



## Deviation from a Railway Group Standard

(In accordance with the Railway Group Standards Code, Issue Four, part 7)

**Deviation Number: 14/093/DEV**

**1. Start and End Date:**

N/A

**2. Details of applicant:**

, Lead Design Assurance Engineer, Bombardier Transportation, Litchurch Lane, Derby DE24 8AD

On behalf of:

, Southern Chief Engineer, Southern Railway Ltd, Selhurst Traincare Depot, Selhurst Road, London, SE25 6LJ

**3. Your reference number:**

DGN.2

**4. Status of applicant:**

A third party acting on behalf of, and with the support of, any party who must currently comply, or may reasonably be expected to have to comply in future, with the RGS.

**5. Title of certificate:**

Class 387 Train Protection and Warning System (TPWS) Labelling.

**6a. Details of Railway Group Standard (RGS):**

<b>RGS Number:</b>	<b>Issue No:</b>	<b>Issue Date:</b>	<b>Title:</b>
GE/RT8075	One	September 2013	AWS and TPWS Interface Requirements

**6b. RGS clause(s):**

4.1.3.1 and Appendix F, clauses F3.6 & F3.7

**6c. RGS clause requirements:**

“4.1.3.1 The TPWS Driver Machine Interface (DMI) shall be designed in accordance with the requirements set out in Appendix F when the TPWS DMI is provided as a separate group of physical control devices and indications which is not integrated into an ETCS DMI, and in Appendix G when TPWS indications and controls are integrated into the ETCS DMI.”

“F.3.6 The labelling of the temporary isolation / fault indicator, train stop override indicator / pushbutton and brake release button shall be centred above the centre of the corresponding indicator / pushbutton, and the rows of each label shall be vertically aligned.

F.3.7 The character height of the labelling shall be a minimum of 5 mm and, when viewed from the driving position, shall subtend as a minimum a visual angle of 15 minutes.”

**7. Scope of deviation:**

Four-car Class 387/1 Electric Multiple Units (EMUs) and four-car Class 387/x EMUs (an option on the current contract).

This deviation is for a project requiring authorisation for placing in service under the Railways (Interoperability) Regulations 2011.

**8. Duration of the deviation:**

The deviation is required for the lifetime of the Class 387 units.

**9. Method of elimination:**

N/A

**10. Impacts of complying with the current RGS requirement:**

Fully complying with Clauses F3.6 and F3.7 of GE/RT8075 would make the TPWS labels inconsistent with the labelling in the remainder of the cab.

The control pushbuttons are different sizes. Complying with GE/RT8075 Clause F3.6, vertically aligning the rows for each label, causes the space between the control and the label to be different and larger than necessary. This is not consistent with good practice whereby space between the label and control is consistent.

Text would be considerably larger than the existing labels and would appear more prominent than on other controls and indicators. This could be interpreted as the TPWS interface being more important than other displays in the cab. Although it is a primary instrument, it should not be prioritised over other primary instrumentation. There is insufficient space to make all other labelling consistent with the specified text size.

This good practice of consistency is identified within the "Ten principles for good interface design", shown on page 36 of the RSSB's "Understanding Human Factors – A Guide for Railway Industry" 2008, and is contained within the guidance notes of the RSSB's "Alarms and Alerts Guidance and Evaluation Tool".

**11. Proposed alternative provisions:**

GE/RT8075 is the only standard which specifies font heights for use in the cab. In the absence of requirements from other standards, Bombardier has used internal best practice and the application of human factors.

The proposed labelling is shown in Drawing No. 3EER400018-2103 and rendering 3EER400017-9981.

The TPWS labels will not comply in three ways:

1. Label position:

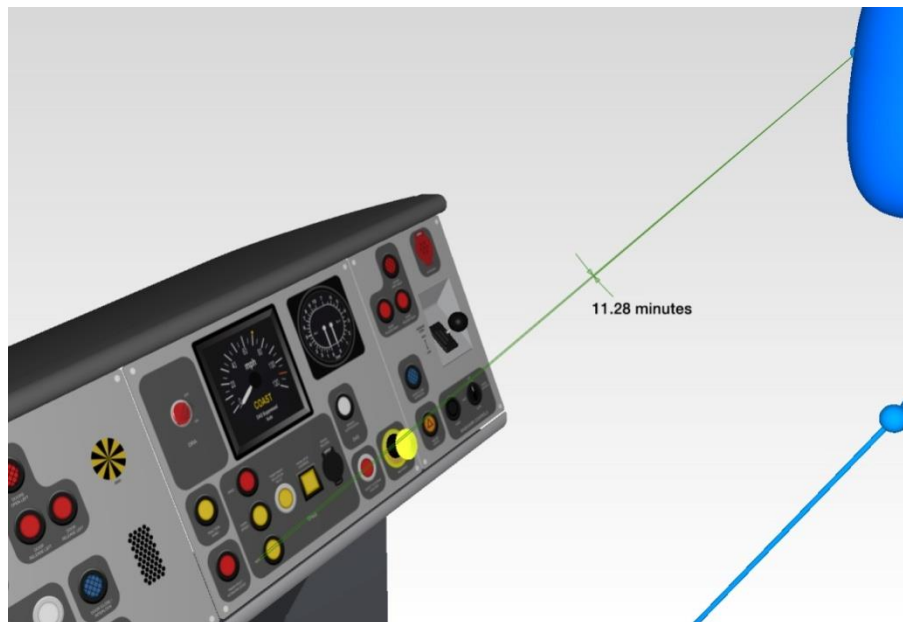
The proposed labels are not vertically aligned in order to keep the general spacing between the control and the label consistent, as it is with the rest of the cab. This is necessary because of the different sizes of the button and reduces the space between the label and the button, which is good practice and makes the relationship between label and control clearer. GE/RT8075 Clause F3.6 requires that the rows of each label are vertically aligned.

2. Minimum viewing angle:

GE/RT8075 Clause F3.7 requires that the text labels subtend as a minimum a visual angle of 15 minutes when viewed from a driving position. The proposed labels have a character height of 3 mm, which is consistent with the labelling provided elsewhere in the cab. The proposed TPWS labels subtend an angle of between 11.3 and 12.1 minutes of arc as shown in Table 1 below. These values are measured on the 3D model using the eyepoint of the 95<sup>th</sup> percentile adult British male which represents the worst case driving position, i.e. the furthest reading distance as shown in Figure 1. This is comparable to and better than other indicators on the driver's desk such as the Safety Systems Isolated indicator and the Train Fault Acknowledge pushbutton.

Control/Indicator	Minutes of Arc subtended at the eye for the 95 <sup>th</sup> percentile male
AWS	11.3
Overspeed	11.5
SPAD	12.0
Temporary Isolation/Fault	12.1
Train Stop Override	12.0
Brake Release	12.1
Safety Systems Isolated	11.2
Train Fault Acknowledge	10.8

**Table 1 Angles subtended at the eyepoint for driver's desk controls**



**Figure 1 Measurement of angle subtended at the eye by 3mm text – worst case example for the 95<sup>th</sup> percentile British adult male.**

### 3. Text Height

GE/RT8075 Clause F3.7 requires that the text labels have a character height of at least 5 mm. The proposed labels have a character height of 3 mm which is consistent with the labelling provided elsewhere in the cab.

The 3 mm text for pushbutton legends and 4.5 mm text for headings, as well as the consistent distance between the labels and the pushbuttons was adapted from the Networker series multiple units designed in the late 1990s. The Networker specification has been repeated on all Electrostar and Turbostar projects since. The same font heights were also employed on the Victoria Line and S Stock trains for London Underground. There have been no problems with the identification of controls in any of those cabs related to font height or alignment reported to Bombardier. Neither has it been raised as an issue in meetings with Driver Representatives in the development of vehicles or adaptation of existing designs for use by other Train Operating Companies.

Functional grouping of controls is indicated by the use of a dark grey (BS 5252 06 A 11) halo which is screen printed on to the panel. The text is rendered using a Sans Serif font which closely matches Helvetica, engraved and back-filled in white. A combination of 3 and 4.5 mm white text on a dark grey background, shown in 3EER400017-9981, provides a very good contrast and is durable. Because Bombardier have used this solution on all their mainline projects and are not aware of any issues related to the font size, this solution is considered as their internal best practice.

**12. Impacts of the alternative provisions:**

All current existing Electrostar units feature TPWS Driver Machine Interface (DMI) labels with a character height of 3 mm and a similar arrangement to that proposed for the Class 387. The worst case angle subtended at the eye is 11.3 minutes of arc, which is comparable to and better than other labels on the driver's desk that comply with good practice. There is no evidence that the existing controls are difficult to read, and so it is not considered that there is a negative impact from this non-compliance.

**13. What other options have been considered?**

Changing the existing labels on the cab desk to be consistent with those specified for TPWS in GE/RT8075 has been considered, but there is insufficient space on the cab desk to achieve this.

**14. Consultation with affected parties**

The layout of the in-cab TPWS equipment does not affect the interface of the system with the infrastructure; therefore, this deviation does not affect Network Rail, and hence they have not been consulted.

Govia Thameslink Railway Ltd, as the future operator of this fleet, has been consulted and is fully supportive of this derogation (see attached email dated 19/06/2014).

**15. Additional actions/observations:**

Upon receipt, the applicant is required to identify affected, interfacing parties and copy this certificate, together with supporting information, to those parties.

The holder of the certificate is responsible for checking that the original assumptions and conclusions contained in the deviation certificate remain valid whenever any material changes occur. If the conditions of the deviation certificate change, the deviation will no longer be valid. In these circumstances, the holder of the deviation certificate may consider applying for a new deviation.

The holder of the certificate is also requested to inform RSSB if the deviation has been addressed or superseded so that it may be closed.

Attachments:

- Govia Thameslink Railway (SGS Correl Rail)'s support email dated 19/06/2014;
- Bombardier's Drawing No. 3EER400018-2103 Revision A 14-04-07: Panel Detail and Print – Speedometer/Instrument – Drivers Desk;
- Figure No. 3EER400017-9981: Speedometer switch panel.

**16. Signature of applicant:**

, Lead Design Assurance Engineer

**Date of application:**

25/06/2014

**17. Lead Standards Committee details:****Name of Committee:**

Control Command and Signalling

**Date of meeting**

24/07/2014

**Minute reference:**

14/CCS/07/171

**Authorised by:**

Signed by Tom Lee on 21/08/2014

**Date of Authorisation:**

21/08/2014

Tom Lee  
Acting Head of Traffic Operation and Management  
Head of New Systems  
Head of Delivery, Control Command & Signalling, and Energy