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Železniške naprave - Komunikacijski, signalni in procesni sistemi - Evropski sistem za vodenje železniškega prometa - Vmesnik človek-stroj - 2. del: Ergonomska razporeditev informacij GSM-R

Railway applications - Communication, signalling and processing systems - European Rail Traffic Management System - Driver-Machine Interface - Part 2: Ergonomic arrangements of GSM-R information

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English Version

Railway applications - Communication, signalling and processing systems - European Rail Traffic Management System - Driver-Machine Interface - Part 2: Ergonomic arrangements of GSM-R information

Applications ferroviaires - Systèmes de signalisation, de télécommunications et de traitement - Système européen de gestion du trafic ferroviaire - Interface de conduite - Partie 2: Aménagement ergonomique des informations GSM-R

Bahnanwendungen - Telekommunikationstechnik, Signaltechnik und Datenverarbeitungssysteme - Europäisches Leitsystem für den Schienenverkehr - Mensch-Maschine Schnittstelle - Teil 2: Ergonomische Anordnung der GSM-R Informationen

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European foreword

This document (CLC/TS 50459-2:2015) has been prepared by CLC/SC 9XA “Communication, signalling and processing systems”, of Technical Committee CLC/TC 9X “Electrical and electronic applications for railways”.

This document supersedes CLC/TS 50459-2:2005.

CLC/TS 50459-2:2015 includes the following significant technical changes with respect to CLC/TS 50459-2:2005:

- update general principles for the presentation of ERTMS/ETCS/GSM-R information correlated with ERA document ERA_ERTMS_015560.
- update ergonomic arrangements with EN 16186 series.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CENELEC [and/or CEN] shall not be held responsible for identifying any or all such patent rights.

CLC/TS 50459 series consists of the following parts under the general title *Railway applications — Communication, signalling and processing systems — European Rail Traffic Management System — Driver-Machine Interface:*

- *Part 1: General principles for the presentation of ERTMS/ETCS/GSM-R information*;
- *Part 2: Ergonomic arrangements of GSM-R information* [the present document];
- *Part 3: Ergonomic arrangements of non ETCS information*.

Introduction

This document should be read in conjunction with ERA_ERTMS_015560, *ETCS Driver Machine Interface*, and the EN 16186 series, *Railway applications — Driver's cab*.

CLC/TS 50459 series contains the ergonomic arrangements of information on the ERTMS/DMI Display (CCD and TRD). Most items are illustrated with an example.

The reasons for defining the ergonomics of the DMI are as follows:

— achieving harmonized and coherent presentation for ERTMS/ETCS and NTC information;

— defining Driver-Machine Interface ergonomics that is compatible with agreed interoperable ERTMS specifications;

— to reduce the risk of incorrect operation by a driver;

— facilitating train operation with a unified ergonomics, hence reducing the cost of driver training;

— better understanding of the tasks to be performed;

— increasing speed and accuracy of driver actions.

1 Scope

This Technical Specification describes from an ergonomic point of view how GSM-R information shall be arranged and displayed. More specifically it covers information that is out of the scope of ERA document ERA_ERTMS_015560. This Technical Specification describes more ergonomic details than currently provided by the GSM-R specifications.

This Technical Specification defines the ergonomics for the Driver-Machine Interface (DMI) for the stand alone ERTMS/GSM-R Voice Radio Systems.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 16186-1, *Railway applications — Driver's cab — Part 1: Anthropometric data and visibility*

prEN 16186-2, *Railway applications — Driver's cab — Part 2: Integration of displays, controls and indicators*

prEN 16186-3:2014, *Railway applications — Driver's cab — Part 3: Design of displays*

CLC/TS 50459-1:2015, *Railways applications — Communication, signalling and processing systems — European Rail Traffic Management System — Driver-Machine Interface — Part 1: General principles for the presentation of ERTMS/ETCS/GSM-R information*

UIC 612-01, *Display System in driver cabs (DDS) — General Requirements, Set Up and Technical Specifications*, version 1 July 2011

UIC 612-04, *Display System in Driver's Cabs (DDS) — Train Radio Display (TRD)*, version 1 September 2012

UIC ERTMS/GSM-R OPERATORS GROUP Document No. O-2680, V1.0, dated 03/02/2005

UIC Project EIRENE, *Functional Requirements Specification*, Version 7.3.0, UIC CODE 950, 8 March 2012

UIC Project EIRENE, *System Requirements Specification*, Version 15.3.0, UIC CODE 951, 8 March 2012

3 Terms, definitions and abbreviated terms

3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in CLC/TS 50459-1:2015 and the following apply.

3.1.1
auto-answered
according to EIRENE, automatically answered from a mobile station to a call if the incoming call is of or exceeds a defined priority level

3.1.2
broadcast call
call made to all members of a pre-defined group within a local geographical area

Note 1 to entry: Only the initiator of the call may talk, with all other group members listening only.

3.1.3
Call Forwarding mobile subscriber Busy
CFB
supplementary service which permits a called mobile subscriber to have the network send incoming calls to another number and thanks to which, if activated, calls are forwarded only if the mobile subscriber is busy

3.1.4
Call Forwarding on mobile subscriber Not ReaChable
CFNRc
supplementary service which permits a called mobile subscriber to have the network send incoming calls to another number and thanks to which, if activated, calls are forwarded only if the mobile cannot be reached due to radio congestion, no paging response or because the subscriber is not registered

3.1.5
Call Forwarding on No ReplY
CFNRy
supplementary service which permits a called mobile subscriber to have the network send incoming calls to another number and thanks to which, if activated, calls are forwarded only if the mobile (radio) does not answer a call

3.1.6
Call Forwarding Unconditional
CFU
supplementary service which permits a called mobile subscriber to have the network send incoming calls to another number and thanks to which, if activated, calls are forwarded no matter what the condition of the termination (radio)

3.1.7
call type
prefix used to identify the user number dialled

Note 1 to entry: The first digit of a National EIRENE Number (see EIRENE SRS Section 9) defines how to interpret the numbers that follow.

Note 2 to entry: Of particular relevance to this document are:

- Call Type 1 – reserved for short codes;
- Call Type 7 – used for train controllers.

3.1.8
chief conductor
member of the train crew with overall responsibility for passenger-related railway activities on-board the train

3.1.9
conductor
member of the train crew with some degree of responsibility for passenger-related railway activities on-board the train

3.1.10
controller
individual responsible for the conduct of some aspect of train operations (also known as dispatcher)

Note 1 to entry: For the purposes of this specification the following functional roles of controllers are defined:

- primary controller;
- secondary controller;

- power (supply) controller.

3.1.11
downlink
radio transmission path from a base station to a mobile station

3.1.12
EIRENE
railway telecommunications system based on the ETSI GSM standard, which complies with all related mandatory requirements as specified in the EIRENE FRS and SRS

Note 1 to entry: An EIRENE system may also include optional features and these are then implemented as specified in the EIRENE FRS and SRS. The EIRENE System includes terminals.

3.1.13
flash SMS
type of SMS that appears directly on the main screen without user interaction and is not stored in the inbox

3.1.14
function code
code which is used as an identification of, for example, the person or equipment on a particular train, or a particular team within a given area

3.1.15
functional identity
full number used within the EIRENE functional addressing scheme to contact an end user/system by function or role rather than by a specific item of radio equipment or user subscription

3.1.16
functional number
full number used within the functional addressing scheme to identify an end user/system by function or role rather than by a specific item of radio equipment or user subscription

EXAMPLES Train Running Number and Locomotive Number.

3.1.17
group call
call made to all members of a pre-defined group within a local geographical area

Note 1 to entry: Only one member of the group may talk at any instant, with all other group members listening only.

3.1.18
Group ID
Group Identification (Number)
three digit number (defined in EIRENE SRS Table 9-8) used within the EIRENE Numbering Plan

3.1.19
Idle State
state of a cab radio when it is connected to a network but there are no active calls

3.1.20
multiparty call
voice communication method whereby a number of parties defined by the call initiator may participate in the call and whereby all parties may talk simultaneously

3.1.21
point-to-point call
voice communication method whereby two parties defined by the call initiator may participate in the call and whereby both parties may talk simultaneously

3.1.22
power (supply) controller
controller responsible for the management of the traction power supply

3.1.23
primary controller
co-ordinator of train emergency calls who is normally responsible for the operation of a designated area of track

Note 1 to entry: The location and direction of movement of any particular train permits the unique identification of a primary controller. The exact responsibilities of the primary controller are determined on a national basis.

3.1.24
secondary controller
train controller who holds responsibility for the safe running of trains on a designated area of track (e.g. a signaller)

Note 1 to entry: Secondary Controllers requires the facility to communicate with trains in all situations in order to perform their function. The split of responsibilities between Primary Controllers and Secondary Controllers is determined on a national basis.

3.1.25
shunting group
group of people manoeuvring trains in order to change the formation of the trains

Note 1 to entry: EIRENE also uses the term 'Shunting team' for this.

3.1.26
sidetone
form of feedback where transmitted audio signal is instantly introduced at a low level into the receiver (earpiece) of the same handset

Note 1 to entry: It only applies when the handset is off-hook.

3.1.27
uplink
radio transmission path from a mobile station to a base station

3.2 Abbreviated terms

For the purposes of this document, the following abbreviated terms apply.

ASCII	American Standard Code for Information Interchange
DMI	Driver-Machine Interface
DTMF	Dual-Tone Multi-Frequency
EIRENE	European Integrated Railway Radio Enhanced Network
ERA	European Rail Agency
FC	Function Code
FRS	Functional Requirements Specification
HMI	Human Machine Interface
IC	Intercom
PA	Public Address
PTP	Point-To-Point
PTT	Push To Talk
REC	Railway Emergency Call

RU	Railway Undertaking
SIM	Subscriber Identity Module
SMS	Short Message System
SRS	System Requirements Specification
TCMS	Train Control and Monitoring System
TRD	Train Radio Display
VBS	Voice Broadcast Service
VGCS	Voice Group Call Service

NOTE For practical reasons, in this document GSM-R is used instead of ERTMS/GSM-R.

4 General DMI-related principles

4.1 General ergonomic principles

The relevant requirements of the EN 16186 series shall be followed.

The GSM-R DMI shall follow the main ergonomic principles as described in CLC/TS 50459-1.

Any additional requirements that are specific to GSM-R are defined in this document.

4.2 Hardware

4.2.1 General

It should be possible to pickup and return the handset 'blindly' (from the driving position) and with one hand. prEN 16186-2 shows the preferred location of the handset.

GSM-R shall automatically detect that the handset is off-hook.

As an alternative to a handset and loudspeaker, it should be possible for a radio to use a hands-free microphone and loudspeaker. The hands-free microphone shall include a PTT function that is used when the driver wants to speak during group calls. The PTT function may also be used during other calls.

4.2.2 Use of alternative layouts for the DMI

For existing systems or systems at an advanced stage of development alternative DMI layouts may be used provided that they meet the functional requirements.

4.3 Areas on the DMI

GSM-R DMI's shall have the following areas: input and monitoring. This is illustrated in Figure 1 — Areas of the DMI Display along with their relative sizes (in cells). Refer to CLC/TS 50459-1:2015, 4.1.3 for a fuller explanation of sizes and cells.

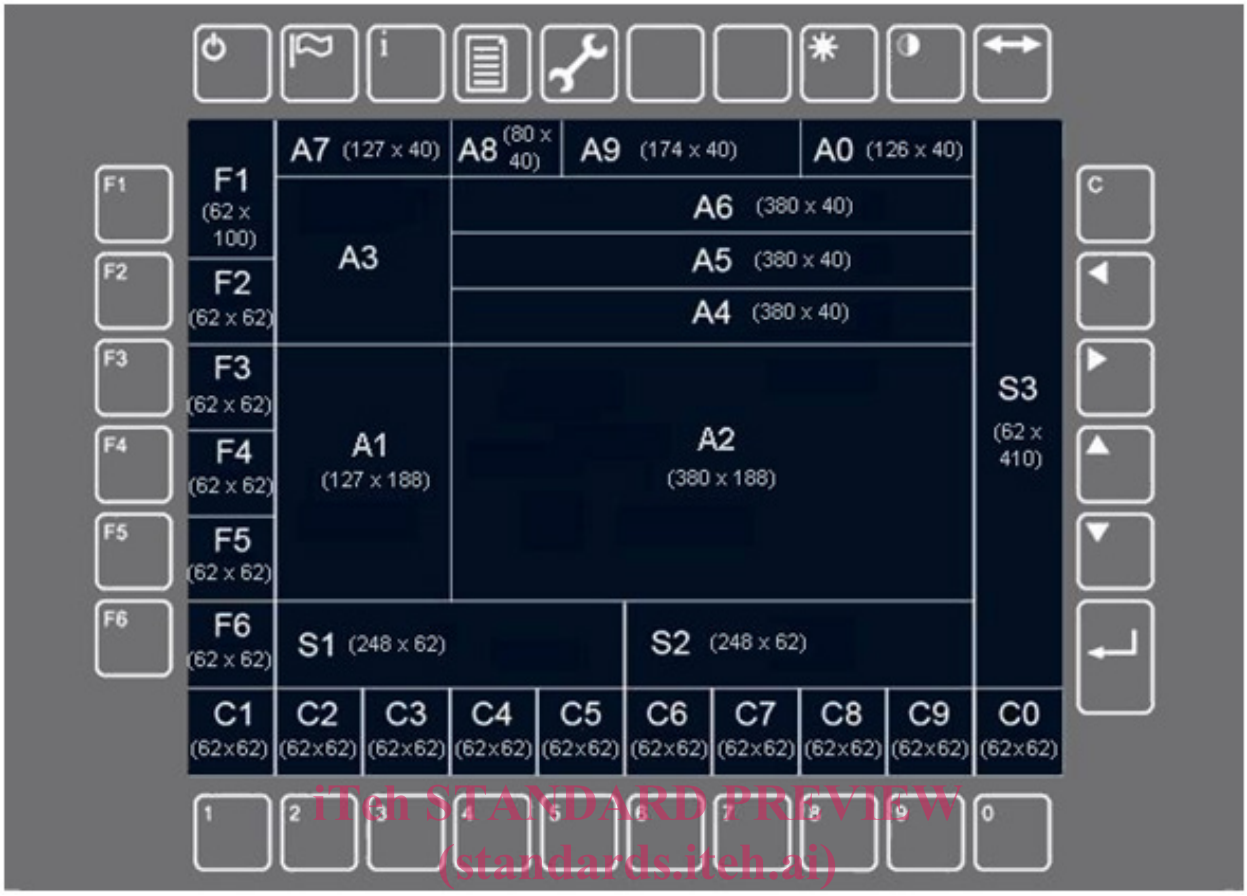

Figure 1 — Areas of the DMI Display

NOTE This layout is in line with UIC 612-04. The functions associated with the various areas and keys are given in the tables below. The descriptions are based on those given in UIC 612-04 with re-wording where it is considered helpful.

Table 1 — Description of functions used in each area

Field	Description
A1	GSM-R symbol showing call status
A2	announcement and communication field • GSM-R information, • flash-SMS (incoming text, at least 160 digits without scrolling), • announcement of other than flash-SMS (symbol: envelope), • other text and symbols.
A3	reserved for future use, e.g. a Driver Advisory System
A4	text heading
A5	• for train radio mode: current call number • for shunting mode: current shunting group number
A6	title of the TRD screen
A7	• for train radio mode: train number • for shunting mode: shunting area number
A8	function code
A9	current GSM-R operator · SNCF: virtual channel number (see UIC ERTMS/GSM-R Operators Group, document no. O-2680) · ADIF: Regulation Band Number (see UIC ERTMS/GSM-R Operators Group)
A0	current time
S1	GSM-R network status information
S2	status field (for acoustic level 5 volume steps shall permanently be provided acc. to GSM-R EIRENE SRS)
S3	soft key display field (blue triangle, if navigation key is active)

Table 2 — Description of functions associated with keys

Key	Pictogram	Functional description
K1.1		Only operational in a non-activated cab: It allows a cab radio to be switched on / off in the absence of any other cab activation signal assuming that power is available.
K1.2		Use this key to open the display screen "switch language".
K1.3		Not used for GSM-R
K1.4		Not used for GSM-R
K1.5		Not used for GSM-R
K1.6		Reserved for future use
K1.7		Reserved for future use
K1.8		Use this key to open the dialog for manual brightness control.
K1.9		Reserved for future use
K1.10		Option: When subsequently pressing this key: the (partial) contents of one of the other displays are shown on the display according to the redundancy concept (see CLC/TS 50459-1:2015, 4.1.4).
K2.x		Right group of keys: - see below for individual details of these six keys - in some applications soft key labels are allocated to these keys. Then they have the meaning given by the soft key labels.
K2.1		Use this key to return to the level above within the display screen hierarchy.
K2.2		Use this key to move from the current field to the next field to the left.

Key	Pictogram	Functional description
K2.3		Use this key to move from the current field to the next field to the right.
K2.4		Use this key to scroll up.
K2.5		Use this key to scroll down.
K2.6		Use this key to acknowledge entries or messages, or confirm a selection. It is also known as the Accept key.
K3.1 to K3.10		Bottom group of keys: 10 keys (labelled 1-0). Only if numerical input is requested (1...0), the soft keys shall show the same numbers as the hard keys K 3.1 to K 3.10. Only the soft key labels relevant for the driver's selection shall be shown. Soft key labels showing other information instead of the numerical values may be allocated to these hard keys. Then the hard keys have the meaning given by the soft key labels.
K4.X		Left group of keys: 6 keys (labelled F1 to F6).
K4.1 = F1		Increase volume
K4.2 = F2		Decrease volume
K4.3 = F3		Intercom This key is dedicated to the intercom function in order to meet the requirement of EIRENE FRS 5.2.3.11.
K4.4 = F4		Public address call. This key is dedicated to the Public Address function in order to meet the requirement of EIRENE FRS 5.2.3.11.
K4.5 = F5		Chief conductor call This key is dedicated to the Call Chief Conductor function in order to meet the requirement of EIRENE FRS 5.2.3.11.
K4.6 = F6		Secondary controller call