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Level 2

Signalling Principles Handbook - Staff Protection Systems

Endorsement and Authorisation

For endorsement and authorisation, please refer to
NR/L2/SIG/30009

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Compliance

This Network Rail standard is mandatory and shall be complied with by Network Rail and its contractors if applicable from 5 December 2009.

When this standard is implemented, it is permissible for all projects that have formally completed GRIP Stage 4 to continue to comply with the Issue of any relevant Network Rail Standards current when GRIP Stage 4 was reached and not to comply with requirements contained herein, unless the designated Standard Owner has stipulated otherwise in the accompanying Briefing Note.

Reference documentation

GK/RT0009	Identification of Signalling and Related Equipment
GK/RT0060	Interlocking Principles
GK/RT0212	Signalling Lockout Systems to Protect Railway Undertaking Personnel
RT/E/C/11600	Signalling and Operational Telecommunications Design: Technical Guidance

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1 Purpose

This section forms part of the Signalling Principles Handbook (NR/L2/SIG/30009) and is to be read in conjunction with the other modules of the handbook.

This section details Network Rail's policy on the provision and application of Staff Protection Systems (often referred to as Lockouts) for the protection of staff needing to work on or near the line and comprises mandatory sections, statements of best practice (which shall be followed unless an alternative can be demonstrated to be beneficial to the company and no less safe), and guidance on historical practices (which are not to be applied to new works but provide information on previous standards or their interpretation).

2 Scope

This specification applies to all signalling schemes and detailed design where a staff protection system is altered or introduced. The operational rules for usage of each system are detailed which underpin the application rules.

Staff warning systems which provide an audible or visual warning but do not inhibit the signalling are excluded.

3 Definitions

3.1 Full Bi-directional Signalling

A signalling arrangement where a line is signalled equally for both directions of traffic.

3.2 Reduced Capacity Bi-directional Signalling

Signalling provided on a line normally used in one direction with a lesser provision of signals for the reverse direction.

3.3 Lockout Device

An instrument, interlocked with the signalling or train detection system, which, as part of a procedure, assists in the establishment of a safe system of work.

3.4 Key enabled

An instrument which requires a key to be inserted for other controls to function.

3.5 Captive Key

An instrument which requires a unique key to be removed to provide protection and replaced for normal signalling to be re-enabled. Release of the key normally requires an electrical release by the signaller.

3.6 Staff Protection System

A lockout or other permanently installed device designed to support staff in establishing a safe system of work by restricting or inhibiting the signalling system.

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3.7 Authorised User

A member of staff who has been trained on the operation of staff protection systems and has been briefed on the application of the specific system. An authorised user shall hold Individual Working Alone (IWA), Controller of Site Safety (COSS) or a Railway Undertaking Nominated Person competency.

3.8 Protected Area

The part of the railway where train movements are restricted or inhibited by a staff protection system.

4 Background

The provision of staff protections systems has developed from early fixed warning systems to co-operative lockouts reliant on procedure through to systems where the withdrawal of a key is the protection for the staff.

This document details both the current requirements and describes some of the historical systems which provided, in some cases, a lesser degree of protection but often more flexibility.

5 Requirements

Where a business case has been established for a staff protection system either by a third party (normally a Train Operator) or Network Rail's maintenance organisation, then the appropriate system shall be selected with boundaries and controls applicable to the work it is intended to protect.

5.1 Understanding the user requirements

The type of system, and more importantly the affect on the signalling, needs to reflect the protection which staff require when undertaking duties on or near the line.

Projects shall establish as part of the requirements specification the needs of the user (maintenance and train operators) for protection systems. This shall include identifying the areas of work to be protected and the nature of the work. The requirements shall consider the costs of provision, but this shall be on a whole life basis including the cost of protection staff, etc.

The requirements for the provision of protection systems for the purposes of Railway Undertaking's staff (typically in stations or at depots) shall be established by the project.

The limits of the Protected Area need to be sufficient to enable the likely tasks to be undertaken and be clear to users of the protection system.

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5.1.1 Protection area terms

The following terms apply to each protection system and are used in the following sections:-

a) Work Area

The area in which staff will stand or work in order to fulfil the task. This requires an understanding of the task(s) and the likely positions staff will undertake them from.

e.g. patrolling plain line may be undertaken from the four foot without fouling an adjacent line, whereas working on a point mechanism will require staff to work outside the four foot and foul of an adjacent line.

b) Published Area

The limits of the area shown on the instrument and other documentation for staff which describes the area in which work may be undertaken. This will normally utilise physical features to assist staff in orientating themselves and understanding the limits of the area, both along and beside the track, in which they may safely be.

c) Protected Area

The sections of line on which train movements are restricted (either in one or both directions). In order to protect staff in the Published Area this may require lines adjacent to the works to be restricted or require points to be in a specific position.

For ease of interlocking control, the Protected Area normally coincides with train detection boundaries.

NOTE The areas are not exclusive to a single protection system and may overlap. For instance, where a crossover exists between two running lines there may be a protection system on each running line for the purposes of patrolling (which does not affect the adjacent line) and a third protection system for staff working on the crossover or point operating equipment which covers both lines for the extent of the crossover.

5.1.2 Stations and rail vehicle stabling areas

Where there is a need for Railway Undertaking personnel to examine, repair or service (e.g. replenishing water supplies) trains in platforms or in stabling facilities and the staff need to go on or near an adjacent line, then it is appropriate to stop movements on the adjacent line as well as the track the train is standing on.

Normally the Work Area and Published Area will be the adjacent platform, stabling line or running line for the length of the platform or stabling line. The Protected Area will be all train detection sections wholly or partially within the Published Area and apply to both signalled routes and their overlaps.

5.1.3 Plain Lines

Work on plain lines normally splits into inspection/patrolling and working (which includes track maintenance, signalling maintenance and traction system maintenance).

For inspection, a safe system of work can often be established on a bi-directionally signalled line by preventing train movements in one direction, enabling staff to utilise lookout protection. The Work Area is normally between access points or junctions and applies to one line only. It is assumed that staff will normally remain within the

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four foot and not approach an adjacent line closer than the end of the sleepers of the protected line. The Published Area can normally coincide but may be slightly larger to provide clear limits. The Protected Area will be all train detection sections wholly or partially within the Published Area and apply to signalled routes only (overlaps may be set into the Protected Area since patrolling will not disturb the signalling).

For work, a safe system of work will normally require the line to be blocked to all train movements by the protection system. The Work Area is normally between access points or junctions and applies to one line only. It is assumed that staff will normally remain within the four foot and not approach an adjacent line closer than the end of the sleepers of the protected line. The Published Area can normally coincide but may be slightly larger to provide clear limits and will need to clearly state that the adjacent line is open to traffic. The Protected Area will be all train detection sections wholly or partially within the Published Area and apply to both signalled routes and their overlaps.

NOTE The nature of the work may require that signals may be cleared into or out of the Protected Area to enable testing, e.g. AWS magnets.

5.1.4 Junction Areas

With the exception of patrolling on a single running line, most work in a junction area is going to require staff to work in the four foot of both legs of a set of points and outside the four foot (e.g. to maintain a point operating mechanism).

The Work Area will normally be one or more ends of points including both track and signalling equipment. The Published Area will normally extend a short distance (typically a rail length) beyond the toes and crossing nose of the points and an equivalent distance on adjacent lines – due to the nature of the intended work a distance may be more appropriate than a physical feature. The Protected Area will be all train detection sections wholly or partially within the Published Area and apply to both signalled routes and their overlaps. However, depending on the layout, it may be acceptable to exclude some train detection sections based on the lie of points.

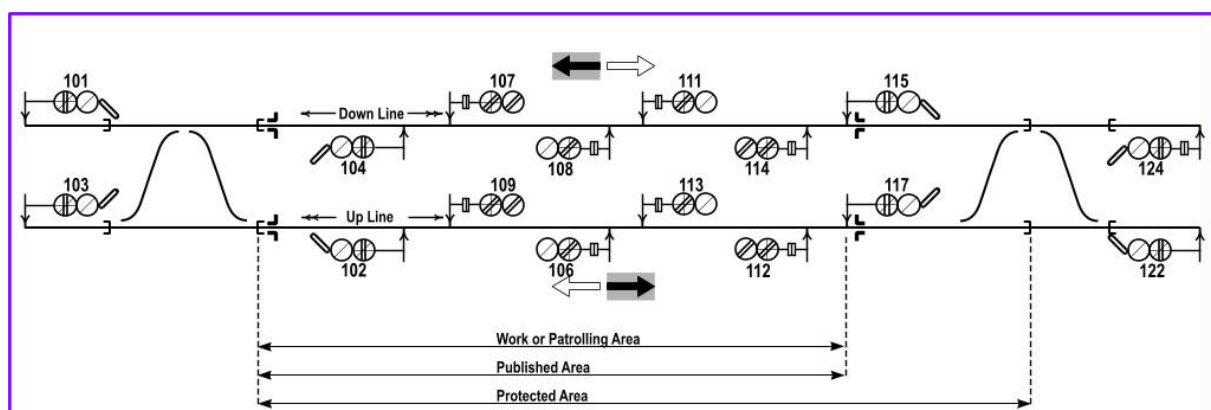


Figure 1 – Plain Line Sections (restriction of bi-directional signalling)

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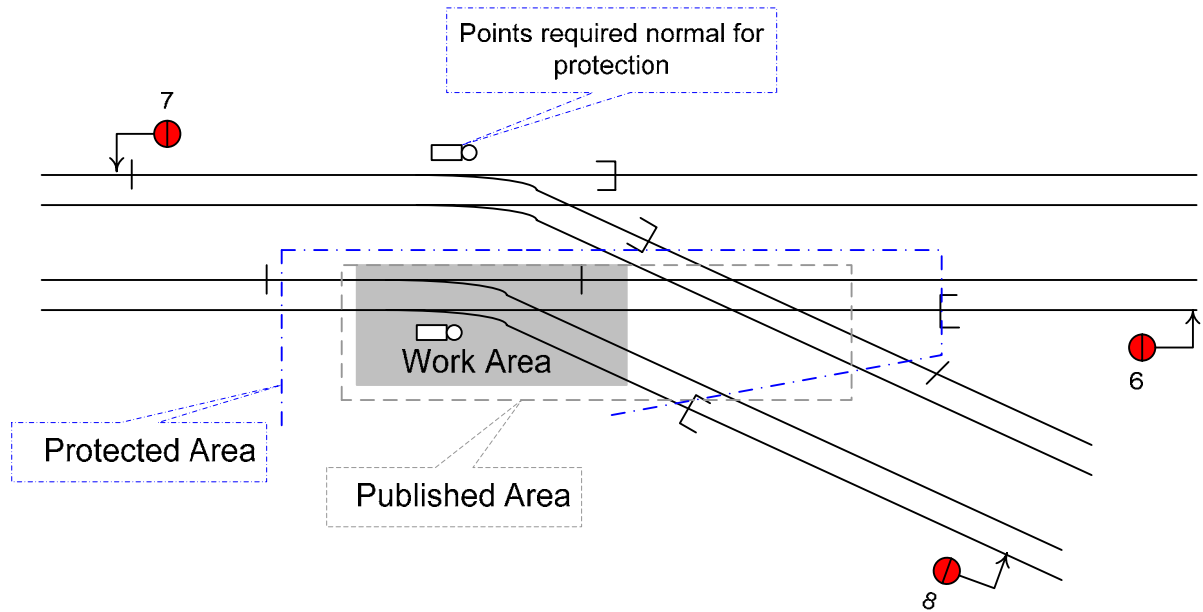


Figure 2 – Simple Junctions (example of work on a point end – e.g. FPL test)

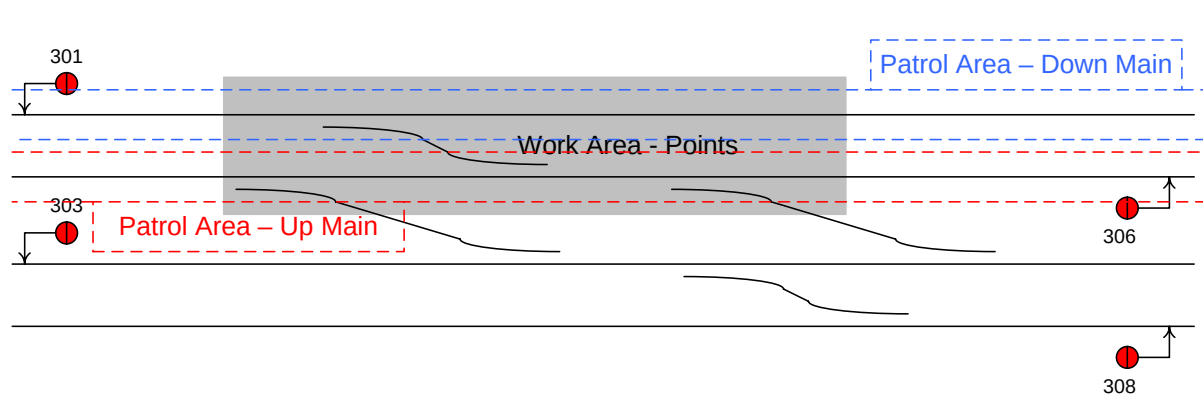


Figure 3 – Complex Junctions (example of overlaid areas)

5.2 Selection of system type

Where it is agreed to provide a fixed protection system for use by a Railway Undertaking to allow for routine/likely inspection/maintenance of vehicles or to access the track for other purposes then a captive key system – LOD(E) – shall be provided.

Where the maintenance organisation requests a facility to prevent all signalled movements into and out of a section to enable inspection and maintenance work (typically areas where red zone working is prohibited or at complex junctions) then one of the following systems may be utilised (supported by local instructions) to create a green zone:-

- A captive key system – LOD(K)
- A key enabled system – LOD(T)
- A fixed train detection interruption device or switch – LOD(D)

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On lines signalled for bi-directional running (normally those signalled for reduced capacity bi-directional signalling) then the maintenance organisation may request a system to inhibit the reverse direction for the purposes of patrolling. This request is normally made where it is not practicable to establish red zone working due to the need to provide lookouts for both directions. Where the request is made a key enabled – LOD(P) – may be provided.

NOTE Captive key systems provide a greater level of surety that other parties cannot cancel the protection in error than key enabled systems. Captive key systems are best suited where teams work in a small area and can easily return to the same instrument. Key enabled systems may be more appropriate if teams work in a larger area and it may be more convenient to have multiple devices.

NOTE Consideration should be given to the potential for multiple teams to be working in an area relying on the protection system for safety. An option to provide an external securing facility on the lockout device to enable multiple padlocks to be applied to secure the door should be considered.

5.3 Key Enabled Systems

The features of a key enabled system are:-

- a) A key is required to operate an instrument in the system,
- b) Co-operative application and removal of the protection between Authorised User and Signaller,
- c) Protection is implemented and retained within the signalling system,
- d) Any instrument within a system can be used to apply or remove a protection.
- e) More than one device may be provided on a system in order to allow an Authorised User to take the protection at one location and release the protection at a second location after walking through the Published Area.
- f) A key enabled system relies on clear understanding between the signaller and the Authorised User requesting protection. In order to prevent human error, an authority number should be issued by the signaller for each protection. The system relies on the signalling system to provide the protection and the signaller to only allow the original requester of the protection to remove the protection.
- g) The instrument shall be in a lockable housing and be associated with a fixed telephone.
- h) The instrument shall include a two-way key switch marked 'Normal' and 'Operate' – in the operate position the key shall be captive within the switch.
- i) Push buttons shall be provided to apply or release the protection which shall only function when the key is in the 'Operate' position.
- j) Indications, which may be incorporated into the push buttons, shall be provided which illuminate when the key is in the 'Operate' position.
- k) A clear, durable diagram showing the limits and scope of the protection system (the Published Area) shall be provided at the instrument.
- l) Procedures shall be in place such that, in the event of system failure, protections are reinstated where the interlocking does not record the granting of protection. Where possible, the interlocking should record the granting of