

TECHNICAL INSTRUCTION

TI 038
Issue 4
16/04/2010
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NETWORK RAIL - SIGNAL ENGINEERING Point Control and Detection Circuits

Relevant Standard: NR/GN/SIG/11600, Part P

Purpose

Point control circuits have varied between locations and technologies. This instruction clarifies the core requirements for the design of point control and detection circuitry. This applies to all types of point mechanism and interlocking technologies.

This instruction also identifies the rules for the use of dc detection circuits in areas of, or in proximity to, dc traction.

Definition

Object controller – an electronic interface to a computer-based interlocking designed to interface directly, or indirectly, to trackside equipment.

Traction immunity area – for ac traction, areas within 5km along the line of route or within 800m proximity of an ac electrified line should be considered to be at risk from ac interference. For dc traction, areas within 800m along the line of route should be considered to be at risk from dc interference.

Changes from Issue 3

Typical Circuits for the control and detection of points have been published supporting these principles which have been extended to cover dc traction and immunity areas. These sheets are in the series T25xxx with T25000 and T25001 providing a “road map” to the sheets. Please note that the sections and associated notes have been renumbered.

Policy

The following principles will be applied to all new or altered installations.

1. All detection elements of the point mechanism shall be monitored by separate detection circuits which shall not include cross proving or correspondence with the control circuits.
NOTE 1 dc detection circuits are permitted in dc traction and immunity areas on condition that a minimum of 2 separate detection elements are associated with each end.
NOTE 2 A clamp lock mechanism including the two detection assemblies shall be treated as one detection element except in dc electrified areas where there is no other detection element associated with the end, in which case each clamp lock mechanism must be detected independently.
NOTE 3 This requirement does not apply where the mechanism incorporates electronic integration of the detection system, e.g. HPSA.
NOTE 4 The detection of lever position associated with mechanically operated points can be regarded as a separate detection element.
NOTE 5 Detection may be either by relay circuits (one pair of relays per detection element) or separate inputs to an object controller (e.g. SSI TFM).

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PUBLISHED UNDER NR/L2/SIG/11120

2. Four wire detection circuits shall be used.

NOTE 6 The circuit shall consist of separate, double cut circuits for normal and reverse.

NOTE 7 Where an object controller with secure coding is used, the four wire detection circuit may be combined into a two wire, pole change input to the object controller provided the remainder of the circuit is four wire.

3. The detection feed circuits for a detection element shall be disabled if the element is detected in both positions simultaneously.

NOTE 8 This provides protection against interference in one circuit.

NOTE 9 Where relay circuits are used, this may be achieved by arranging two contacts in series across the supply to rupture the fuse.

4. Control feeds to the mechanism shall be double cut and utilise independent active circuits.

NOTE 10 Where relays and contactors are used to control the mechanism, double cut front contacts must be utilised to initiate each element of the mechanism (this includes the solenoid valve in a clamp lock).

NOTE 11 Where an object controller controls the mechanism, a common, uncontrolled return may be used subject to the object controller being able to detect an unauthorised voltage on an output.

5. The feed to the mechanism shall be removed as soon as the desired position is obtained.

NOTE 12 Where contactors are utilised, their feed shall be removed when detection is achieved on all detection elements associated with an end.

6. The interlocking shall prove that all detection elements are in the correct position (including opposite position not detected).

NOTE 13 For relay detection circuits, this shall consist of all correct detection relays energised and opposite detection relays de-energised.

NOTE 14 For object controller monitored detection, both presence of correct detection and absence of opposite detection must be continually monitored.

NOTE 15 Where relay contacts are used in the input circuit to SSI TFMs, the number of contacts should be minimised and not exceed 3 through the use of relays to combine multiple contacts.

7. Each end shall be separately monitored by the interlocking and separately indicated to the signaller.

NOTE 16 This requirement shall not apply for S&C renewals or simple upgrades of the point operating mechanism unless reasonably practicable. The cost of extending individual detection from the local control point to the interlocking or signalbox may be excessive.

NOTE 17 Except for simple renewals, the detection of multiple ended sets of points shall, as a minimum, be separate as far as the interlocking and not combined on site.

8. The interlocking shall prove that there is no feed to the mechanism for the non-required position.

NOTE 18 For relay controlled points, this shall include down proving of contactors in the detection circuit to the interlocking.

NOTE 19 Where an object controller drives the mechanism directly, the object controller shall prove the feed de-energised before reporting detection to the central interlocking.

9. Where intermediate relays are used, the detection circuit shall cross prove the opposite intermediate detection relay.

NOTE 20 Separate power supplies shall be used for the repeating of the control and detection circuits from the intermediate location.

10. The signaller's indication shall only display detection when it corresponds with the interlocking required position for the points.

NOTE 21 Since the signaller may rely on the detection indications to authorise a train movement, it is important that the interlocking is not seeking the points in the opposite position if a fault was rectified or another condition was satisfied.