Digital Vehicular Radio Equipment

login
U 0 5221
Voice communication between headquarters and mobile service stations utilizes a TETRA radio network. The mobile radio fixed installation (FFA) enables the driver to participate in the internal radio communication.

The FFA is used in all areas of the subway and special rail vehicles of the Berlin subway system.

The mobile radio installation is adapted to the unique characteristics of every vehicle model and is connected to electroacoustic equipment (ELA) for announcements in the passenger compartment.

Via mobile radio installation:

• Voice connections with headquarters and other radio users
• Display of the network’s central reference time
• Receiving and transmitting of textual reports
• Transmitting of emergency calls
• Direct radio connection between the drivers

The mobile radio installation is served via the data operation terminal (DABT). It is integrated in the desk and mounted within direct reach and view of the driver.

An additional, directly connected loudspeaker mirrors incoming voice reports independent of the ELA functions.

**Application field**

**TETRA functionality**

- Group call (semi-duplex) for voice
- Individual call (semi-duplex and full-duplex) as an express call or with call-accepted signal
- Telephone call (net internal and via Gateway) with call-accepted signal
- SDS short data service (SDS-4)
- Package data
- Emergency call
- Simultaneous voice and data (Status/ SDS/ Text)

**Integration of the FFA in the current environment**

The integration of the mobile radio installation uses existing peripheral components such as microphones, broadcast keys and electroacoustic infrastructure (ELA) wherever possible.

The driver’s microphone is used either for voice radio for FFA (key “F”) or for ELA. The ELA can mirror the driver’s announcements (key “L”) or announcements received via radio (key “FL”) to the passenger compartment.

Typical components and additional equipment:

- Radio module (integrated radio set)
- Controller DBCO
- Data Operation Terminal DABT
- Mounting for the Data Operation Terminal
- Speakers for the driver’s radio
- Cables
- Antenna
- Microphone
- External microphone amplifier (in addition to the integrated DBCO controller)
- DC/DC converter
- Foot Pedal PTT (Push-to-Talk)
- ELA including on-board speakers
- Pin board
Features and Capabilities

These are the general features and capabilities of the Vehicular Radio Equipment:

- Highly reliable
- Illuminated keys (for night operation)
- High contrast graphic display
- Wide operating temperature range (-10°C...+60°C)
- Clear optical / acoustic signaling
- Wide range of adjustable volume; configurable minimum volume
- Volume control
- Transmitting key (PTT)
- Emergency key (protected against accidental triggering)
- Transmitting / receiving display
- Pushbutton dialing
- Calling Number ID Display (CLI)
- Display of the speaker during group calls
- Interface to an on-board computer
- Interface to vehicle - ELA
- Transfer of vehicle diagnosis data (provided optionally)
- Assembly of the radio unit on an assembly plate or in a 19” cabinet
- Designated control terminal
- Level control and transmission assembly for coupling of the radio installation with the ELA

Block Diagram TETRA Radio Installation
• Connection for ELA for transition „Radio control center to passengers“
• Connection for ELA for transition „Passenger to radio control center“ (emergency call door intercom)
• Connection for ELA (microphone input)
• Connections for station announcement speakers

Adaptation assembly for coupling of the computer interface (interface adapter):

• Radio interface: RS-232
• On-board computer (ZFG): RS-232, external V.24 data and control interface
• Designated control unit with assembly mounting adapted to several vehicle types
• Anti-theft control of the control unit (firmly attached)
• Voltage converter DC 110 V / DC 13.5 V for installation on a mounting plate or as a cartridge for 19”
• Chassis (adapted to several vehicle types)
• Driver cabinet speakers with appx. 2m feeder
• Cable between control unit and radio unit is 5m long, complete with fastened contacts, with loose arranged racks
• Connection for transmit keying (press-to-talk-button)
• Connection for emergency call key (release from the driver)
• Connection for emergency call key, coupled with emergency brake (for driverless operation)
• Connection for electric supply
• Connection for antenna

Additional Features and Capabilities of the radio equipment assembly

• All control connections on the Send / Receive device, control unit and voltage converter are pluggable
• Permanent illumination of the buttons and the display
• Automatic brightness control of the display to adapt to ambient brightness
• Antenna connector implementation
• Wire-wrapped connections for power supply in solid conductors

Band of Frequencies

Frequency range TMO (Trunked Mode Operation): 410 – 430 MHz
Frequency range DMO (Direct Mode Operation): 410 – 430 MHz

Transmitting Efficiency

The radio sets dissipate 3 W in accordance with ETS 300 392-3 for FFA as a mobile radio installation.

Norms, regulations and standards

The following regulations and standards are adhered to within the scope of an audit:

• CE – EG conformance control
• E1 – guideline 95/54/EG of the commission as of 31 October 1995
• EN 55011
• EN 61000-6-3 (previously EN 50081-1)
• EN 61000-6-4 (previously EN 50081-2)
Voice and Textual Reports

Voice Reports
During normal vehicle operation, voice communications can be established by the control center or by other authorized radio participants. In doing so, primary express calls are used. The voice of the caller is heard directly on the speakers of the FFA.

The driver can reply during a pause in speech. Alternatively, individual voice calls can also be received by the FFA. These calls must be accepted by the driver.

Furthermore, conference calls can also be received, in which a number of participants from the organization, for example the drivers of trains traveling along a route, are connected to one another simultaneously and can hear the currently speaking participant.

Voice communication for emergency calls happens over an emergency call conference loaded into the FFA dynamically in an emergency.

An authorized command center can temporarily connect together various participants into a conference for communication in an emergency.

Textual Report
Text messages from other subscribers of the digital radio network can be received by the Vehicle Radio Equipment.

There are predetermined text messages (status calls) and editable longer texts.

Received text messages are immediately presented on the display.

Dimensions

If an existing switched vehicle is accepted into an emergency call conference, then at the same time it is also associated with the switch procedure of participating vehicles. That occurs exclusively under the responsibility and control of the authorized command center.
In general, the Data Operation Terminal consists of an illuminated flat screen console with curved surface keys, a rotating volume control, a graphic-capable color display with automatic brightness control and an infrared configuration interface.

All control elements of the Vehicular Radio Equipment other than the transmitting key (foot pedal) are concentrated in the Data Operation Terminal DABT.
Function settings and LEDs

Volume of voice and tone signals
The volume of speech and tone signals can be modified by turning the speaker button. A menu appears which shows the adjusted volume.

Brightness of the display
The brightness of the display is regulated automatically. In a dark environment the brightness of the display is reduced after a short time and in a bright environment, the display brightness increases. The ambient brightness is determined by a sensor.

The menu associated with the volume control knob also allows control of the standard brightness.

LEDs for send and receive status
On the left side, under the volume control, a couple of colored LEDs which report incoming calls and indicate whether the FFA is sending or receiving are located.

- green: Acknowledges an active connection
- yellow: Flashes during incoming call
- red: Indicates device is sending

Display

The display has the following functions:

- High resolution transflective TFT color display - capable of graphics
- Size: 2.2"
- Resolution: 220xRGBx176
- Colors: 262144
- Display brightness: Standard brightness adjustable with automatic adaptation to the ambient brightness

There are symbols on the upper left side of the display for field strength and network availability. On the right side is space for additional situation-dependent symbols.

The height of the symbols is approx. 4 mms. Beneath, there are 2 lines with min. 6.5 mms font size. The lower row shows the contextual assignment of the soft keys. The height is approx. 4 mms.
Our communication solutions

Maritime
- Maritime radio base stations VHF + DSC
- Radio technology for NAVTEX
- Control centre systems and applications
- Control units for maritime mobile radio

Public safety
- Indoor coverage radio, analogue and digital
- Field strength measurement
- Control centres for police and fire brigade
- Migration concept analogue to digital
- Remote control units

Public Transport
- Digital vehicle radio systems
- TETRA radio system units
- Applications

Industry & Energie
- Professional mobile radio systems
- Secure connections for high security zones
- Personal emergency signal systems
- Communication systems
- Measurement data acquisition system

Our areas of expertise

Planning and project management
- Extensive consultancy and concept planning
- Project development
- Support for creating specification documents
- On-site project management
- Project management
- Project supervision and support

Product developments
- Hardware development in RF, AF and digital areas acc. customer requirements
- Software development for application specific controls and PC application programs
- Product applications
- Creation of technical documentation
- System development

Prototype construction, sample and series production
- Prototypes and small series production of terminal modules, systems and system cabinets

System setup & support
- Assembly, set up and installation
- Customer care at system integration
- Final system installation

Support
- Service and system care
- Hotline for service support
- Performance of service and maintenance
- Component testing and repairs
- Procurement of replacement parts

Training
- Engineering and maintenance training sessions for your staff

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