Car Communication Computer (CCC)

E60

Introduction

The Car Communication Computer (CCC) is installed in the E60 in conjunction with special equipment "DVD navigation system Professional" (option 609), "Voice recognition system" (option 620) or "TV function" (option 601). Several control units and the CD-ROM/MD/DVD drives are integrated into a single housing. The CCC controls all information and communication systems.
The start menu and the
su
b
menus appear on the 8.8" screen of the central information display (CID) to the left of the secondary screen (splitscreen).   [system overview ...]

New features of CCC:
The CCC is of a modular construction. The most important systems in the communications
networ
k
 are integrated as modules in the CCC. Depending on what is required, the CCC can
b
e configured and
e
x
tended.
The following functions and interfaces are integrated in the CCC:

- **CCC aerial tuner (CCC-ANT)**

  Radio reception with the two-tuner radio

- **CCC applications (CCC-A)**

  DVD navigation system Professional with map display

  Voice recognition system

  TV function

  Online services
  (
  W
  AP)

- **CCC user interface (CCC-BO)**

  Operating system

  Processor for graphics display

  Central information display activation

  Controller for selecting menus

- **CCC gateway (CCC-GW)**

  Interface
  b
  etween the MOST
  b
  us and K-CAN

  Control and monitoring of the MOST
  b
  us

- **CCC audio system controller (CCC-ASK)**

  Generates acoustic signals

  Fades acoustic signals in and out

  Distri
  b
  utes and outputs audio signals through the
  loudspea
  k
  ers

- **Interfaces**

  For
  e
  x
  pansion with future applications

Brief description of components

The CCC receives signals from the following components:

- **Controller**

  The controller delivers the signals for selecting the menus and
  su
  b
  menus.

- **Telephone**

  The telephone delivers the signal for the radio mute circuit and the low-frequency output signal to transmit the call to the loudspeakers.

- **CD changer**

  The CD changer supplies low frequency output signals for activating the output stages.

- **Aerials**

  The aerials in the rear window deliver the signals for radio and TV reception and for remote control operation.   [more ...]

- **Telephone and GPS aerial**

  The telephone and GPS aerial receives signals from the GPS satellites. The signals to the HIP module and the navigation system are transmitted via the aerial cable to other connections.

- **Dynamic Stability Control (DSC)**

  The DSC control unit calculates the data for distance, speed and direction for the navigation system.

- **Navigation DVD**

  The navigation DVD supplies data to the Central Information Display (CID) for the map display and for calculating the distance.

- **Wheel-speed sensors**

  The wheel-speed sensors deliver the signals to the DSC control unit for calculating distance and speed and direction recognition (forwards and backwards).

- **Steering column switch cluster (SZL)**

  The SZL delivers the steering angle signal for the navigation system. The SZL contains the additional buttons for volume and station selection. The push-to-talk button activates/deactivates the voice recognition system.

- **Video module 5**

  Video module 5 (VM 5) is the central processing unit for the video signals from the DVD drive/changer to the CCC. Video module 5 contains 2 TV tuners to guarantee trouble-free TV reception.

  Video module 5 is available in the following versions:

- VM 5 FBAS = EURO version:

- VM 5 Drive = for rear entertainment with 2 monitors.

Video module 5 has the following functions:

- Reception of television stations

- Reception and storage of
  telete
  x
  t

- Power supply to aerial amplifiers TV1 and TV2 in the aerial diversity system (on the rear window)

- Self-diagnosis

[more ...]

The CCC comprises the following components:

- **Housing**

  The
  si
  z
  e of the CCC corresponds to 2 DIN radio housings
  stac
  k
  ed one on top of the other.   [more ...]

- **CD-ROM drive**

  The CD-ROM drive allows the following CDs to
  b
  e played:

  - Audio CD

  - CD-ROM with MP3 files

  [more ...]

- **DVD drive**

  The DVD drive is used for the navigation DVD. If the navigation system is not in use, the DVD drive can also
  b
  e used to play audio CDs, CD-ROMs or films on DVD.   [more ...]

- **HIP module**

  The HIP module (Host Independent Positioning) contains the GPS receiver. The GPS receiver deciphers the navigation system signals received from the aerial. [more ...]

- **Rotating-speed sensor**

  The rotating-speed sensor supplies the data for changes of direction. This data is required to identify the position more precisely. [more ...]

- **Two-tuner radio**

  The two-tuner radio consists of tuner 1 and tuner 2. Tuner 1 acts as a receiver for AM and FM stations. Tuner 2 acts as a receiver for additional information from the Radio Data System (RDS) and from the Traffic Message Channel (TMC). [more ...]

- **Motherboard with processors**

  The
  mother

b

oard holds slots for additional cards and for the memory chips for CCC applications. The following processors are found on the CCC

mother

b

oard, which

wor

k

 in the same way as control units and can

b

e flash-programmed.

- CCC applications (CCC-A)

- CCC gateway (CCC-
  G
  W
)

- CCC user interface (CCC-BO)

- CCC audio system controller (CCC-ASK)

[more ...]

- **Power board**

  The power
  b
  oard contains the 4 audio output stages for the
  loudspea
  k
  ers and provides the power supply for all printed circuits and modules.   [more ...]

- **Audio board**

  The audio
  b
  oard contains the CCC audio system controller and 2 digital sound processors. The voice recognition system
  can
  b
  e used as the same time as audio signals are
  b
  eing processed. Information
  (e.g.
  Par
  k
   Distance Control, PDC) can
  b
  e output at the same time as the voice recognition system is in use.   [more ...]

- **Memory chip for CCC applications**

  The memory chip for CCC applications contains two RAM memories. The memory chip is located
  a
  b
  ove the two permanent RAM memories and is connected to the
  mother
  b
  oard
  b

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y a plug-in contact.

- **Front panel**

  The front panel acts as a cover panel for the control elements of the Car Communication Computer.
  [more ...]

- **Aerial diversity**

  The aerial diversity system contains the aerial amplifiers and is used to select the FM aerials.   [more ...]

- **Possibilities for expansion**

  The CCC can
  b
  e
  e
  x
  panded in a modular fashion for future applications. There are 3 slots
  availa
  b
  le for later retrofitting with PMC (PCI
  Me
  z
  z
  anine Card) and PCMCIA (Personal Computer Memory Card International Association).

- **Electric fan**

  The Car Communication Computer has an electric fan for cooling the audio output stages and processors. The
  electric fan is controlled in stages
  b
  y the integrated automatic heating/air-conditioning system, depending on the temperature of the CCC.

The CCC outputs the following signals:

- **Instrument cluster**

  The instrument cluster is used to display
  Chec
  k
  -Control messages.

- **Central Information Display (CID)**

  The following functions can
  b
  e displayed on the CID:

  - Navigation

  - Entertainment

  - Communication

  - Climate

  - Settings

- **Audio operation**

  The following signals can
  b
  e output via the
  loudspea
  k
  ers:

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- Audio signals

- Par
  k
   distance control (PDC)

- Audi
  b
  le notes (jingles) e.g. gongs during the
  Chec
  k
  -Control messages

System functions

The CCC includes the following functions:

- CCC aerial tuner (CCC-ANT)

  - Radio

- CCC applications (CCC-A)

  - DVD navigation system Professional

  - Voice recognition system

  - TV function

  - Online services

- CCC gateway (CCC-
  G
  W
)

  - System master

  - Power master

  - Networ
    k
     master

- CCC audio system controller (CCC-ASK)

  - Audio master

  - Connection master

- CCC user interface (CCC-BO)

  CCC aerial tuner

  - Radio

    The "radio" function is implemented in a two-tuner radio. Tuner 1 is principally
    responsi
    b
    le for radio reception. Tuner 1 receives the radio frequencies FM (VHF) and AM
    (M
    W

,
S
W
 and
L
W
). The radio waves from the radio station are received
b
y the aerials in the rear window. The aerial diversity system (on the rear window) feeds the HF signals received to the aerial input of the two-tuner radio via a
coa
x
ial
ca
b
le.
W
hile tuner 1 receives the radio station required, tuner 2 continues to
wor
k
 in the
b
ac
k
ground. Tuner 2 searches the station frequencies for additional signals. If a radio station transmits a stronger signal on another frequency, tuner 2 automatically switches to this alternative frequency. Tuner 2 receives additional information from the Radio Data System (RDS) and from the Traffic Message Channel (TMC). The additional RDS and TMC information is transmitted together with the signal from the FM radio station. TMC information is used
b
y the navigation system to detect
tail
b
ac
k
s and traffic congestion. If an AM station is selected, tuner 2 will continue to receive RDS traffic information announcements from an FM station. The station is faded out and the traffic information announcement is output through the
loudspea
k
ers. Tuner 2 also generates a list of all RDS radio and traffic information stations that can
b
e received.

CCC applications

- DVD navigation system Professional

  On the E60, the DVD navigation system Professional is integrated in the CCC. There is no longer a separate navigation system. The DVD navigation system Professional has the following new features:

  - Map information on DVD

  - Complete display of Europe and US

  - Scale:
    1000
    k

m,
500
k
m

- Dynamic route planning

Navigation data can
b
e displayed in the left-hand area of the CID screen or on the right in the secondary screen. The left-hand
area of the screen has a resolution of
400
x
240
pi
x
els. The secondary screen has a resolution of
240
x
240
pi
x
els. Navigation data can
b
e displayed in the following form:

- Map with northward orientation

- Map orientated to direction of travel

- Perspective display

- Arrow display

- Location

In addition to the navigation data, the following information can
b
e displayed on the secondary screen:

- Travel computer

- On-
  b
  oard computer

- Help
  te
  x
  t

The following components are integrated in the CCC for the "DVD navigation system Professional":

- DVD drive for reading map information

- HIP module for receiving satellite signals

- Rotating-speed sensor for precise location identification

The navigation system software is installed in the CCC. The navigation system uses the memories and
processors in the CCC. The navigation system uses the Traffic Message Channel to detect
tail

back s and traffic congestion. If a tail back or traffic congestion is detected, an alternative route around the hindrance is computed. The system has its own diagnosis address.

GPS satellites

GPS satellites move around the earth in 6 nearly circular or b its. There are 4 GPS satellites per or b it, therefore there is a ma x imum num b er of 24 GPS satellites. Before the navigation system can process the reference signal from the GPS satellites (minimum 4 GPS satellites), the Almanac data must first b e loaded.

Loading Almanac data

The Almanac data delivers the following data and information to the navigation system:

- UTC (Universal Time Coordinate)

- Date

- Location of the GPS satellites

- Or
  b
  its

- Operational capacity of the GPS satellites

Once the navigation system has b een switched on for the first time (terminal R ON) the GPS satellite Almanac data is received and loaded. The loading time depends on the num b er of "visi b le" GPS satellites and can ta k e up to 20 minutes during the learning phase. Otherwise the Almanac data is permanently stored in the

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system.

Note: After longer periods of not being used (longer than 1 week) it is possible that navigation will be inaccurate at first.

The Almanac data must
b
e reloaded if the vehicle is not used for a prolonged period of time or if it is transported over a distance of more
than 300
k
m from the starting point, e.g. after:

- Transportation from the Dingolfing
  wor
  k
  s.

- Return transport from
  a
  b
  road in the case of damage.

- Transporting the vehicle on a train.

- Switching off the micro power module/off-load current cutoff

During the learning phase, navigation is
possi
b
le when the vehicle is stationary or during a journey. Navigation is highly inaccurate at first. After some time and longer journeys, the end of the learning phase and optimum accuracy of navigation is achieved.

W
hen the Almanac data is loaded, the navigation system is ready for operation 10 to 15 seconds after starting each time.

- Voice recognition system

  A voice recognition system (SVS) is integrated in the CCC. The SVS can
  b
  e used to operate all
  b
  uttons that are displayed in the CID
  b
  y means of voice commands. The advantage of this is that the driver does not have to
  ta
  k
  e his/her hands off the steering wheel to change the settings during a journey. The SVS can
  b
  e used to control the following systems:

  - Entertainment

  - Communication

  - Navigation

  - Climate

  - Settings

There are specified voice commands that are used for the SVS. SVS engages in a dialogue with the user. If a command is not understood, an appropriate warning will be given.

The SVS software is installed in the CCC. SVS uses the memories and processors in the CCC. The system is activated/deactivated with the push-to-talk button on the multi-function steering wheel or with the controller. Voice commands are input through a separate microphone that is directly connected to the CCC.

- TV function

  The CCC TV function is available as special equipment (option 601 "TV function"). The Central Information Display (CID) in the dashboard acts as a screen for the TV function.

Important. For reasons of safety, TV reception is not permissible while the vehicle is being driven!

From a speed of 5 km/h upwards, the TV function is switched off. TV reception while the vehicle is being driven is only allowed with special equipment "Rear entertainment" (option 603).

CCC gateway

The CCC Gateway control unit forms the interfaces for data exchange between the MOST bus and the K-CAN. The two bus systems use different data transfer rates and data formats. To communicate with all systems, data for each bus is configured as necessary in the CCC gateway.

- System master

  The system master connects the individual control units in the CCC.

- Power master

  The power master initialises the network and switches the MOST bus on and off (wa

k
e-up, sleep mode).

- Networ
  k
   master

  The
  networ
  k
   master controls and monitors the MOST
  b
  us. Each time the
  networ
  k
   is started, the
  e
  x
  act system configuration is recorded and compared with a stored target configuration. If systems do not
  wor
  k
   correctly, these are reset and separated from the MOST
  b
  us. Any operating fault in the
  networ
  k
   or any deviation from the target configuration is stored in a fault memory for the MOST
  b
  us.

CCC user interface

The CCC user interface control unit contains the operating system for controlling the CCC. Signals from the controller for selecting the menus and
su
b
menus are processed in the CCC user interface control unit. To actuate the CID, the red-green-
b
lue signals from the graphics processor are converted into Low Voltage Differential Signalling (LVDS) digital signals.

CCC audio system controller

- Audio master

  The audio master collects all the audio signals in the vehicle, processes the audio signals and outputs them over the
  loudspea
  k
  ers. The audio master also produces additional
  audi
  b
  le signals for warnings and for
  Par
  k
   Distance Control (PDC). By
  mi
  x

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ing or fading in and out, a "softer" audible change is obtained between the signal sources.

- Connection master

  The connection master distributes the signals of the audio sources and the audible signals to the loudspeakers. The signals are transmitted to the loudspeakers in the following way:

  - Front left and right (audible signals, telephone, gong, messages from the navigation system, traffic information announcements)
  - Front left and right, rear left and right (PDC signals)
  - All loudspeakers (all sources in the "Entertainment" menu)

Operation

The CCC has 4 buttons

- Rotary push button for switching on and off and for adjusting the volume.
- Search rocker switch for changing radio station and selecting tracks on an audio CD or CD-ROM/MD
- 2 eject

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b

uttons for ejecting the CD/CD-ROM/MD/DVD from the drives

Operation of the CCC and its functions occurs almost without

e

x

ception via the controller in the centre console or via the multifunctional steering wheel.

Menus are selected in the CID using the controller. The selector

b

uttons for the

su

b

menus are found in the menus. After confirming

(

b

y pressing on the controller) the selected

su

b

menu is called up. For each menu selected, the "Help

te

x

t"

su

b

menu can

b

e called up on the secondary screen.

The following 5 menus are

availa

b

le in the start menu on the CID:

- Communication (move controller to the front)

- Navigation (move controller to the right)

- Entertainment (move controller to the rear)

- Climate (move controller to the left)

- Settings (press controller)

"Communication" menu

After the PIN (personal identification

num

b

er) has

b

een entered, the following functions can

b

e called up in the "Communication" menu:

- Telephone

- SMS (short message service)
  te
  x
  t messaging

- Note

b
oo
k

"Navigation" menu

The following functions can
b
e selected in the "Navigation" menu:

- Navigation

- On-
  b
  oard info

- Address
  b
  oo
  k

- Traffic information

"Entertainment" menu

The following functions can
b
e selected in the "Entertainment" menu:

- FM

- AM

- BM
  W
   satellite radio

- CD

- MD

- TV

- Telete
  x
  t

- DVD

- AU
  X

"Climate" menu

The following functions can
b
e selected in the "Climate" menu:

- Automatic programs

- Seat-heating
  distri

b
ution / seat-cooling

distri
b
ution (with seat ventilation)

- Stationary operation

"Settings" menu

The following functions can
b
e selected in the "Settings" menu:

- Screen OFF

- Information

- Settings

- Key

Notes for service staff

Service staff should note the following points:

- General information: [more ...]

- Diagnostics: [more ...]

- Encoding/programming: ---

- Car and Key Memory: [more ...]

US national version

The US version has the two-tuner radio with FM, AM and
weather
b
and (7 channels) radio frequencies. The telephone and GPS aerial also contains the telephone aerial 2. The
SDARS aerial is installed in conjunction with special equipment
"BM
W
 satellite radio" (option 655).

Japanese national version

In the Japanese version, the Car Communication Computer has a MD drive (mini-disc) instead of the CD-ROM
drive. The two-tuner radio has the radio frequencies FM, AM and Traffic (2 channels).
In the Japanese version, the Car Communication Computer does not have a rotating-speed sensor or a HIP
module.

Su
b
ject to alteration due to misprints, errors and technical modifications.