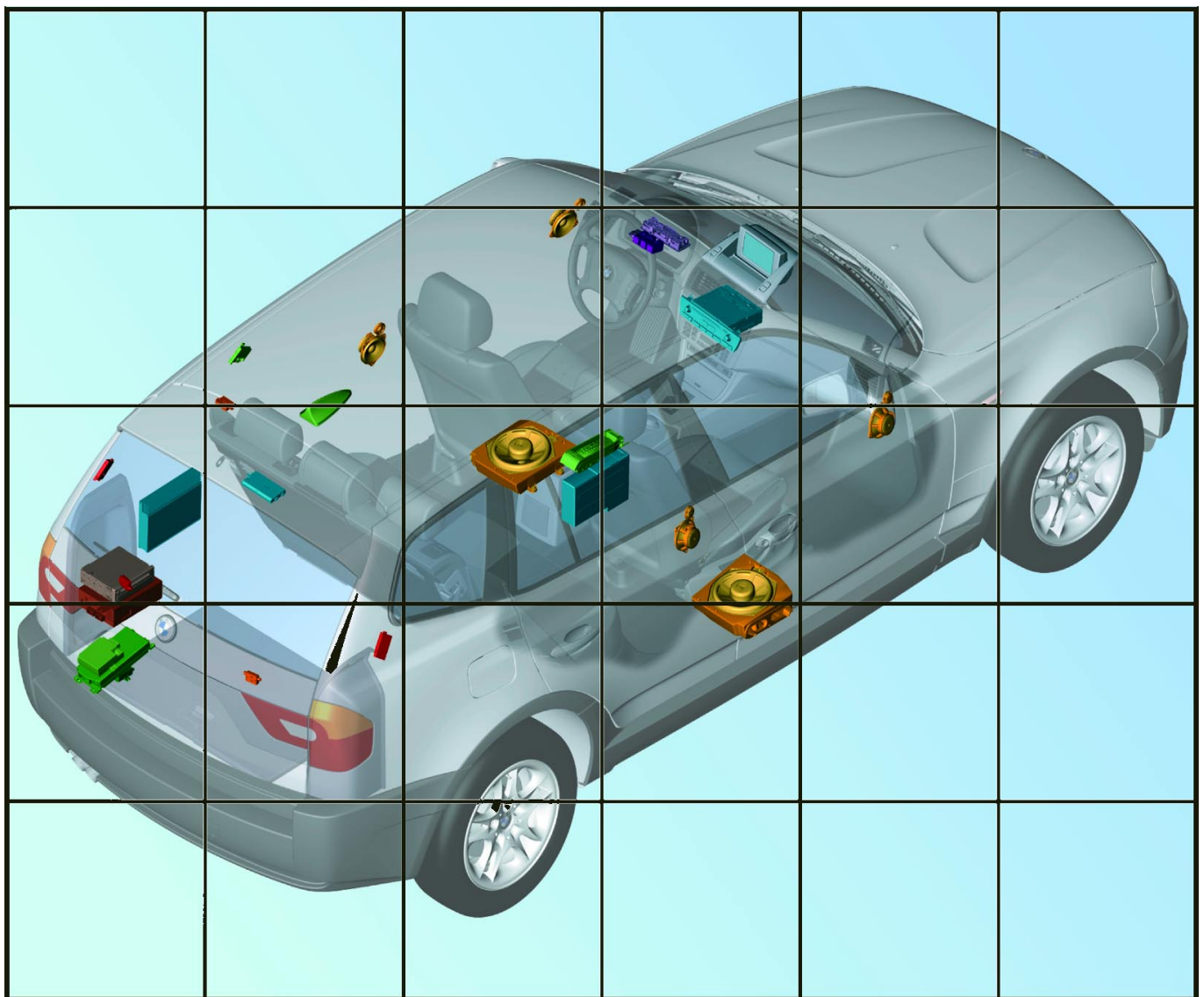# BMW Group
Aftersales Training

E83 Infomation and Communication
Participant Manual

NOTE
The information contained in this participant's manual is intended for participants of the Aftersales Training.
Refer to the relevant "BMW Service" information for any changes/ supplements to the Technical Data.

Contents

E83 Information and Communication

Introduction

The BMW X3 is a premium vehicle in the SAV (Sports Activity Vehicle) range. The X3 information and communication systems also offer current technology which meets the highest standards. For example, DVD navigation with colour screen, Bluetooth telephone technology and audio systems with digital sound improvement are all offered in the X3.

KT-12460

Fig. 1: E83 information and communication

Note:
The information and communication systems of the E83 are described in this documentation. They correspond to the systems in the E85 to the greatest possible extent. System descriptions can also be found in the **E85 Information/Communication** participant's manual, if this is available.
The **E83-X3 SIP** training and information program introduces you to the information and communication systems, the installation locations, the electronic control unit and the bus systems (Electrical/electronic systems chapter).

- New features of the systems

New features compared to previous BMW systems

Various telephone systems are used in the E83. The fixed installation units use the new Everest platform; the Bluetooth mobile phones work with the universal charging and hands-free unit (ULF).

- The CD changer is installed in a user-friendly position between the driver's seat and front passenger's seat.

- Powerful central bass system for all audio systems

- A hifi amplifier adapted to the central bass system with increased bass power for the HiFi audio system

System overviews

- Installation locations
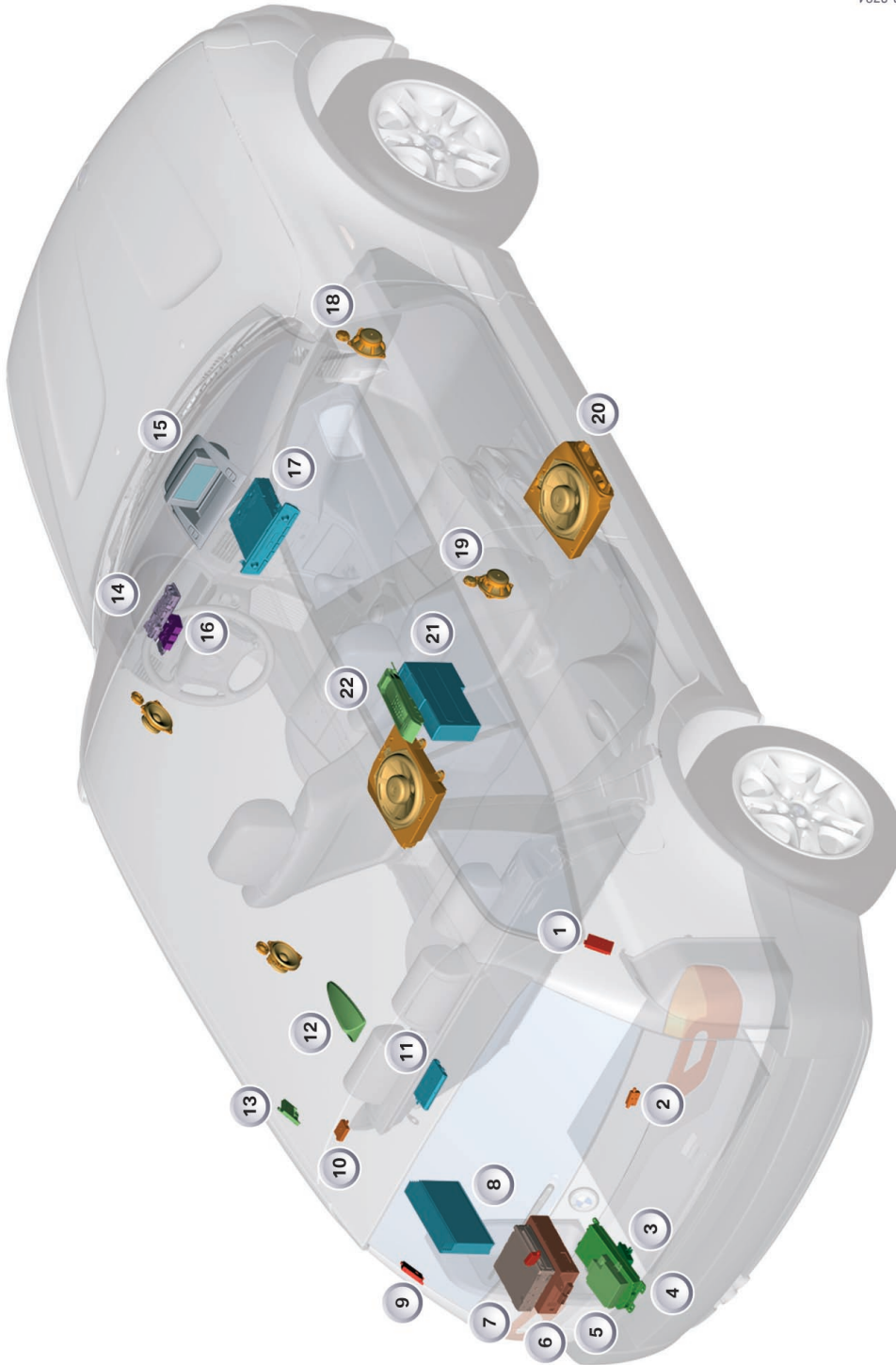
Fig. 2:   Installation locations

KT-12558

Index	Explanation	Index	Explanation
1	Right-hand TV amplifier	12	Telephone communication aerial, GPRS, SDARS
2	Heated rear window noise suppression inductor	13	Bluetooth aerial
3	Voice input system SES	14	Hands-free microphone; emergency call and breakdown assistance buttons
4	Telematic Control Unit TCU	15	CID
5	Universal charging and hands-free unit ULF	16	Multifunctional steering wheel
6	Video module VM	17	Radio
7	Navigation computer DVD	18	Front broadband speaker and tweeter
8	Top-HiFi amplifier (HiFi amplifier)	19	Rear broadband speaker and tweeter
9	Left-hand TV aerial	20	Central woofer
10	Rear brake lamp noise suppression inductor	21	CD changer (CDC)
11	AM/FM/FBD amplifier and aerial diversity	22	Telephone (SBDH/mobile phone)

- Bus plan
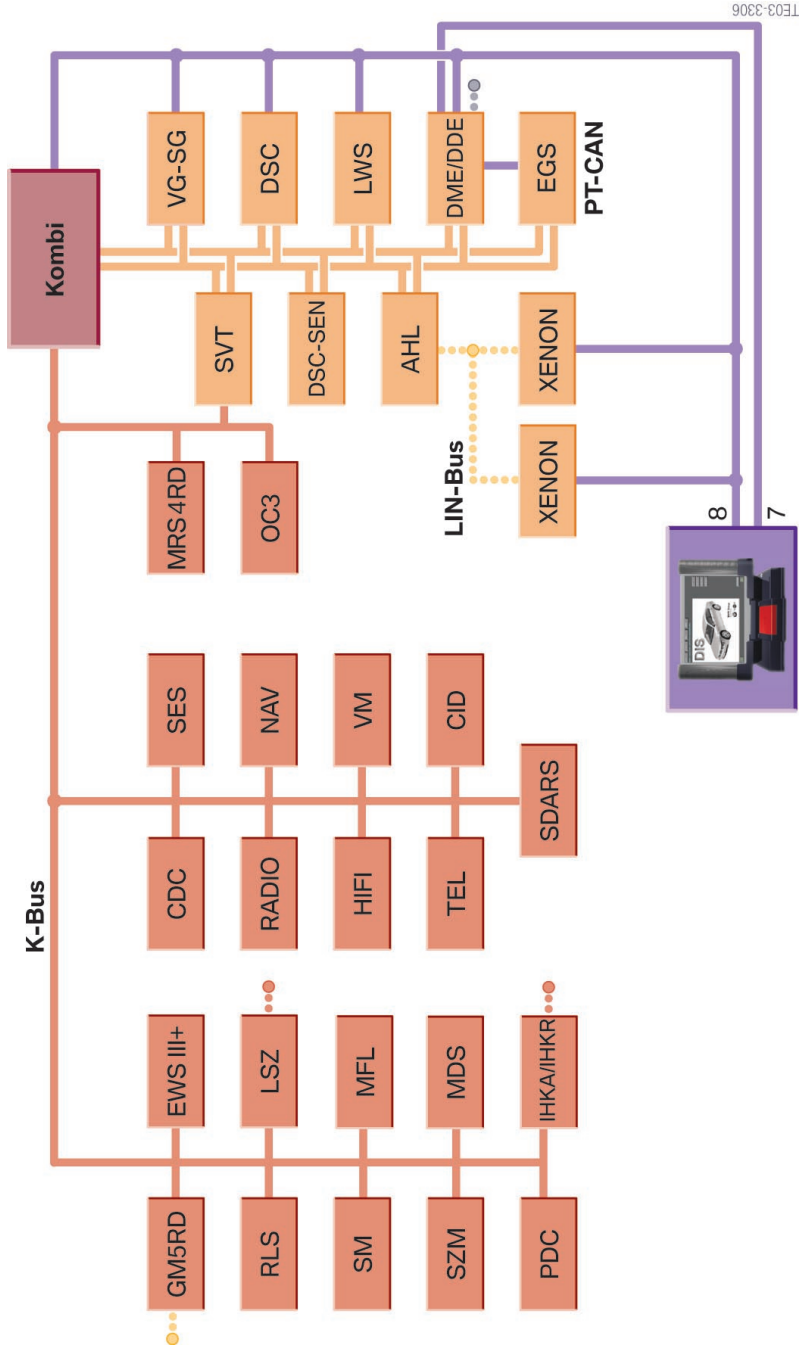
Fig. 3:   E83 bus plan

Index	Explanation	Index	Explanation
K-Bus	Body bus	SDARS	Satellite radio
LIN	Local Interconnected Network	CID	Central information display
PT-CAN	Powertrain CAN	VM	Video module
GM5RD	Basic module 5 RD	NAV	Navigation
RLS	Rain/low beam sensor	SES	Voice input system
SM	Seat memory	MRS 4RD	MRS 4RD electronic control unit
SZM	Centre console switch centre	OC3	Seat occupancy recognition, only US
PDC	Park distance control	Kombi	Instrument cluster
IHKR	Integrated heating and air conditioning control	SVT	Servotronic
IHKA	Integrated automatic heating and air conditioning control	DSC-SEN	DSC sensor
MDS	Multi Drive Sunroof	AHL	Adaptive headlight
AHM	Trailer module	XENON	Bi-xenon light
LSZ	Light switch cluster	EGS	Electronic transmission control unit
EWS III+	Electronic immobilizer	DDE	Digital diesel electronics
CDC	CD changer	DME	Digital motor electronics
Radio	Radio	LWS	Steering angle sensor
HiFi	HiFi amplifier	DSC	Dynamic Stability Control
Tel	Telephone	VG-SG	Transfer box electronic control unit
MFL	Multifunctional steering wheel		

Radio and CD changer

This section describes the various radios and CD changers in the E83.

Note:
The radios in the E83 are identical to those in the E85 except for the colour of the front finisher panel. The controls and functional efficiency also correspond to those of the E85 radio system.

The E83 does not come with a radio or radio prefitting as standard. The following radios are available for the E83:

- BMW CD radio (option 648)

- BMW Business CD radio (option 662)

- BMW Multi Information Radio MIR (Business navigation option 606)

- BMW Central Information Display radio CID radio (Professional navigation option 609 in conjunction with CD or MD drive)

All radios are new generation radios (NG radios). The radios feature a K-bus connection via which they communicate with other control units. Radios with a cassette deck are no longer available.

A 6-CD changer is also available for the E83 (option 672).
The CD changer audio signals have a level of 2.0 V (increased inter-ference voltage distance). New generation radios detect whether they are communicating with a 0.5 V CD changer (old) or a 2.0 V CD changer (new) and switch over the input accordingly.

- System overview

KT-10037

Fig. 4:   Overview of the radios in the E83

Index	Explanation
1	BMW CD radio (option 648)
2	BMW Business CD radio (option 662)
3	BMW Multi Information Radio MIR (Business navigation option 606)
4	BMW Central Information Display CD radio (CID radio, Professional navigation option 609)
5	BMW Central Information Display MD radio (CID radio, option 609 with option 651)

- System circuit diagram
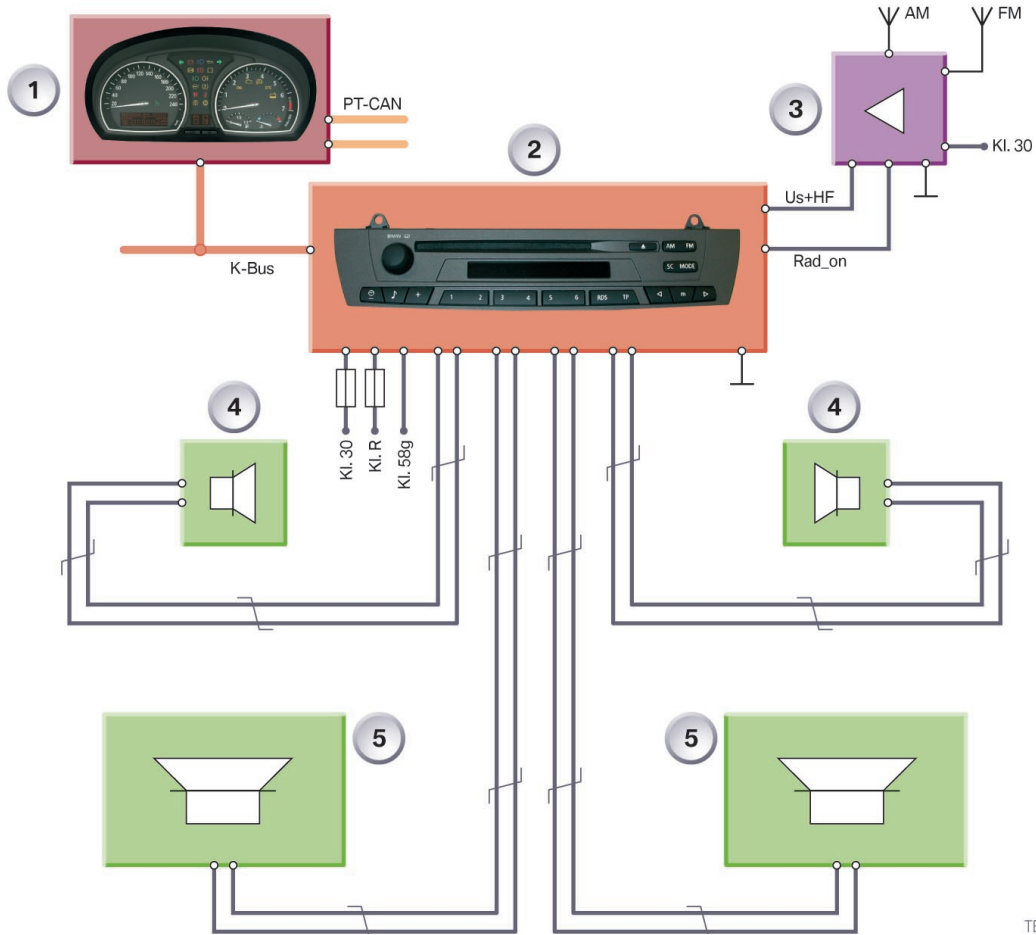
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Fig. 5:   System circuit diagram of the stereo audio system with BMW CD radio

Index	Explanation	Index	Explanation
1	Instrument cluster	4	Front left and right broadband loudspeakers
2	BMW CD radio	5	Left and right central woofers with sill connection
3	AM/FM amplifier without aerial diversity		
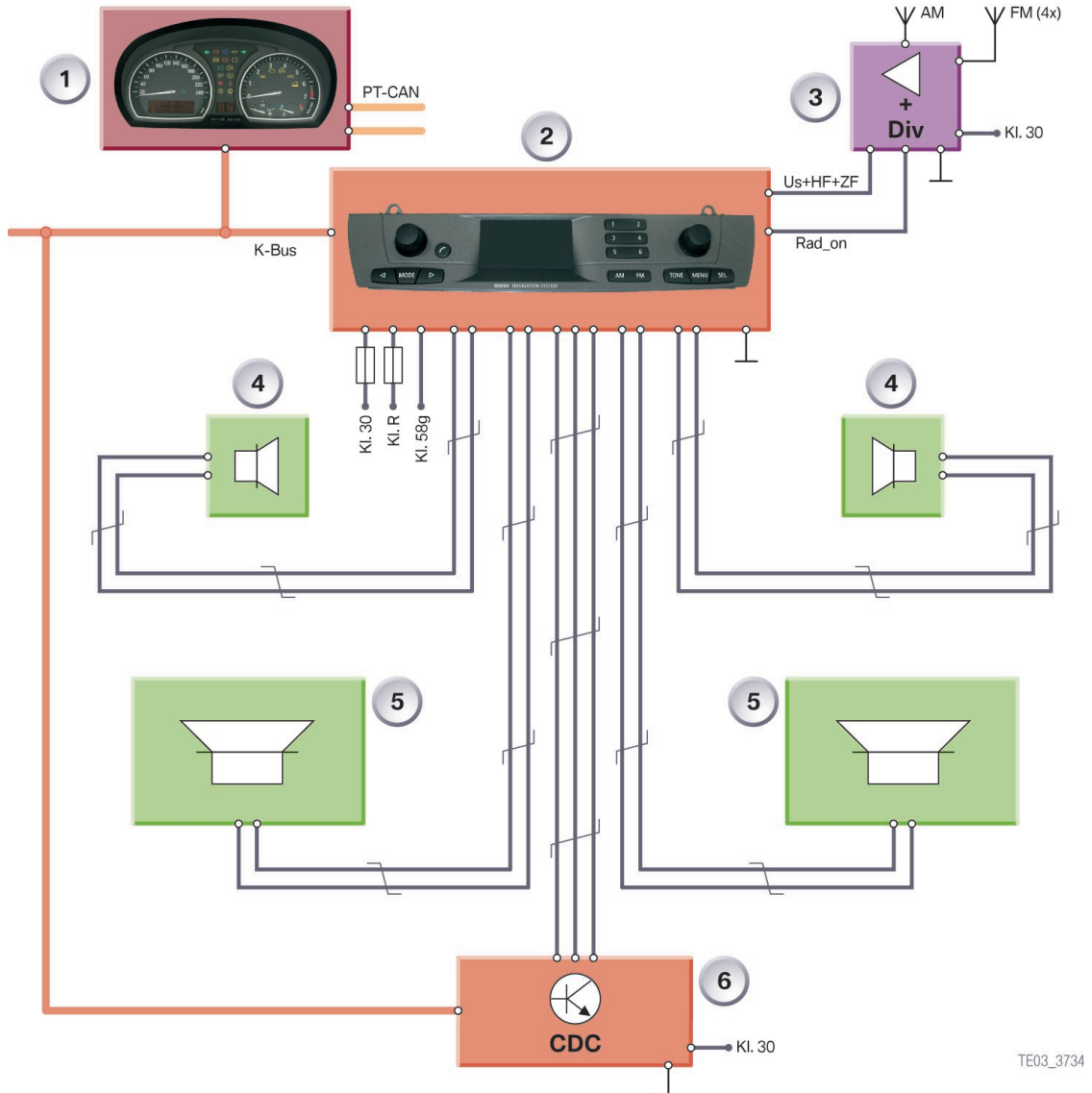
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Fig. 6:   Stereo audio system with BMW MIR radio and CD changer

Index	Explanation	Index	Explanation
1	Instrument cluster	4	Front left and right broadband loudspeakers
2	BMW Business navigation system (MIR)	5	Left and right central woofers with sill connection
3	Aerials with AM/FM preamplifier and FM aerial diversity	6	CD changer
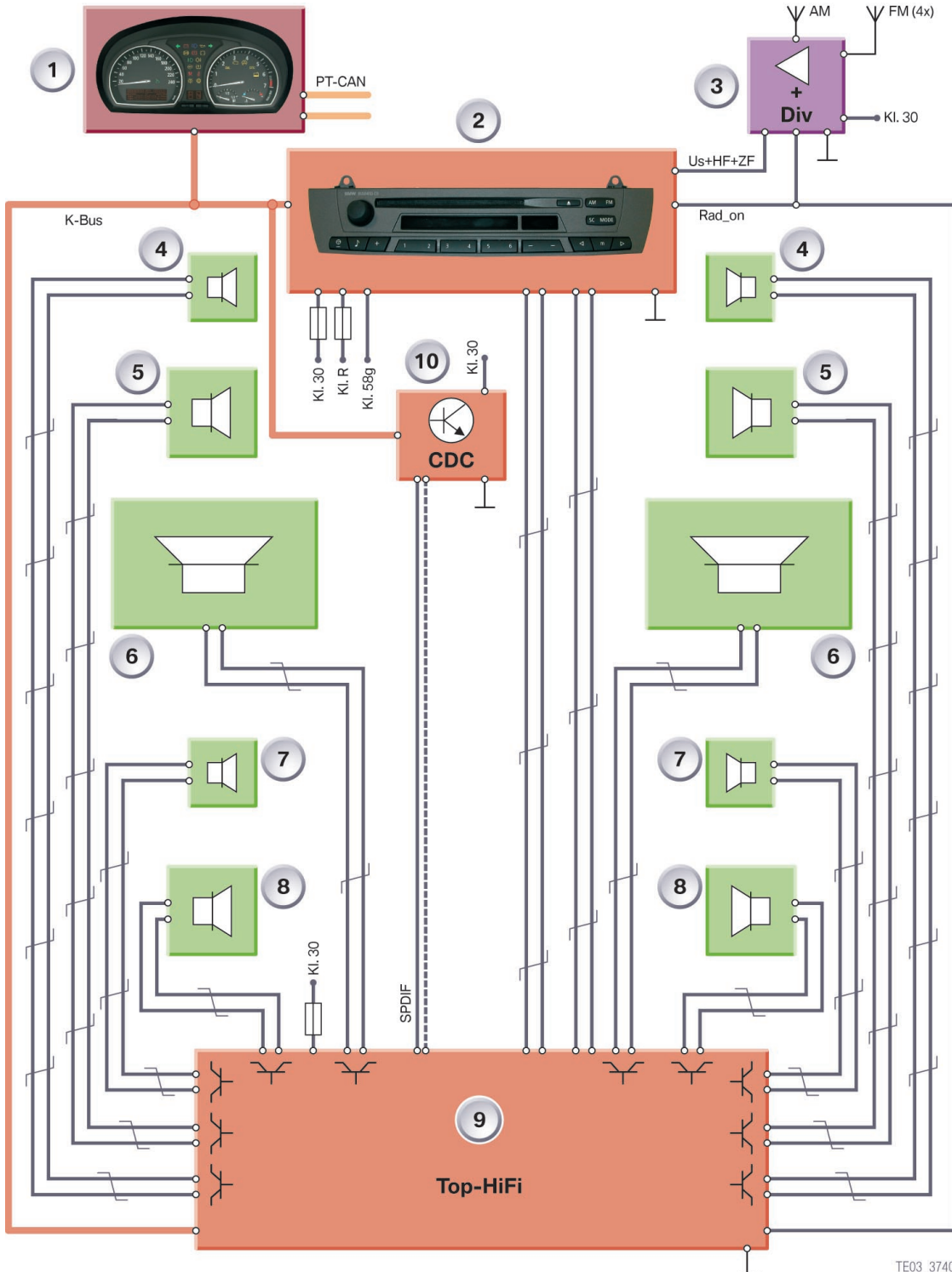
Fig. 7:   Top-HiFi audio system with BMW Business CD radio and CD changer

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Index	Explanation	Index	Explanation
1	Instrument cluster	6	Left and right central woofers with sill connection
2	BMW Business CD radio	7	Rear left and right tweeter (high-range speaker)
3	Aerials with AM/FM preamplifier and FM aerial diversity	8	Rear left and right broadband loudspeakers
4	Front left and right tweeters	9	Carver Top-HiFi amplifier
5	Front left and right broadband loudspeakers	10	CD changer with digital connection between Top-HiFi amplifier and CDC

Note:
The digital connection between the Top-HiFi amplifier and the CD changer is an SPDIF connection. SPDIF stands for Sony Philips Digital Interface and is a data transfer standard for digital audio data. The data can be transferred optically via fibre-optic cables or via coaxial cables depending on the unit.

Advantage: The digital data is read by the CD and transferred between the units with the highest possible quality, as no digital/analogue conversion is necessary. The Top-HiFi amplifier also no longer has to carry out analogue/digital conversion. The digital data can therefore be processed directly from the DSP (Digital Sound Processor).

- Components

Radios

Model	Stereo audio system	HiFi audio system	Top-HiFi audio system	CDC (option 672)
BMW CD radio Option 648 *	x			
BMW Business CD radio option 662 **	x	x	x	x
Business navigation system option 606 **	x	x	x	x
Professional navigation system option 609 **	x	x	x	x

* with AM/FM aerials (without aerial diversity); no world radio, so cannot be encoded for USA, Oceania, Japan
**with AM/FM aerials and multiple FM aerial diversity

Radio prefitting on the wiring harness side is not available as standard and cannot be ordered. A wiring harness side prefitting can only be ordered as optional equipment for the CD changer (option 692). Each radio can be retrofitted with an AUX socket as an optional accessory. The AUX connector connects external devices such as cassette players, MP3 players etc.

System functions

Depending on the radio, various functions result from the interconnected system:

Model	Functions
BMW CD radio option 648	- Settings for stereo audio system - AUX socket source changeover (optional accessory)
BMW Business CD radio option 662**	- CD changer - Settings for stereo, HiFi and Top-HiFi audio systems - AUX socket source changeover (optional accessory)
Business navigation system option 606	- Navigation computer - Telephone - CD changer - Settings for stereo, HiFi and Top-HiFi audio systems - On-board computer functions - AUX socket source changeover (optional accessory)
Professional navigation system option 609	- Central information display (CID) - Navigation computer - Telephone - Video module - CD changer - Settings for stereo, HiFi and Top-HiFi audio systems incl. graphic equalizer audio systems - On-board computer functions - AUX socket source changeover (optional accessory)

Installation location

All radios in the E83 are fitted on the centre console below the centre fresh air grille and above the air conditioning controls.

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Fig. 8:   Installation location of the BMW CID radio (option 609)

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Fig. 9:   BMW Multi Information Radio (Business navigation option 606)

CD changer

The CD changer is a standard 6 disc CD changer as fitted on the E46. The CD changer is suitable for the new generation radios (2.0 V audio output).

Installation location

For the first time, the CD changer is located in a user-friendly position between the driver's seat and front passenger's seat in the front armrest (forced connection with option 473). The snap-in adapter for the mobile phone (ULF) or the cordless handset (SBDH/TCU) is housed in a flap above the CD changer.

KT-12474

Fig. 10:   Installation location of the CD changer between the front seats

- Aerial systems

The E83 has up to 6 aerial systems depending on the options installed. There is also an aerial for the remote control services (FBD).

The E83 features the following aerial systems:

- FM 1-3 window aerials in the rear window

- FM aerial 4 in the rear spoiler

- AM aerial in the rear spoiler

- Telephone aerial (roof-mounted aerial)

- TV aerial in both luggage compartment side windows

- GPS aerial for the navigation system (roof-mounted aerial)

- SDARS aerial for the digital radio in the USA (roof-mounted aerial)

The radio aerials for AM and FM are described below.
The other aerials are described in the respective chapters.

AM and FM aerials

The aerial structures for the FM aerials 1-3 are integrated in the rear window. The rear window is made of toughened safety glass (ESG) and is approximately 3.1 mm thick.
The AM aerial is in the rear spoiler. To avoid disturbances in AM reception through the third brake light in the rear spoiler, there is a suppressor filter in the feed line to the third brake light.
The power supply to the AM and FM aerial amplifier (with and without FM aerial diversity module) comes from the radio via terminal Rad_on.

The power supply for the TV amplifier comes from an external feed from the video module.

Installation locations of the aerial systems
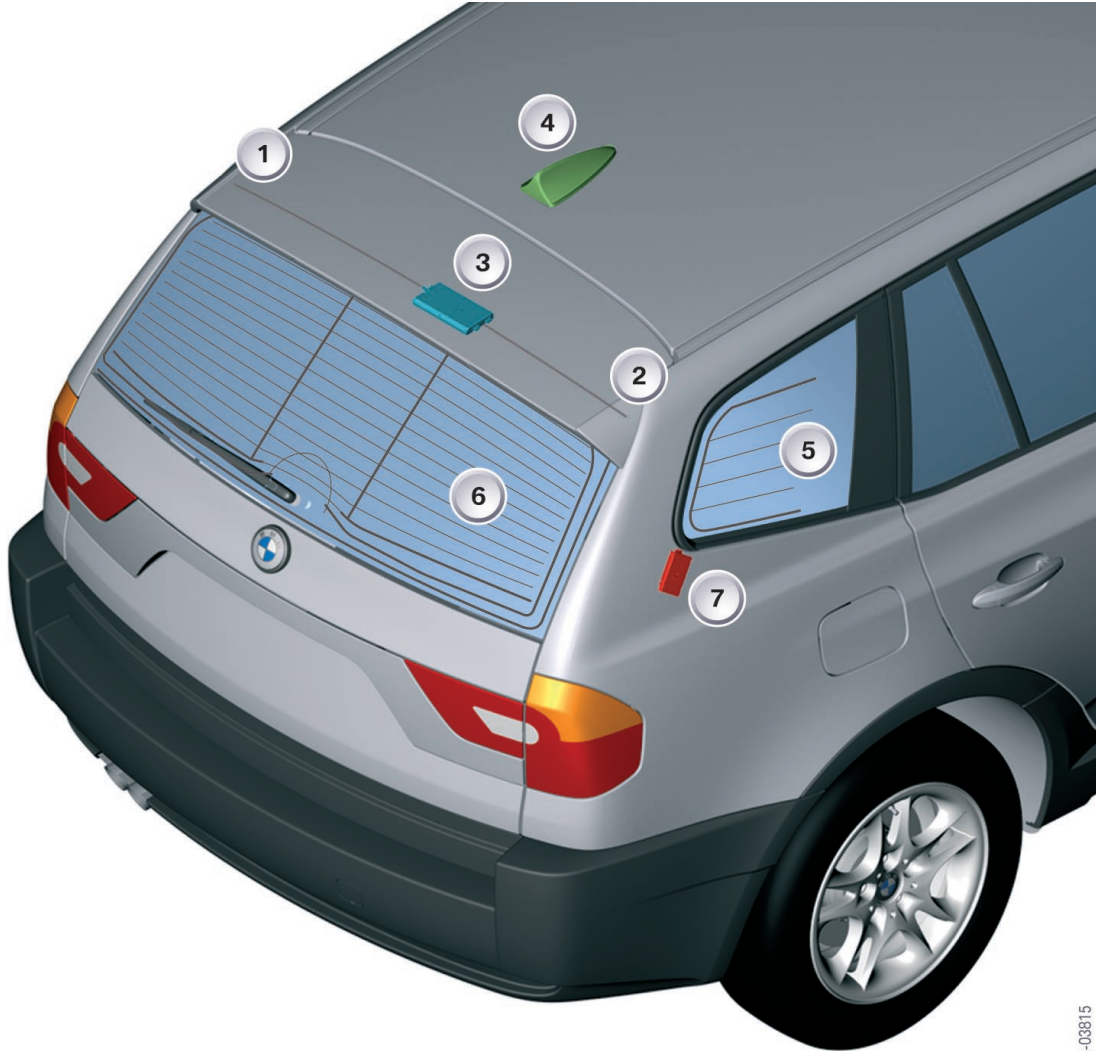
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Fig. 11:   FM, AM and TV aerials

Index	Explanation
1	AM aerial
2	FM aerial 4
3	Aerial amplifier with aerial diversity module
4	Roof-mounted aerial for telephone, navigation system, digital radio (US)
5	TV aerial in the right-hand side window (left-hand side not visible)
6	Heated rear window with built-in FM aerials 1-3
7	TV amplifier (left-hand side not visible)

Installation location of the aerial amplifier

The aerial amplifier for AM, FM and remote control services (FBD) as well as the aerial diversity are built into a housing. The module is fitted on the inside of the tailgate.
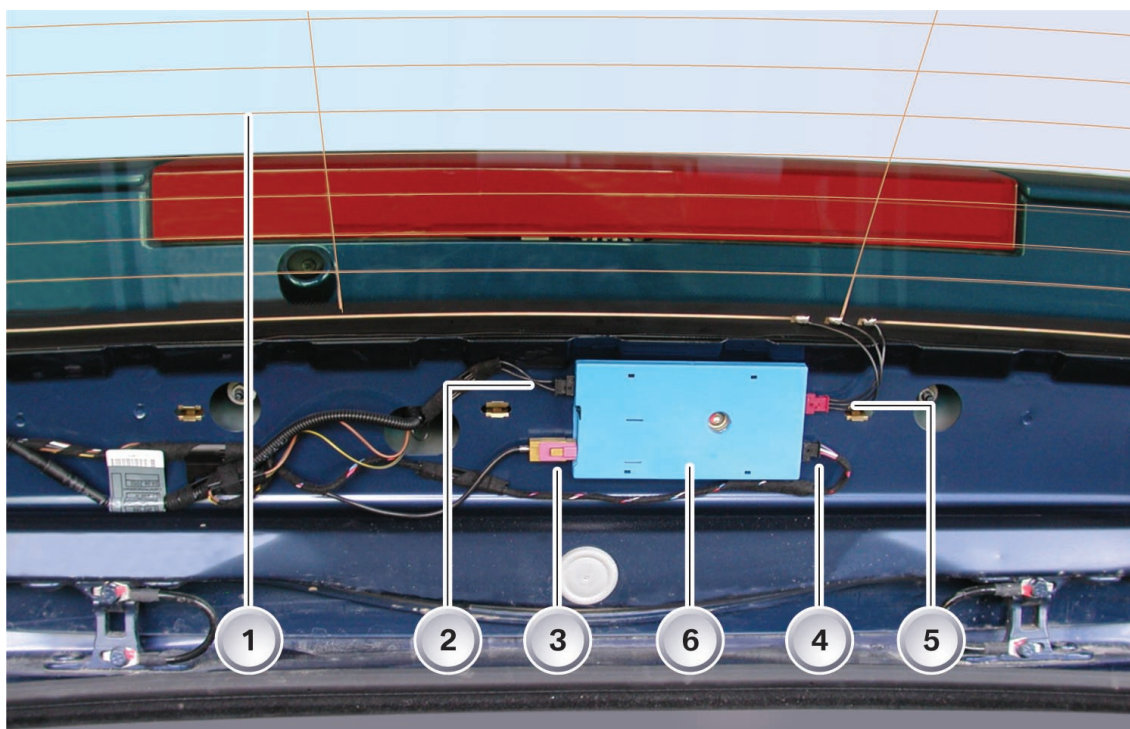
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Fig. 12:   FM aerial diversity and aerial amplifier for AM, FM and FBD

Index	Explanation
1	Heated rear window heating wires with built-in FM aerials
2	Input: terminal 30, terminal Rad_on; output FBD_{out}
3	Input/output: coaxial cable (AM/FM/ZV/U_S signals)
4	Input: FM aerial 4 incl. FBD_{in}; AM aerial
5	Input: FM aerial 1 - 3
6	Aerial amplifier with aerial diversity module

There are 4 different aerial amplifiers and diversity modules (depending on options and national variants):

- FBD 433 MHz amplifier

- AM/FM/FBD 433 MHz amplifier

- AM/FM/DIV/FBD 433 MHz amplifier

- AM/FM/DIV/FBD 315 MHz amplifier

FM aerial diversity

FM aerial diversity is used in the E83.
Exception: The fitted BMW CD radio does not have a diversity function.
The aerial diversity module is in the same housing as the aerial amplifier.
The diversity module comprises the following components:

- FM aerials in the rear window (FM 1 - 3)

- FM aerials in the rear spoiler (FM 4)

- FM aerial amplifier with aerial diversity module

The tuner is connected to the aerial diversity module via an aerial connector (Fakra) and a coaxial cable.
The antenna diversity switches to the next aerial as soon as the signal quality of the active FM aerial exceeds a defined threshhold value. No interruption can be heard when the diversity module switches over. Evaluation of the signal quality and the switch over only occur in the aerial diversity module. At the same time a switch in the diversity module evaluates the intermediate frequency signal of the radio. Reception changes from AM to FM by means of a direct current voltage (U_S), which is produced from the radio and is evaluated in the diversity module.

Note: A detailed description of the way in which the aerial diversity function works can be found in:
E60/E63 Information and Communication

Design
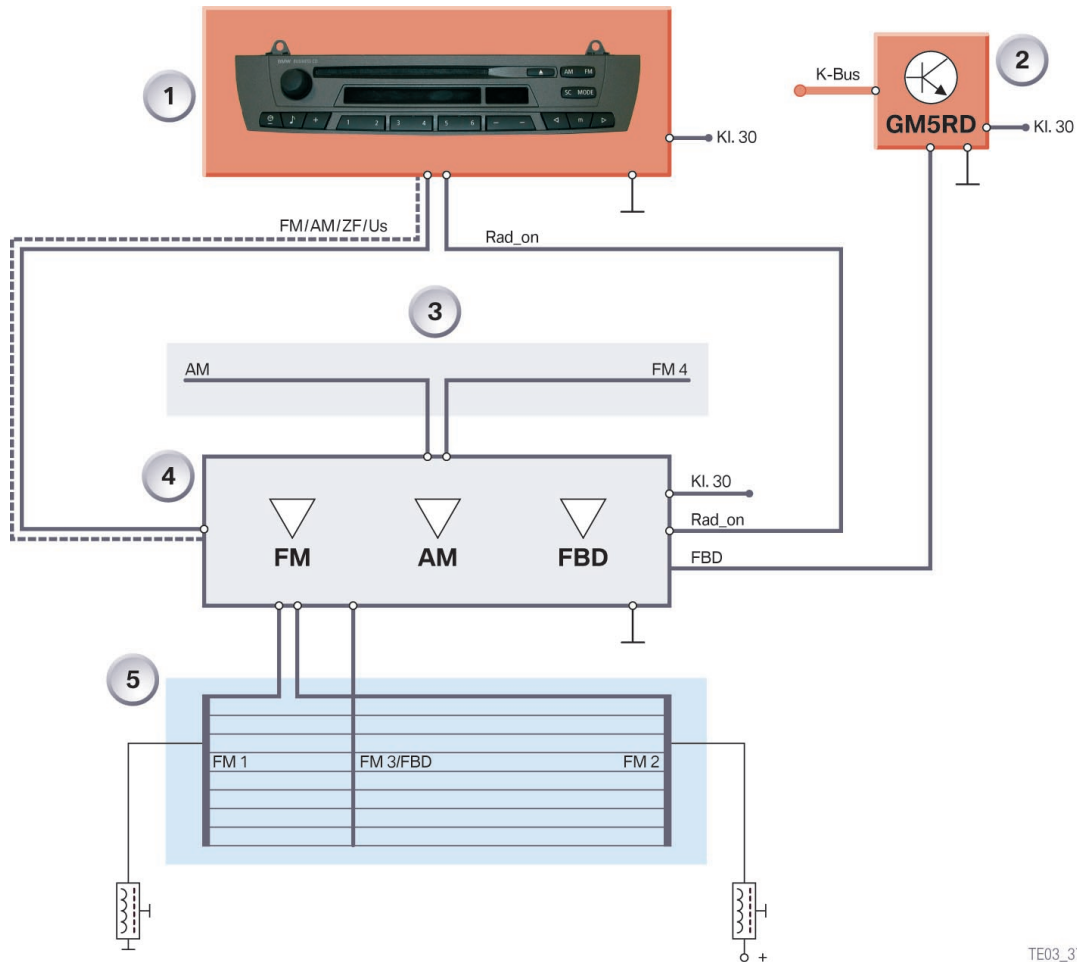
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Fig. 13: System circuit diagram of aerial diversity

Index	Explanation
1	BMW Business CD radio
2	Basic module 5 control unit (central locking activation)
3	Rear spoiler with AM aerial and FM aerial 4
4	Aerial amplifier (AM, FM, FBD) with FM aerial diversity module
5	Rear window with heated rear window, noise suppression inductors and FM aerials 1 - 3

- 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 BMW CD radio, BMW Business CD

Service mode is selected differently depending on the type of radio. The following procedure applies to BMW CD radio and Business CD:

- Switch on the 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 BMW MIR, CID radios

The following procedure applies to BMW MIR and CID radios:

- Switch on the 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

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

Diagnosis

Diagnosis of the radios 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 of the radios comprises the following functions:

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

Car and key memory

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

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

Audio systems

This section describes the various audio systems of the E83. No radio or loudspeaker system is fitted in the E83 as standard.

The radio systems originate from the E85. The loudspeaker systems are new developments and are adapted to the acoustic and technical dimension requirements of the E83.
The following audio systems are available for the E83:

- Stereo audio system

- HiFi audio system (option 676)

- Top-HiFi audio system (option 677)

The BMW audio standards which have been applied since the E85 are also being applied to the E83. They apply to the stereo, HiFi and Top-HiFi systems with regard to symmetry of the sound field, sound pressure and linearity of the frequency response.

- New features/modifications to the systems

New features/modifications by comparison with the E85

- Central woofers for the stereo, HiFi and Top-HiFi audio systems are fitted. The central bass principle is the same as to the systems in the E65/E60.

- The stereo audio system does not have a separate tweeter. Broadband loudspeakers cover the mid-range and high-range.

- The HiFi amplifier in the E83 luggage compartment is a modified version of the HiFi amplifier from the E85/E46. A 6 channel amplifier is adapted from the 10 channel HiFi amplifier by internal circuit modifications changes (summing circuit).

- A fuse is added to the Carver Top-HiFi amplifier from the E85 but is otherwise installed in the E83 without further modifications.

- No radio/audio system is fitted as standard.

- Stereo audio system

System overview - stereo
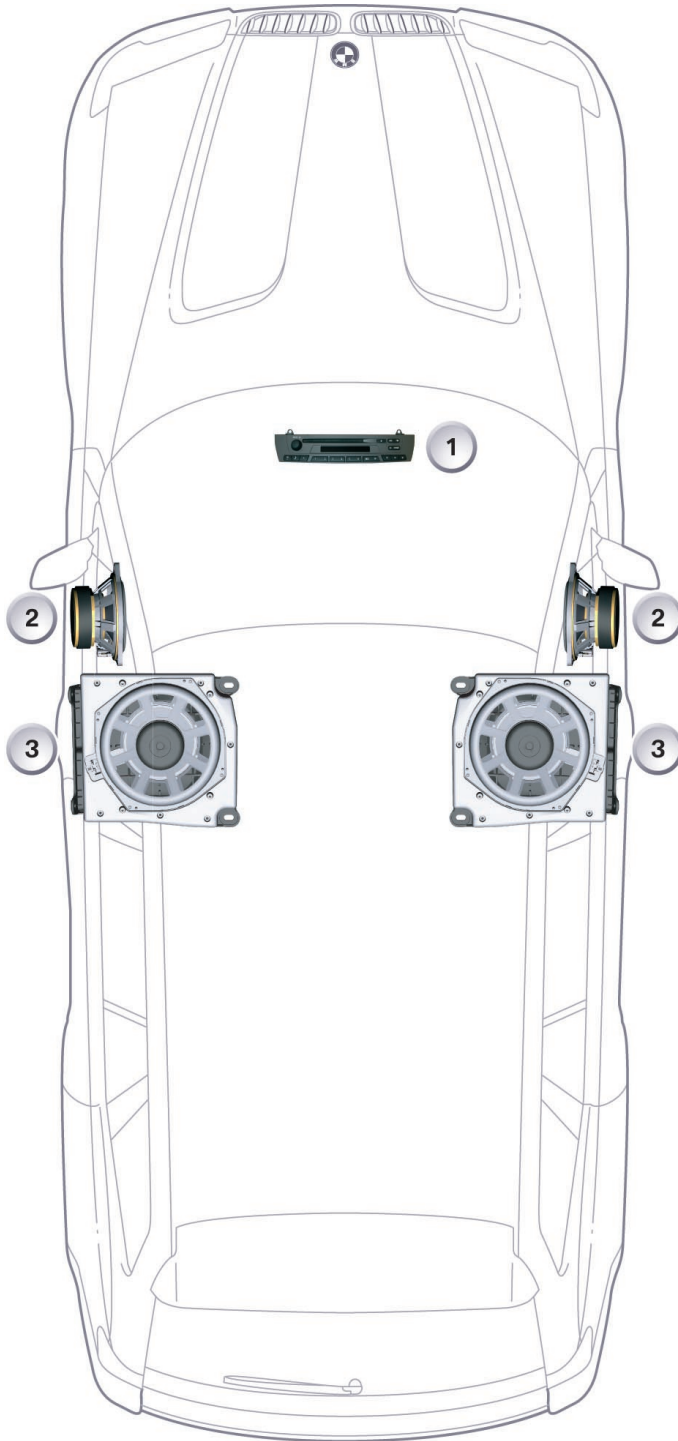
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Fig. 14:   Stereo audio system with components

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Index	Explanation	Index	Explanation
1	BMW CD radio	3	Left and right central woofers with sill connection
2	Front left and right broadband loudspeakers		

Stereo system circuit diagram
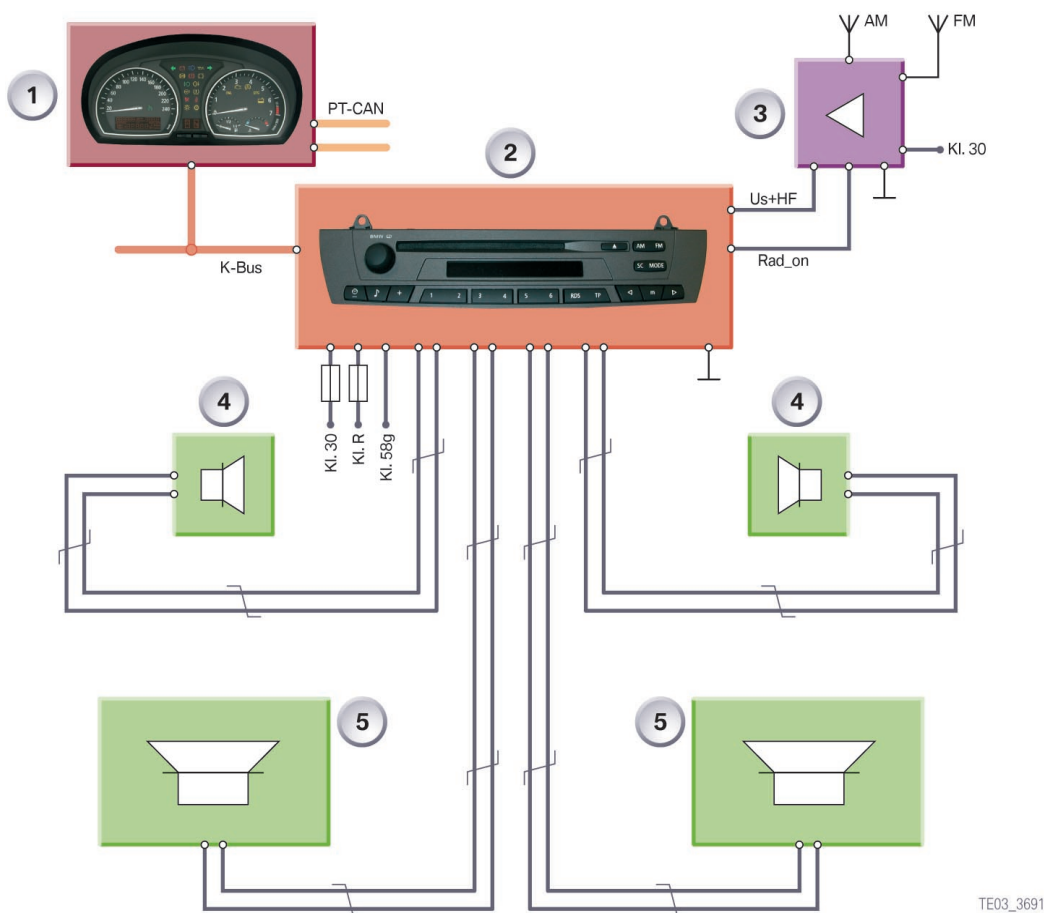
KT-12486

Fig. 15:   System circuit diagram, stereo

Index	Explanation	Index	Explanation
1	Instrument cluster	4	Front left and right broadband loudspeakers
2	BMW CD radio	5	Left and right central woofers with sill connection
3	Aerials with AM/FM amplifier (without aerial diversity)		

- HiFi audio system

System overview - HiFi

Fig. 16:   HiFi audio system with components

Index	Explanation	Index	Explanation
1	BMW Business CD radio	4	Left and right central woofers with sill connection
2	Front left and right tweeters	5	Rear left and right broadband loudspeakers
3	Front left and right broadband loudspeakers	6	6 channel HiFi amplifier

HiFi system circuit diagram
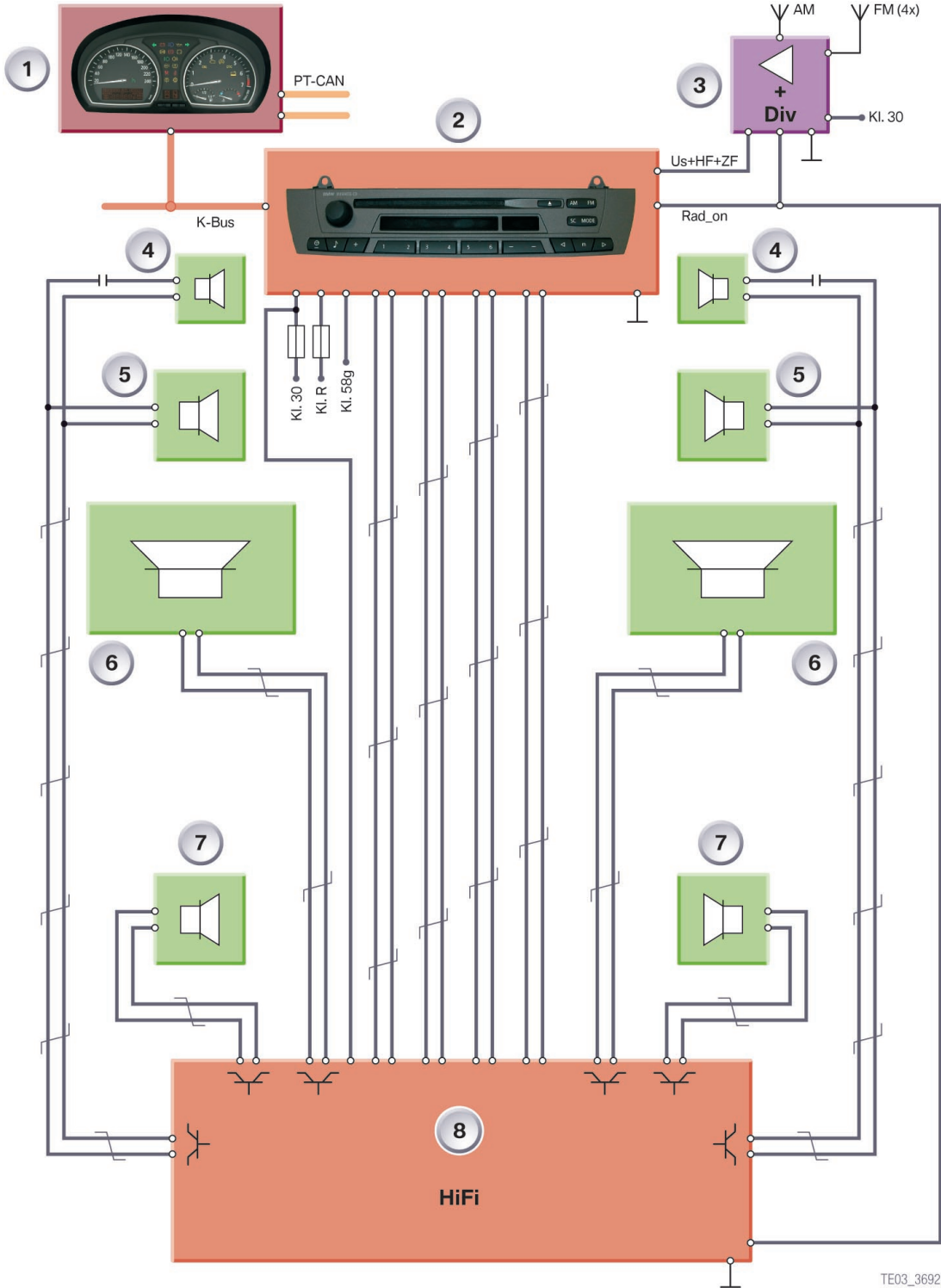
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Fig. 17:   System circuit diagram, HiFi

Index	Explanation	Index	Explanation
1	Instrument cluster	5	Front left and right broadband loudspeakers
2	BMW Business CD radio	6	Left and right central woofers with sill connection
3	Aerials with AM/FM preamplifier and FM aerial diversity	7	Rear left and right broadband loudspeakers
4	Front left and right tweeters	8	6 channel HiFi amplifier

- Top-HiFi audio system

System overview - Top-HiFi

Fig. 18:   Top-HiFi audio system with components

Index	Explanation	Index	Explanation
1	BMW Business CD radio	5	Rear left and right tweeter
2	Front left and right tweeters	6	Rear left and right broadband loudspeakers
3	Front left and right broadband loudspeakers	7	Carver Top-HiFi amplifier
4	Left and right central woofers with sill connection		

Top-HiFi system circuit diagram
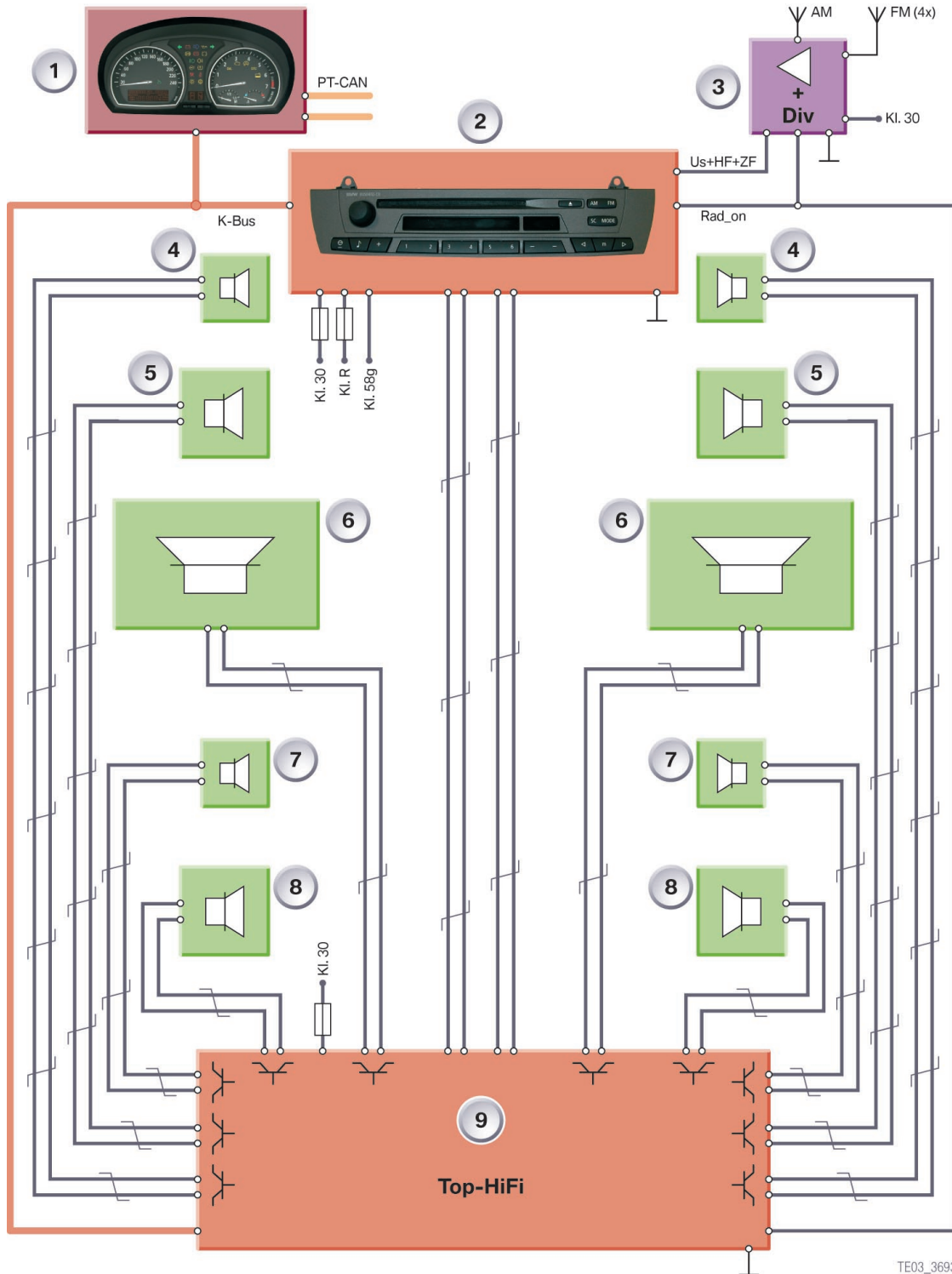
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Fig. 19:   System circuit diagram, Top-HiFi

Index	Explanation	Index	Explanation
1	Instrument cluster	6	Left and right central woofers with sill connection
2	BMW Business CD radio	7	Rear left and right tweeter
3	Aerials with AM/FM preamplifier and FM aerial diversity	8	Rear left and right broadband loudspeakers
4	Front left and right tweeters	9	Carver Top-HiFi amplifier
5	Front left and right broadband loudspeakers		

- Audio system components

Speaker

Model	Stereo audio system	HiFi* audio system	Top-HiFi** audio system
Central bass 160 mm	x		
Central bass L 217 mm		x	
Central bass H 217 mm			x
Broadband loudspeaker L 100 mm	x	x	
Broadband loudspeaker H 100 mm			x
Tweeter L 26 mm		x	
Tweeter H 26 mm			x

* 6 channel HiFi amplifier

** 10 channel Top-HiFi amplifier

Radios and CD changers

Model	Stereo audio system	HiFi audio system	Top-HiFi audio system	CDC (option)
BMW CD radio option 648	x			
BMW Business CD radio option 662	x	x	x	x
Business navigation system option 606	x	x	x	x
Professional navigation system option 609	x	x	x	x

- Loudspeaker installation location

Broadband loudspeakers and tweeters

The broadband loudspeakers (stereo audio system) and the combi-
nation of broadband loudspeaker and tweeter (HiFi and Top-HiFi audio
systems) are mounted on the inner door lining. The broadband
loudspeakers use the door volume controls as resonance volumes.
The tweeters are no longer mounted at the height of the door mirror.
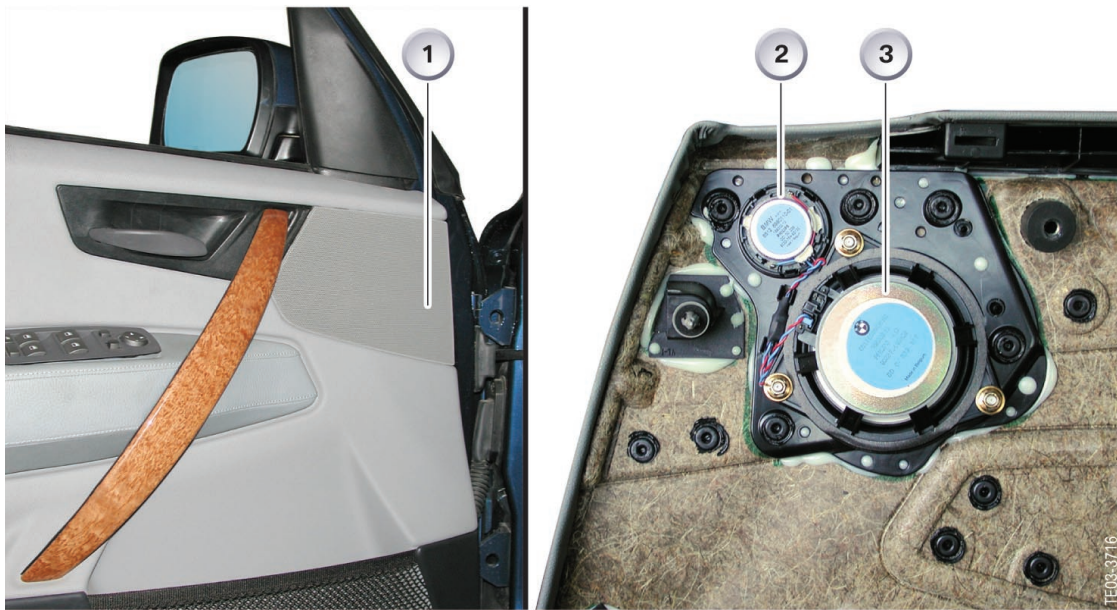
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Fig. 20:   Top-HiFi audio system door loudspeakers

Index	Explanation
1	Speaker cover (front left door)
2	Tweeter (mounted on the back of the inner door lining)
3	Broadband loudspeaker (mounted on the back of the inner door lining)

Central bass

The central woofers are fitted under the driver and front-passenger seats. The central bass principle is the same as the systems in the E65/E60.
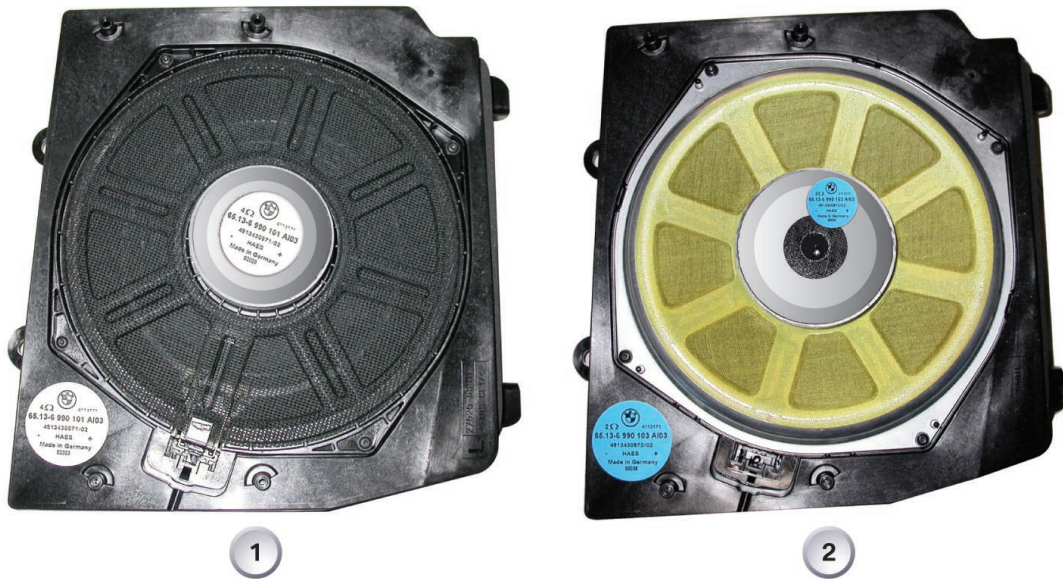
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Fig. 21:   Central bass stereo and HiFi audio system

Index	Explanation
1	Central bass 160 mm (stereo audio system)
2	Central bass L 217 mm (HiFi audio system)

Note: The central woofer housings are identical for the stereo, HiFi and Top-HiFi audio systems (dimensions and sill connection). Because of its small diameter (160 mm instead of 217 mm), the stereo central woofer has an additional spacer to fit the interior of the central woofer housing.

- HiFi amplifier (6 channel)
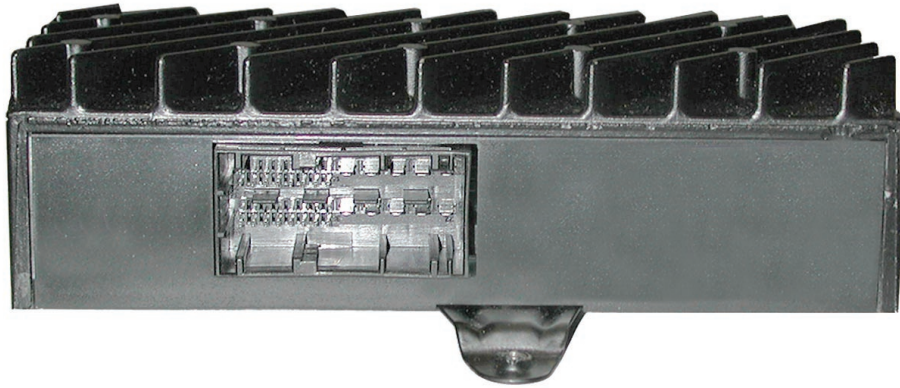
Fig. 22:   6 channel HiFi audio system amplifier

The 6 channel HiFi amplifier in the luggage compartment of the E83 is a modified version of the 10 channel HiFi amplifier from the E85/E46. Four channels are for the door loudspeakers (broadband loudspeaker or broadband speaker with additional tweeter) and 2 channels are for the central woofers.

The 4 audio input signals from the radio (front left and right, rear left and right) are filtered by the amplifier, amplified by the 4 mid-range to high-range levels and transmitted over the door loud speakers.

The central bass is independent of the radio fader settings. To attain this, the HiFi amplifier is added to the E83 internal electrical summing circuit. The two electrical summing circuits form a left and right humming signal for the central bass (overload of the audio signals) from the two left (front and rear) and the right audio input signals. The humming signals produced from this are filtered through a low pass filter, then amplified and transmitted over the left or right central woofer.

The housing is constructed in the same way as the 10 channel HiFi amplifier in the E85/E46. The HiFi amplifier in the E83 has 4 x 25 watt (2 Ω) power for the mid-range and high-ranges and 2 x 40 watt (2 Ω) for the low frequency range.
In comparison: The 10 channel HiFi amplifier in the E85 has 6 x 15 watt (4 Ω) and 4 x 30 watt (2 Ω) power.

- Top-HiFi amplifier

KT-12484

Fig. 23:   10 channel Top-HiFi audio system amplifier

Index	Explanation
1	46-pin connector
2	Digital input (for CD changer)
3	Fuse

A fuse is added to the Carver Top-HiFi amplifier from the E85 but is otherwise installed in the E83 without further modifications.
However, special Carver woofers with increased cone excursion such as in the E85 are not fitted. The space available in the E83 and the resonance volume in the side sill enables the use of the central bass principle.
The central woofers in the Top-HiFi audio system are simply adapted to the increased voltage level of the bass end levels (8 Ω impedance).
The amplifier delivers 6 x 20 watts (4 Ω), 2 x 40 watts (2 Ω) and 2 x 100 watts (8 Ω).

- Amplifier installation location
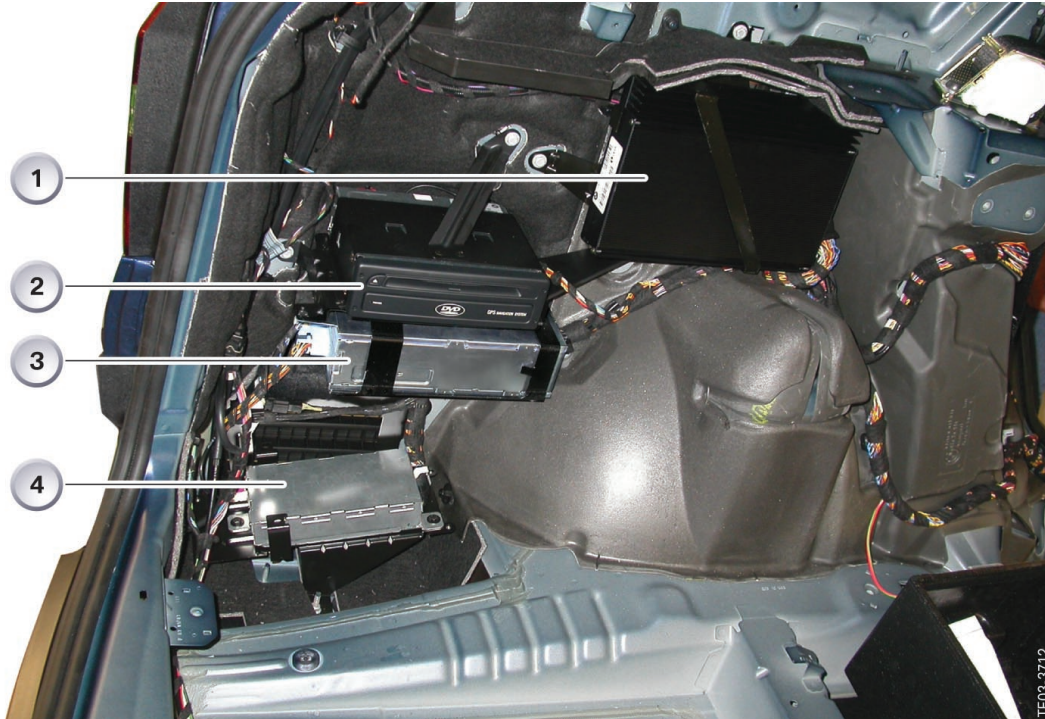
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Fig. 24:   Installation location in left luggage compartment

Index	Explanation
1	Top-HiFi amplifier (is also the installation location of the HiFi amplifier)
2	Navigation computer DVD
3	Video module TV
4	Universal charging and hands-free electronics (ULF) control unit

- System functions

Stereo audio system

The audio system loudspeakers are directly connected to the 4 speaker outputs of the radio.

The output of the stereo audio system is 4 x 25 watts at 4 Ω.

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

HiFi audio system

The HiFi audio system features a 6-channel analogue amplifier that is connected directly to the 4 speaker outputs of the radio. The loudspeakers are connected to the 6 HiFi amplifier output channels. The tweeters are protected from overload by passive frequency gates (capacitors) in the supply lead and connected in parallel to the broadband loudspeakers.

All sound controlling functions such as volume, bass, treble, fader and GAL (speed-sensitive volume control) etc. are formed in the radio.

Top-HiFi audio system

The Top-HiFi audio system features a 10 channel amplifier with digital signal processor technology for sound control.
The Top-HiFi amplifier is controlled via the two radio analogue audio signals.
The Top-HiFi amplifier features a digital input for the CD changer. The digital input is only used for the BMW Business CD radio and CD changer combination.
The 10 loudspeakers are directly connected to the 10 output channels of the Top-HiFi amplifier. The active frequency gates for adaptation of the loudspeakers are built into the amplifier.

Depending on the radio, various functions can be called up. Sound control functions such as volume, bass, treble, fader, GAL, spatial sound simulation etc. are formed in the Top-HiFi amplifier. The 7 band graphic equalizer can only be used in connection with the CID radio.

- 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 and key memory

No diagnosis packages are available for the car and key memory.

Telephone and voice input systems

This section describes the telephone systems of the E83 (except for Japan). The telephone systems correspond completely to the telephone systems in the E85. The following telephone systems are offered in the E83 depending on national variants:

- **Option 638 Professional car phone**
  Fixed installation GSM telephone with dualband and Bluetooth handset for EU vehicles (also with voice input system option 620*)

- **Option 644 Universal mobile phone prefitting**
  Prefitting for universal Bluetooth mobile phone with charging and hands-free unit for EU vehicles (also with voice input system** option 620)

- **Option 639 full prefitting USA/CDN incl. telematics**
  AMPS/CDMA telephone prefitting for US with telematics functions (also with voice input system option 620*)

- **Option 646 Car phone prefitting for Japan**
  Prefitting for the JBIT II

- **Option 640 Car phone prefitting**
  Multifunction wiring harness with aerial for GSM telephone (not described in this documentation)

- **Option 641 Universal mobile phone prefitting, US standard**
  Prefitting for US telephones in EU vehicles
  (e.g. country-specific versions for 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

*voice input system (SES) for operation of the telephone, navigation system and the notepad (language versions: D, UK, I, US)

*voice input system as software in the ULF for operation of the telephone, navigation system and the notepad (language versions: D, UK, I, US, SP, FRA)

- System features

Since production of the E85, various telephone systems have been used worldwide on a standardized platform (Everest) for almost all fixed installation telephones (except for Japan). This Everest platform can be used for vehicles with a K-bus (e.g. E46, E85, E83) and vehicles with a MOST bus (e.g. E60).

Depending on the country-specific version, the Everest platform comprises the following new features:

- GSM dual-band 900/1800 MHz

- AMPS/CDMA 800/1900 MHz

- Standard Telematic Control Unit (TCU) with functions for telephone, telematics, SMS and Bluetooth interface

- Cordless handsets (SBDH) with Bluetooth connection to the TCU which gives improved security against tapping

- Telematics functions (emergency call, breakdown call)

In addition there is a universal charging and hands-free unit (ULF) for Bluetooth mobile phones. The customer can now use his mobile phone with Bluetooth functionality in the vehicle (at the moment only GSM markets).

- Professional car phone

System overview

Fig. 25: System overview of Professional car phone, EU

Index	Explanation	Index	Explanation
1	Multi-function steering wheel MFL with telephone button	5	Bluetooth aerial
2	BMW Business CD radio	6	GSM aerial
3	Speaker	7	Hands-free microphone
4	Cordless handset SBDH	8	Telematic Control Unit TCU

System circuit diagram
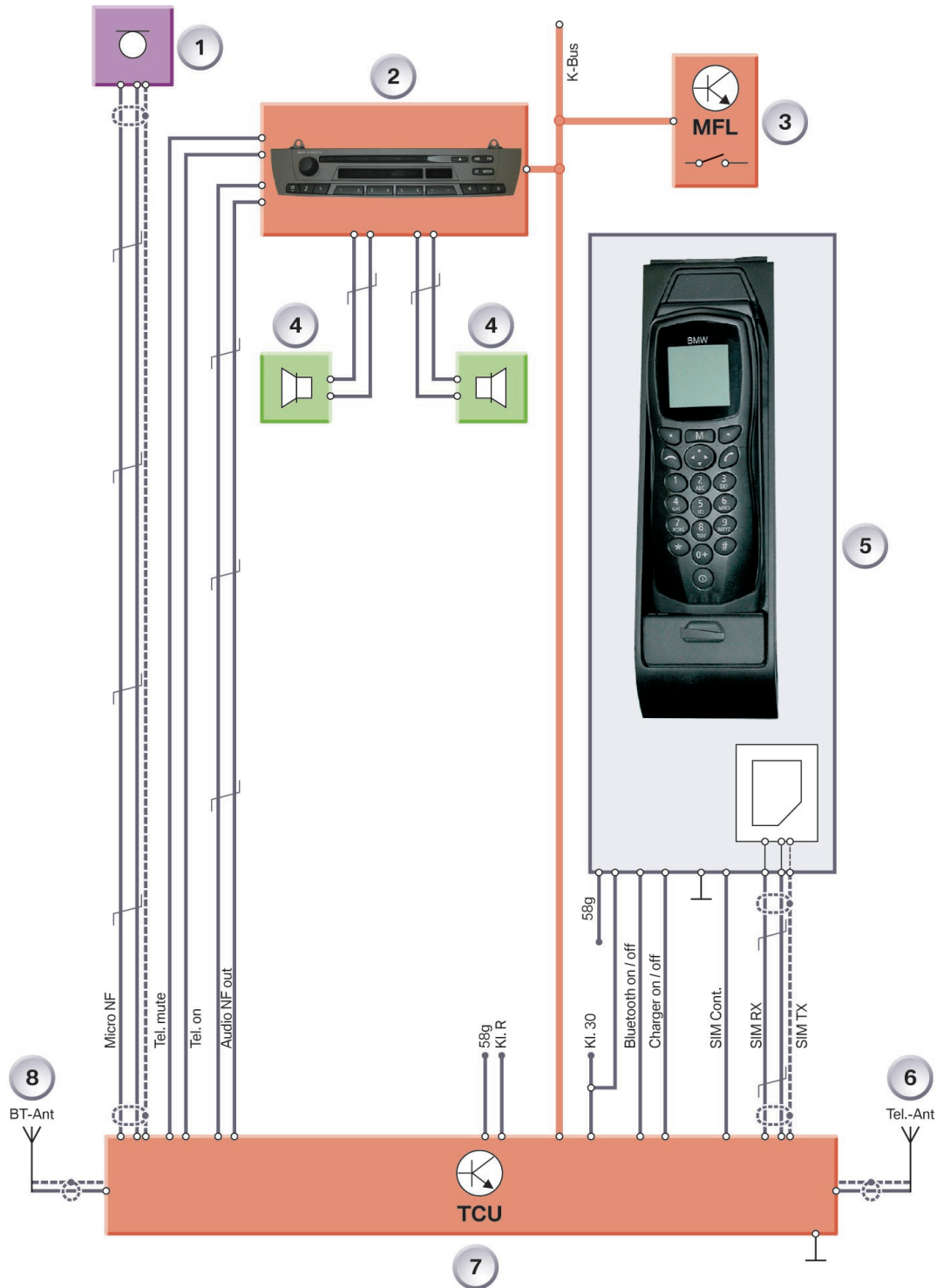
KT-12549

Fig. 26:   Professional telephone system circuit diagram

Index	Explanation	Index	Explanation
1	Hands-free microphone	5	Eject box with cordless handset and SIM card
2	BMW Business CD radio	6	Bluetooth aerial
3	Telephone button on the multi-function steering wheel	7	Telematic Control Unit TCU
4	Speaker	8	GSM aerial
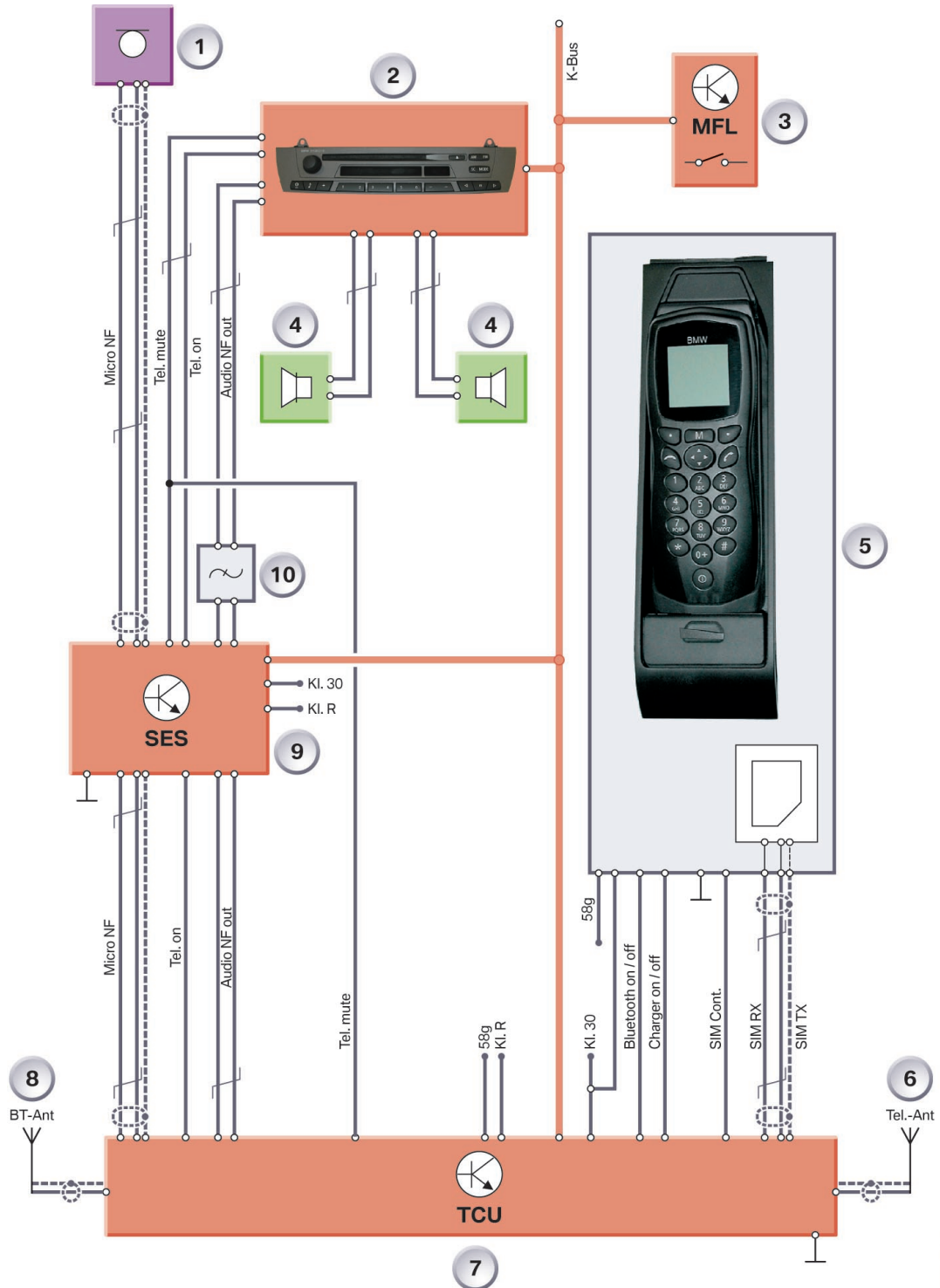
Fig. 27:   System circuit diagram - Professional ECE telephone with voice input system

KT-12551

Index	Explanation	Index	Explanation
1	Hands-free microphone	6	GSM aerial
2	BMW Business CD radio	7	Telematic Control Unit TCU
3	Telephone button on the multi-function steering wheel	8	Bluetooth aerial
4	Speaker	9	Voice input system
5	Eject box with cordless handset and SIM card	10	Noise filter

- Professional car phone components

The option 638 Fixed installation Professional telephone is offered with all radio systems with the exception of BMW CD radio option 648. The fixed installation 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

- Multi-function steering wheel with telephone button

- 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 fixed installation 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 national specifications

- The Bluetooth module as interface for communication with the SBDH or other Bluetooth equipment

- 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

KT-10542   1936_02

Fig. 28:   Telematic Control Unit TCU

Installation location

The TCU is fitted in the luggage compartment at the partition wall next to the video module.

Fig. 29:   Installation location in left of luggage compartment

Index	Explanation
1	Top-HiFi amplifier (is also the installation location of the HiFi amplifier)
2	Navigation computer DVD
3	Video module TV
4	Universal charging and hands-free control unit (also the installation location of the TCU)

Eject box and cordless handset

The eject box accommodates the cordless handset (SBDH) while the vehicle is being driven. The eject box is fitted in the cover of the centre console between the front seats. The SIM card reader is located in the eject box. The eject box adopts the charging function of the battery in the SBDH.

KT-10587

1963_02

Fig. 30:   Eject box with SBDH

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

The SBDH consists of the housing with microphone and loudspeaker, the keypad and the display. Furthermore, the SBDH contains a Bluetooth chip for data transmission to the TCU.

Functions

Telephone calls can be carried out in Privacy Mode using the SBDH, i.e. the person being spoken to cannot be heard over the vehicle loudspeakers. For safety reasons, calls made whilst driving must only be made using the hands-free system and the SBDH should only be stored in the eject box.
The Bluetooth radio path between the SBDH and TCU enables calls to be made within a radius of approximately 10 m of the vehicle.
Text messages (SMS) can be written using the SBDH.

Hands-free microphone

The hands-free microphone is used for voice transmission without using the handset while the vehicle is being driven.

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

The hands-free microphone is installed next to the interior lamp on the roof lining.

KT-12609   TE03-3821

Fig. 31:   Hands-free microphone in the roof console

Index	Explanation
1	Hands-free microphone, left
2	Slide/tilt sunroof button
3	Hands-free microphone cover, left (microphone not fitted)

GSM aerial

The GSM aerial is a passive multiple-band aerial and is located at the end of the vehicle roof. Depending on the equipment specification, the navigation and SDARS aerial (US only) is also built in. The housing of the roof-mounted aerial is still fitted even if no aerial system is fitted (empty housing).

KT-12315

Fig. 32:   Roof-mounted aerial for telephone

Design
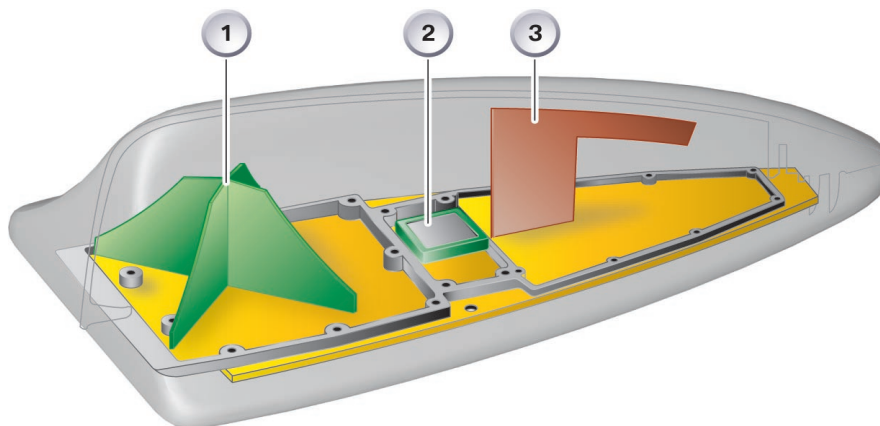
KT-12560

Fig. 33:   Roof-mounted aerial design

Index	Explanation
1	SDARS aerials (terrestrial and satellite)
2	GPS navigation aerial
3	GSM multiple-band aerial or AMPS/CDMA aerial

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. 34:   Bluetooth aerial

Installation location

The Bluetooth aerial is fitted on the top left of the C-pillar.

- System functions

Telematic Control Unit

In the EU version, the Telematic Control Unit has an NAD (Network Access Device) that works in the GSM standard with the frequencies 900/1800 MHz. This means that, in Germany for example, the D and E networks can be used.

The TCU detects the provider from the SIM card (Subscriber Identity Module) and which frequencies can be sent.

In the E83, the cordless handset SBDH is used for telephoning and most telephone functions. The SBDH can be used in an area approx. 10 m around the vehicle. The connection to the vehicle is by means of Bluetooth technology.

Note:
Bluetooth technology is described in detail in the **Universal charging and hands-free unit** section.

Telephoning

The telephone functions are ensured even if the SBDH is not in the eject box (e.g. in the glove compartment).

Accepting a call

A call is accepted by pressing the transmit-receive button on the multi-function steering wheel, in the radio control panel or on the SBDH.

The GSM aerial receives a signal (call) and forwards this to the NAD (transmit/receive module) in the TCU. The MUTE module in the TCU produces a MUTE signal, which mutes music playback. If the radio is switched off, the signal "TEL ON" switches on the radio. A sound signal (ring) is transmitted across the audio system via the MUX/DSP module.

Hands-free mode

Hands-free mode is activated when a call is accepted via the transmit-receive button on the multi-function steering wheel in the radio control panel.

At the same time, the MUX/DSP module enables the digital full-duplex hands-free unit. It is then possible to speak and listen simultaneously

The microphone produces an LF signal which is sent to the MUX/DSP module in the TCU. In the TCU, the signal is forwarded to the NAD 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 receive signal is sent by the NAD 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 on the multi-function steering wheel, in the radio and the transmit-receive button on the SBDH.

Emergency call functions

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

The automatic emergency call is triggered after a certain crash severity without the driver having to take any action (depending on the country). The MRS control unit sends a crash message to the TCU, which then activates the emergency call.

If a navigation system is installed, the TCU receives a message from the navigation system with the coordinates of the vehicle's position. The vehicle's position and other data such as the direction of travel are sent to the service provider by means of a binary SMS (depending on the country). 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 a rescue operation can be initiated (depending on the country).

The manual emergency call is triggered by hand.

An emergency call (112) is possible at any time, even if no SIM card is inserted.

Breakdown call

In the CID, there is a virtual breakdown call button in the Telephone menu. If the breakdown call button in the CID is activated, an attempt is made to set up a voice connection to the service provider (only with ASSIST). Alternatively, a number stored in the telephone book (e.g. dealer) can be dialled.

Power management

The TCU monitors and regulates the power supply of the telephone system in order to switch it off in the event of undervoltage or overvoltage.
In addition, the battery capacity in the SBDH is monitored and the charge regulated.

- Universal mobile phone prefitting - Bluetooth technology

The option 644 Universal mobile phone prefitting is designed for the use of Bluetooth mobile phones.

- Data and voice

Bluetooth has been developed for the transmission of both voice signals and data. As the transmission of language requires a continuous information flow, Bluetooth supports both synchronous and asynchronous communications channels. A band-width of approximately 1 MBit/s (gross) is available.

- Security

All Bluetooth devices have a separate 48-bit address. This makes it possible to differentiate between up to 281 billion different devices. All transmitted data can be encoded with a code of up to 128 bits in length.

A decisive contribution to security is made by changing the channels 1600 times a second. The relatively short range of approx.10 metres also contributes to security, as manipulations of the data flow are only possible in the direct vicinity.

In order to set up a secure connection between two Bluetooth devices, a one-off linking operation with input of an identification (passkey) is required (initial logon).

System overview

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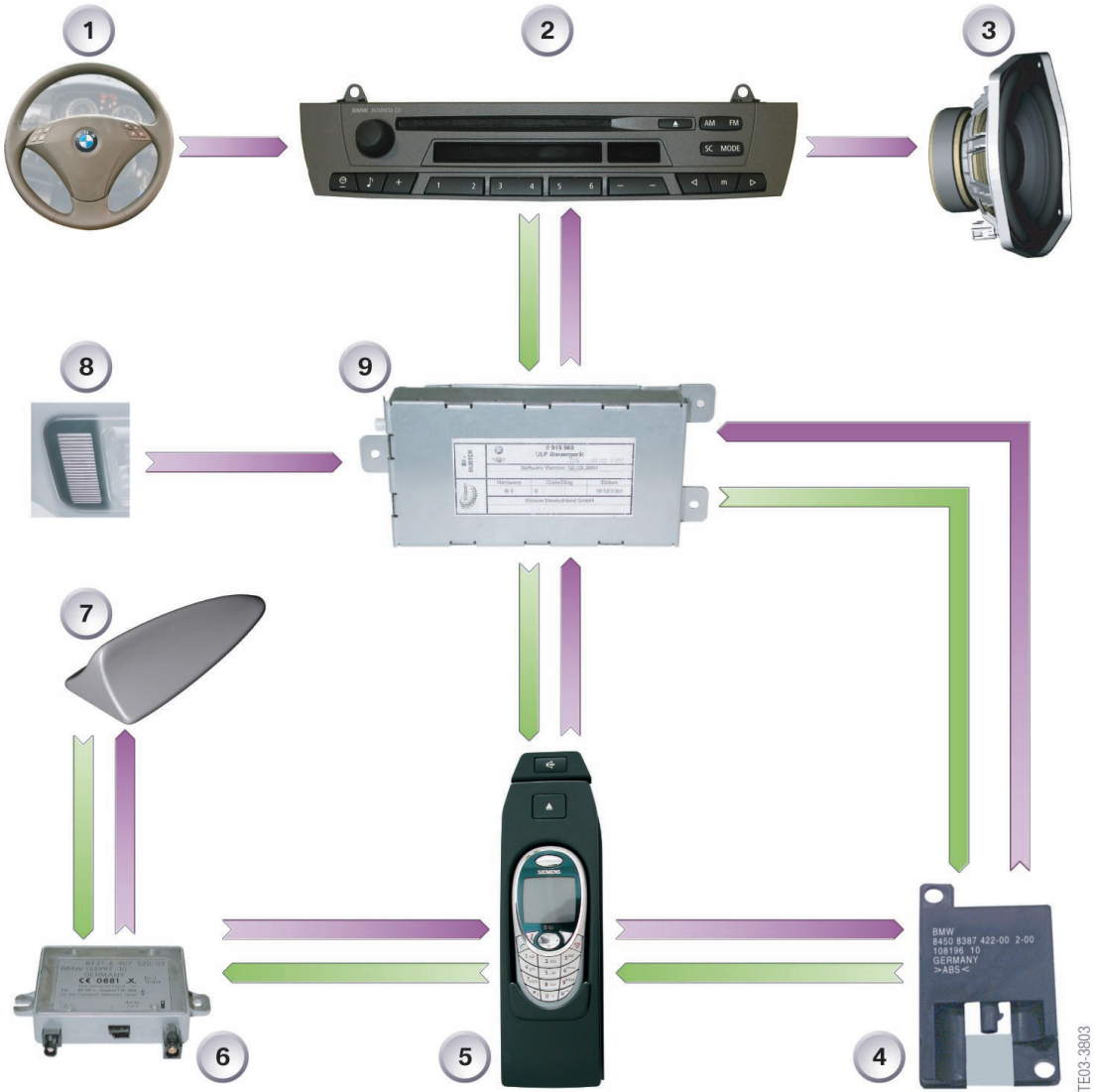
Fig. 35:   System overview of universal charging and hands-free unit

Index	Explanation	Index	Explanation
1	Multi-function steering wheel MFL with telephone button	6	Compensator
2	BMW Business CD radio	7	GSM aerial
3	Speaker	8	Hands-free microphone
4	Bluetooth aerial	9	Universal charging and hands-free electronics ULF control unit
5	Siemens mobile phone S55		

System circuit diagram
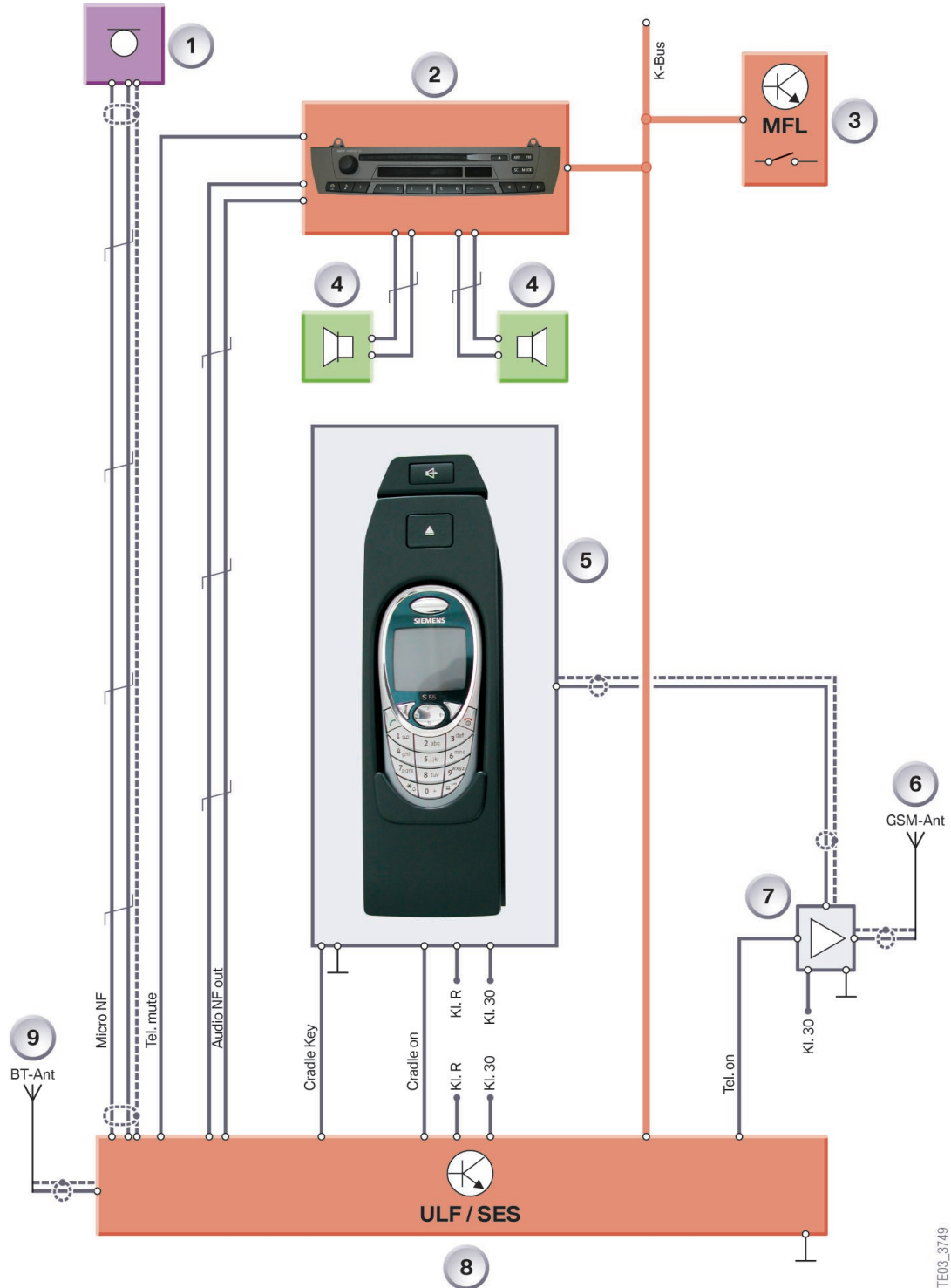
Fig. 36:   System circuit diagram for universal charging and hands-free unit with SES

KT-12553

TE03_3749

Index	Explanation
1	Hands-free microphone
2	BMW Business CD radio
3	Multi-function steering wheel with telephone button
4	Speaker
5	Mounting plate with snap-in adapter and Siemens S55 mobile phone
6	GSM aerial
7	Compensator
8	Universal charging and hands-free unit ULF
9	Bluetooth aerial

- Universal mobile phone prefitting components

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

- Universal charging and hands-free electronics ULF (control unit)
- Mounting plate
- Snap-in adapter (not supplied as standard)
- Multi-function steering wheel with telephone button
- Hands-free microphone
- GSM aerial
- Bluetooth aerial
- Line compensator (not supplied as standard)

Universal charging and hands-free unit ULF

Installation location
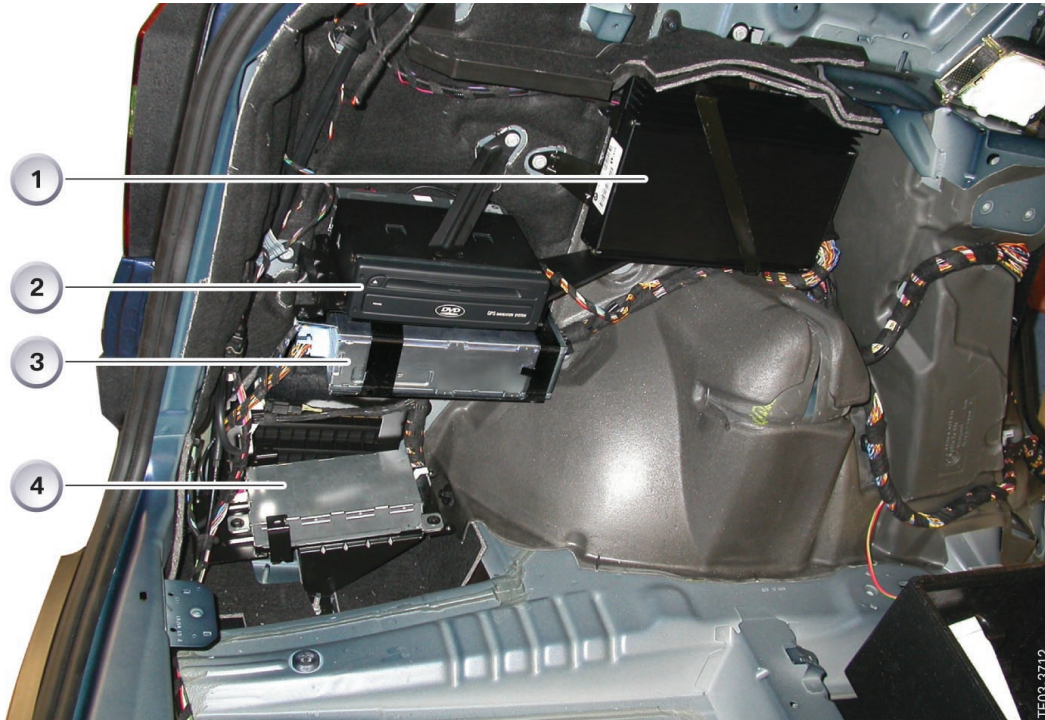
Fig. 37:   Installation location in left of luggage compartment

Index	Explanation
1	Top-HiFi amplifier (is also the installation location of the HiFi amplifier)
2	Navigation computer DVD
3	Video module TV
4	ULF control unit

The ULF forms the interface between the Bluetooth mobile phone and the vehicle.

The ULF contains the following assemblies:

- The DSP module for control of the digital full-duplex hands-free unit

- Output of the LF signal for the loudspeakers

- The Bluetooth module for control of the Bluetooth participants

- A K-bus interface for connection to the vehicle

- An aerial interface for the Bluetooth aerial (internal)

KT-10541   1935_02

Fig. 38:   ULF control unit

Functional principle

A number of modules are integrated in the universal charging and hands-free unit, ULF. The various modules enable the connection of a commercially available Bluetooth mobile phone in the vehicle.

The main modules of the ULF are described below. The ULF consists of the following modules:

- Bluetooth module

- Hands-free module

- Power module

- Interface for K-bus

Bluetooth module

The Bluetooth module is connected to the Bluetooth aerial. The Bluetooth module sets up the connection for the voice input and output between the mobile phone and vehicle.

Hands-free module

The hands-free module in the ULF controls the input/output of the LF signals in the hands-free mode. The hands-free mode is activated by pressing the transmit-receive button in the mobile phone cradle or in the radio control panel.

The hands-free unit is a full-duplex transmission for simultaneous listening and speaking. The voice input is transmitted via a microphone on the left in the interior lamp in the roof frame.

Power module

The power module regulates the power supply and monitors cutoff in the event of undervoltage.

Interface for K-bus

The interface for the K-bus controls transmission and reception of data telegrams on the K-bus to other nodes.

Bluetooth mobile phone cradle

The mounting plate with storage tray is part of the mobile phone prefitting. Depending on the Bluetooth mobile phone used, a specific snap-in adapter is required. Depending on the mobile phone, the snap-in adapter is available from BMW accessories outlets.

The Bluetooth mobile phone cradle consists of two parts:

- Mounting plate
- Snap-in adapter

Installation location

The mobile phone cradle is fitted on the inside of the centre console lid between the seats.

Mounting plate

The mounting plate accommodates the snap-in adapter. The mobile phone is engaged in the snap-in adapter and the plug-in connection (aerial, charge voltage etc.) is established. The mounting plate sets up the connection to the ULF and to the vehicle wiring harness. The mounting plate is supplied with a storage tray.

KT-10546   1940_02

Fig. 39:   Mounting plate with storage tray

The charging module is located in the mounting plate. Using the "Cradle On" signal, it monitors whether a snap-in adapter is connected and whether there is a mobile phone in the adapter. The actual battery charging is by means of the charging electronics in the telephone-specific snap-in adapter. The mobile phone is only charged when the following parameters are met in the charging module:

- Snap-in adapter inserted in the mounting plate

- Mobile phone inserted in the snap-in adapter

- Terminal R or after-run time active

- No overvoltage > 16 V

- No undervoltage < 9 V

Snap-in adapter and mobile phone

The snap-in adapter regulates the battery charging in the mobile phone and sets up the connection to the GSM vehicle aerial via the mounting plate.

An input filter and activation control are integrated in the charging electronics. These regulate the specific charge of the mobile phone depending on the battery status.

The after-run time is set at the plant to 12 minutes. By means of coding, the after-run time can be set in the range between 0 and 60 minutes as required.

KT-12475

Fig. 40:   Snap-in adapter with Siemens S55 mobile phone

Bluetooth mobile phones

For the beginning of series production, snap-in adapters will be available for the following Bluetooth mobile phones:

-   Siemens S55

-   Planned: Sony Ericsson T61

Note:
Using mobile phones which are not approved by BMW can lead to faults during coupling or while calls are being made.

Compensator

The length of the aerial cable can lead to reduced output power. For this reason, if required, a compensator can be placed between the mounting plate and the GSM aerial to balance out the losses of the aerial cable. The compensator is not absolutely necessary. At the request of the customer, however, it can be fitted for a separate charge.

The compensator for the ULF is not a power amplifier (booster) to increase the output power. It is only for balancing out cable losses.

KT-10548

Fig. 41:   Aerial line compensator for the ULF

Installation location

The compensator is installed in the rear left-hand side of the luggage compartment.

Bluetooth aerial

The Bluetooth aerial for the ULF is the same as the Bluetooth aerial for the Professional car phone system (TCU).

KT-9168

Fig. 42: Bluetooth aerial

- System functions

Universal charging and hands-free unit

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

The transmit/receive unit is the Bluetooth mobile phone. The GSM aerial is directly connected via the mounting plate and the snap-in adapter.

Telephoning

While the vehicle is being driven, the Bluetooth mobile phone should always be placed in the snap-in adapter and locked in position.

A cradled mobile phone has the following advantages:

- Reduces the risk of injury from loose objects (e.g. Bluetooth mobile phone) in the passenger compartment in the event of sudden heavy braking

- Connection of the external aerial (GSM aerial) and therefore significantly reduced radiation in the vehicle interior

- Continuous checking of the charge of the batteries

- Avoids disruptions to other vehicle systems

However, the telephone functions are still ensured if the Bluetooth mobile phone is located somewhere else in the vehicle, e.g. in a briefcase or handbag.

Accepting a call

A call is accepted by pressing the transmit-receive button on the radio, on the multi-function steering wheel, on the mounting plate or on the mobile phone itself.

When a telephone signal is received via the GSM aerial, the call tone rings on the Bluetooth mobile phone. At the same time, a signal is sent to the Bluetooth aerial in the vehicle across the Bluetooth interface in the mobile phone. The Bluetooth aerial is connected to the Bluetooth module in the ULF. The ULF recognizes an incoming call and mutes the radio via the "Mute" module. Via the DSP (Digital Signal Processor), the loudspeakers for output of the sound signal are enabled and the sound signal is heard in the vehicle.

Making and receiving a call

If a call is accepted using the transmit-receive button on the multi-function steering wheel, on the radio or on the mounting plate, the call is taken using the hands-free microphone and vehicle loudspeakers. If a call is accepted using the transmit-receive button on the mobile phone, it is taken using the mobile phone.

Once the transmit-receive button has been pressed, the hands-free unit is activated. The incoming call is sent via the Bluetooth interface in the mobile phone to the Bluetooth aerial in the vehicle. The call is transmitted over the vehicle loudspeakers via the Bluetooth aerial and the ULF.

As the vehicle has a digital full-duplex hands-free unit, it is possible to speak and listen at the same time. When the user is speaking into the microphone, an echo compensation avoids a cross-back coupling. The microphone signal is transmitted across an LF cable to the ULF. There, the received audio signal is encrypted in the Bluetooth module and sent to the mobile phone via the Bluetooth aerial. The Bluetooth mobile phone transmits the call across the GSM aerial.

Terminating a call

A call is terminated using the same transmit-receive button of the vehicle that was used to accept it. The mobile phone has its own key for terminating a call.

To terminate a call there are the following possibilities:

- Press the transmit-receive button on the multi-function steering wheel once again
- Press the transmit-receive button on the radio once again
- Press the transmit-receive button on the mounting plate once again
- Press the terminate call key on the Bluetooth mobile phone

Charging

The batteries of the Bluetooth mobile phone are charged automatically as soon as the phone is placed in the snap-in adapter and recharge is required.

Charge status monitoring

The snap-in adapter has an electronic system that can be used to check the charge status of the Bluetooth batteries via the charge contacts.
When the batteries have reached the cell-end voltage, the electronic system switches on the battery charging.

Battery charging

The power supply for battery charging is from terminal 30 to the mounting plate and via contacts on the snap-in adapter.

Battery charging takes place under the following conditions:

- Terminal R or after-run time active

- No overvoltage > 16 V

- No undervoltage < 9 V

The after-run time is set at the plant to 12 minutes. By means of coding, the after-run time can be set in the range between 0 and 60 minutes as required.

- Full prefitting USA/CDN - versions

The Everest platform for the telephone and telematics functions are also used in the US version of the E83. For the American market, three different versions are offered:

- TCU only with telematics function emergency call (E-Call) and breakdown call (B-Call) as standard equipment

- TCU with telematics function emergency call and enabling by provider. In addition to the series-standard telematics emergency call function, the customer can use other functions of the TCU by having them enabled by a provider.

- TCU with telematics and telephone functions via hands-free unit or mobile phone (after retrofitting a telephone).

System overview

Fig. 43:   System overview, US telephone

Index	Designation	Index	Designation
1	Multi-function steering wheel MFL with telephone button	7	GPS aerial
2	CID	8	Hands-free microphone
3	Speaker	9	Emergency call and breakdown assistance buttons
4	Motorola mobile phone	10	CID control panel
5	Compensator	11	TCU
6	GSM aerial		

System circuit diagram
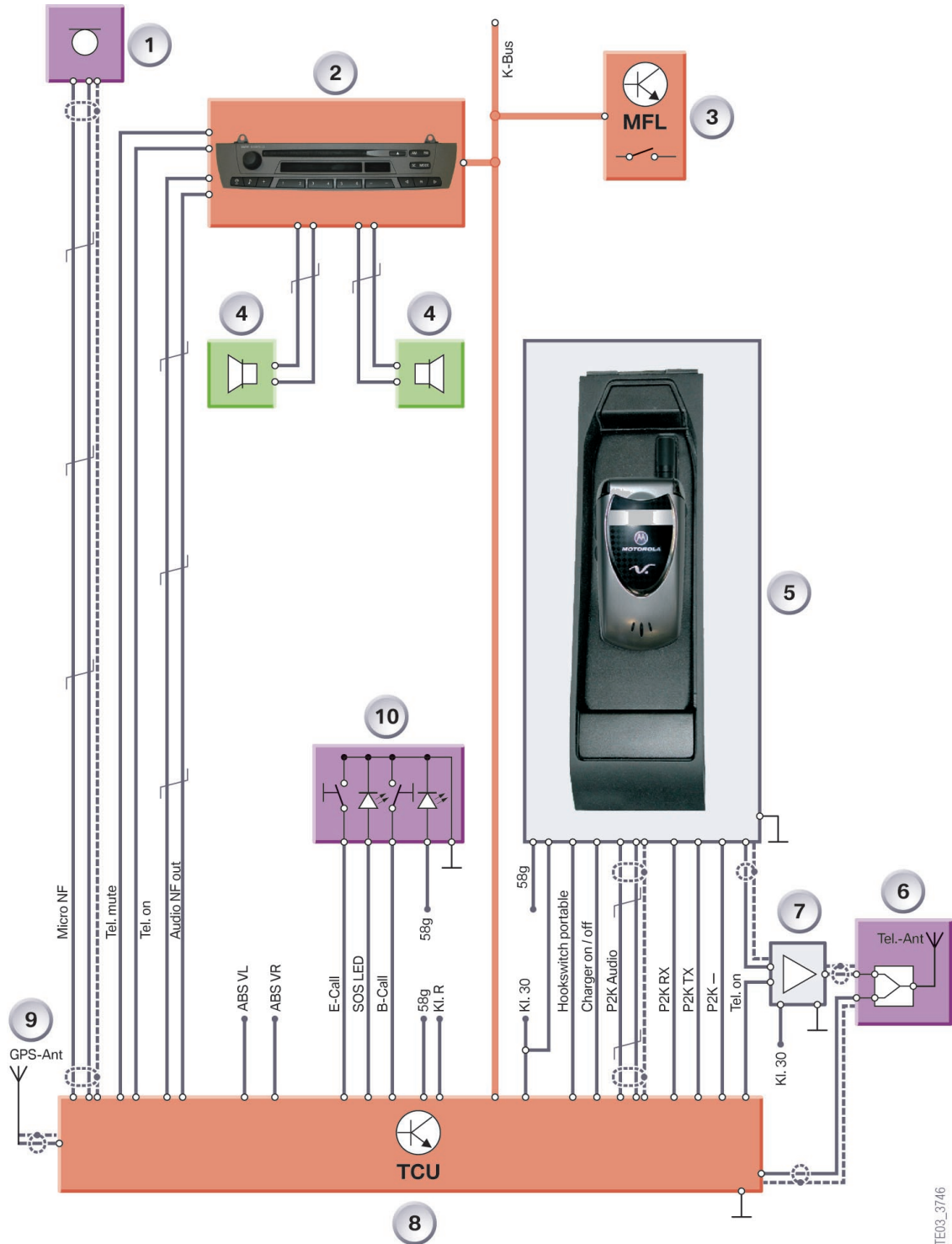
KT-12550

Fig. 44:   System circuit diagram, telephone US

Index	Explanation	Index	Explanation
1	Hands-free microphone	6	AMPS/CDMA aerial
2	BMW Business CD radio	7	Compensator
3	Telephone button on the multi-function steering wheel	8	Telematic Control Unit TCU
4	Speaker	9	GPS aerial
5	Eject box with mobile phone	10	Emergency call and breakdown assistance button
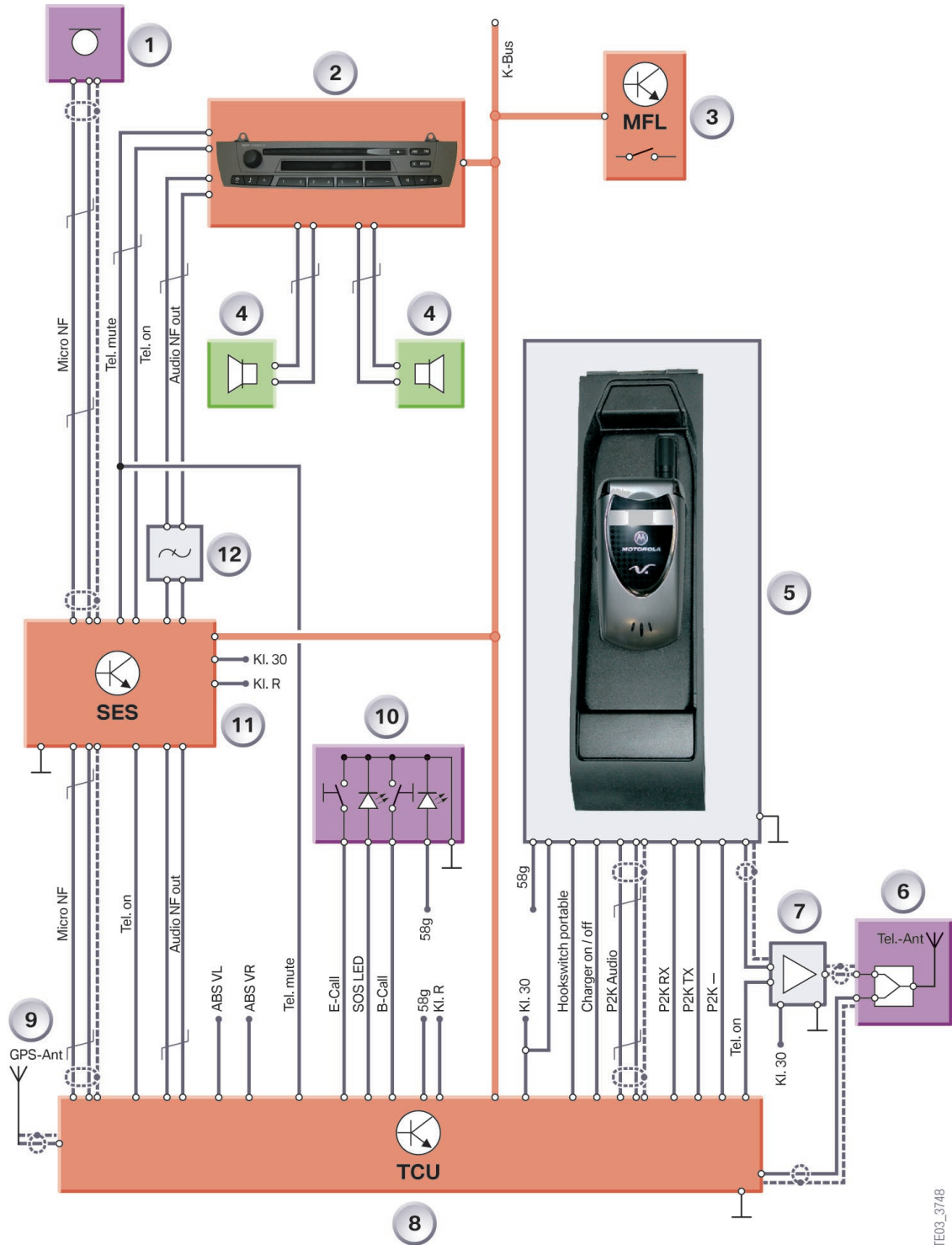
Fig. 45: System circuit diagram - Professional US telephone with voice input system

KT-12552

Index	Explanation	Index	Explanation
1	Hands-free microphone	7	Compensator
2	BMW Business CD radio	8	Telematic Control Unit TCU
3	Telephone button on the multi-function steering wheel	9	GPS aerial
4	Speaker	10	Emergency and breakdown call
5	Eject box with cordless handset and SIM card	11	Voice input system
6	AMPS/CDMA aerial	12	Noise filter

- Full prefitting USA/CDN components

Depending on the version of the telephone, there are various components in the vehicle.
The list below contains all the components that can become necessary for a complete telephone facility for USA/CDN:

- Telematic Control Unit TCU (series standard)

- Telephone aerial for telematics (series standard)

- GPS aerial (series standard)

- Multi-function steering wheel with telephone button

- Hands-free microphone (series standard)

- Eject box (retrofit equipment in USA)

- Motorola Phoenix V60 mobile phone (retrofit equipment in USA)

- Compensator (retrofit equipment in USA)

- Software enabling by the provider (retrofit equipment in USA)

Note:
In the following chapter, only components and functions that differ from those in the EU version are described.

Telematic Control Unit TCU

The Telematic Control Unit TCU is standard equipment in US vehicles. This means that an emergency call can always be made, also if the customer has not (yet) retrofitted a telephone.

The range of functions of the US/CDN version differs from the EU version in the following ways:

- TCU is always fitted in order to ensure the emergency call can be made even if no telephone is present

- Dual-band 800 MHz and 1900 MHz

- Combined transmit/receive module NAD (Network Access Device) for analog AMPS (American Mobile Phone Standard) for telephone calls and digital CDMA (Code Division Multiplex Algorithm) for telematics functions

- Eject box with charging unit for Motorola Phoenix V60

- Telematics functions (E/B call)

- GPS receiver for localization

Installation location

The Telematic Control Unit is fitted in the luggage compartment to the left of the separating wall.

Functional principle

In the US version, the Telematic Control Unit has an NAD (Network Access Device) that works in the AMPS/CDMA standard with the frequencies 800/1900 MHz.
The TCU features a hands-free system with full-duplex transmission. This makes it possible to speak and listen simultaneously.
The position of the vehicle is determined by the TCU by means of a built-in GPS receiver. In the event of a crash, the TCU sends an SMS with this location data to the provider.
Furthermore, the TCU has an interface for the connection of an emergency call button (E/B Call). The emergency call button is a dual-function switch with two keys: one for the emergency call and one for the breakdown call. The emergency call button is standard equipment.

Eject box

The eject box is an additional component that has to be retrofitted in the USA. The eject box is used to hold the Motorola Phoenix V60.

KT-10589   1965_02

Fig. 46:   Eject box with Motorola Phoenix V60

Installation location

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

Motorola Phoenix V60

The Motorola Phoenix V60 is the standard telephone in the US version.

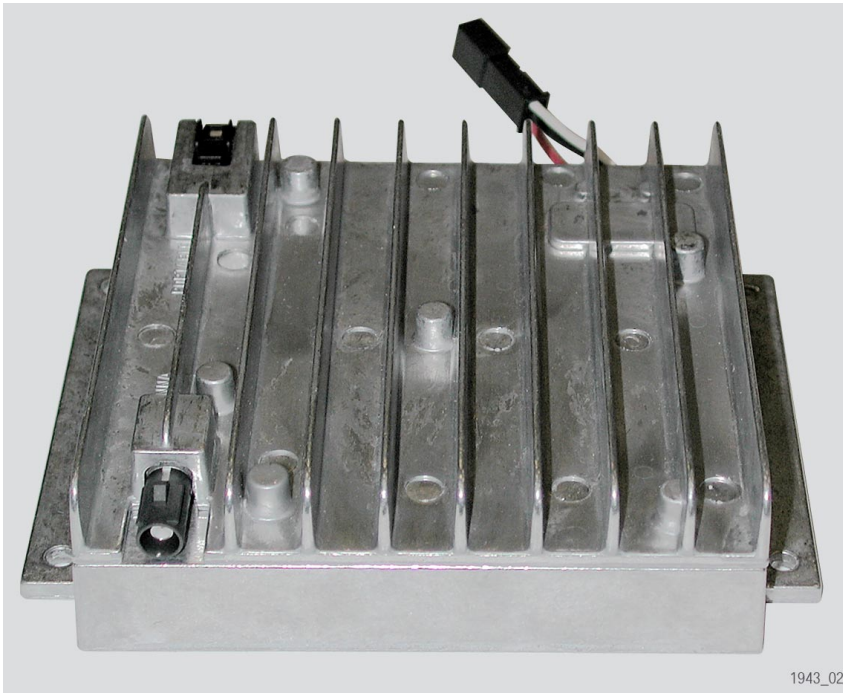KT-10588   1964_02

Fig. 47:   Motorola Phoenix V60

Compensator

The compensator is connected in the aerial cable between the telephone and the roof aerial. It balances out the losses of the aerial cable.

KT-10549   1943_02

Fig. 48:   Compensator

Installation location

The compensator is fitted in the luggage compartment on the separating wall to the left of the TCU.

GPS aerial

The GPS aerial permanently receives data regarding the current latitude and longitude from the satellites of the Global Positioning System, GPS. This data is transferred to the GPS receiver in the TCU, which uses it to determine each position of the vehicle.

Installation location

The GPS aerial is integrated in the roof aerial.
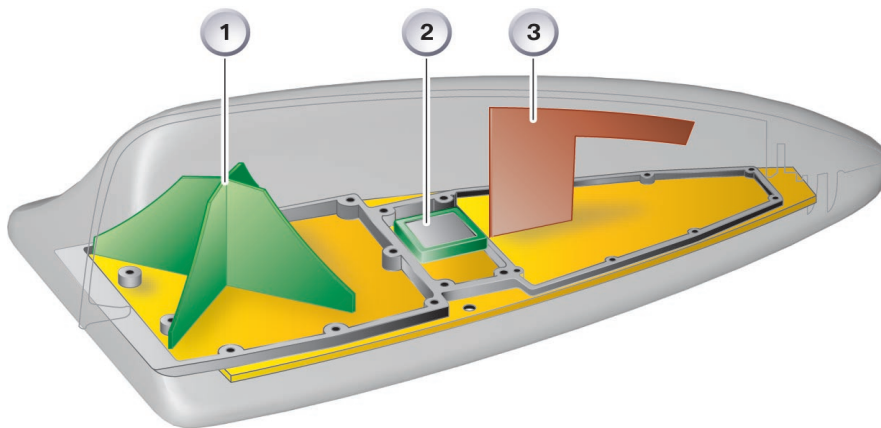
KT-12560

Fig. 49:

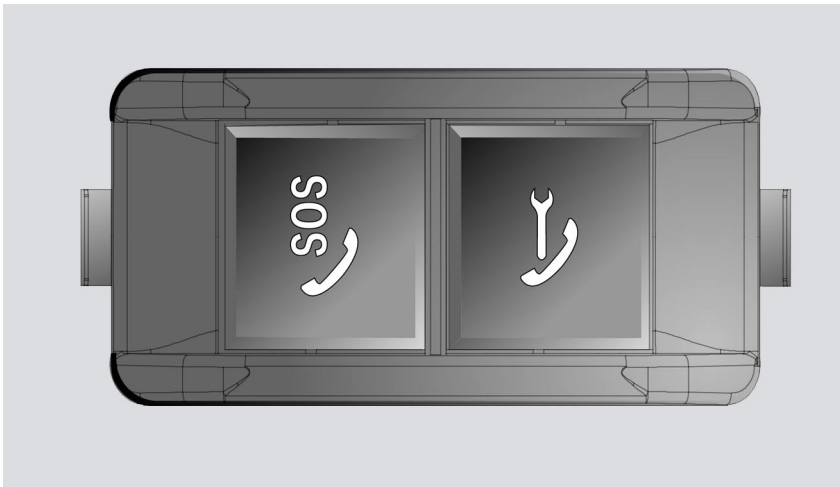| Index	Explanation
1	SDARS aerials (terrestrial and satellite); only USA
2	GPS navigation aerial
3	AMPS/CDMA aerial

Telephone aerial

The telephone aerial is a retrofit part which is fitted when the vehicle is in the USA.

Installation location

The telephone aerial for the Motorola Phoenix V60 is the same aerial as the transmit-receive aerial of the TCU. The two aerial supply lines are separated by an aerial splitter in the roof-mounted aerial.

Emergency call button

The emergency call button is used for manual triggering of an emergency call. The emergency call button is a dual-function switch for the emergency call and the breakdown call. Triggering the manual emergency call is indicated by an LED in the switch.

KT-10612

Fig. 50:   Emergency call button, US

Installation location

The emergency call button is located on the roof console next to the hands-free microphone.

KT-12610   TE03-3822

Fig. 51:   Hands-free microphone in the roof console

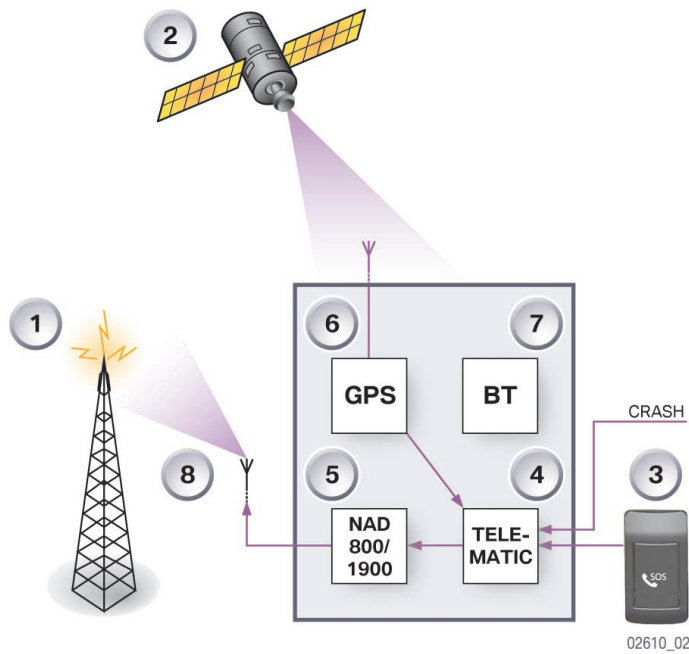| Index	Explanation
1	Hands-free microphone, left
2	Slide/tilt sunroof button
3	Airbag warning light
4	Emergency call button
5	Hands-free microphone cover, right (microphone not fitted)

- System functions

TCU only with telematics function (standard equipment)

As standard equipment, all US vehicles are fitted with a TCU. This means that, in the event of an accident, an automatic emergency call or, if necessary, a manual emergency call (E-Call) can be triggered by means of a button. There is also the possibility to use a button to trigger a breakdown call (B-Call).

In all cases, the current position of the vehicle is transmitted using data packet. The time and, if the vehicle is moving, the direction of movement of the vehicle are also transferred.

The following diagram illustrates the signal path for the telematics function:

KT-11222

02610_02

Fig. 52:   Signal progression for telephone/telematics function, basic

Index	Explanation	Index	Explanation
1	Transmit-receive mast	5	Transceiver module
2	GPS signal	6	GPS module
3	Emergency call button signal	7	Bluetooth module (not yet active)
4	Telematics module	8	Transmit signal

**TCU with telematics and enabled hands-free function**

The customer has the additional possibility of accepting calls using the transmit-receive button in the radio control panel. The call is taken via the hands-free unit and terminated using the same button.

A telephone number can be entered using the number input in the Central Information Display and dialled using the transmit-receive button.

The differences in relation to full telephone equipment are:

- No telephone book is available

- No mobile phone private mode is possible (any occupant or passer-by can eavesdrop)

- No mobile phone can be connected, as the eject box is missing

The following diagram illustrates the signal path for the telematics enabling of the hands-free function:
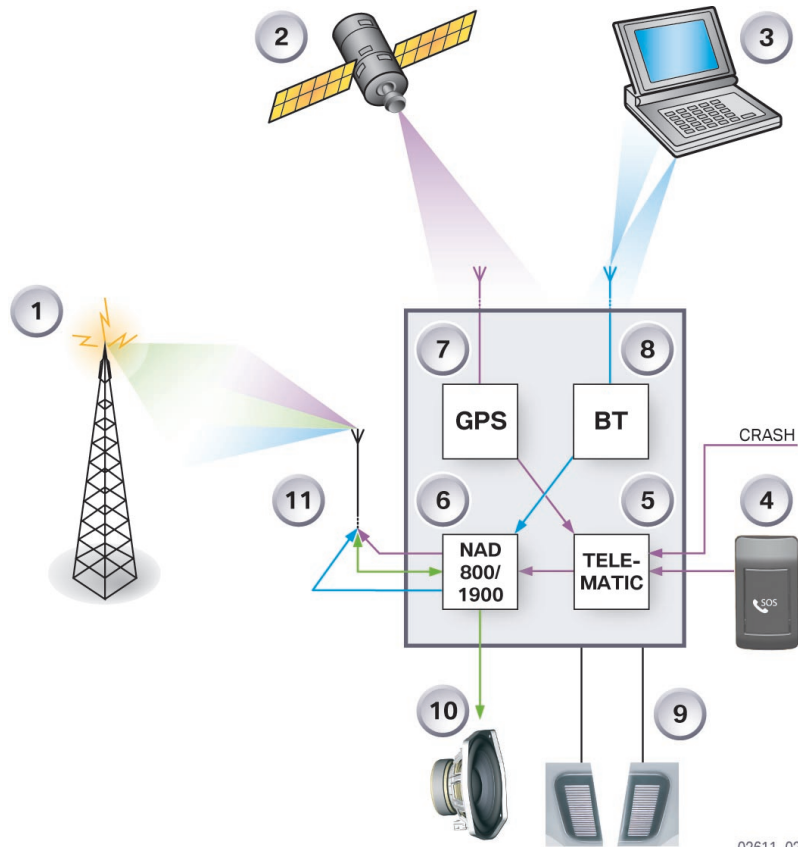
KT-11223

Fig. 53: Signal progression for Business telephone/telematics function

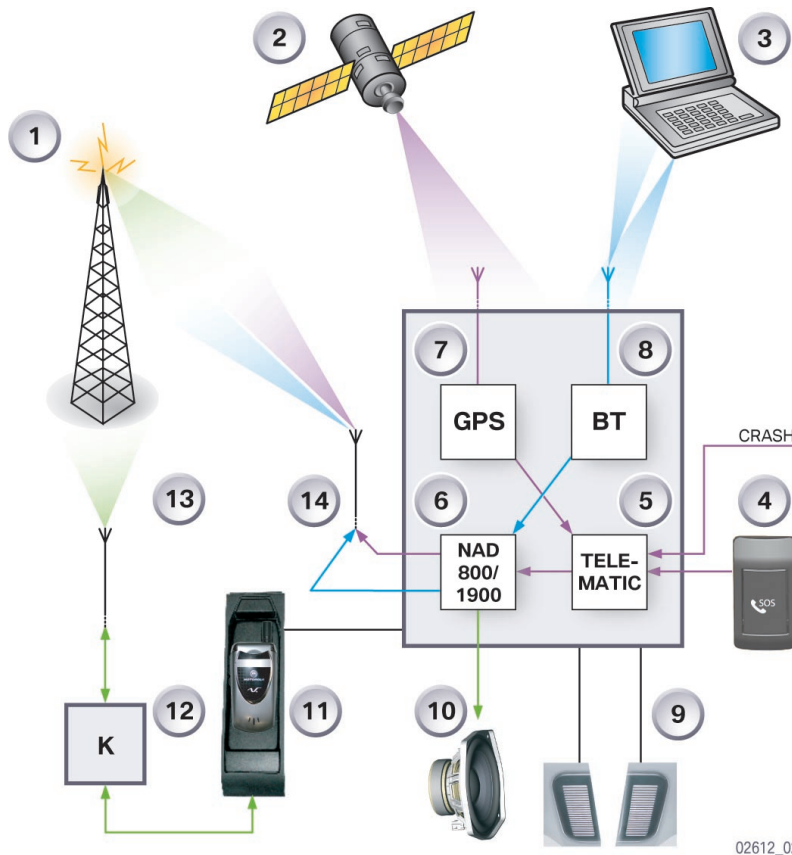| Index	Explanation	Index	Explanation
1	Transmit-receive mast	7	GPS module
2	GPS signal	8	Bluetooth module (not yet active)
3	Laptop with Bluetooth interface (not yet possible)	9	Hands-free microphone
4	Emergency call button signal	10	Output loudspeaker
5	Telematics module	11	Transmit-receive signal
6	Transceiver module		

TCU with telematics and Motorola Phoenix V60 telephone

- Eject box

- Motorola Phoenix mobile phone

- Compensator

- Telephone aerial for Motorola Phoenix V60

- Software enabling by the provider

With this retrofit equipment, the customer has the following additional functions:

- Telematics (E/B call)

- Hands-free unit

- Private mode via mobile phone when it is taken out of the eject box

- Parallel transmission of telematics and telephone functions on different bands (AMPS/CDMA)

- Telephone book function in the mobile phone

The following diagram illustrates the signal path for the telematics and telephone functions:

KT-11224

Fig. 54:   Signal progression for Professional telephone/telematics function

Index	Explanation	Index	Explanation
1	Transmit-receive mast	8	Bluetooth module (not yet active)
2	GPS signal	9	Microphone
3	Laptop with Bluetooth interface (not yet active)	10	Output loudspeaker
4	Emergency call button signal	11	Eject box with Motorola telephone
5	Telematics module	12	Compensator
6	Transceiver module	13	Transmit / receive signal for telephone
7	GPS module	14	Transmit / receive signal for telematics and modem

- Car phone prefitting for Japan

The telephone in the Japan country version in the E83 is completely the same as the Japan basic interface telephone II JBIT II, as used in the E46.

The JBIT II is not yet based on the Everest platform.

- Notes for Service

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 and key memory

No functions are available for the car and key memory.

TV system

This section describes the TV function in the E83.
The TV function option 601 is only offered in the EU version vehicles and only in connection with the Professional navigation option 609. The Professional navigation option 609 includes the central information display as TV screen.

The TV function is integrated in the video module II. Video module II is identical to the video module in the E39, E46, E53 and E85.
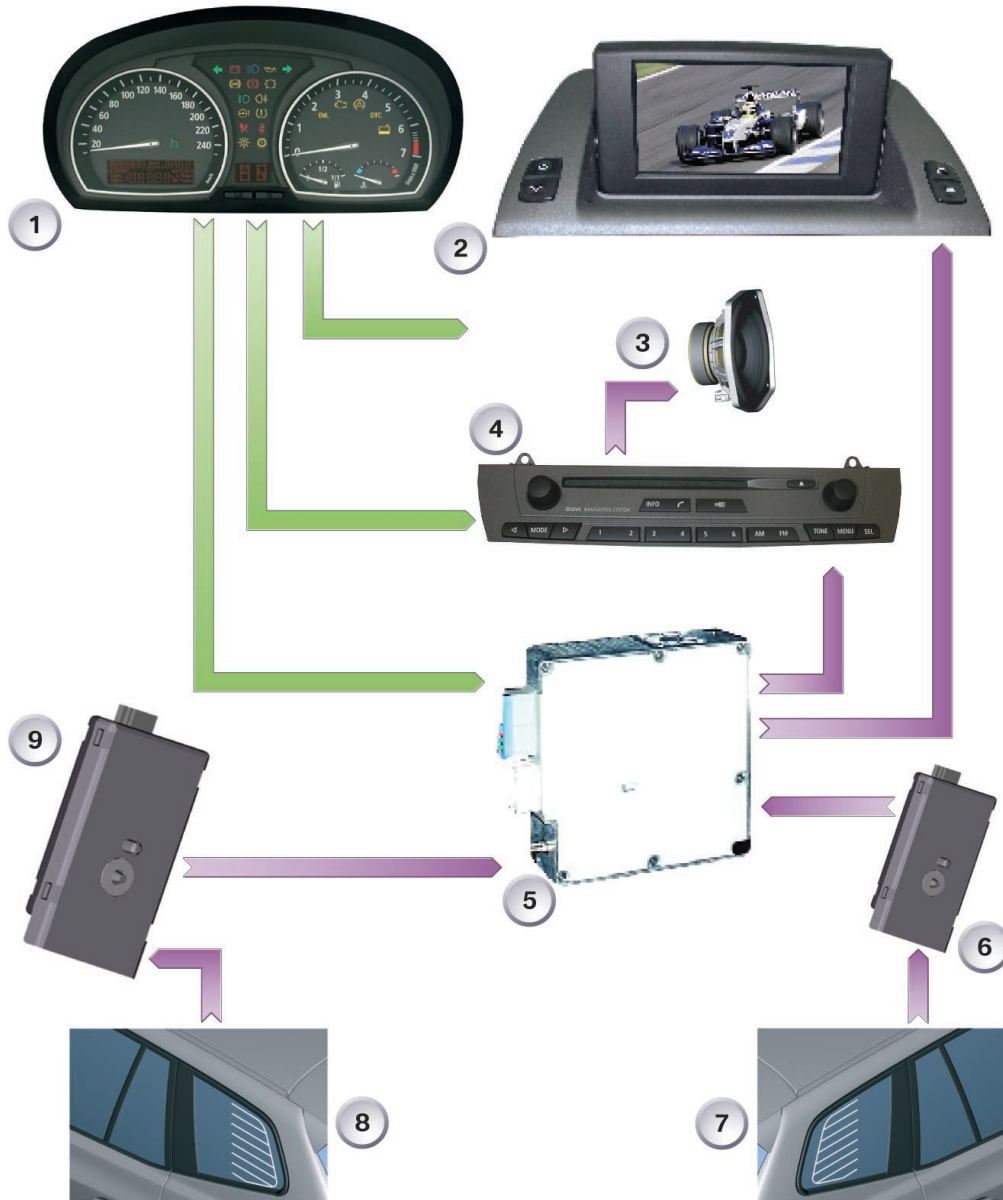The functions are also identical.

- Reference to existing documents

The following chapter describes the TV system.
The TV system is the same as the TV system in the E85.
The components and functions previously used are described in the participant's manual:

E85 Information/Communication

- EU TV system

EU system overview

Fig. 55:   TV input/output

Index	Explanation
1	Instrument cluster
2	Central information display (CID)
3	Speaker
4	CID control panel
5	Video module with aerial diversity
6	Right-hand TV amplifier
7	Right-hand TV aerial
8	Left-hand TV aerial
9	Left-hand TV amplifier

EU system circuit diagram
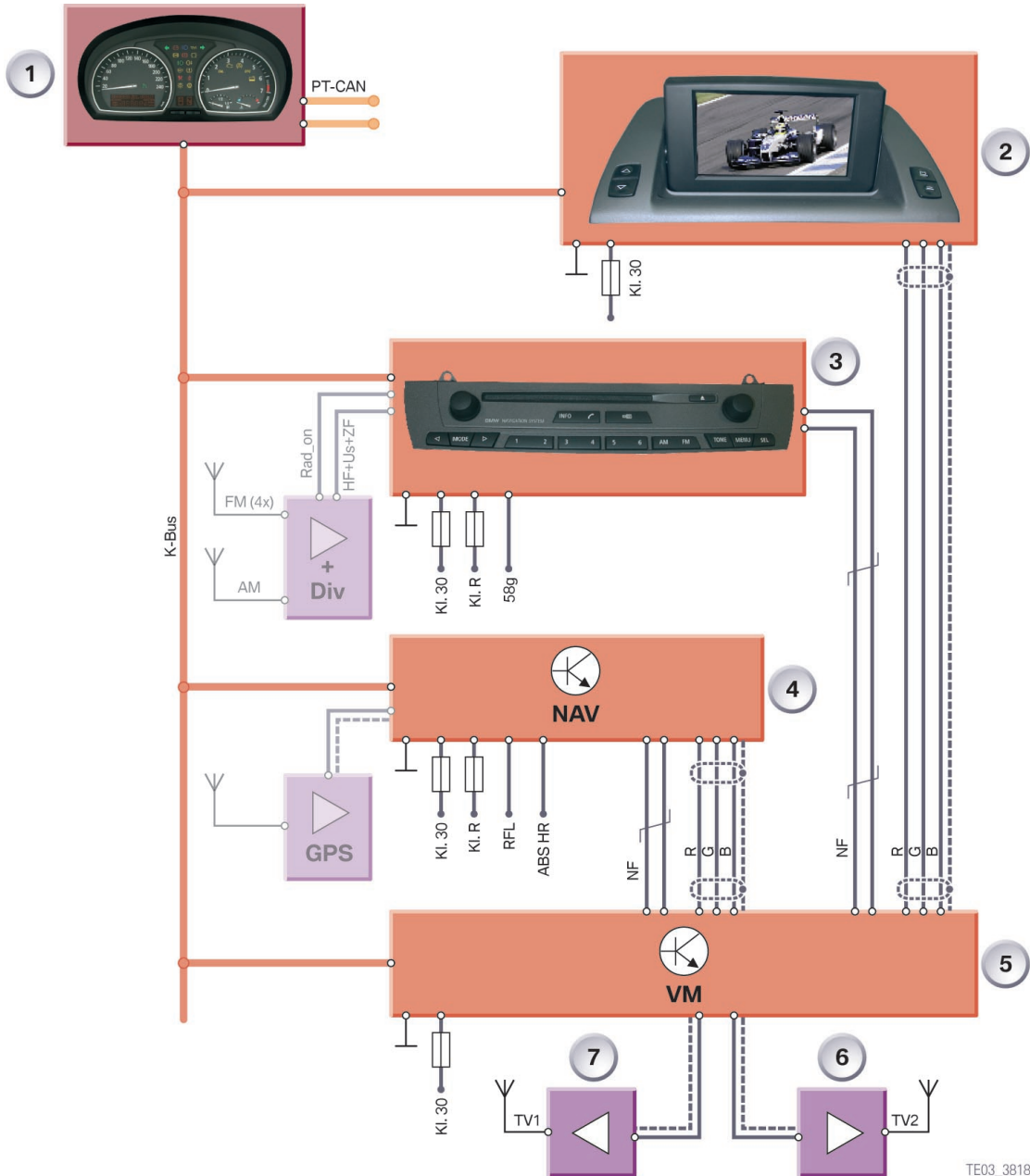
KT-12604

Fig. 56:   TV system circuit diagram

TE03_3818

Index	Explanation
1	Instrument cluster
2	Central information display (CID)
3	CID control panel
4	Navigation computer DVD
5	Video module with aerial diversity
6	Right-hand TV aerial with TV amplifier
7	Left-hand TV aerial with TV amplifier

- Components

The system consists of the following components:

- Central information display (CID)
- CID control panel
- Video module
- TV aerials (TV1 aerial and TV2 aerial)
- Left and right-hand TV amplifier

Central information display

The central information display serves as the TV screen.

KT-10631

1979_02

Fig. 57: Central information display
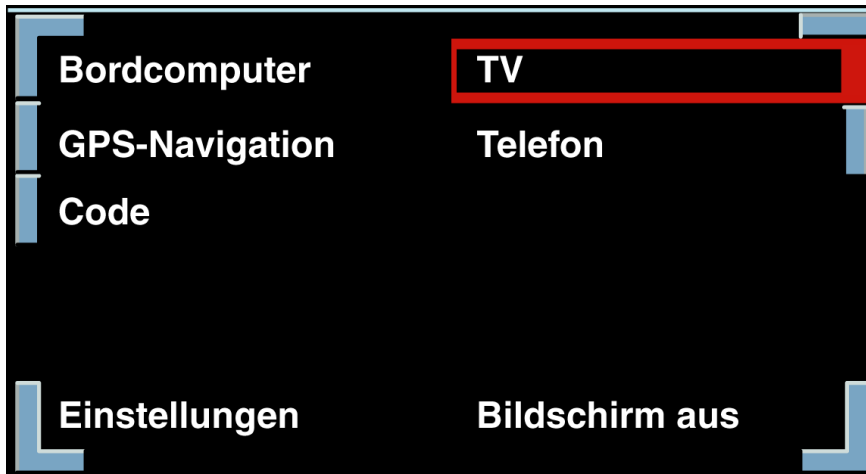
The central information display is the same as the central information display in the E85.

Functional principle

The TV function is selected via a menu item on the CID.

KT-10536

Fig. 58: Operating interface for selecting TV function

CID control panel

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

KT-10044

Fig. 59: CID control panel

Video module

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

Source changeover: Corresponding to the selection, the video module changes over between navigation presentation mode and TV function. The video module splits the received HF (high frequency) signals into the following functions:

- Audio signals: The audio signals are transferred via the AF lines to the CID control panel (radio).

- Picture data: The picture data are transferred to the central information display (via the RGB outputs).

Installation location

KT-12502

Fig. 60:   Installation location of the video module (item 3)

- 113 -

Index	Explanation
1	Top-HiFi amplifier (is also the installation location of the HiFi amplifier)
2	Navigation computer DVD
3	Video module TV
4	Universal charging and hands-free control unit (also the installation location of the TCU)

TV aerials

The TV amplifiers for both aerials are supplied with voltage from the video module via an external feed. An aerial diversity module is located in the video module which switches to the aerial with the best signal. The TV module is designed to be operated when the vehicle is stationary.
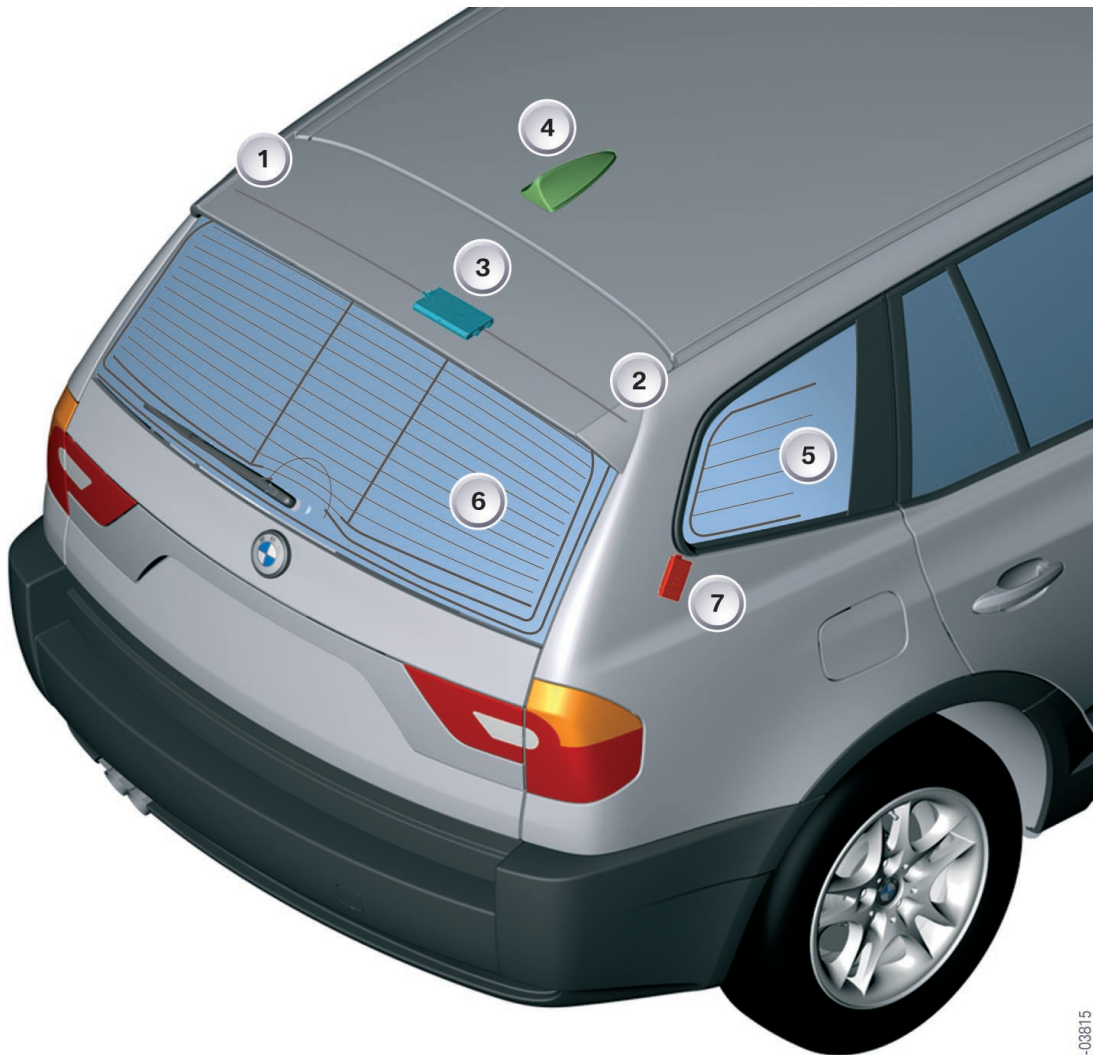
KT-12598

Fig. 61:   FM, AM and TV aerials

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Index	Explanation
1	AM aerial
2	FM aerial 4
3	Aerial amplifier with aerial diversity module
4	Roof-mounted aerial for telephone, navigation system, digital radio (US)
5	TV aerial in the right-hand side window (left-hand side not visible)
6	Heated rear window with built-in FM aerials 1 - 3
7	TV amplifier (left-hand side not visible)

- Notes for Service

Diagnosis

Diagnosis of the TV system comprises two areas, i.e. the video module and the central information display for display functions. The diagnosis for the central information display is described in the "Radio" chapter.

Diagnosis of the video module comprises the following functions:

- Read identification

- Read fault code memory

- Delete fault code memory

- Diagnosis query, e.g. rotary push button

Coding

Coding in the TV system comprises the following function:

- New coding of a video module

Navigation systems

The two navigation systems fitted on the E83 are described in this section.
Note:
The function and operation of the navigation systems completely correspond to the E85 navigation systems.

The following navigation systems are offered for the E83:

- Business navigation option 606 (BMW Multi-information Radio MIR)

- Professional navigation option 609 (BMW Central Information Display radio with CD or MD drive)

- Features of the system

- Map display or arrow display

- Europe or USA on DVD

- Data on CD or DVD (backward compatible with the MK-3 system)

- Reference to existing documents
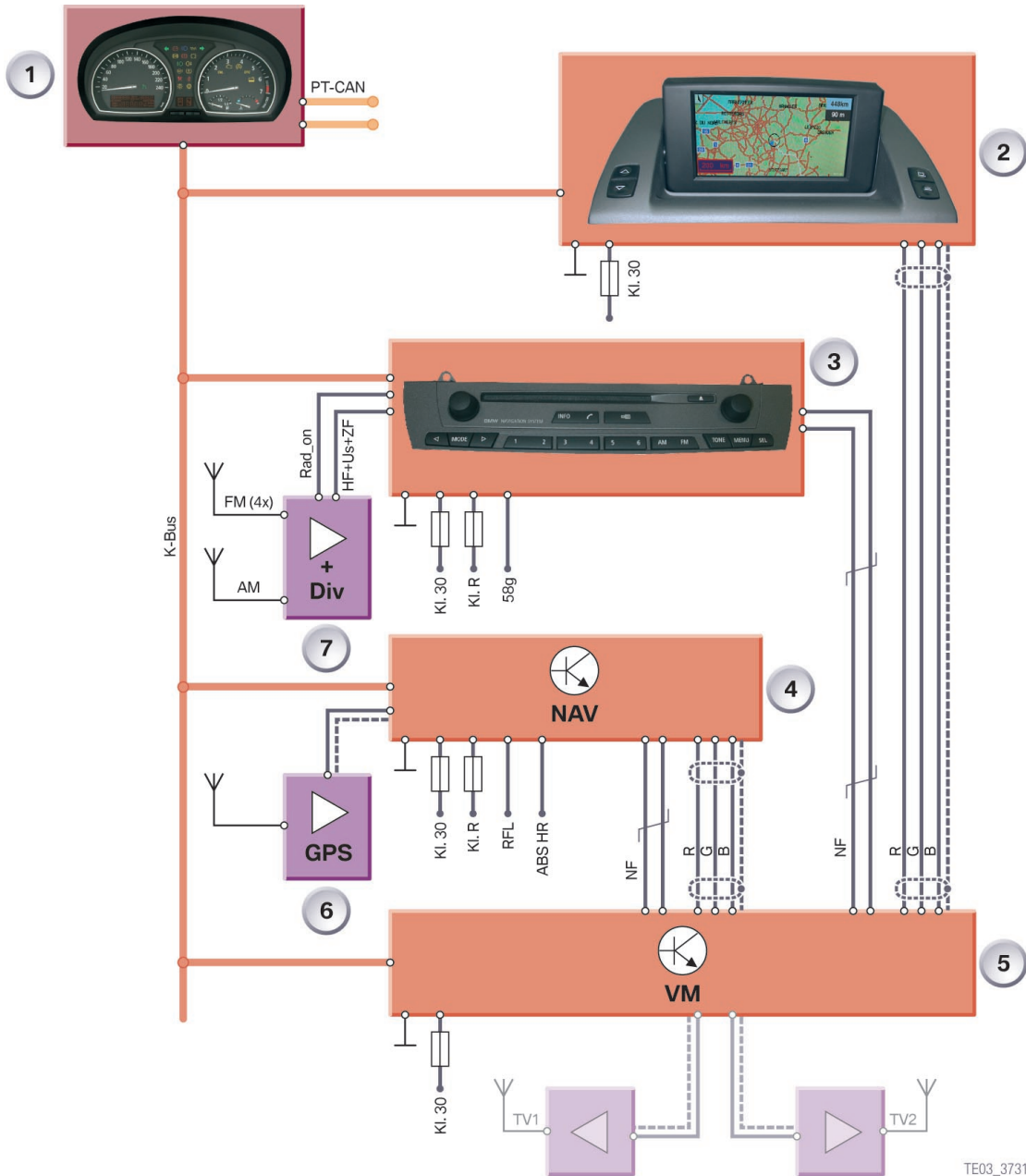
The following document gives an overview of the systems used in the E83. The components and functions used are described in detail in the participant's manual:

E85 Information/Communication

- Professional navigation

EU system circuit diagram with VM

KT-12480 TE03_3731

Fig. 62:   Professional navigation (option 609) with video module (option 601) system circuit
diagram

Index	Explanation
1	Instrument cluster
2	Central information display
3	CID control panel
4	Navigation computer DVD
5	Video module TV (with TV aerial and TV amplifier)
6	GPS aerial
7	Aerials with AM/FM preamplifier and FM aerial diversity

EU system circuit diagram without VM
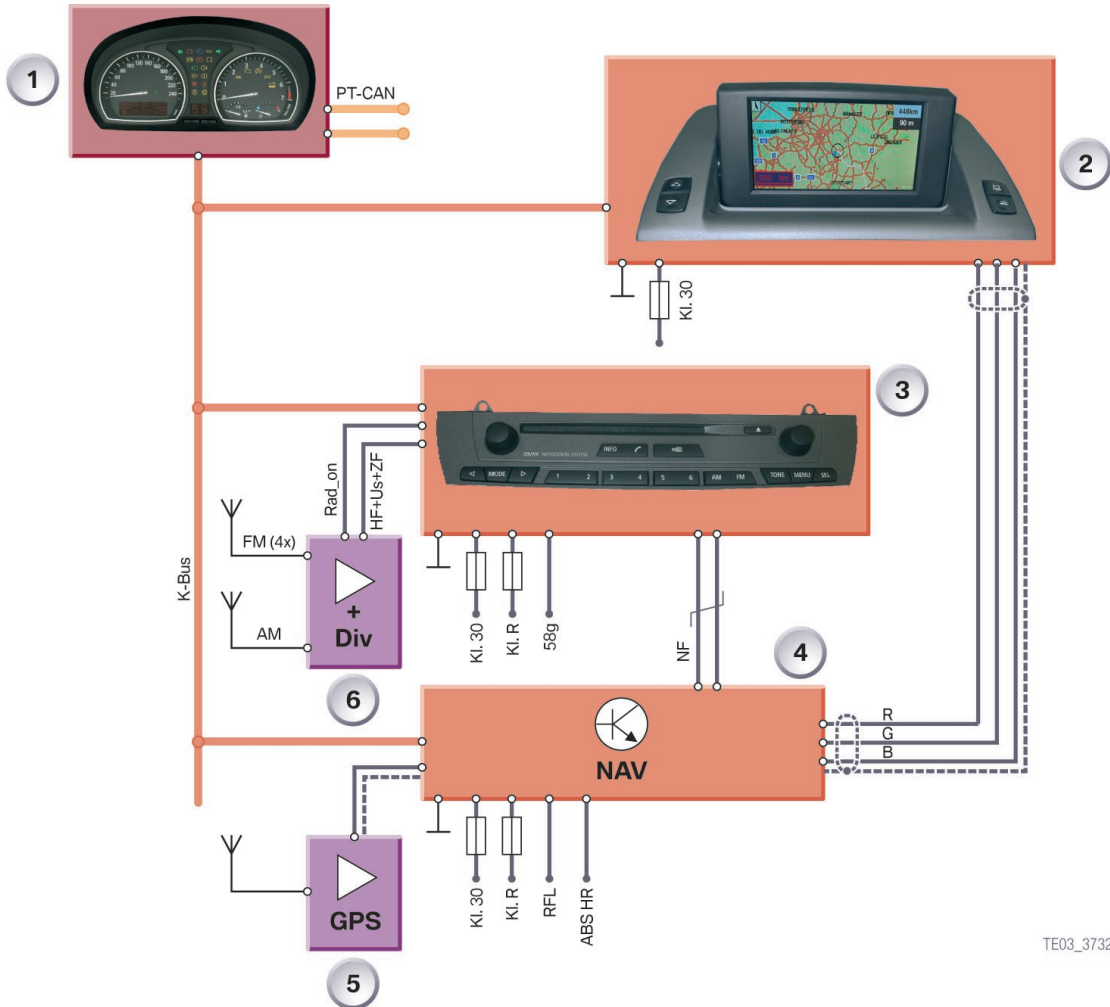
KT-12479

Fig. 63: System circuit diagram Professional navigation system (option 609)

Index	Explanation
1	Instrument cluster
2	Central information display
3	CID control panel
4	Navigation computer DVD
5	GPS aerial
6	Aerials with AM/FM preamplifier and FM aerial diversity

- Radio navigation EU

System circuit diagram
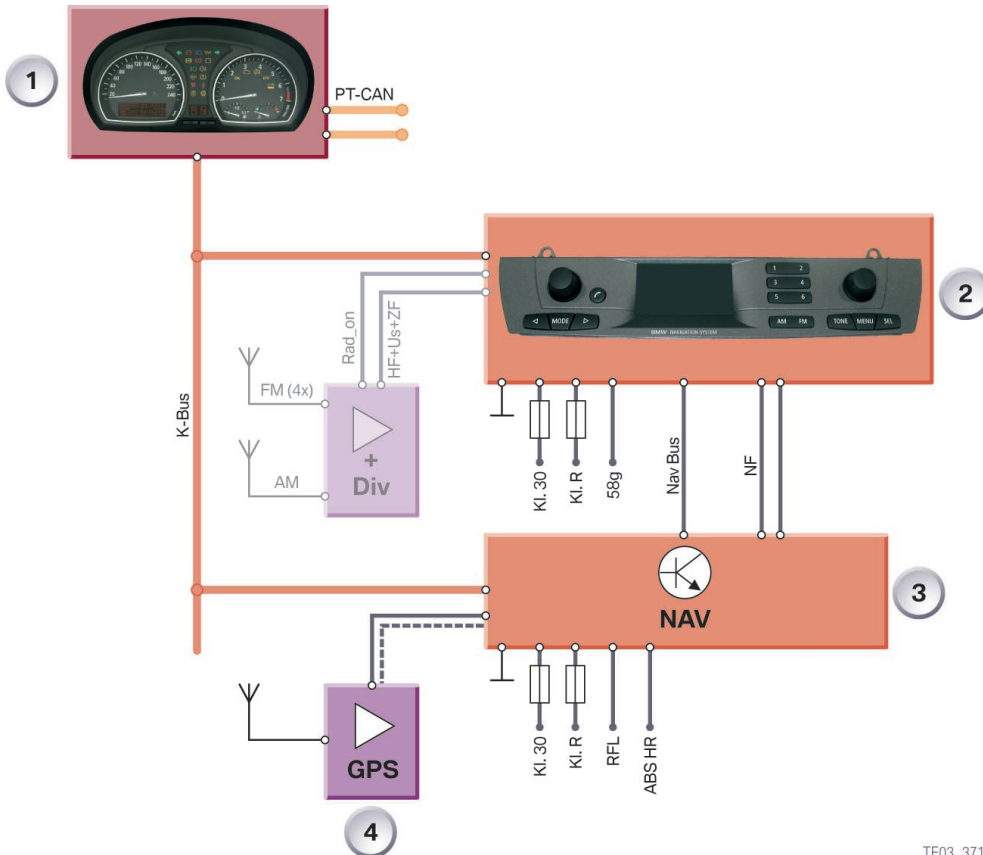
KT-12478

TE03_3713

Fig. 64:   Business navigation (option 606) system circuit diagram

Index	Explanation
1	Instrument cluster
2	Radio BMW Multi-information Radio (MIR) display for arrow display
3	Navigation computer DVD
4	GPS aerial

- Components

The High navigation system consists of the 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 the following components:

- Multi-information radio MIR

- Navigation computer DVD

- GPS aerial

- Wheel speed sensor

- Reversing light switch

Central information display CID

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.

Installation location

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

KT-10603

Fig. 65:   Navigation display in central information display

CID control panel

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.

KT-10044

Fig. 66: CID control panel

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

- Processor for 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

KT-10496   1909 02
Fig. 67:   Navigation computer DVD

Installation location

The navigation computer is found in the rear left of the luggage compartment.
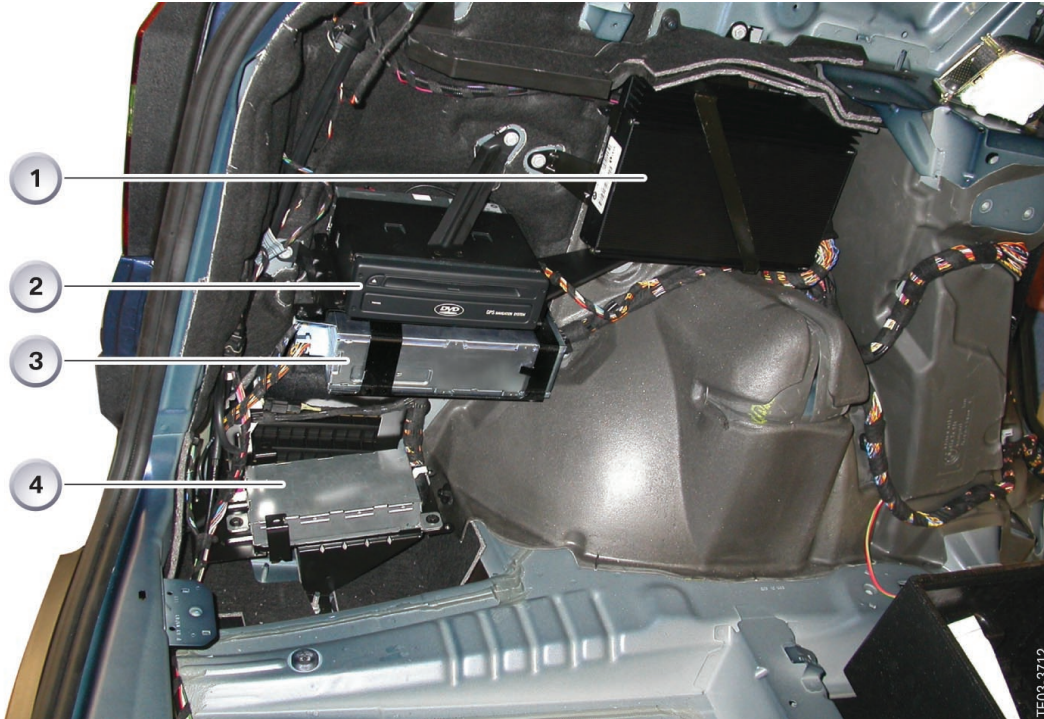
KT-12502

Fig. 68:   Installation location of navigation computer DVD

Index	Explanation
1	Top-HiFi amplifier (is also the installation location of the HiFi amplifier)
2	Navigation computer DVD
3	Video module TV
4	Universal charging and hands-free electronics control unit (ULF)

Functional principle

- Position data (degrees of longitude, degrees of latitude) from global positioning system (satellites) for determining the position before starting off

- Wheel speed for measuring the distance covered

- Reverse gear signal for determining direction

- Digitized road map

- Yaw rate sensor for calculating position while driving

The following navigation aids are provided:

- Display of current position on the screen

- Display of calculated route in the form of a white course up to the destination

- Direction arrows serving as orientation of the further course of the route

- Distance data up to the next change in direction (turn-off)

- Additional voice information giving further directions

- Distance to destination

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.

Installation location

The GPS aerial is integrated in the roof aerial.
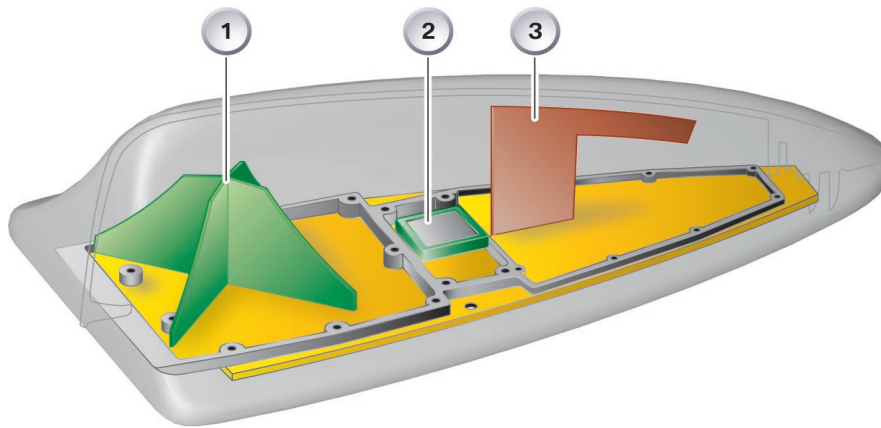
KT-12560

Fig. 69: Roof-mounted aerial design

Index	Explanation
1	SDARS aerials (terrestrial and satellite); only US
2	GPS navigation aerial
3	Multiband aerial AMPS/CDMA aerial

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.

Installation location

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

Reversing light switch

The navigation system detects whether reverse gear is selected via the reversing-light switch. The distance travelled can then be considered via the wheel-speed sensor in accordance with the direction vector.

Installation location

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

In the EU version, the video module is linked to High navigation option 609. The video module is only relevant to the TV function and is not necessary for the navigation system. 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.

Installation location

The navigation computer is found in the rear left of the luggage compartment.

KT-12502

Fig. 70: Installation location video module (position 3)

Index	Explanation
1	Top-HiFi amplifier (is also the installation location of the HiFi amplifier)
2	Navigation computer DVD
3	Video module TV
4	Universal charging and hands-free electronics control unit (ULF)

Multi-information radio MIR

The multi-information radio incorporates the functions for operation and display of the radio navigation system.
Traffic control comprises arrow presentations and distance data in the display as well as voice information. The functions and controls are identical to those of the E85/46.

Fig. 71:   BMW multi-information radio MIR

- US country- specific version

Introduction

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

- There is no radio navigation system

- There is no link with the TV function option 601 as a TV function is not permitted in vehicles 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 circuit diagram US
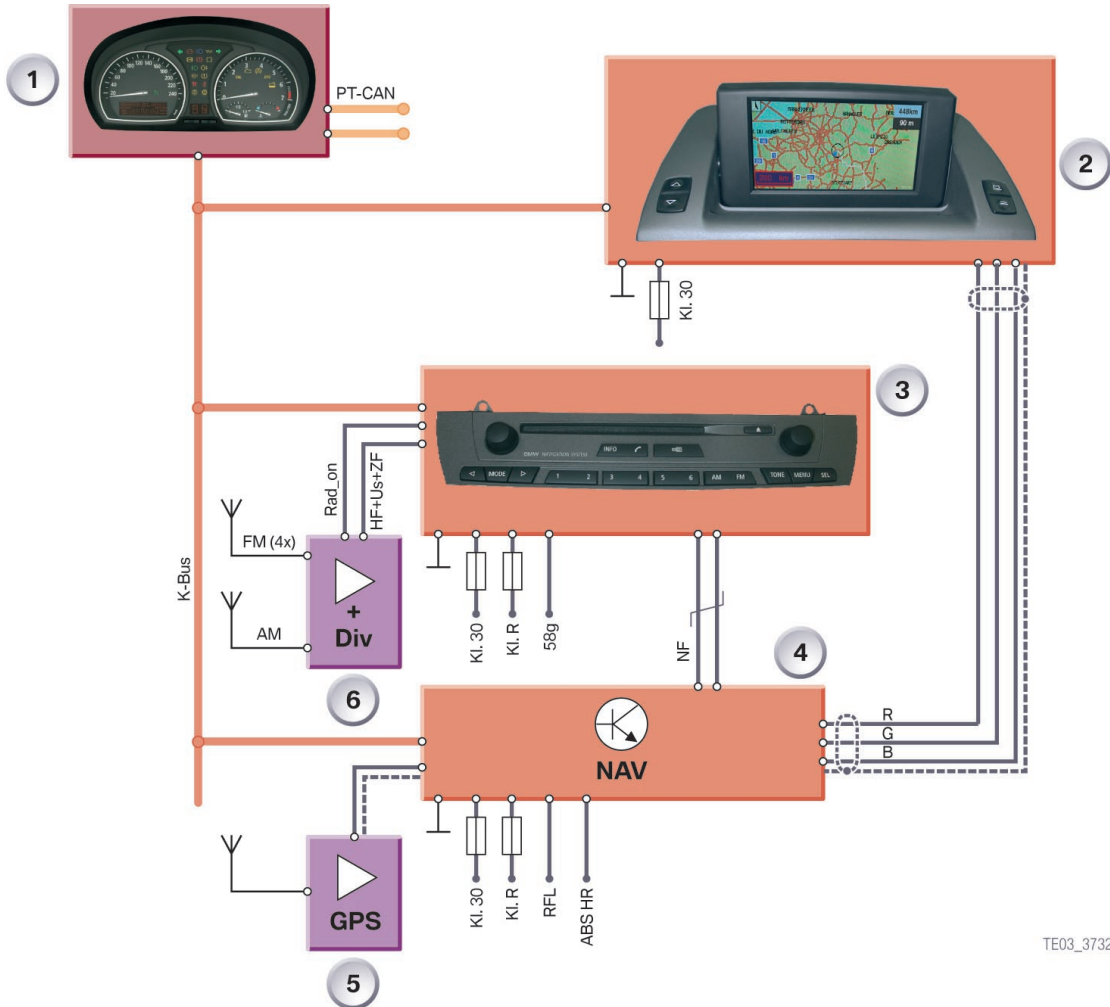
KT-12479

Fig. 72:   Professional navigation system system circuit diagram

Index	Explanation
1	Instrument cluster
2	Central information display
3	CID control panel
4	Navigation computer DVD
5	GPS aerial
6	Aerials with AM/FM preamplifier and FM aerial diversity

- Notes for Service

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.

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 status	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	E83
		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
		Signing off	OFF

Descriptions for service mode

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

No diagnosis packages are available for the car and key memory.