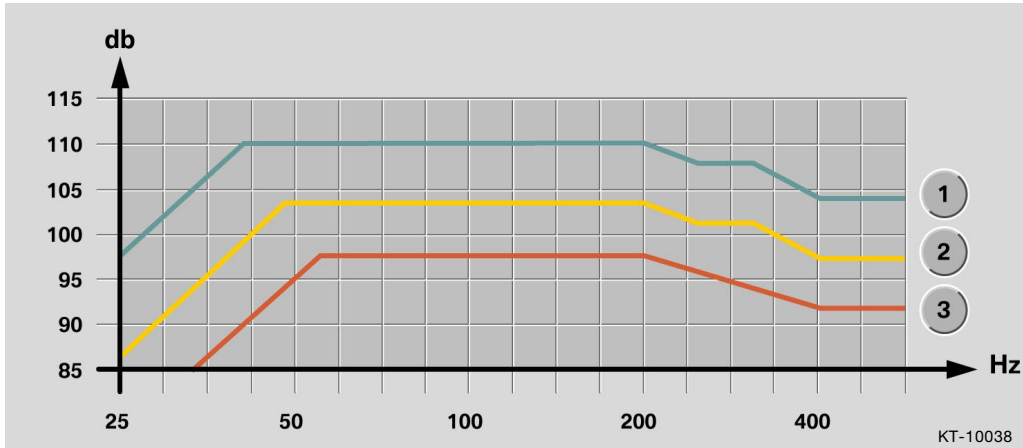


Fig. 22: E85 Sound pressure comparison of the audio systems: Stereo, HiFi and Top-HiFi

Index	Explanation
1	Top-HiFi
2	HiFi
3	Stereo

The higher the sound pressure the greater the volume. When the sound pressure is increased by approx.10 dB, the volume is subjectively doubled.

- System comparison - linearity

A frequency response as linear as possible is the prerequisite for sound reproduction true to the original.

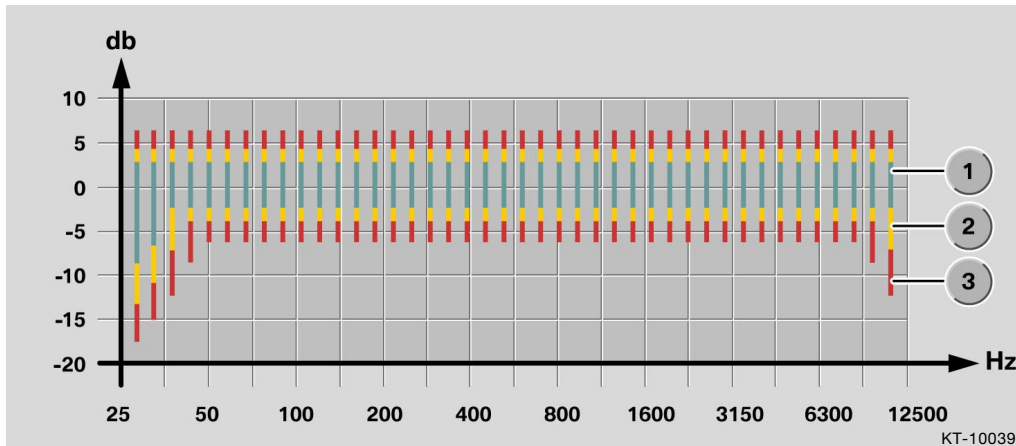


Fig. 23: E85 Linearity comparison of the audio systems: Stereo, HiFi and Top-HiFi

Index	Explanation
1	Top-HiFi
2	HiFi
3	Stereo

The illustration above shows the permissible range within which a defined test signal can deviate from the zero line.

- Advantages of the systems

Advantages compared to previous BMW developments

The following advantages characterize the 3 new audio systems:

- Compared to the E36/7, distinct improvements in the low frequency range have been achieved.
- Due to the dynamically set parameters (adaptive filters) of the Top-HiFi amplifier, the sound impression is adapted to the driving noise characteristic of a roadster.
- The HiFi and Top-HiFi audio systems can be combined with virtually all radios (exception: radio CD).

System overview - Stereo



Fig. 24: System overview, Stereo audio system

KT-10018

Index	Explanation	Index	Explanation
1	BMW radio-CD	3	High-range speaker, front
2	Low-range speaker, front	4	Mid-range speaker, rear

System diagram - Stereo

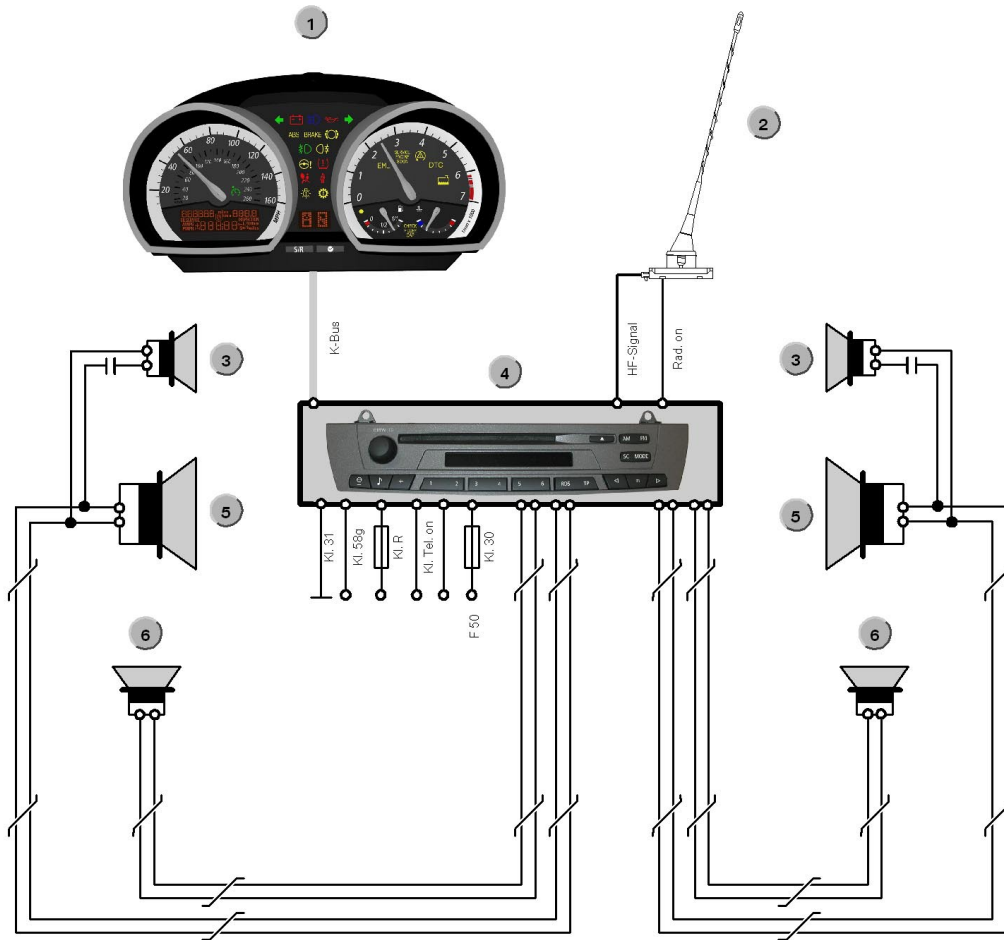


Fig. 25: E85 System diagram - Stereo

KT-10008

Index	Explanation	Index	Explanation
1	Instrument cluster	4	BMW radio-CD
2	Radio aerial	5	Low-range speaker, front
3	High-range speaker, front	6	Mid-range speaker, rear

Components of Stereo audio system

The Stereo audio system consists of following components:

- Radio-CD
- Front left and right low-range speakers (woofers)
- Front left and right high-range speakers (tweeters)
- Rear left and right mid-range speakers

- Low-range speakers (woofers)

The woofers have a diameter of 160 mm and a paper cone. The maximum load capacity is 25 W. The woofer covers a frequency range from 50 Hz to 500 Hz.

Installation location

The front woofers (low-range speakers) are mounted at the bottom in the A-pillars on the left and right.

The woofers are arranged transversely with respect to forward direction.

The resonance volume is approx. 10 l and utilizes a part of the sill area.



Fig. 26: E85 Installation location of woofers (low-range speakers)

KT-10117

- High-range speakers (tweeters)

The tweeter has a diameter of 26 mm and a fabric cap or calotte. The maximum load capacity is 25 W.

The tweeter (high-range speaker) covers a frequency range from 4000 Hz to 20,000 Hz.

The tweeter is connected to the woofer. The frequency range of the high-range speaker is set by means of a capacitor.

Installation location

The tweeter (high-range speaker) is located in a panel mounted in the mirror triangle.

The output direction of the tweeter is directed at the head area of the occupant opposite.

The tweeter (high-range speaker) is based on a sealed design.



Fig. 27: E85 Tweeter (high-range speaker) in mirror triangle

KT-10049

- Mid-range speakers, rear

The mid-range speaker has a diameter of 100 mm and a paper cone. The maximum load capacity is 25 W. The mid-range speaker covers a frequency range from 100 Hz to 15,000 Hz.

Installation location

The mid-range speakers are mounted behind the seats.

The output is aligned in forward direction.
The resonance volume is approx. 2 l.



Fig. 28: E85 Mid-range speaker behind the seats

KT-10097

Index	Explanation
1	Mid-range speaker

- Stereo audio system

The Stereo audio system is connected directly to the 4 speaker outputs of the radio.

The tweeters are powered by the radio via the woofers and are decoupled by means of capacitors.

The output of the stereo audio system is 4x25 W at 4 Ω .

All functions such as volume, bass, treble, fader etc. are formed in the radio and output to the speakers.

System overview - HiFi

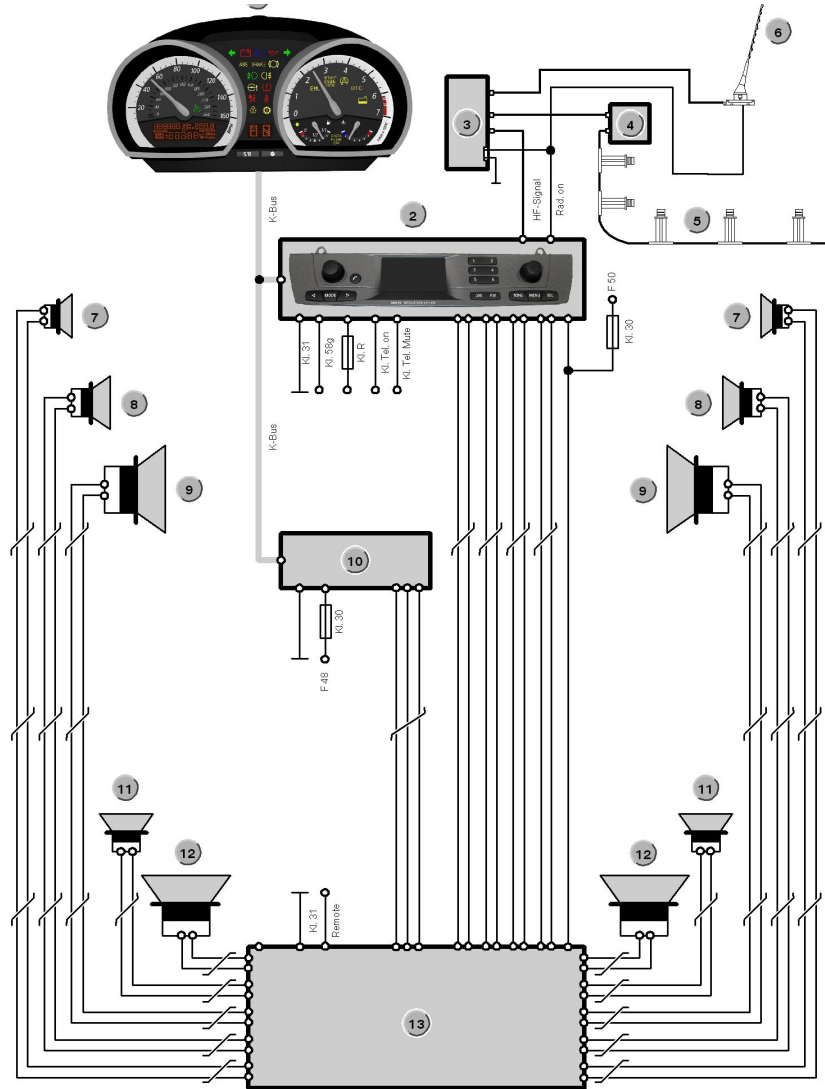


Fig. 29: E85 System overview - HiFi audio system

KT-10016

Index	Explanation	Index	Explanation
1	Multi-information radio	5	CD changer
2	Low-range speaker, front	6	Low-range speaker, rear
3	High-range speaker, front	7	Mid-range speaker, rear
4	Mid-range speaker, front	8	HiFi amplifier

System diagram - HiFi



KT-10006

Fig. 30: E85 System diagram - HiFi

Index	Explanation	Index	Explanation
1	Instrument cluster	8	Mid-range speaker, front
2	Multi-information radio	9	Low-range speaker, front
3	FM aerial diversity	10	CD changer
4	FM amplifier	11	Mid-range speaker, rear
5	FM aerial 2	12	Low-range speaker, rear
6	AM/FM1 aerial	13	HiFi amplifier
7	High-range speaker, front	14	

Components of HiFi audio system

The HiFi audio system consists of following components:

- Radio Business-CD, MIR or CID
- HiFi amplifier
- Front left and right low-range speakers (woofers)
- Front left and right high-range speakers (tweeters)
- Front left and right mid-range speakers
- Rear left and right low-range speakers (woofers)
- Rear left and right mid-range speakers
- CD changer (optional)

- HiFi amplifier

The HiFi amplifier is designed as an analogue 10-channel amplifier.

The 4 input channels are divided via frequency gates and equalizing filters over 10 channels.

The output power is:

- Low-range 4x40 W
- High range/mid-range 6x25 W



Fig. 31: E85 View of HiFi amplifier

KT-10098

The channels are divided over a 3-way speaker system at the front and a 2-way speaker system at the rear.

Installation location

The HiFi amplifier is installed in the luggage compartment trough next to the vehicle battery.

- Low-range speakers (woofers)

The low range speakers (woofers) are identical to those in the stereo audio system. Rear woofers are additionally installed in the partition behind the seats.

- High-range speakers (tweeters)

The high-range speakers (tweeters) and their location are identical to those in the stereo audio system.

- Mid-range speakers

The mid-range speakers have a diameter of 100 mm and a paper cone. The maximum load capacity is 25 W. The mid-range speaker covers a frequency range from 100 Hz to 15,000 Hz. The front and rear mid-range speakers are of identical design.

Installation location

The front mid-range speakers are fitted in the doors. The rear mid-range speakers are mounted behind the seats.

The front mid-range speakers emit sound transversely with respect to forward direction.

The mid-range speakers utilize the resonance volume of the doors.

The output of the rear mid-range speakers is aligned in forward direction. The resonance volume is approx. 2 l.



Fig. 32: E85 Front mid-range speaker in driver's door

KT-10077

- HiFi audio system

The HiFi audio system features a 10-channel analogue amplifier that is connected directly to the 4 speaker outputs of the radio. The HiFi amplifier is identical to that of the E46. The speakers are connected to the 10 output channels.

The HiFi audio system has following output ratings:

- Medium-range and high-range speakers: 6x20 W
- Low-range speakers: 4x40 W

System overview - Top-HiFi



Fig. 33: E85 System overview - Top-HiFi audio system

KT-10017

Index	Explanation	Index	Explanation
1	Multi-information radio	5	CD changer
2	Low-range speaker, front	6	Carver low-range speaker, rear
3	High-range speaker, front	7	Mid-range speaker, rear
4	Mid-range speaker, front	8	Top-HiFi amplifier

System diagram - Top-HiFi

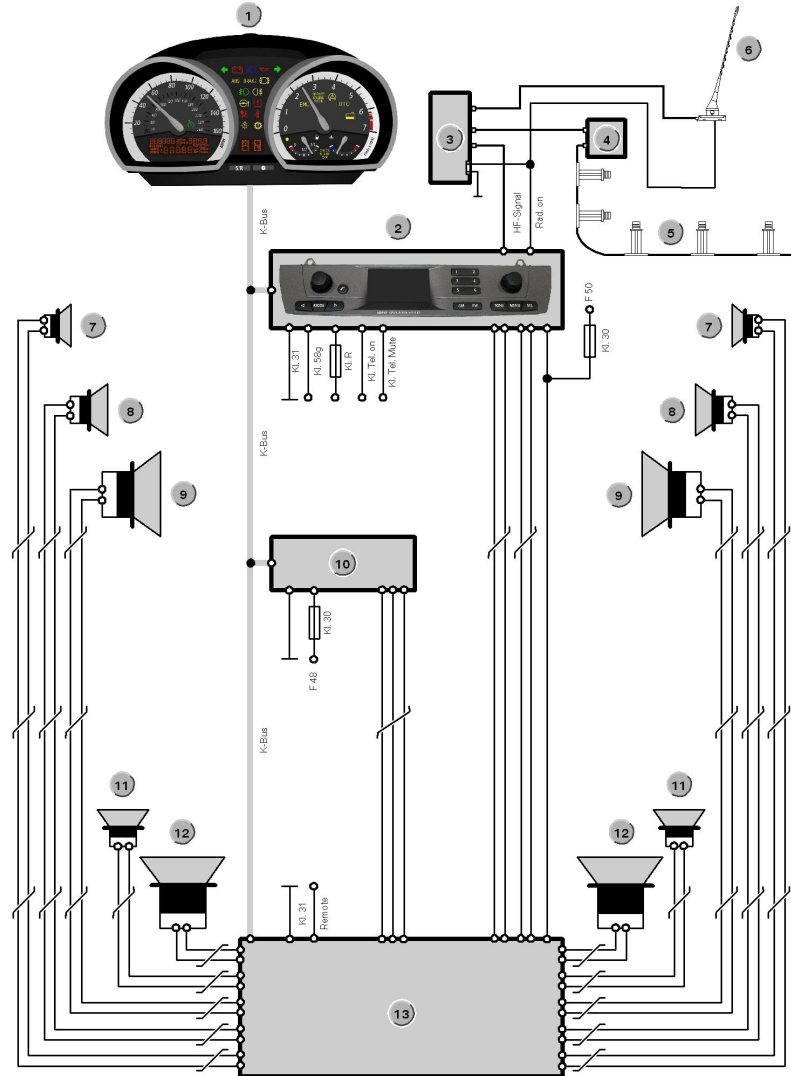


Fig. 34: E85 System diagram - Top-HiFi

KT-10007

Index	Explanation	Index	Explanation
1	Instrument cluster	8	Mid-range speaker, front
2	Multi-information radio	9	Low-range speaker, front
3	FM aerial diversity	10	CD changer
4	FM amplifier	11	Mid-range speaker, rear
5	FM aerial 2	12	Carver low-range speaker, rear
6	AM/FM1 aerial	13	HiFi amplifier
7	High-range speaker, front	14	

Components of Top-HiFi audio system

The Top-HiFi audio system consists of following components:

- Radio Business-CD, MIR or CID
- Top-HiFi amplifier
- Front left and right low-range speakers (woofers)
- Front left and right high-range speakers (tweeters)
- Front left and right mid-range speakers
- Rear left and right mid-range speakers
- Rear left and right low-range speakers (woofers) in Carver technology
- CD changer (optional)

- Top-HiFi amplifier

With regard to its functionality, the Top-HiFi amplifier corresponds to the previous DSP amplifier as already used in other model series.

The special features on the E85 are the two high voltage output stages (30 V) for the Carver woofers.

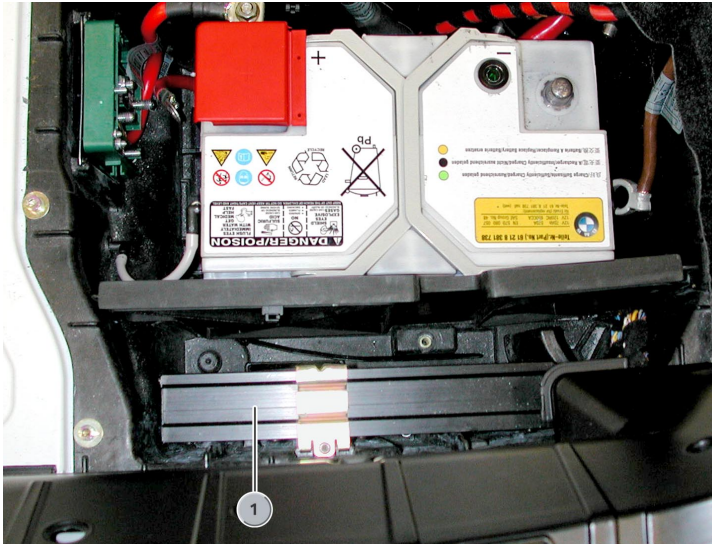
The Top-HiFi amplifier has 2 analogue inputs (left and right). In addition, the Top-HiFi amplifier features a digital input for the CD changer connection (coaxial cable). This arrangement achieves a higher signal quality.



Fig. 35: E85 Top-HiFi amplifier

KT-10126

Installation location of Top-HiFi amplifier



The Top-HiFi amplifier is installed in the luggage compartment pan next to the vehicle battery.

Fig. 36: Top-HiFi amplifier

KT-10118

Index	Explanation
1	Top-HiFi amplifier

- Front low-range speaker (woofer)

The woofer has a diameter of 160 mm and a paper cone. The maximum load capacity is 50 W. The woofers (low-range speakers) cover a frequency range from 50 Hz to 500 Hz.

Installation location

The front woofers (low-range speakers) are mounted at the bottom in the A-pillars on the left and right.

- High-range speakers (tweeters)

The high-range speakers (tweeters) and their installation location are identical to those in the Stereo audio system.

- Mid-range speaker

The mid-range speaker has a diameter of 100 mm and an aluminium cone. The maximum load capacity is 50 W. The mid-range speaker covers a frequency range from 100 Hz to 10,000 Hz. The front and rear mid-range speakers are identical.

Installation location

The front mid-range speakers are fitted in the doors. The rear mid-range speakers are installed in the partition behind the seats.

- Carver woofers (low-range speakers), rear

The Carver woofers have a diameter of 160 mm and a paper cone in Carver technology. The maximum load capacity is 100 W.

The Carver woofers cover a frequency range from 30 Hz to 150 Hz.

Installation location

The rear Carver woofers are accommodated in the partition behind the seats.

The resonance volume is approx. 10 l.



Fig. 37: E85 Carver low-range speakers, rear

KT-10097

Index	Explanation
1	Mid-range speaker, rear
2	Carver low-range speaker, rear

Design

The design of the Carver woofer (low-range speaker) is shown in the illustration below:

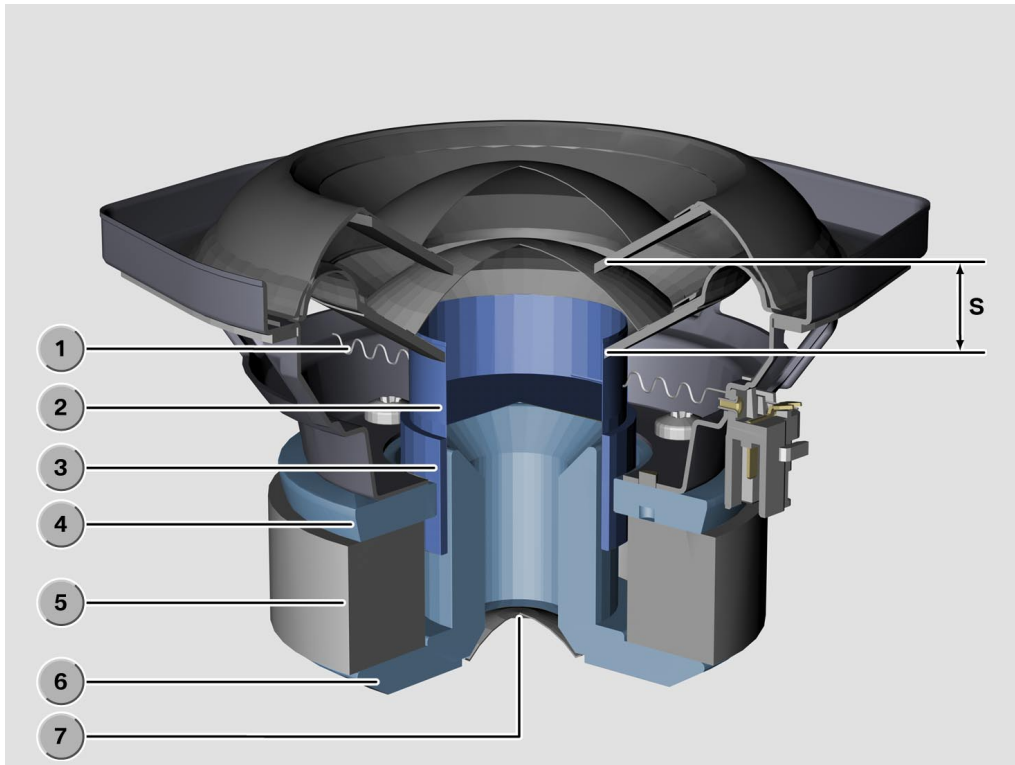


Fig. 38: Design of a Carver woofer (low-range speaker)

KT-10094

Index	Explanation
1	Centering swing arm
2	Displacement cylinder
3	Moving coil
4	Pole core
5	Permanent magnet
6	Iron core
7	Ventilation hole
S	Diaphragm displacement

Operating principle

High sound pressure is required for achieving a rich bass. The Carver woofers (low-range speakers) produce this sound pressure with their small diameter by increasing the displacement of the diaphragm.

The sound pressure is produced by movement in the volume of air.

The volume of air moved is derived from the diaphragm area multiplied by the displacement.

To date to achieve this, the largest possible diaphragm area (diameter of the speaker) was used in conjunction with relatively low displacement (approx. 3-10 mm). A matching resonance volume is additionally required.

In vehicle construction applications, this technology leads to a conflict between vehicle design and vehicle equipment: Due to the design and comprehensive level of equipment, there is little package space available for large bass speakers.

Carver technology represents a new approach in solving this problem. Thanks to Carver technology, a high sound pressure is produced with a small speaker diameter by increasing the diaphragm displacement (approx. 30 mm).

- Top-HiFi audio system

The Top-HiFi audio system features a 10-channel analogue amplifier with DSP technology as used in the current vehicles. The Top-HiFi amplifier is controlled with a constant audio signal via the two analogue output channels of the radio. In addition, the Top-HiFi amplifier features a digital input for the CD changer. The speakers are connected to the 10 output channels. The Top-HiFi audio system has following output ratings:

- Medium-range and high-range speakers: 6x20 W
- Low-range speakers: 2x40 W
- Carver low-range speakers: 2x100 W

Top-HiFi with radio Business-CD, MIR or CID radio

Depending on the type of radio installed, programmed sound settings can be selected or freely programmed.

In connection with the radio Business-CD, one of the following 3 programmed sound settings can be selected in the "Tone" (sounds) menu:

- Jazz
- Hall
- Cathedral

The radio MIR or the CID radio with the central information display offers the following features:

- 3 preset menus (see above)
- 3 freely programmable menus

In the case of the CID radio, the overall acoustics can be set individually by means of a 7-band graphic equalizer.

Operation

All audio systems are controlled via the radios. The differences between the systems are in the control of the amplifiers.

The HiFi and Top-HiFi amplifiers do not feature direct control functions.

- HiFi amplifier

The HiFi amplifier is controlled via the radio.

The required settings are selected in the radio and output via 4 radio outputs to the amplifier. The amplifier amplifies the settings and distributes them over 10 channels.

No variable matching takes place in the HiFi amplifier.

Vehicle-specific equalizing is integrated in the HiFi amplifier.

The following functions can be set in the radio:

- Volume
- Bass
- Treble
- Balance (left/right)
- Fader (front/rear)
- Loudness
- Speed-dependent volume control

- Top-HiFi amplifier

The Top-HiFi amplifier is also controlled via the radio.

The Top-HiFi amplifier receives a constant audio signal for the left and right (via the two audio inputs) from the radio. The required settings are transferred via the K-bus and formed in the amplifier.

The following functions can be set:

- Volume
- Bass
- Treble
- Balance (left/right)
- Fader (front/rear)

In addition, the overall acoustics can be set individually (CID only) by means of a 7-band graphic equalizer.

Deactivation of the Top-HiFi amplifier during a telephone call

If the vehicle is equipped with a telephone, the telephone control unit switches off the Top-HiFi amplifier inputs in the event of a telephone call.

The inputs are switched off by the "Tel-Mute" signal. The Tel-Mute input is a separate input. To ensure the inputs are switched off immediately, the signal is transferred on a separate line (not on the K-bus). If the signal were transmitted via the K-bus, delays could occur in switching off the inputs when the load on the K-bus is high. Consequently, this would cause disturbance of the telephone call.

Improved overall acoustic impression

With the aid of software, adaptations were implemented in the Top-HiFi amplifier for the purpose of improving the overall acoustic impression.

The following adaptations in the amplifier are conducted automatically:

- Loudness
- Speed-dependent volume control
- Vehicle-specific equalizing
- Dynamic equalizing
- Dynamic compression
- Internal temperature monitoring

Loudness

To improve the listening nuance, the low frequencies are raised slightly at low volume settings.

Speed-dependent volume control

The volume is raised as the driving speed increases. 6 characteristic curves are available for this purpose. The characteristics can be set individually in the service functions.

Vehicle-specific equalizing

The acoustics are matched to the vehicle interior.

Dynamic equalizing

The acoustics are adapted to increasing driving noise.

Dynamic compression

The dynamics must be compressed to avoid overloading the system.

The upper level of effective dynamics is limited by the output power of the amplifier and the load capacity of the speakers. For this reason, the speed-dependent volume cannot be increased infinitely,

Internal temperature monitoring

In the event of excessively high temperature, the output of the output stages is reduced in order to cool them.

The temperature of the output stages is permanently monitored.

Notes for Service

- Diagnosis

No diagnosis functions are provided for the audio systems.

- Coding

No variant coding functions are provided for the audio systems.

- Car & key memory

No functions are available for the car & key memory.

Telephone systems E85

Introduction

- Telephone versions

This technical vehicle documentation describes the most important telephone systems of the E85. Depending on the country and equipment specifications, the following telephone versions are offered for the E85:

- **Option 638 "Professional" car phone**
Permanently built-in GSM telephone with dual-band and Bluetooth handset for EU vehicles
- **Option 644 Universal mobile phone preparation**
Preparation for universal Bluetooth mobile phones with hands-free and charging unit for EU vehicles
- **Option 639 Full preparation USA/CDN incl. Telematic**
Preinstalled devices for telephone AMPS/CDMA for US with Telematic functions (emergency call)
- **Option 646 Car phone preparation for Japan**
Preparation for the JBIT II
- **Option 640 Car phone preparation**
Multifunction wiring harness with aerial for GSM telephone (not described in this documentation)
- **Option 641 Universal mobile phone preparation, US standard**
Preparation for US telephones in EU vehicles (e.g. country-specific versions South Korea, Latin America, etc.)
(not described in this documentation)

GSM = Global System for Mobile Communication

AMPS = American Mobile Phone Standard

CDMA = Code Division Multiplex Algorithm

JBIT II = Japan Basic Interface Telephone 2

- New features of systems

New features supplementing previous BMW systems

Two new telephone systems are used in the E85. The new Everest platform (built-in) and the universal charging and hands-free unit (ULF) that can be used in conjunction with Bluetooth mobile phones.

The Everest platform is the basis for almost all built-in telephones worldwide (exception: Japan). Depending on the country to which the vehicle is delivered, the TCU control unit can be adapted to the corresponding standards. Connections to the K-bus are possible. In parallel, as of 12/02, built-in telephones with the Everest standard will be introduced in all BMW models.

Everest platform

Depending on the country variant, the Everest platform comprises the following innovations:

- GSM dual-band 900/1800 MHz
- AMPS/CDMA 800/1900 MHz
- Standard Telematic Control Unit (TCU) with functions for telephone, Telematic, SMS and Bluetooth interface
- Cordless handset with Bluetooth connection
- Telematic functions (emergency call, breakdown call)
- Secure Privacy mode through Bluetooth
- Connection of a laptop, PDA (Personal Digital Assistant), etc. by means of Bluetooth for transmission of data across the TCU.

Universal charging and hands-free unit, ULF

Furthermore, a universal hands-free and charging unit will be created for the new generation of Bluetooth mobile phones. This enables the customer to use Bluetooth mobile phones in the vehicle (currently only GSM markets).

In the E85, Bluetooth technology is used in BMW car phones for the first time.

Car phone, "Professional"

System overview

The "Professional" car phone (option 638) is based on the Everest platform and will be used in this equipment in the EU version.

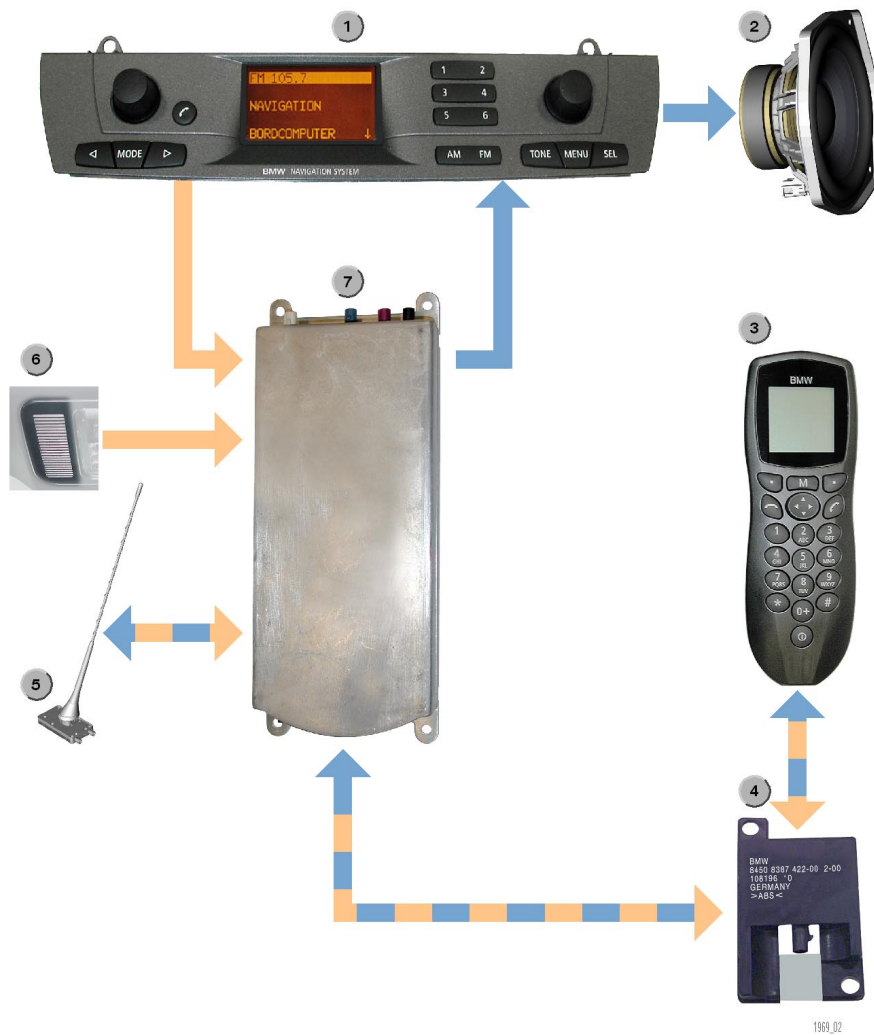


Fig. 40: E85 System overview of "Professional" car phone, EU

KT-10600

Index	Description	Index	Description
1	Multi-information radio	5	GSM aerial
2	Speakers	6	Hands-free microphone
3	Cordless handset	7	Telematic Control Unit TCU
4	Bluetooth aerial		

System circuit diagram

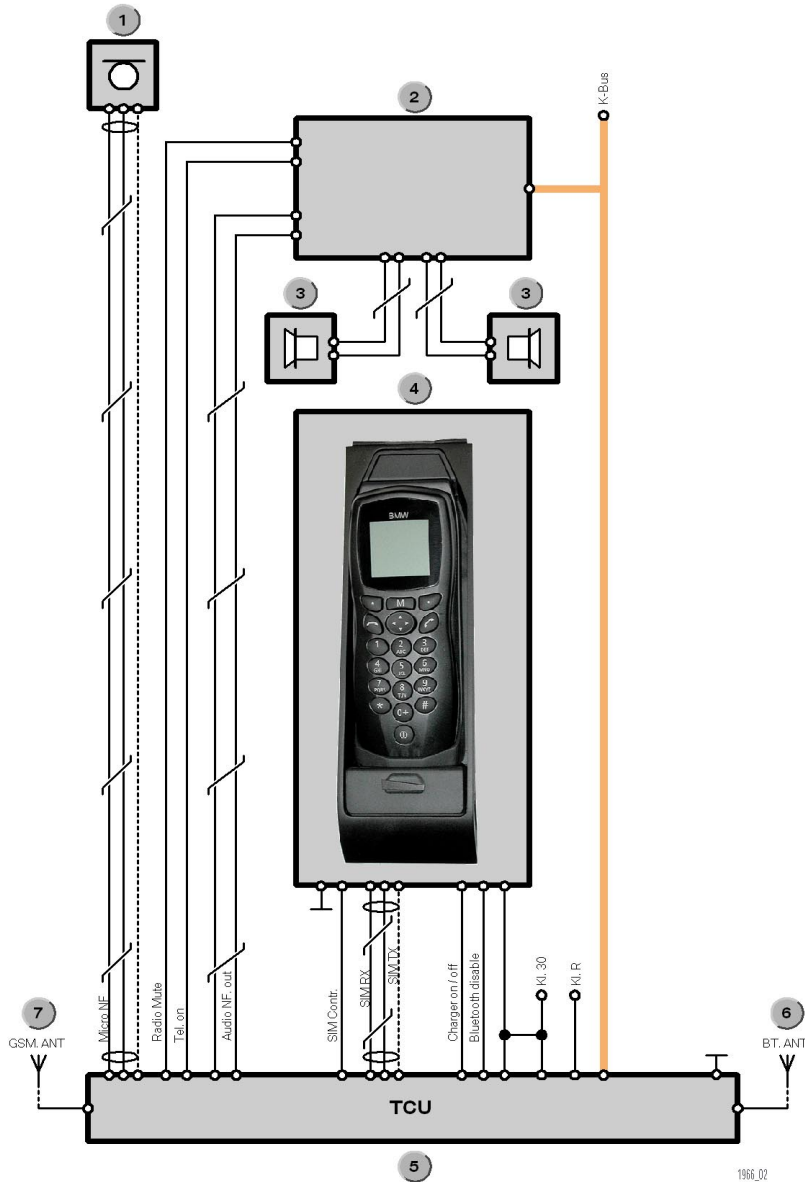


Fig. 41: E85 System circuit diagram for "Professional" car phone

KT-10590

Index	Description	Index	Description
1	Hands-free microphone	5	Telematic Control Unit TCU
2	Radio	6	Bluetooth aerial
3	Speakers	7	GSM aerial
4	Eject box with cordless handset		

Components

The option 638 built-in "Professional" telephone is only offered in conjunction with the option 609 navigation High or option 606 radio navigation. The built-in "Professional" telephone (GSM) consists of the following components:

- Telematic Control Unit TCU with dual-band for GSM 900/1800 MHz
- Eject box with SIM card reader
- Cordless handset SBDH with Bluetooth connection
- Microphone for hands-free unit
- GSM aerial
- Bluetooth aerial

- Telematic Control Unit TCU

The Telematic Control Unit TCU is the transmit and receive unit for the built-in "Professional" telephone.

The TCU contains the following assemblies:

- The power supply and power management
- The microprocessor for control of all functions
- The transmit/receive module NAD (Network Access Device), which enables access to the various telephone systems (GSM, CDMA/AMPS, PDC) depending on country configuration
- The Bluetooth module as interface for communication with the SBDH and/or other Bluetooth devices
- A digital, full-duplex hands-free unit
- A K-bus interface for connection to the vehicle
- Interfaces for all necessary components (SIM card reader, eject box, etc.)
- Aerial interfaces for GSM and Bluetooth aerial



Fig. 42: Telematic Control Unit TCU

KT-10542

TCU

The TCU is fitted in the luggage compartment at the separating wall beside the video module.

Operating principle

In the EU version, the Telematic Control Unit features a transmit/receive module that works in the GSM standard with the frequencies 900/1800 MHz. This means that, in Germany for example, D1/D2 or E-Plus can be used.

Via the SIM card (Subscriber Identity Module), which is inserted into the card reader in the eject box, the TCU recognizes which system is involved and enables the telephone.

- Eject box

The eject box accommodates the cordless handset SBDH while the vehicle is being driven.

The eject box is fitted in the lid of the centre console between the seats.

The SIM card reader is located in the eject box. The eject box takes on the charging function for the batteries of the SBDH.



Fig. 43: Eject box with SBDH

1963_02
KT-10587

Index	Explanation
1	Eject box
2	SIM card reader
3	Cordless handset (SBDH)
4	Unlock button for SBDH

- Cordless handset



The cordless handset SBDH is the operating unit for the telephone. The data exchange between the SBDH and TCU is by means of Bluetooth. With the SBDH, it is possible to make phone calls in the passenger compartment.

Fig. 44: SBDH (cordless handset)

KT-10586

For safety reasons, the SBDH should be placed in the eject box while the vehicle is being driven.

- Hands-free microphone



The hands-free microphone is fitted to the left of the interior light in the roof frame.

Fig. 45: E85 Installation location of the hands-free microphone

KT-10046

The hands-free microphone transmits in full-duplex mode. That means that the LF signals are enabled for both parties involved in the call, making it possible to speak and listen simultaneously. An echo compensation avoids a cross-back coupling of the calls.

- GSM aerial

The GSM aerial is located together with the AM/FM aerials in the rod aerial. The GSM aerial is a dual-band aerial and it is geared to the ranges 900/1800 MHz in the EU version.

Installation location

The GSM aerial is located on the side panel at the rear left.

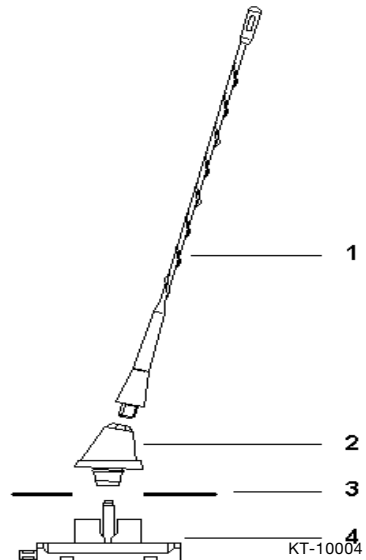
Design

The structure of the GSM aerial is shown in the following drawing.



Fig. 46: E85 GSM aerial

KT-10641



Index	Explanation
1	Aerial rod
2	Aerial head
3	Body panel
4	Aerial amplifier (radio function)

- Bluetooth aerial



The Bluetooth aerial works in the ISM band (Industrial Science Medical band) on a frequency of 2.45 GHz. The Bluetooth aerial has the same design as the former WDCT aerial.

KT-9168

Fig. 47: Bluetooth aerial

Installation location

The Bluetooth aerial is fitted in the centre console in the separating wall to the left beside the navigation computer.

System functions

Telephoning

Accepting a call

A call is accepted by pressing the transmit-receive button in the radio control panel or on the SBDH.

The GSM aerial receives a signal (call) and forwards this to the TCU. In the TCU, the MUTE module switches the radio to mute. If the radio is switched off, the signal "TEL ON" switches on the radio. From the TCU, a sound signal is output across the audio system.

The call is accepted by pressing the transmit-receive button in the radio control panel or on the SBDH.

Hands-free mode

The hands-free mode is activated when a call is accepted via the transmit-receive button in the radio control panel.

At the same time, the digital full-duplex hands-free unit is enabled. It is then possible to speak and listen simultaneously (hands-free mode).

By means of voice input into the microphone, an LF signal is sent to the TCU. In the TCU, the signal is forwarded to the transmit/receive module and transmitted via the GSM aerial.

Making a call on the SBDH (Privacy Mode)

If a call is accepted using the transmit-receive button on the SBDH when lifted, the hands-free system is switched off.

If the call is accepted on the SBDH and then the user speaks into the microphone of the SBDH, the voice transmission takes place through the integrated Bluetooth interface to the Bluetooth aerial in the vehicle and to the TCU (Privacy Mode).

The received signal is sent by the transmit/receive module to the Bluetooth module, sent across the Bluetooth aerial to the SBDH, and output across the loudspeaker in the SBDH.

Terminating a call

A call can be terminated using both the transmit-receive button in the radio and the transmit-receive button on the SBDH.

To terminate a call, there are the following possibilities:

- Press the transmit-receive button on the radio once again
- Press the transmit-receive button on the SBDH once again

- Modem function

The Bluetooth interface in the TCU provides the possibility to address other Bluetooth devices e.g. laptops or PDAs (Personal Digital Assistant) on the TCU.

By linking to other devices, the TCU can also be used as a modem, e.g., to send an e-mail from a laptop.

- Emergency call functions

The "Professional" car phone offers the customer a number of emergency call functions:

The **automatic emergency call** is triggered as of a certain crash severity without the driver having to take any action.

The **manual emergency call** is selected by hand.

A breakdown call using BMW ASSIST is only possible if a corresponding service contract exists.

An emergency call is possible at any time, even if no SIM card is inserted.

Automatic emergency call

In the event of an accident with corresponding crash severity, the SIM transmits a crash telegram across the K-bus to the telephone. The telephone makes the emergency call. The telephone also receives an SMS from the navigation system with the coordinates of the location. The telephone sends the SMS to the service provider.

The service provider then attempts to set up a voice connection with the vehicle occupants to obtain more information on the accident (severity of the accident, number of injured) so that rescue operations can be initiated.

Manual emergency call

In the central information display, there is a virtual emergency call button in the "Telephone" menu. If the emergency call button is activated, an attempt is made to set up a voice connection to the service provider.

If no connection can be set up, the country-specific emergency number is dialled (Germany 112).

Manual emergency call

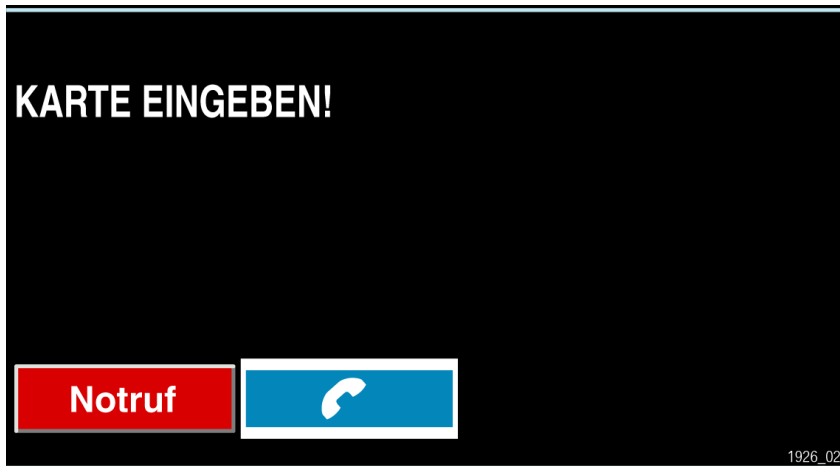


Fig. 48: Emergency call button in the central information display

KT-10530

Breakdown call

If a contract for BMW ASSIST has been concluded, a "Breakdown call" button appears in the BMW ASSIST menu. Activating the button sets up a direct telephone connection to the Mobile Service of the BMW Group.

- Power management

The TCU monitors and regulates the power supply of the telephone system in order to switch it off in the event of under-voltage or overvoltage.

Universal charging and hands-free unit, ULF

Introduction

The universal charging and hands-free unit ULF (option 644) is designed for use in connection with Bluetooth mobile phones.

For the first time BMW has introduced a new telephone generation that provides the customer with the option of using standard mobile phones with Bluetooth technology. The launch will take place in September 2002 in the models E46, E39 and E53.

The universal charging and hands-free unit ULF forms the interface between the Bluetooth mobile phone and vehicle. It combines the functions of the Bluetooth mobile phone with the telephone functions of the vehicle.

The Bluetooth mobile phone is the transceiver. The GSM aerial of the vehicle is connected via the base plate and the snap-in adapter directly to the mobile phone.



Fig. 49: Cradle for Bluetooth mobile phone

KT-10767

Advantages of the ULF:

- Thanks to automatic configuration of the wireless connection in the vehicle, no operating functions whatsoever are required for daily use. A cordless connection is established automatically while making available the familiar comfort functions (handset pick-up, telephone book selection).
- The control function of Bluetooth mobile phones are standardized irrespective of the manufacturer and therefore allow connection of the telephone of different manufacturers and types to the ULF in BMW Group vehicles.

- What is Bluetooth?

The name Bluetooth is derived from the Danish king of the same name who lived in the 10th century. He united and unified his kingdom and today lends his name to a technology that connects devices in the short radio range.

Bluetooth is a new short-range radio standard that allows several devices to communicate with each other simultaneously. In contrast, only one connection can be set up simultaneously between two devices operating on infrared interfaces. Communication can therefore only take place "point to point." The distance between the devices must not be greater than 1 meter.

With Bluetooth, it is possible to connect up to eight users to a network (Piconet) within a range of up to 10 m.
The ULF allows four users to set up a connection in the vehicle.



Fig. 50: Bluetooth system network

KT-10770

- Transmission

The system uses the licence-free, global industrial scientific medical band (ISM) at 2.45 GHz. This frequency range from 2.402 GHz to 2.480 GHz is subdivided into 79 channels at 1 MHz bandwidth.

The channels are changed 1600 times per second to avoid interference in connection with other devices and to make interception more difficult.

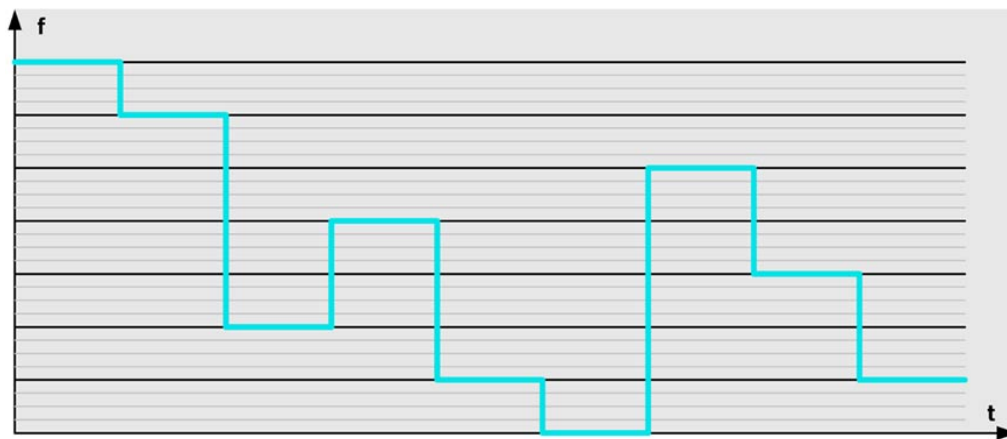


Fig. 51: Frequency change during data transfer

KT-10769

Note:

The signal range is shortened substantially when using the hands-free facility to make a call together with the Bluetooth mobile phone and turning the head into the transmitter range from the Bluetooth mobile phone to the Bluetooth aerial.

The attenuation is particularly high when an obstruction contains water molecules.

Reason:

The resonance frequency of water approximately corresponds to the transmit frequency of the ISM band.

- Data and voice

Bluetooth was developed for the transmission of both voice as well as data. A bandwidth of approx. 1 MBit/s is available for this purpose.

- Interception security

All transmitted data can be scrambled and unscrambled. It is possible to differentiate up to 281 trillion devices.

Changing the frequencies 1600 times per second is a further decisive security feature. The relatively small range of approx. 10 m also contributes to security as tampering with the data flow is only possible in the immediate vicinity.

A coupling procedure in which a pass key is entered is required once (initial logon) to establish a secure connection between two Bluetooth devices.

System overview

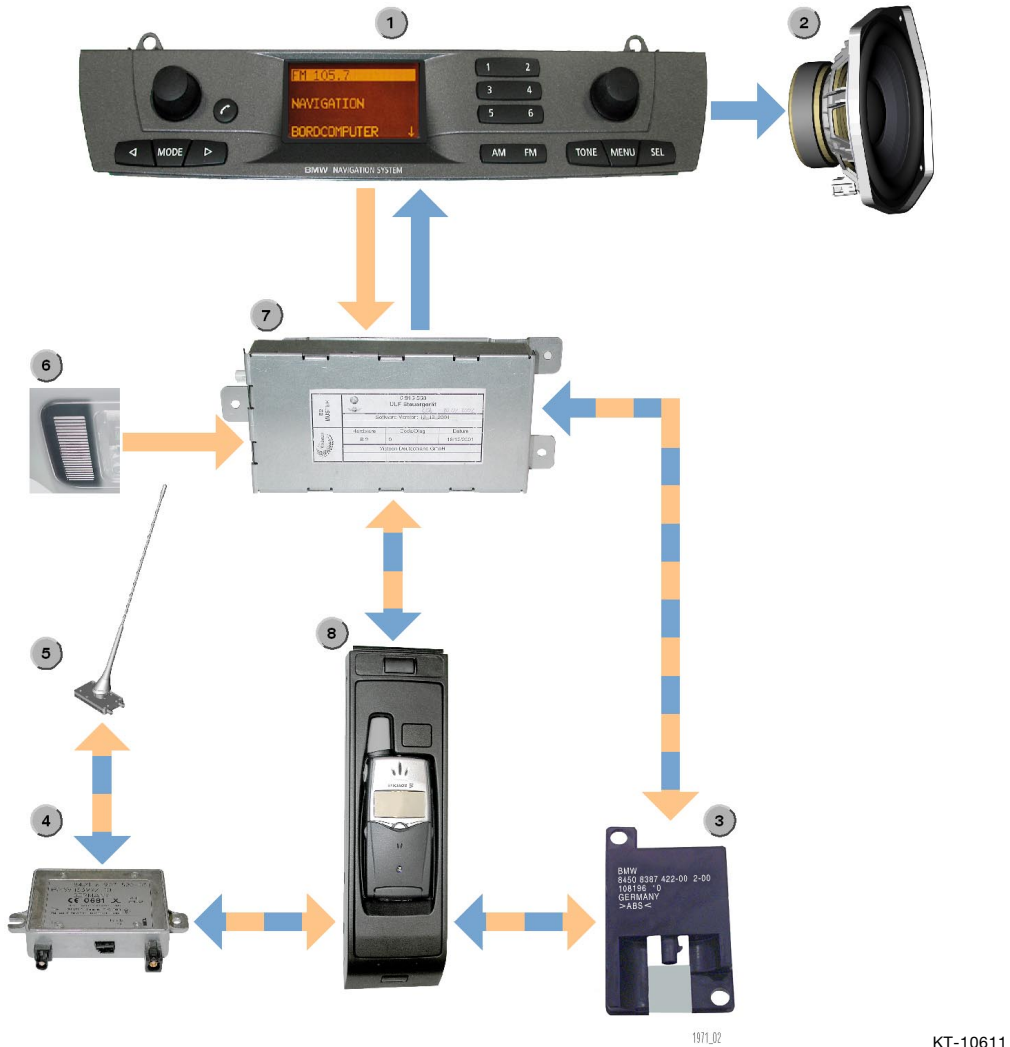


Fig. 52: System overview of universal charging and hands-free unit ULF

Index	Explanation	Index	Explanation
1	BMW multi-information radio	5	GSM aerial
2	Output speaker	6	Microphone
3	Bluetooth aerial	7	ULF control unit
4	Compensator (not standard equipment)	8	Base plate with snap-in adapter and Bluetooth mobile phone

System diagram

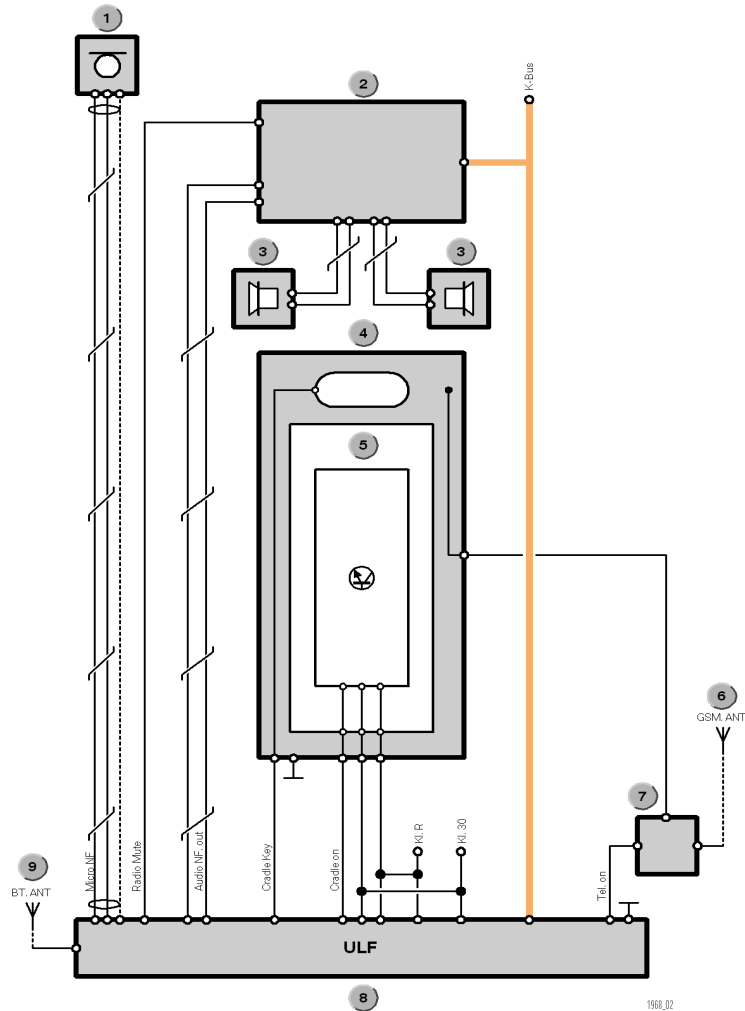


Fig. 53: System circuit diagram for universal charging and hands-free unit

KT-10592

Index	Explanation
1	Hands-free microphone
2	Radio
3	Speaker
4	Base plate
5	Snap-in adapter
6	GSM aerial
7	Compensator (not standard equipment)
8	Control unit for universal charging and hands-free unit
9	Bluetooth aerial

Components

The telephone preparation package for the various Bluetooth mobile phones consists of the following components:

- ULF control unit
- Base plate
- Snap-in adapter (not included in scope of delivery)
- Hands-free microphone
- GSM aerial
- Bluetooth aerial
- Compensator (not included in scope of delivery)
- Display unit (radio display or screen)

- **ULF control unit**

The ULF forms the interface between the Bluetooth mobile phones and the electronic systems in the vehicle.

The ULF system contains following assemblies:

- The module for controlling the digital hands-free facility
- AF signal output for the speakers
- The Bluetooth module for controlling all Bluetooth users
- An I/K-bus interface for connection to the vehicle
- An aerial interface for the Bluetooth aerial (internal)



Fig. 54: ULF control unit

The ULF modules are described in the following. The ULF consists of the following modules:

- Bluetooth module
- Hands-free module
- Power module
- I/K-bus interface

Bluetooth module

The Bluetooth module is connected to the Bluetooth aerial. It establishes the connection between the Bluetooth mobile phone and the vehicle.

Hands-free module

The hands-free module in the ULF controls the input/output of AF signals in hands-free mode. Hands-free mode is activated by pressing the send/receive key in the base plate on the multi-function steering wheel or in the radio control panel.

The hands-free facility is designed for full-duplex transmission. This means the user can listen and speak simultaneously. Voice transmission takes place via a microphone in the vehicle interior.

Power module

The power module in the ULF control unit regulates the voltage supply and monitors system shut-down in the event of under-voltage.

I/K-bus interface

The interface in the ULF control unit for the I/K-bus controls the procedure for transmitting and receiving data telegrams via the I/K-bus in connection with other I/K-bus users.

- Bluetooth mobile phone cradle

The base plate is included in the scope of delivery of the telephone preparation package. A cradle is inserted in the base plate on delivery of the vehicle.

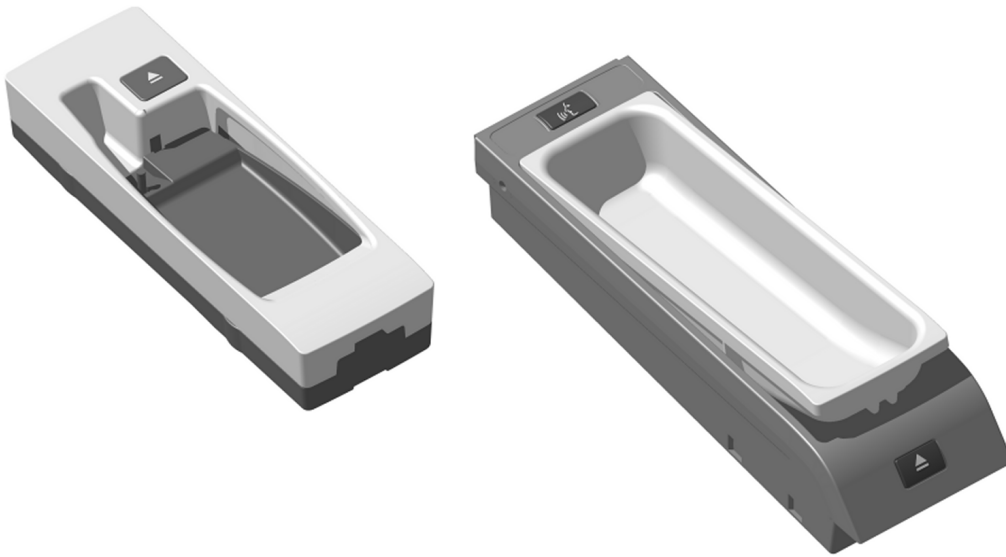


Fig. 55: Base plate with cradle/snap-in adapter

KT-10785

A specific snap-in adapter is necessary corresponding to the type of Bluetooth mobile phone used. It is snapped into the base plate instead of the cradle and establishes the connection between the base plate and Bluetooth mobile phone. The snap-in adapter is available only for mobile phones approved for the BMW Group.

Base plate

The base plate serves the purpose of accepting the snap-in adapter and therefore the Bluetooth mobile phone.

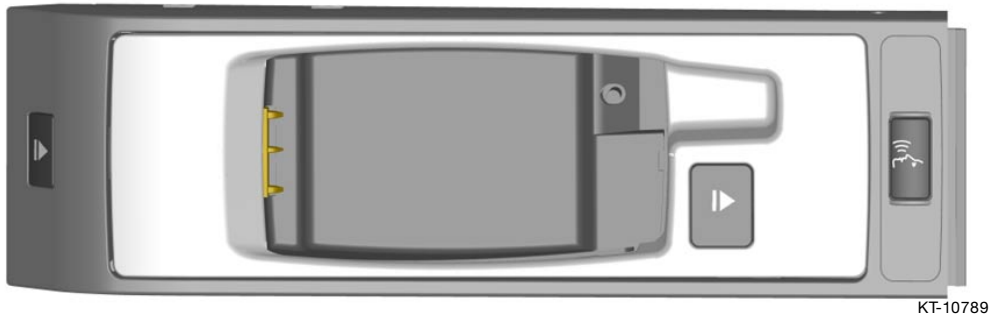


Fig. 56: Base plate with snap-in adapter

The base plate establishes the connection to the ULF and to the vehicle wiring harness.

The charging module is integrated in the snap-in adapter. The snap-in adapter is powered by the ULF control unit as soon as it is connected with the base plate. The charger is active and adapted to the corresponding Bluetooth mobile phone.

The Bluetooth mobile phone is charged only when the following parameters in the charging module apply:

- Snap-in adapter fitted in base plate
- Telephone inserted in snap-in adapter
- Terminal R or after-run time active
- No overvoltage $> 16\text{ V}$
- No undervoltage $> 9\text{ V}$

Snap-in adapter

Two snap-in adapters are currently available (described in the following).

The snap-in adapter regulates battery charging in the Bluetooth mobile phone and establishes the connection to the GSM vehicle aerial.

The after-run time is set at the plant to 12 minutes. The after-run time can be defined as required in the range between 0 to 60 minutes. The mobile phone functions are available during this period of time and charging of the mobile phone battery is ensured.

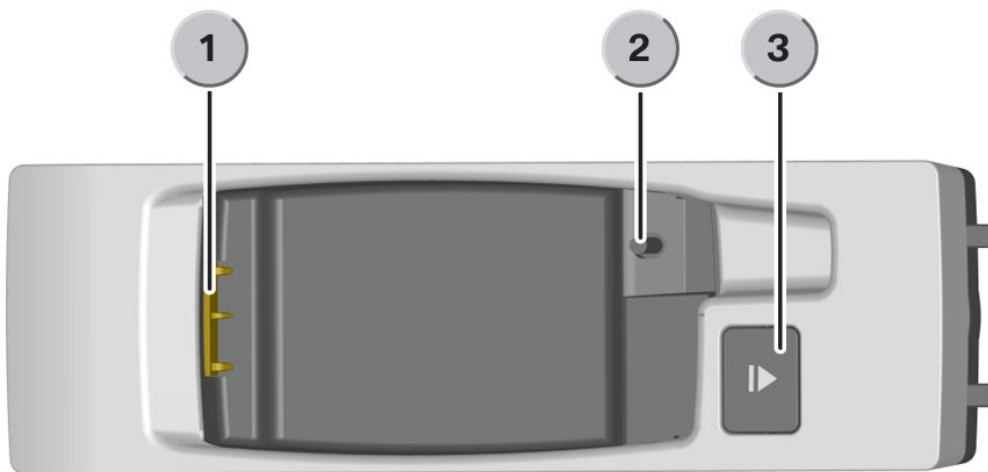


Fig. 57: Snap-in adapter

KT-10790

Index	Designation
1	Charge contacts
2	Aerial connection
3	Eject button, Bluetooth mobile phone

- Bluetooth mobile phone

Essentially, all Bluetooth mobile phones can be operated together with the universal charging and hands-free unit. However, a specific snap-in adapter is necessary for each type of mobile phone.

Snap-in adapters will be available for the following mobile phones from series launch:

- Nokia 6310/6310i
- Ericsson T39



Fig. 58: Bluetooth mobile phone Nokia 6310 (left) and Ericsson T39 (right)

KT-10576

- GSM aerial and hands-free unit

The GSM aerial and the hands-free unit correspond to those of the fixed installation system.

- Compensator

A line compensator is available as a special accessory for compensating line losses. It increases the output power at the vehicle telephone aerial up to a maximum of 2 Watt.

In this way, the compensator improves the transmit and receive power of the telephone in areas with weak network structure.



1942_02

KT-10548

Fig. 59: Compensator

- Bluetooth aerial



The Bluetooth aerial operates on a frequency of 2.45 GHz. It is of identical design as the earlier WDCT (worldwide digital cordless telephone) aerial.

Fig. 60: Bluetooth aerial

KT-9168

System functions

- Telephoning

The mobile phone must always be inserted and locked in the snap-in adapter while driving.

A locked mobile phone offers the following advantages:

- Fixed in position in vehicle
- Connection of the external aerial (GSM aerial) and consequently the user is exposed to distinctly lower radiation
- Continuous monitoring of battery charge status

The telephone functions such as hands-free for instance are also available when the Bluetooth mobile phone is located in a different position in the vehicle.

Accepting a call

The call ringer in the Bluetooth mobile phone sounds when a mobile phone signal is received via the GSM aerial. At the same time, a signal is sent via the Bluetooth interface in the mobile phone to the Bluetooth aerial in the vehicle.

The Bluetooth aerial is connected to the Bluetooth module in the charging and hands-free unit ULF. The ULF recognizes the incoming call and mutes the radio. The speakers for outputting the tone signal are enabled by the audio system and the tone signal additionally sounds.

The following options are available for accepting the call:

- Press send/receive key on radio/operating unit
- Press send/receive key on base plate
- Press send/receive key on MFL (if installed)
- Press send/receive key on mobile phone

Conducting a call

If the call is accepted by pressing the send/receive key on the radio or on the base plate, it will be conducted via the hands-free microphone and vehicle speakers.

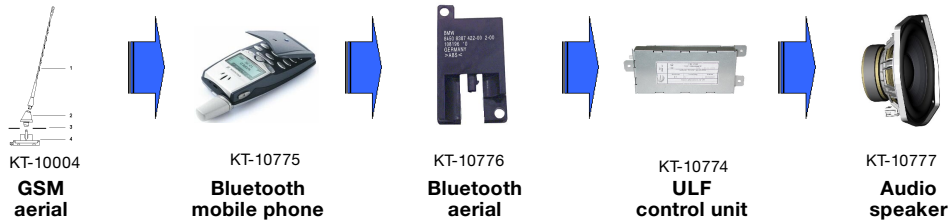
If a call is accepted by pressing the send/receive key on the mobile phone, the reaction will depend on the type of handset. In the majority of cases, however, the question appears:

"Do you wish to use the mobile phone?"

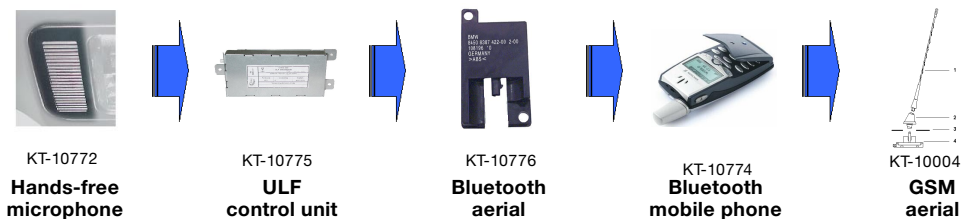
Refer to the operating instructions of the mobile phone for a detailed description of the operating procedure.

E85 Information/Communication

The hands-free facility is activated after pressing the send/receive key. The incoming call is encoded (scrambled) via the Bluetooth interface in the mobile phone and sent to the Bluetooth aerial in the vehicle. The call is received by the ULF control unit and output via the audio speakers.

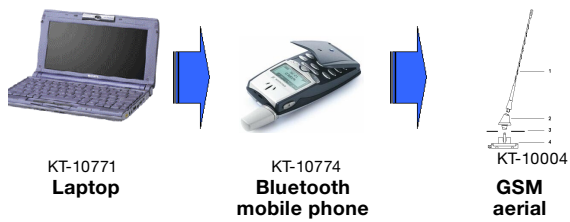


As the vehicle features a digital full-duplex hands-free facility, it is possible to simultaneously speak and listen to calls. An echo compensation facility avoids feedback when speaking into the microphone. The microphone signal is sent via an AF line to the ULF control unit. Here, the received AF signal is scrambled in the Bluetooth module and transferred via the Bluetooth aerial to the mobile phone. The mobile phone transmits the call via the GSM aerial.



Data transfer

Data can be sent via a laptop for instance to the Bluetooth module in the Bluetooth mobile phone. From here when the Bluetooth mobile phone is inserted in the snap-in adapter, the data are transmitted via the GSM aerial.



Ending a call

The following options are available for ending a call:

- Press send/receive key on radio/operating unit
- Press send/receive key on the base plate
- Press send/receive key on MFL (if installed)
- Press send/receive key on mobile phone

- Charging

The rechargeable battery in the Bluetooth mobile phone is charged automatically as soon as it is inserted in the snap-in adapter and recharging is necessary.

Charge status monitoring

The snap-in adapter features an electronic circuit which can check the charge status of the battery in the Bluetooth mobile phone via the charge contacts.

Battery charging

The voltage for battery charging is supplied from terminal 30 to the base plate and via contacts to the snap-in adapter.

Battery charging takes place under following preconditions:

- Terminal R active or after-run time active (cradle on)
- No overvoltage > 16 V
- No undervoltage > 9 V

Battery charging is also ensured during the after-run time.

Operation

- Initial operation

Before using for the first time, each Bluetooth mobile phone must be coupled with the charging and hands-free unit ULF. This coupling procedure is necessary in order to assign the mobile phone to the ULF in the vehicle.

After coupling, this mobile phone is recognized automatically by the ULF as soon as the handset is located in the vehicle interior.

Note

Depending on the mobile phone manufacturer, particular care must be taken prior to initial operation to ensure that no headset is coupled with the mobile phone. Various devices interpret the ULF as a headset and request deactivation of the headset. Please refer to the operating instructions of the mobile phone for detailed information.

Coupling

The mobile phone must be within the reception range (interior).

The coupling procedure differs corresponding to the different menu configurations of Bluetooth mobile phones. Please refer and adhere to the valid instructions provided by the manufacturer.

By way of example, the following coupling operation describes the procedure in connection with the Bluetooth mobile phone Ericsson T39.

Procedure

Press accept key on the base plate and turn ignition key in position (terminal R). Release key after one second.



KT-10800

Fig. 61: Accept key

The "Setup" menu is activated. The telephone indicator lamps (yellow, red, green) blink.



KT-10788

Fig. 62: Screen display during coupling

Start the menu "Search for Bluetooth mobile phones" on the Bluetooth mobile phone.

Ericsson T39

In the case of the Ericsson T39 select the following menu items:

- Select Extras menu
- Select Bluetooth submenu
- Find handset
- Select corresponding handset (display BMW and the last 5 digits of the vehicle identification number)
- Following selection, a four-digit pass key must be entered.



Fig. 63: Display Ericsson T39 KT-10783

Refer to the operating instructions for the pass key. If lost, the pass key can be read out via the BMW diagnosis tester.

The message "Coupling successful" then appears in the vehicle display.

Turn the ignition key to position "0" to exit the Setup menu.

Linking several Bluetooth mobile phones

Up to four Bluetooth mobile phones can be coupled one after the other to the charging and hands-free unit ULF. The coupling operation corresponds to the procedure described above.

The handset coupled last has the highest priority. The telephone coupled first will drop out of the list if a fifth Bluetooth mobile phone is coupled.

Note

For incoming and outgoing calls, only the user coupled first can speak via the hands-free facility.

If two users enter the coupling range simultaneously, only the user with the highest priority (the user last coupled during the initial operation procedure) will be able to use the hands-free function for outgoing calls.

Deleting entries

The coupled Bluetooth mobile phones can only be deleted together in the ULF.

The setup menu must be activated again (press accept key and switch on terminal R) in order to delete entries. The accept key must then be pressed repeatedly for 10 seconds.

Adopting telephone book

Depending on the type of Bluetooth mobile phone, the telephone book is either transferred automatically (Nokia 6310) or manually by the user (Ericsson T39). The ULF must be in setup mode for manual transfer. The corresponding data can now be transferred. Automatic matching does not take place. If the addresses are changed, the transfer procedure must be repeated.

Example: Ericsson T39 operation

- Telephone book menu
- Visiting cards
- Send telephone book
- About Bluetooth

The ULF control unit must then be selected as the target address (BMW + last 5 digits of the vehicle identification number).

Refer to the operating instructions for detailed information on operation of the Bluetooth mobile phones.

Indicator lamps

The indicator lamps show the following:



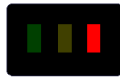
KT-10779

Active call



KT-10778

SMS received (future function)



KT-10780

No mobile phone in range (steady light)

No network (flashing)

Notes and diagnosis

Diagnosis

Diagnosis of the telephone systems comprises the following:

- Read identification
- Read fault code memory
- Delete fault code memory
- Diagnosis request

Coding

Coding in the telephone systems comprises the following function:

- Enabling must be coded for US telephones

Car & key memory

No functions are available for the car & key memory.

TV

Introduction

For the E85, the TV function is offered in option 601 together with the option 609 High navigation system. Option 609 High navigation includes the central information display for the TV function.

The TV function is integrated in the video module II. Video module II is identical to the video module in the E39, E46 and E53.

The functions are also identical.

System overview

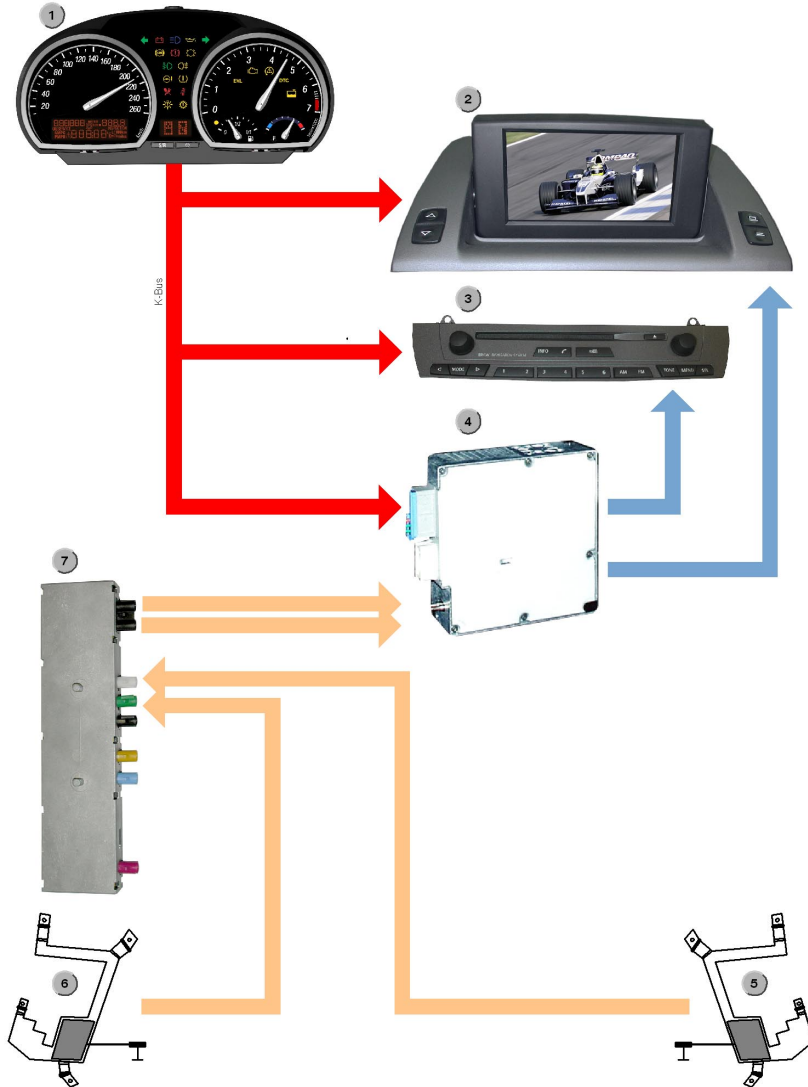


Fig. 64: E85 System overview - TV

KT-10165

Index	Explanation
1	Instrument cluster
2	Central information display (CID)
3	CID control panel
4	Video module
5	TV aerial 1
6	TV aerial 2
7	Aerial diversity

System diagram

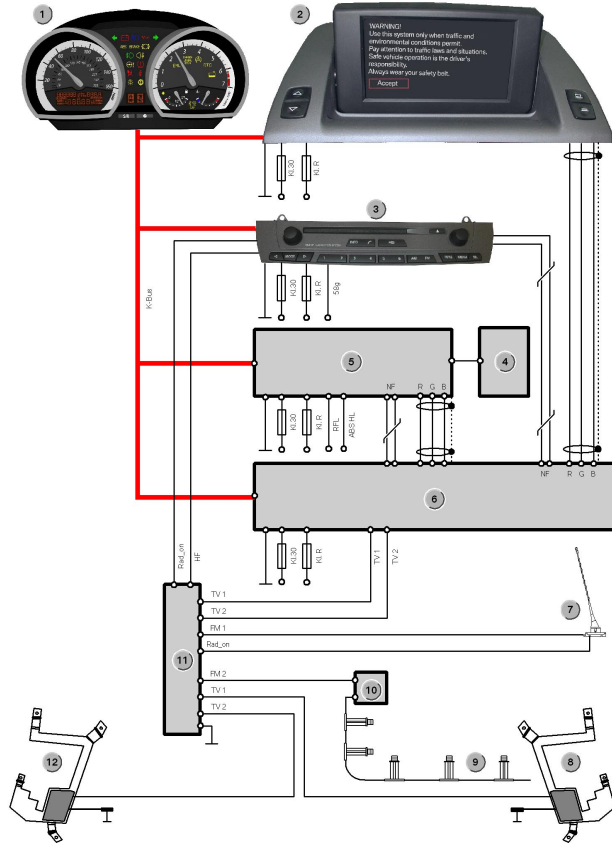


Fig. 65: E85 System diagram - TV

KT-10116

Index	Explanation
1	Instrument cluster
2	Central information display (CID)
3	CID control panel
4	GPS aerial
5	Navigation computer
6	Video module
7	Rod aerial
8	TV aerial 1
9	FM2 aerial
10	FM2 amplifier
11	Aerial diversity
12	TV aerial 2

Components

The system is made up of the following components:

- Central information display (CID)
- CID control panel
- Video module
- TV aerials
- Aerial diversity

- Central information display CID



The CID serves as the television screen.

Fig. 66: E85 Central information display

KT-10631

- CID control panel

The CID control panel serves to control the TV functions in connection with the CID.

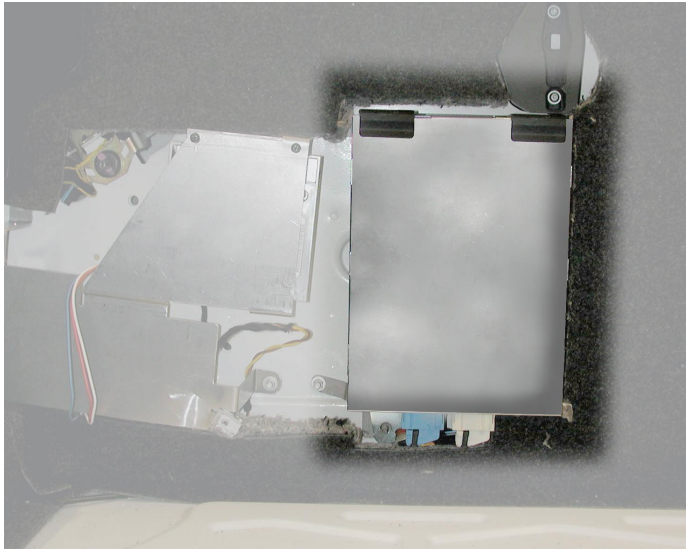


Fig. 67: CID control panel

KT-10044

The CID and CID control panel is described in the "Radio" chapter.

- Video module



The video module contains the TV receiver with video text function as well as the source changeover for audio and RGB signals. The video module communicates via the K-bus with the navigation computer, CID and the CID control panel.

Fig. 68: E85 Installation location of video module

KT-10120

Source changeover: The video module receives audio and RGB signals from the aerials. The video module passes on these source data as follows:

- The audio signals are transferred via the AF lines to the CID control panel (radio).
- The picture data are transferred to the central information display (via the RGB outputs).

Installation location

The video module is mounted on the partition in the luggage compartment.

- TV aerials

2 TV aerials are mounted on the rear left and right in the bumper trim (TV1 and TV2).

The positions of the aerials are matched to the vehicle.

The aerials are connected via ground cables to the body. The TV1 and TV2 aerials are connected to the aerial diversity facility.

The aerial diversity contains a double TV amplifier for both aerials.

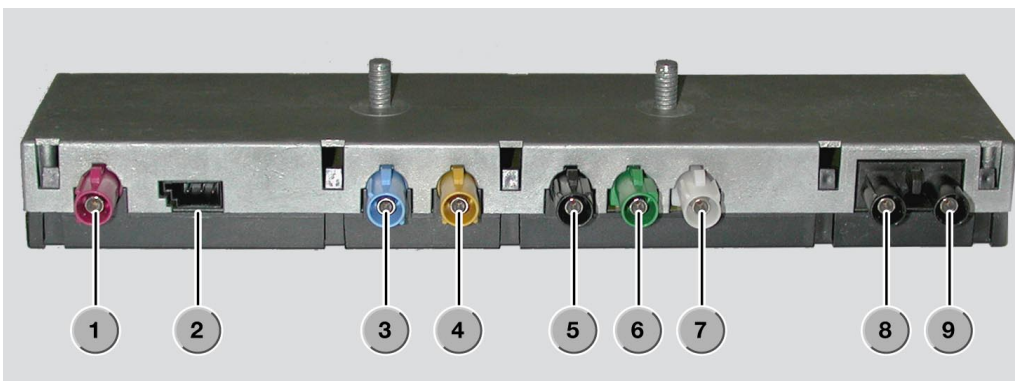


Fig. 69: E85 Connections of aerial diversity module

KT-10096

Index	Explanation
1	Not used
2	Radio_ON signal
3	FM2 aerial
4	HF output to radio
5	FM input from rod aerial
6	TV1 aerial, rear left
7	TV2 aerial, rear right
8	TV1 aerial to video module
9	TV2 aerial to video module

Operating principle

System diagram

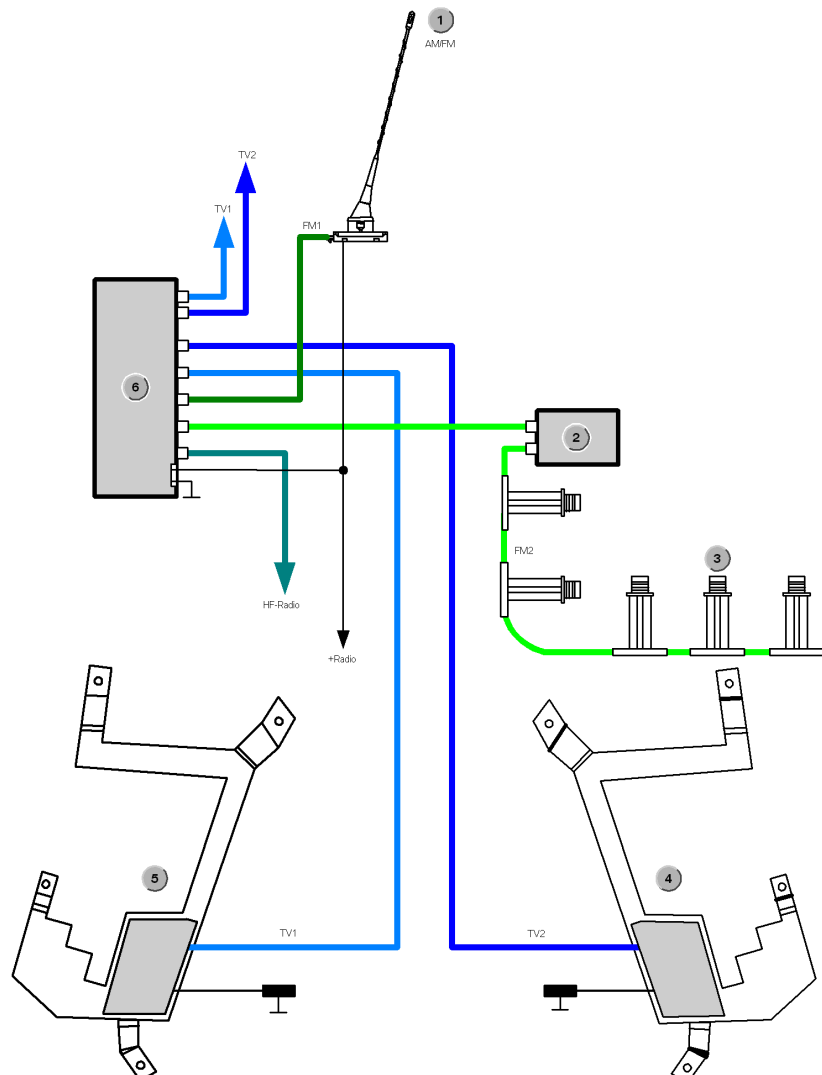


Fig. 70: E85 TV aerial diversity

KT-10122

Index	Explanation
1	AM/FM/GSM aerial
2	FM amplifier
3	FM2 aerial
4	TV2 aerial, rear right
5	TV1 aerial, rear left
6	Aerial diversity

- Aerial diversity

Aerial diversity for TV is only designed for operation with the vehicle stationary.

2 lines lead from the aerial diversity module to the video module. During TV reception, both signals are combined and used in the video module. The video module switches over to the strongest aerial signal depending on the reception quality.

Installation location

The aerial diversity module is located at the rear left in the wheel arch.



Fig. 71: E85 Installation location of aerial amplifier and aerial diversity

KT-10119

Index	Explanation
1	FM amplifier
2	Aerial diversity

Navigation system

Introduction

The following navigation systems are offered for the E85:

- Navigation High
- Radio navigation

The navigation systems of the E85 are based on the familiar MK-3 navigation system. The navigation computer has been further developed and optimized for the E85 and is now known as **navigation computer DVD**.

The specific features of the new system include:

- DVD drive
- Faster processor
- Larger memory

- System advantages

The use of new improved hardware provides the following advantages for the customer:

- The use of the DVD drive now facilitates presentation of all of Europe or of the USA on one DVD
- Extended destination entry functions
- More accurate calculation of arrival time
- Improved route planning
- More exact traffic control management
- New display presentation
- Data on CD or DVD

System overview - Navigation High

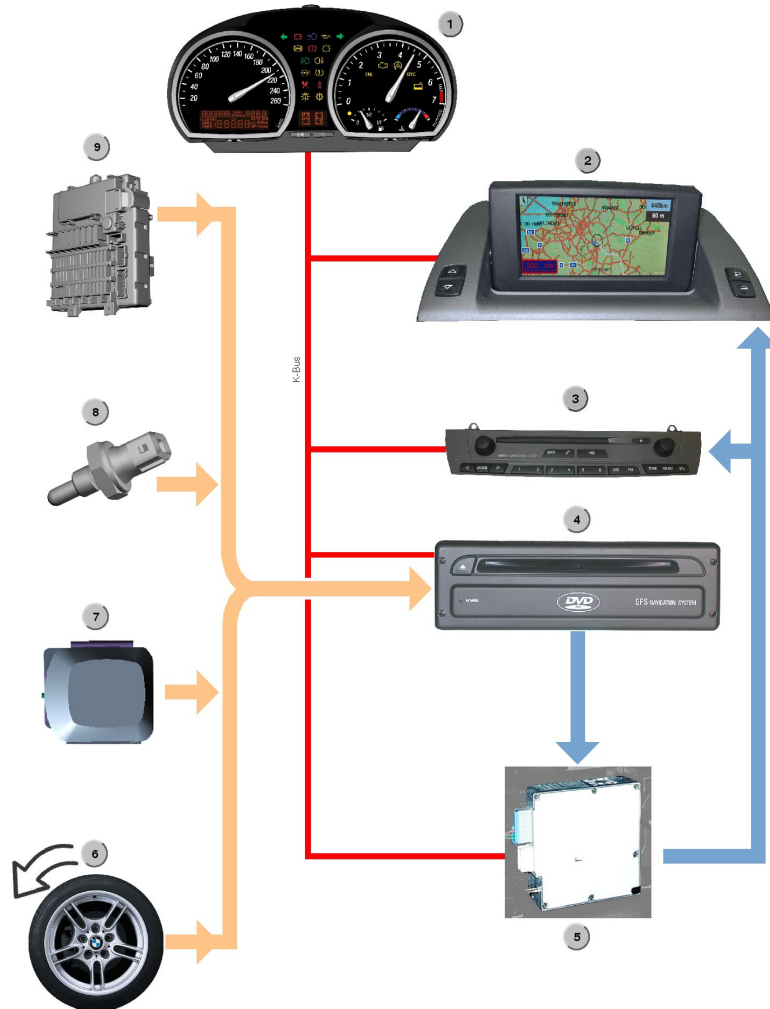


Fig. 72: E85 System overview - Navigation High EU

KT-10598

Index	Explanation
1	Instrument cluster
2	Central information display
3	CID control panel
4	Navigation computer DVD
5	Video module
6	Wheel speed signal
7	GPS aerial
8	Reversing light switch
9	Power distribution box

System diagram - Navigation High

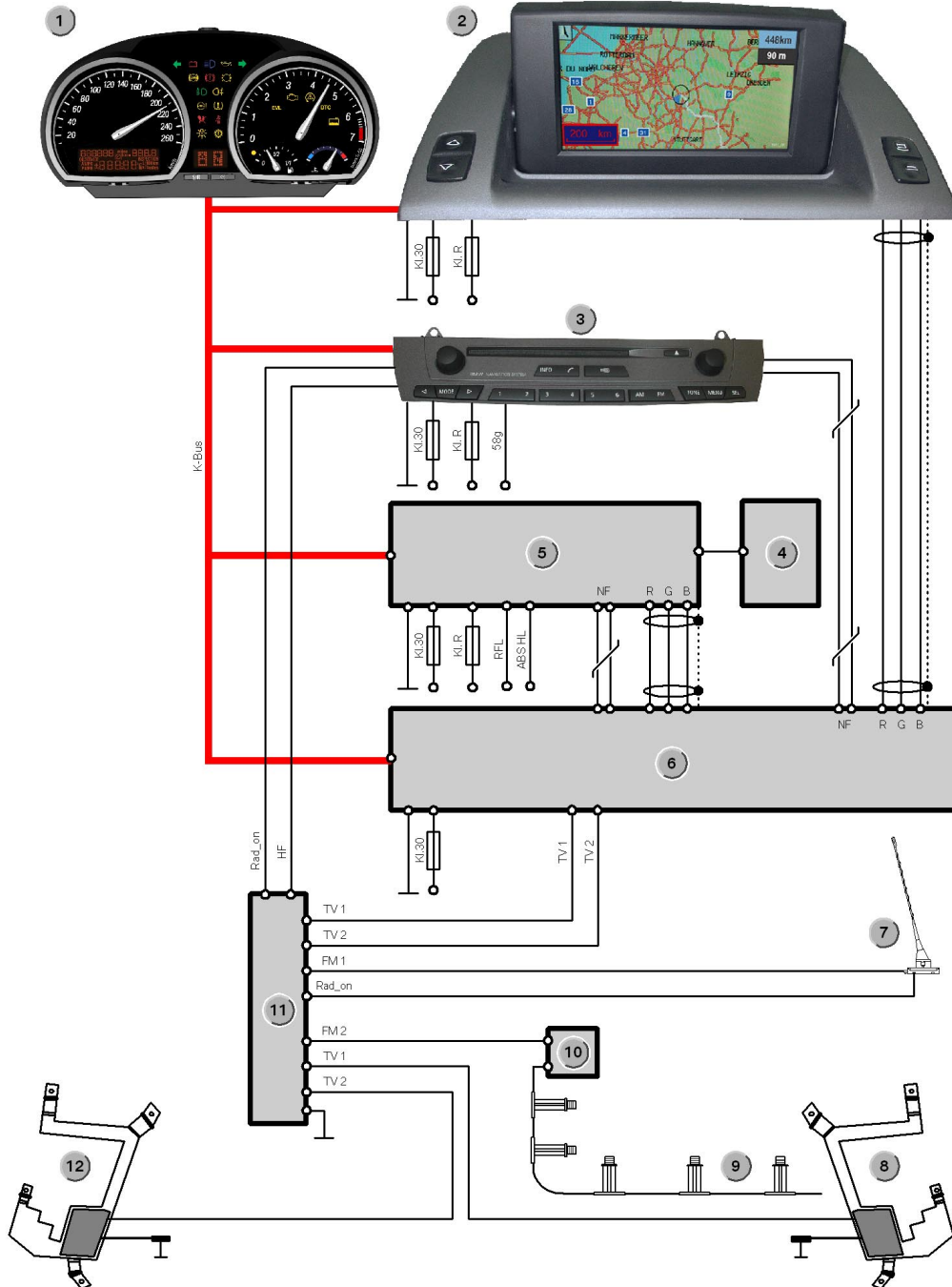


Fig. 73: E85 System diagram - Navigation High EU

KT-10599

E85 Information/Communication

Index	Explanation
1	Instrument cluster
2	Central information display
3	CID control panel
4	GPS aerial
5	Navigation computer DVD
6	Video module
7	Rod aerial
8	TV1 aerial
9	FM2 aerial
10	FM2 amplifier
11	Aerial diversity
12	TV2 aerial

System overview - Radio navigation EU

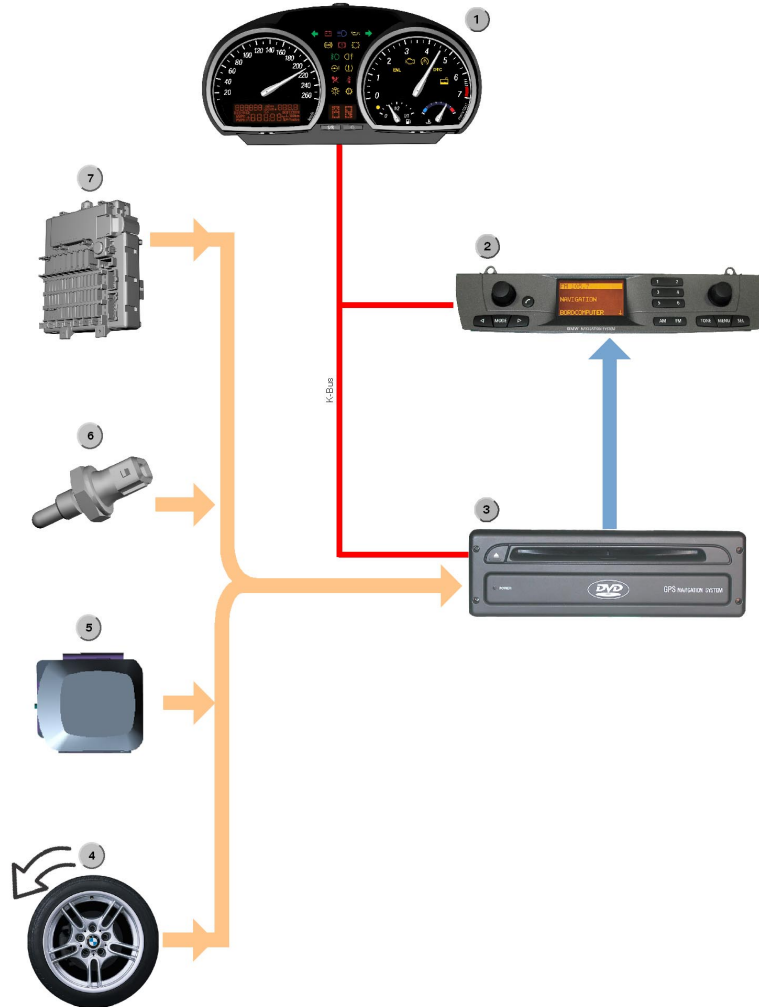


Fig. 74: E85 System overview - Radio navigation EU

KT-10371

Index	Explanation
1	Instrument cluster
2	Multi-information radio MIR
3	Navigation computer DVD
4	Wheel speed signal
5	GPS aerial
6	Reversing light switch
7	Power distribution box

System diagram - Radio navigation EU

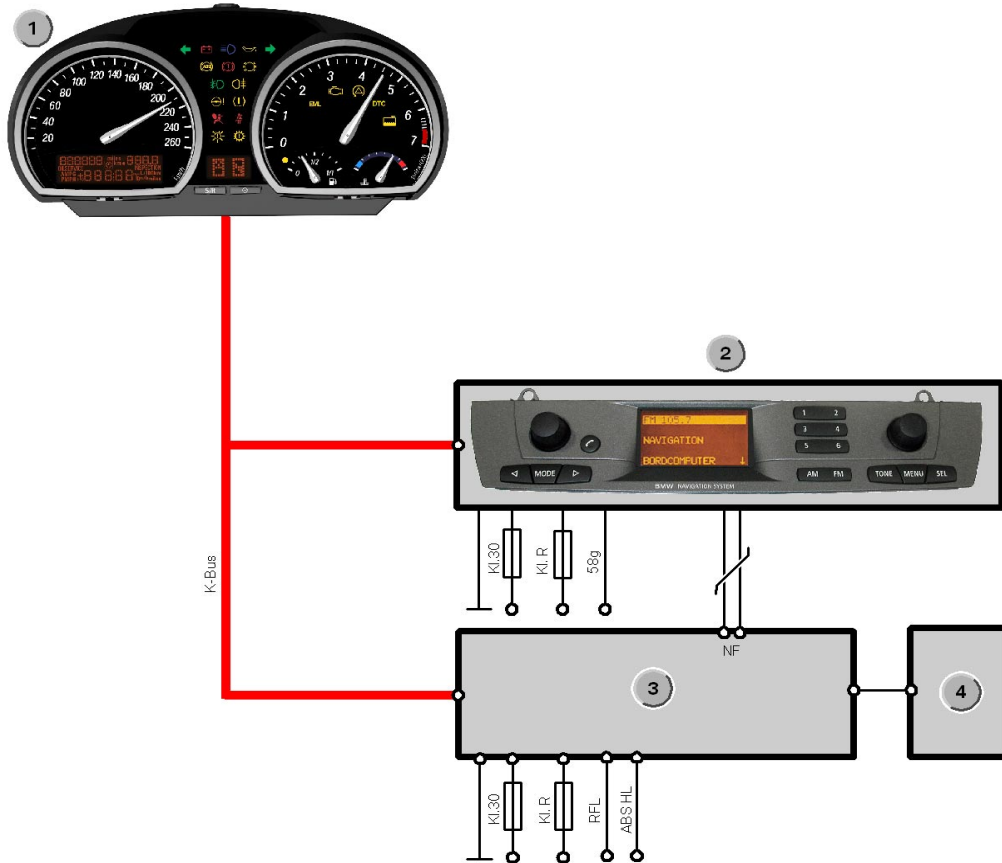


Fig. 75: E85 System diagram - Radio navigation

KT-10372

Index	Explanation
1	Instrument cluster
2	Multi-information radio MIR
3	Navigation computer DVD
4	GPS aerial

Components

The High navigation system consists of following components:

- Central information display CID
- CID control panel
- Navigation computer DVD
- GPS aerial
- Wheel speed sensor
- Reversing light switch
- Video module

The radio navigation system consists of following components:

- Multi-information radio MIR
- Navigation computer DVD
- GPS aerial
- Wheel speed sensor
- Reversing light switch

- Central information display



Fig. 76: Central information display KT-10603

The central information display is the display unit for the High navigation system. The display is designed as a 6.5" advanced TFT display for presenting the operating interface and maps.

To optimize the legibility, the display can be precision adjusted by means of a switch.

The central information display is located in the centre of the instrument panel above the ventilation outlet.

- CID control panel



Fig. 77: CID control panel KT-10044

The functions presented in the CID can be controlled with the rotary push-button on the right and the menu key on the CID control panel.

The central information display is located in the centre of the instrument panel below the ventilation outlet.

- Navigation computer DVD



The navigation computer DVD incorporates the main functions for the navigation system. The navigation computer contains the following components:

- DVD drive for reading information of the digitized road maps on DVD or CD
- GPS receiver for determining position before start of journey
- Yaw rate sensor for calculating position while driving
- Powerful processor for fast calculation of data
- Memory modules for buffering data
- Interfaces for communication with other systems and evaluating sensor data
- Interfaces for outputting image data and voice information

Fig. 78: Navigation computer DVD KT-10048

The navigation computer is located in the lockable cubby between the seats in the partition between the vehicle interior and luggage compartment.

- GPS aerial

The GPS aerial receives the signals from GPS satellites and transfers the data (degrees longitude, degrees latitude, Greenwich meantime (GMT)) to the GPS receiver in the navigation computer DVD for the purpose of calculating the position.

This is of particular importance during initial or re-initialization of the system. These data are also read in during the restart procedure.

The GPS aerial is located in the middle of the roof frame behind the interior lamp.

- Wheel speed sensor

The wheel speed sensor determines the rotary motion of the wheel. The information is routed to the ABS/DSC control unit and the corresponding distance calculated. The conditioned signal is then made available to the navigation computer.

The ABS sensor at the rear left is used for the purpose of determining the speed signal.

- Reversing light switch

With the aid of the reversing light switch, the navigation system detects whether reverse gear is engaged.

On manual transmission vehicles, the reversing light switch is located in the manual gearbox.

On automatic vehicles, the reversing signal comes from the selector lever switch.

- Video module

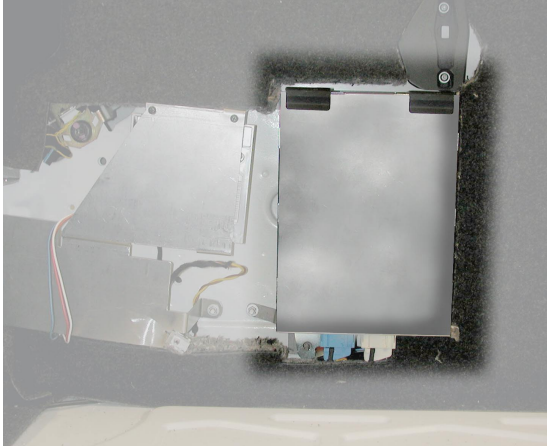


Fig. 79: Video module

KT-10120

In the EU version, the video module is linked to option 609 Navigation High. The video module is responsible only for the TV function. The picture data (RGB signals) for the operating interface and the maps from the navigation computer are looped through the video module and shown on the central information display.

The video module is located in the luggage compartment in the middle of the partition.

- Multi-information radio MIR



Fig. 80: Multi-information radio MIR

1908_02
KT-10495

The multi-information radio incorporates the functions for operation and display of the radio navigation system. The functions are identical to those of the E46.

System functions

- Introduction

The navigation computer DVD represents a further-development of the MK-3 computer. The computing capacity and memory module of the navigation computer DVD have been expanded. The previous functions of the MK-3 computer have been fully adopted. Only the new or modified functions are outlined in the following section.

The following functions are new:

- Additional destination inputs
- More accurate calculation of arrival time
- Improved direction
- Improved map presentation on the CID
- New map presentations
- Digitized road maps on DVD

- Additional destination inputs

The following new destination inputs are possible:

- Direct input of border crossing points
- Address book extended from 20 to 100 entries
- Storage of the last destinations extended from 10 to 20

- More accurate calculation of arrival time

By including traffic information (TMC), e.g. in the event of a traffic queue ahead, an alternative route is calculated and displayed.

The expected time of arrival is calculated more accurately by including the average vehicle speed corresponding to the type of road.

For this purpose, the average speed of the last 7 minutes is stored corresponding to the type of road (motorway, major trunk road, district road). Based on the selected route, the computer calculates the share of different types of road and the determined average speed so it can calculate the arrival time more accurately.

- Improved direction

When changing from one motorway to another, the number of the new motorway is announced (voice information).

- Improved map presentation

In future, the maps will be presented in up to 256 colours. The indicator for the current position has been enlarged.

- New map presentation

The scaling of the maps has been extended to 1000 km. The scales 200 km, 500 km and 1000 km have been additionally introduced.

As a result, all of Europe or the USA can be shown on the display.

The selected route is highlighted in white.

The following scales can now be additionally represented:

- The scale bar on the display corresponds to 1000 km
- The scale bar on the display corresponds to 500 km
- The scale bar on the display corresponds to 200 km

The 200 km, 500 km and 1000 km scales can only be presented in connection with DVD maps. The previous CD maps only provide scales of up to 100 km.

The map scales are selected in the "Settings" menu under "Announcement."

E85 Information/Communication

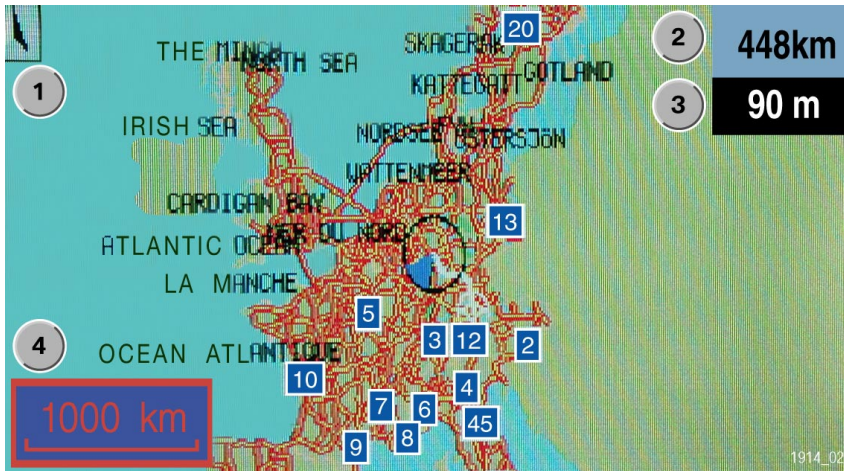


Fig. 81: Map in 1000 km scale on DVD
The scale bar in the display corresponds to 1000 km

KT-10518

Index	Explanation
1	Direction indicator (pointing north)
2	Distance to destination
3	Distance to next turn-off
4	Scale bar with map scale data

The pointer for the current position has been enlarged to 32x32 Pixels (previously 16x16 Pixels).

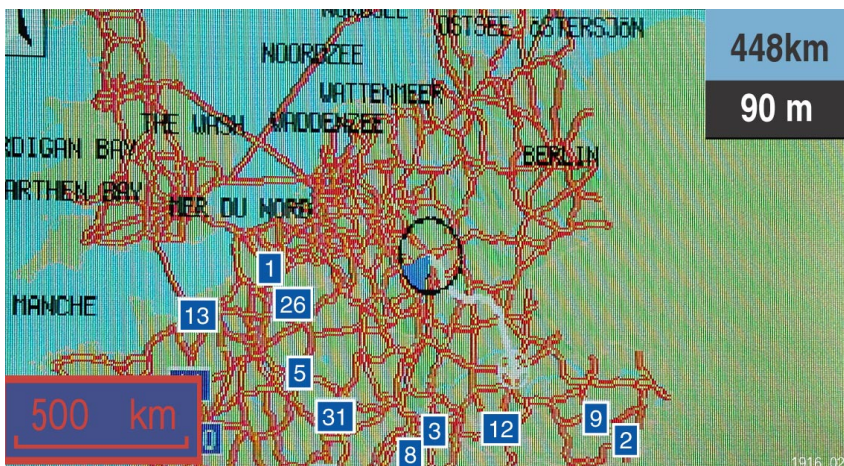


Fig. 82: Map in 500 km scale on DVD
The scale bar on the display corresponds to 500 km

KT-10520

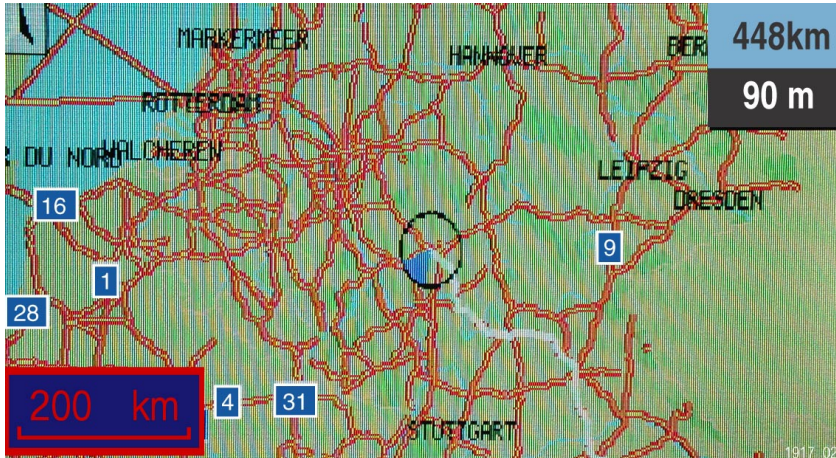


Fig. 83: Map in 200 km scale on DVD
The scale bar in the display corresponds to 200 km

KT-10521

The selected route is highlighted in white on the map.

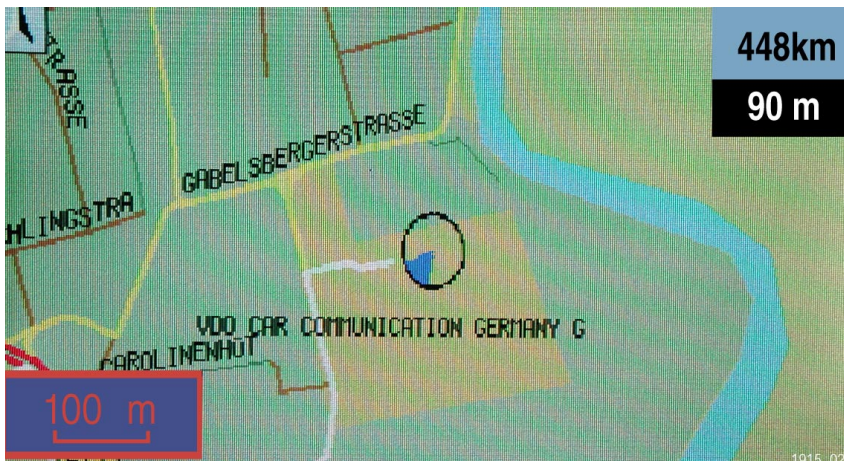


Fig. 84: Map with 100 m scale (smallest scale)
The scale bar in the display corresponds to 100 m

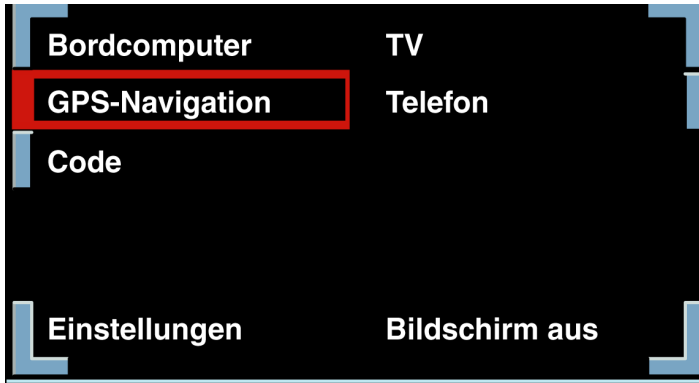
KT-10519

Digitized maps on DVD

The navigation computer DVD is equipped with a DVD drive. The navigation computer DVD is retro-compatible and can be used in all MK-x systems. It can also read the previously used CDs.

Operation

- Main menu

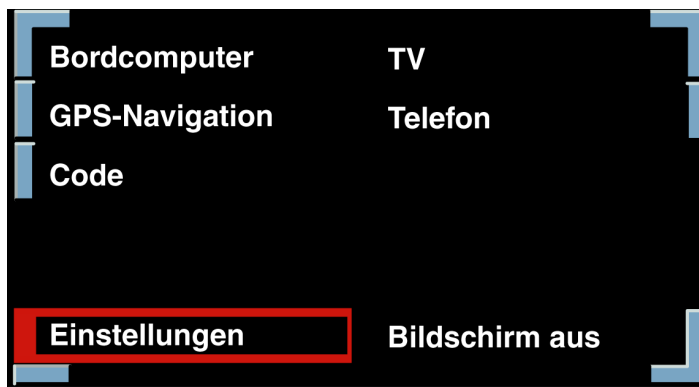


The High navigation system is controlled by selecting the "GPS navigation" menu in the main menu of the central information display.

Fig. 85: Selecting menu item "GPS navigation"

1933_02
KT-10537

- Settings selection

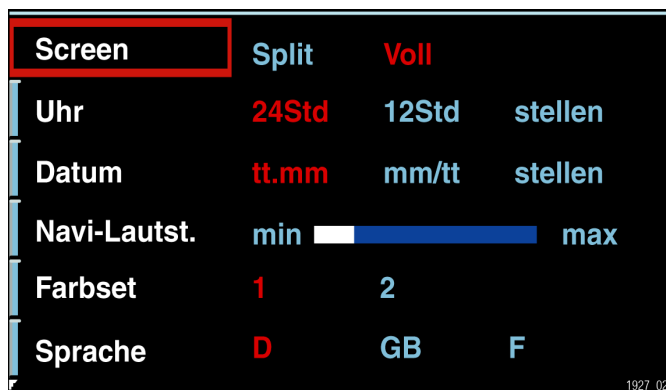


The following basic settings are possible under the menu item "Settings" in the main menu for the purpose of adapting the display representation to country-specific requirements.

Fig. 86: Settings selection

1947_02
KT-10539

- Settings Page 1

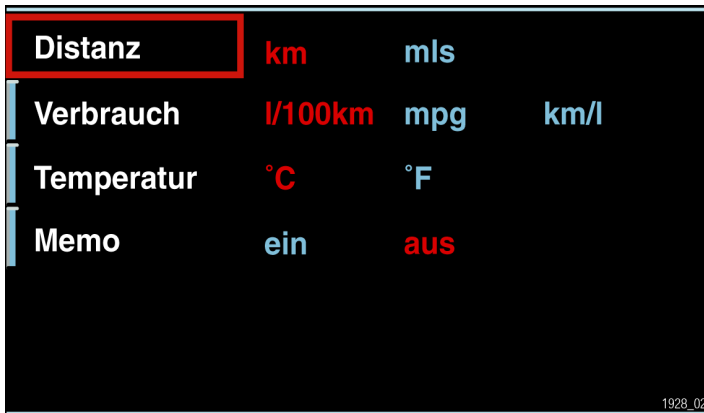


Various settings can be carried out in the windows. The red markings correspond to the current settings.

Fig. 87: Settings selection, Page 2

1927_02
KT-10531

- Settings selection, Page 2

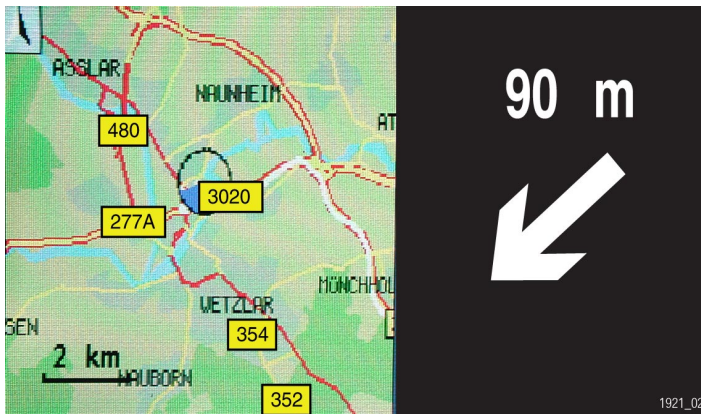


With the "Screen" menu item in the Settings menu it is possible to switch between full view and split screen.

Fig. 88: Settings selection, Page 2

KT-10532

- Map and arrow presentation

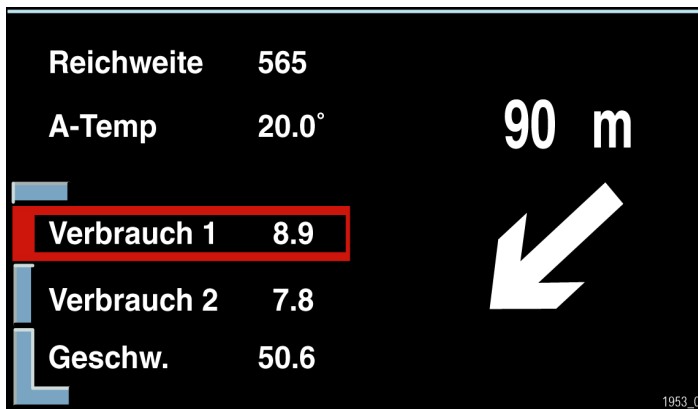


As a result, it is possible to show the map and the navigation arrow simultaneously.

Fig. 89: Map and arrow presentation

KT-10525

- Settings

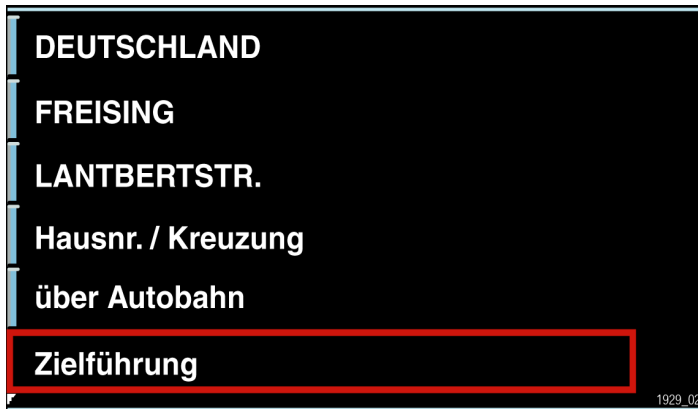


Navigation is represented with arrows in split screen mode and on selecting on-board computer functions.

Fig. 90: Display of on-board computer and navigation arrow

KT-10550

- Destination input main menu

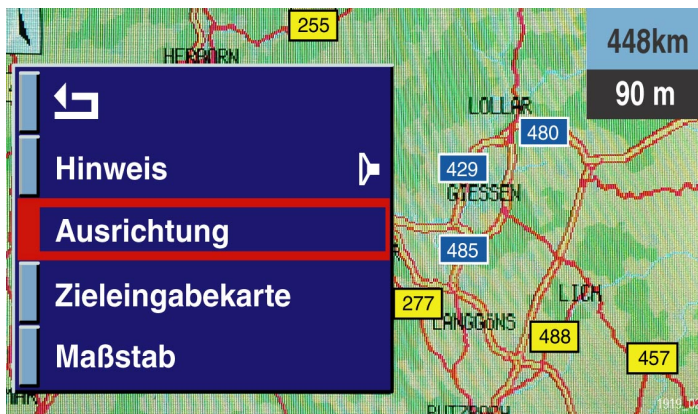


The mask for entering the destination is accessed after selecting the "GPS navigation" menu. A submenu is selected by pressing the rotary push-button on the CID control panel.

Fig. 91: Destination input menu

KT-10533

- Destination input submenu



In the "Announcement" menu, the last voice announcement is repeated by pressing the button. By pressing the button for longer than 2 seconds, the announcement is deactivated or activated depending on the setting.

Fig. 92: Destination input submenu

KT-10523

- Route selection



Fig. 93: "Route selection" menu

KT-10667

- Destination input



By pressing the button, current directions are ended in the "Destination input" menu and the input mask is selected in order to enter a new destination.

Fig. 94: Route selection

KT-10529

Index	Explanation
1	Status line with destination
2	"Destination input" button
3	"Announcement" button
4	"New route" button
5	"Route map" button
6	"Traffic information" button

- New route



Corresponding to the traffic situation, e.g. accident, traffic congestion etc., it is possible to calculate an alternative route. The distance for the route to be newly calculated can be selected between 1-10 km.

Fig. 95: "New route" menu

KT-10527

It is possible to switch between map presentation mode and arrow presentation mode in the "Route map" menu.

Information on the current traffic situation can be selected in the "Traffic information" menu.

Country-specific version

- Country-specific version US

Introduction

Compared to the EU version, there are the following differences in the country-specific version US:

- There is no radio navigation system
- There is no link with the option 601 TV function as a TV function is not permitted in the USA.
- There is no video module and the central information display is connected directly to the navigation computer DVD.

The functions of the High navigation system are identical.

System overview - US

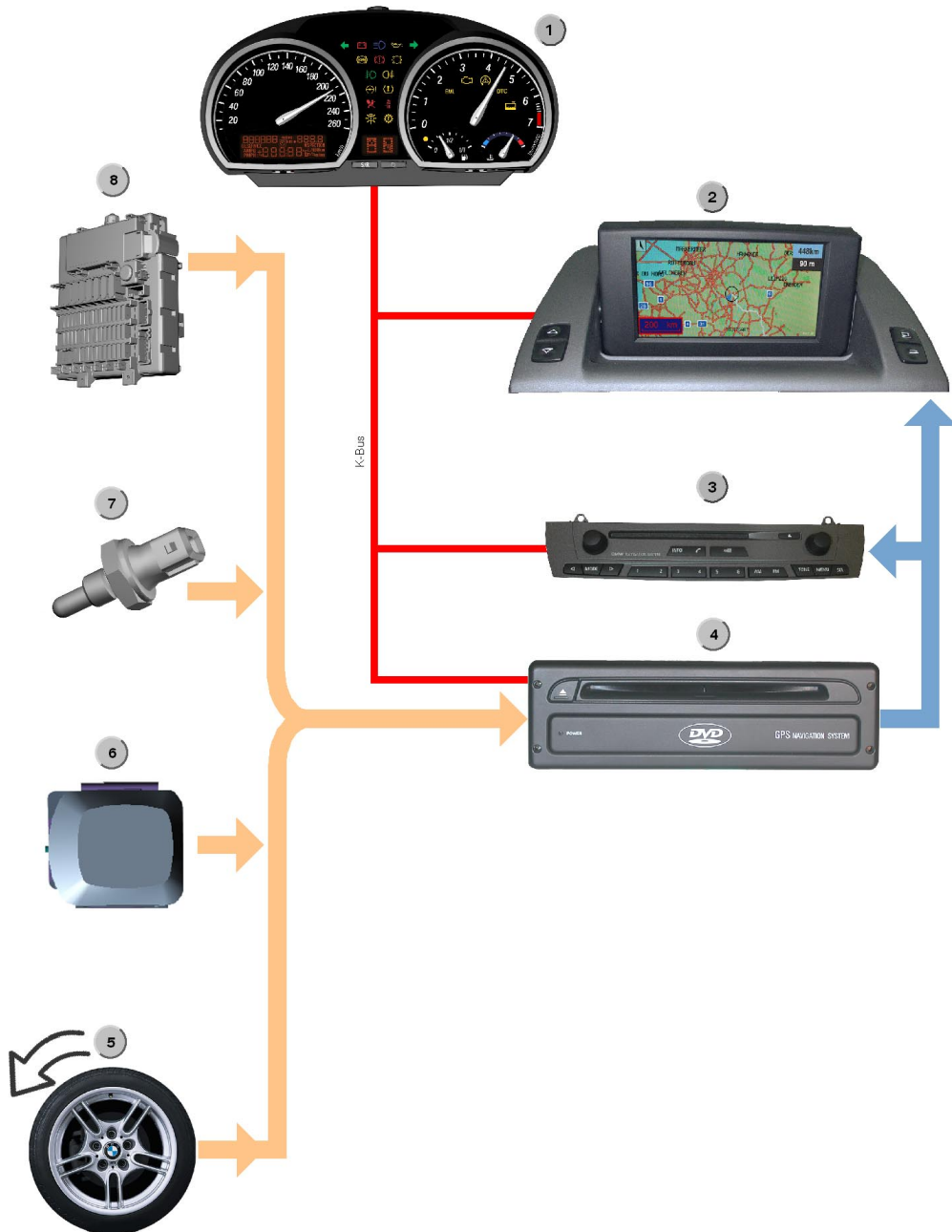


Fig. 96: E85 System overview - Navigation High US

KT-10604

E85 Information/Communication

Index	Explanation
1	Instrument cluster
2	Central information display
3	CID control panel
4	Navigation computer DVD
5	Wheel speed signal
6	GPS aerial
7	Reversing light switch
8	Power distribution box

E85 Information/Communication

System diagram - US

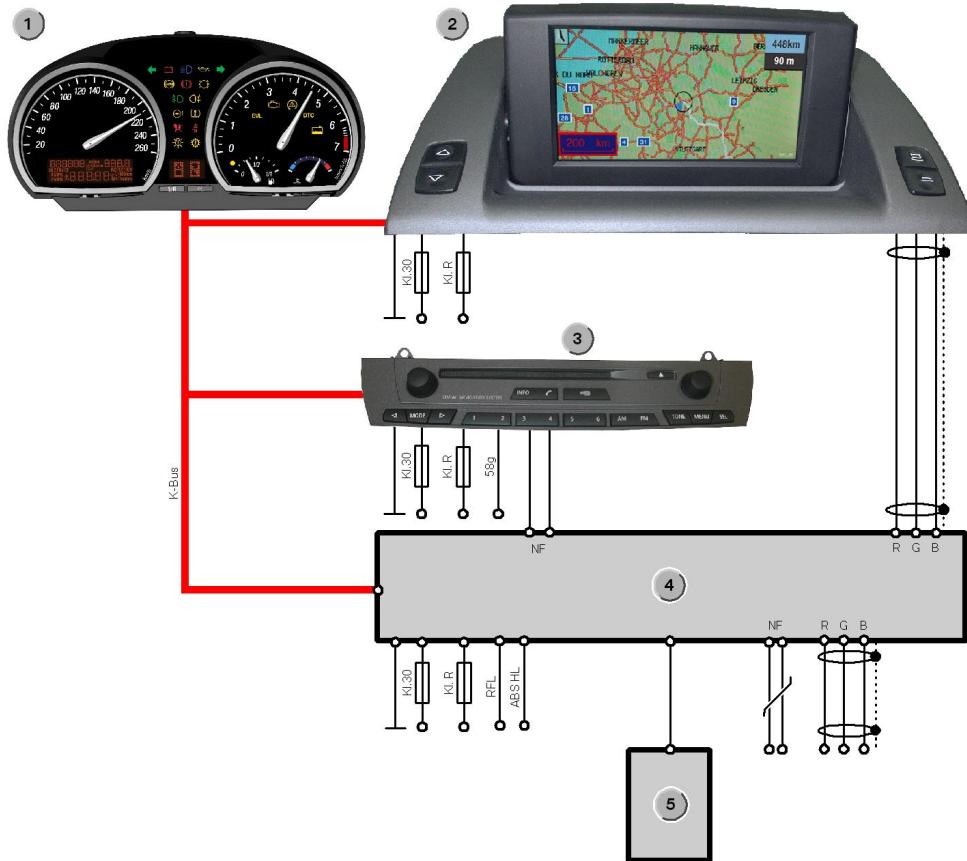


Fig. 97: E85 System diagram - Navigation High US

KT-10602

Index	Explanation
1	Instrument cluster
2	Central information display
3	CID control panel
4	Navigation computer DVD
5	GPS aerial

Notes for Service

- Service information

Conversion

The navigation computer DVD is retrocompatible for all MK-x systems.

The following point must be observed when the navigation computer DVD is fitted in a vehicle with MK-1 system:

The GPS receiver must be disconnected as the navigation computer DVD features an integrated GPS receiver.

- Service mode

Service mode in the High navigation system supplies information for system diagnosis.

Accessing service mode

The test functions can be selected via the "Settings" menu in the central information display. Proceed as follows:

- Terminal R active
- Select main menu
- Select "Settings" menu
- Press and hold rotary push-button for 8 seconds
- Select the required menu item from the list that now appears
- Confirm selected menu item with the rotary push-button

Switch off terminal R to end the test functions.

E85 Information/Communication

Service mode menus

Menu	Submenu	Display
CID		SW-status 03
		HW-status 02
		Diag-index 03
		Bus-index 01
		Coding index 01
		Supplier 17
GPS	Version	Receiver 8.6
		SW date 23.03.02
	Status	Latitude 48° 11' 48"
		Longitude 11° 34' 17"
		Altitude 500 m
		Date 16.04.02
		Time 16:28
		G Speed 22.3 m/s
		Heading 97 degrees
		Rec-stat POS
		Pos-Src 3D/5
		PDOP 1.8
HDOP 1.4		
VDOP 2.2		
Tracking info	CH 1	
	PRN 07	
	S/N 5.1	
	Visible Sat 08	
	Almanac Yes	
Video module		SW-status 11
		HW-status 04
		Diag-index 02
		Bus-index 11
		Coding index 02
		Supplier 09
Sensor check		Wheel 835 RL navi
		835 RR navi
		Satellites 05
		GPS status Position known
		Gyro 2500
		Dir Forward
Telematics		VIN AB 12345
		Vehicle type E85 roadster
		Colour Black
		Reg. number B-MW 85
		SMS code number +49 172 XXXX
		D1 +49 171 XXXX
		BMW Information ON
		Automatic emergency call ON
		Initialization ON
		Sign-off Off

Explanations

Menu	Display	Explanation
GPS/Status	G Speed	Relative vehicle speed over the ground
	Heading	Direction of travel
GPS/Tracking info	Rec-stat	Search/track/position receiver status
	Pos-Src	Number of satellites available for analysis
Sensor check	PDOP	Accuracy of the calculated position
	HDOP	< 8 sufficient determination of position
Telematics	VDOP	< 4 very good determination of position
	CH	Channel
GPS/Tracking info	PRN	Satellite detection
	S/N	The better the reception the higher the value
Sensor check	Visible Sat	The number of visible satellites, signals receivable, depends on time of day and constellation
	Almanac	Satellite database, automatically loaded after 15 minutes
Telematics	Wheel	ABS sensors, pulses/minute, neg. when reversing
	Satellites	Number of satellites currently received
Telematics	GPS status	07: 3 Sat, position possible; 11: 2D-position determined; 12: 3D-position determined
	Gyro	+/- 400; mV setpoint value, halted or driving straight ahead, > right-hand, < left-hand curve
Telematics	Dir	Reverse signal detection: Backward: reverse gear selected
	VIN	Vehicle identification number
Telematics	Colour	Colour code or "Other" text
	D1	Telephone network/contract number
Telematics	BMW information	Customer-specific information
	Automatic emergency call	Status on/off
Telematics	Initialization	Telematics service status on/off
	Sign-off	Log out of the telematics service

PDOP Position Dilution of Precision
 HDOP Horizontal Dilution of Precision
 VDOP Vertical Dilution of Precision
 S/N Signal/noise ratio
 Gyro Piezo Gyro sensor (in navigation computer)
 Dir Direction of travel

- Diagnosis

Diagnosis of the navigation systems comprises the following features:

- Read identification
- Diagnosis enquiry, e.g. gyro value, wheel speed, eject button

- Coding

Coding of the navigation systems comprises the following functions:

- Recoding a control unit
- Retrofitting a control unit

- Car & key memory

No functions are available for the car & key memory.