

SSI Applications Group

Approved Discussion Document

DIS180

Problem with Obsolescent Horizontal Boundary Data

Issue 1

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

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Cover Sheet



Documents

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1. Document Status

This document has been prepared for the SSI Applications Group (SSIAG). Draft 1 was approved for generic use at the SSIAG meeting of 22nd May 2013, subject to minor amendments included in issue 1.

2. Table Of Contents

1.	DOCUMENT STATUS.....	2
2.	TABLE OF CONTENTS	2
3.	PURPOSE.....	2
4.	INTRODUCTION	2
5.	SSI8003-54 COMPATIBILITY CHECKS.....	4
6.	DATA SOLUTION A.....	5
7.	DATA SOLUTION B.....	6
8.	CONCLUSION.....	7

3. PURPOSE

This document has been produced to consider data solutions to address a problem encountered with the obsolescent data method for horizontal boundaries shown in SSI8003-92 when used with SSI fixed program version D4 or later.

4. INTRODUCTION

A problem occurred on one of the Paddington workstations when the signaller attempted to set a route over a crossover reverse through a horizontal boundary. The second half of the route set in the exit interlocking, but the first half of the route in the entrance interlocking did not set. The signaller was unable to cancel the second half of the route, or to get the full route to set by restroking it.

The cross-boundary SSI data at Paddington is written in accordance with the method shown in SSI8003-92 “Obsolescent Data”. This method has identities for the crossover points in both entrance and exit interlockings, with the point locking being shared between the two interlockings: the points are not allowed to move unless the locking is free in both interlockings. In this case, the entrance interlocking was the “slave” interlocking that only controls a duplicate point identity, while the exit interlocking was the “master” interlocking that controls both ends of the crossover points. The state of point detection is copied across from the master to the slave interlocking.

When setting a cross-boundary route, the necessary locking conditions are first tested in the entrance interlocking, and then a request sent across to the exit interlocking. The exit interlocking tests the necessary locking conditions in its area, and if suitable the exit half of the route is set and points called. The exit interlocking will then send an acknowledgement back to the entrance interlocking, which should set its half of the route, and call its points. In this particular case, it would appear that the acknowledgement got lost (possibly due to noise corrupting the internal datalink message). The result was that the second-half of the route set in

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the exit interlocking, with the crossover points being controlled reverse, but the first half of the route in the entrance interlocking remained unset, with the duplicate point identity in the entrance interlocking still set to “controlled normal”.

Note that if the acknowledgement request had been received and processed by the entrance interlocking, then a latch would have been unset that would trigger the process for cancelling the second-half of the route in the exit interlocking. Normally this process would wait until the route is cancelled in the entrance interlocking, but if the route should fail to set in the entrance interlocking for any reason (e.g. because the route is no longer available by the time the acknowledgement is returned) then the cross-boundary route-cancellation process should be triggered immediately. Unfortunately, because the acknowledgement request was not processed by the entrance interlocking, the latch that would normally trigger the cross-boundary process to cancel the second-half of the route was never unset.

As noted above, when the second-half of the route was set in the exit interlocking, the crossover points were called reverse. When the crossover points made reverse detection, this was then copied across to the entrance interlocking, and stored in the duplicate point identity there. The duplicate point identity in the entrance interlocking was therefore set to “controlled normal” but “detected reverse”.

Following an incident at Newcastle, when a set of points were called one way and then immediately called back, and a signal cleared momentarily while the points were motoring, an additional safeguard was added into the SSI fixed programme at version D4 and subsequent versions. This results in a set of points being locked if they are controlled one way but still detected the opposite way, to give the detection inputs time to break before the points can be controlled back to their original lie. This ensures that a signal cannot be cleared through the points controlled and detected in their original lie, where the detection is based on out-of-date information.

In the situation described above, with the duplicate point identity “controlled normal” but “detected reverse”, this “Newcastle locking” came into effect: the duplicate point identity became locked normal. This blocked any further attempts by the signaller to set the route over the points reverse, while attempting to cancel the route by “pulling the entrance button” had no effect as there was no route in the entrance interlocking to cancel. The signaller was unable to key the points normal, due to the route locking in the exit interlocking, and keying them reverse also had no effect as they were locked normal in the “slave” interlocking. The only way out was either to wind the points by hand (breaking the point detection would release the “Newcastle locking”), or to reboot the entrance interlocking (which would trigger the process for cancelling the second-half of the route).

Note that “Newcastle locking” is usually over-ridden when points are keyed. However, when using data written in accordance with SS18003-92, the over-ride only applies to “Newcastle locking” applied in the “master” interlocking. In the “slave” interlocking, the duplicate point key memory is always set to “key centre”, and hence the “Newcastle locking” cannot be over-ridden.

Prior to introduction of Smartlock, the Paddington interlockings used the following versions of the SSI fixed-program: