

Ref:	SSI8003-79
Issue:	6
Date:	05/09/2015
Compliance date:	06/12/2015

Module

Special Signal Control

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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Published and Issued by Network Rail, 2nd Floor, One Eversholt Street, London. NW1 2DN.



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User information

This Network Rail standard may contain requirements that are colour-coded according to the following Red–Amber–Green classification.

Red – Mandatory requirements

- **Requirements** that **will** be complied with, and achieved under all circumstances.
- Accountability for the efficacy of these requirements lies with the Professional Head/Standard Owner.
- These requirements are monitored for compliance.
- Local non-compliances, discovered through engineering verification visits, will be reported and monitored through the quarterly Engineering Verification Report.
- Corrective actions will be enforced where local non-compliances remain open beyond the agreed mitigation plan dates.
- These are presented in a red box **and with the word “shall” or a direct instruction.**

Amber – Conditional requirements

- **Requirements** that **will** be complied with unless deviation has been approved.
- Accountability for the efficacy of these requirements lies with the Professional Head/ Standard Owner, or their nominated Delegated Authority.
- These requirements are monitored for compliance.
- Derogations **may** be permitted; which are to be approved by Standard Owner in advance.
- Derogations and Temporary Non-Compliances **may** be granted through the existing Delegated Authority arrangements.
- These are presented with an amber sidebar **and with the word “shall” or a direct instruction.**

Green – Guidance

- Guidance based on good practice; representing supporting information, based on good practice, to help achieve **RED** and **AMBER** requirements.
- This guidance is **not mandatory** and is not monitored for compliance.
- Alternative solutions may be used, which do not need to be formally approved.
- Decisions made by a competent person to use alternative solutions should be backed up by appropriate evidence/documentation.
- This is presented with a dotted green sidebar **and with the word “should” (usually in notes).**

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Issue record

Issue	Date	Comments
6	05/09/2015	Figure in Clause 3.2.1 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/RT0060	"Interlocking Principles", Issue 4, June 2003
GK/RT0041	"Track Circuit Block", Issue 1, July 1997
GK/RT0032	"Provision of Lineside Signals", Issue 2, February 2002
GK/RT0064	"Provision of Overlaps, Flank Protection and Trapping", Issue 1, December 2000
GK/RT0042	"Absolute Block", Issue 1, July 1997
GK/RT0051	"Single Line Control", Issue 1, August 1999
NR/L2/SIG/11201	Signalling Design Handbook
GK/RT0025	"Signalling Control Centres", Issue 2, October 2003

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1 Introduction

This document covers special controls required in signal aspects which are not dealt with in [SSI8003-10G](#) and [SSI8003-83](#). The included controls are covered under the following main section headings:

- 2 Proving of Signal Ahead Replaced
- 3 Tunnel and Viaduct Control
- 4 Overrun Detection
- 5 Override of Signal Lamp Proving
- 6 Closing Up Controls and Consecutive Single Yellows

2 Proving of signal ahead replaced

2.1 Principles

[GK/RT0060](#) Section C8.2.2 states:

The replacement of the signal ahead has to be "remembered" in order to allow for the two signals legitimately being cleared in reverse order. This "remembering" is cancelled when the first track section past the signal ahead is next occupied.

The control is effected by requiring the signal ahead either to be "on", or having been "on" at some point previously during the period since this track section was last occupied and cleared.

It should be noted that [GK/RT0041](#), Section 6, "Signal Controls" paragraph, fifth sentence states:

Where there is not prompt, automatic and guaranteed replacement of the signal aspect, the replacement shall be proved before the clearance of any block signal in rear.

However, this is referring to the replacement of the signal once the trigger conditions for replacement have been satisfied. It is not referring to a defined delay in establishing the trigger conditions for replacement such as occurs when replacement is typically delayed until the second track section beyond the signal is occupied or berth track cleared. Thus this is not extending the above Section C8.2.2 in [GK/RT0060](#) to apply to all main signals in rear of signals with delayed replacement.

2.2 Data

Data methods are already in place to prevent this problem occurring (see [SSI8003-10D](#) Section 1.2 and [SSI8003-51C](#) Section 1.5.7). However these methods do not use the above control, and thus wherever [GK/RT0060](#) Section C8.2.2 applies, the data for applying this control has to overlay, not replace, these methods.

2.2.1 Identities

An additional latch identity is required in the FLG file named "L<zz>(ON)S" where <zz> is the identity of the signal ahead. This "signal-ahead-on stick" latch is set whilst the signal ahead is on, and is unset when the track section ahead of the signal ahead becomes occupied or undefined with the signal ahead off.

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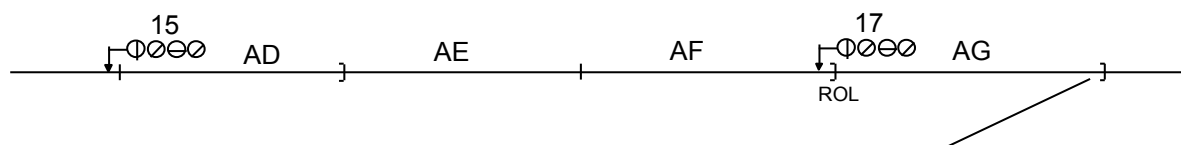
2.2.2 Simple Case

In the OPT file, the data for setting and unsetting the signal-ahead-on stick latch is located after, and in the same telegram as, the Output Telegram for Signal Special for the signal ahead. This data takes the form, where <xx> is the track section ahead of the signal ahead:

```
if S<signal-ahead> set r
then LS<signal-ahead>(ON) S s
else if T<xx> c then else LS<signal-ahead>(ON) S xs \
\
```

Also in the OPT file, in the aspect control data section of the Output Telegram for Signal Special for the signal (and route, if applicable) requiring the control, a test for the signal-ahead-on stick latch set is added.

A data example now follows.



NOTE In the diagram above, signal 17 is last-wheel replaced, thus signal 15 can clear for route 15(W) for a following train as signal 17 is replaced by the previous train. The aspect of signal 15 for route 15(W) therefore requires track sections AD, AE & AF all clear, signal 17 lit **and (signal 17 on, or having been on after track section AG last occupied and cleared)**.

In the OPT file, the following data is located after, but in the same telegram as, the Output Telegram for Signal Special for the signal ahead:

```
if S17 set r
then LS17(ON) S s
else if TAG c then else LS17(ON) S xs \
\
```

Also in the OPT file, the aspect control data for route 15(W) becomes:

```
if S15 set stick
TAD c , TAE c , TAF c
S17 set lp
LS17(ON) S s
. / ACD
```

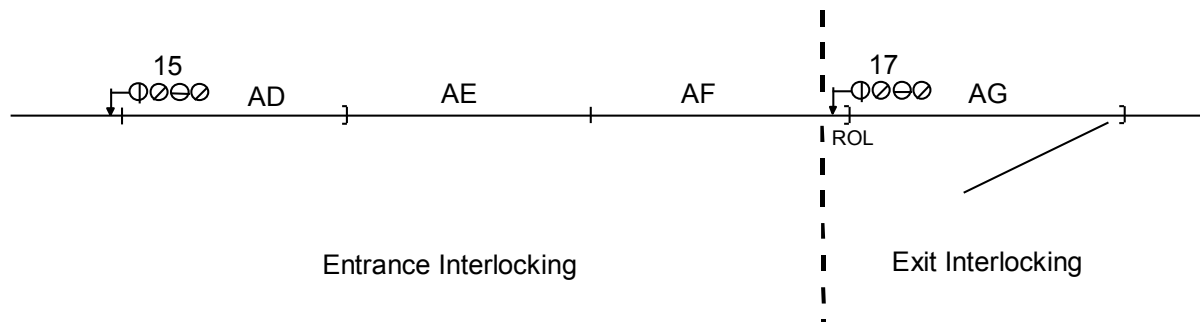
There is no need for this latch to be unset at start-up as the signal ahead will be held on at start-up anyway.

2.2.3 Cross-boundary Cases

Where an Interlocking boundary occurs between the two signals then the OPT file data controlling the state of the latch is provided in the Exit Interlocking, and is as shown in the Section above. A test for this latch set is then included in the aspect

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controls for the signal (and route, if applicable) requiring the control, as passed from the Exit Interlocking to the Entrance Interlocking.



When the Interlocking boundary comes between the signal ahead and the first track section beyond it, the data controlling the signal-ahead-on stick latch still has to be located with that of the signal ahead, i.e. in the Entrance Interlocking. The state of this track section being clear or otherwise has to be passed from the Exit to the Entrance Interlocking into a duplicate track section memory, as described in [SSI8003-51B](#).

The data in the OPT file for setting and unsetting the signal-ahead-on stick latch is located after, and in the same telegram as, the Output Telegram for Signal Special for the signal ahead. It will be the same as that shown in the Section above except that the duplicate track section memory for this track section will be tested instead. The test on this latch set will be included in the aspect controls for the signal (and route, if applicable) requiring the control as shown in the Section above.

3 Tunnel and Viaduct Control

3.1 Signalling Principles Standards

[GK/RT0032](#), Section B6.5 includes the following requirements:

Where practicable, stop signals shall be positioned to avoid the risk of a passenger train stopping in a hazardous location (e.g. on a viaduct or in a tunnel).

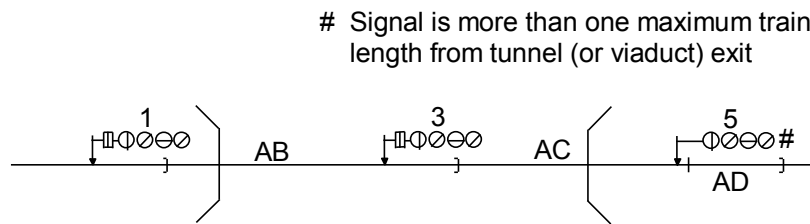
Where a signal is required at such a location, e.g. so as to maintain headway, signalling controls shall be applied to the previous signal so as to minimise the risk of a train being brought to a stand at such a location. Where two or more successive signal sections are affected by such controls, the headway is likely to be adversely affected.

Superseded Standard Signalling Principle [61](#) dated February 1991 "Stop Signals in Tunnels" Appendix A demonstrated these special controls. Although shown as just applying to tunnels, they can equally be applied to viaducts or any other location where it is undesirable to stop trains.

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3.2 One Stop Signal in Tunnel (or on Viaduct)

3.2.1 Principles



In the above diagram, the aim is to avoid, as far as reasonably practical, stopping trains at the signal in the tunnel. A special control is added to the aspect controls of the signal leading into the tunnel (the “tunnel-entry signal”). This control either proves that

there is no train ahead between the signal in the tunnel (the “mid-tunnel signal”) and the signal beyond the tunnel (the “beyond-tunnel signal”),

or,

if there is a train ahead, then it has (or will have if approach control is present) authority to proceed past the beyond-tunnel signal and thus can be reasonably expected to move and permit the following train to pass through the tunnel without stopping.

The special control is only applied at time of clearing of the tunnel-entry signal.

This control is not meant to cater for all types of failures. Thus if an unlit lamp in the beyond-tunnel signal will prevent the mid-tunnel signal from clearing, the special control will not prevent the tunnel-entry signal from clearing.

From the above, signal 1 requires:

track section AB clear, signal 3 alight

and

[at time of clearing only
(track section AC clear or signal 5 off #A)]

#A: or ready to clear when approach controlled

The #A option is provided if signal 5 is approach controlled for one or more routes of any class.

3.2.2 Data

This special control is added in the OPT file, in the Output Telegram for Signal Special aspect control data for the tunnel-entry signal. It takes the form:

```
( T<xxa> c , T<xxb> c
or S<beyond-tunnel signal> set <r
or S<tunnel-entry signal> set <r
)
```

<xxa>, <xxb>, etc. are the one or more track sections between mid-tunnel and beyond-tunnel signals. In the example above the aspect control data for signal 1, an automatic signal, becomes:

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```

if TAB c
  S1 set auto
  S3 set lp
  ( TAC c or S5 set <r or S1 set <r )
\

```

. / ACD

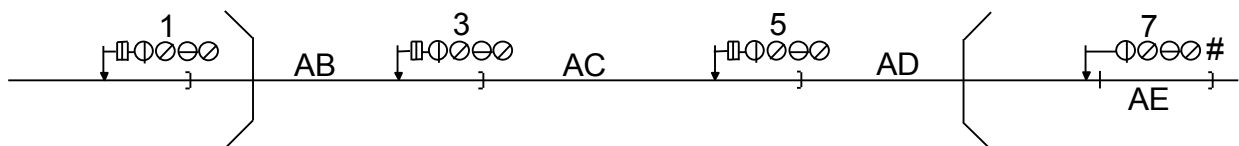
If the beyond-tunnel signal is approach controlled for one or more routes of any class, then for these routes the “S<beyond-tunnel signal> set <r” test becomes a “S<beyond-tunnel signal> set ascon” test, i.e. “S5 set <r” becomes “S5 set ascon” in the data example immediately above.

If an Interlocking boundary is present anywhere between the tunnel-entry signal and the beyond-tunnel signal, then the data tests for the special control still have to be included directly in the aspect control data. Thus any tests required in the special control not present in the Interlocking holding the former signal have to be passed across the boundary separately from any other aspect controls for this signal.

3.3 Two Stop Signals in Tunnel (or on Viaduct)

3.3.1 Principles

Signal is more than one maximum train length from tunnel (or viaduct) exit



In the above diagram, the aim is to avoid, as far as reasonably practical, stopping trains at either signal in the tunnel. The special control added to the aspect controls of the signal leading into the tunnel (the “tunnel-entry signal”), as used in the previous section, is expanded to cater for the additional signal in the tunnel. This control proves that:

- there is no train ahead between the first signal in the tunnel (the “first mid-tunnel signal”) and the signal beyond the tunnel (the “beyond-tunnel signal”),

or,

- if there is a train ahead, between the first and second mid-tunnel signals, then it has (or will have if approach control is present) authority to proceed past both the second mid-tunnel signal and the beyond-tunnel signal and thus can be reasonably expected to move and permit the following train to pass through the tunnel without stopping,

or,

- if there is a train ahead, between the second mid-tunnel signal and the beyond-tunnel signal, then it has (or will have if approach control is present) authority to proceed past the beyond-tunnel signal and thus can be reasonably expected to move and permit the following train to pass through the tunnel without stopping.

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