# Participant's Manual
## IKT E90

BMW Service

**Aftersales Training**

The information contained in this Participant's Manual is intended solely for the participants of this seminar run by BMW Aftersales Training.

Refer to the latest relevant "BMW Service" information for any changes/supplements to the Technical Data.

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# Participant's Manual
## IKT E90

## Audio systems

## Navigation and TV systems

## Telephone systems

## Voice recognition systems

# Information on this Participant's Manual

### Symbols used

The following symbols are used in this Participant's Manual to facilitate better comprehension and to draw attention to important information.

⚠ contains information for better understanding of the described systems and their functions.

◄ identifies the end of an item of information.

### Current content of Participant's Manual

In view of the constant further developments in the design and equipment of BMW vehicles deviations may arise between this Participant's Manual and the vehicles made available as part of the training course.

The background material refers exclusively to left-hand drive vehicles. The controls are in part arranged differently in right-hand drive vehicles than shown on the graphics in the Participant's Manual.

### Additional information sources

You will find further information on the individual vehicle topic in the BMW diagnosis and repair systems as well as on the Internet under www.bmw.com.

# Contents
## IKT





# Objectives
## IKT

## Guide for training, Reference work for everyday practice

This Participant's Manual is designed to inform you about the information and communication technology in the new BMW 3 Series (E90). It deals with the following topics:

- Audio systems
- Navigation systems
- TV system
- Telephone systems
- Voice recognition systems

This document is intended to convey a fundamental understanding of the system. That purpose is served by the input/output diagrams and system circuit diagrams used. The layout of the circuit diagrams is such that components with the same or similar function are positioned in the same place. They are therefore also assigned identical item numbers. This may result in gaps in the numbering depending on the specific variant.

This procedure is intended to facilitate effective comparison of the diagrams and to achieve the targeted level of understanding and comprehension of the system.

This manual is intended as an accompaniment to training and complements the course content specified by BMW Aftersales Training. It is suitable for individual study and as a reference work.
As a preparation for the technical training course and in conjunction with the practical exercises in the training course, it is intended to enable course participants to carry out servicing operations involving information and communication technology on the new BMW 3 Series.

An existing technical and practical knowledge of the BMW 1 Series (E87), BMW 5 Series (E60) or BMW 7 Series (E65) models will assist with the understanding of the systems presented in this manual and their functions.

TE04-5832

Don't forget to work through the training and information programme (SIP) on this topic.
Basic knowledge creates confidence in learning and practical situations.

# Introduction
## IKT

## Information and communication technology

Information and communication technology (IKT) comprises systems that inform or entertain the driver and passengers. Corresponding to the equipment configuration, the IKT also serves the purpose of making available servicing-relevant data and sending messages in the case of emergency.

For the first time in this vehicle class, a fibre optics-based bus is used for data transmission in information and communication applications (IKT). This bus is the so-called MOST (Media Orientated Systems Transport) bus as already used on the E65, E60 and E87.

### Audio systems

Radios combined with CD or MD players are offered. There are also DVD navigation systems which, in addition to navigation, also feature radio, CD and amplifier functions.

The radios and navigation systems can be enhanced with more powerful audio amplifier and speaker systems.

The following new features have been introduced:

- New 'Professional' radio with MOST capabilities
- Additional audio input for external devices
- Playback of MP3 files

### Navigation systems

The two navigation system options, 'Business' and 'Professional', are already familiar from the E60.

This section will deal with the navigation display and system connection.

### TV system

The hybrid video module enables the reception of terrestrial analogue and digital television signals. It replaces the combination of Video Module 5 and set-top box.

### Telephone systems

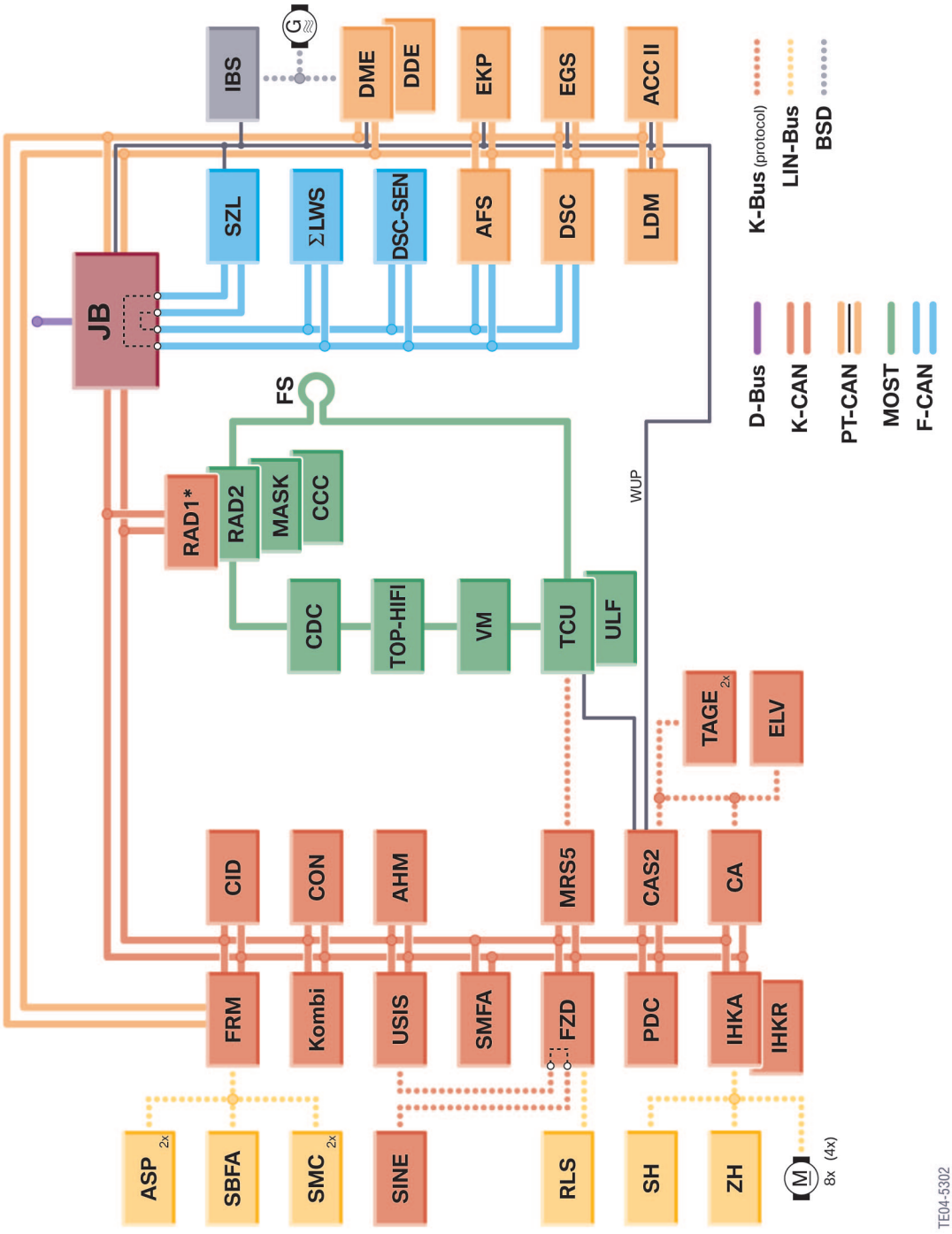
A new feature introduced on the BMW 3 Series is the option SA633, "Business mobile phone station", for cars with MOST bus. This telephone system allows owners to integrate a supported Bluetooth-compatible mobile phone in the vehicle's systems. Regardless of the presence of the owner's mobile phone, the Telematic, TeleService and online functions (e.g. automatic emergency call, BMW Assist and e-mail) remain available.

### Voice recognition systems

The two voice recognition system options are also familiar from the E60 and E87. The basic version supports control of the telephone and notebook by means of voice commands. In the expanded version, many of the functions that can be selected in the CID via the iDrive can be controlled with voice commands.

# System overview
## IKT

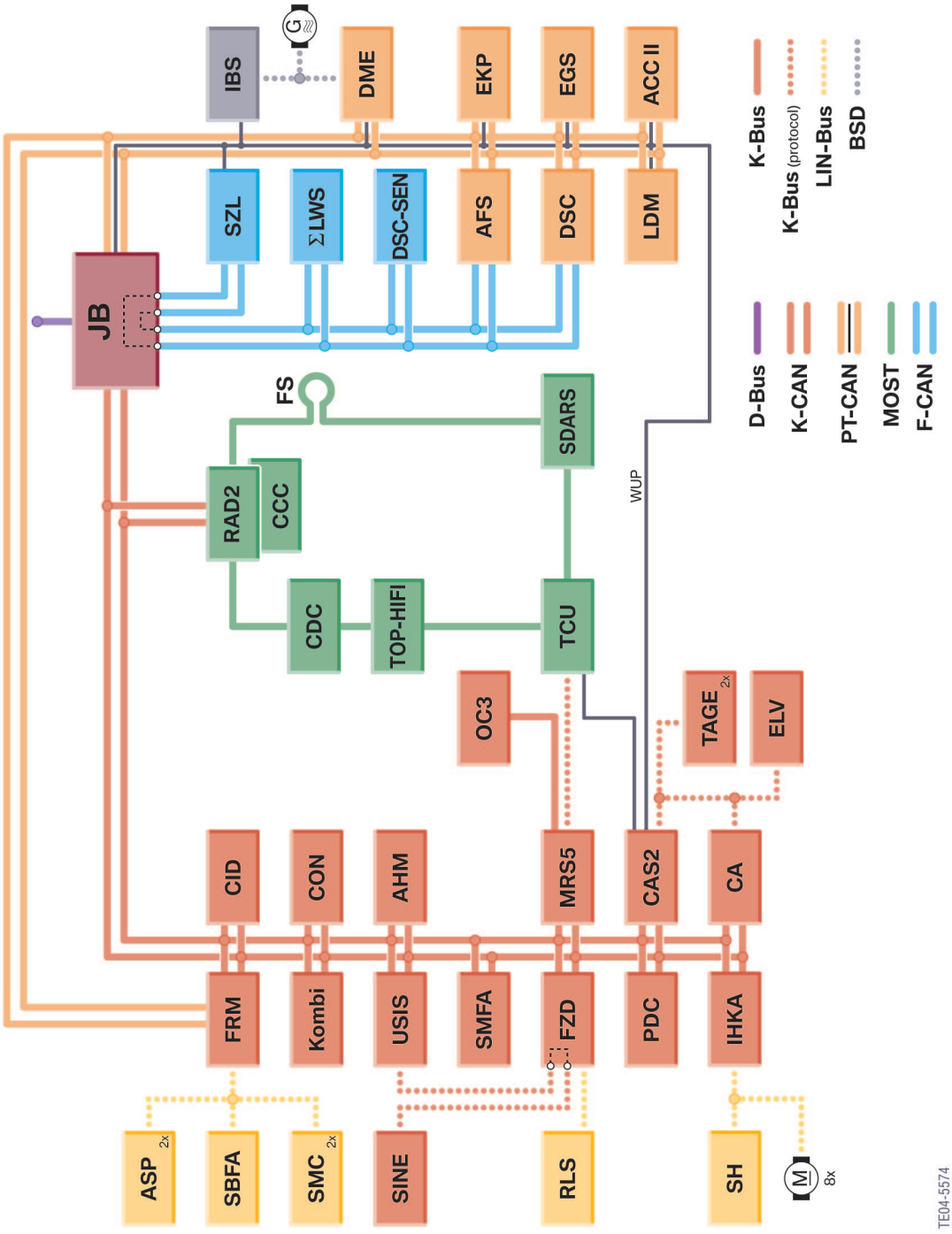
### Bus overview




1 - E90 bus overview (main and sub-busses), European version

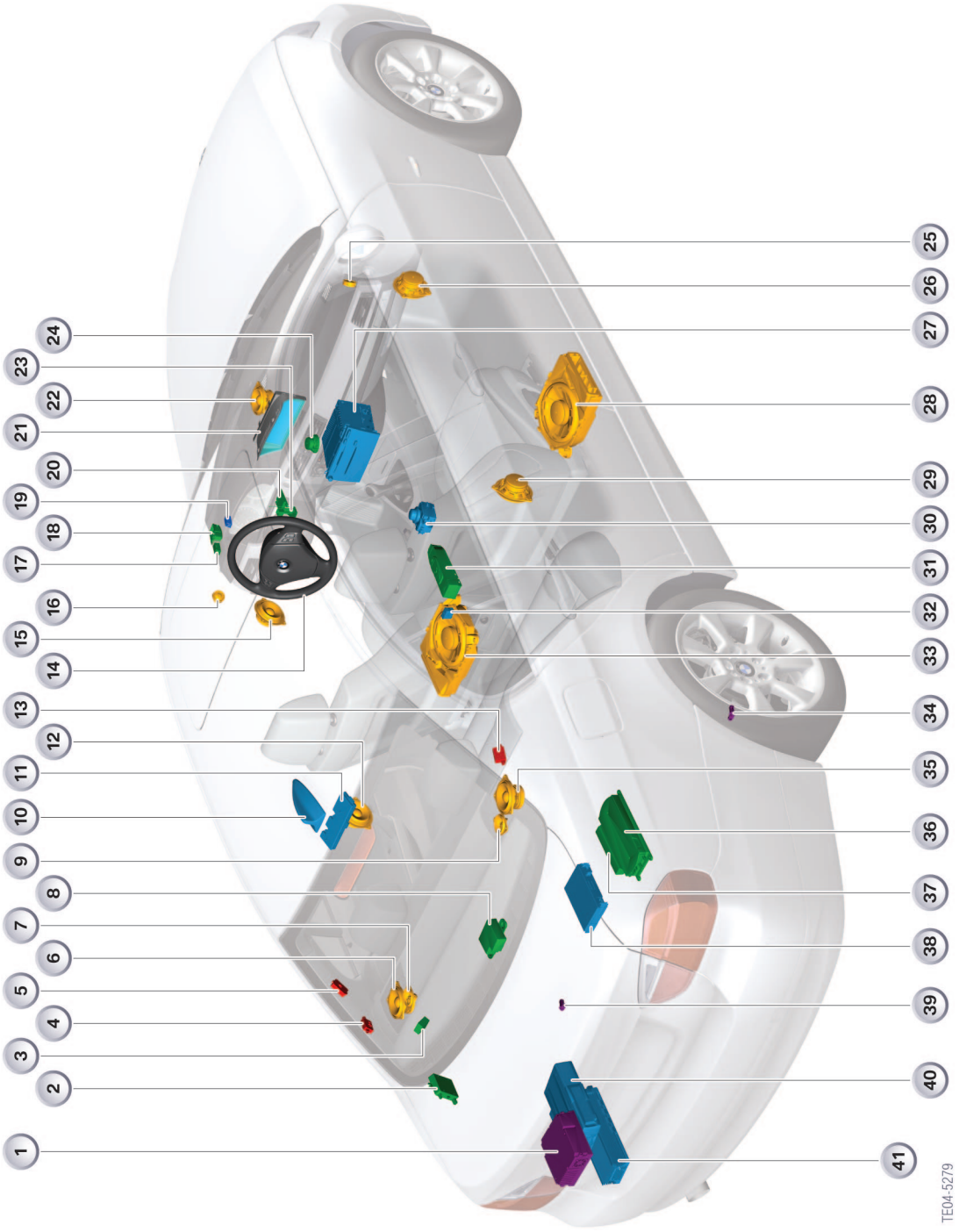
Table of control units for bus overviews for European and US versions

| Index | Explanation | Index | Explanation |
|---|---|---|---|
| JB | Junction box control unit | TOP-HIFI | Top-HiFi amplifier (Logic 7) |
| FRM | Footwell module | VM | Video module |
| CID | Central information display | TCU | Telematic control unit |
| CON | Controller | ULF | Universal charging and hands-free facility |
| KOMBI | Instrument cluster | FS | MOST direct access |
| IHKA | Integrated heating and air conditioning control | ASP | Outside mirrors |
| IHKR | Integrated heating and air conditioning control | SMC | Stepper motor controller |
| ZH | Electric auxiliary heater based on PTC principle (diesel models only) | SBFA | Driver's door switch cluster |
| SH | Independent heating | IBS | Intelligent battery sensor |
| USIS | Ultrasonic passenger-compartment sensor | SZL/ LWS | Steering column switch cluster/ Steering-angle sensor |
| AHM | Trailer module | DSC-SEN | DSC Sensor |
| SMFA | Driver's seat module | DSC | Dynamic stability control |
| FZD | Roof function centre | LDM | Linear Dynamics Management |
| SINE | Emergency-power horn with integral tilt sensor | DME | Digital engine management module |
| RLS | Rain/low beam sensor | DDE | Digital diesel electronics |
| MRS5 | Multiple restraint system 5 | EKP | Control unit for electric fuel pump |
| CA | Comfort Access | EGS | Electronic transmission control unit |
| ELV | Electric steering lock | ACC II | Active Cruise Control 2 |
| TAGE | Exterior door handle module | WUP | Wake-up line |
| PDC | Park distance control | D-Bus | Diagnosis bus |
| CAS2 | Car Access System 2 | K-CAN | Body CAN |
| RAD1* | Radio 1 ('Business CD' radio) | PT-CAN | Powertrain CAN |
| RAD2 | Radio 2 ('Professional' radio) | MOST | Media oriented system transport |
| MASK | Multi-audio system controller | F-CAN | Suspension/chassis CAN |
| CCC | Car communication computer | K-Bus | Body bus (protocol) |
| CDC | CD changer | LIN-Bus | Local interconnect network bus |



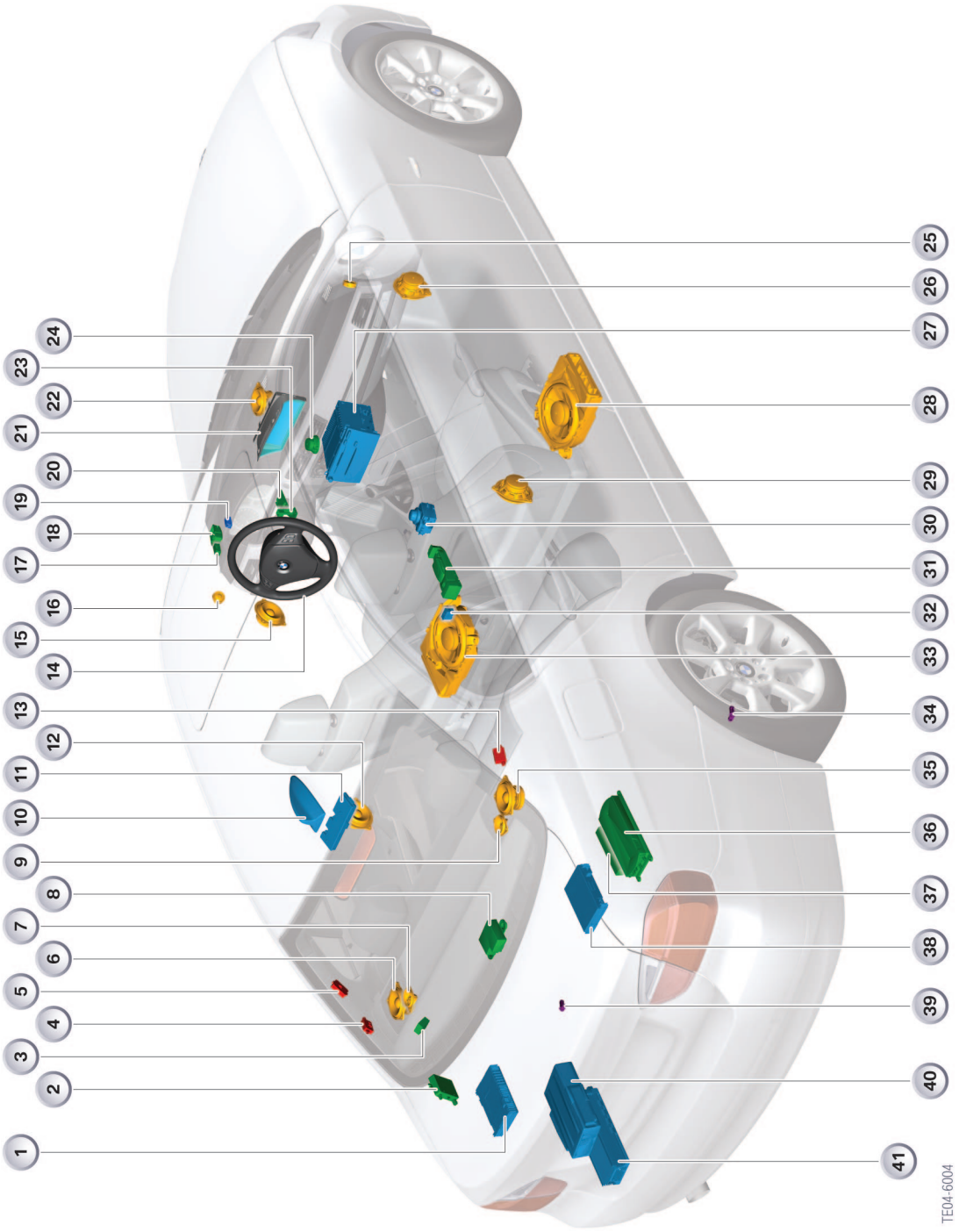

2 - E90 bus overview (main and sub-busses), US version

# Locations




3 - Locations of IKT components, European version

| Index | Explanation | Index | Explanation |
|---|---|---|---|
| 1 | Hybrid video module (EURO) or SDARS satellite tuner (US) | 22 | Mid-range speaker, front centre |
| 2 | Line compensator (optional) | 23 | MOST direct access |
| 3 | Fibre-optic connector | 24 | Emergency speaker (only in connection with TCU) |
| 4 | Lockout circuit, left, for rear window heater | 25 | Tweeter, front right |
| 5 | Suppression filter for third brake light | 26 | Broadband or mid-range speaker, front right |
| 6 | Broadband or mid-range speaker, rear left | 27 | Radio or navigation system |
| 7 | Tweeter, rear left | 28 | Central bass speaker, right |
| 8 | Emergency aerial (only in conjunction with TCU) | 29 | Mid-range speaker, right rear door |
| 9 | Tweeter, rear right | 30 | Controller |
| 10 | Roof aerial (satellite tuner, GPS, telephone) | 31 | Telephone with snap-in adapter |
| 11 | Antenna amplifier with diversity module | 32 | Audio jack (AUX-In) |
| 12 | Mid-range speaker, left rear door | 33 | Central bass speaker, left |
| 13 | Lockout circuit, right, for rear window heater | 34 | Wheel speed sensor, right rear wheel arch |
| 14 | Multifunction steering wheel (MFL) | 35 | Broadband or mid-range speaker, rear right |
| 15 | Broadband or mid-range speaker, front left | 36 | Universal charging and hands-free kit (ULF) or telematic control unit (TCU) |
| 16 | Tweeter, front left | 37 | Emergency call battery (not currently fitted) |
| 17 | Microphone, driver's side (telephone) | 38 | DAB tuner (EURO) or IBOC tuner (US) |
| 18 | Emergency call button (only in connection with TCU) | 39 | Wheel speed sensor, left rear wheel arch |
| 19 | Microphone, passenger's side (voice recognition system) | 40 | CD changer (CDC) |
| 20 | Bluetooth antenna | 41 | Audio amplifier (HiFi or Top-HiFi) |
| 21 | Central information display (CID) | | |




4 - Locations of IKT components, US version

# Contents
## Audio systems





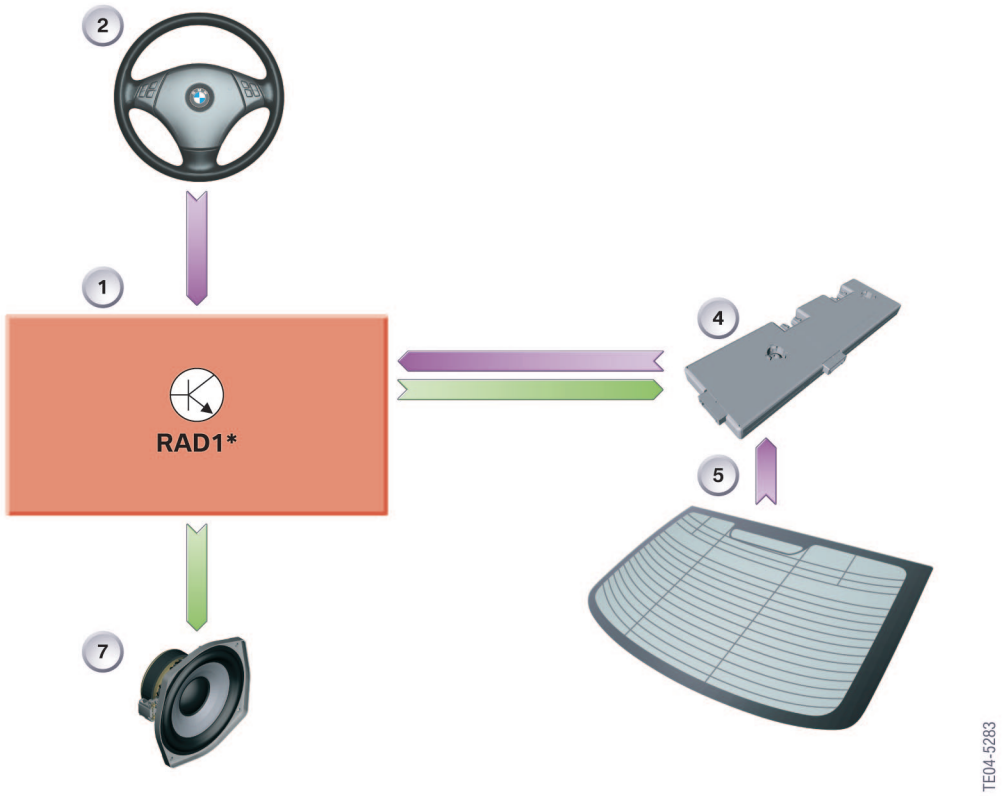




# System overview
## Audio systems

## Stereo system

### Input/Output




1 - Stereo system with 'Business CD' radio

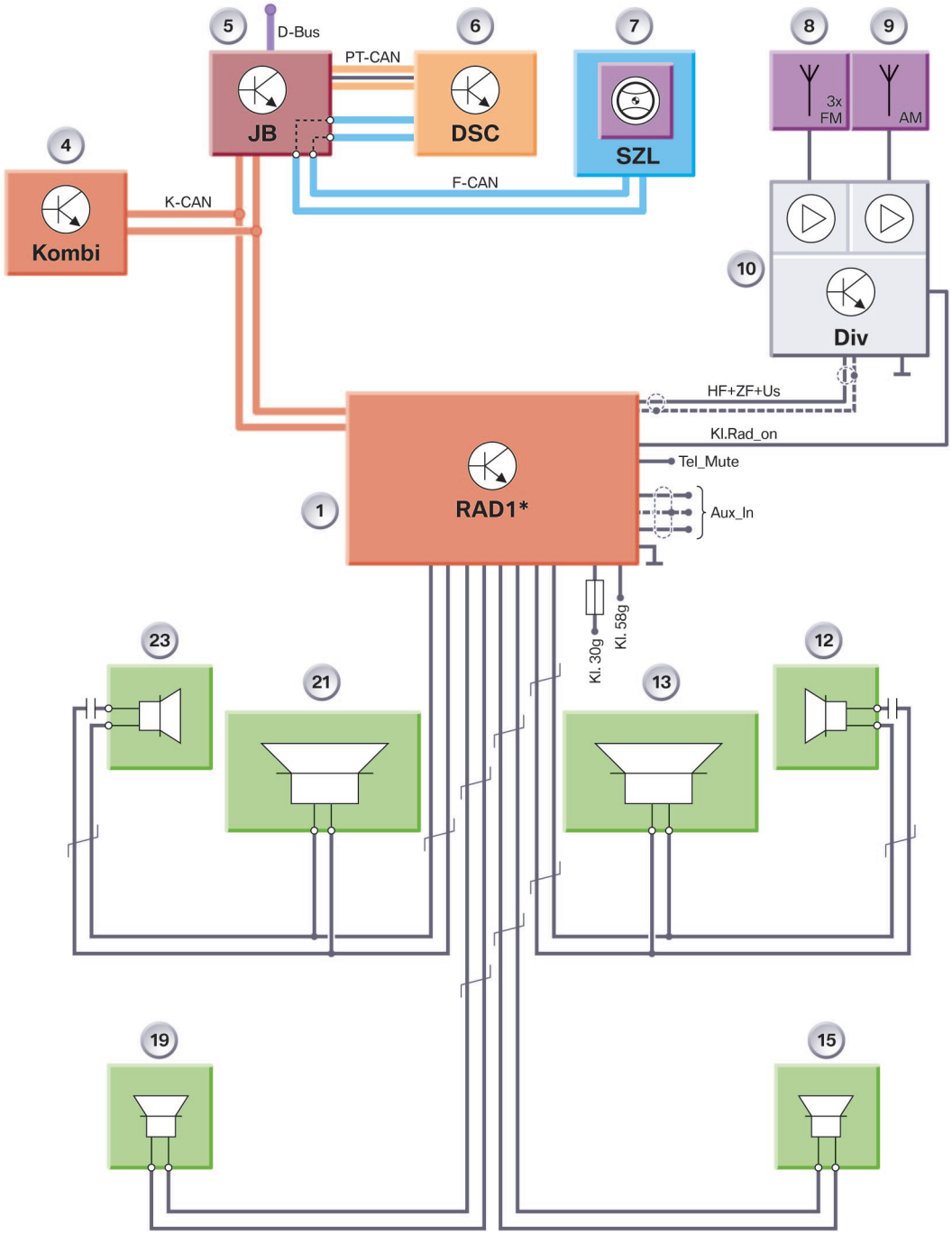
| Index | Explanation | Index | Explanation |
|---|---|---|---|
| 1 | 'Business CD' radio | 5 | Rear-window aerials (AM, FM1, FM2, FM3) |
| 2 | Multifunction steering wheel (MFL) | 6 | Audio speaker |
| 4 | Aerial amplifier with diversity module | | |

The input/output diagram also applies to:

- 'Professional' radio (RAD2)
- 'Business' navigation system (M-ASK with Controller and CID)
- 'Professional' navigation system (CCC with Controller and CID)

⚠ On the US version, the 'Professional' radio (RAD2) and the 'Professional' navigation system (CCC) are offered. ◄

## System circuit diagram

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2 - Stereo system with 'Business CD' radio

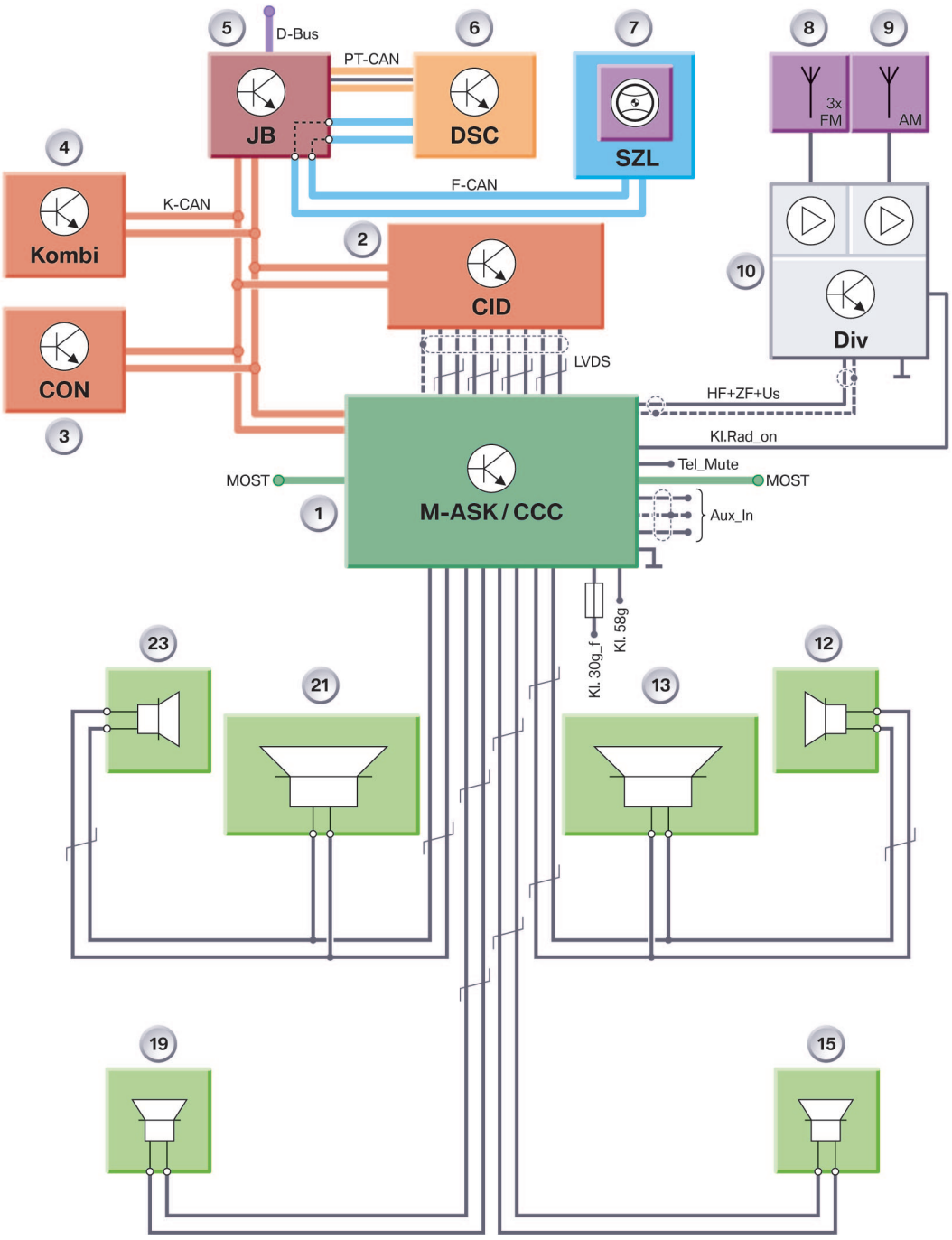
| Index | Explanation | Index | Explanation |
|---|---|---|---|
| 1 | 'Business CD' radio | 10 | Aerial amplifier with Diversity module |
| 4 | Instrument cluster | 12 | Broadband speaker, front right |
| 5 | Junction box control unit | 13 | Central bass speaker, right |
| 6 | Dynamic stability control | 15 | Broadband speaker, rear right |
| 7 | Steering column switch cluster | 19 | Broadband speaker, rear left |
| 8 | FM1, FM2 and FM3 aerials | 21 | Central bass speaker, left |
| 9 | AM aerial | 23 | Broadband speaker, front left |
| Aux_In | Audio input for additional audio sources | HF | High frequency signal |
| Tel_ Mute | Radio muting during telephone operation | ZF | Intermediate frequency signal |
| Kl. Rad_on | Control signal or power supply | Us | Changeover voltage, AM/FM antenna diversity mode |

The system circuit diagram also applies to the 'Professional' radio (RAD2).

The Aux_In audio input is not used with the 'Business CD' radio (RAD1*).

A capacitor is connected in series with each of the front broadband speakers in order to protect the audio output stages of the 'Business CD' radio and 'Professional' radio from being overloaded by the speakers, which are connected in parallel. The capacitor for alternating current is a resistor that changes its value as a function of frequency. The lower the frequency, the greater the resistance. This measure ensures the total resistance (impedance) of the central bass speaker, capacitor and broadband speaker is in a non-critical range for the audio output stage.

⚠ On the US version, the 'Professional' radio (RAD2) is offered. ◄




3 - Stereo system with 'Business' or 'Professional' navigation system

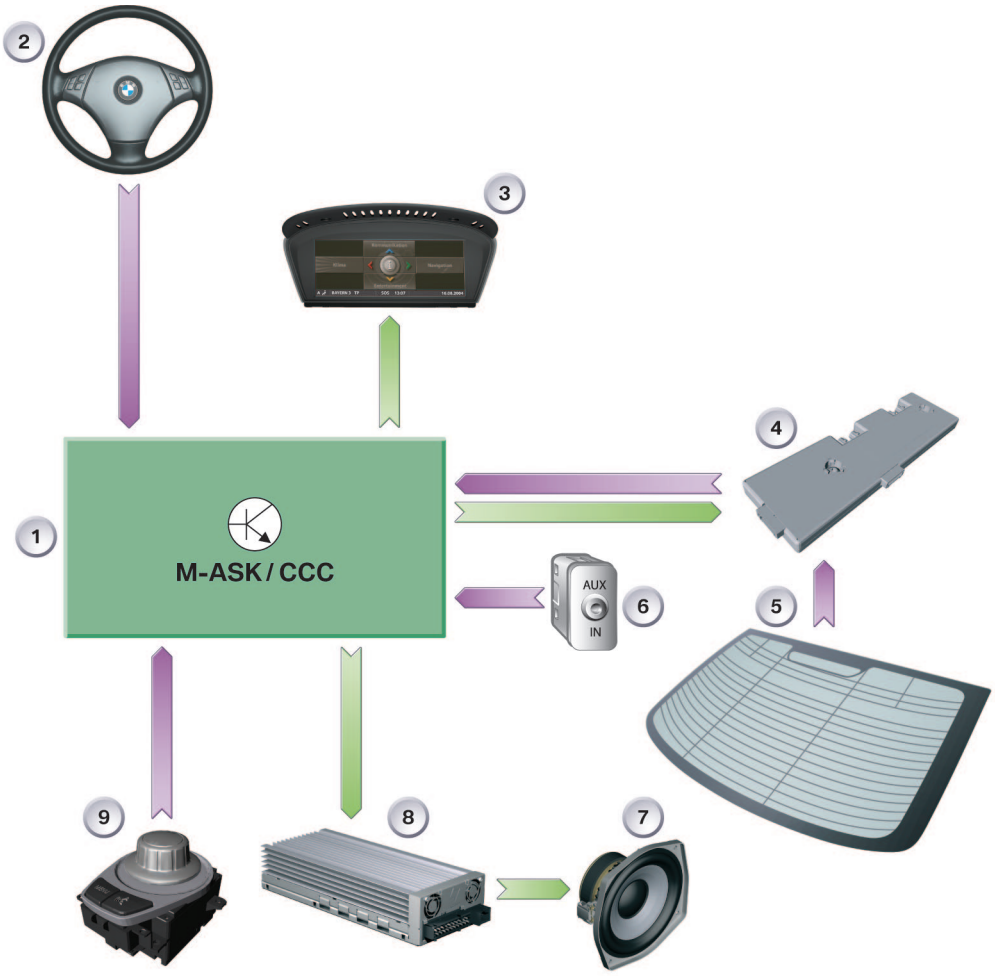
| Index | Explanation | Index | Explanation |
|---|---|---|---|
| 1 | 'Business' navigation system (M-ASK) or 'Professional' navigation system (CCC) | 9 | AM aerial |
| 2 | Central information display | 10 | Antenna amplifier with diversity module |
| 3 | Controller | 12 | Broadband speaker, front right |
| 4 | Instrument cluster | 13 | Central bass speaker, right |
| 5 | Junction box control unit | 15 | Broadband speaker, rear right |
| 6 | Dynamic stability control | 19 | Broadband speaker, rear left |
| 7 | Steering column switch cluster | 21 | Central bass speaker, left |
| 8 | FM1, FM2 and FM3 aerials | 23 | Broadband speaker, front left |
| LVDS | Low voltage differential signal | MOST | Media orientated system transport (digital bus) |
| Aux_In | Audio input for additional audio sources | HF | High frequency signal |
| Tel_ Mute | Radio muting during telephone operation | ZF | Intermediate frequency signal |
| Kl.Rad_ on | Control signal or power supply | Us | Changeover voltage, AM/FM antenna diversity mode |

The audio output stages of the navigation systems Business (M-ASK) and Professional (CCC) can drive two parallel-connected speakers. The capacitors for resistance adaptation shown on the system circuit diagram "Stereo system with 'Business CD' radio" are therefore not necessary.

⚠ On the US version, the 'Professional' navigation system (CCC) is offered. ◄

# HiFi and Top-HiFi

## Input/Output




4 - Top-HiFi system with 'Business' or 'Professional' navigation system

| Index | Explanation | Index | Explanation |
|---|---|---|---|
| 1 | 'Business' navigation system (M-ASK) or 'Professional' navigation system (CCC) | 6 | Audio jack (AUX-In) |
| 2 | Multifunction steering wheel (MFL) | 7 | Audio speaker |
| 3 | Central information display (CID) | 8 | Audio amplifier (HiFi or Top-HiFi) |
| 4 | Antenna amplifier with diversity module | 9 | Controller |
| 5 | Rear-window aerials (AM, FM1, FM2, FM3) | | |

The input/output diagram also applies to:

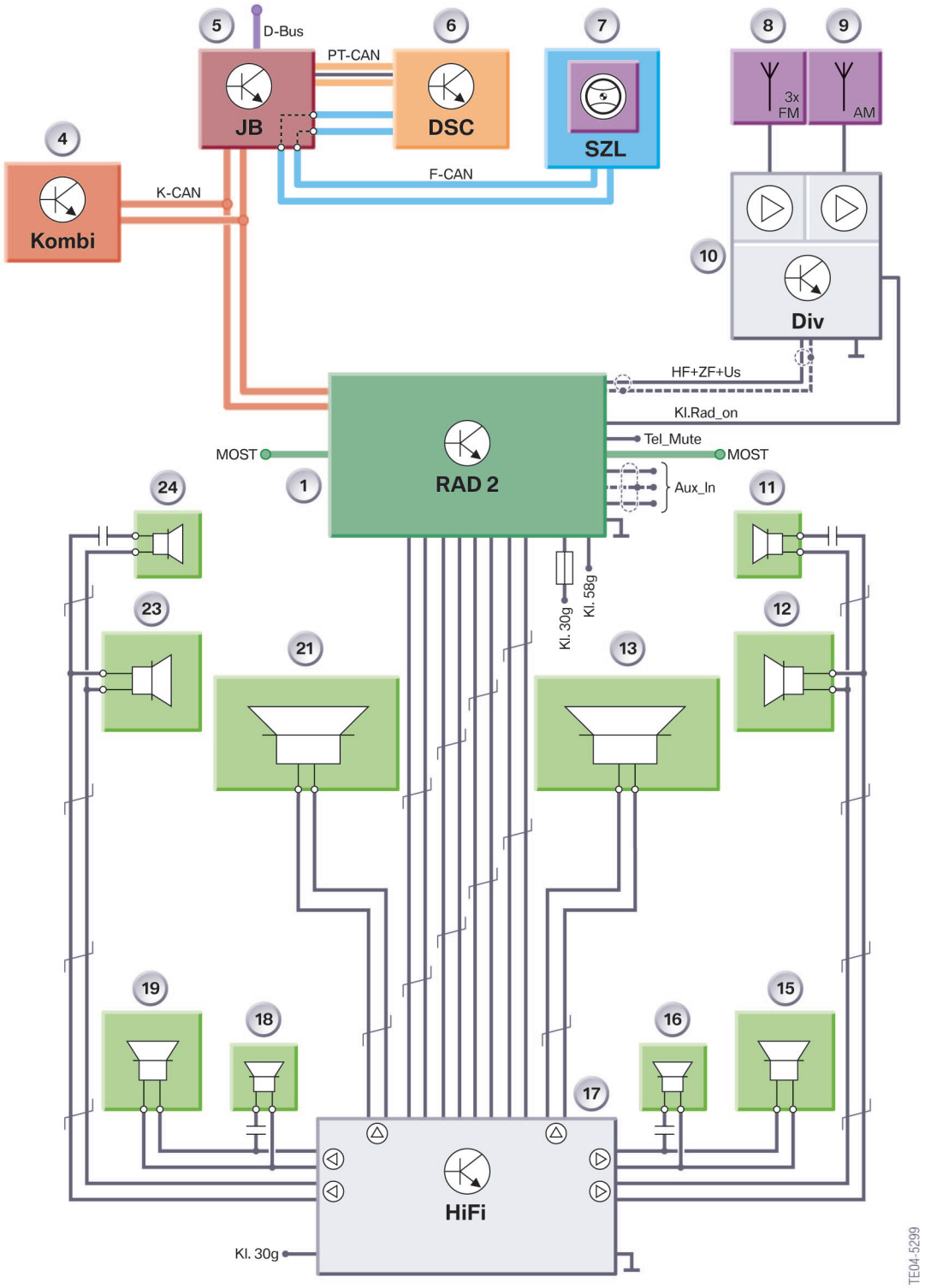
- 'Professional' radio (RAD2, no Controller or CID)

If the HiFi amplifier is fitted instead of the Top-HiFi amplifier, the input/output diagram also applies to:

- 'Business CD' radio (RAD1*, no Controller or CID)
- 'Professional' radio (RAD2, no Controller or CID)

⚠ On the US version, the 'Professional' radio (RAD2) and the 'Professional' navigation system (CCC) are offered. ◄

## System circuit diagram



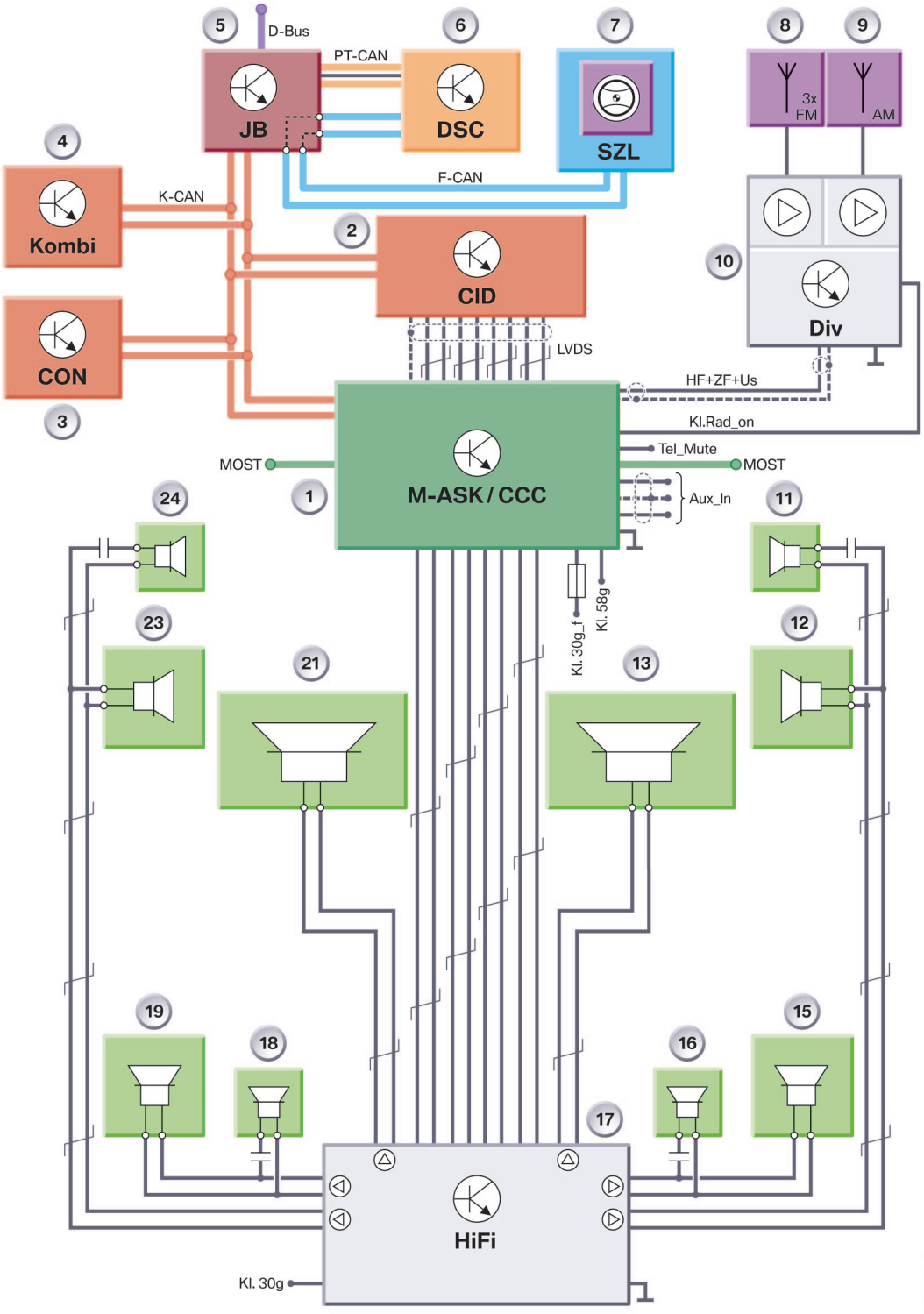

5 - HiFi system with 'Professional' radio

| Index | Explanation | Index | Explanation |
|---|---|---|---|
| 1 | 'Professional' radio | 13 | Central bass speaker, right |
| 4 | Instrument cluster | 15 | Mid-range speaker, rear right |
| 5 | Junction box control unit | 16 | Tweeter, rear right |
| 6 | Dynamic stability control | 17 | HiFi amplifier |
| 7 | Steering column switch cluster | 18 | Tweeter, rear left |
| 8 | FM1, FM2 and FM3 aerials | 19 | Mid-range speaker, rear left |
| 9 | AM aerial | 21 | Central bass speaker, left |
| 10 | Antenna amplifier with diversity module | 23 | Mid-range speaker, front left |
| 11 | Tweeter, front right | 24 | Tweeter, front left |
| 12 | Mid-range speaker, front right | MOST | Media orientated system transport (digital bus) |
| Aux_In | Audio input for additional audio sources | HF | High frequency signal |
| Tel_ Mute | Radio muting during telephone operation | ZF | Intermediate frequency signal |
| Kl.Rad_ on | Control signal or power supply | Us | Changeover voltage, AM/FM antenna diversity mode |

The system circuit diagram also applies to the 'Business CD' radio (RAD1*).

The high-range and mid-range speakers are connected in parallel and are powered by means of a common supply line from the four amplifier output stages. There is a frequency diplexer (high-pass filter) at the mid-range speaker (door or rear window shelf) that decouples the signal for the high-range speaker. The frequency diplexer is designed as a capacitor. The AC resistance (impedance) becomes lower at higher frequency, i.e. the capacitor becomes more conductive. In this way, only higher-frequency signals are routed to the high-range speakers. The low-frequency signals that are damaging for the high-range speaker are suppressed.

⚠ On the US version, the 'Professional' radio (RAD2) is offered. ◄

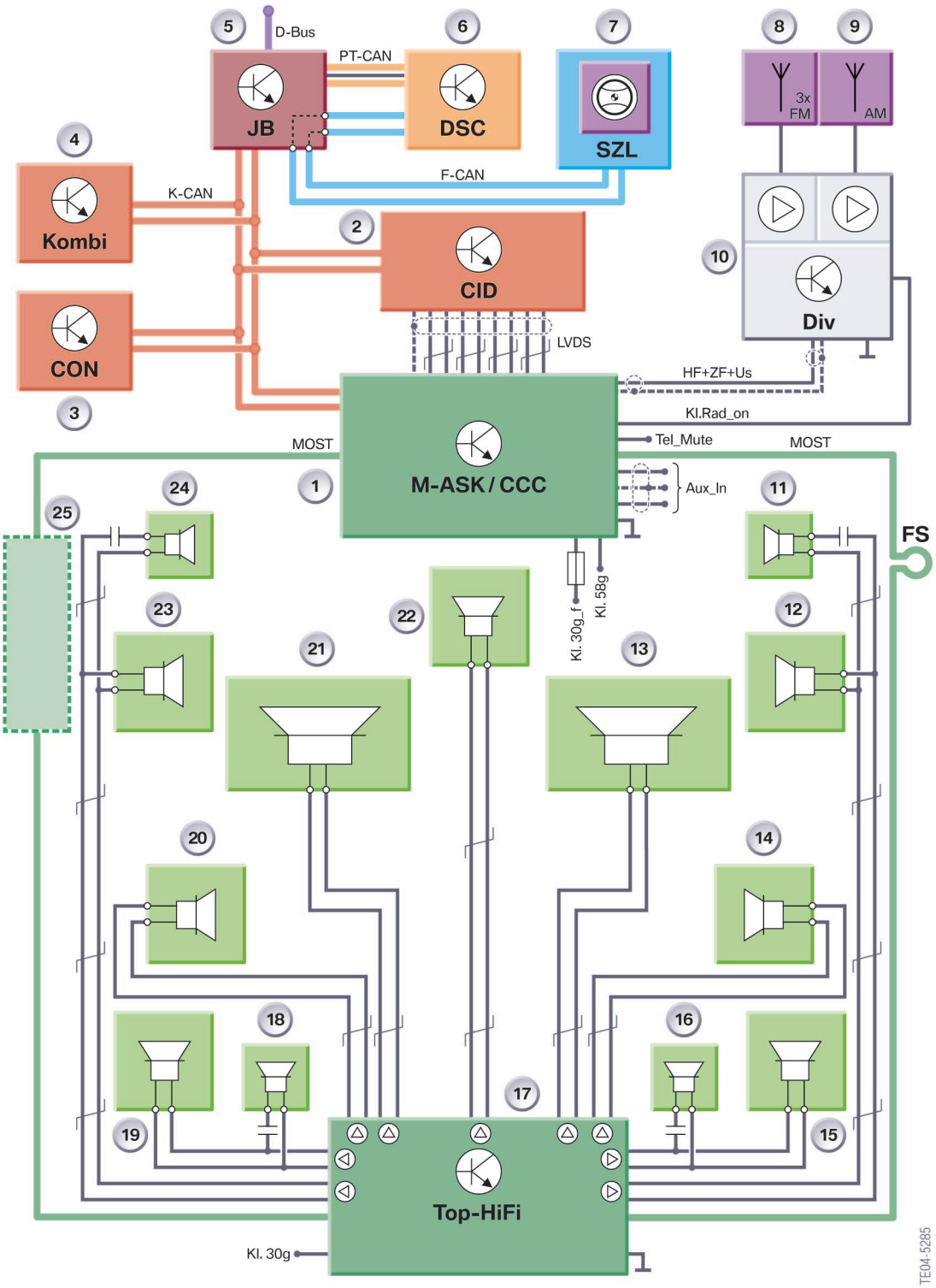



6 - HiFi system with 'Business' or 'Professional' navigation system

| Index | Explanation | Index | Explanation |
|---|---|---|---|
| 1 | 'Business' navigation system (M-ASK) or 'Professional' navigation system (CCC) | 12 | Mid-range speaker, front right |
| 2 | Central information display | 13 | Central bass speaker, right |
| 3 | Controller | 15 | Mid-range speaker, rear right |
| 4 | Instrument cluster | 16 | Tweeter, rear right |
| 5 | Junction box control unit | 17 | HiFi amplifier |
| 6 | Dynamic stability control | 18 | Tweeter, rear left |
| 7 | Steering column switch cluster | 19 | Mid-range speaker, rear left |
| 8 | FM1, FM2 and FM3 aerials | 21 | Central bass speaker, left |
| 9 | AM aerial | 23 | Mid-range speaker, front left |
| 10 | Antenna amplifier with diversity module | 24 | Tweeter, front left |
| 11 | Tweeter, front right | MOST | Media orientated system transport (digital bus) |
| LVDS | Low voltage differential signal | HF | High frequency signal |
| Aux_In | Audio input for additional audio sources | ZF | Intermediate frequency signal |
| Tel_ Mute | Radio muting during telephone operation | Us | Changeover voltage, AM/FM antenna diversity mode |
| Kl.Rad_ on | Control signal or power supply | | |

The capacitors act as frequency gates between tweeters and mid-range speakers.

⚠ On the US version, the 'Professional' navigation system (CCC) is offered. ◄




7 - Top-HiFi system with 'Business' or 'Professional' navigation system

| Index | Explanation | Index | Explanation |
|---|---|---|---|
| 1 | 'Business' navigation system (M-ASK) or 'Professional' navigation system (CCC) | 14 | Mid-range speaker, right rear door |
| 2 | Central information display | 15 | Mid-range speaker, rear right |
| 3 | Controller | 16 | Tweeter, rear right |
| 4 | Instrument cluster | 17 | Top-HiFi amplifier |
| 5 | Junction box control unit | 18 | Tweeter, rear left |
| 6 | Dynamic stability control | 19 | Mid-range speaker, rear left |
| 7 | Steering column switch cluster | 20 | Mid-range speaker, left rear door |
| 8 | FM1, FM2 and FM3 aerials | 21 | Central bass speaker, left |
| 9 | AM aerial | 22 | Mid-range speaker, front centre |
| 10 | Antenna amplifier with diversity module | 23 | Mid-range speaker, front left |
| 11 | Tweeter, front right | 24 | Tweeter, front left |
| 12 | Mid-range speaker, front right | 25 | MOST components (optional) |
| 13 | Central bass speaker, right | MOST | Media orientated system transport (digital bus) |
| LVDS | Low voltage differential signal | FS | MOST direct access |
| Aux_In | Audio input for additional audio sources | HF | High frequency signal |
| Tel_ Mute | Radio muting during telephone operation | ZF | Intermediate frequency signal |
| Kl.Rad_ on | Control signal or power supply | Us | Changeover voltage, AM/FM antenna diversity mode |

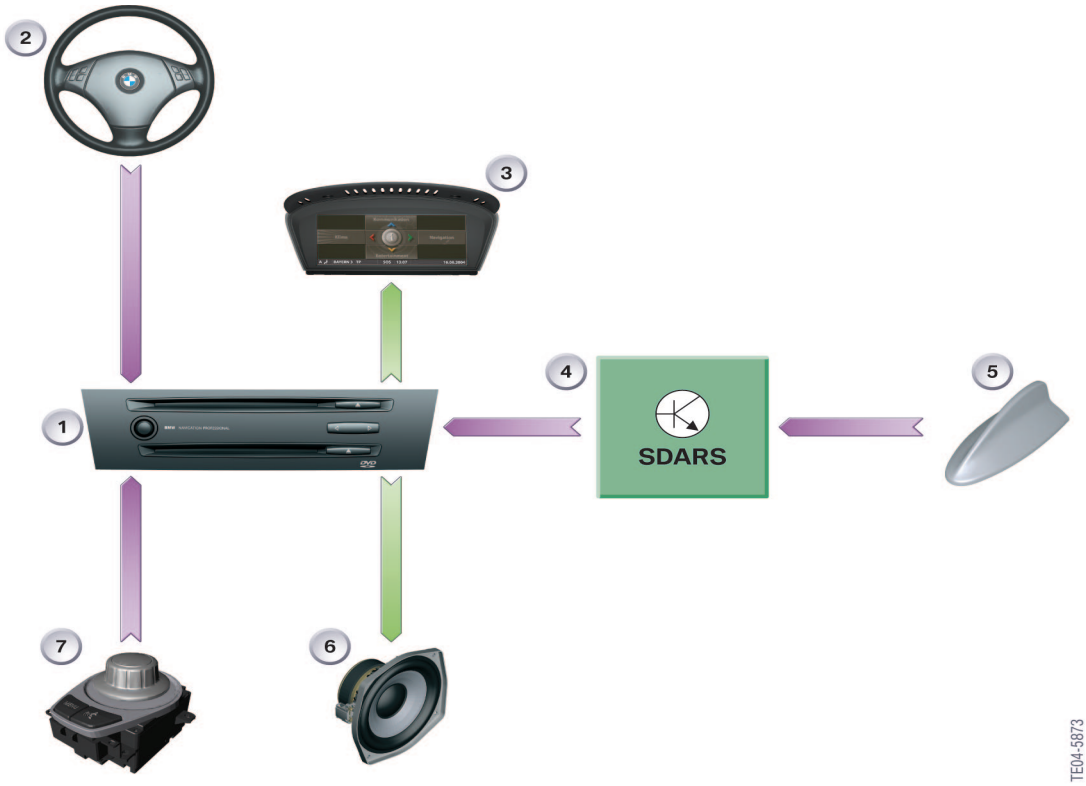
The system circuit diagram also applies to the 'Professional' radio (RAD2, no Controller and no CID).

The capacitors act as frequency gates between tweeters and mid-range speakers.

⚠ On the US version, the 'Professional' navigation system (CCC) is offered. ◄

# SDARS satellite tuner (US version)

## Input/Output

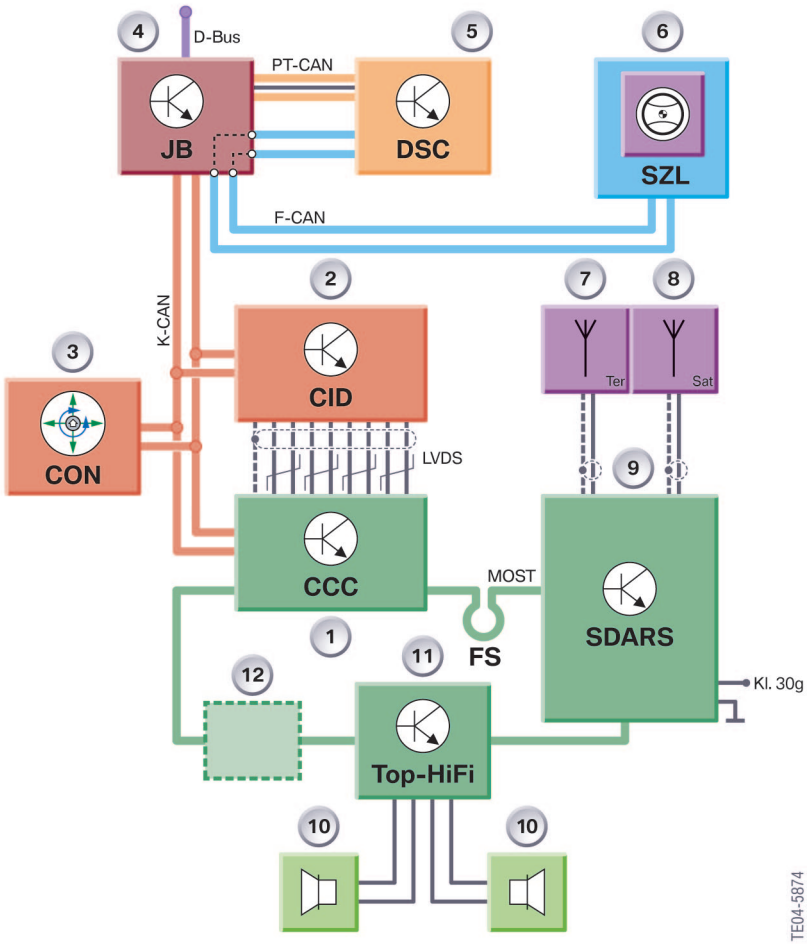



8 - SDARS satellite tuner

| Index | Explanation | Index | Explanation |
|---|---|---|---|
| 1 | 'Professional' navigation system (CCC) | 5 | Roof aerial (SDARS aerials for terrestrial and satellite reception) |
| 2 | Multifunction steering wheel (MFL) | 6 | Audio speaker |
| 3 | Central information display (CID) | 7 | Controller |
| 4 | Satellite tuner | | |

The input/output diagram also applies to the 'Professional' radio (RAD2, no Controller and no CID).

## System circuit diagram




9 - SDARS satellite tuner

| Index | Explanation | Index | Explanation |
|---|---|---|---|
| 1 | 'Professional' navigation system (CCC) | 7 | SDARS aerial for terrestrial reception |
| 2 | Central information display | 8 | SDARS aerial for satellite reception |
| 3 | Controller | 9 | Satellite tuner |
| 4 | Junction box control unit | 10 | Audio speaker |
| 5 | Dynamic stability control | 11 | Audio amplifier |
| 6 | Steering column switch cluster | 12 | MOST components (optional) |
| LVDS | Low voltage differential signal | MOST | Media orientated system transport (digital bus) |
| FS | MOST direct access | | |

The system circuit diagram also applies to the 'Professional' radio (RAD2, no Controller and no CID).

# System components
## Audio systems

## General description

This section describes the audio systems in the E90. It is divided into the following chapters:

- Radios
- Amplifiers and speakers
- Antennas
- Peripherals (CD changer, audio socket (jack))

The radios and navigation systems with integrated audio function can be combined with the 'Stereo', 'HiFi' and 'Top-HiFi' speaker systems.

The 'Professional' radio and the multi-audio system controller (M-ASK) support playback of MP3 and WMA files.

The CD player ('Professional' radio) and the DVD player (M-ASK) can play back CDs with compressed audio data (MP3/WMA) as well as conventional audio CDs. Information such as folder name, music track or artist are shown on the display. Detailed information based on ID3 tags can also be represented. ID3 tags contain additional information that is added to the music data.

What is MP3?

- MP3 stands for MPEG Layer 3 (MPEG = Moving Pictures Expert Group)
- MP3 is a music compression process that was originally designed for digital sound or image transmission (MPEG 1 or 2)
- It requires 8 to 12 times less storage space for virtual CD quality. Approximately 10 audio CDs in compressed form can be stored on a standard 640 MB data CD.
- MP3 was developed by the German Fraunhofer Institute for integrated circuits (Fraunhofer IIS Audio)

What is WMA?

- Like MP3, Windows Media Audio(WMA) is a compression method for audio data that produces a sound with more detail than MP3 at low bit rates (up to approx.112 kbit/s).

⚠ It may take up to 20 seconds to read in the data depending on the directory and data structure. ◄

# Radios

## Overview

The following table provides an overview of the audio features of the radios and navigation systems available for selection.

More detailed information than in the table is provided in the following chapters.

| | **'Business CD' radio** | **'Professional' radio** | **'Business' navigation system** | **'Professional' navigation system** |
|---|---|---|---|---|
| | SA662 | SA663 | SA606 | SA609 |
| |  |  |  |  |
| Designation | CD-72 | CD-73, MD-73 | M-ASK | CCC |
| Display | Single-line | Two-line | CID 6.5" | CID 8.8" |
| Manufacturer | Visteon | Alpine | Harman/ Becker | Siemens VDO |
| Bus connection | K-CAN | K-CAN, MOST | K-CAN, MOST | K-CAN, MOST |
| AM tuner range | Single LW,MW | Single LW,MW | Single LW,MW,SW | Single LW,MW,SW |
| FM tuner (RDS) | Single | Single | Double | Double |
| FM diversity | ✓ | ✓ | ✓ | ✓ |
| CD | ✓ | ✓ | --- | ✓ |
| MD (instead of CD) | --- | ✓ | --- | ✓(Japan only) |
| DVD | --- | --- | ✓ | ✓ |
| MP3 playback | --- | ✓ | ✓ | Planned |
| Audio jack | --- | ✓ | ✓ | ✓ |
| AUX level matching | --- | ✓ | --- | --- |
| Top-HiFi operation | --- | ✓ | ✓ | ✓ |
| Telephone operation | --- | ✓ | ✓ | ✓ |
| CD changer operation | --- | ✓ | ✓ | ✓ |

The BMW 3 Series is supplied as standard with either the 'Business CD' or 'Professional' radio and the 'Stereo' system, depending on market.

## 'Business CD' radio


1 - 'Business CD' radio

The 'Business CD' radio is identical in function and operation to the familiar radios such as those used in the E46, for example. Additional notes on the features table:

- Since these radios do not have a digital sound processor (DSP) for generating sound, they do not support signal generation functions either, such as are necessary for the park distance control system (PDC), for example. In this case, the signal sounds are generated by the corresponding control units themselves. In connection with PDC, the PDC control unit is responsible for generating sound/control.
- The 'Business CD' radio is not an all-regions radio. It does not support the Oceania and Japan frequency bands.

## 'Professional' radio


2 - 'Professional' radio

The 'Professional' radio is a new radio for the MOST system network. In addition to the M-ASK and CCC, it serves as a further MOST master.

Like the 'Business' and 'Professional' navigation systems, it forms the gateway between the K-CAN and MOST bus.

The MP3 directory structure corresponds to that of the PC. Up to 8 directory levels can be represented. A maximum of 255 directories and a total of 999 music tracks per CD can be managed.

## 'Business' navigation system


3 - 'Business' navigation system

The 'Business' navigation system is based on the multi-audio system controller (M-ASK), the functions of which are already familiar from the E60 and E87.

The M-ASK combines the following control units in one housing:

- Navigation computer and GPS module; arrow view in CID
- RDS double tuner
- Audio system controller (ASK)
- Gateway between MOST and K-CAN
- Interface to control display (LVDS)

The integrated DVD player is necessary for navigation. The necessary data are read by the navigation DVD and stored after programming in the RAM (Random Access Memory) of the M-ASK (memory navigation). After entering the destination, the DVD player can be used to play audio CDs.

Together with the controller and CID, the M-ASK forms the iDrive system. The system can be used to control:

- Communication
- Entertainment
- Navigation
- Air conditioning (climate control)
- Settings

The MP3 directory structure allows a maximum combined total of 250 files and directories. In other words, if there are 150 files, only 100 directories can be created.

## Navigation system, Professional


4 - Navigation system, Professional

The 'Professional' navigation system is based on the CCC (car communication computer), the functions of which are already familiar from the E60 and E87.

The CCC combines the following control units in one housing:

- Navigation computer/GPS module; Map display and/or arrow view on CID (split screen)
- RDS double tuner
- Audio system controller (ASK)
- MOST-CAN gateway
- Interface to control display (LVDS)

Two player drives are integrated in the housing

- DVD player
- CD player

The Japan country-specific version additionally offers:

- MD player instead of CD player
- Calculation and image preparation of the Japan navigation data by means of a separate navigation computer in the luggage compartment

When the navigation system is not in use, its DVD drive can be used to play audio CDs.

Together with the controller and CID, the CCC also forms the iDrive system (see 'Business' navigation system).

# Amplifiers and speakers

## System concept

The audio systems in the E90 follow the familiar principle of the 3 quality levels:

- Stereo system
- HiFi system
- Top-HiFi system

In addition to the higher achievable sound pressure, the audio systems are also distinguished by the improved system linearity. For the customer, the additional features such as the 7-band graphic equalizer and the spatial sound (Logic7) provide both visible as well as audible added value.

The 'Stereo' system consists of 6 speakers. The 'HiFi' system consists of 10 speakers and the 'Top-HiFi' system of 13 speakers, with different additional amplifiers in each case.

The central basses are located under the front seats. They are coupled to the side sills, thus enlarging the resonance volume necessary for bass reproduction.

The following table outlines the possible combinations of the radios, navigation systems with the speaker/amplifier systems:

| | **Stereo** | **HiFi** | **Top-HiFi** |
|---|---|---|---|
| | Standard equipment when radio installed | SA676 "HiFi speaker system" | SA677 "HiFi system Professional" |
| 'Business CD' radio | ✓ | ✓ | --- |
| 'Professional' radio | ✓ | ✓ | ✓ |
| 'Business' navigation system | ✓ | ✓ | ✓ |
| Navigation system, Professional | ✓ | ✓ | ✓ |

The stereo, HiFi and Top-HiFi systems exhibit different performance features in terms of symmetry of the sound field, sound pressure and linearity of the frequency response.

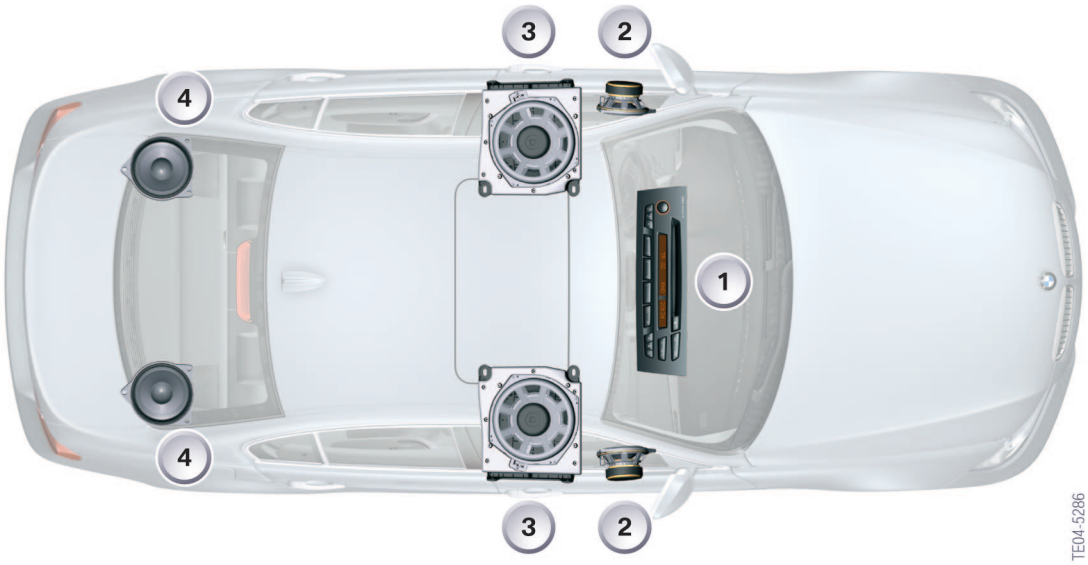
The 'Stereo' system has a broadband speaker for the high and mid-range frequencies. A separate tweeter is not installed. Instead, separate speakers are installed for the high and mid-ranges in the HiFi and Top-HiFi systems.

Even though the diameters of the speakers in the HiFi and Top-HiFi systems are the same, there are differences in the output of the speakers. This is achieved by the use of different materials for the diaphragms, coils, magnets etc. To distinguish between them, the designations Medium and High are used in the table below.

| | Stereo | HiFi | Top-HiFi |
|---|---|---|---|
| Output | Radios: 4*15W (4Ω)<br>M-ASK: 4*40W (2Ω)<br>CCC: 4*25W (2Ω) | Auxiliary amplifier:<br>2*40W (2Ω) Bass<br>4*25W (2Ω) | Auxiliary amplifier:<br>2*70W (4Ω) Bass<br>7*40W (2Ω) |
| Max. sound pressure | 98 dB as from 63 Hz | 104 dB as from 50 Hz | 110 dB as from 40 Hz |
| Bandwidth | 50 Hz to 14 kHz | 40 Hz to 20 kHz | 30 Hz to 20 kHz |
| Linearity | ±3 dB | ±3 dB | ±1.5 dB |
| Tweeter<br>Manufacturer | --- | 26 mm (medium)<br>Harman/Becker | 26 mm (high)<br>Harman/Becker |
| Broadband speaker<br>Manufacturer | 100 mm<br>Philips | --- | --- |
| Mid-range speaker<br>Manufacturer | --- | 100 mm (medium)<br>Harman/Becker | 100 mm (high)<br>Harman/Becker |
| Central bass speaker<br>Manufacturer | 160 mm<br>Philips | 217 mm (medium)<br>Harman/Becker | 217 mm (high)<br>Harman/Becker |

The housings of the central bass speakers are identical for the stereo, HiFi and Top-HiFi audio systems (package space and sill connection). Due to its smaller diameter (160 mm instead of 217 mm), the stereo central bass speaker features an additional spacer ring for mounting on the inside of the central bass housing.

## Stereo system




5 - Stereo system with components

| Index | Explanation | Index | Explanation |
|---|---|---|---|
| 1 | 'Business CD' radio | 3 | Central woofers |
| 2 | Broadband speaker, front | 4 | Broadband speaker, rear |

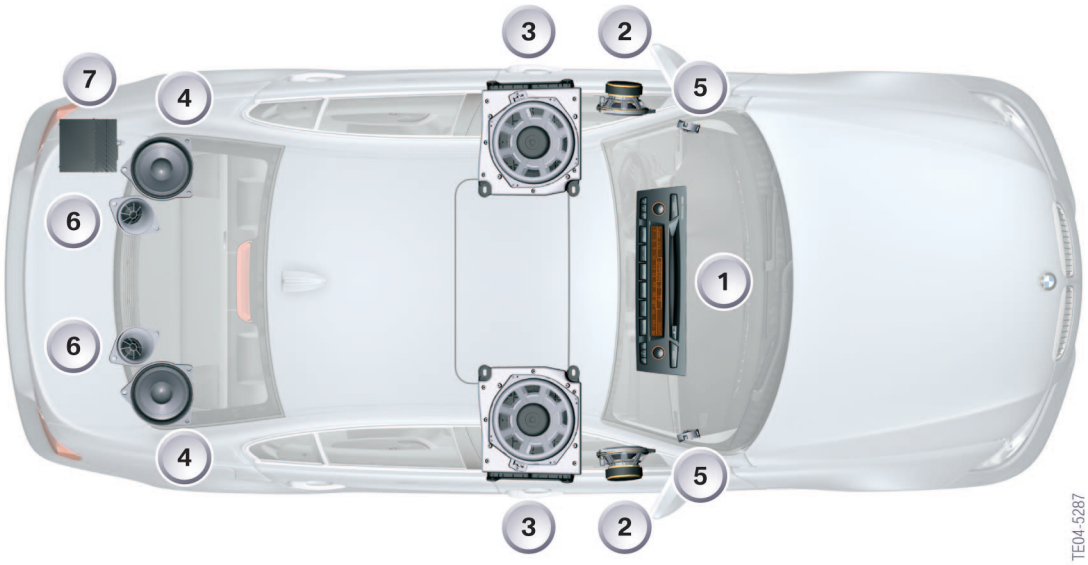
In the stereo system, the speakers are driven without an additional amplifier directly by the audio output stages of the radios or navigation systems. The stereo speaker system is standard equipment as soon as a radio or navigation system is installed.

6 speakers are driven via 4 audio channels.

- A broadband speaker in each of the front doors with a central bass speaker connected in parallel under each of the front seats
- A broadband speaker on each side of the rear shelf

The broadband speakers in the front doors and the central bass speakers are activated per side by a common radio output stage of the radio/navigation system. The speaker supply line is branched in the A-pillar of the vehicle. From here, the signal is routed separately to the speakers.

## HiFi system




6 - HiFi system with components

| Index | Explanation | Index | Explanation |
|---|---|---|---|
| 1 | 'Professional' radio | 5 | Tweeter, front |
| 2 | Mid-range speaker, front | 6 | Tweeter, rear |
| 3 | Central woofers | 7 | HiFi amplifier |
| 4 | Mid-range speaker, rear | | |

The analogue 6-channel 'HiFi' amplifier has the same technical specifications as the one fitted in the E83 and E87. In the E90, however, it features settings specific to the E90 (diplexers, equalizing). This amplifier can be operated with any of the offered radios or navigation systems.

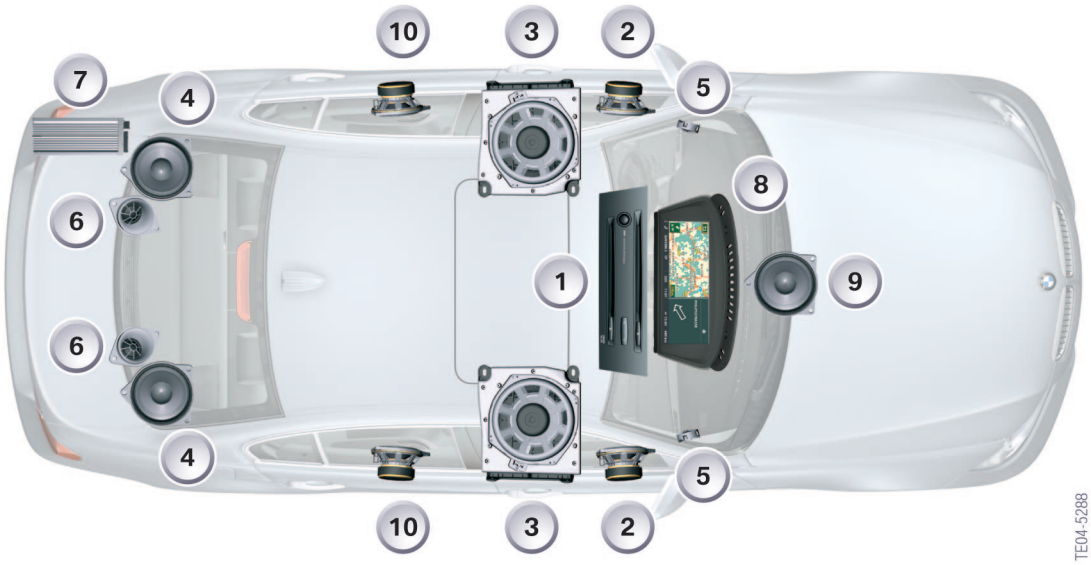
The HiFi amplifier is located behind the rear left side panel trim in the luggage compartment.

The audio signals are transmitted in analogue form from the radios or navigation systems to the HiFi amplifier. This amplifier amplifies the signals and transfers them to the speakers.

A total of 10 speakers are driven by 6 audio channels:

- A high-range and mid-range speaker in each front door
- A tweeter and a mid-range speaker on each side of the rear shelf
- A central bass speaker under each front seat

## Top-HiFi system




7 - Top-HiFi system with components

| Index | Explanation | Index | Explanation |
|---|---|---|---|
| 1 | Navigation system, Professional | 6 | Tweeter, rear |
| 2 | Mid-range speaker, front | 7 | Top-HiFi amplifier |
| 3 | Central woofers | 8 | Central information display (CID) |
| 4 | Mid-range speaker, rear | 9 | Mid-range speaker, front centre |
| 5 | Tweeter, front | 10 | Mid-range speaker, rear door |

The digital 'Top-HiFi' amplifier with Logic7 (Surround Sound) is of identical design to that used in the E60 and the E87. This amplifier is a MOST bus node and can be operated only with radios or navigation systems with MOST capabilities.

The audio signals are sent in digital form via the fibre-optic cable (MOST bus) from the radio or navigation systems to the 'Top-HiFi' amplifier. The amplifier converts the digital signals to analogue signals, amplifies them and routes them to the speakers. The sound adjustment (7-band equalizer, spatial sound, fader etc.) takes place prior to the analogue conversion in the digital signal processor (DSP) of the amplifier.

The Top-HiFi amplifier is installed in the same location as the HiFi amplifier.

A total of 13 speakers are driven by 9 audio channels:

- A high-range and mid-range speaker in each front door
- A tweeter and a mid-range speaker on each side of the rear shelf
- A mid-range speaker in each rear door
- A mid-range speaker in the dashboard (Surround Sound)
- A central bass speaker under each front seat

⚠ If there is no audio function after replacing the 'Professional' radio or the navigation systems, the replacement radio or navigation system must be programmed with the coding for the 'Top-HiFi' system. ◄

# Antennas

## Overview

The E90 can have up to 5 aerial systems depending on the optional equipment fitted:

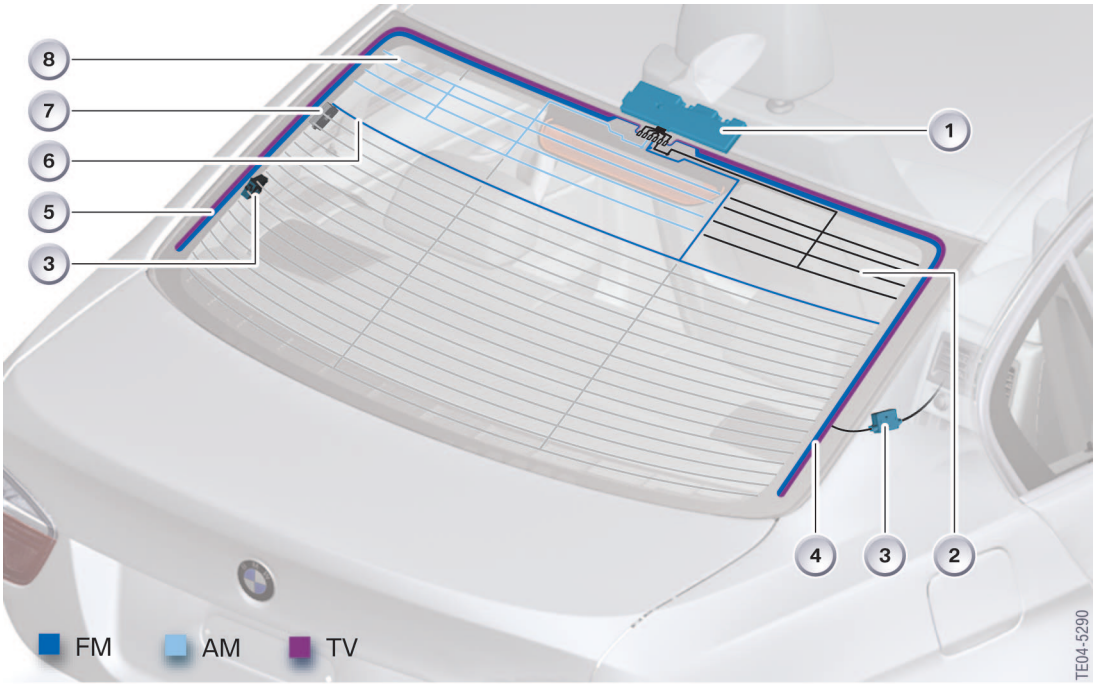
- FM/AM radio (rear-window aerials)
- Digital radio (roof antenna)
- Navigation system (roof antenna)
- TV (rear-window aerials)
- Telephone (roof antenna) additionally:
  - Bluetooth antenna in steering column trim panel for mobile telephone connection
  - Emergency aerial in left rear wheel arch (only in conjunction with option SA633 "'Business' mobile phone station")

In addition to those, there is also the aerial for the remote control services (FBD) and the 6 aerials for the Comfort Access system. Both systems are described in the section "E90 general vehicle electrical system - Part 1 - Distributed functions".

The radio aerials for AM (LW, MW and SW bands) and FM (UHF band) reception are described below.

The aerials for the navigation and telephone systems are described in the succeeding sections.

An HBL filter is fitted in order to suppress interference signals from the third brake light.




8 - Antennas at rear of vehicle

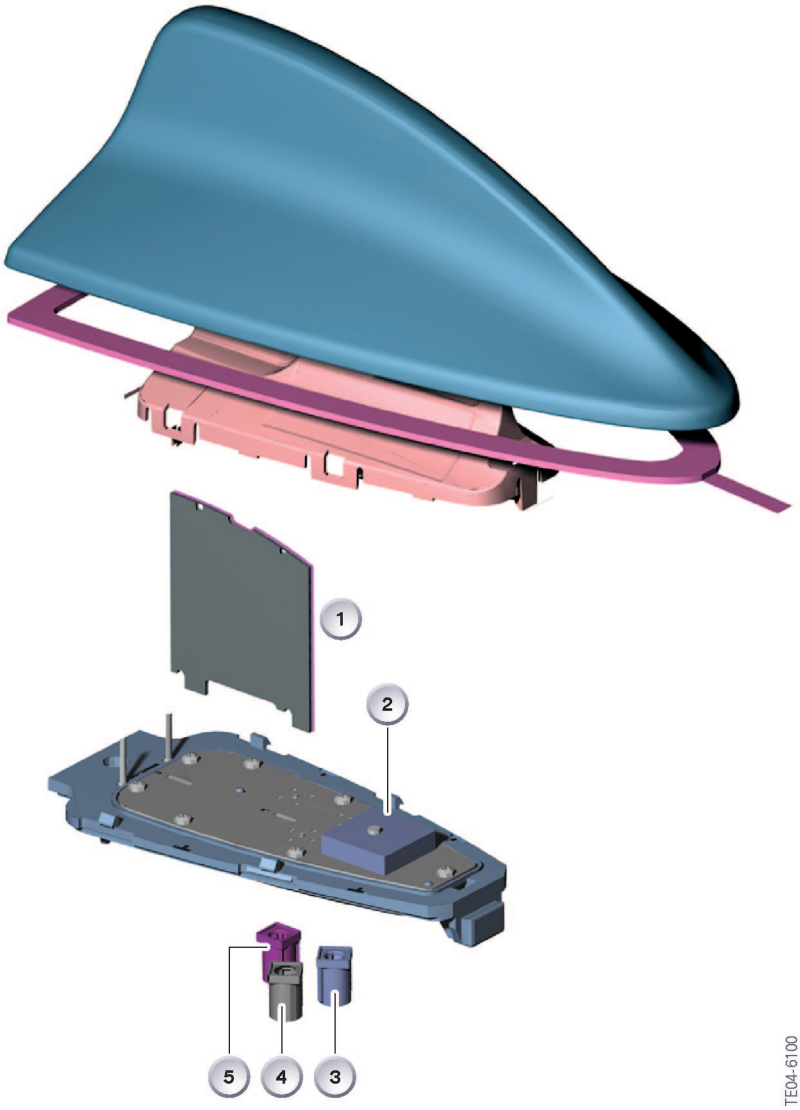
| Index | Explanation | Index | |
|---|---|---|---|
| 1 | Antenna amplifier with diversity module | 5 | FM2 and TV2 aerial |
| 2 | FBD aerial | 6 | FM1 antenna |
| 3 | Lockout circuit | 7 | HBL filter |
| 4 | FM3 and TV1 aerial | 8 | AM aerial |

## Roof antenna

The roof aerial for all possible equipment options on the European version comprises:

- Mobile phone aerial
- Telematic Control Unit (TCU) telephone aerial
- GPS aerial

⚠ A roof aerial is not fitted if the car is not equipped with a telephone or navigation system. ◄




TE04-6100

9 - Roof antenna

| Index | Explanation | Index | |
|---|---|---|---|
| 1 | Telephone aerials for mobile phone and Telematic Control Unit (TCU) | 4 | Telephone signal:<br>connector colour code: Grey |
| 2 | GPS antenna | 5 | Telephone signal:<br>connector colour code: Bordeaux violet |
| 3 | GPS signal<br>connector colour code: blue | | |

⚠ The telephone aerials for the mobile phone and the Telematic Control Unit (TCU) are on different sides of the same circuit board. ◄

## Radio antennas

The high-frequency signals from the radio transmitters are received via the rear-window aerials (FM1, FM2, FM3 and AM).

The aerial amplifiers are in the Diversity module. There are separate ones for AM and FM.

The combined aerial amplifier and Diversity module is located on the headliner above the rear window, concealed behind a cover.

Both aerial amplifiers are supplied with direct current when the radio is switched on (via terminal Rad_On).

The high-frequency signals from the AM and FM aerials are passed via a ribbon cable from the rear window to the combined aerial amplifier and Diversity module.

### FM Antenna diversity

A quadruple FM aerial diversity system is fitted as standard on the E90.

FM antenna diversity comprises:

- FM1, FM2 and FM3 aerials
- FM4 aerial, formed by combining the signals from the FM1 and FM2 aerials
- FM antenna amplifier with antenna diversity module

⚠ For SW, MW and LW reception, no aerial diversity system is provided as there is only an AM aerial. ◄

For reasons of space, the rear window of the E90 can accommodate only three FM aerials. In contrast with the E60 and E87, the FM4 aerial is not a physical component. To improve FM reception, the FM4 aerial is artificially created by overlaying the HF signals from the FM1 and FM2 aerials.

The signal quality of the currently selected FM antenna (FM1 to FM4) is evaluated and assessed in the diversity module. The next FM antenna is selected if the signal quality of the received radio station deteriorates in connection with the active antenna. The changeover takes place such that no interruption can be heard. The high-frequency signal from the active FM aerial at any particular time is fed by the aerial amplifier and Diversity module via a co-axial cable to the tuner in the radio or navigation system. The signal is demodulated in the tuner and output in the form of an audio signal through the speakers.

The radio or navigation system detects that a diversity module is installed and generates the changeover voltage $U_S$ and the intermediate frequency signal (ZF) necessary for diversity operation. The ZF signal is analysed by the electronic circuitry in the diversity module and is a copy of the currently selected radio station transmission on a fixed frequency of 10.7 MHz.

The changeover between AM reception, FM diversity mode and diagnosis mode is effected by means of the DC voltage signal $U_S$. This voltage is generated by the radio and used in the diversity module for evaluation purposes. Diversity mode is active at $U_S$ = 2.5 V. AM mode is active at $U_S$ = 0 V, i.e. the FM1 antenna is selected. Diagnosis mode is active at $U_S$ = 5 V.

In total, up to three signals are therefore applied on the coaxial cable simultaneously.

- HF signal (e.g. 87.5-108 MHz) from diversity module to radio
- Control DC voltage $U_S$ from the radio to the diversity module
- Intermediate frequency ($f_{IF}$ = 10.7 MHz) from the radio to the diversity module as the basis for evaluating the quality of the RF signal.

⚠ Mutual influencing is not possible due to the different frequencies. ◄

# Peripherals

## CD changer and CD changer ready option

The option SA672 for the E90 is a new "CD changer for 6 CDs" (CDC). The CD changer is a MOST network node and differs from the MOST-compatible CD changer on the E60 and E87 by virtue of its support for MP3 files.

It can be used together with the 'Professional' radio and the 'Business' or 'Professional' navigation systems.

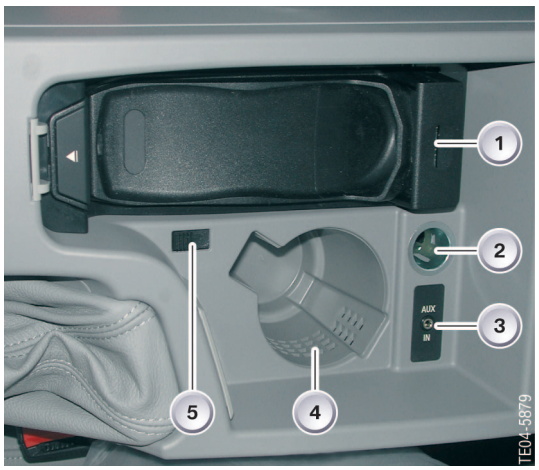
The CD changer is located behind a flap on the left in the luggage compartment.

If the vehicle is equipped with the 'Stereo' or HiFithe digital data of the CD is sent via the MOST bus to the radio or navigation system.Here they are converted to analogue data and output via the amplifier and the speakers.
If a 'Top-HiFi' system (Logic7) is installed, the audio data is transmitted in digital form via the MOST bus from the CD changer directly to the Top-HiFi amplifier, from where it is output. This direct transmission bypassing the radio and the navigation system is possible as data conversion and sound adjustment take place exclusively in the Top-HiFi amplifier.

The CD changer supports playback of MP3 CDs. The MP3 files are decoded in the CD changer.

The option SA694 "Preparation for CD changer" is also available in certain markets. The fibre optics conductors for connecting the CD changer are arranged at the fibre optics connector in the luggage compartment such that they are not incorporated in the MOST ring. After retrofitting a CD changer, the fibre optics conductors for the CD changer preparation are unplugged at the fibre optics connector and connected to the MOST ring. Subsequent coding of the system is then necessary.

## Audio jack




10 - Audio jack location

| Index | Explanation | Index | |
|---|---|---|---|
| 1 | Eject box | 4 | Drinks cooler |
| 2 | 12V socket | 5 | Switch for cooler |
| 3 | Audio jack | | |

The audio jack (AUX-In) is used to connect an external audio source such as MP3, cassette or CD playback devices. It is a standard feature with the 'Professional' radio and the 'Business' and 'Professional' navigation systems.

It is located below the centre armrest. A 12 V socket outlet is located in the immediate vicinity of the audio jack.

Connection of the external audio source is provided by means of a 3.5 mm latch connector.

Fine adjustment of the playback volume is possible with the 'Professional' radio. The purpose of such adjustment is to prevent volume differences that can occur when switching between different audio sources. If the 'Business' or 'Professional' navigation system is fitted, the fine adjustment must made on the external audio device.

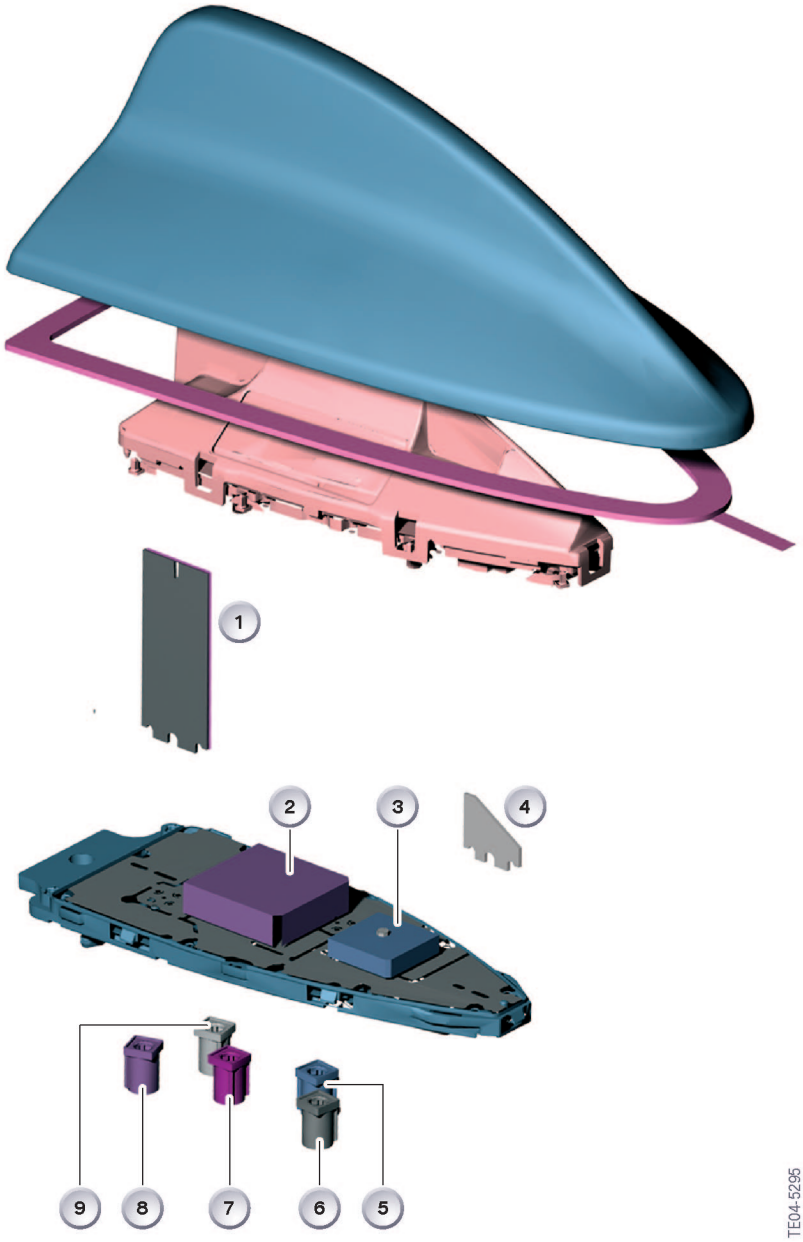
# US Version

## SDARS roof aerial

The roof aerial for SDARS reception on the US version has a larger housing compared with the version without satellite radio capability.

Specifically, the roof aerial for all possible equipment options on the US version comprises:

- Mobile phone aerials
- Telematic Control Unit (TCU) telephone aerials
- GPS antenna
- SDARS aerial for satellite reception
- SDARS aerial for terrestrial reception




TE04-5295

11 - SDARS roof aerial

| Index | Explanation | Index | |
|---|---|---|---|
| 1 | Telephone aerials for mobile phone and Telematic Control Unit (TCU) | 6 | SDARS signal, terrestrial |
| 2 | SDARS aerial for satellite reception | 7 | Telephone signal:<br>connector colour code: Bordeaux violet |
| 3 | GPS antenna | 8 | SDARS signal, satellite |
| 4 | SDARS aerial for terrestrial reception | 9 | Telephone signal:<br>connector colour code: Grey |
| 5 | GPS signal<br>connector colour code: blue | | |

## SDARS satellite tuner

The SDARS satellite radio is the same as the satellite tuner fitted on the E60, E61, E63 and E64.

It enables reception of digital radio signals. These are of a higher quality that analogue transmissions.

Advantages of digital satellite radio:

- Reception of same radio station across the entire US mainland (excluding Alaska)
- Digital reception of music, news and talk stations
- Wide choice of available music genres
- No commercial breaks
- Digital signal transmission provides greater immunity to external interference

The SDARS system developed by Sirius Satellite Radio is supported. This uses three satellites which follow an elliptical orbit around the Earth. Because of the arrangement of the orbits, there are always two satellites over the reception area.

In large urban areas where there are obstructions (e.g. tower blocks, tunnels) or in situations where there are topographical features (e.g. mountains) that block the satellite signals, terrestrial transmitters are used to relay the signals.

The separate satellite tuner is necessary because the signals are transmitted in the gigahertz band (microwave band).

The satellite tuner is fitted in the boot above the recess, on the left (when viewed from the rear) next to the Telematic Control Unit (TCU).

# Radios

## Service mode

### General description

In the case of customer complaint or malfunctions, certain important functions can be checked directly at the radio with the aid of service mode. This service mode can also be used to implement settings that are not intended for the customer. For this purpose, it is first necessary to enter service mode. This procedure differs for the various radios and navigation systems (M-ASK/CCC).

### 'Business CD' radio / 'Professional' radio

To activate Service mode:

- Switch on radio
- Within 8 s, press and hold the "m" button for at least 8 s
- The various menus can be selected in service mode
- Switch off the radio to exit service mode

Explanation of Service menu entries as illustrated by the 'Professional' radio.

| Menu | Display content (example) | Explanation |
|---|---|---|
| Serial number | AL87013SPL0122 | Serial number of device |
| Type | MC57CD72 | Radio type |
| SW Ver | H8S 00-0000 4.25.1<br>ST10 18-3203 4.40.4 | Device software status |
| Revision index | 02 | Revision index |
| GAL | 3 | Set level of speed-dependent volume control |
| ANT | AUTO | Aerial selection:<br>ANT1 = FM1 aerial<br>ANT2 = FM2 aerial<br>ANT3 = FM3 aerial<br>ANT4 = FM1 and FM2 aerials<br>AUTO = Automatic selection of FM aerial with best reception |
| F/Q | FM1 1 89.3 5 11 | Current FM memory<br>Current memory location<br>Current frequency<br>Field strength of current station<br>Signal quality of current station |
| DSP/Volume | DSP 1 V4 | DSP 0 = No DSP installed<br>DSP 1 = DSP installed<br>V = Volume setting increment |
| TP-V | 0 | Traffic information setting, minimum volume<br>Setting range: -9 to +9 |
| Display check | | Display check |
| Area | ECE | Country-specific version:<br>ECE = Europe<br>USA = United States<br>JPN = Japan<br>OCE = Oceania |
| AF | Auto | RDS and alternative frequency tracking:<br>RDS Off = RDS function not available as soft-key button.<br>AF Off = RDS function available, alternative frequency tracking off<br>AF Man = RDS function available, alternative frequency tracking only active in mute pauses (e.g. station selection via station buttons, frequency band change, telephone muting)<br>AF Auto = RDS function and automatic alternative frequency tracking active |
| Key memory | ON | To switch car and key functions on and off |

⚠ The "Tool" menu is for development purposes. It is of no significance for BMW Service. ◄

Content of Service menus

| Menu | 'Business CD' radio | 'Professional' radio |
|---|---|---|
| Serial number | ✓ | ✓ |
| Type | ✓ | --- |
| SW Ver | ✓ | ✓ |
| Revision index | ✓ | ✓ |
| GAL | ---* | ✓* |
| ANT | ✓ | ✓ |
| F/Q | ✓ | ✓ |
| DSP/Volume | --- | ✓ |
| TP-V | ---* | ✓* |
| Display check | ✓ | ✓ |
| Area | ✓ | ✓ |
| AF | ✓ | --- |
| Key memory | ✓ | ✓ |

* Customer function, see operating instructions

### 'Business' navigation system (M-ASK) / 'Professional' navigation system (CCC)

When Service mode is selected, numerous menus are visible. Some provide access to important Service information or allow settings to be altered. However, as a general rule those settings should not be changed. The information is primarily intended for equipment development purposes. The functions and the effects of changing parameters are therefore not fully documented here.

Service mode is accessed as follows:

- Open Start menu
- Press and hold Controller for at least 10 s
- Move Controller 3 stops to the right
- Move Controller 3 stops to the left
- Move Controller 1 stop to the right
- Move Controller 1 stop to the left
- Move Controller 1 stop to the right
- Press Controller once

To exit Service mode press the Menu button.

### M-ASK Service mode

On the "Tuner Test" menu, submenu "Mode A (Frequency, Quality, ...)" there is a table of the currently set transmitters.

The meanings of the entries in that table are as follows:

| Entry | Meaning |
|---|---|
| Freq | Frequency |
| FS | Field strength |
| QU | Quality |
| VG | Foreground tuner |
| AF | Alternative frequency |
| PS | Program Service Name |
| PI | Program Identification Code |
| TP | Traffic Programme |
| TA | Traffic Announcement |

The quality relates to the low-frequency signal quality. This is independent of the field strength of the signal received. Thus the quality may be low despite a high field strength or good even when the field strength is low. The figures for field strength and quality can range from 0 to 255. The higher the figure, the better the reception.

The entry 'Foreground tuner' indicates the frequency of the station to which the receiver is currently tuned.

The alternative frequency indicates a second frequency for the station to which the receiver is currently tuned.

## Reset

The 'Business CD' and 'Professional' radios and the 'Business' navigation system (M-ASK) can be reset by the following procedures:

- Switch system ON/OFF
- Disconnect from vehicle electrical system
- BMW diagnosis system

There is no button or key combination on the device for performing a reset.

The 'Professional' navigation system (CCC) can be reset by simultaneously pressing and holding the eject buttons on the DVD and CD player and the rotary push-button for approx. 10 s. The CID becomes blank. The CCC is then restarted.

⚠ The MOST gateway ('Professional' radio, M-ASK or CCC) is muted for 2 s when resetting a MOST control unit. ◄

## Interference in radio reception

Check the following in the event of interference in radio reception:

- Power supply terminal Rad_On for the antenna amplifiers in the diversity module.
- Antenna connector at diversity module
- Antenna connector at radio or navigation system

⚠ Care must be taken as the antenna plug connection may be damaged due to the restricted package space behind the CCC. ◄

## Service concept

The following are replaced as complete units:

- 'Business CD' radio
- 'Professional' radio
- 'Business' navigation system (M-ASK)

The service concept of the CCC permits replacement of individual assemblies. It is based on the concept implemented on the E60. The following assemblies can be replaced:

- Fan
- CD and DVD player
- Front panel
- HIP, gyro sensor
- Tuner/audio board

Observe the ESD guidelines when replacing components.

⚠ The CCC must not be stood on its rear panel as the sockets may be damaged by the weight of the unit. ◄

## Diagnosis

The BMW diagnosis system details the control-unit entries shown in the table in respect of the radios and navigation systems:

| 'Business CD' radio CD-72 | 'Professional' radio CD-73/MD-73 | 'Business' navigation system M-ASK | 'Professional' navigation system CCC |
|---|---|---|---|
| RAD | RAD2-GW | M-ASK-GW | CCC-GW |
| | RAD2-BO | M-ASK-BO | CCC-BO |
| | | M-ASK-NAV | CCC-A |
| | | | CCC-ANT |
| | | | CCC-ASK |

Key:

GW: Gateway

BO: User interface

NAV: Navigation system

A: Applications

ANT: Antenna tuner

ASK: Audio system controller

# Antennas

## Antenna diagnosis

Aerial diagnosis on the E90 is similar to the diagnostic procedure on the E60 and E87:

The self-diagnosis procedure for the diversity module is initiated in the diagnosis module of the BMW diagnosis system. The self-diagnosis comprises a check of the aerial inputs based on a DC measurement. Following positive completion, each individual FM antenna is specifically switched on one after the other and the signal quality evaluated (antenna scan). The AM reception can be evaluated in the LW, SW and MW range with the AM amplifier switched on and off. The diagnosis system evaluates the measurements and deduces the status when the self-diagnosis of the diversity module provides a positive result.

This procedure can also be performed manually in Service mode on the 'Business CD' and 'Professional' radios:

The signal quality and field strength of the station currently tuned in can be displayed in service mode. The active antenna can also be specifically controlled. If the system switches over to the FM4 aerial, the signals of the FM1 and FM2 aerials are used, as only three FM aerials physically exist. A defective antenna can be located by switching over the active antenna and evaluating the signal quality and field strength. Refer to "Service mode" above.

⚠ A fault is detected during self-diagnosis if "ANT Error" is indicated in radio service mode. ◄

⚠ Low values with regard to signal quality and field strength may indicate to damaged antennas or the absence of terminal Rad_On. Terminal Rad_On supplies power to the antenna amplifier and the diversity module. ◄

# Peripherals

## Audio jack

The audio inputs can be coded as follows:

- "No AUX": Audio inputs not active

  The audio jack is inoperative. "AUX" is no longer offered as a menu item for mode changeover in the radio. This coding is used for the 'Business CD' radio as it is not available with an audio jack.

- "AUX": Audio inputs active (basic setting on the E87 if the 'Professional' radio or a navigation system is fitted)

  The audio jack is operational. "Aux" is offered as a menu item for mode changeover on the radio.

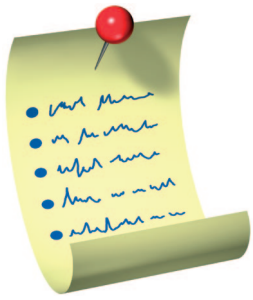
⚠ Particular care must be taken to ensure that the audio inputs are activated by programming the appropriate code if the radio/ navigation system is replaced or the audio jack is retrofitted. ◄

# Summary
## Audio systems

## Points to remember

The most important information relating to audio systems in the BMW 3 Series is summarized in the following table.

It can be used as a final check-list for what you should now have learned.



Points to remember for everyday theoretical and practical applications.

| | Audio systems |
|---|---|
|  | Two radios and two navigation systems are available for the BMW 3 Series (E90).<br>The 'Business CD' radio<br>• has a K-CAN link<br>• can be combined with the 'Stereo' and 'HiFi' systems<br>The 'Professional' radio and the 'Business' and 'Professional' navigation systems<br>• have a K-CAN and MOST link<br>• can be combined with the Stereo, HiFi and Top-HiFi systems<br>• enable operation of systems within the MOST network such as the 6-CD CD changer, the 'Top-HiFi' amplifier and the telephone systems<br>The 'Stereo' system consists of 6 speakers; the corresponding amplifier is in the radio/navigation system.<br>The 'HiFi' system consists of 10 speakers; the corresponding analogue 6-channel amplifier is in the boot.<br>The 'Top-HiFi' system consists of 13 speakers; the corresponding digital 9-channel amplifier is in the boot.<br>Radio aerials and aerial diversity module:<br>• There are three FM aerials and one AM aerial on the rear window<br>• To improve reception quality, the diversity module artificially creates a fourth aerial. It is created by overlaying the signals of the FM1 and FM2 aerials.<br>• The diversity module relays the high-frequency signals to the radio or navigation system. If the reception quality or field strength falls below a predefined level, the diversity module switches over to the next FM aerial.<br>The 6-CD CD changer is MP3-compatible.<br>Systems from the 'Professional' radio upwards have an audio jack for connecting external devices to the audio system.<br>On the US version, the SDARS satellite tuner is also an option. |

# Test questions
## Audio systems

## Questions

Check what you have learned

In this section, you can check what you have learned about audio systems.

**1. What bus connection does the 'Business CD' radio have?**

- ☐ K-CAN
- ☐ PT-CAN
- ☐ MOST
- ☐ F-CAN

**2. Which radios and navigation systems support the aerial diversity module?**

- ☐ 'Business CD' radio
- ☐ 'Professional' radio
- ☐ 'Business' navigation system
- ☐ 'Professional' navigation system

**3. On what vehicle has the 'Top-HiFi' LOGIC 7 amplifier been used before?**

- ☐ BMW 5 Series (E60)
- ☐ BMW Z4 (E83)
- ☐ BMW X5 (E53)
- ☐ BMW 7 Series (E65)

**4. With which radios and navigation systems can the 'HiFi' system be combined?**

- ☐ 'Business CD' radio
- ☐ 'Professional' radio
- ☐ 'Business' navigation system
- ☐ 'Professional' navigation system

**5. How many physically existent FM aerials are used by the aerial diversity module?**

- ☐ 2 FM aerials
- ☐ 3 FM aerials
- ☐ 4 FM aerials
- ☐ 5 FM aerials

**6. Where are the FM aerials located?**

- ☐ On the roof
- ☐ On the side windows
- ☐ On the rear window

## Solutions to test questions

**1. What bus connection does the 'Business CD' radio have?**

☑ K-CAN
☐ PT-CAN
☐ MOST
☐ F-CAN

**2. Which radios and navigation systems support the aerial diversity module?**

☑ 'Business CD' radio
☑ 'Professional' radio
☑ 'Business' navigation system
☑ 'Professional' navigation system

**3. On what vehicle has the 'Top-HiFi' LOGIC 7 amplifier been used before?**

☑ BMW 5 Series (E60)
☐ BMW Z4 (E83)
☐ BMW X5 (E53)
☑ BMW 7 Series (E65)

**4. With which radios and navigation systems can the 'HiFi' system be combined?**

☑ 'Business CD' radio
☑ 'Professional' radio
☑ 'Business' navigation system
☑ 'Professional' navigation system

**5. How many physically existent FM aerials are used by the aerial diversity module?**

☐ 2 FM aerials
☑ 3 FM aerials
☐ 4 FM aerials
☐ 5 FM aerials

**6. Where are the FM aerials located?**

☐ On the roof
☐ On the side windows
☑ On the rear window

# Contents
## Navigation systems





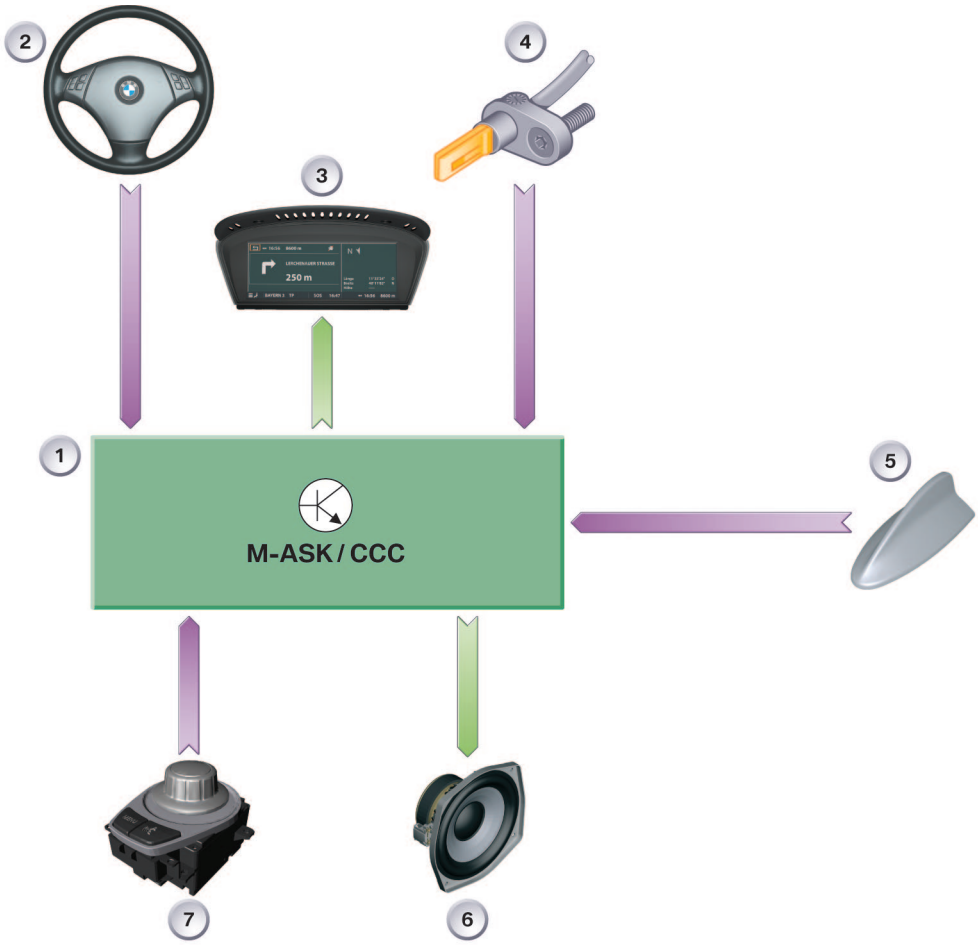




# System overview
## Navigation systems

## 'Business' and 'Professional' navigation systems

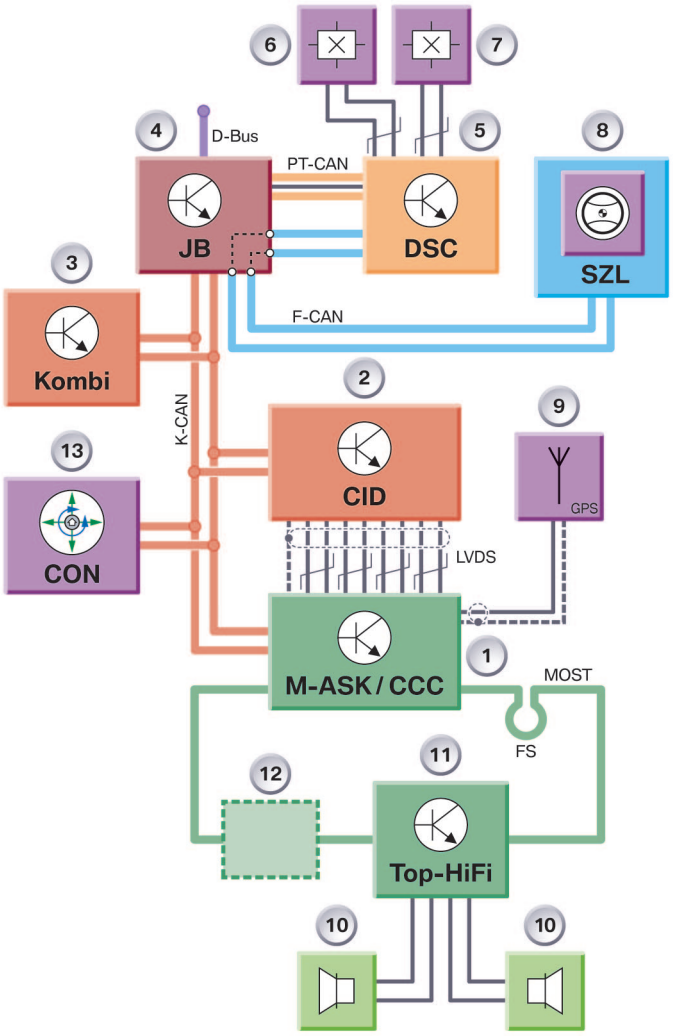
### Input/Output




1 - 'Business' or 'Professional' navigation system

| Index | Explanation | Index | Explanation |
|---|---|---|---|
| 1 | 'Business' navigation system (M-ASK) or 'Professional' navigation system (CCC) | 5 | Roof aerial (GPS) |
| 2 | Multifunction steering wheel (MFL) | 6 | Audio speaker |
| 3 | Central information display (CID) | 7 | Controller |
| 4 | Wheel speed sensor (2x) | | |

## System circuit diagram




TE04-4860

2 - 'Business' or 'Professional' navigation system

| Index | Explanation | Index | Explanation |
|---|---|---|---|
| 1 | 'Business' navigation system (M-ASK) or 'Professional' navigation system (CCC) | 7 | Wheel speed sensor, rear right |
| 2 | Central information display | 8 | Steering column switch cluster |
| 3 | Controller | 9 | GPS antenna |
| 4 | Junction box control unit | 10 | Audio speaker |
| 5 | Dynamic stability control | 11 | Audio amplifier |
| 6 | Wheel speed sensor, rear left | 12 | MOST components (optional) |
| LVDS | Low voltage differential signal (digital RGB signal) | MOST | Media orientated system transport (digital bus) |
| FS | MOST direct access | | |

The travel data from the wheel speed sensors is transmitted as a bus message. It is broadcast on the PT-CAN by the DSC. From there it is transferred to the K-CAN by the junction box control unit and passed to the navigation system.

⚠ On the US version, the 'Professional' navigation system (CCC) is offered. ◄

# System components
## Navigation systems

## General description

This section describes the two navigation systems available on the E90. With few exceptions, with regard to function, display and operation, these navigation systems correspond to the navigation systems used in the E60.

Available systems:

- SA606 "'Business' navigation system" (M-ASK)
- SA609 "'Professional' navigation system" (CCC)

Both navigation systems are made up of the following components:

- Navigation computer with GPS receiver and yaw rate sensor in the M-ASK or CCC control unit
- GPS antenna
- Double tuner (radio/TMC data)
- DVD-Laufwerk mit Navigations-DVD

Additional information:

- Wheel speed sensor information from DSC control unit (bus message)
- Reverse gear signal from footwell module (bus message)
- TMC data (Traffic Message Control)

The data structure of the navigation DVDs for both navigation systems differs and is therefore not compatible. The 'Business' (M-ASK) and 'Professional' (CCC) navigation DVDs for the E60 to E64 and E87 can be used for the corresponding systems on the E90. The DVD player can play audio CDs. The M-ASK enables playback of MP3 files. The playback of audio DVDs and video DVDs is not supported. Please refer to the Owner's Handbook for more detailed information on operation.

On the Japan version a separate navigation computer is fitted in the boot on the left-hand side.

## Functional principle of the navigation system

Each satellite transmits messages with the following (simplified) information:

- Number of the satellite
- Current position of the satellite
- Message time

The satellite additionally broadcasts so-called orbit (path) and almanac data. These orbit and almanac data are stored in the navigation system and used for subsequent calculations to enable fast acquisition of the currently available satellites. Almanac data contain information on the orbits of all satellites, time correction factors and atmospheric delay parameters.

To determine the position, the GPS data are received by the GPS antenna in the antenna base and routed via a coaxial cable to the navigation computer (CCC or M-ASK). The GPS data are decoded. To determine the location, the navigation system compares the time at which the signal was sent with the time at which the signal was received. The distance of the satellite can be calculated from this time difference. The time calculations are based on a highly accurate atomic clock (UTC: Universal Time Co-ordinated). The current position can now be determined by adding measurements from other satellites. The GPS receiver can determine its position on the earth's surface with the aid of at least three satellites. This process is known as "2D position fix". Two-dimensional because the receiver must assume that it is located directly on the earth's surface. The absolute spatial position can be determined with the aid of four or more satellites ("3D position fix"). The altitude is necessary, for example, on multi-tier road junctions and intersections.

⚠ A clear view of the sky is necessary for the reception of GPS data. Rain or snow normally do not interfere with reception. However, a very dense cover of wet leaves or shadow areas (high-sided buildings, rows of trees) may impair reception. In addition, depending on the time of day, there may be fluctuations in satellite reception at one location during a 24 hour period (example: Munich 5-10 satellites). This is due to the orbits of the satellites. ◄

The navigation system therefore calculates

- longitude
- latitude
- altitude from the satellite data.

Based on repeated measurements, the

- direction of movement and
- speed can also be calculated by way of GPS.

## Navigation mode

The present position is known at the start of the journey as it is either still stored or is checked/established at the time. When the vehicle is being driven, the navigation system receives the "distance covered" information from the DSC control unit via the bus (PT-CAN/junction box control unit/K-CAN). The rear left wheel speed sensor supplies the information necessary for this purpose to the DSC control unit. If that wheel speed sensor fails, the rear right wheel speed sensors takes over.

The yaw rate sensor determines any changes in direction such as when cornering. Changes in altitude are not detected by the two-dimensional yaw rate sensor. The current position can be determined by combined evaluation of the "distance covered" and "driving direction". The position calculated in this way is compared to the navigation data stored on the DVD. If considerable deviations occur (incorrect calculations due to inaccurate sensor data, outdated map data), priority is given to the current position determined by the GPS. During normal operation, the position is therefore determined during navigation operation based on correspondingly processing the wheel speed and yaw rate sensor information. The footwell module makes available the "reversing" information in the form of a bus message to the navigation system and this information is taken into account in the position calculation. On manual transmission vehicles, the reverse gear switch is located on the manual gearbox. On automatic transmission vehicles, the reverse gear information is provided by the transmission control unit that detects the status of the selector lever position switch.

After the navigation computer has been disconnected from the power supply, it can take up to 10 minutes before the navigation system determines the current position as an update of the almanac data and the received satellite data is necessary in this case. Delayed positioning can also occur after longer parking periods (e.g. holidays).

The following aids are available for route guidance purposes:

- Display of current position on the screen
- Direction arrows as orientation for further road routing
- Distance information up to the next change in direction (turn off)
- Voice announcements for further route guidance
- Distance to destination
- Route list and destination list
- Calculated route indicated by a white line to the destination in the map presentation (CCC only)

## Traffic Message Channel (TMC)

Some UHF radio stations broadcast traffic information in the form of TMC data. That data is transmitted in digital form as part of the RDS (Radio Data System) signal. The TMC data is automatically analysed and processed by the BMW navigation systems. This enables the driver to save time by avoiding traffic hold-ups or to be warned in advance about hazards.

With the introduction of the TMC 3.0 standard by TMC radio transmitters, the accuracy of the traffic bulletins and the recommended diversions have substantially improved. This advance means that the navigation systems have to be equipped with the latest software. The navigation system on the E90 will be able to decode the new standard from the start of production. In addition, use of the new TMC 3.0 standard requires use of the up-to-date "digital road map".

In addition to the free TMC service, there are also chargeable radio traffic information services. These are offered as the V-Info Plus component of the BMW Assist service. For the E90, the V-Info Plus service will be transmitted as an encrypted RDS signal by certain radio stations. To distinguish it from the free TMC service, it will be known as "Conditional Access TMC" (CA TMC).

The advantages of this free service are a faster update rate and the improved accuracy of the reports.

## SA606 "'Business' navigation system"

The 'Business' navigation system is based on the M-ASK (as used on the E60, E61 and E87) and features the following familiar range of functions:

- Navigation with arrow mode
- Display on 6.5" colour CID
- Memory navigation (navigation DVD can be removed after programming)
- Dynamic route planning with traffic queue avoidance based on RDS-TMC (Radio Data System - Traffic Message Channel)
- NEW: The V-Info Plus service is available as part of option SA612 "BMW Assist".
- Input via the mechanical controller
- The navigation DVD from the E60, E61 and E87 can be used in the 'Business' navigation system.

Processing of TMC information is a programmable option. The higher-grade V-Info Plus service is an extra-cost option (SA612) and can be activated independently of TMC. It can only be used if a Telematic Control Unit is fitted and BMW Assist is enabled.

# SA609 "'Professional' navigation system"

The 'Professional' navigation system is based on the CCC (already familiar from the E60 to E64 and E87) and features the following range of functions:

- Navigation with map and arrow mode
- Display on 8.8" colour CID
- Split-screen view
- Perspective map presentation
- Dynamic route planning with traffic queue avoidance based on RDS-TMC (Radio Data System - Traffic Message Channel)
- The V-Info Plus service is available as part of option SA612 "BMW Assist".
- Input via controller with electrically controlled haptics (feel), optionally controlled by voice commands (SA620)
- The navigation DVD from the E60 to E64 and E87 can be used in the 'Professional' navigation system.

TMC function can be activated in the "Settings" menu. The current TMC transmitter can be selected from a list of TMC transmitters that can be currently received. The higher-grade V-Info Plus service is an extra-cost option (SA612) and can be activated independently of TMC. It can only be used if a Telematic Control Unit is fitted and BMW Assist is enabled.

In the Japan country-specific version, the navigation data are calculated by a separate navigation computer (JNAV). The data are sent via the CCC to the CID.


1 - Perspective (left) and direction-indicating (right) map presentation

# 'Business' navigation system (M-ASK) and 'Professional' navigation system (CCC)

## Navigation DVD

The navigation DVDs of the 'Business' navigation system (M-ASK) and of the 'Professional' navigation system (CCC) are not mutually compatible. These DVDs, however, are compatible with other vehicles (e.g. E60) with the same equipment (M-ASK or CCC).

⚠ If the navigation DVD is not recognized although the correct DVD is loaded in the player, the DVD should be removed and reinserted. ◄

## Media ejection

If the navigation DVD is not ejected during normal operation by pressing the Eject button, carry out the following procedure:

- Reset CCC
- Press the Eject button several times during start-up

Alternatively, the system can be activated by means of the BMW diagnosis system (control unit functions).

⚠ No mechanical emergency release facility is provided on the DVD player to remove media. ◄

## Start-up

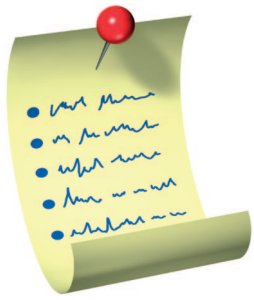
After disconnecting the battery, due to the necessary data transmission, it may take up to 10 minutes before the navigation system correctly displays the current position.

# Summary
## Navigation systems

## Points to remember

The most important information relating to navigation systems in the new BMW 3 Series is summarized in the following table.

It can be used as a final check-list for what you should now have learned.



Points to remember for everyday theoretical and practical applications.

| | Navigation systems |
|---|---|
|  | Two DVD-based navigation systems are offered. |
| | The 'Business' navigation system (arrow mode) is based on the M-ASK with memory navigation. |
| | The 'Professional' navigation system (map presentation) is based on the CCC. |
| | CCC and M-ASK incorporate a GPS receiver and yaw rate sensor. |
| | The GPS aerial is integrated in the roof aerial. |
| | The data from the rear left wheel speed sensor is used to calculate the distance travelled. |
| | The data from the wheel speed sensor is transmitted as a bus message. |
| | Both navigation systems use TMC (double tuner) for dynamic route planning. |
| | The CCC permits a perspective map view. |

# Test questions
## Navigation systems

## Questions

Check what you have learned

In this section, you can check what you have learned about navigation systems.

**1. Which control unit offers map navigation?**

☐ CCC

☐ M-ASK

**2. Which wheel speed sensor is used to calculate position?**

☐ Front right

☐ Front left

☐ Rear right

☐ Rear left

**3. How is the data from the wheel speed sensor transmitted?**

☐ Direct transmission

☐ Bus message

**4. Which navigation system offers memory navigation?**

☐ 'Business' navigation system

☐ 'Professional' navigation system

## Solutions to test questions

**1. Which control unit offers map navigation?**

☑ CCC

☐ M-ASK

**2. Which wheel speed sensor is used to calculate position?**

☐ Front right

☐ Front left

☐ Rear right

☑ Rear left

**3. How is the data from the wheel speed sensor transmitted?**

☐ Direct transmission

☑ Bus message

**4. Which navigation system offers memory navigation?**

☑

☐ 'Business' navigation system 'Professional' navigation system

# Contents
## TV system



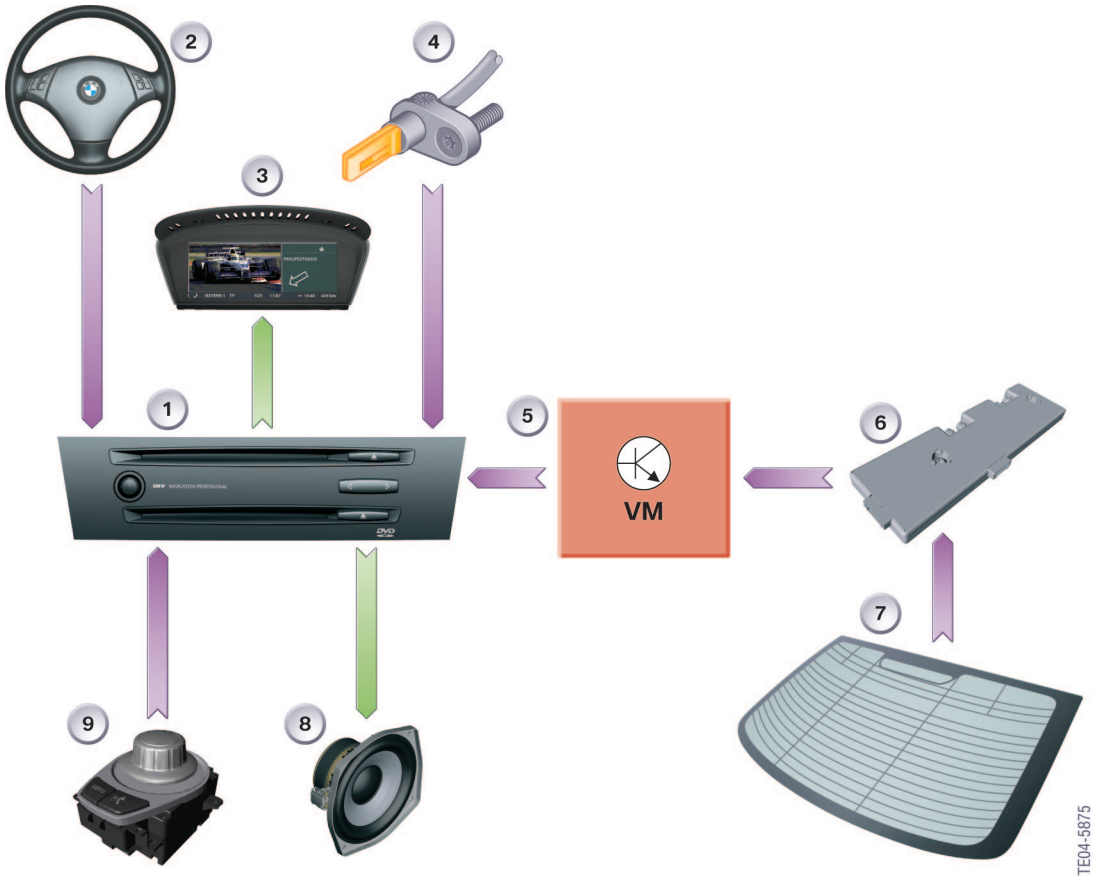




# System overview
## TV system

## Hybrid video module

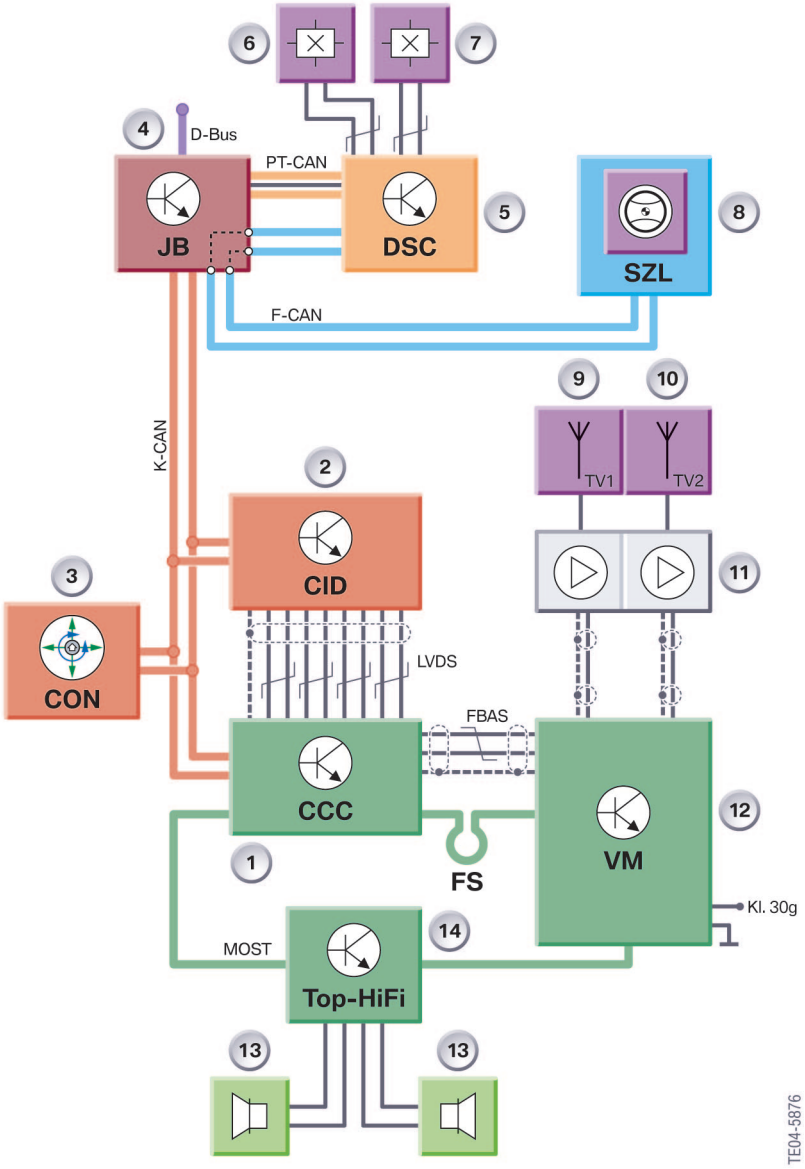
### Input/Output




1 - TV system

| Index | Explanation | Index | Explanation |
|---|---|---|---|
| 1 | 'Professional' navigation system (CCC) | 6 | TV aerial amplifier in diversity module |
| 2 | Multifunction steering wheel (MFL) | 7 | Rear window aerials (TV1, TV2) |
| 3 | Central information display (CID) | 8 | Audio speaker |
| 4 | Wheel speed sensor (2x) | 9 | Controller |
| 5 | Hybrid video module | | |

## System circuit diagram




2 - TV system

| Index | Explanation | Index | Explanation |
|---|---|---|---|
| 1 | 'Professional' navigation system (CCC) | 8 | Steering column switch cluster |
| 2 | Central information display | 9 | TV1 aerial |
| 3 | Controller | 10 | TV2 aerial |
| 4 | Junction box control unit | 11 | TV amplifier in diversity module |
| 5 | Dynamic stability control | 12 | Video module |
| 6 | Wheel speed sensor, rear left | 13 | Audio speaker |
| 7 | Wheel speed sensor, rear right | 14 | Audio amplifier |
| LVDS | Low voltage differential signal (digital RGB signal) | MOST | Media orientated system transport (digital bus) |
| FS | MOST direct access | FBAS | Synchronous colour picture blanking signal |

For switching off the monitor when the car is being driven, the road speed signal (DSC control unit and wheel speed sensors) is analysed.

The road speed signal is transmitted as a bus message to the CCC.

## Digital television

Digital television is the transmission of the previously analogue video and audio signals for television broadcast in digital form.

In Europe and most other countries in the world, transmissions are broadcast using the DVB standard (Digital Video Broadcasting). Japan and the USA use different standards.

The video and audio data is digitized and compressed prior to transmission. A television picture of 216 Mbit/s studio quality can be compressed using MPEG-2 (Moving Picture Experts Group, 2nd generation) to 3-4 Mbit/s. Despite the lower data rate, an equivalent perceived image quality is obtained. The compression (like MP3 compression) inherently involves data loss. Digital data transmission in itself is virtually loss-free. Due to the substantial MPEG compression, up to 4 digital TV channels can be transmitted using DVB-T within the band width previously occupied by a single analogue TV channel.

Digital television can be broadcast via cable (DVB-C), satellite (DVB-S) or terrestrial transmitter (DVB-T). For mobile reception, BMW uses DVB-T. A major advantage of digital television is the error-correction capability and, consequently, the improved picture quality. One error-correction method is the use of multi-source signals. These are received from different transmitters and then overlaid. The multi-source signals are brought about by signal reflection (e.g. by large buildings) and on analogue televisions cause the well-known "ghosting" effect.

Digital video compression has achieved widespread use as a result of the DVD (Digital Versatile Disc). Video DVDs also use the MPEG-2 standard.

## Hybrid video module

The hybrid video module enables the reception of terrestrial analogue and digital television signals. It replaces the combination of Video module 5 (analogue TV tuner) and the set-top box (digital TV receiver).

The range of functions of the hybrid video module is the same as the Video module 5.

Changeover between digital and analogue television is performed automatically. The switch from digital to analogue signal is discernible by the increase in picture noise.

The same aerial structures on the rear window can be used to receive both analogue and digital signals because the signals are transmitted in the same frequency bands.

The TV function can be ordered as a separate option. In that case, the CCC plus Controller and CID is fitted without navigation system.

The hybrid video module is fitted in the boot, on the left behind the trim panel.

The Video module 5 will continue to be fitted in countries where there is no digital TV reception.

⚠ No video module is offered on the US version. ◄

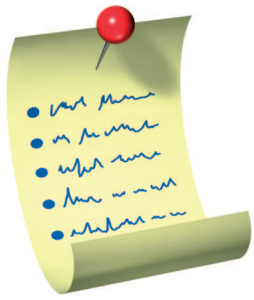
⚠ On the Japan version, the present Video module 5 will continue to be used. ◄

# Summary
## TV system

## Points to remember

The most important information relating to TV systems in the BMW 3 Series is summarized in the following table.

It can be used as a final check-list for what you should now have learned.



Points to remember for everyday theoretical and practical applications.

| | TV systems |
|---|---|
|  | The hybrid video module is fitted in countries where digital television is available. It replaces the combination of Video module 5 and set-top box.<br><br>In countries where digital television is not available, the Video module 5 will continue to be fitted.<br><br>The hybrid video module automatically switches between analogue and digital television signals.<br><br>The standard for terrestrial digital television broadcasts is called DVB-T and replaces the old analogue signal transmission system.<br><br>Digital television produces better-quality TV reception than with analogue signals. |

# Test questions
## TV system

## Questions

Check what you have learned

In this section, you can check what you have learned about TV systems.

**1. Where are the TV aerials located?**

- ☐ On the roof
- ☐ On the side windows
- ☐ On the rear window
- ☐ In the rod aerial

**2. Where is the hybrid video module fitted?**

- ☐ In the headliner
- ☐ In the centre console
- ☐ In the boot, at the rear on the left
- ☐ Built into the CCC

**3. Where are the digital TV signals decoded?**

- ☐ CCC
- ☐ Video module 5 (VM5)
- ☐ Hybrid video module

## Solutions to test questions

**1. Where are the TV aerials located?**

☐ On the roof
☐ On the side windows
☑ On the rear window
☐ In the rod aerial

**2. Where is the hybrid video module fitted?**

☐ In the headliner
☐ In the centre console
☑ In the boot, at the rear on the left
☐ Built into the CCC

**3. Where are the digital TV signals decoded?**

☐ CCC
☐ Video module 5 (VM5)
☑ Hybrid video module

# Contents
## Telephone systems





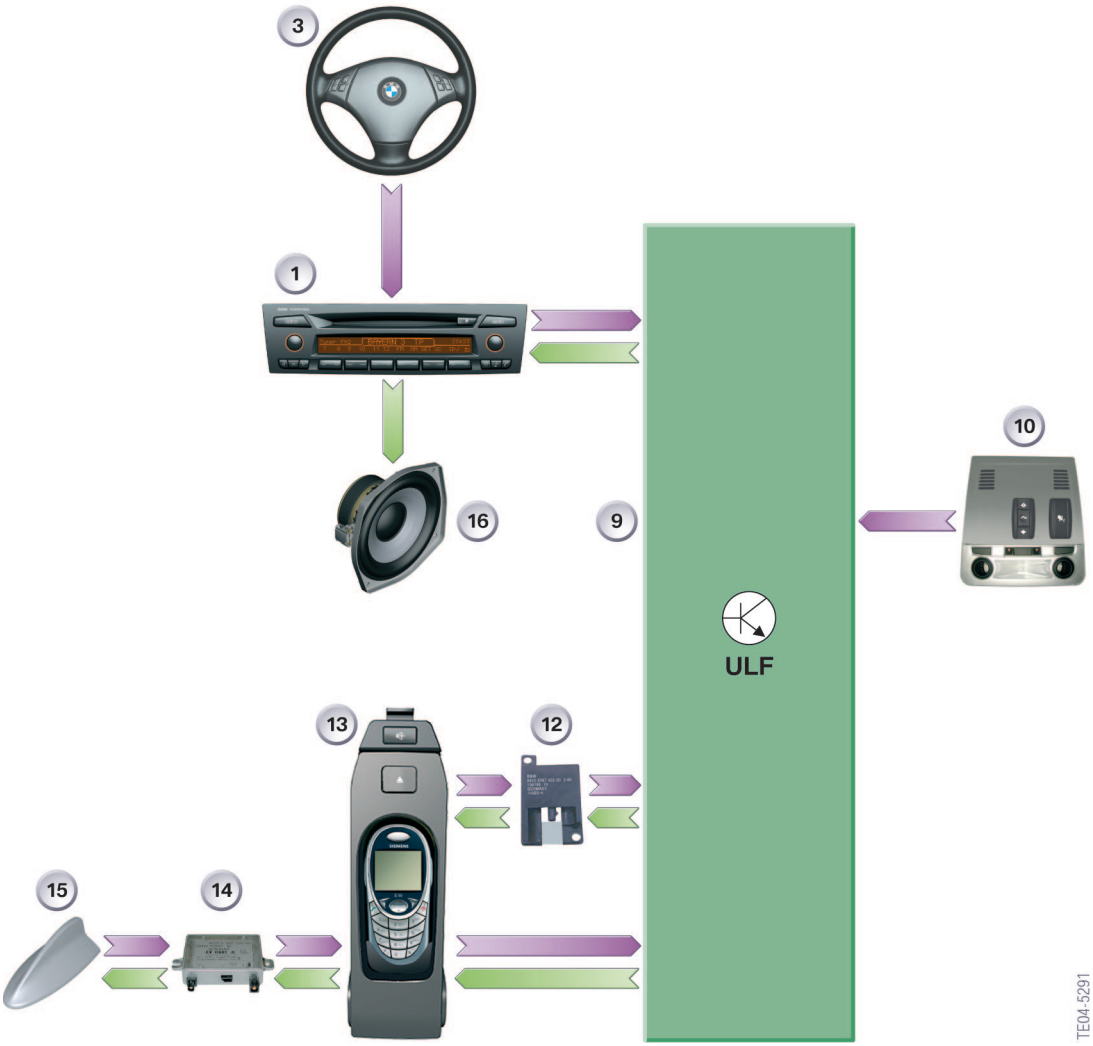




# System overview
## Telephone systems

## SA644 "Universal mobile phone preparation"

### Input/Output



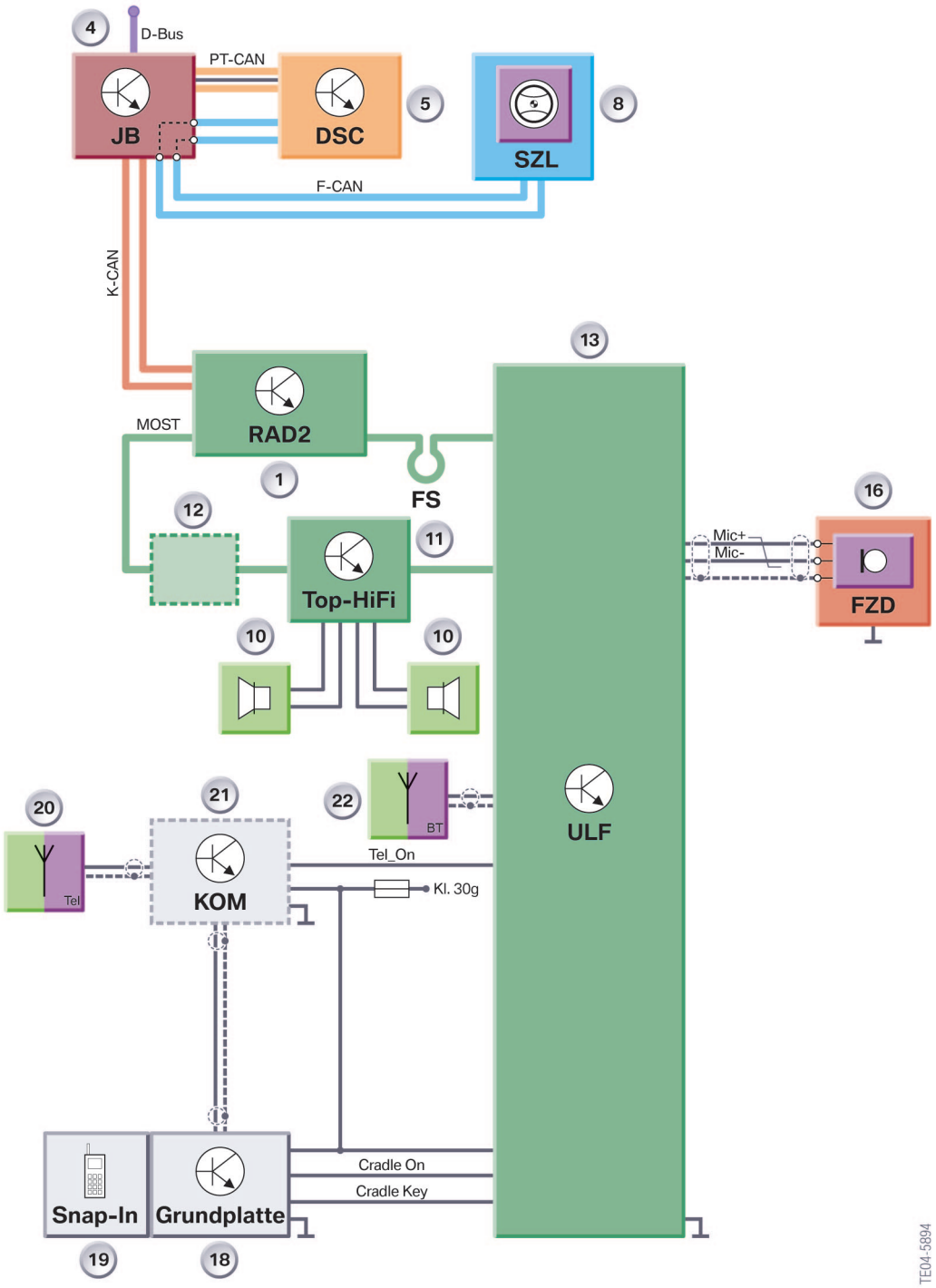

1 - Universal mobile phone preparation

| Index | Explanation | Index | Explanation |
|---|---|---|---|
| 1 | 'Professional' radio (RAD2) | 13 | Snap-in adapter with mobile phone |
| 3 | Multifunction steering wheel (MFL) | 14 | Line compensator (optional) |
| 9 | Universal charging and hands-free facility | 15 | Roof aerial (telephone) |
| 10 | Microphone, driver's side (telephone) | 16 | Audio speaker |
| 12 | Bluetooth antenna | | |

The input/output diagram also applies to the 'Business' and 'Professional' navigation systems.

In those cases the Central Information Display (CID) and the Controller (CON) are also fitted.

## System circuit diagram




2 - Universal mobile phone preparation

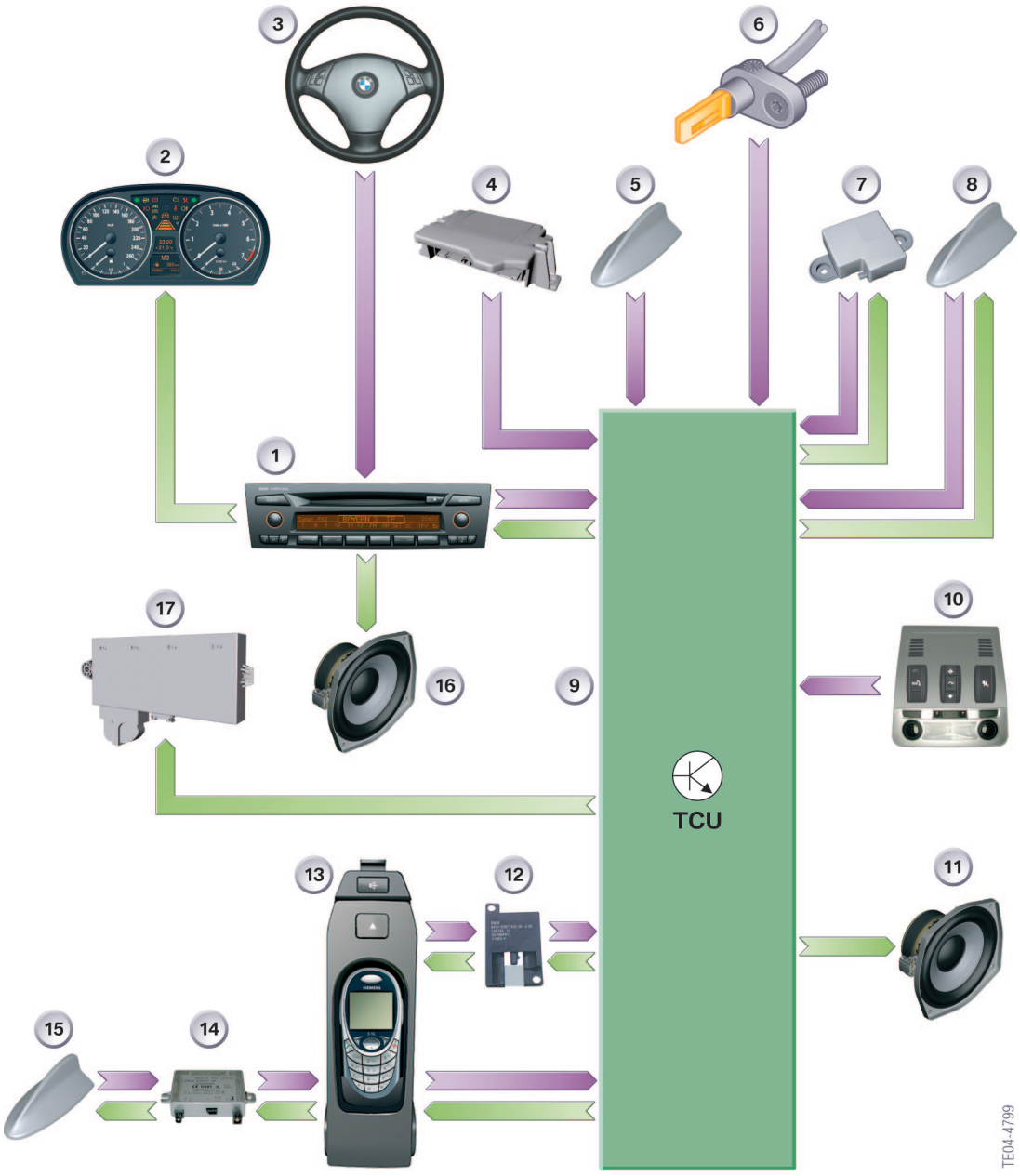
| Index | Explanation | Index | Explanation |
|---|---|---|---|
| 1 | 'Professional' radio | 13 | Universal charging and hands-free facility |
| 4 | Junction box control unit | 16 | Roof function module (driver's-side microphone) |
| 5 | Dynamic stability control | 18 | Base plate |
| 8 | Steering column switch cluster | 19 | Snap-in adapter with mobile phone |
| 10 | Audio speaker | 20 | Telephone antenna |
| 11 | Audio amplifier | 21 | Line compensator (optional) |
| 12 | MOST components (optional) | 22 | Bluetooth antenna |
| FS | MOST direct access | MOST | Media orientated system transport (digital bus) |
| Mic+ | Microphone, positive | Mic- | Microphone, negative |
| Cradle On | ON signal for the charger electronics in the snap-in adapter | Cradle Key | Call accept/transfer/pairing button |
| Tel_On | Telephone ON signal for compensator | | |

The system circuit diagram also applies to the 'Business' and 'Professional' navigation systems. In those cases the Central Information Display ( CID) and the Controller (CON) are also fitted.

Communication between mobile phone and universal charging and hands-free facility (ULF) takes place via the Bluetooth interface.

# SA633 "'Business' mobile phone station"

## Input/Output




3 - 'Business' mobile phone station with 'Professional' radio

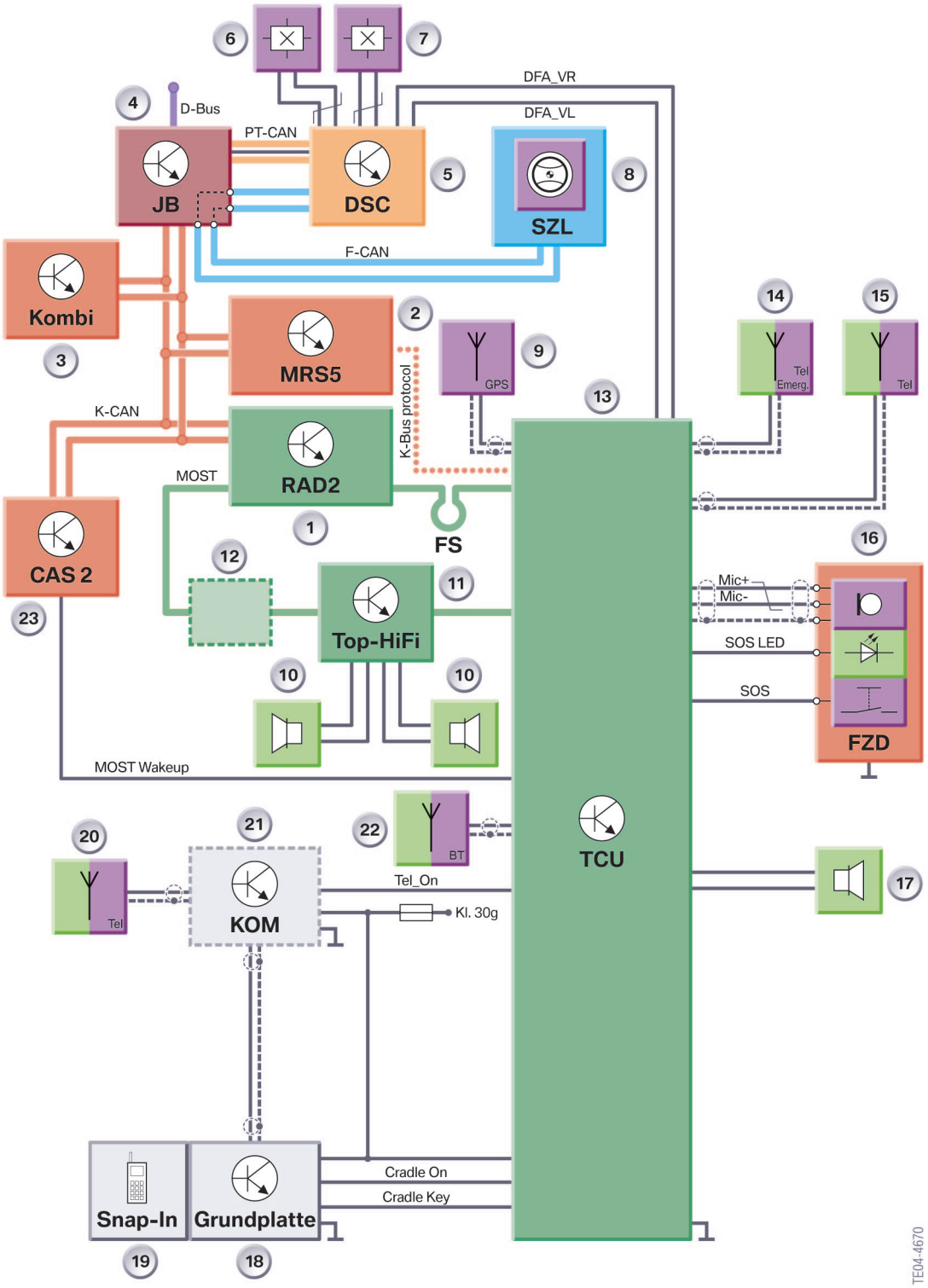
| Index | Explanation | Index | Explanation |
|---|---|---|---|
| 1 | 'Professional' radio (RAD2) | 10 | Roof function module (FZD) |
| 2 | Instrument cluster | 11 | SOS speaker |
| 3 | Multifunction steering wheel (MFL) | 12 | Bluetooth antenna |
| 4 | Multiple restraint system 5 (MRS5) | 13 | Snap-in adapter with mobile phone |
| 5 | Roof aerial (GPS) | 14 | Line compensator (optional) |
| 6 | Wheel speed sensor (2x) | 15 | Roof aerial (telephone) |
| 7 | SOS antenna | 16 | Audio speaker |
| 8 | Roof aerial (TCU) | 17 | Car Access System 2 (CAS2) |
| 9 | Telematic control unit | | |

There is a GPS decoder fitted in the Telematic Control Unit (TCU) so that the 'Professional' radio (RAD2) can support BMW Assist functions. Location pinpointing is facilitated by reading the front wheel speed sensor signals and the reversing light signal.

The aerials for GPS, TCU and mobile phone are located in the roof-aerial housing.

The input/output diagram also applies to the 'Business' (M-ASK) and 'Professional' (CCC) navigation systems. In those cases the Central Information Display ( CID) and the Controller (CON) are also fitted.

## System circuit diagram




4 - 'Business' mobile phone station with 'Professional' radio

| Index | Explanation | Index | Explanation |
|---|---|---|---|
| 1 | 'Professional' radio | 13 | Telematic control unit |
| 2 | Multiple restraint system 5 | 14 | SOS antenna |
| 3 | Instrument cluster | 15 | Telephone aerial (TCU) |
| 4 | Junction box control unit | 16 | Roof function module (driver's-side microphone, emergency-call button with emergency-call indicator lamp) |
| 5 | Dynamic stability control | 17 | SOS speaker |
| 6 | Wheel speed sensor, front left | 18 | Base plate |
| 7 | Wheel speed sensor, front right | 19 | Snap-in adapter with mobile phone |
| 8 | Steering column switch cluster | 20 | Telephone aerial (mobile phone) |
| 9 | GPS antenna | 21 | Line compensator (optional) |
| 10 | Audio speaker | 22 | Bluetooth antenna |
| 11 | Audio amplifier | 23 | Car access system 2 |
| 12 | MOST components (optional) | MOST | Media orientated system transport (digital bus) |
| MOST Wake-up | Vehicle wake-up signal from Telematic Control Unit | FS | MOST direct access |
| DFA_VL | Wheel speed signal, front left | DFA_VR | Wheel speed signal, front right |
| Mic+ | Microphone, positive | Mic- | Microphone, negative |
| SOS LED | Emergency-call indicator lamp | SOS | Emergency call signal |
| Cradle On | ON signal for the charger electronics in the snap-in adapter | Cradle Key | Call accept/transfer/pairing button |
| Tel_On | Telephone ON signal for compensator | | |

The system circuit diagram also applies to the 'Business' (M-ASK) and 'Professional' (CCC) navigation systems on the European version with the following modifications:

- Central Information Display ( CID) and Controller (CON) are fitted.
- The direct connection between the Dynamic Stability Control (DSC) and the Telematic Control Unit (TCU) is omitted. Instead, the data from the wheel speed sensors is sent as a bus message to the navigation system (M-ASK or CCC).

If the 'Professional' radio is fitted, the front left and front right wheel speed sensor signals are analysed. If a navigation system is fitted, the rear left wheel speed sensor signal is analysed.

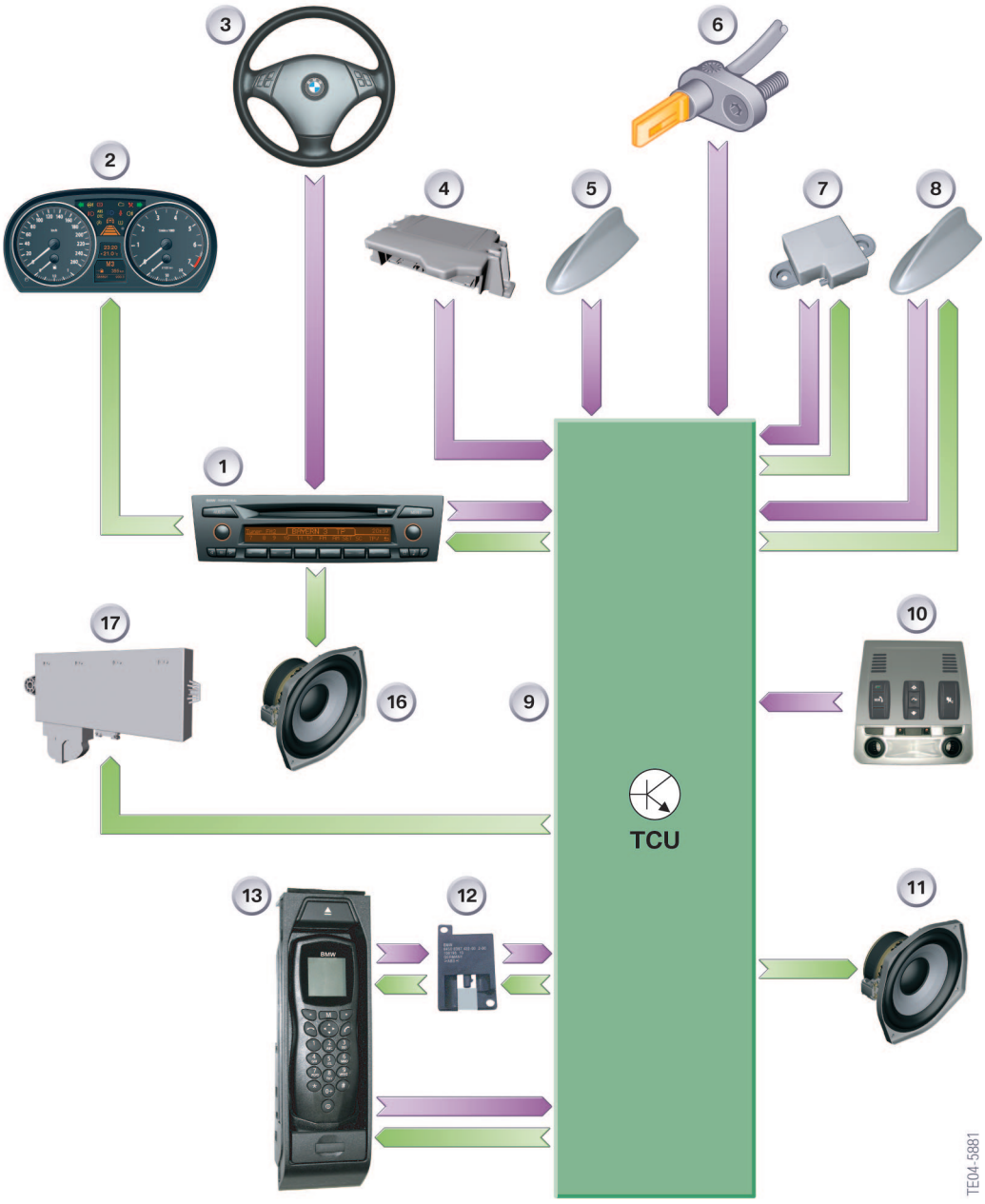
Communication between the mobile phone and the Telematic Control Unit takes place via the Bluetooth interface.

The bus link between the Multiple Restraint System 5 (MRS5) and the Telematic Control Unit (TCU) is used to trigger an emergency call in the event of a crash.

The eject button on the base board does not receive a signal from terminal 58g. The button is not illuminated.

# SA638 "'Professional' carphone"

## Input/Output

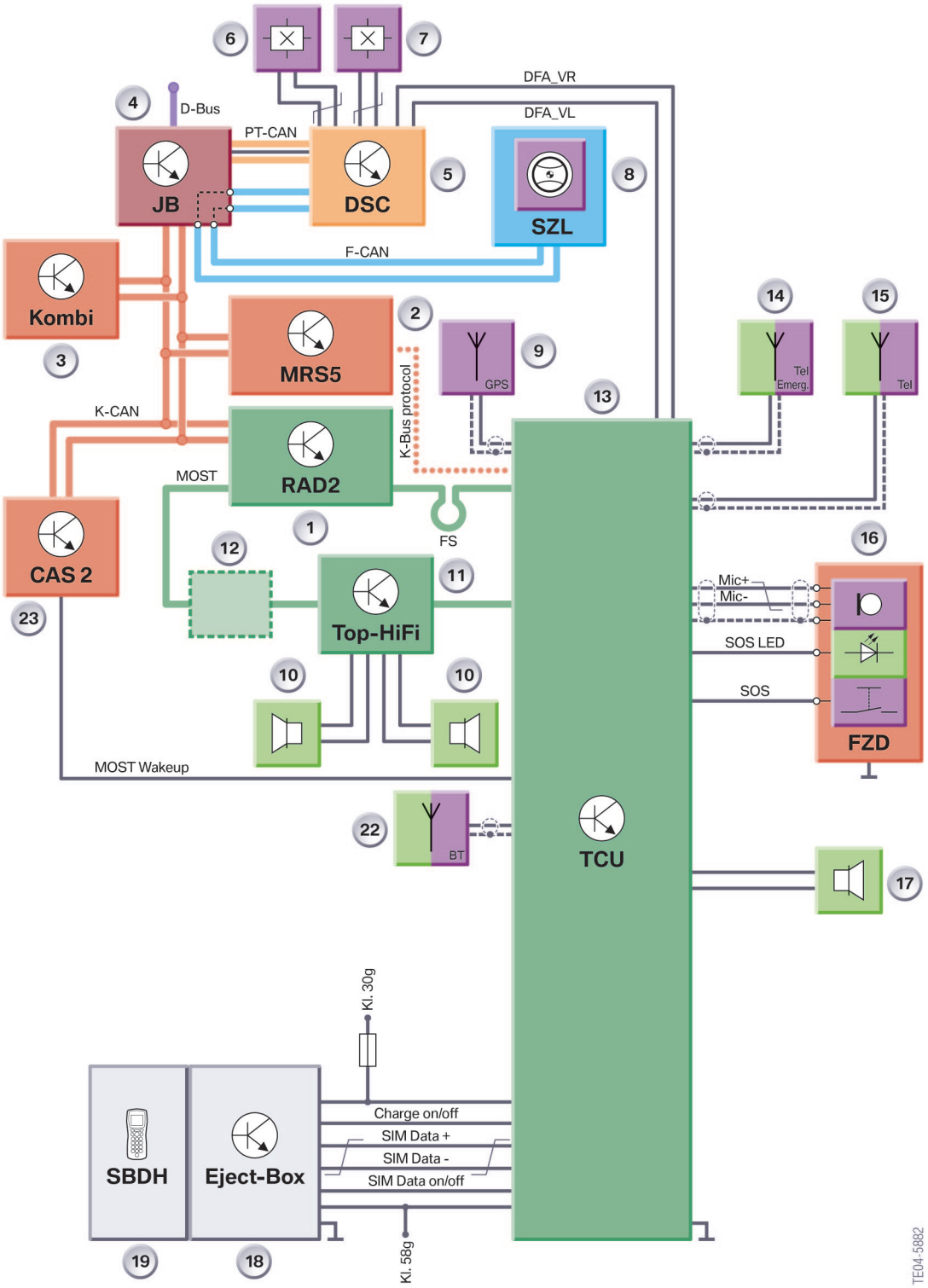



5 - 'Professional' carphone with 'Professional' radio

| Index | Explanation | Index | Explanation |
|---|---|---|---|
| 1 | 'Professional' radio (RAD2) | 9 | Telematic control unit |
| 2 | Instrument cluster | 10 | Roof function module (FZD) |
| 3 | Multifunction steering wheel (MFL) | 11 | SOS speaker |
| 4 | Multiple restraint system 5 (MRS5) | 12 | Bluetooth antenna |
| 5 | Roof aerial (GPS) | 13 | Eject box with handset (SBDH) |
| 6 | Wheel speed sensor (2x) | 16 | Audio speaker |
| 7 | SOS antenna | 17 | Car Access System 2 (CAS2) |
| 8 | Roof aerial (TCU) | | |

The input/output diagram also applies to the 'Business' (M-ASK) and 'Professional' (CCC) navigation systems. In those cases the Central Information Display ( CID) and the Controller (CON) are also fitted.

## System circuit diagram




6 - 'Professional' carphone with 'Professional' radio

| Index | Explanation | Index | Explanation |
|---|---|---|---|
| 1 | 'Professional' radio | 12 | MOST components (optional) |
| 2 | Multiple restraint system 5 | 13 | Telematic control unit |
| 3 | Instrument cluster | 14 | SOS antenna |
| 4 | Junction box control unit | 15 | Telephone aerial (TCU) |
| 5 | Dynamic stability control | 16 | Roof function module (driver's-side microphone, emergency-call button with emergency-call indicator lamp) |
| 6 | Wheel speed sensor, front left | 17 | SOS speaker |
| 7 | Wheel speed sensor, front right | 18 | Eject box |
| 8 | Steering column switch cluster | 19 | Handset |
| 9 | GPS antenna | 22 | Bluetooth antenna |
| 10 | Audio speaker | 23 | Car access system 2 |
| 11 | Audio amplifier | MOST | Media orientated system transport (digital bus) |
| MOST Wake-up | Vehicle wake-up signal from Telematic Control Unit | FS | MOST direct access |
| DFA_VL | Wheel speed signal, front left | DFA_VR | Wheel speed signal, front right |
| Mic+ | Microphone, positive | Mic- | Microphone, negative |
| SOS LED | Emergency-call indicator lamp | SOS | Emergency call signal |
| SIM Data + | Data cable for SIM card reader | SIM Data- | Data cable for SIM card reader |
| SIM Data on/off | Switchover between control/data signals, SIM card reader | Charge on/off | ON signal for the charger electronics in the eject box |

The system circuit diagram also applies to the 'Business' (M-ASK) and 'Professional' (CCC) navigation systems with the following modifications:

- Central Information Display ( CID) and Controller (CON) are fitted.
- The direct connection between the Dynamic Stability Control (DSC) and the Telematic Control Unit (TCU) is omitted. Instead, the data from the wheel speed sensors is sent as a bus message to the navigation system (M-ASK or CCC).

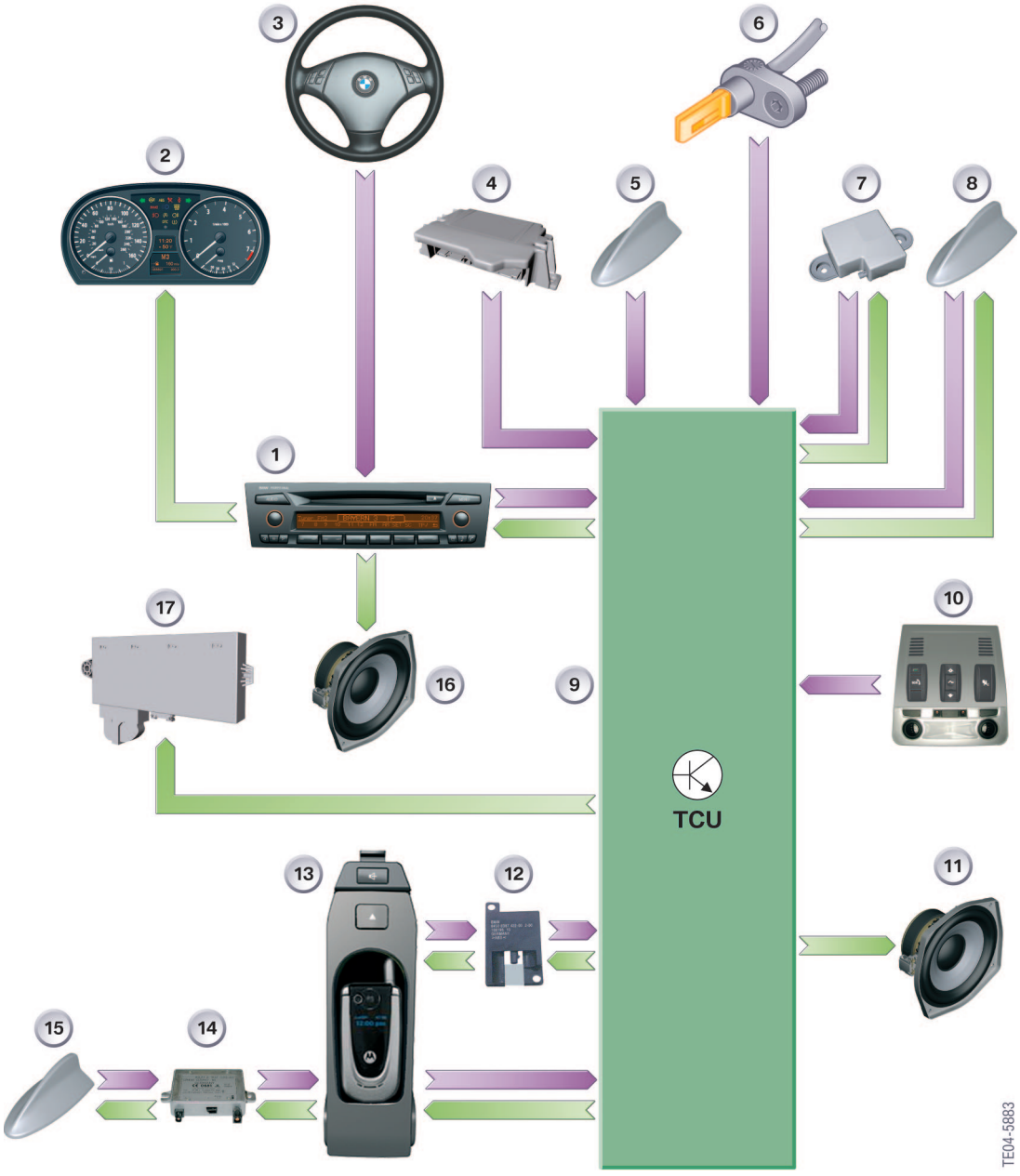
If the 'Professional' radio is fitted, the front left and front right wheel speed sensor signals are analysed, if a navigation system is fitted, the rear left wheel speed sensor signal is analysed.

Communication between the mobile phone and the Telematic Control Unit takes place via the Bluetooth interface. The SIM card-reader link is a wired connection.

The bus link between the Multiple Restraint System 5 (MRS5) and the Telematic Control Unit (TCU) is used to trigger an emergency call in the event of a crash.

# SA639 "Complete mobile phone station with option SAZ633" (for US version only)

## Input/Output



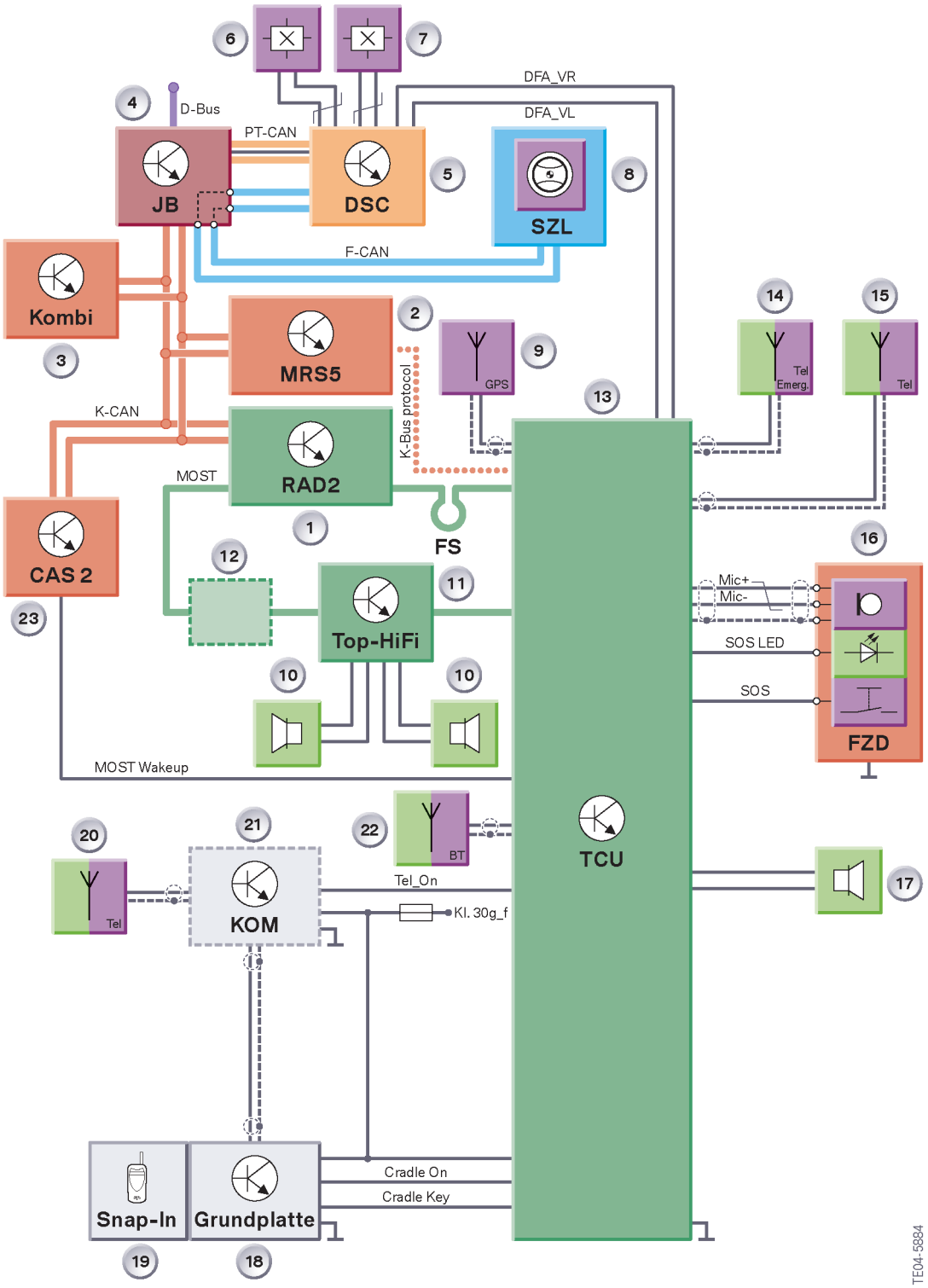

7 - Complete mobile phone station with 'Professional' radio

| Index | Explanation | Index | Explanation |
|---|---|---|---|
| 1 | 'Professional' radio (RAD2) | 10 | Roof function module (FZD) |
| 2 | Instrument cluster | 11 | SOS speaker |
| 3 | Multifunction steering wheel (MFL) | 12 | Bluetooth antenna |
| 4 | Multiple restraint system 5 (MRS5) | 13 | Snap-in adapter with mobile phone |
| 5 | Roof aerial (GPS) | 14 | Line compensator (optional) |
| 6 | Wheel speed sensor (2x) | 15 | Roof aerial (telephone) |
| 7 | SOS antenna | 16 | Audio speaker |
| 8 | Roof aerial (TCU) | 17 | Car Access System 2 (CAS2) |
| 9 | Telematic control unit | | |

The input/output diagram also applies to the Professional' navigation system (CCC). In those cases the Central Information Display ( CID) and the Controller (CON) are also fitted.

Communication between the mobile phone and the Telematic Control Unit takes place via the Bluetooth interface.

## System circuit diagram




8 - Complete mobile phone station with 'Professional' radio

| Index | Explanation | Index | Explanation |
|---|---|---|---|
| 1 | 'Professional' radio | 13 | Telematic control unit |
| 2 | Multiple restraint system 5 | 14 | SOS antenna |
| 3 | Instrument cluster | 15 | Telephone aerial (TCU) |
| 4 | Junction box control unit | 16 | Roof function module (driver's-side microphone, emergency-call button with emergency-call indicator lamp) |
| 5 | Dynamic stability control | 17 | SOS speaker |
| 6 | Wheel speed sensor, left | 18 | Base plate |
| 7 | Wheel speed sensor, right | 19 | Snap-in adapter with mobile phone |
| 8 | Steering column switch cluster | 20 | Telephone aerial (mobile phone) |
| 9 | GPS antenna | 21 | Line compensator (optional) |
| 10 | Audio speaker | 22 | Bluetooth antenna |
| 11 | Audio amplifier | 23 | Car access system 2 |
| 12 | MOST components (optional) | MOST | Media orientated system transport (digital bus) |
| MOST Wake-up | Vehicle wake-up signal from Telematic Control Unit | FS | MOST direct access |
| DFA_VL | Wheel speed signal, front left | DFA_VR | Wheel speed signal, front right |
| Mic+ | Microphone, positive | Mic- | Microphone, negative |
| SOS LED | Emergency-call indicator lamp | SOS | Emergency call signal |
| Cradle On | ON signal for the charger electronics in the snap-in adapter | Cradle Key | Call accept/transfer/pairing button |
| Tel_On | Telephone ON signal for compensator | | |

The system circuit diagram also applies to the 'Professional' navigation system (CCC). In those cases the Central Information Display ( CID) and the Controller (CON) are also fitted.

Option SAZ633 extends option SA639 by the addition of the following components/ functions:

- Base plate
- Snap-in adapter for owner's supported mobile phone
- Compensator (optional)

If the 'Professional' radio is fitted, the front left and front right wheel speed sensor signals are analysed. If a navigation system is fitted, the rear left wheel speed sensor signal is analysed.

The 'Professional' radio (RAD2) is supplied via terminal 30g_f.

The MOST wake-up signal is used to wake up the vehicle. The Telematic Control Unit responds to a call. From the TCU, a signal is sent via the MOST wake-up line to the Car Access System 2 (CAS2). The CAS2 then wakes up the vehicle. This routine is currently only used on the US version for locating the position of the vehicle. It provides a means of recovering stolen vehicles ("Stolen Vehicle Recovery").

The eject button on the base board does not receive a signal from terminal 58g. The button is not illuminated.

# System components
## Telephone systems

## General description

The following telephone systems and mobile phone stations are available on the E90:

- SA644 "Universal mobile phone preparation"
- NEW: SA633 "'Business' mobile phone station"
  (replaces option SA638 "'Professional' carphone")
- New US version:
  SA639 "Complete mobile phone station with option SAZ633"
- SA640 "Carphone station"

The Telematic, TeleService and Online functions are linked to a TCU (Telematic Control Unit) and will be available in conjunction with option SA633 "'Business' mobile phone station". This optional extra represents a combination of the familiar fixed carphone, option SA638, with the functionality of the universal charging and hands-free facility, option SA644.

The Telematic Control Unit/universal charger and hands-free facility is fitted in the boot above the recess.

Snap-in adapters for the telephone systems are currently available to fit the following mobile phones:

- Siemens S55, S65
- SonyEricsson T610, T630
- Nokia 6310, 6310i
- Motorola V525, V600

The adapters are identical to those used in the E60.

A compensator can be additionally connected in the antenna line between the roof antenna and mobile phone. The compensator compensates for line losses on the antenna line. This option can be retrofitted on customer request. The compensator makes available the maximum, legally permitted transmit power at the telephone antenna on the vehicle roof (GSM mobile radio network max. 2 Watt). This feature minimizes interruptions in telephone connections in shadow areas (obstructions).

The following applies to vehicles fitted with the Telematic Control Unit:

- A GPS receiver is fitted in the TCU which is used to pinpoint the vehicle's current location if no navigation system is fitted. The GPS aerial is integrated in the roof aerial.
- The specifications of option SA613 "Internet-based services" have been integrated in option SA612 "Online platform". As a result option SA613 has been dispensed with.
- Text messages (SMS messages) are sent and received by using the owner's mobile phone.

For the Japan version, option SA646 "Everest telephone" is used. Communication between the owner's mobile phone and the Telematic Control Unit takes place via a wired connection.

For countries which do not support the Telematic functions 'Emergency call' and 'Breakdown call', option SA664 "US-standard mobile phone" is offered.

## SA644 "Universal mobile phone preparation"

The option SA644 "Universal mobile phone preparation" facilitates the connection of mobile telephones with Bluetooth capabilities to the vehicle.

The telephone functions can be operated by means of voice commands (see telephone voice control).

The components and functions of this option are the same as those offered on the E60 to E64 and E87.

A Bluetooth mobile telephone is coupled to the navigation system (M-ASK, CCC) via the "Settings" menu. The coupling takes place in the "TEL" menu in connection with the 'Professional' radio.

SMS (text messaging) functions on the radio display or CID are not supported as the data transfer by means of Bluetooth protocol necessary for this purpose is not supported by all mobile phone manufacturers.

All MOST-compatible radios and navigation systems support integration of the Bluetooth-compatible mobile phone in the vehicle systems network. For further information on operation, please refer to the telephone operating instructions.

Up to 4 Bluetooth mobile phones can be logged in on the vehicle in succession. A list of the phones that are logged in is created. If a fifth mobile phone is logged in, the sign-on data of the last mobile phone on the list will be deleted.

If several of the phones on the list are detected simultaneously, the hands-free facility will be allocated to the phone with the highest priority.

⚠ CCC and M-ASK show a list of the logged in mobile phones on the CID. The positions of the phones on that list can be changed. ◄

# SA633 "'Business' mobile phone station"

Option SA633 combines certain features of option SA644 "Universal mobile phone station" and option SA633 "'Professional' carphone".
As with option SA644, the owner can link his/her own Bluetooth-compatible mobile phone to the vehicle. In addition, services such as Telematic, TeleService, BMW Assist and BMW Online are enabled.
The handset (SBDH) from option SA638 is replaced by the customer's own mobile phone.
This functionality has already been introduced on K-bus vehicles (E46, E53, E85 and E83).

The features of option SA633 are made technically possible by extending the functions of the familiar TCU from option SA638.

In conjunction with the 'Business' (M-ASK) and 'Professional' (CCC) navigation systems, option SA633 replaces the familiar option SA638 "'Professional' carphone".

Option SA633 will be offered in conjunction with the 'Professional' radio at a later date. Option SA638 will not be available with the 'Professional' radio.

The TCU included in option SA633 is not compatible with the TCU from SA638.

Normal telephone connections can only be dialled from the customer's mobile phone.

The TCU provided with option SA633 has a permanently installed SIM card) (prefit SIM) with a fixed set of numbers. That set of numbers can be used to connect to the following services regardless of whether a mobile phone is present:

- TeleService
  - CBS data[1)]
  - Manual service call[1) 4)]
  - Automatic service call[1) 4)]
- Telematic
  - Manual emergency call detailing vehicle location to service provider[1) 4)]
  - Automatic emergency call detailing vehicle location to service provider[1) 4)]
  - Breakdown call detailing vehicle location and service information to service provider[1) 4)]
- BMW Assist
  - Information services[1) 4)]
  - BMW Info[1)]
  - V-Info Plus[2)]
  - Floating Car Data[1)]
- BMW Online
  - Mobile Office[3)]
  - News, weather, stock exchange prices[3)]

1) Data SMS
2) Data via CA-TMC
3) Data via WAP
4) Voice connection

⚠ The above services are dependent on location.
BMW Assist has to be initialized before it can be used. ◄

BMW Assist is available with:

- NEW: 'Professional' radio
- NEW: 'Business' navigation system
- Navigation system, Professional

Option SA633 consists of the following components:

- Telematic Control Unit (TCU) with dual band for GSM 900 MHz/1800 MHz and prefit SIM
- Base plate
- Microphone, driver's side
- Telephone aerial for TCU (roof aerial)
- Telephone aerial for mobile phone (roof aerial)
- Bluetooth aerial (behind steering-column trim)
- GPS aerial (roof aerial)
- Multifunctional steering wheel

The option SA633 retrofit kit consists of:

- Snap-in adapter
- Bluetooth-compatible mobile phone
- Compensator (optional)

Option SA605 "Preparation for Telematic" incorporates the following:

- SOS aerial (rear shelf)
- SOS speaker
- Emergency-call button with emergency-call indicator lamp

## US Version

The range of functions offered on the US version differs from the European version as follows:

- The Telematic Control Unit is fitted as standard in order to provide the Telematic functions Emergency call (E-call) and Breakdown call (B-call)
- Dual band 800 MHz and 1900 MHz
- Combined NAD (network access device) transceiver module for the analogue AMPS- (American Mobile Phone Standard) and digital CDMA(Code Division Multiplex Algorithm) standard

Two different equipment levels are offered for the American market:

- Telematic Control Unit with Telematic functions Emergency call (E-Call) and Breakdown call (B-Call) without base plate or snap-in adapter.
- Telematic Control Unit with Telematic functions Emergency call (E-Call) and Breakdown call (B-Call) with base plate and snap-in adapter for a supported Bluetooth-compatible mobile phone.

The Telematic Control Unit for the US version is factory-programmed as "active" for Bluetooth. Consequently, even with the lower equipment level (option SA639), any supported mobile phone can be linked to the vehicle.

With the higher equipment level (option SAZ633), the customer also has the facility for charging the mobile phone in the vehicle and making calls via the external aerial. The external aerial reduces the radiation exposure inside the vehicle.

## Option SA639 "Complete mobile phone station with option SAZ633"

For the US market, SAZ633 is available as an optional extra. It is an extended version of option SA639 "Complete mobile phone station" familiar from the E60 to E64. The previous wired mobile phone connection is replaced by a Bluetooth link.

Option SAZ633 extends option SA639 by the addition of the following components/ functions:

- Base plate
- Snap-in adapter for Bluetooth-compatible mobile phone
- Compensator (optional)

With the introduction of option SAZ633, option SAZ639 will no longer be available.

# General

## Linking

A variable passkey that must have at least one character is used for the purpose of coupling Bluetooth mobile phones. A predefined key is no longer necessary.

## Number sets for the prefit SIM (option SA633)

The number set cannot be altered by the customer. The TCU has to be programmed to set the service numbers that are specific to the country of use. Service initialization then has to be carried out.

## Off delay (option SA633)

The off delay for the TCU cannot be altered by Service. Normally, the TCU is switched off by "Ignition Off".

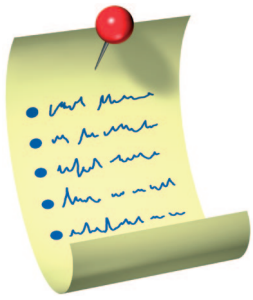
Exception: a telephone call in progress is not disconnected by "Ignition Off". In that case, the TCU is not switched off until the call is ended.

# Summary
## Telephone systems

## Points to remember

The most important information relating to telephone systems in the new BMW 3 Series is summarized in the following table.

It can be used as a final check-list for what you should now have learned.



Points to remember for everyday theoretical and practical applications.

| | Telephone systems |
|---|---|
|  | Requirements for fitting the TCU and ULF are as follows:<br>• 'Professional' radio<br>• 'Business' navigation system<br>• 'Professional' navigation system<br>Supported Bluetooth-compatible mobile phones can be linked to the vehicle.<br>The Telematic Control Unit supports<br>• Telematic<br>• TeleService<br>• BMW Assist<br>• BMW Online<br>The TCU for the European version (option SA633) has a permanently installed SIM card. That SIM card provides access to the above services. The availability of those services is dependent on location.<br>The Telematic option provides the following:<br>• Emergency-call button with emergency-call indicator lamp<br>• SOS speaker<br>• SOS antenna<br>The Telematic Control Unit in option SA633 replaces the TCU from option SA638.<br>The telephone aerials for TCU and mobile phone are integrated in the roof aerial.<br>The Bluetooth antenna is located behind the steering column trim panel.<br>Communication between mobile phone or handset (SBDH) and telephone control unit (TCU or ULF) takes place via a Bluetooth interface.<br>The hands-free microphone for telephone calls and voice control of the telephone is in the roof function module (FZD) which is located on the driver's side. |

# Test questions
## Telephone systems

## Questions

Check what you have learned

In this section, you can check what you have learned about telephone systems.

**1. Which telephone systems are supported by BMW Assist?**

- ☐ Option SA644 "Universal charger and hands-free facility"
- ☐ Option SA638 "'Professional' carphone"
- ☐ Option SA633 "'Business' mobile phone station"
- ☐ Option SA640 "Carphone station"

**2. How are mobile phones linked to the vehicle with option SA633?**

- ☐ Via an infrared (IR) link
- ☐ Via a cable
- ☐ Via a Bluetooth link

**3. How are normal telephone connections established with option SA633?**

- ☐ Via the Telematic Control Unit (TCU)
- ☐ Via the customer's supported mobile phone
- ☐ Via the universal charger and hands-free facility (ULF)
- ☐ Via the handset (SBDH)

**4. What components does the station for the customer's mobile phone consist of?**

- ☐ Eject box
- ☐ Snap-in adapter
- ☐ Base plate
- ☐ Telematic Control Unit

**5. For which services is the TCU required?**

- ☐ Telematic
- ☐ TeleService
- ☐ BMW Assist
- ☐ BMW Online

## Solutions to the test questions

**1. Which telephone systems are supported by BMW Assist?**

☐ Option SA644 "Universal charger and hands-free facility"
☑ Option SA638 "'Professional' carphone"
☑ Option SA633 "'Business' mobile phone station"
☐ Option SA640 "Carphone station"

**2. How are mobile phones linked to the vehicle with option SA633?**

☐ Via an infrared (IR) link
☐ Via a cable
☑ Via a Bluetooth link

**3. How are normal telephone connections established with option SA633?**

☐ Via the Telematic Control Unit (TCU)
☑ Via the customer's supported mobile phone
☐ Via the universal charger and hands-free facility (ULF)
☐ Via the handset (SBDH)

**4. What components does the station for the customer's mobile phone consist of?**

☐ Eject box
☑ Snap-in adapter
☑ Base plate
☐ Telematic Control Unit

**5. For which services is the TCU required?**

☑ Telematic
☑ TeleService
☑ BMW Assist
☑ BMW Online

# Contents
## Voice recognition systems



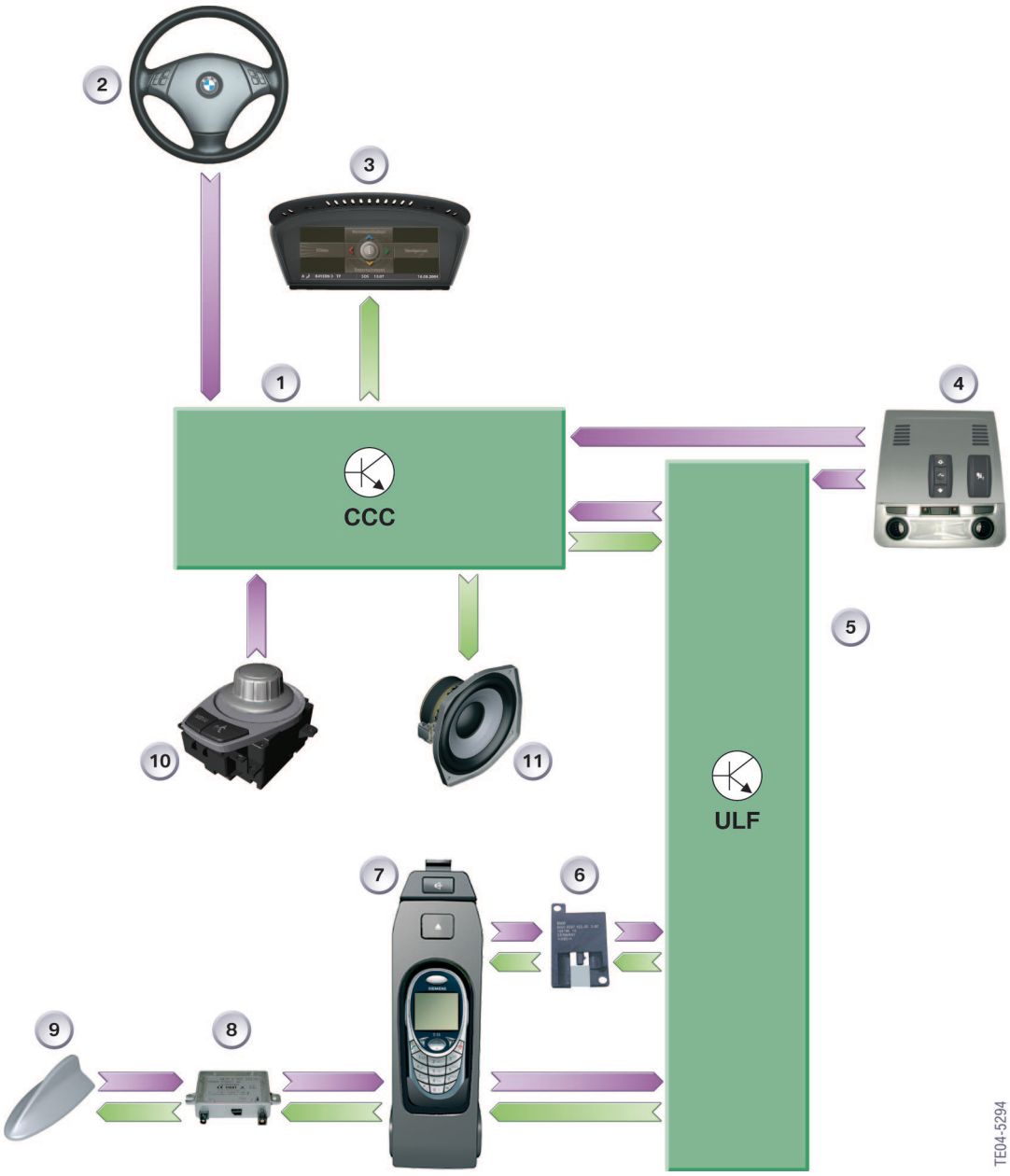




# System overview
## Voice recognition systems

## SA620 "Voice recognition system"

### Input/Output




1 - Voice control system

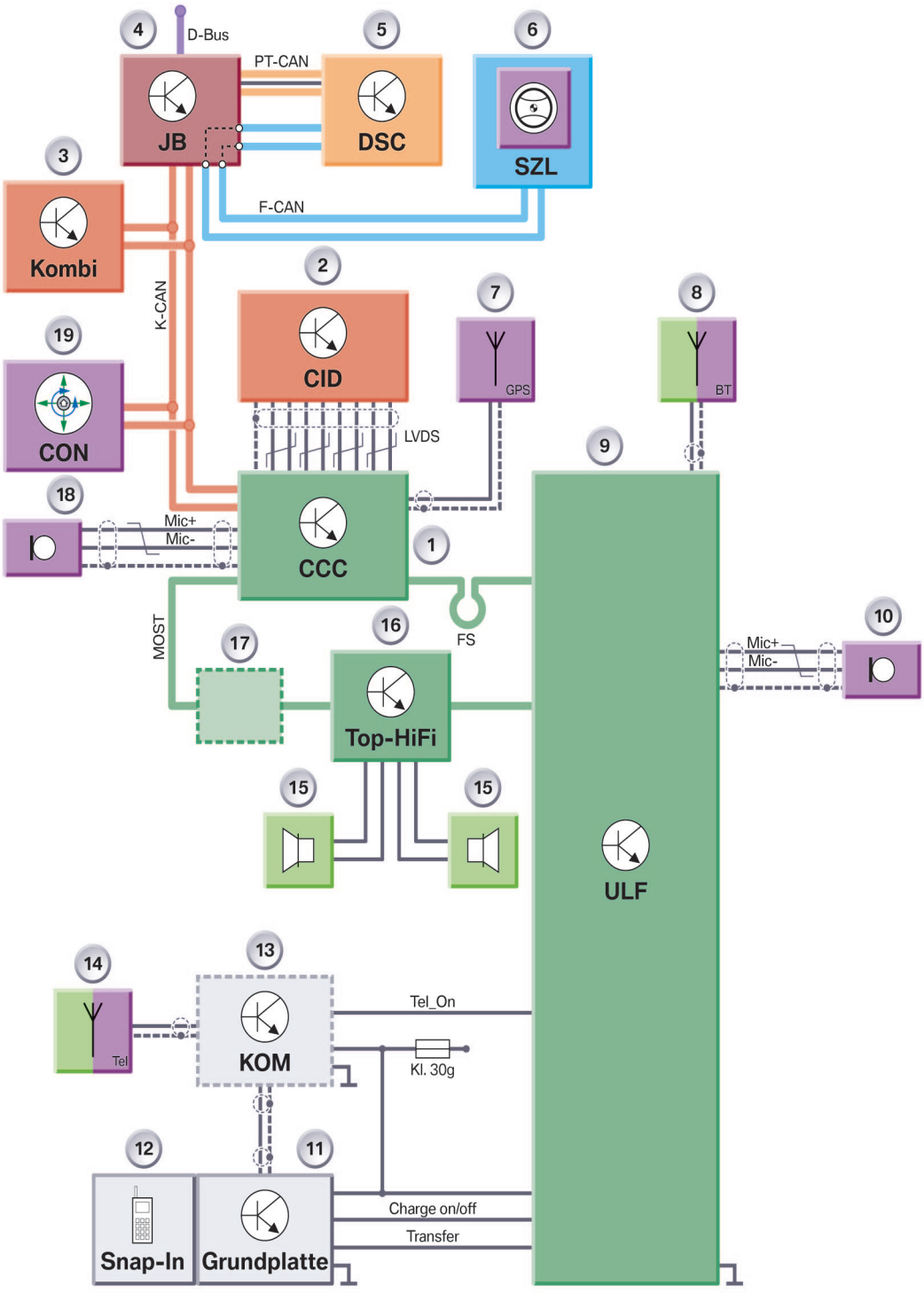
| Index | Explanation | Index | Explanation |
|---|---|---|---|
| 1 | Navigation system, Professional | 8 | Telephone with snap-in adapter |
| 2 | Multifunction steering wheel (MFL) | 9 | Compensator |
| 3 | Central information display (CID) | 10 | Telephone aerial |
| 4 | GPS antenna | 11 | Audio speaker |
| 5 | Universal charging and hands-free facility | 12 | Controller |
| 6 | Microphone, driver's side (telephone) | 13 | Microphone, passenger's side (voice recognition system) |
| 7 | Bluetooth antenna | | |

The input/output diagram also applies to the Telematic Control Unit (TCU) in place of the universal charger and hands-free facility (ULF).

If no ULF or TCU is fitted, the passenger-side microphone for voice control of the CCC is fitted. The driver's-side microphone is not fitted.

⚠ On the US version, only the Telematic Control Unit (TCU) is fitted. ◄

## System circuit diagram




2 - Voice control system

| Index | Explanation | Index | Explanation |
|---|---|---|---|
| 1 | Navigation system, Professional | 11 | Eject box |
| 2 | Central information display | 12 | Snap-in adapter |
| 3 | Junction box control unit | 13 | Line compensator |
| 4 | Dynamic stability control | 14 | Telephone aerial |
| 5 | Steering column switch cluster | 15 | Audio speaker |
| 6 | | 16 | Audio amplifier |
| 7 | GPS antenna | 17 | MOST components (optional) |
| 8 | Bluetooth antenna | 18 | Microphone, passenger's side (voice recognition system) |
| 9 | Universal charging and hands-free facility | 19 | Controller |
| 10 | Microphone, driver's side (telephone) | | |
| Mic+ | Microphone, positive | Mic- | Microphone, negative |
| Transfer | Switchover between privacy mode and hands-free | Charge on/off | Telephone charging function |
| Tel_On | Telephone signal for muting audio system | LVDS | Low voltage differential signal (digital RGB signal) |
| FS | MOST direct access | MOST | Media orientated system transport (digital bus) |

The system circuit diagram also applies to the Telematic Control Unit (TCU) in place of the universal charger and hands-free facility (ULF).

If no ULF or TCU is fitted, the passenger-side microphone for voice control of the CCC is fitted. The driver's-side microphone is not fitted.

⚠ On the US version, only the Telematic Control Unit (TCU) is fitted. ◄

## Telephone voice control

Voice control for telephone functions comes as standard with all telephone systems.

- Option SA633 "'Business' mobile phone station"
- Option SA638 "'Professional' carphone"
- SA644 "Universal mobile phone preparation"

The voice control capability is achieved by means of software on the telephone control unit.

Voice control comprises the telephone function and a voice-controlled phone book that is separate from the address book on the mobile phone or on the SIM card. Up to 50 names and telephone numbers can be stored. The telephone book managed by means of voice control cannot be transferred to the mobile phone.

⚠ The notepad function previously available with the ULF is not available on the E90. ◄

The microphone for voice control of the telephone is located in the roof functions centre on the driver's side. It is connected to the telephone control unit.

6 languages are supported:

- German
- English US
- English UK
- French
- Italian
- Spanish

⚠ Voice control on the US version for option SA639 "Complete mobile phone station for US/CDN" together with option SAZ633 is the same as offered by the present option SA639. ◄

## SA620 "Voice recognition system"

Voice recognition is available only in connection with the option SA609 "'Professional' navigation system" as the voice recognition system is realized as software in the CCC.

Many of the functions that are otherwise selected via the controller in the CID can be operated by means of voice commands.

The microphone is located in the roof functions centre on the passenger's side and is connected directly to the CCC.

The voice recognition system supports 6 languages:

- German
- English US
- English UK
- French
- Italian
- Spanish

The language of the voice recognition system cannot be changed in the CID. The language that can be selected in the CID (one of three languages) refers only to the display text and the announcement language for the navigation system. During the CCC programming procedure, the language of the voice recognition system is programmed corresponding to the vehicle order (country assignment). The language cannot be easily changed over as for the display language due to the size of the software package.

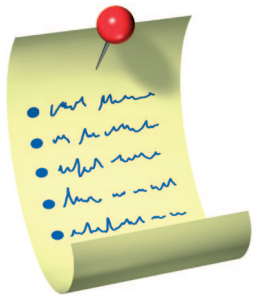
⚠ The language setting for the voice recognition can only be altered by changing the vehicle order and reprogramming the CCC. ◄

# Summary
## Voice recognition systems

## Points to remember

The most important information relating to voice recognition systems in the new BMW 3 Series is summarized in the following table.

It can be used as a final check-list for what you should now have learned.



Points to remember for everyday theoretical and practical applications.

| | Voice recognition systems |
|---|---|
|  | A distinction is made between two voice recognition systems:<br>• Voice control for telephone (linked to Telematic Control Unit or universal charging and hands-free kit)<br>• SA620 "Voice recognition system" (coupled to the option SA609 "'Professional' navigation system")<br>The microphone on the driver's side is assigned to the telephone function.<br>The microphone on the passenger's side is linked to SA620 "Voice recognition system". |

# Test questions
## Voice recognition systems

## Questions

Check what you have learned

In this section, you can check what you have learned about voice recognition systems.

**1. Which button is used to activate the voice recognition system?**

- ☐ Button on CCC
- ☐ Button on iDrive Controller
- ☐ Button on multifunction steering wheel
- ☐ Button on onboard computer

**2. Which control units enable voice control of certain functions?**

- ☐ Instrument cluster
- ☐ Universal charger and hands-free facility (ULF)
- ☐ CCC
- ☐ Telematic Control Unit (TCU)
- ☐ M-ASK

**3. Where can the voice output of the navigation system be changed?**

- ☐ BMW diagnosis system
- ☐ iDrive Settings menu
- ☐ Instrument cluster
- ☐ iDrive Navigation menu

## Solutions to test questions

**1. Which button is used to activate the voice recognition system?**

☐ Button on CCC
☑ Button on iDrive Controller
☑ Button on multifunction steering wheel
☐ Button on onboard computer

**2. Which control units enable voice control of certain functions?**

☐ Instrument cluster
☑ Universal charger and hands-free facility (ULF)
☑ CCC
☑ Telematic Control Unit (TCU)
☑ M-ASK

**3. Where can the voice output of the navigation system be changed?**

☐ BMW diagnosis system
☑ iDrive Settings menu
☐ Instrument cluster
☐ iDrive Navigation menu

# Abbreviations

| | |
|---|---|
| AF | Alternative frequency |
| AHM | Trailer module |
| AM | Amplitude modulation |
| AMPS | American Mobile Phone Standard |
| ANT | Antenna |
| B-Call | Emergency call (SOS) |
| CA | Comfort access |
| CAS | Car access system |
| CBS | Condition based service |
| CCC | Car communication computer |
| CD | Compact disc |
| CDC | CD changer |
| CDMA | Code Division Multiplex Algorithm |
| CID | Central information display |
| CON | Controller |
| DAB | Digital audio broadcast |
| DDE | Digital diesel electronics |
| DFA_VR | Wheel speed sensor, front right |
| DFA_VL | Wheel speed sensor, front left |
| Div | Diversity module with antenna amplifier |
| DME | Digital motor electronics |
| DSC | Dynamic stability control |
| DSP | Digital sound processor |
| DVB | Digital Video Broadcasting |
| DVD | Digital Versatile Disk |
| E-Call | Emergency call |
| EGS | Electronic transmission control unit |
| EKP | Electric fuel pump |
| ELV | Electric steering lock |
| ESD | Electrostatic discharge |
| | Limited slip differential |
| F-CAN | Chassis CAN |
| FBAS | Synchronous colour picture blanking signal |
| FBD | Remote control service |
| FM | Frequency modulation |
| FRM | Footwell module |
| FS | MOST direct access |
| FZD | Roof function centre |
| GAL | Speed-dependent volume control |

| | |
|---|---|
| GPS | Global Positioning System |
| GSM | Global Standard for Mobile Communication |
| GW | Gateway |
| HBL | Auxiliary brake light |
| HF | High frequency |
| HiFi | High fidelity |
| IBOC | In Band On Channel |
| IBS | Intelligent battery sensor |
| IHKA | Integrated automatic heating/air conditioning |
| IHR | Integrated heating control |
| IKT | Information and communication technology |
| JB | Junction box, junction box control unit |
| JNAV | Japan navigation |
| K-Bus | Body bus |
| K-CAN | Body Controller Area Network |
| KW | Crankshaft |
| | Short wave |
| LED | Light emiting diode |
| LVDS | Low-voltage differential signalling |
| LW | Long wave |
| M-ASK | Multi-audio system controller |
| MD | Mini-disc |
| MFL | Multifunction steering wheel |
| MOST | Media oriented system transport |
| MRS | Multiple restraint system |
| MW | Medium wave |
| NAD | Network access device |
| NAV | Navigation |
| PDC | Park Distance Control |
| PT-CAN | Power Train Controller Area Network |
| RAD | Radio |
| RDS | Radio Data System |
| RLS | Rain/driving light sensor |
| SBDH | Keypad handset |
| SBFA | Switch cluster, driver's door |
| SDARS | Satellite digital audio radio service |
| SH | Auxiliary heating |
| SIM | Safety and information module |
| | Subscriber identification module |

| | |
|---|---|
| SINE | Emergency current siren with integrated tilt alarm sensor |
| SMFA | Driver's seat module |
| SMS | Short message system |
| SOS | Emergency |
| SW Ver | Software status |
| TAGE | Electronic outer door handle module |
| TCU | Telematics control unit |
| TMC | Traffic massage channel |
| TV | Television |
| UKW | Very high frequency |
| ULF | Universal charging/hands-free facility |
| USIS | Ultrasonic passenger-compartment sensor |
| V-Info | Traffic information |
| VM | Video module |
| WMA | Windows Media Audio |
| WUP | Wake-up line |
| ZF | Intermediate frequency |
| ZH | Auxiliary heater |

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