18-016 New RIS for Multi-Mode signage

Version:	2.4		
Purpose:	Approval to proceed to consultation		
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Lead industry committee:	Traffic Operation and Management Standards Committee (TOM SC)	**Date:**	12 October 2021
Supporting industry committee:	Rolling Stock Standards Committee (RST SC)	**Date:**	08 October 2021
Supporting industry committee:	Control, Command and Signalling Standards Committee (CCS SC)	**Date:**	21 October 2021
Supporting industry committee:	Energy Standards Committee (ENE SC)	**Date:**	07 October 2021

Decision

Traffic Operation and Management Standards Committee (TOM SC), Rolling Stock Standards Committee (RST SC), Control, Command and Signalling Standards Committee (CCS SC) and Energy Standards Committee (ENE SC) are asked to:

- **DECIDE** if the proposed issue 1 of RIS-3784-TOM delivers the intentions of the proposal for change.
- **DECIDE** if the proposed issue 1 of RIS-3784-TOM is in a suitable state for consultation.
- **APPROVE** that the proposed issue 1 of RIS-3784-TOM is consulted on**.**
- **IDENTIFY** any specific organisations or individuals to be included in the consultation.
- **DECIDE** on the method of consultation (set out proposed approach in sections 5-7 as appropriate).

18-016 New RIS for Multi-Mode signage

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 documents

Number	Title	Issue
RIS-3784-TOM	Provision of Signage at Power Changeover Locations	1

Summary

Background and change

Some multi-mode trains that can utilise traction power either from an external electric supply (overhead or conductor rail) or from an internal source such as diesel or battery power are being introduced to the GB Mainline railway. This supports decarbonisation by maximising use of available electrical infrastructure. Multi-mode vehicles provide operational flexibility allowing trains to operate over routes which involve both electrified and non-electrified sections, both on a planned basis and in times of perturbation.

In the interests of safe and efficient operation, locations where there is a changeover between power modes must be defined as suitable and their whereabouts understood by the drivers of such trains. In the past there have been a limited number of locations involving trains changing between overhead line and conductor rail power, or between overhead line systems with different characteristics.

The introduction of new multi-mode trains which are capable of power changeover (PCO) between modes for which industry agreed signage is not currently available means that signs are required to prompt the driver to ensure that the train is in the correct mode for the route ahead. There are currently no application rules agreed at industry level and signage specifications for multi-mode operations. This means that more than one approach is being deployed in adapting existing signs and developing new signs.

The objective of this project is to provide application rules and specifications for signs that can be applied consistently by future projects for all situations in which a change of traction mode is required.

There are signs already in existence at 'temporary' changeover locations that indicate whenever there is damage to, or planned work on, the overhead line equipment, that trains are required to:

- coast without an external overhead electricity supply; or
- change to an internal power supply.

It is possible that the introduction of new signs for multi-mode operation may cause confusion with the 'temporary' ones. Therefore, a secondary objective is to review the design of the existing signage to assess whether there is any possibility of confusion in relation to existing (permanent) signage for mode changes.

Industry impact due to changes

Impact areas	Scale of impact	Estimated value £ 000's
A. Legal compliance and assurance	N/A	-
B. Health, safety and security	Low	Difficult to quantify
C. Reliability and operational performance	Medium	£8.76m over 5 years
D. Design and maintenance	Low	Difficult to quantify
E. People, process and systems	N/A	-
F. Environment and sustainability	Low	Difficult to quantify
G. Customer experience and industry reputation	Low	Difficult to quantify
Total value of industry opportunity =		**£8.76m**

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

Detail

2. What are the objectives associated with this change?

Objective 1 – To provide application rules and specifications for signs for all situations in which a change of traction mode is required

2.1 The aim of this objective is to provide within a new RIS a set of requirements which can be applied consistently to support all situations in which trains are required to change between traction modes.

Objective 2 – To review the design of signage where, as a result of damage or planned work, it is necessary for trains to coast or change to an internal power source

2.2 The aim of this objective is to assess whether there is any risk of confusion between 'permanent' and 'temporary' changeover locations and any action needed to eliminate it.

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

Objective 1 - To provide application rules and specifications for signs for all situations in which a change of traction mode is required

3.1 New functional requirements will be introduced with clear guidance on the application of signage which optimises the use of appropriate signs. The requirements will:

- apply to both planned and unplanned operation for power transitions for multi-mode trains on a consistent basis;
- avoid the proliferation of different types of sign across the network, or the provision of signs which add no obvious value; and
- consider human factors, driveability and all expected scenarios e.g. normal and degraded modes, automatic and manual transitions, changeovers on the move (dynamic) and when stationary (static), changeovers at fixed points and changeovers in permitted areas.

Objective 2 - To review the design of signage where, as a result of damage or planned work, it is necessary for trains to coast or change to an internal power source

3.2 To review from a driveability perspective whether the use of similar signs in this situation as at changeover locations is acceptable. If not acceptable, the review will indicate what alternative measure can be put in place.

3.3 The content of the new RIS will be based on input received from industry involved with the introduction of multi-mode trains and the Network Rail Multi-Mode System Review Panel (SRP).

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

4.1 The application rules and design specifications should be published as soon as possible as multi-modes are already in operation and the development of project-specific solutions which may not be consistent can be avoided.

5. 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

5.1 The Railways and Other Guided Transport Systems (Safety) Regulations 2006 (as amended) (ROGS) requires transport operators to control all categories of risk associated with their operations. Implementing the measures in this project aims to help control the risk of multi-mode trains at a changeover location proceeding onto routes in the incorrect traction mode. This is by providing application rules and specifications for signs that can be applied consistently across the network to indicate when a change of traction mode is required for the route ahead.

5.2 Consistent application rules and specifications for signs contribute to the correct execution of changeovers to and from the overhead line equipment (OLE). An incorrect execution of a changeover to or from the overhead electricity supply creates the possibility of a dewirement incident. A dewirement incident is defined (by research report T1060: *Understanding the forces and energy in the electrification system during dewirements*) as "any event in which the interaction between the OLE and train pantograph(s) results in major component damage across the interface of the energy exchange system, such that it is unable to function." During a dewirement incident, there is the potential for debris to present a risk to railway staff, to passengers on stations and on trains, and to the public on land near the railway. However, it is difficult to predict whether a dewirement incident as a result of an incorrect execution of a changeover will cause injuries. Therefore, it is difficult and not appropriate to quantify the impact on legal compliance and assurance.

B. Health, safety and security

5.3 During a dewirement incident, there is the potential for debris to present a risk to railway staff, to passengers on stations and on trains, and to the public on land near the railway. However, it is difficult to predict whether a dewirement incident as a result of an incorrect execution of a changeover will cause injuries. Therefore, it is difficult and not appropriate to quantify these impacts.

5.4 Optimising requirements to provide signage also reduces the number of signs provided. There will be an initial increase in trackside exposure risk for railway staff putting up, removing or replacing signs. There will also be ongoing risks in maintaining signs. However, a reduction in the number of signs will reduce those risks over time but this is difficult to quantify.

C. Reliability and operation performance

5.5 The use of signs support successful changeovers at the correct locations. Unsuccessful changeovers to or from the overhead electricity supply creates the possibility of a dewirement

incident. Such incidents can cause disruption to services and damage to rolling stock and the infrastructure. Since 2014, MK-II Pantograph-related incidents have caused passengers over 49,200 minutes of delay, cost the industry £6.3m and have caused a significant amount of disruption on the network (Source: Rail Staff Awards 2019). As experience to date with power changeovers has been relatively limited, it is difficult to estimate the potential for incidents involving failure to complete power changeover successfully as this becomes a more common feature of regular operation. If an equivalent extent of delay were to be caused by unsuccessful changeovers, leading to the same cost to industry and the same level of disruption over five years, avoiding these costs would provide estimated benefits of:

- £2.46m for delay of services (49,200 minutes assuming £50/minute); and
- £6.3m for cost to industry.

D. Design and maintenance

5.6 This project aims to have consistent design specifications that will reduce the proliferation of different types of sign across the network, or the provision of signs which add no identifiable value to operations. This reduction in the number of signs will therefore avoid a need to devote time and effort in the creation of bespoke designs for individual multi-mode train projects. Reducing the total number of signs provide would avoid some costs for cleaning and maintenance. However, the reduction is difficult to quantify.

E. People, process and systems

5.7 There are signs already in existence at 'temporary' changeover locations that indicate whenever there is, for example, damage to, or planned work on, the overhead line equipment, that trains are required to:

- coast without an external overhead electricity supply; or
- change to an internal power supply.

5.8 It is possible that the introduction of new signs for multi-mode operation may cause confusion with the 'temporary' ones. This project will review the design of the existing signage to assess whether there is any risk of confusion and any action needed to eliminate it. Therefore, the impact is not yet known.

F. Environment and sustainability

5.9 The introduction of multi-mode trains is seen as an important step to support the reduction and ultimate elimination of carbon emissions from rail traction as acknowledged in Network Rail's Traction Decarbonisation Network Strategy - Interim Programme Business Case. The introduction and operation of multi-mode vehicles can also help to support improvements in local air quality around routes and stations with energy infrastructure where diesel-only trains currently operate. Local air quality improvements are of benefit to local residents, passengers and staff, whilst the benefits of decarbonisation are ultimately experienced by the entire global population.

5.10 This standard can be used to assist in making the maximum use of electric traction capabilities by optimising changeover locations and so help with the introduction of trains that help to realise these benefits and lessen the negative environmental impacts of diesel use. These benefits are difficult to quantify.

G. Customer experience and industry reputation

5.11 If disruption to services is avoided by using signs to correctly execute changeovers to and from the OLE, then this will benefit the customer experience and help keep the industry reputation intact. However, these benefits are difficult to quantify.

5.12 The environmental impacts described above (section F) are also relevant for enhancing industry reputation, with local air quality a significant concern in certain areas. However, this is difficult to quantify.

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

6.1 The new RIS will provide a consistent set of requirements for signage at multi-mode changeover locations on the GB mainline network and will support the provision of consistent information to supplement driver route knowledge. The intent of this RIS is to help industry in supporting a common approach between stakeholders on multi-mode projects, helping to avoid conflicts where multi-mode projects overlap. The level of contribution is considered to be 'moderate'.

7. What is the effort required by RSSB to make the change?

7.1 The preparation of the RIS will be led by an RSSB rail operations technical specialist, with input from human factors technical specialists, supported by a project manager and administrative staff as necessary

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

8.1 Industry previously expressed a view that it would like project 18-016 to be published in parallel with project 18-006 that covers all Multi-Mode train requirements. However, due to project 18-016 being placed on hold for over a year this proved to be impossible. The planned publication date has been deferred to March 2022.

9. How will the industry implement the change?

9.1 The industry can use the requirements to help provide safe and interoperable operation of signage for multi-mode trains.

9.2 The regular briefing materials will be provided and any supplementary materials explaining key changes from this project will be developed as necessary to brief industry effectively and support understanding.

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

10.1 Twelve months after publication, RSSB will review feedback against the new RIS on multi-mode signage, taking into account enquiries, requests for change, amendments and clarifications, and comments from industry stakeholders via TOM SC and any other relevant forums.