

TECHNICAL INSTRUCTION		TI 168 Issue 1 05/04/2012 Page 1 of 8
	NETWORK RAIL - SIGNAL ENGINEERING Evaluation of Minimum Reading Time	
Relevant Standard	NR/L2/SIG/10157	

Purpose

As part of the Signal Sighting process, the Signal Sighting Committee (SSC) needs to establish how long it will take a driver to identify, read and interpret a signal's display in different circumstances.

The Minimum Reading Time (MRT) is agreed by the SSC based on a number of factors. When completing the MRT consideration must first be given to removing the risk; rather than increasing the MRT. Where increasing the MRT is appropriate this instruction provides guidance and information to promote consistency in the allowances added to the base time of 8 seconds.

Scope

This instruction applies to all Signal Sighting undertaken on Network Rail managed infrastructure. This applies to both assessments of existing signals as part of line speed increases, SPAD investigations and also in connection with Infrastructure change.

Compliance requirements

This Technical Instruction applies to all SSC and assessments of MRT taking place after 30/04/2012.

Background

The objectives of providing a driver with sufficient time to identify, read and interpret a signal include:-

- reducing the risk of a SPAD at the signal being assessed,
- reducing the risk of a SPAD at a subsequent signal where the assessed signal is the first cautionary aspect,
- enabling the driver to assimilate route and aspect information to control the train safely.

To ensure the driver has sufficient time, the SSC formed of representatives of train drivers and Network Rail, assess each signal to identify whether the normal time of 8 seconds is sufficient or whether additional allowances are required. Guidance on the application of these allowances and the risks they seek to address have previously only formed part of training courses and have been applied inconsistently.

Abbreviations & Definitions

MRD	Minimum reading distance.
MRT	Minimum reading time.
RRD	Required reading distance.
SPAD	Signal passed at danger.
SSC	Signal Sighting Committee.

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TECHNICAL INSTRUCTION

TI 168
Issue 1
05/04/2012
Page 2 of 8

Signal Sighting Workbook

Network Rail has produced an Excel based workbook to support SSC in the generation of signal sighting forms and this includes the calculation of the MRT appropriate to the signal.

The Signal Sighting Chair should check that the current version of the workbook is being used since this includes extra questions to support subsequent overrun risk assessments.

The issues identified on the worksheet can address the risk of a SPAD at the signal or another risk. For some signals it may be appropriate to calculate a number of MRT depending on whether the driver has previously received a caution and will be travelling at reduced speed.

The SSC should indicate where an issue is present, however it is acceptable that, after discussion, they conclude there is no need to increase the MRT. The recording of the presence of the issue assists the subsequent overrun risk assessment.

The following sections refer to the questions/issues for consideration on the MRT calculation sheet. The guidance provided addresses the common situations, however there will always be signals where the SSC has to use its judgement. As part of the guidance there is also an indication as to whether the issue may be appropriate to a line speed approach or a reduced speed following a previous caution.

Issue 1.1 - Target aspect is on signal that is complex or of unusual form

This is intended where the signal has features where the aspects are arranged in an unusual form such as horizontal signal, splitting distant signal or where the signal is accompanied by route information. The risks associated with complexity of the signal may require the driver longer time to read and interpret the displayed signal.

Where time is added for this risk, the risk will be assessed at the approach speed applicable to the speed profile for the indication being displayed. Table 1 gives guidance on the time values to be used in these circumstances.

Table 1

Additional Equipment to the Main Aspect	Typical increased value in MRT)
1. Position one or four on a Position Light Junction Indicator (PLJI).	0.00 s
2. Standard Indicator with one route indication.	0.00 s
3. Position Light Signal.	0.00 s
4. Splitting distant signal	1.00 s
5. Two or more PLJIs, but not diametrically apposed indications (ie: 1 and 6, 2 and 5 and 3 and 4).	0.50 s
6. Aspects mounted horizontally	0.50 s
7. Two or more PLJIs, that are diametrically apposed indications (ie: 1 and 6, 2 and 5 and 3 and 4). MRT assessment to be carried out for highest approach speed for the position light junction indicators.	1.00 s
8. Standard Indicator with more than one route indication.	0.50 s
9. Two (or more) Standard Indicators with multiple route indications	1.00 s
10. Position Light Signal with a single Miniature Alphanumeric Route Indicator with one indication..	0.50 s
11. Position Light Signal with more than one Miniature Alphanumeric Route Indicator or a single Miniature Alphanumeric Route Indicator with multiple indications.	1.00 s
12. Elements of a signal arranged horizontally.	0.50 s
Combinations of sections 5 to 12	1.00 s
Maximum default value for an individual signal is 1.0 second	

Issue 1.2 - Target signal is viewed against a complex background

This applies in circumstances where there is difficulty in detecting the signal against a complex background. Consideration to be given to day and night time view of the signal. The assessment of the risk should take place at:

- AWS magnet
- Where AWS is not provided 8 seconds
- Where AWS or 8 seconds sighting is not within the available reading distance, then the initial sighting point.

Potential mitigations include an enlarged backboard (may be achieved by in-filling of the faraday cage or handrails to the back of the signal) or changing the type of signal head. If a suitable mitigation is not practicable then depending on severity of the complex background additional time up to 1 second may be required.

Issue 1.3 - Possibility of 'reading through' to a signal in advance of target signal

This applies where the target signal is showing a red or cautionary aspect and the signal in advance is showing a proceed aspect. The severity of the read through will be influenced by:

- Horizontal and vertical position of the signal in advance in relation to the target signal. In particular where the target signal is positioned outside the normal vertical and horizontal position, but the signal in advance is positioned in the conventional vertical and horizontal position.
- Signal in advance displays the same aspect configuration as the target signal.
- Signal in advance has an association with the line that is common to the target signal.

Depending on severity of the read through additional time of up to 1 second may be required to mitigate this. The risk does not normally apply where the target signal is green.

Issue 1.4 - Non-standard positioning of signal (outside normal vertical and horizontal positioning, or right-hand located)

Consideration should be given to whether the non-standard position makes it harder for a driver to identify the correct signal. Often the non-standard position is deliberate to improve the visibility of the signal from a long distance or as part of a group of signals in connection with bi-directional working to increase discrimination for signals in the right direction, in which case no time should be added.



A non standard position may be used due to gauge constraints or operational requirements (platform starting signal, signals with freight yards etc) rather than to improve the visibility of the signal. For these occasions a red aspect positioned in the grey area of the diagram on the next page denotes a signal in a non standard position; a red aspect in the white area denotes a standard position. In these circumstances where the red aspect is within the grey area additional time up to 1 second may be