Multi-audio system controller

E60, E61, E63, E64, E70, E87, E90, E91, E92, E93

Introduction

> E60, E61, E63, E64:
The multi-audio system controller (M-ASK) is fitted as standard on the E60 with the BMW "Business" radio with CD drive. The menus are displayed on the 6.5 inch Central Information Display (CID) in colour.
In conjunction with option 663 BMW "Professional" radio or option 606 "Navigation system Business", M-ASK is extended by the following additional functions

- Selection of the strongest FM station
- Traffic Message Channel (TMC)
- Navigation with DVD (only with option 606)

> E87, E90, E91, E92, E93 and E70:
The M-ASK is fitted along with the special equipment "Navigation system 'Business"'. The menus are displayed on the 6.5 inch Central Information Display (CID) in colour.

New features:

> E60, E61, E63, E64, E87, E90, E91, E92:
Introduction of new M-ASK from 09/2006 (design as previous M-ASK).

> E70 and E93 from start of series production:
Introduction of M-ASK with favourites buttons
8 favourites buttons (programmable buttons) allow certain functions to be stored for faster access.

Several electronic control units and the drive are integrated in one casing.

- E60, E61, E63, E64 - [System overview ...]
- E70: [System overview ...]
- E87, E90, E91, E92, E93: [System overview ...]
- Arrangement of boards, inputs/outputs for navigation system:

  [System overview ...]

The M-ASK has a modular structure: the functional ranges are combined in "virtual" control units in the M-ASK. "Virtual" means that although the individual control units are combined in the M-ASK, they operate as "separate" control units (e.g. when programming).

The following "virtual" control units are differentiated as follows:

- **Multi-audio system controller (M-ASK)**

  The M-ASK has the following functions:

  - Aerial tuner for radio reception with the single-tuner radio (standard equipment on E60, E61, E63, E64)
  - Aerial tuner for radio reception with the two-tuner radio (standard equipment on E70 and E87, E90, E91, E92, E93)
  - Navigation (with option 606).
  - Audio function for generating acoustic signals, for setting tones, for fading the audio source in and out and distribution to the loudspeakers
- **M-ASK user interface (M-ASK-BO)**

  The M-ASK-BO control unit controls the graphical user interface of the M-ASK.
- **M-ASK Gateway (M-ASK-GW)**

  The M-ASK-GW control unit has the following functions:

  - Interfaces between the MOST bus and K-CAN
  - Control and monitoring of the MOST bus
- **M-ASK navigation system (M-ASK-NAV)**

  The control unit M-ASK-NAV controls the navigation system (with option 606).
- **M-ASK voice recognition system (M-ASK-S)**

  The M-ASK-S controls the output of different voice packages for foreign languages.

Brief description of components

The M-ASK obtains signals from the following components:

- **CON: Controller**

  The controller delivers the signals for selecting the menus and submenus. The submenus are selected by turning and/or pushing the controller.
- **Telephone**

  The telephone delivers the signal for the radio mute circuit and the low-frequency output signal to transmit the call to the loudspeakers. The two signals are transmitted via the MOST bus. Other information can also be transmitted by the telephone.
- **CD changer or DVD changer**

  The CD changer or DVD changer (optional) supplies the low-frequency output signals to actuate the output stages.

The CD changer or DVD changer is connected to the MOST bus.

- **Aerials**

  The aerials (e.g. rear window aerial, roof-mounted aerial, rod antenna, aerial in the spoiler, side-window aerial) supply the signals for radio reception and for the remote control.

  > E87, E90, E91, E92: [for further information, please refer to SI Technology (SBT) 65 02 05 114]

- **GPS aerial**

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

- **DSC: Dynamic Stability Control**

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

- **Navigation DVD**

  The navigation DVD supplies the 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 for the distance, speed and direction (forwards and backwards) for calculation in the DSC control unit.

- **SZL: Steering column switch cluster**

  The SZL delivers the steering angle signal for the navigation system.

- **Multi-function steering wheel**

  The multi-function steering wheel houses the buttons for volume and station selection. The push-to-talk button activates/deactivates the voice recognition system.

The M-ASK consists of the following components:

- **Housing**

  The size of the M-ASK corresponds to that of a radio DIN housing.
  [more ...]

- **Drive**

  Depending on the design, the M-ASK is equipped with the following drives:

  - CD drive for playback of audio CDs.
  - CD-ROM drive for playback of audio CDs.
  - DVD drive for loading data for the navigation system and for playback of audio CDs.

- **Aerial tuner**

  Depending on the design, the M-ASK is equipped with the following tuners:

  - Single-tuner radio for reception of VHF, MW and LW radio frequencies.
  - Two-tuner radio for reception of the strongest FM station. The traffic message channel (TMC) receives information that is used by the navigation system to avoid traffic jams (with option 606).

    [more ...]

- **M-ASK motherboard (M-ASK-H)**

  The M-ASK motherboard is connected to the processor board. There are memories and processors on both boards which function as individual control units.

- **Aerial diversity**

  The aerial diversity contains the aerial amplifier and switches over the aerials to FM.
  [more ...]

- **Electric fan**

  An electric fan for cooling the audio output stages and the processors can be found on the back of the 1 DIN radio

casing.

The M-ASK outputs the following signals:

- **KOMBI: Instrument cluster**

  The instrument cluster is used to display Check-Control messages.

- **CID: Central Information Display**

  The following functions can be displayed on the CID:

  - On-board info (with option 606 is displayed as menu navigation)
  - Entertainment
  - Communication
  - Climate
  - Settings

- **Audio operation**

  The following signals can be output via the loudspeakers:

  - Audio signals
  - Parking aid (PDC: Park Distance Control)
  - Audible signals (jingles), e.g. signals during Check-Control messages

System functions

The M-ASK includes the following functions:

- Aerial tuner
  - Single-tuner radio (only E60,E61,E63,E64)
  - Two-tuner radio
    (standard equipment on E70, E87, E90, E91, E92, E93; optional on E60, E61, E63, E64)

- Multi-audio system controller (M-ASK)
  - System master
  - Power master
  - Network master
  - Audio master
  - Connection master
- M-ASK user interface (M-ASK-BO)
- M-ASK Gateway (M-ASK-GW)
- M-ASK navigation system (M-ASK-NAV)
  - Loading almanac data
  - Navigation with DVD

Aerial tuner

- Single-tuner radio

  > E60, E61, E63, E64

  The single-tuner radio is fitted as standard in the M-ASK. The tuner receives the radio frequencies FM (VHF) and AM (MW and LW). The radio waves from the radio station are received by the aerials in the rear window. The received high-frequency signal is led by the aerial diversity (on the rear window) via a coaxial line to the aerial input on the single-tuner radio.

- Two-tuner radio

  > E70, E87, E90, E91, E92, E93

  > Optional on: E60, E61, E63, E64

  While tuner 1 receives the required radio station, tuner 2 works in the background. Tuner 2 searches the station frequencies for additional signals. If a radio station is transmitting a stronger signal on a different frequency, the radio will automatically switch to this alternative frequency.
  Tuner 2 receives additional information from the Traffic Message Channel (TMC). The TMC information is used by the navigation system (option 606) to avoid areas of traffic congestion.

- Radio Data System (RDS)

  Both aerial tuners receive information from the Radio Data System (RDS) which is emitted with the signal from the FM station.

  If the radio is tuned to an AM station, RDS traffic information announcements can still be received from an FM station.

  If a traffic information announcement is received, the AM station is hidden and the message is outputted over the loudspeakers. All the radio stations and traffic information stations that can be received are contained in a list of RDS stations.

Multi-audio system controller

- System master

  The system master connects the individual control units in the M-ASK.

- Power master

  The power master initialises the network and switches the MOST bus on and off (wake-up, sleep mode).

- Network master

  The network master controls and monitors the MOST bus. Each time the network is started, the exact system configuration is recorded and compared with a stored target configuration.

  If systems do not work correctly, these are reset and separated from the MOST bus. Any operating fault of the network or any deviation from the target configuration is stored in a fault memory for the MOST bus.

- Audio master

  The Audio master collects all the audio signals in the vehicle, processes the audio signals and outputs them over the loudspeakers. The audio master also produces additional audible signals for warnings and for Park Distance Control (PDC). By mixing 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 (acoustic signals, telephone, messages from the navigation system, traffic information announcements)
  - Front left and right, rear left and right (signals for PDC)
  - All loudspeakers (all sources in the "Entertainment" menu)

M-ASK user interface

The M-ASK control unit user interface processes signals from the controller (selection from the menus and submenus).

In addition the M-ASK user interface controls the displays on the Central Information Display (CID). The data in the graphics processor is immediately transmitted to the CID as LVDS digital signals.

M-ASK gateway

The M-ASK Gateway control unit forms the interfaces for data exchange between the MOST bus and the K-CAN. The two bus systems transfer data formats at different data transfer rates and in different formats. The data for each bus is configured in the M-ASK Gateway to communicate with all systems.

M-ASK navigation system

- Navigation with DVD

  In conjunction with option 606, the navigation system is integrated in the M-ASK. The navigation system has the following new features:

  - Data for navigation on DVD
  - Reading and storing the data for navigation in the RAM (Random Access Memory)
  - Complete representation of Europe
  - Manual alteration of the route calculated by the navigation system by route criteria (fastest route, motorway) and by the Via function.
  - Dynamic route planning by using TMC information (avoiding traffic jams)
  - List of stored destinations
  - Exact calculation of the arrival time. By integration of the various types of streets (motorway, A roads, B roads) and the average speed of the vehicle, the arrival time can be calculated exactly.
  - Better route guidance. When changing from one motorway or A road onto another, the road number is announced.

- GPS satellites

  GPS satellites move around the earth in 6 nearly circular orbits. There are 4 GPS satellites per orbit, therefore there is a maximum number 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 be loaded.

- Loading almanac data

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

  - UTC (Universal Time Coordinate)
  - Date
  - Location of the GPS satellites
  - Orbits
  - Operational capacity of the GPS satellites

  Once the navigation system has been switched on for the first time (terminal R ON) the GPS satellite Almanac data is received and loaded. The loading time depends on the number of "visible" GPS satellites and can take up to 20 minutes during the adaptation phase. Otherwise the almanac data is permanently stored in the 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 be reloaded if the vehicle is transported over a distance of more than 300 km from the manufacturing point, e.g. after:

- Transportation from the Dingolfing factory.
- Return transport from abroad in the case of damage.
- Placing the vehicle on a train.

Navigation is still possible in the adaptation phase, both when the vehicle is stationary and when it is being driven. Navigation is highly inaccurate at first. The end of the adaptation phase and thus the maximum precision of the navigation system will be achieved after some time or a lengthy journey.

When almanac data is loaded, the navigation system is ready for operation 10 to 15 seconds after starting each time.

Notes for service staff

Service staff should note the following points:

- General information: [more ...]
- Diagnosis: ---
- Encoding/programming: ---

US national version

> E70 and E93 from start of series production
Instead of the multi-audio system controller (M-ASK), the Central Head Unit and Multimedia Platform (CHAMP) operates as the BMW "Professional" radio. In contrast to M-ASK, CHAMP **does not** have a navigation system.

Of the 8 favourites buttons, 6 can be assigned certain functions.
2 favourites buttons are assigned fixed functions.

Subject to change.