20-037 ERTMS Handbook

Version:	9		
Purpose:	Approval to publish		
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Sponsor:	Tom Lee – Director of Standards		
Lead industry committee:	Traffic Operation and Management Standards Committee (TOM SC)	**Date:**	28 June 2022
Supporting industry committee:	Control, Command and Signalling Standards Committee (CCS SC)	**Date:**	30 June 2022
Supporting industry committee:	Plant Standards Committee (PLT SC)	**Date:**	07 July 2022
Supporting industry committee:	Rolling Stock Standards Committee (RST SC)	**Date:**	15 July 2022

Decisions

Traffic Operation and Management Standards Committee (TOM SC) is asked to:

- **NOTE** that the proposed new issue of RS525 issue 1 was subject to targeted consultation amongst standards committees' members and the Future Rule Review Group following the April/May meetings of SCs.
- **UNDERTAKE** consultation at the TOM SC meeting on 28 June 2022.
- **DECIDE** if the proposed new issue of RS525 issue 1 delivers its intentions.
- **APPROVE** the proposed new issue of RS525 issue 1 for authorisation to publish, together with the associated Business Case for Change.

Control, Command and Signalling (CCS), Plant (PLT) and Rolling Stock (RST) standards committees (SCs) are asked to:

- **NOTE** that the proposed new issue of RS525 issue 1 was subject to targeted consultation amongst standards committees' members and the Future Rule Review Group following the April/May meetings of SCs.
- **UNDERTAKE** consultation at the meetings on 30 June 2022 (CCS SC), 7 July 2022 (PLT SC) and 15 July 2022 (RST SC).
- **SUPPORT** that the proposed new issue of RS525 issue 1 delivers its intentions.
- **SUPPORT** the proposed new issue of RS525 issue 1 for authorisation to publish, together with the associated Business Case for Change.

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This business case for change has been developed to support standards committees in taking decisions related to changes to standards, it includes an assessment of the predicted impacts arising from the change.

Proposed new document

Number	Title	Issue
RS525	ERTMS Handbook	1

Summary

Background and change

The Future Rules Working Group (FRWG) has been working on European Rail Traffic Management Systems (ERTMS) rules and standards strategies. It has identified the need for a new handbook to explain the basic concepts and operating principles of ERTMS to impacted frontline staff. The implementation of ERTMS has thus far been relatively limited across industry. However, with development in technologies and new ERTMS deployments, such as East Coast Mainline (ECML) in early 2023, ERTMS knowledge will be required for a wider audience across industry. Frontline staff in impacted areas are familiar with traditional signalling concepts and methods of working. However, they will now require specific reference material and guidance relating to ERTMS principles and operation prior to deployment to support in their transition to the new system.

Formal ERTMS training is in place for some frontline roles in industry, and the new handbook is designed to complement this. It provides additional guidance and information beyond the rules contained within GERT8000 (the Rule Book) and The Operation and Traffic Management National Technical Specification Notice (OPE NTSN) Appendix A. In addition, as ERTMS and its systems involves new components and terms, a comprehensive Control Command and Signalling Glossary has been developed and published on the RSSB website in March 2022 to support knowledge and understanding. The benefits from providing this new handbook will be wide reaching across industry, as it gives frontline staff the underpinning knowledge needed to understand ERTMS operation, therefore enabling them to make safe decisions in degraded working, and ensuring they are able to operate the system correctly and effectively. This will improve safety and reliability and operational performance, as decisions will be made quickly, safely and efficiently under ERTMS.
The key output of this project is RS525 'ERTMS Handbook' Issue One, which will provide all Infrastructure managers' (IMs) and Railway Undertakings' (RUs) frontline staff impacted by ERTMS with consistent and standardised guidance information on ERTMS principles, concepts and methods of working.

Industry impact due to changes

Impact areas	Scale of impact	Estimated value
A. Legal compliance and assurance	Low	Difficult to quantify
B. Health, safety and security	Medium	£30,000 over 5 years
C. Reliability and operational performance	Medium	£330,000 over 5 years
D. Design and maintenance	Low	N/A
E. People, process and systems	Low	£90,000 over 5 years
F. Environment and sustainability	N/A	N/A
G. Customer experience and industry reputation	Low	Difficult to quantify
Total value of industry opportunity =		**£450,000 over 5 years**

The standards change contribution to the total value of industry opportunity				
☐ None or low	☐ Minor but useful	☐ Moderate	☑ Important / essential	☐ Urgent / critical

Detail

1. What are the objectives associated with this change?

Objective 1 – To support ERTMS deployment by providing comprehensive information on key ERTMS principles, concepts and methods of operation to impacted frontline staff

1.1 ERTMS roll-out has been relatively limited thus far across the GB railway network. However, there are further planned deployments in the near future with ERTMS due to go-live on the Northern City Line section of ECML in 2023 and Welwyn to Hitchin in 2024. Further deployments are due on TransPennine and Western routes. More of the network will see ERTMS systems replacing traditional signalling methods in the coming years. Moving from traditional lineside signalling with legacy train protection systems to ERTMS brings infrastructure and technology changes, and therefore significant operational differences for frontline staff.

1.2 As a result of these upcoming transitions to ERTMS, the FRWG and Network Rail identified the need to provide impacted frontline staff with reference material and guidance on the key concepts, principles, processes and components of the new systems prior to deployment and, in particular, the deployments in 2023 and 2024. Frontline staff are currently trained in, and familiar with, operating traditional signalling and train protection systems. The transition to ERTMS will mean that frontline staff will need additional information and training to support their conversion and competent operating under the new control system.

1.3 ERTMS introduces changes in lineside and on-train architecture, and therefore, new terminology, processes and methods of working. For ERTMS operation to be effective, those working on ERTMS infrastructure need to understand the fundamental principles of ERTMS, key components, how they interface and methods of operation. If staff understand these areas and are therefore able to identify what the correct methods of working are in different circumstances, they will be able to operate effectively and make correct and safe decisions when working on ERTMS infrastructure. This will have a positive impact on normal running and degraded working. Staff in maintenance, operations, trackside, station, control, signalling, and design are just some of the areas of the workforce who would benefit from additional information on this topic. The two critical roles are signallers and drivers.

1.4 Formal training is in place for key frontline impacted roles, including ‘Introduction to ETCS’ e-learning which is available across industry. Previous individual deployments have produced locally specific information and briefing materials. However, there is no additional industry written guidance or reference material available around the overall ERTMS principles and methods of working to consolidate the fundamental ERTMS rules contained within GERT8000 and the OPE NTSN Appendix A. Formal written guidance and reference material is therefore required to consolidate and complement formal training and provide robust, clear, consistent and standardised accessible information on the industry methods of working and principles. This needs to be made available to all impacted frontline staff.

1.5 New terms, words, components and acronyms are also being brought in with ERTMS. These will require detailing and explaining so that staff working on areas of ERTMS deployments are familiar with them.

2. How does the content in the standard need to change to achieve the objectives?

Objective 1 – To support ERTMS deployment by providing comprehensive information on key ERTMS principles, concepts and methods of operation to impacted frontline staff

2.1 Fundamental ERTMS rules are incorporated into the Rule Book, including the separate module GERT8000-TS10 'ERTMS Level 2 train signalling regulations'. There is no formal written guidance or reference material on nationally applicable ERTMS principles, concepts and systems. Some guidance exists for local route deployments, but these are specific to the areas they relate to. A new document is therefore required, providing consistent and comprehensive reference material on ERTMS operating principles that will be nationally applicable.

2.2 It has been decided the most appropriate medium for this reference material is a new handbook (RS525). This provides detailed information on the concepts, principles, components and processes that frontline staff need to be familiar with. This handbook does not contain rules, but will act as a reference document, explaining and detailing key principles and elements of ERTMS, such as Modes and Levels. The basis of this handbook has been drawn from the 'Operators Guide to ETCS' created by the Network Rail System Requirements and Integration team (previously Digital Railway).

2.3 The new content in the handbook has been reviewed against existing handbooks to ensure no duplication or conflicting information, for example in terms of ERTMS specific signage and any potential overlap with RS521 'Signals, Handsignals, Indicators and Signs Handbook'. The handbook content has also been reviewed against existing training where possible, to ensure information is not being unnecessarily duplicated.

2.4 The ERTMS rules contained within the Rule Book and OPE NTSN Appendix A have been reviewed to ensure no duplication or conflicting information between these and RS525. Reviewing the current content of relevant reference documents such as the 'Operators Guide to ETCS' and the 'Digital Railway - Integrated Concept of Operations' determined what content needed to be included in the handbook, and whether there is the need to include additional ERTMS rules in GERT8000. Where the requirement for rules additions or changes are identified, these will be progressed through the normal channels for rules changes.

2.5 The scope of the project initially included a comprehensive ERTMS glossary. However, this has been removed from the scope of the project as a CCS Glossary of Signalling Terms was published on the RSSB website in March 2022 and RS525 also contains a definition of terms used therein.

3. How urgently does the change need to happen to achieve the objectives?

3.1 The next national ERTMS deployment is the Northern City Line section of the East Coast Main Line, planned to commence from Spring 2023 onwards. It is the intention to make this reference material available to impacted frontline staff in time for this ERTMS deployment going live. By providing the handbook in advance of deployment, frontline staff on the Northern City Line section of the East Coast Main Line will be able to consolidate their training

and develop their required underpinning knowledge for the new systems and methods of working. It will then be in place for all subsequent ERTMS deployments, catering to the wider audience who will then need information on ERTMS.

4. What are the positive and negative impacts of implementing the change?

Justification of impact, scale and quantification for the seven impact areas

A. Legal compliance and assurance

4.1 The Control Command and Signalling National Technical Specification Notice (CCS NTSN) requires the installation of ETCS and the OPE NTSN sets out in Appendix A the ERTMS operational principles and rules. Therefore, providing the supporting information on ERTMS helps industry meet these requirements by supporting the deployment programme and the training of frontline staff. However, it would be difficult and not proportionate to quantify this benefit.

B. Health, safety and security

4.2 This handbook will help embed the new ERTMS information with frontline staff and consolidate their frontline training in the new systems. By supporting the development of their knowledge, competence and familiarity with the system, this improves safety, as it enables frontline staff to make safe decisions within ERTMS during degraded working and incidents. It will also reduce potential safety incidents or irregular working and operational close calls caused by human error or misinterpretation of how ERTMS works or what method of working should be implemented. In addition, the provision of this information may help reduce the likelihood of a major safety incident.

4.3 The risk of injury from incidents due to miscommunication (the closest cause precursor from the Safety Risk Model) is 0.05891 FWI per year. If there is a 3% reduction in risk as a result of introducing the handbook, then this represents 0.002946 FWI per year. Using the Value of Preventing a Fatality (£2,017,000) this represents a benefit of £29,705 over five years, rounded to £30,000 for the purposes of this estimate.

C. Reliability and operation performance

4.4 Ensuring frontline staff have full understanding of how to operate the system effectively and correctly, including understanding the potential and constraints of the systems, will ensure they are able to minimise potential delay and operate in the most efficient way possible. It will also support operators in reacting correctly and appropriately to disruption and irregular working, optimising use of the system. Ultimately, a better trained and more well-informed workforce will make fewer mistakes. This can lead to reduced delays and therefore increased operational performance and reliability across the network controlled by ERTMS.

4.5 Considering the benefits of this in terms of delay minutes, it seems reasonable to take a conservative estimate that providing this guidance information might prevent 0.1% of operator error caused delays. Using delay data from 2018-2019, operator (driver and signaller error) accounted for a total of 1,324,692 delay minutes. A 0.1% reduction would prevent 1,324.7 delay minutes per year. At an average cost of £50 per delay minute, this is a cost benefit of around £66,000 per year, or £330,000 over 5 years, a significant cost benefit to industry.

D. Design and maintenance

4.6 This area is not directly applicable to this project.

E. People, process and systems

4.7 Providing reference material on ERTMS will benefit people by ensuring they are competent, confident and comfortable operating the new system, and ensures ERTMS operating processes are clearly and robustly defined and explained to impacted staff. However, it would be difficult and not proportionate to quantify these benefits.

4.8 In terms of negative impact to industry, no additional briefing or training is expected to be required as a result of this new handbook, as formal training requirements will have been covered as part of the preparation for the deployments of ERTMS, and the handbook will consolidate this rather than require extra briefing.

4.9 By RSSB conducting this work internally, and making the handbook available for the whole industry, this is expected to reduce the costs for industry of undertaking this work a number of times. This reduces the costs that would be involved if multiple RSSB members (train operating company (TOC), freight operating company (FOC) or IMs) were undertaking similar work individually and removes potential unnecessary duplication. The average cost of an RSSB standards change project is in the region of £30,000[1]. Taking a conservative estimate that RSSB creating this handbook might avoid similar work being undertaken separately four times, (costing an estimated £120,000), total savings to industry from RSSB undertaking this work would be £120,000 - £30,000 = £90,000.

F. Environment and sustainability

4.10 This area is not directly applicable to this project.

G. Customer experience and industry reputation

4.11 As mentioned in Section C, Reliability and Operational Performance, providing this information to frontline staff is expected to reduce delay and disruption to passengers, which will in turn improve customer experience and preserve industry reputation. However, it would be difficult and not proportionate to quantify this benefit.

5. What is the contribution of this standards change in realising the value to industry opportunity?

5.1 The contribution of the new handbook is important and essential in realising the benefits of deployment of ERTMS to industry.

6. What was the effort required by RSSB to make the change?

6.1 There was effort required from an Operations technical specialist, and two supporting technical specialists, to review documentation and draft the handbook. Key documentation reviewed includes the current 'Operators Guide to ETCS', 'Digital Railway Integrated Concept of Operations', ERTMS rules, Cambrian Operational Sub-System Description, and industry training and e-learning.

[1] Taken from an average of all standards projects undertaken by RSSB from 2018-2020, exact average is £29,157

6.2 Review input was required from a technical specialist from each of the following areas: CCS, Human Factors and Risk. A Policy specialist was also required for review purposes.

6.3 Project management and administration effort was required, including with publication tasks, e.g. liaising with Willsons, and communication of changes to industry. Additional effort was also required from an expert in the requirements management database (RMDB) content creation due to the requirement for complex diagrams and images.

7. Can RSSB deliver against industry's expected timescales?

7.1 It is expected that the handbook will be ready for the publication cycle in September 2022, thereby meeting the industry need to have this information available for the next ERTMS deployment in 2023. Formal training and industry e-learning is available in the interim before the handbook is made formally available.

7.2 The handbook will then be available for all frontline staff affected by future deployments, as the audience for ERTMS information widens.

8. How will the industry implement the change?

8.1 RS525 will be published as part of the standard Rule Book publication cycle, and therefore will be subject to the same briefing cycle as the Rule Book, including industry briefing webinars and a briefing leaflet.

8.2 In addition, we will engage with key industry stakeholders, including Network Rail Network Services (previously Digital Railway), FRWG, ECML Ops readiness group (and TransPennine and Western stakeholders), Rail Delivery Group, and key TOC/FOC representatives, to understand the most effective way to share and brief the handbook to impacted frontline staff. We will also engage and communicate with Systems and Ops Board, to enable it to take the necessary action with its respective companies to prepare their workforce for the upcoming handbook. Additional briefing of the handbook may take the form of targeted webinars or Q&A sessions with ECML, or engagement through their key groups.

9. How will RSSB assess whether the change is achieving the objectives?

9.1 RSSB will monitor use of the handbook as follows:

a) Supporting implementation of the handbook through engagement with key stakeholders and requesting feedback from key groups such as FRWG and Ops readiness groups to understand how the handbook is being used and received.

b) Undertaking a comprehensive 12-month review following publication which will incorporate feedback from users and consider comments made during targeted consultation.

c) Monitoring any enquiries relating to the handbook.