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Ref	NR/SP/SIG/I0138
Issue	3
Date	April 2004

Train Protection and Warning System (TPWS) Transmitter Loop Requirements And Positioning (formerly RT/E/S/I0138)

This temporary front sheet facilitates change to the new Network Rail Standards referencing nomenclature.

The Ref above will be formally allocated to this standard when it is next changed in the meantime the contents, date and issue number of this Network Rail Standard are **UNCHANGED and with immediate effect it should be referred to as “(new ref) formerly (old ref)”.**

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Company Specification

Train Protection & Warning System (TPWS) - Transmitter Loop Requirements and Positioning

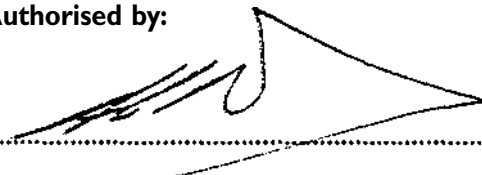
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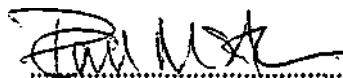
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Issue record

Issue	Date	Comments
One	January 1999	Original issue
Two	October 2000	Updated
Three	April 2004	Replaces Issue 2, TPWS/TI/014 , TPWS/TI/020 , TPWS/TI/030 , TPWS/TI/033 , TPWS/TI/035 , TPWS/TI/036 , TPWS/TI/043 , TPWS/TI/046 , TPWS/TGN/005 , TPWS/TGN/008 and TPWS/TGN/020 .

Implementation

This Specification shall be implemented from 3 April 2004.

Compliance

This Specification shall be complied with by 3 April 2004.

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1 Purpose

This Specification defines the criteria for the positioning of Train Protection and Warning System (TPWS) transmitter loops and determination of the need for Overspeed Sensor Systems (OSS).

2 Scope

This issue of the Specification includes the requirements for and positioning of TPWS Transmitter Loops at signals, speed restrictions and Buffer Stops, at which the provision of TPWS is necessary to meet the requirements of the Railway Safety Regulations 1999 ('the Regulations').

This Specification should be read in conjunction with Network Rail Company Standard [RT/E/S/10178](#) for RETB Signalled areas.

In addition to the requirements of the Regulations contained within this Specification, the requirements for signal overrun risk assessments of existing and new signals shall also consider additional transmitter loop requirements based on an assessment of managing risk ALARP. In this context, this Specification includes the requirements for transmitter loop positioning for the application of TPWS+ to existing signals and to certain 'plain line' signals selected for retrospective application of TPWS.

3 Reference Documentation

AEA/S&AM/LD03202/REP/001	TPWS Application at Curving PSRs
GE/RT8030	Requirements for a Train Protection & Warning System
GK/RT0034	Lineside Signal Spacing
GO/RT3251	Train Driving
PA05/00446	Network Rail Certificate of Acceptance, Thales Communications UK Limited TPWS Trackside Equipment
RT/E/S/10133	TPWS Signalling Interface Design Requirements
RT/E/S/10134	TPWS Track Sub System Equipment
RT/E/S/10137	TPWS Selection of Signals and Other Locations for Provision of Track Sub-system
RT/E/S/10173	TPWS Track Sub-system Installation Requirements
RT/E/S/10178	TPWS in Areas Where the Control of Train Movements is by RETB Signalling

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TI-014_6.xls

Spreadsheet for Determining TPWS transmitter loop
Positions at Speed Restrictions, AEA Technology Rail, Issue
6, June 2003

4 Definitions

AB	Absolute Block
Attainable Speed	The highest speed at which trains normally approach a location taking account of the Permissible Speed and train acceleration capabilities from speed reductions or stations on the approach to the signal or speed restriction.
Cascade	A number of successive PSRs within a distance of 2 miles from the PSR being considered for TPWS protection which, put together, reduce an approach speed of 60 mph or more by one third or more.
Clearance Point	The minimum distance from points and crossings at which track circuit boundaries must be positioned, to prove that a vehicle on one track is in a position clear of a movement on the other.
Conflict	A point within a track layout (generally the Clearance Point of a junction or the position an opposing movement may take) at which a train passing a signal at Danger may cross, converge with, or otherwise impinge on the path of another train so as to cause a collision, except that it does not include where a train may collide only with the rear of another train travelling in the same direction on the same track.
Excessive Speed	The agreed acceptable overspeed margin above which derailment risk is considered to require mitigation. This has been agreed with HMRI as being greater than 50% above the published PSR speed.
Fouling Point	The place where a vehicle standing on a converging line would come into contact with a vehicle on the other line.
IBJ	Insulated Block Joint
Inner Signal	A signal directly protecting a conflict situated between itself and the next signal ahead, including those within the Inner Signal's overlap. See also ' <i>Outer Signal</i> '.
NSTR	No Signaller Token Remote – a passing loop on a single lie route operated by the No Signaller Key Token system of signalling.

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Other Locations	Those parts of the infrastructure where an OSS is to be fitted for reasons other than protecting against SPADs.
Outer Signal	A signal protecting a conflict situated beyond the next signal ahead, but within the latter signal's overlap, in the direction of travel. See also ' <i>Inner Signal</i> '.
Overspeed Sensor System (OSS)	Trackside equipment with the function of demanding a brake application on a train which passes the sensor above a predefined Set Speed.
Permissible Speed	The maximum permitted speed for the section of line as detailed in Table A of the Sectional Appendix.
PSR	Permanent Speed Restriction
PUT	Power Up Test
RETB	Radio Electronic Token Block
Safe Overrun Distance	The distance between a signal and its Clearance Point or to a point where an opposing movement may be stood. It does not include a conflict within the signal's overlap which is protected by a TPWS fitted <i>Outer Signal</i> .
Safety Margin	A speed in excess of the plated PSR speed that trains may negotiate the curve/turnout with minimal risk of derailment.
Self-reversion	When a TPWS fitted train causes the signal to return to danger before the TPWS train antenna has passed clear of the energised TSS thus causing the train brakes to be applied.
Set Speed	The minimum train speed(s) at which an OSS will demand a brake application on passing trains.
SIMBIDS	Simplified Bi-Directional Signalling
SOD	Safe Overrun Distance
SPAD	Signal Passed At Danger
SPOSS	Self-Powered Overspeed Sensor System
TEP	Token Exchange Point

TPWS	Train Protection & Warning System
TPWS+	An additional Overspeed Sensor System installed to increase the effectiveness of TPWS.
Track Mounted Equipment	Includes Overspeed Sensor loops and Train Stop loops.
Train Stop System (TSS)	Trackside equipment with the function of demanding a brake application on a train that passes a signal at danger without authority.
TSR	Temporary Speed Restriction
Warning (Route Class)	A route from one main signal to the next main signal where the full overlap is not available or not required.

5 General Requirements

TPWS is a system that is designed to reduce the number of and the consequences of SPADs and overspeeding. Track mounted TPWS transmitter loops produce a magnetic field at defined frequencies which are detected by a receiver on the train. When the trainborne TPWS receiver detects specific combinations of frequencies it will use these to determine whether to initiate an automatic brake application.

TPWS is required at certain signals, speed restrictions and buffer stops in accordance with the Railway Safety Regulations 1999, and as defined in Railway Group Standard [GE/RT8030](#) and Network Rail Company Standard [RT/E/S/10137](#). Note - certain plain line signals may be selected for the provision of TPWS and certain other signals may be selected for the provision of TPWS+. These categories are not included in Network Rail Company Standard [RT/E/S/10137](#) but the requirements for and positioning of transmitter loops are detailed in this Specification.

TPWS consists of a Train Stop System (TSS) to automatically apply the train brakes should a fitted signal be passed at Danger, and an Overspeed Sensor System (OSS) to automatically apply the brakes on a train which passes a fitted location above the Set Speed.

A TSS is necessary at all signals selected using the process specified in Network Rail Company Standard [RT/E/S/10137](#). Signals will also normally be provided with an OSS unless the TSS can be shown to be capable of bringing all passenger trains passing that signal without authority to a stand at or before the Clearance Point.

The Regulations require provision of TPWS on passenger lines even if the only conflict possible is between two non-passenger trains. TSS and OSS provision and positioning shall take this into account.

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An OSS is necessary at all speed restrictions which have been selected for fitment using the process specified in Network Rail Company Standard [RT/E/S/10137](#).

An OSS is necessary at all Buffer Stops which have been selected for fitment using the process specified in Network Rail Company Standard [RT/E/S/10137](#).

The longitudinal positioning of OSS and TSS transmitter loops is important to the effectiveness of TPWS. The position of the TSS loops can cause both Self-reversion and restrictions in track capacity if poorly planned. The position of OSS loops is a compromise between technical constraints, minimising unwarranted brake applications and ensuring TPWS is as effective as possible in mitigating SPADs.

The location of TPWS transmitter loops is a function of the track and signalling layout together with the Attainable Speed. Any significant changes to these parameters will require the positioning of and requirement for TPWS transmitter loops to be re-assessed. Significant changes in this context include:

- changes in attainable speed of trains by 10 mph or more;
- alterations to track layouts or movement of signals such as to affect the safe overrun distance by more than 25 metres.

All distances used in this standard are in metres. On site measurements shall be made using a calibrated measuring wheel.

Appendix A identifies general limitations on the positioning of TSSs and OSSs.

6 Train Stops At Signals And Stop Boards

6.1 General

All signals and Stop Boards selected for fitment in accordance with Network Rail Company Standard [RT/E/S/10137](#), and certain other (non Regulated) 'plain line' signals selected for TPWS fitment, shall be fitted with a TSS. Note the following requirements for signals also apply to Stop Boards.

The main objectives to consider when determining the position of the TSS are:

- To provide maximum protection for SPADing trains, particularly to protect trains starting against signals at Danger at station stops.
- To allow trains to stop at the normal stopping point for the signal without the TSS loops activating the trainborne TPWS equipment or being in range of the trainborne antenna.
- To avoid the TSS loops causing 'Self-reversion' because the train returns the signal to Danger before the trainborne antenna has passed clear of the TSS loops, thus causing the train brakes to apply.

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The acceptable location of the TPWS trainborne receiver on all trains has been defined within Railway Group Standard [GE/RT8030](#) as being mounted behind the leading axle by no more than 2.3 metres. However, it should be noted that issue 1 of [GE/RT8030](#) permitted the TPWS trainborne receiver to be located at least 1 metre from the front of the train, i.e. ahead of the leading axle, hence this standard reflects this earlier requirement.

To complement the TPWS trainborne receiver positioning rules and thus avoid Self-reversion, TSS loop positioning guidance has also been published in Railway Group Standard [GE/RT8030](#). These form the basis of the rules provided in this standard, and are amplified to account for tolerances in sleeper configuration and other relevant factors.

The following rules assume:

- a) when stopping at a signal at Danger, trains normally come to a stand no closer than 2 metres on the approach to the signal;
- b) the centre line of sleeper spacing is between 0.6 and 1 metre.

There is no requirement to adjust TSS loop positioning for gradient.

To comply with [RT/E/S/10137](#) for Stop Board fitment protecting the entry to single lines, all permitted Token Exchange Point exit points leading into the single line section shall be fitted with TPWS TSS equipment. This shall include both loop lines/platform exits for the movement in both directions even if there is no Stop Board for the direction not normally used. The TSS loops shall be positioned in line with the Stop Board so as to permit maximum length trains operating over the route to be accommodated within the TEP. It is not intended to provide mitigation against side collisions of two trains departing the loop in the same direction simultaneously, as it is not possible to differentiate between which of the trains has the legitimate token.

6.2 TSS loop positioning rules

To ensure that trains cannot stop at a fitted signal with the trainborne TPWS receiver positioned between the TSS and the signal, thus having no protection from starting against the signal at Danger, the TSS shall normally be positioned at the foot of the signal with the centre of the TSS aligning with the centre of the signal as shown in Figure 1.

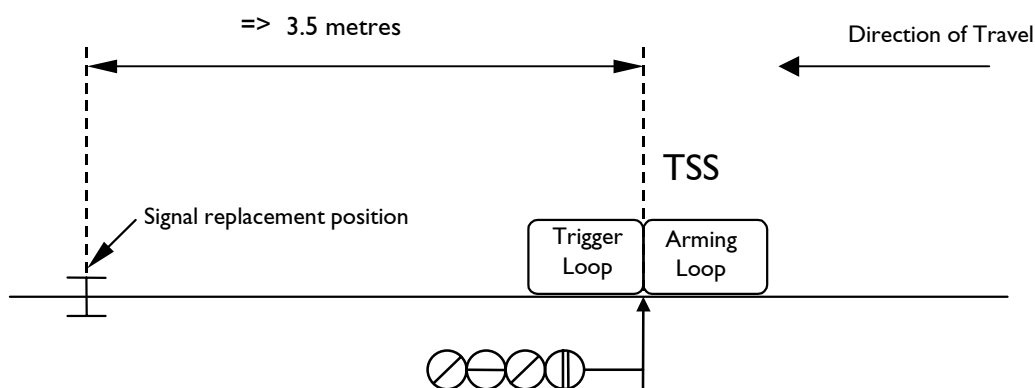


Figure I – Nominal Position of Train Stop System

There may however be circumstances where it is not always possible to locate the TSS at the foot of the signal. These are described in the following sections together with the options for ensuring an appropriate TSS arrangement.

To avoid Self-reversion, the centre of the TSS shall not normally be positioned closer than 3.5 metres to the replacement track circuit IBJ (or equivalent e.g. axle counter head or nearest end of a tuned zone) as shown in Figure I. However, this dimension does not apply where existing signalling controls would delay switching the TSS on until the leading vehicle is clear of the TSS, for example, 'last wheel replacement' or 'second track circuit replacement'.

Where other equipment is already located in the four foot at the foot of the signal then the nearest edge of the TPWS transmitter loops shall be mounted at least 1 metre away from the other equipment. Typical examples of such other equipment are identified in section 11.

The distances quoted will need to be adjusted to the centre line of the nearest sleepers provided the minimum distances stated are not infringed.

Where the TSS cannot be mounted at the foot of the signal due to circumstances described above, the following options should be considered, in conjunction with the Regional Production Manager, to maintain the required distances or to effect appropriate TPWS controls.

- Move the TSS to a position on the approach side of the signal provided it can be guaranteed that all trains will be able to stop behind the TSS and without the TPWS trainborne receiver being in range of the TSS transmitter loops. It should be noted that it is normal for trains to stop at least 2 metres from the signal for signal sighting purposes and this distance should usually be adequate for the TSS where it cannot be located at the foot of the signal.

- Exceptionally, when moving the TSS on the approach side by up to 2 metres, and more likely in cases where the TSS needs to be located in excess of 2 metres on the approach side to the signal, it may be necessary to move other equipment such as platform stopping point marker boards and/or Driver Only Operation monitors/mirrors. Consideration must also be given to any platform length constraints caused by stopping the train short of the TSS, and to any track circuit length constraints that will disrupt the normal operation of the signalling.
- Move the TSS to a position beyond the signal. It is acceptable to move the centre of the TSS up to 6 metres beyond the signal provided the minimum Safe Overrun Distance exists. Where it is necessary to position the TSS greater than 6 metres beyond the signal, an assessment of effectiveness is required to justify this. Where the TSS is to be sited beyond the signal, then the Safe Overrun Distance shall be measured from the centre of the TSS and not from the foot of the signal. The design shall also ensure that trains will not be subject to self-reversion under these circumstances.
- Relocate the existing signal replacement function (e.g. IBJ).
- Relocate other equipment in conflict.
- Modify the system that controls TPWS switching on to include a time delay before TPWS re-energises.

Where one TSS is to be used to protect two diverging routes immediately ahead of the signal and cannot be located at the foot of the signal, the TSS shall be installed within the maximum offset permitted in [RT/E/S/10173](#).

For locations with 'standing out' facilities, a second TSS shall be positioned so as to provide TSS protection for all trains that are permitted to use the location.

7 Overspeed Sensors At Signals

7.1 General

To maximise the effectiveness of TPWS the OSS loops should be placed as far away from the signal as possible. However, increasing the distance causes the effectiveness of TPWS to be reduced because:

- unwarranted brake applications are more likely to occur as the speed differential between a train approaching at a 'reasonable' speed and one approaching too fast becomes difficult to distinguish;

- b) the Set Speed of the OSS has to be increased thus introducing more risk of trains approaching at below the Set Speed and continuing, or accelerating, towards the signal at Danger unabated. This is particularly so where trains approaching have started from a station or are accelerating from a speed restriction on the approach.

With the exception of the Self-powered OSS which is limited to 100 metres of transmitter loop feeder cable, TPWS is technically limited to 500 metres of transmitter loop feeder cable from the trackside equipment to the transmitter loops including the tail cables (refer to Figure 2 and Network Rail Company Standard RT/E/S/10134). The OSS positioning takes account of these various conflicting requirements and optimise the resultant loop positioning. The maximum nominal distance between the signal post and the leading edge of the OSS Trigger Loop is normally limited to 350 metres with an absolute limit of 450 metres when adjusted for gradient and other factors (refer to Figure 2).

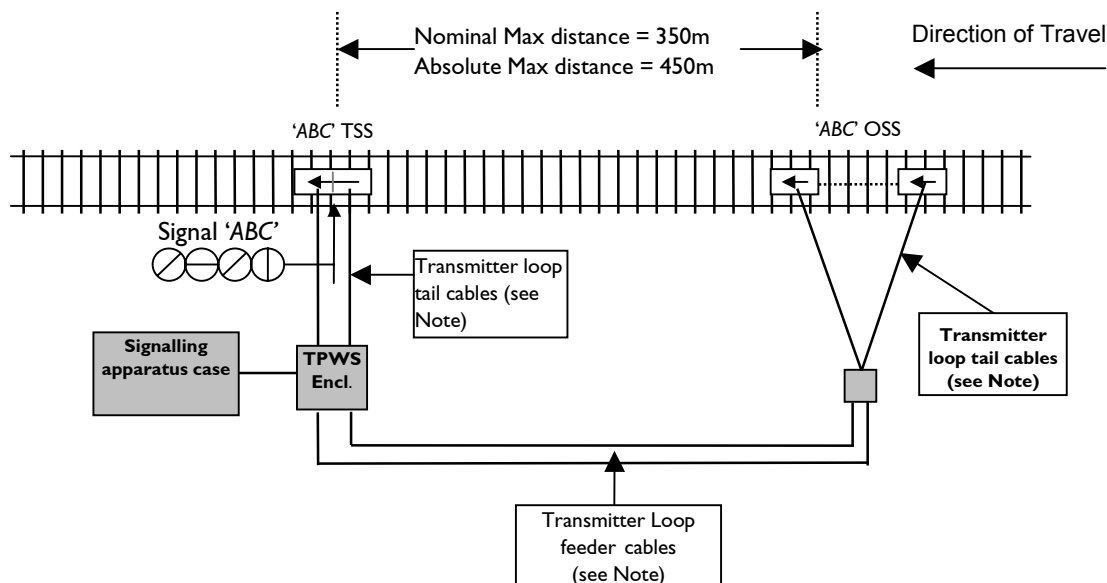


Figure 2 - Typical Layout of TPWS System

To optimise the effectiveness of TPWS whilst minimising the potential for unnecessary brake applications, the OSS loop positions assume the adoption of the Defensive Driving policy outlined in [GO/RT3251](#). This has been interpreted as meaning a maximum approach speed envelope equivalent to a constant retardation rate of 6%g over the final 500 metres when approaching a signal at Danger. If trains approach above this assumed maximum defensive driving approach, then they will be tripped by the OSS. The minimum Set Speed of OSS equipment for signals is 15mph.

Where differential permitted speeds exist which affect the requirement for, or positioning of an OSS, then the highest of the differential speeds shall be used.

The requirements for TPWS+ transmitter loop positioning are detailed in section 8.

7.2 Loop positioning tolerances

A range of parameters will significantly influence the effectiveness of TPWS in any particular incident. There are also corresponding tolerances for the positioning of OSS loops due to location specific constraints. As a consequence, the OSS positioning rules allow a tolerance of ± 25 metres on the required distance between the OSS Trigger Loop and the signal once the nominal distance has been identified and adjusted for defined factors such as gradient.

The distance between the OSS Trigger and Arming Loops is however critical as this determines the minimum speed at which trains will be tripped. This distance must be accurate to within ± 0.5 metres to avoid unwarranted brake applications and to ensure TPWS is effective at its Set Speed.

7.3 Determining whether an OSS is required (Appendix C Flowchart 1)

There are 6 main conditions under which an OSS may not be required:

- The Safe Overrun Distance is adequate (section 7.3.1);
- The signal is a platform starter at a terminal or turn round platform with speeds generally below 25 mph (section 7.3.2);
- There are points in the Overlap of the signal beyond and Warning controls are in place (section 7.3.3);
- Certain signals in Absolute Block, Electric Token Block and Tokenless Block signalled areas (section 7.3.4);
- Stop Boards in RETB signalled areas (section 7.3.6)
- Stop Boards in NST and NSTR signalled areas (section 7.3.7).

7.3.1 Adequate Safe Overrun Distance

An OSS will not normally be required where the TSS alone will be effective in stopping all approaching trains within the available Safe Overrun Distance (SOD). This criteria shall be applied to all legitimate routes, including shunt routes, leading to the signal being assessed.

The SOD will normally be identified from the signalling plan. Normally this will be the distance from the signal (or in certain circumstances the position of the TSS) to the nearest Clearance Point, but it may also be to a point where the front of a train making an opposing movement may stand. No consideration is required of a position where the rear of a train travelling in the same direction may stand except for fitment at 'plain line' signals (see section 7.3.5).

If the SOD on the signalling plan is within 25 metres either side of that required in Table 2, then the actual SOD shall be verified on site.

The adequacy of the SOD depends on the Attainable Speed at the signal which will normally be the Permissible Speed listed in Table A of the Sectional Appendix. Where there is a reduction in permissible speed either at the signal or within 450 metres on the approach to the signal, then the Attainable Speed shall be taken as the permissible speed on approach to the signal and not the permissible speed immediately beyond the signal.

However, the presence of a Permanent Speed Restriction (PSR) on the approach to the signal may reduce the Attainable Speed at the signal. Where there is a PSR of 60 mph or less which ends within 1000 metres on the approach to the signal then the Attainable Speed at the signal shall be based on Table I. Table I does not include any allowance for train length which should be considered when identifying Attainable Speed.

Note: Table I should only be used for determining the requirement for an OSS and shall not be used to position OSSs under section 7.4.2 of this standard.

Distance PSR to Signal (metres)	PSR Speed (mph)					
	5-10	15-20	25-30	35-40	45-50	55-60
50 - 99	20	30	30	40	50	60
100 - 199	30	30	40	40	50	60
200 - 299	40	40	40	50	60	60
300 - 324	40	40	40	50	60	60
325 - 374	40	40	50	50	60	60
375 - 449	40	40	50	50	60	70
450 - 499	40	50	50	50	60	70
500 - 599	50	50	50	50	60	70
600 - 774	50	50	50	60	60	70
775 - 874	50	50	60	60	60	70
875 - 899	50	60	60	60	60	70
900 - 924	50	60	60	60	70	70
925 - 1000	60	60	60	60	70	70

Table I – Attainable Speed on Approach to Signal Following a PSR

The minimum SOD for which an OSS is not required is identified in Table 2.

See section 7.3.5 for the SOD requirements for Plain Line signals.

The effectiveness of the TSS will be influenced by a falling gradient beyond the signal requiring a longer SOD than for a level or rising gradient. Table 2 contains 2 columns for the minimum SOD. The first SOD column shall be used where the gradient between the signal and the Clearance Point is either level, rising or is not falling by steeper than 1 in 100.

The second SOD column shall be used where a falling gradient between the signal and the Clearance Point is steeper than 1 in 100 falling. If the falling gradient is steeper than 1 in 50 then an OSS shall always be provided.

In all cases, the gradient used shall be the maximum gradient and not an average gradient. Where the gradient changes from level/rising to falling over the SOD, then the maximum falling gradient shall be used.

Attainable Speed (mph)	Minimum Safe Overrun Distance (SOD) required without an OSS (metres)	
	Rising gradients, level and falling gradients no steeper than 1 in 100	Falling gradient steeper than 1 in 100 but no steeper than 1 in 50
0 - 20	OSS not required	OSS not required
21 - 30	125	125
31 - 40	200	200
41 - 50	450	525
51 - 60	625	725
61 - 70	850	OSS always required (see note 1)
over 70	OSS always required (see note 1)	OSS always required (see note 1)

Table 2 – Minimum Safe Overrun Distances when an OSS is not Required

The distances in Table 2 are based on an assumed nominal emergency braking rate of 12%g up to 40 mph and 7.5%g above 40 mph. The distances in SOD column 1 are based on a falling gradient of 1 in 100 and those in column 2 a falling gradient of 1 in 50.

Note 1 – Where the SOD to the point of conflict is a significant distance, e.g. several kms, then an OSS may not be required despite Attainable Speeds in excess of 70mph. Such signals include SIMBIDS entry signals, signals with opposing moves at the other end of a long tunnel, signals with the circumstances described in sections 7.3.3 and 7.3.4 etc. It may be acceptable not to provide an OSS for higher speeds provided there is sufficient braking distance from the signal to the Clearance Point. Reference to the appropriate standard signal and braking distances in [GK/RT0034](#) shall be made in these cases.

7.3.2 Signals With Low Attainable Speed

Signals with an Attainable Speed no greater than 20mph shall not be provided with an OSS even if the Safe Overrun Distance in Table 2 is not available.

Examples of this include terminal platform starter signals, starter signals at platforms where trains can only approach from a stand having reversed in the platform, and other areas of low speed such as in Token Exchange Points.

The Attainable Speed shall normally be the lower of the published speed restriction or the train speed achievable over the distance between the front of the train and the TSS as identified in Table 3.

Distance from Front of Train to TSS (metres)	Attainable Speed (Mph)
50 – 74	20
75 – 99	20
100 – 149	25
150 – 200	30

Table 3 - Attainable Speed

7.3.3 Points in Overlap of Next Signal Beyond

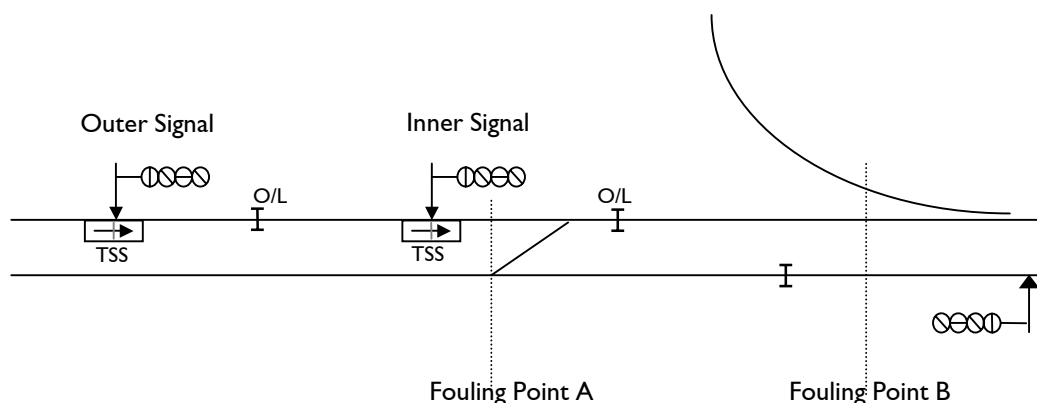


Figure 3 - Typical Inner and Outer Signal Arrangement

Where there is a point of conflict within the overlap of a signal (referred to here as the Inner Signal), the signal immediately on the approach to the Inner Signal (referred to in this context as the 'Outer Signal') shall normally be fitted with a TSS only (refer to Figure 3). The requirement for an OSS for the Outer Signal is dependent on whether there is an adequate SOD from the TSS of the Outer Signal to the first Conflict Point (see Note 1 in section 7.3.1).

If the only Fouling Point for the Inner Signal is Fouling Point A, then the Inner Signal shall normally only be provided with a TSS (refer to Figure 3). An exception to this exists where it can be guaranteed that trains cannot be brought up to the Inner Signal at Danger with a full overlap, and then the route cancelled/timed out to allow a conflicting movement to be signalled through the conflict in the Inner Signal's overlap. If it can be guaranteed that such moves cannot take place, then the Inner Signal shall not be fitted with TPWS.

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If the Inner Signal can be approached at Danger with a reduced overlap under 'Warning' arrangements then the requirement for an OSS shall be considered by reference to Table 2 based on the Warning approach speed for that signal. The Warning Approach speed, as detailed as part of the existing signalling design, shall be the Attainable Speed (it is assumed that trains will not accelerate after reducing to the Warning approach speed).

Where the Inner Signal also protects another conflict beyond its overlap (Fouling Point B Figure 3) which can be approached with a standard overlap and standard signal aspects, a TSS shall always be provided at the Inner Signal and the standard rules for determining the requirement for an OSS shall be followed using Tables 1 and 2.

7.3.4 Absolute Block, Electric Token Block and Tokenless Block signalling

In Absolute Block (AB), Electric Token Block (ETB) and Tokenless Block (TB) signalled areas, the Home signal (used for Block acceptance) required to be fitted in accordance with Network Rail Company Standard RT/E/S/10137 will normally be provided with both a TSS and an OSS. Any additional signals within the block section or station limits requiring TPWS in accordance Network Rail Company Standard [RT/E/S/10137](#) shall only be fitted with a TSS as the Attainable Speed will normally be low being governed by operational procedures and signalling instructions.

7.3.5 Plain Line signals

For plain line signals, the SOD shall be taken as being the distance from the TSS at the signal being fitted, to the rear of a train standing in the section beyond. For the purposes of determining the SOD, the following shall be considered:

- The rear of a train shall be taken as the point where the rear of the longest permitted train (passenger or freight) over the route would be standing.
- The position where the longest permitted train would be standing shall be taken as the most likely location depending on the features of the block section. For example, if there is a passenger station in the section and the platform is available for operational use, then the rear of the train shall be considered to be the trailing end of the platform, unless it is likely that the rear of a freight train would stand further in rear of the platform end.
- If the plain line signal is protecting a hazardous location, such as a level crossing, viaduct or tunnel, the SOD should be taken as the distance from the protecting signal to the first point of the hazard being considered, i.e. the tunnel entrance.

- It is not required to consider 'out of course' events such as a broken down train stopping somewhere in the block section.

7.3.6 Radio Electronic Token Block (RETB) Areas

Stop Boards in RETB signalled areas shall not be provided with an OSS unless the Attainable Speed on the approach to the Stop Board is greater than 20mph and insufficient SOD exists.

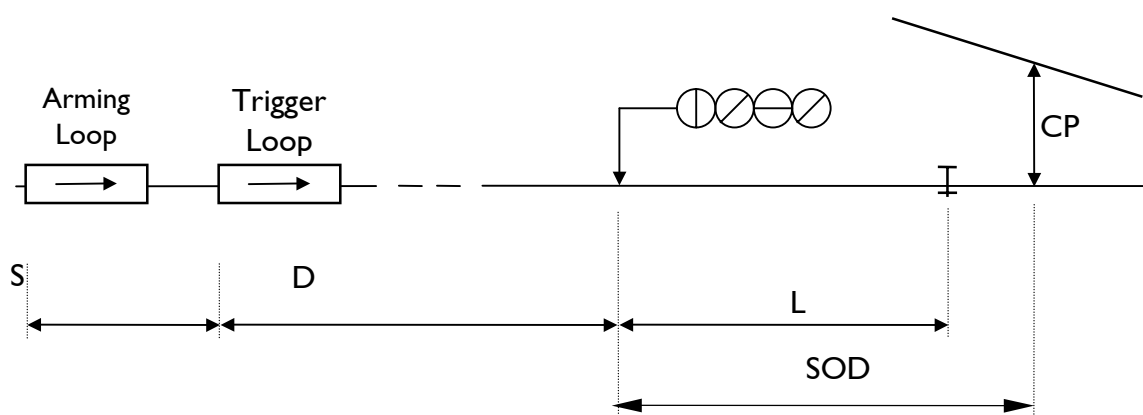
7.3.7 No Signaller Token (NST) and No Signaller Token Remote (NSTR) Areas

Stop Boards in NST and NSTR signalled areas shall not be provided with an OSS unless the Attainable Speed on the approach to the Stop Board is greater than 20mph and insufficient SOD exists.

7.4 OSS transmitter loop positioning rules

7.4.1 General

Figure 4 outlines the general positioning of the OSS.



Key:

- S = Distance between leading edges of the loops
- D = Distance from the signal to leading edge of the Trigger Loop
- L = Overlap distance
- CP = Clearance Point
- SOD = Safe Overrun Distance

Note : This key is referred to in Tables 5, 7 & 8 within this specification.

Figure 4 - General Positioning of Overspeed Sensor System Transmitter Loops

See Appendix D Flowchart 2 and Appendix E Flowchart 3.

Where there are no junctions between the OSS and the signal being protected, normally only one OSS shall be positioned for the signal.