



Resetting Axle Counters

Applicability

ARTC Network Wide		Western Jurisdiction		New South Wales	✓	Victoria	
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Audience	Main Points	Change History
Signal Engineers	Sweep Train for Resetting	Previously Draft Signal Eng Instruction ESI-06-02N
Design Engineers	Special Proceed Authority	
Test Engineers	Aspect Restriction	
Project Managers		

Introduction

ARTC is implementing axle counters for rail vehicle detection purposes as an alternative to track circuits. These have advantages in the reduction of glued insulated joints in points in high train tonnage areas. The axle counter has a significantly different mode of operation in failure scenarios to the track circuit. Alternate processes for resetting need to be applied. This document details the Reset Procedure requirements arising from the technical evaluations and Risk Workshops.

Failure Modes

There are a number of failure modes associated with the use of axle counters over points in lieu of track circuits. Note that different situations will arise for axle counters over long track sections and these will be dealt with separately.

- 1 – System operational with different count and last count was out of section.
- 2 – System operational with different count and last count was into section.
- 3 – System not operational and power restart.

Reset Requirements

The Reset requirements require a combination of Operations rules and Technical interfaces. The overall objective is to ensure that the section is clear before the system is reset to clear. The equipment has the following functions:

Reset – a remote reset input to set the axle counter to clear.

Pre-reset – a local pushbutton on the equipment which can be operated in association with the Reset input.

Sweep – a logical function which after a reset function looks for a balanced axle count in and axle count out before restoring to clear and normal operation.

Aspect Restriction – this entails not permitting the aspect to show a proceed indication, when the route is set. However, track locking of points is released, which permits the points to be swung to an alternate path for the next train after the failure initiating the reset requirement. The aspect restriction only applies to the signal section of a route and not to an overlap of a signal route.

Reset operations will need to be different for the various Failure Modes because each of these presents a different set of risks.

Failure Mode 1 – Conditional Reset Process for last count out. Signaller/Area Controller controlling the section will communicate with the last train to cross the section and verify that the train is complete. Signaller/Area Controller will operate the Reset function for the specific axle counter section. See the

Issued by	Date
John Cowie, Manager Standards & Systems	08 Nov 2006

technical requirements for the reset function. This will release the track locking associated with the track section. The Reset function will also provide an aspect restriction to prevent the signal clearing, however, the points will be able to be moved and routes across the section will be able to be set. The Signaller/Area Controller will need to confirm to the train driver that the route is set, points locked and to proceed past the red signal up to the next signal and prepared to stop clear of any obstruction. The passage of the train into and out of the track section will complete the Reset Process and the track section will operate normally after this action.

Failure Mode 2 – Conditional Reset Process for last count in (infrequent event). Signaller/Area Controller controlling the section will communicate with the last train to cross the section and verify that the train is complete. The Signalling Technician will confirm from observation as reasonably possible that there is no train in the track section. The Signalling Technician will ask the Signaller/Area Controller to confirm that he has verified that the last train through the section was complete. The Signalling Technician will operate the Pre-reset button on the axle counter module. Signaller/Area Controller will operate the Reset function for the specific axle counter section. See the technical requirements for the reset function. This will release the track locking associated with the track section. The Reset function will also provide an aspect restriction to prevent the signal clearing, however, the points will be able to be moved and routes across the section will be able to be set. The Signaller/Area Controller will need to confirm to the train driver that the route is set, points locked and to proceed past the red signal up to the next signal and prepared to stop clear of any obstruction. The passage of the train into and out of the track section will complete the Reset Process and the track section will operate normally after this action.

Failure Mode 3 – Conditional Reset Process for power up. Signaller/Area Controller controlling the section will communicate with the last train to cross the section and verify that the train is complete. The Signalling Technician will confirm from observation as reasonably possible that there is no train in the track section. The Signalling Technician will ask the Signaller/Area Controller to confirm that he has verified that the last train through the section was complete. The Signalling Technician will set power up for the axle counter module. Signaller/Area Controller will operate the Reset function for the specific axle counter section. See the technical requirements for the reset function. This will release the track locking associated with the track section. The Reset function will also provide an aspect restriction to prevent the signal clearing, however, the points will be able to be moved and routes across the section will be able to be set. The Signaller/Area Controller will need to confirm to the train driver that the route is set, points locked and to proceed past the red signal up to the next signal and prepared to stop clear of any obstruction. The passage of the train into and out of the track section will complete the Reset Process and the track section will operate normally after this action.

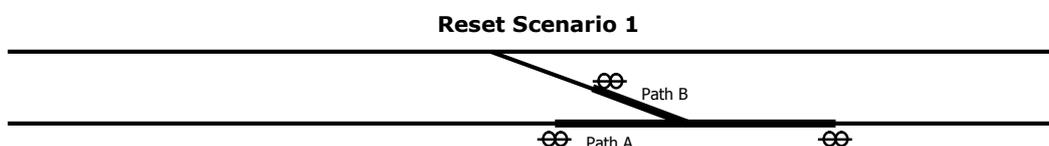
Reset Technical Requirements

The remote signallers reset will operate through a switch on the control panel or a function on the signal control system VDU. Control panel switches shall be rotary spring action switches restoring to normal position. The VDU interface shall have a general reset function which enables the specific options for the signaller to select the specific track section axle counter to be reset. The output shall operate a stick function in the signalling for each path over the axle counter section. The stick function shall operate the reset input to the axle counter section and apply an aspect restriction to each route or path over the track section. The respective stick function shall return to normal after one train movement (sweep train) over its respective track section. A bidirectional path is only required to have a sweep train pass over it in one direction.

Sweep Function and Aspect Restriction

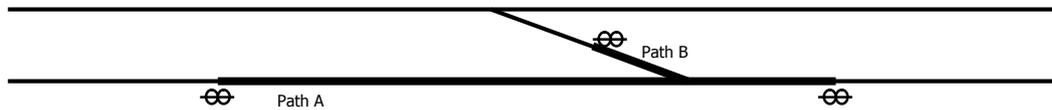
Where an axle counter section is over a section of track (without turnouts), only one sweep train is required. This may be in either direction. Where the axle counter section is over a set (or sets) of turnouts with two or more paths then a separate stick function may be required for the aspect restriction for each separate path (unidirectional or bidirectional). The respective aspect restriction shall only be released after a sweep train movement over the respective path.

The following scenarios define the clearance of the aspect restrictions for specific sweep trains. The signalling design shall be implemented to achieve these requirements.



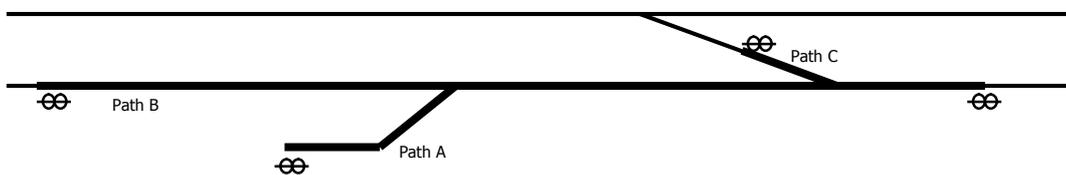
The axle counter heads are located at the clearance point for the turnout. In this case, a sweep train over one path will also confirm that the other path is clear. Only one stick function is required

Reset Scenario 2



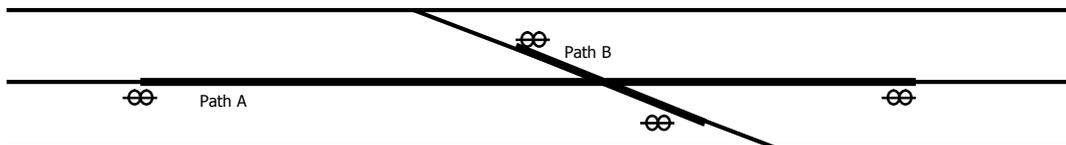
The axle counter heads are located such that path A extends beyond the clearance point for the turnout. Separate stick functions are required for each path. A sweep train on path A will also clear path B. However, a sweep train on path B shall clear path B only.

Reset Scenario 3



This has an axle counter section over multiple sets of turnouts with paths A, B and C. Axle counter heads for paths A and B are beyond the clearance point for the turnouts. Separate stick functions are required for each of the three paths. Path C is cleared by a sweep train over paths A or B or C. However, Paths A and B shall require a sweep train over the respective path.

Reset Scenario 4



This has an axle counter section over a diamond crossing or two turnouts with two paths. The axle counter heads for path B are at the clearance point for the turnouts/diamond crossing. Separate stick functions are required for each of these paths. Path A is cleared by a sweep train only on path A. Path B is cleared by a sweep train on either path A or path B.

Design of Track Sections

The design of axle counter sections should be based on the operational needs for train movements and not on requirements for sweep trains during reset. However, the position of axle counter heads for point sections, should be close to the clearance point of the diverging paths of the point where possible. Preference should also be given to having a single point in an axle counter section where possible to minimise the number of paths through the axle counter section.