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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 ERTMS/ETCS/GSM-R

(istoveten CLC/TS 50459-2:2005)

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

ICS 03.220.30; 13.180; 35.240.60

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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 ERTMS/ETCS 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 ERTMS/ETCS

Bahnanwendungen – Telekommunikationstechnik, Signaltechnik und Datenverarbeitungssysteme – Europäisches Leitsystem für den Schienenverkehr – Mensch-Maschine Schnittstelle Teil 2: Ergonomische Anordnung der ERTMS/ETCS 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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Ref. No. CLC/TS 50459-2:2005 E

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 50459-2 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 2 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 50459-3 for ergonomic arrangements of ERTMS/GSM-R 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 2 of the Technical Specification CLC/TS 50459 series is to define ergonomic arrangements of ERTMS/ETCS information.

This specification gives guidelines how to implement different technology (soft keys, touch screen device, LCD, cathode tube, etc.)

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 50459-3, *Railways applications – Communication, signalling and processing systems – European Rail Traffic Management System – Driver-Machine Interface – Part 3: Ergonomic arrangement of ERTMS/GSM-R 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 and definitions

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

4 Symbols and abbreviations

AllS	All Status
ATD	Automatic Train Driving
ATO	Automatic Train Operation
CSG	Circular Speed Gauge
CSM	Ceiling Speed Monitoring
dgry	dark grey
DSD	Driver Safety Device
EOA	End Of Authority
EVC	European Vital Computer
IndS	Indication Status
IntS	Intervention speed Status
LCD	Liquid Crystal Display
LED	Light Emitting Diodes
LXG	Level Crossing
MA	Movement Authority
mgry	medium grey

MRSP	Most Restrictive Speed Profile
NL	Non Leading mode
NoFS	Not in Full Supervision Mode
NoS	No Status active
or	orange
OS	On Sight mode
OvS	Over-speed Status
PreS	Pre-indication Status
PTT	Push To Talk
RBC	Radio Block Centre
RSM	Release Speed Monitoring
SR	Staff Responsible mode
STM	Specific Transmission Module
TIU	Train Interface Unit
T_{int}	Time before intervention
TSM	Target Speed Monitoring
T_{square}	Time at which 'warning time to intervention' is displayed
UIC	Union Internationale des Chemins de Fer
UN	Unfitted
V_{int}	Intervention speed
V_{perm}	Permitted speed
$V_{release}$	Release speed
V_{target}	Target speed
V_{train}	Current speed of the train
WaS	Warning speed Status
w x h	width by height
yel	yellow

5 Characteristics of the screen layout

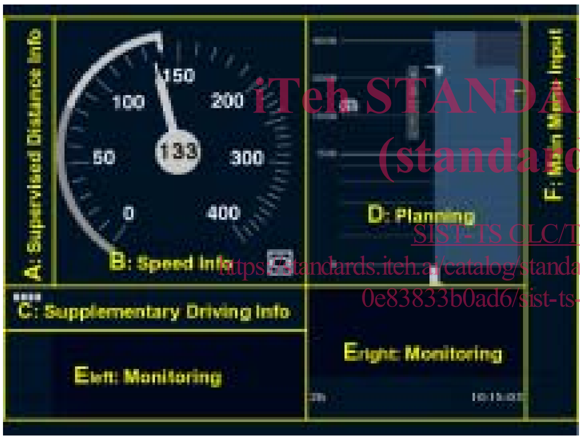
5.1 Presentation philosophy

The information shown to the driver on the ERTMS/ETCS DMI is grouped into different areas depending on the nature of the information: speed related information, distance related information, driver inputs, etc. Figure 1 and Figure 2 show the definition and the allocation of the different areas. It shows the DMI when all information is combined into one screen.

Whilst most of the examples are based on touch screen technology for input actions, it is not the intention of this standard to restrict implementation solely to this technology. Soft key arrangements are discussed, they have the same status as touch screen arrangements, but they are not explicitly shown in an example. The areas for navigation of soft keys (e.g. the dedicated control or navigation buttons) are not shown either.

Annex B gives an overview of area and screen dimensions when using a touch device. Annexes C, D, E and F give examples of area and screen dimensions when using soft keys.

This specification and the shown figures describe what information shall be presented on the screen, regardless of its technical implementation. Clause 6 explains in detail how the different areas shall be used.



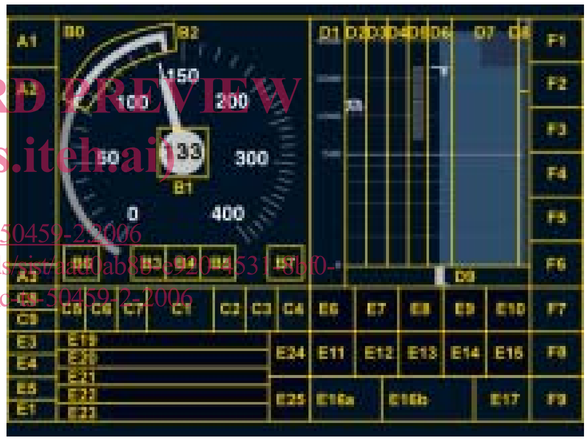


Figure 1 — The main areas of the DMI

Figure 2 — The sub areas of the DMI

5.1.1 Area description

The total size of all information areas shown on the DMI is 640 x 450 cells (w x h).

These dimensions are chosen because all areas will then properly fit into the total size. The height of 450 cells is the graphical compromise between the 9 vertical oriented buttons of equal size in the F area and a clear separation between the A, B and D area on one hand and the C and E area on the other hand. The 30 cells in the heights of the display are not needed in the touch screen option, but they can be used in the soft key option to show along the width of the display the soft key reference to hard keys along the display (see Annexes C and D).

5.1.1.1 Speed and Supervision area

A Supervised distance information (A1, A2 and A3; total size: 54 x 300 cells (w x h))

B Speed Information (B0, B1, B2, B3/4/5, B6 and B7; total size: 280 x 300 cells (w x h))

C Supplementary Driving Information (C1, C2/3/4, C5/6/7, C8 and C9; total size: 334 x 50 cells (w x h)); the size of the areas C1 – C7 can vary within the range of the area C

5.1.1.2 Planning area

D Planning Information (D1, D2, D3/4/5, D6, D7, D8 and D9; total size 246 x 300 cells (w x h))

5.1.1.3 Monitoring area

Eleft Monitoring (E1, E3, E4, E5, E19/20/21/22/23 and E24/25; E2 and E18 are intentionally missing; total size 334 x 100 cells (w x h))

Eright Monitoring (E6/7/8/9/10/11/12/13/14/15, E16a/b, E17; E2 and E18 are intentionally missing; total size 246 x 150 cells (w x h))

5.1.1.4 Driver input area

F Input (F1, F2, F3, F4 and F5/6/7/8/9; total size: 60 x 450 (w x h))

5.1.2 The use of areas

Figure 3 — The use of areas of the DMI

Preference may be given to show all areas on the same display screen, as shown in the examples in this specification.

If the information is displayed on more than one screen the way the information is presented in each area shall not be affected. A change of resolution or screen size shall not affect the general appearance of each area; but only the accuracy of the details shown.

5.1.2.1 The use of the areas A, B, C and Eleft

The main information is shown on area A, B, C and Eleft

The areas A, B, C and Eleft shall be displayed, shall be adjacent to one another and shall be within central forward field of the driver's vision.

5.1.2.2 The use of the areas D and Eright

The areas D and Eright should be shown as described in this document; however they need not be adjacent to each other or to A, B, C and Eleft.

5.1.2.3 The use of area F

The content of area F does not need to be adjacent to the other areas.

5.1.2.4 The use of areas with STM

All areas can be used for STM visualisation, as long as the required ERTMS/ETCS information can be clearly displayed.

5.1.3 Examples of screen management

To control the attention of the driver, either the driver or the ERTMS/ETCS system or the Railway Operator can decide to show or hide information. This can be achieved using several screen layers.

NOTE 1 The combination of layers with a touch screen device enables fast dialogues and an integrated interface. The same can be applied for soft keys, by pointing to a few keys along the screen, which activates the other layers.

A level crossing 10 km ahead might be known to the system (within the movement authority (MA)) but the driver only wants to be informed in advance of events within a distance of 4 km. By setting the planning scale on area D to 4 km, the driver hides information outside this range.

When the train is running too close to intervention or is running in target speed monitoring (TSM, see 5.2.2) the system shall automatically dim the planning information; the driver has to reduce speed first before the hidden or dimmed information is shown again in the original presentation. In this example, the system controls the attention of the driver by hiding certain categories of information, e.g. advisory or timetable information.

Another example of the ERTMS/ETCS DMI helping to control the driver's attention, is showing and hiding the supervised distance information (area A) and dimming the Planning area (area D), depending on whether the train is inside or outside the TSM. Dimming the Planning area ensures that route information is still visible but less conspicuous.

Some information is available in the ERTMS/ETCS system, but is only needed in special situations or in case of disturbance or malfunction, e.g. test functions, diagnostics, train data, geographical information, explanations of orders and announcements and (non-) ERTMS/ETCS information (e.g. door systems). These kinds of detail are generally available on an underlying screen layer.

NOTE 2 When using a touch screen device, the driver can reveal them by touching the screen on the appropriate area, or activating the dedicated key of the soft key arrangement. After a second driver's action or after a certain time delay, the information will be hidden again.

5.2 Colour and sound philosophy

The principle (illustrated in Figure 4) is used extensively in the description of this specification (CLC/TS 50459-2). The principle is based on the general explanation of the colour philosophy described in CLC/TS 50459-1.

For explanatory reasons Figure 4 is divided in the following sections:

— one ceiling speed monitoring section (CSM);

— two target speed monitoring sections (TSM) to explain how to manage the colour philosophy when two targets are defined;

— one release monitoring section (RSM)[1)].

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1) RSM is a special case of TSM

NOTE 1 Figure 4 is used only to explain the DMI objects presentation in the other clauses of this specification. Figure 4 is showing the situation when ERTMS/ETCS is in Full Supervision (FS) mode.

NOTE 2 Annex A gives a complete overview of the colour philosophy for all related areas and objects.

Undesired oscillation between colour schemes and audible information shall be avoided by the appropriate means (e.g. with a delay time of 2 seconds to switch off the current colour scheme).

5.2.1 Ceiling speed monitoring (CSM)

5.2.1.1 Permitted speed

The Permitted Speed is the speed the driver is allowed to follow in Figure 4. The Permitted speed is shown to the driver by the CSG (see 6.2.1.4) and is defined by the MRSP.

5.2.1.2 Over-speed Status information

If the current train speed (V_{train}) exceeds the Permitted Speed (V_{perm}) the Over-speed Status information is activated.

Each time the Over-speed Status is activated an audible information (S1, see CLC/TS 50459-6) shall be activated

5.2.1.3 Warning Status information

The Warning Status information shall be activated whilst the On-Board system activates a Warning.

While the Warning Status information is activated an audible information (S2, see CLC/TS 50459-6) shall be activated.

5.2.1.4 Intervention Status information

The Intervention Status information shall be activated whilst the On-Board system activates an Intervention.

The Intervention Status information overwrites the Over-speed Status and Warning Status information.

When the Intervention Status is no more active an audible information (S3 see CLC/TS 50459-6) shall be activated.