

SSI Applications Group

Approved Discussion Document

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Over-run Detection

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Approved by:

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This document forms SSIAG's guidance on this topic pending the production of an update to the relevant chapter(s) of the SSI Applications Manual.

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SSI Applications Group

SSIAG DIS138

Overflow Detection and Management

1. DOCUMENT STATUS

This paper was approved (subject to minor changes now incorporated) by the SSI Applications Group (SSIAG) on the 15th June. It has been amended to correct two minor errors in Section 6.11, and re-approved at the SSIAG meeting on the 17th August.

2. SCOPE

This paper contains data for controls and indications for track overrun detection and management from a VDU based Signalling Control System via a Solid State Interlocking.

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4. INTRODUCTION

Track overrun protection is provided so that when a train overruns a stop signal which protects an area of conflict, other stop signals protecting the same area are automatically placed or maintained at danger.

Network Rail requirements for track overrun are stated in NR/L2/SIG/30009/E420 Issue 1 Dated December 2010.

The preference is to provide Overrun Management within the Signalling Control System; until this method is developed, controls may be provided in SSI (as detailed in this paper). Some modifications will still be required to the Signalling Control System (see Appendix A for further details).

5. PRINCIPLES

The Overrun Management detailed in this paper consists of three stages-

1. Overrun/SPAD Detection
2. Reaction to a SPAD – replacement of signals
3. Post Overrun Management –resumption of control to the Signaller.

The Overrun/SPAD detection uses sequential controls to prove an unauthorised movement past a signal at danger.

The detection of an overrun is inhibited when the Signaller authorises the train to pass a signal at danger and has operated the control to inhibit the SPAD alarm.

Following the detection of an overrun –

- a) Protected routes (i.e. routes that would come into conflict with the overrunning train) that are not set will be prevented from setting.
- b) Protected routes that are set will be cancelled if the points are set such that the overrunning train will conflict with the route. This will be achieved, within the SSI, with equivalent controls to the route being manually cancelled. When the overrun management and detection system is fully integrated into the Signalling Control System it will cancel protected routes in a similar manner by generating a panel request to send to the SSI.
- c) The overrunning train will be monitored using point set controls (track controls to prove the position of the train within the overrun will not be provided). Movement of the facing points ahead of the overrunning train will result in further routes being cancelled, if the overrunning train will conflict with these routes.

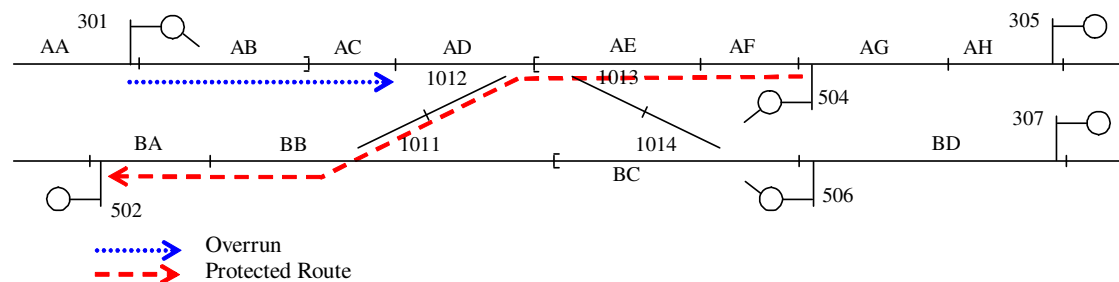
- d) Where Automatic Route Setting (ARS) is provided, the ARS sub-area(s) for the affected area are disabled.

Resumption of Signallers Control -

- a) The Signaller is prevented from requesting to resume control of the affected routes in a SPAD sub-area until four minutes after the overrun occurred.
- b) After four minutes has elapsed the Signaller may request to resume control.
- c) There is a further one minute 'cooling off' period before the affected routes and ARS sub-area(s) are returned to the control of the Signaller.

6. EXAMPLE OF SIMPLE TRACK OVERRUN

6.1 Controls



Route 504A will require protection against an overrun at signal 301. Sequential controls are provided to minimise the risk of signals having to be passed at danger as a consequence of failure of the overrun train detection equipment and to ensure an overrun is not registered when the train is proceeding away from the area of conflict.

A SPAD will be registered when a train passes the signal at red. Controls are required to ensure the test for overlap track section occupied with signal 'on' only takes place when the overlap track section first becomes occupied.

The detection of an overrun must be inhibited when the Signaller authorises the train to pass a signal at danger and has operated the SPAD Inhibit control.

After an overrun has been detected route 504A will be cancelled (if set) and prevented from being reset until the signaller resumes control. Also, where ARS is provided, the ARS sub-area that contains the SPAD signal 301 and the protected route 504A will be disabled.

The signaller is prevented from requesting to resume control until four minutes after the SPAD occurred. A separate timer is provided for each 'SPAD sub-area' – the SPAD sub-area is normally (but does not have to be) based on a SGRC area. If there are a limited number of timers in the interlocking available for this purpose it may be necessary for the SPAD sub-area to cover more than one SGRC. In this example the SPAD sub-area is named 'MNLN'.

After the SPAD sub-area timer has run for four minutes (i.e. an overrun in the SPAD sub-area has not been detected for four minutes), the signaller may request to resume control. A separate 'Resume Control' button (hit area) is provided for each SPAD sub-area. There is a 'cooling off' period of one

minute before the signaller may commence to set routes and re-enable ARS sub-areas.

The timer will be restarted if there is another overrun in the area within the time off period.

6.2 Identities

For each signal that is provided with overrun controls the following identities are required.

In the FLG file, the 'SPAD inhibit' latch, which is set when the Signaller operates the signal SPAD inhibit and will prevent a SPAD being registered within the interlocking. The latch will remain set until a cancellation request is processed. In this example - L301SPAD(INH).

In the FLG file, the 'SPAD priming' latch for the overrun signal, which is set when the berth track section is occupied with the first track section beyond the signal clear; and unset when the first track section beyond the signal is occupied or when the berth track section is clear. It is named after the track sections; in this example - LAA/AB-TZ.

In the FLG file, the 'signal SPAD' latch for each signal, which is set when a train occupies the first track section beyond the signal with the SPAD priming latch set and the signal 'ON'. The SPAD latch will remain set until the normal service has been resumed to the SPAD sub-area. In this example - L301SPAD.

In the QST file, a request identity to give the SPAD inhibit; in this example Q301SPAD(INH).

In the QST file, a request identity to cancel the SPAD inhibit; in this example QX301SPAD(INH).

In the BUT file, an identity for the SPAD Inhibit given; in this example B301SPAD(INH)F s.

In the BUT file, an identity for the SPAD Inhibit cancel; in this example B301SPAD(INH)FM s

In the IND file, a non-flashable identity for the 'SPAD Inhibit' indication; in this example I301SPAD(INH)

For each SPAD sub-area the following identities are required.

In the FLG file, the 'SPAD sub-area' latch, which is set when a SPAD is registered at one of the signals within the SPAD sub-area. The latch will remain set until the Signaller has requested to resume control and the timer has run for one minute. The latch is named after the SPAD sub-area; in this example - LMNLNSPAD.

In the FLG file, a 'SPAD sub-area timer' latch, which is set when the SPAD sub-area timer has run for 240 seconds. The latch will remain set until the Signaller has requested to resume control and the timer has run for one minute. It will also be unset if another overrun occurs within the timing off period. It is named after the SPAD sub-area name with a (240) suffix; in this example LMNLNSPAD(240).

In the FLG file, a 'SPAD sub-area resume control' latch, which is set when the Signaller requests to resume control. The latch will remain set until the SPAD sub-area timer has run for one minute. It will also be unset if another overrun occurs within the timing off period. It is named after the SPAD sub-area name with a (RES) suffix; in this example LMNLNSPAD(RES).

In the ELT file, a 'SPAD sub-area' timer, which is started when the SPAD occurs and after it has run for 240 seconds it is used to set the SPAD sub-area timer latch. It is also started when the Signaller has requested a resumption of service. This timer is used to reset the SPAD signal latch(es) after it has run for a 'cooling off' period of 60 seconds. It is named after the SPAD sub-area name; in this example EMNLNSPAD.

In the QST file, a request to resume control; in this example QMNLNSPAD(RES).

In the BUT file, an identity for the resume control; in this example BMNLN(RES)F.

In the IND file, a flashable identity for the 'SPAD sub-area' indication; in this example IMNLNSPAD.

6.3 SPAD Inhibit Panel Requests

The Signalling Control System will generate a panel request to the interlocking when the Signaller operates the SPAD Inhibit Short or SPAD Inhibit Long. A cancellation request will be generated when the SPAD Inhibit is cancelled by the signaller. A cancellation request will also be generated when the SPAD Inhibit Short has been selected and a train passes the signal at danger or a length of time has elapsed. Generally, a SPAD Inhibit control will be provided for each signal in the interlocking that has overrun controls but, where required by Network Rail, a SPAD Inhibit may be provided for a group of signals.

```
*Q301SPAD (INH)          L301SPAD (INH) s .
```

```
*QX301SPAD (INH)         L301SPAD (INH) xs .
```

6.4 Overrun Detection Data

In the IPT file, the following data is provided. In order to minimise response times, this data is to be allocated in the telegram holding the input data for the first track section beyond the overrun signal.

```
*I02

"TAB 0

if ( TAA c or L301SPAD (INH) s )          / SPAD Inhibit (a)
then LAA/AB-TZ xs
else if TAB c then LAA/AB-TZ s \          / set priming latch
\

if LAA/AB-TZ s , TAB o
then LAA/AB-TZ xs
    if S301 set r
    then L301SPAD s          / overrun detected at signal 301
        @LMNLNSPAD (DET)    / see section 6.6
        S504 set bpull      / protected route cancelled (b)
    \
\

. / end of tgm 02
```

- (a) The SPAD priming latch will be set if TAA is undefined, e.g. due to loss of communication cross-boundary or with the TFM.

Generally, a SPAD inhibit latch is provided for each signal that has overrun controls but where a SPAD inhibit latch is provided for the SPAD sub-area L301SPAD(INH) will be replaced with LMNLNSPAD(INH).

- (b) Any other controls in signal 504 button pulled request (QXS504) should be included. For example, where axle counters are provided the axle counter latches will need to be unset here i.e. LS504(RR)I and LS504(RR)S.