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(istoveten CLC/TS 50459-3:2005)

Railway applications – Communication, signalling and processing systems – European Rail Traffic Management System – Driver-Machine Interface – Part 3: Ergonomic arrangements of ERTMS/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 3: Ergonomic arrangements of ERTMS/GSM-R information

Applications ferroviaires – Systèmes de signalisation, de télécommunications et de traitement – Système européen de gestion du trafic ferroviaire – Interface de conduite Partie 3: Dispositions ergonomiques des informations ERTMS/GSM-R

Bahnanwendungen – Telekommunikationstechnik, Signaltechnik und Datenverarbeitungssysteme – Europäisches Leitsystem für den Schienenverkehr – Mensch-Maschine Schnittstelle Teil 3: Ergonomische Anordnung der ERTMS/GSM-R Informationen

This Technical Specification was approved by CENELEC on 2005-05-07.

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CENELEC

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

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Foreword

This Technical Specification was prepared by SC 9XA, Communication, signalling and processing systems, of Technical Committee CENELEC TC 9X, Electrical and electronic applications for railways.

The text of the draft was submitted to the vote and was approved by CENELEC as CLC/TS 50459-3 on 2005-05-07.

The following date was fixed:

– latest date by which the existence of the CLC/TS has to be announced at national level (doa) 2005-11-07

This Technical Specification has been prepared under mandates M/024 and M/334 given to CENELEC by the European Commission and the European Free Trade Association.

Contents

Introduction

This Technical Specification forms Part 3 of a series, the other parts being:

CLC/TS 50459-1 for ergonomic principles for the presentation of ERTMS/ETCS/GSM-R information

CLC/TS 50459-2, for ergonomic arrangements of ERTMS/ETCS information

CLC/TS 50459-4 for data entry procedure for ERTMS/ETCS/GSM-R

CLC/TS 50459-5 for symbols for ERTMS/ETCS/GSM-R

CLC/TS 50459-6 for audible information for ERTMS/ETCS/GSM-R

These Technical Specifications contain the ergonomic arrangements of information on the ERTMS DMI Display. Most items are illustrated with an example.

1 Scope

This Technical Specification describes from an ergonomic point of view how ERTMS information shall be arranged and displayed. This Technical Specification describes more ergonomic details than currently provided by the ERTMS/ETCS/GSM-R specifications.

This Technical Specification defines the ergonomics for the Driver-Machine Interface (DMI) for the ERTMS/ETCS Train Control System, and for the integrated ERTMS/GSM-R Train Control and Train Radio Systems, and for the stand alone ERTMS/GSM-R Train Radio Systems and for other technical systems currently provided on the engines.

The ergonomics covers the

— general arrangements (dialogue structure, sequences, layout philosophy, colour philosophy),

— symbols,

— audible information,

— data entry arrangements.

The aims of the ERTMS/ETCS/GSM-R Train Control and Train Radio Systems are standardised systems facilitating interoperable movement of trains and permitting economies of scale in procurement and operations. The objective of this Technical Specification is to define the minimum requirements on the DMI that are necessary to enable these objectives to be achieved. Hence the Technical Specification is limited to ergonomic considerations and does not define the technology to be used for the implementation.

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

— achieving harmonised and coherent presentation for ERTMS/ETCS and STM information. Given the large number of STM's requiring the use the ERTMS/ETCS DMI, only a harmonised approach is feasible;

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

— to reduce the risk of incorrect operation by a driver working with different trains fitted with ERTMS/ETCS and ERTMS/GSM-R;

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

This Technical Specification is applicable on all trains fitted with the ERTMS/ETCS and also for trains fitted with train radio (GSM-R) DMI.

The scope of Part 3 of the Technical Specification CLC/TS 50459 series is to define ergonomic arrangements of ERTMS/GSM-R information only.

2 Normative references

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

Council Directive 96/48/EC of 23 July 1996 on the interoperability of the trans-European high-speed rail system, Official Journal L 235 , 17/09/1996 P. 0006 – 0024

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

CLC/TS 50459-2, *Railways applications – Communication, signalling and processing systems - European Rail Traffic Management System - Driver-Machine Interface - Part 2: Ergonomic arrangements of ERTMS/ETCS information*

CLC/TS 50459-4, *Railways applications – Communication, signalling and processing systems - European Rail Traffic Management System - Driver-Machine Interface - Part 4: Data entry for the ERTMS/ETCS/GSM-R systems*

CLC/TS 50459-5, *Railways applications – Communication, signalling and processing systems - European Rail Traffic Management System - Driver-Machine Interface - Part 5: Symbols*

CLC/TS 50459-6, *Railways applications – Communication, signalling and processing systems - European Rail Traffic Management System - Driver-Machine Interface - Part 6: Audible information*

UIC 651, *Layout of driver's cabs in locomotives, railcars, multiple-unit trains and driving trailers*

3 Terms, definitions and abbreviated terms

3.1 Definitions

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

3.2 Symbols and abbreviated terms

PA Public Address

PTT Push To Talk

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

All ERTMS/GSM-R DMI procedures and layout principles shall be consistent with the ERTMS/ETCS DMI and the ERTMS/ETCS DMI philosophy as far as it concerns the integrated ERTMS/ETCS/GSM-R DMI.

When there is a GSM-R call, this shall not disturb the ERTMS/ETCS information.

When there is a call to other on-train users/devices using GSM-R this, shall not disturb the ERTMS/ETCS information. This requirement is applicable to the integrated option only.

The principle for navigation for the integrated ERTMS/ETCS/GSM-R DMI shall be consistent with the rules defined in CLC/TS 50459-1. For the stand alone GSM-R DMI it is strongly recommended to have the same consistency.

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

4.2 DMI possibilities

The GSM-R DMI may be a stand alone DMI (one device for GSM-R only) or an integrated DMI (one screen for GSM-R and ETCS).

For the train radio DMI not integrated with ERTMS/ETCS, the following requirements apply in addition to those given in CLC/TS 50459 -1, 4.1.1.2:

— for both national and international trains, symbols should be used for indicators and buttons, however text is acceptable as an alternative provided that the mandatory requirements of this Technical Specification are met;

— if symbols are to be used, then these symbols shall conform to the specifications given in CLC/TS 50459 -5;

— if text is used for an international train, the driver shall be able to select the language appropriate to the country in which the train is operating and appropriate to his own needs.

When using a monochrome display for a standalone GSM-R DMI a similar ergonomic approach to ETCS shall be followed but without the use of colour.

4.3 Hardware

4.3.1 General

In the case of a radio DMI not integrated with ERTMS/ETCS, a monochrome full graphic display may be implemented.

It should be possible to pickup and return the handset 'blindly' (from the driving position) and with one hand.

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

It should be possible for the railway to enable the drivers to change handsets between cabs.

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 button that is used when the driver wants to speak during group calls.

4.3.2 Use of alternative layouts for the DMI

For all functions described above a different layout is possible if a stand alone DMI is used. Examples of alternative graphical layouts are presented in Annex A to this document. It is also acceptable to use textual layouts provided they meet the functional requirements.

4.4 Task structure

All GSM-R DMI's have the same basic areas. Although position and dimensions of the GSM-R areas may be slightly different, the areas visually should be identified as being the same.

GSM-R DMI's shall have the following areas: input and monitoring. This is illustrated in Figure 1.

The monitoring area is covered by the same area as described in CLC/TS 50459-1 (i.e. area E). The input area is the area F of CLC/TS 50459-1 and overlays for different menus and keyboards on areas D and F (see CLC/TS 50459-1).

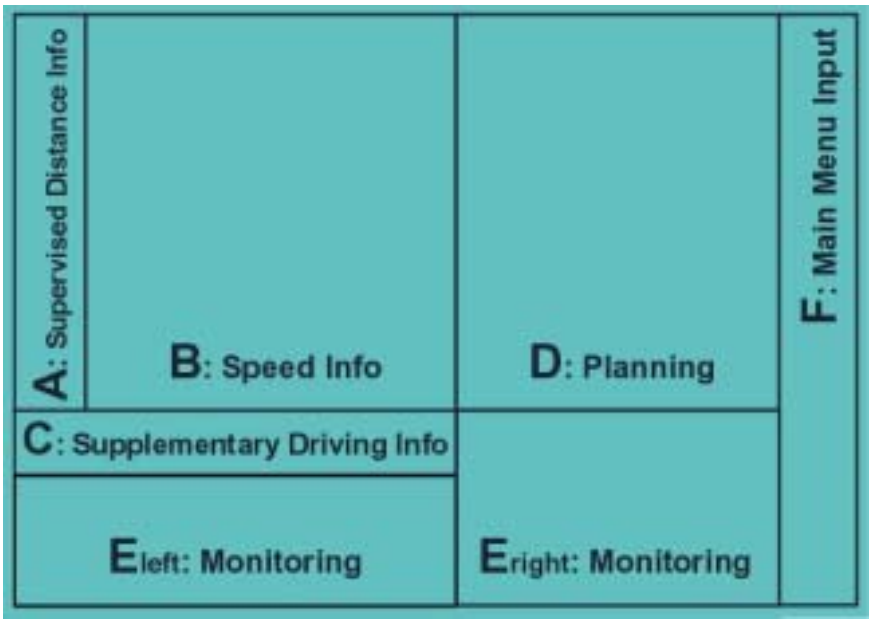

Figure 1 — Areas of the DMI Display

For stand alone solutions other principles may be obtained.

The GSM-R DMI shall take into account that the position of the stand alone DMI can be left or right from the driver.

Input areas (in the primary visual and reach field) should be closer to the driver than monitoring areas (in the secondary visual and reach field). This requirement does not apply to the integrated option, because the whole integrated DMI is in the primary field.

Unexpected information and 'aide memoire' should be clearly distinguished.

4.5 Flashing

Examples of GSM-R situations where flashing is appropriate are

— train number not entered and request for train number not acknowledged (yellow flashing frame),

— radio network not present. E16 Area is flashing (no acknowledgement is required).

4.6 Sounds

Sounds to be used are described in CLC/TS 50459-6. The reference to the sound numbers can also be found in CLC/TS 50459-6.

Any sound is related to one or more status symbol as defined in CLC/TS 50459-5.

4.7 Lists

Presenting the choices in a vertical scrollable list should be used for the following GSM-R items:

— language selection;

— network selection;

— overview of recent calls;

— predefined telephone numbers;

— selection of Group numbers;

— selection of Shunting Group numbers.

5 GSM-R functions shown on the integrated DMI

5.1 Introduction

The following subclauses and figures illustrate the key functions of the proposed integrated GSM-R Driver-Machine Interface.

Figure and text together explain how a function can be activated and how the user should perform the navigation. For this purpose the following guidelines apply:

— areas in black show the relevant function together with all needed buttons for the navigation;

— areas in white show other possible active functions;

— areas in grey mark the rest of the interface not associated with the relevant function.

The coding in the pictures (e.g. F5, E14, G22 etc.) is used only for reference purposes. The codes G, H, K and L are used for GSM-R functions only; the codes E and F are used in the same way as described in CLC/TS 50459-2.

Table 1 — Description of functions used in each area

Code	Description	Code	Description
E	Monitoring	H	Navigation
F	Input	K	Scroll lists
G	Menu on 2nd and 3rd level	L	Keyboard

It should be noted that for the integrated DMI used in the examples shown below, a touch screen device for data entry is assumed.

Subclause 5.2 gives requirements of a more general nature. Starting with 5.3, a more detailed description of functions and related requirements is given.

The descriptions below assume the use of a handset and loudspeaker. The mode of operation is generally similar if a hands-free microphone is used in place of the handset.

5.2 General functions

5.2.1 Switch DMI on/off

The on/off status of GSM-R shall be clearly indicated and visible during the operation of GSM-R.

The off-status of GSM-R should be visible by disabled buttons for the GSM-R functions.

The on/off status of the display used by GSM-R shall be clearly indicated.

When there is a technical link between ETCS and GSM-R, the latter shall be switched on automatically when the first is switched on.

When the start up of GSM-R is linked to another system (e.g. ETCS), it also should be possible to switch GSM-R on and off independently.

On an integrated DMI, showing the on/off status of GSM-R shall not interfere with basic ETCS information.

5.2.2 Select mobile radio network

The mobile radio network is normally selected automatically according to preferences stored within the radio.

The mobile radio network chosen shall be shown to the driver (E16b).

If the mobile radio network is lost, this shall be indicated to the driver (see 5.2.12).

The driver shall be informed audibly and visually when there is an automatic change of mobile radio network.

The driver should be informed when during start-up the system is looking for a mobile radio network but has not found one yet.

It shall be possible for the driver to select another mobile radio network (if another mobile radio network is available) from a list of mobile radio networks stored in the radio.

The driver shall be able to select the mobile radio network by using one of the data entry windows as specified in CLC/TS 50459-4.

5.2.3 Register and de-register running number and on train users

The driver shall be able to register and de-register a train running number.

The driver shall be able to register and de-register on-train users.

The functions register and de-register running numbers and on-train users should be accessed via the first level of the GSM-R DMI.

Figure 2 displays an example of Register Train Running Number.

Figure 2 — Register Train Running Number

EXAMPLE Register Train Running Number:

1) The function can be reached via E16a on the first level GSM-R. The procedure for entering the data is achieved via a keyboard. The train running number must be entered and activated.

2) Via H02 a list is shown to address who is going to be registered. If no user is selected the list is shown by default. Those who have been registered already are presented as disabled.

De-registering follows the procedure in reverse direction via E16a and H03.

5.2.4 Invoke supplementary services

It shall be possible for the driver to place a call on hold with a maximum of two actions.

It should be possible for the driver to place a call on hold with a single action.

The Hold button shall only be visible and be possible to activate when required.

It shall be possible for the driver to retrieve a call on hold with a maximum of two actions.

It should be possible for the driver to retrieve a call on hold with a single action.

It shall be possible for the driver to toggle between a held call and active call with a maximum of two actions.

It should be possible for the driver to toggle between a held call and active call with a single action.

5.2.5 Invoke self test

No specific DMI requirements.

5.2.6 Select language

The procedure for choosing language shall be identical to the ETCS procedure.

If GSM-R and ETCS are technically related, the language should be changed either via the ETCS 'branch' or via the GSM-R 'branch'.

The choice for the language when GSM-R and ETCS are technically related should be possible via the ETCS data input procedure and via the GSM-R procedure. When the language is changed in either one of them the language in the other is changed as well.

When GSM-R and ETCS are technically related, both systems must have the same default language.

5.2.7 Adjust display settings

The procedure for adjusting display settings should be identical to the ERTMS/ETCS procedure as described in CLC/TS 50459-1.

5.2.8 Adjust loudspeaker volume

The procedure for adjusting loudspeaker volume should be identical to the ERTMS/ETCS procedure as described in CLC/TS 50459-1.

5.2.9 Status information

The status of a call shall be indicated. This indication can use text or symbols or a combination of both.

The symbols shall be in accordance with (CLC/TS 50459-5).

When a controller is handling a call other than the call of the driver, the driver should be informed about that.

5.2.10 Information and functions available to the driver

The driver shall have the following information and functions independent of the status of a call:

— functional identity of connected party (for an outgoing call);

— functional identity of calling party (for an incoming call);

— the status of a call;

— see which (incoming) calls are queuing;

— the ability to break into the voice call of other on-train users by picking up the handset;

— the ability to terminate calls which he is entitled to terminate;

— ability to end a call not by hanging up the handset, but by using a button;

— radio network availability.

NOTE Other on-train users can include, for example, a conductor using the intercom to connect via the cab radio to a signaller, an external call routed via the cab radio to the public address, etc.