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Issue:	6
Date:	05/09/2015
Compliance date:	06/12/2015

Module

Bi-Directional Signalling with Automatic or Semi-automatic Signals

Endorsement and Authorisation

For endorsement, authorisation and issue record of this document, please refer to the SSI Applications Manual Contents, NR/L2/SIG/17002.

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User information

This Network Rail standard contains colour-coding according to the following Red–Amber–Green classification.

Red requirements – No variations, could stop the railway

- **Red requirements shall** always be complied with and achieved.
- Red requirements shall be presented in a red box **with the word “shall” or expressed as a direct instruction**.
- Accountability for the efficacy of red requirements lies with the Professional Head/Standard Owner.
- Red requirements are monitored for compliance.
- Corrective actions shall be enforced if deviations are discovered through functional checks (e.g. engineering verification visits, audit or Operations Self-Assurance).

Amber requirements – Controlled variations, approved risk analysis and mitigation

- **Amber requirements shall** be complied with unless variation has been approved in advance.
- Amber requirements shall be presented with an amber sidebar **and with the word “shall” or expressed as a direct instruction**.
- Accountability for the efficacy of these requirements lies with the Professional Head/Standard Owner, or their nominated Delegated Authority.
- Amber requirements are monitored for compliance.
- Variations **may** be permitted. Variations are approved by the Standard Owner or through existing Delegated Authority arrangements.
- Corrective actions shall be enforced if **non-approved** variations are discovered through functional checks (e.g. engineering verification visits, audit or Operations Self-Assurance).

Green – Guidance

- Guidance is based on good practice. Guidance represents supporting information to help achieve **Red** and **Amber** requirements.
- Guidance shall be presented with a dotted green sidebar **and with the word “should” (usually in notes) or as a direct instruction**.
- Guidance is **not mandatory** and is not monitored for compliance.
- Alternative solutions may be used. Alternative solutions do not need to be formally approved.
- Decisions made by a competent person to use alternative solutions should be backed up by appropriate evidence or documentation.

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Issue record

Issue	Date	Comments
5	April 2008	5 th Issue
6	05/09/2015	Clause 5.2.2 – error corrected

Compliance

This Network Rail standard is mandatory and shall be complied with by Network Rail and its contractors if applicable from 06/12/2015.

When this standard is implemented, it is permissible for all projects that have formally completed GRIP Stage 3 (Option Selection) to continue to comply with the issue of any relevant Network Rail standards current when GRIP Stage 3 was completed and not to comply with requirements contained herein, unless stipulated otherwise in the scope of this standard.

Reference documentation

[GK/RT0041](#)- “Absolute Block”, Issue 1, July 1997.

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1 Introduction

Data preparation for the features of bi-directionally signalled lines is generally covered by various chapters of [SSI8003-10](#) & [SSI8003-20](#), with Interlocking boundaries and AWS suppression on such lines being covered by [SSI8003-51](#) and [SSI8003-76](#) respectively. This document covers the inclusion of automatic or semi-automatic signals on such lines.

The following situations are dealt with:

- Section 3 covers a bi-directional section of line which has one or more automatic signals in both directions. Both non-biased and biased directional control of these signals is included.
- Section 4 covers a bi-directional section of line which has one or more automatic signals in one direction only. Just biased directional control of these signals is included.
- Section 5 covers the inclusion of an Interlocking boundary.
- Section 6 covers the inclusion of semi-automatic signals protecting a traffic type ground frame.
- Section 7 covers the inclusion of controlled signals in mid-section.

2 Applicable Signalling Principle Standards

The principles for the directional control of automatic or semi-automatic signals on bi-directionally signalled lines is included in [GK/RT0041](#) Section 5 "Principles of Operation", third paragraph. The wording of this paragraph has been queried with the Signalling Principles Group, and the Group has advised that they consider that this paragraph needs to be changed as follows:

Where there are automatic or semi-automatic signals for both directions, opposing signals shall only be clear for one direction at any one time. The clear direction may be selected by the operation of controlled signals or, where there is more than one signaller, by the operation of direction or acceptance controls.

Further guidance on precisely when this directional clearance control should be applied and removed was given in superseded [GS/ST 0068](#) Issue 1 Revision A "Bi-directional Lines - Control of Automatic or Semi-automatic Signals", Sections 3 & 4 as follows:

3 LINES REGULARLY USED FOR THE PASSAGE OF TRAINS IN BOTH DIRECTIONS

All intermediate signals shall normally be controlled to their most restrictive aspects.

The setting of a route up to the first such signal shall cause all signals in the sequence to clear (subject to other controls).

Intermediate signals shall again return to their most restrictive aspects after the passage of the train through the section(s) unless another route giving access to the section has been set or the original route is "working auto".

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4 LINES USED PREDOMINANTLY FOR THE PASSAGE OF TRAINS IN ONE DIRECTION, INCLUDING LINES SIGNALLED USING SIMPLIFIED BIDIRECTIONAL SIGNALLING

Intermediate signals which apply to trains in the predominant direction shall be controlled to their most restrictive aspect when a route is set in the opposite direction; they will then remain at their most restrictive aspect until the train has passed completely out of the bi-directional line section.

Intermediate signals which apply to trains in the non-preferred direction shall be controlled to their most restrictive aspect as described in section 3.

Section 3 of [GS/ST0068](#) minimises the occasions when automatic or semi-automatic signals are replaced to red by opposite direction route setting. Section 4 of [GS/ST0068](#) reduces the effect on traffic of route setting failures. These controls are considered best practice and thus have been adopted in this document.

3 Automatic Signals in Both Directions

3.1 Principles

For the principles defined in applicable Signalling Principle Standards see Section 2.

With the signals in the section being automatic, the arrangement of track sections can result in two trains legitimately occupying adjacent track sections. This can potentially overcome the standard enhanced track circuit bobbing protection applied to the release of sectional route locking if a track circuit bobs under the second train, thus this locking has to be reinforced. This reinforcement has to extend at least from the berth track circuit of the first automatic signal through to the track circuit beyond the overlap of the last automatic signal, inclusive, thus it normally extends between the berth track circuits of the controlled exit signals at each end of the bi-directional section.

The freeing of the reinforcing locking will require the prior sectional route locking, in the route(s) giving entry to the bi-directional section, free, plus all track sections within the reinforcing locking area clear for 15 seconds. However, the final track section in this direction is proved [clear for 15 sec., or clear dead & next track section occupied], thus confirming that the locking release is not delayed.

As the reinforcing locking overlays the standard locking, the setting of a route into the section will require both the opposing reinforcing locking and sectional route locking free.

This reinforcing locking provides the directional control on the automatic signals clearing. It also controls the direction arrow indications to the Signaller. Route light indications to the Signaller are controlled by the standard sectional locking.

3.2 Data

3.2.1 Additional identities

For each section of bi-directional line, the following additional identities are to be allocated. [tc1] and [tc2] are the track sections at each end of the area of reinforced

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locking, assumed to be the berth track sections of the controlled exit signals at each end of the section.

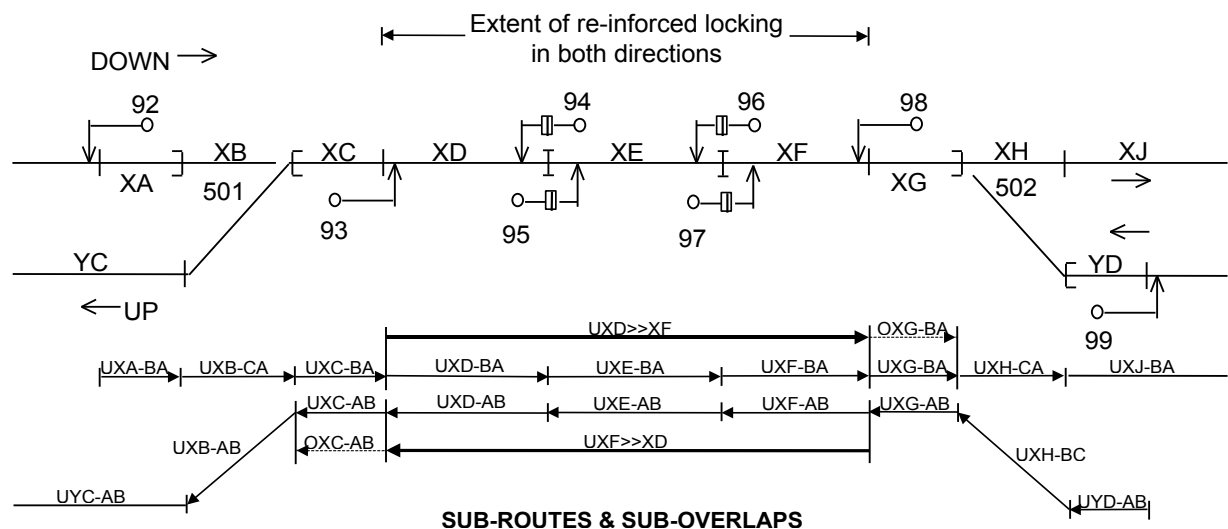
In the FLG file:

- Two long sub-routes, one for each direction, named U[tc1]>>[tc2] and U[tc2]>>[tc1].

In the ROU file:

- Two long route identities, one for each direction, similarly named R[tc1]>>[tc2] and R[tc2]>>[tc1].

In the IND file, the two direction arrow indication identities, one for each direction, are named after the sub-route for the berth track section of the exit signal at the end of the section, "I<exit signal berth track section sub-route (less U)>-D". Hence, with such a sub-route "UXF-BA", the indication identity will be named "IXF-BA-D".



3.2.2 Locking application and release

Ordinary (i.e. "standard") sub-routes are provided and are locked and freed in the standard manner. Additionally, the added "long" sub-routes overlay and thus reinforce the locking provided by the standard sub-routes. The added long route identities control the directional clearance of the automatic signals.

Where the directional clearing control of the automatic signals is not biased (see the next Section), a long sub-route is locked, and its associated long route identity set, whenever a route is set into the section in the direction to which it applies. The setting of a route into the section will require both the opposing long sub-route and the standard opposing sub-route, for the berth track section of the opposing direction section exit signal, free. Thus, using the figure above, the data in the PRR file for setting the routes from signals 92 & 99 will be: