

TECHNICAL INSTRUCTION

TI 162
Issue 1
15/07/2011
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NETWORK RAIL - SIGNAL ENGINEERING

Restriction of positioning of TPWS loop in reference to EBI Track 200

Relevant Standard: NR/L3/SIG/11761 & NR/L2/SIG/10138

Background

There is the potential for a TI21 (also known as EBI Track 200) transmitter to be detected by a train's TPWS receiver as a valid signal.

NR/L2/SIG/10138 Issue 3 requires a minimum clearance of 5m between TPWS loops and TI21 transmitter connections, and no positioning of TPWS loops in the tuned zone. The acceptance certificate for TPWS is the same except that it does not include a restriction on TI21 transmitter connections at an End Termination Unit.

NR/L3/SIG/11761 was updated to Issue 2 in December 2010 and incorporated TPWS restrictions. At this time the supporting evidence was reviewed and it was considered that the restrictions could be refined. An investigation report identified a conflict between TI21 Frequency D and the TPWS Normal Direction Trigger Frequency (f2).

It has also been identified that a slightly off tune TI21 Frequency D can produce the TPWS Normal Direction Overspeed Arming Frequency (f1).

Unfortunately, the resultant update to NR/L3/SIG/11761 wrongly identified TI21 Frequency E as the problematic frequency, and also did not fully consider the implications of the report.

The main problem is that a TI21 Frequency D transmitter may be interpreted as a Normal Direction Overspeed Trigger(f2) for a train which has just passed over a Normal Direction Overspeed Arming loop (f1) and its on-board timer has not yet expired. The Normal Direction Train Stop Arming loop (f3) presents a similar problem because it is paired with the same Trigger frequency (f2), although the Train Stop on-board timer expires much more quickly.

Changes to NR/L3/SIG/11761 and NR/L2/SIG/10138

For these standards, the revised TPWS/TI21 fitment restrictions shall be as follows:-

All TPWS loops shall be positioned with at least 1m clearance longitudinally from any TI21 tuned zone or TI21 transmitter end tail cables.

For new work involving either TPWS or TI21 fitment, the design shall not include TI21 Frequency D transmitter end tail cables:-

- between TPWS Normal Direction Overspeed loops (f1 and f2);
- beyond a TPWS Normal Direction Overspeed Arming loop (f1) in the opposite direction to which the loop applies, within the distance in which the on-board timer will remain energised at the line speed for that direction;
- beyond a TPWS Normal Direction Train Stop Arming loop (f3) in the opposite direction to that which the loop applies, for a distance of 2m.

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Note for (b): A distance of 55m for bi-directional lines and 38m for other lines shall be used to establish a generic exclusion zone for both freight and passenger trains travelling in the defined opposite direction. Where conflicts occur, to avoid un-necessary moving of equipment, distance S in Table 9 of NR/L2/SIG/10138 shall be used to establish the site specific absolute minimum exclusion zone. Where no relevant speed is specified in the Sectional Appendix then 50mph shall be assumed.

General Note: Localised false TPWS activations caused by TI21 frequency drift or close proximity to large metal structures can usually be resolved by replacement and/or repositioning of the TI21 transmitter and associated End Termination Unit or Tuning Unit. False activation sites where this is not the case, but that are compliant to all fitment restrictions, shall be reported for investigation.

Compliance Requirements

This TI is mandatory from 01/09/2011 for all projects that do not have final detail design of the track circuit layout.

Staff to be Briefed

The following table shows who needs to be briefed and who has responsibility for briefing:-

Role	Responsible for Briefing
Head of Asset Management (S&T) Senior Programme Engineering Manager (S&T)	Author
Route Asset Managers (S&T) soon to be Route Asset Managers (Signals)	Head of Asset Management (S&T)
Signal & Telecoms Maintenance Engineer	Route Asset Managers (S&T)
Signal Design Engineers Signal Project Engineers Testing & Commissioning Engineers	Senior Programme Engineering Manager (S&T)

End

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