AUSTRALIAN RAIL TRACK CORPORATION LTD

Discipline: Engineering (Signalling) **Category: Procedure**

Facing Point Lock and Detection Testing

ESM-06-01

Applicability

ARTC Network Wide	✓	**CRIA (NSW CRN)**	✓

Primary Source

NSW Standards SMP 28, SMP 29, SMP 30

Document Status

Version	Date Reviewed	Prepared by	Reviewed by	Endorsed	Approved
1.2	13 August 2010	Standards	Manager Standards	Exec Manager SS&P 25/06/2010	CEO

Amendment Record

Version	Date Reviewed	Clause	Description of Amendment
1.0	18 December 2007		First issue. Supersedes NSW Standards SMP 28 v1.2, SMP 29 v1.2, SMP 30 v1.2
1.1	7 October 2009		Disclaimer updated as per Risk & Safety Committee 14/09/2009
1.2	25 June 2010		Residual NSW standard SMP 30 retained. ESM-06-01 partially supersedes SMP 30.
1.3	13 August 2010	All	Issued as final.

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1 Points Detection Test: Separate Electrical

1.1 General Procedure

In routine testing of points detection, the Signal Maintainer carrying out the tests shall liaise with the train controller so that testing is conducted without detriment to safety or train working. The Network Controller is to place affected controlled signals at stop before the testing is allowed to commence.

Where electric points machines are involved, the Signal Maintainer carrying out the tests shall use the Emergency Switch Machine Lock or Emergency Operations Lock or Plug Connector and Key arrangements, where available, or arrange for the signals protecting the points concerned to be otherwise securely maintained at stop during testing.

Where Emergency Switch Machine Locks or Emergency Operations Lock arrangements are used, the signals protecting the points concerned must first be placed at stop and approaching trains brought to a stand before the Plug Connector is disconnected or the Emergency Switch Machine Lock or Emergency Operations Lock keys are taken.

Where the Emergency Switch Machine Lock, Emergency Operation Lock or Plug Connector and Key arrangements are not being used and adjustment is required, the signals protecting the points are to be booked out of use for traffic movements in accordance with the Safe Working Rules before commencing adjustment.

Where the detection contacts cannot be made or broken during tests, such as in the case of sealed detector contacts, connect a voltmeter across the circuit wires from the detector to monitor the test.

The aim is to adjust detection to be just made at 4mm switch opening and broken at 6mm switch opening.

Detection shall be broken and detector contacts visibly open with a switch opening of 6mm.

Note: that where sealed contacts are used (e.g. ML Detectors) detection shall be verified electrically open and contacts changed over with a switch opening of 6mm. For other types of detector contacts that are not visible, the detection shall be verified to be electrically open at 6mm switch opening.

Back drive detectors, where fitted should be adjusted to be broken at 8mm switch opening (at the back drive detector) and made with a switch opening of 6mm (at the back drive detector).

For combined detection of switches and mechanical facing point locks, ensure that detection does not make until the FPL plunger engages the lock rod by at least 35mm.

Note:

With trailing points it is permissible to increase the detection 6mm limit up to 8mm under certain circumstances as follows:

- *This increased limit is necessary to avoid failures and delays to traffic.*
- *There is no signalled moved through the trailing points in the facing direction.*
- *There is no reversing move where part of the train would set back through the points in a facing direction.*
- *The condition causing the inability to obtain reliable detection at the lower limits is to receive attention to correct the problem.*
- *The approval of the ARTC Executive Manager Standards & Systems or nominated representative is obtained.*
- *A record is kept of such arrangements in the Signal Maintenance Engineer's Office.*
- *Approval is to be sought using an Engineering Waiver.*

On single blade catchpoints, detection of the open switch position, usually the normal position, may be coarsely adjusted to make at about 13mm, measured from the switch stop, i.e. with the points open at least 100mm

2 Facing Point Lock Testing - Mechanical

2.1 General Procedure

Facing point locks shall be periodically tested to ensure reliable operation of the points and that with the lock engaged the switches are held within 3.2mm of the running face of the stock rail, and to ascertain if the slide chairs in the vicinity of the points have worn, or the stock rails have worn, or the track gauge has varied.

The lock plunger travel is to be 200mm, except in the case of double lock plungers worked by one lever, where travel is 175mm. When the lock plunger is withdrawn the clearance between the end of the lock plunger and the slotted lock rod or locking rod block is to be 20mm.

When gauge testing a 3.2mm gauge shall be used and the lock shall be maintained sufficiently tight to ensure that the movement of the F.P.L. lever cannot be completed with the gauge inserted between the point switch and the stock rail in line with the stretcher at the toe of the points. The switch shall be operated by means of the lever in the interlocking machine. When the F.P.L. locks the points both ways, each switch shall be tested.

The signalling maintainer shall confirm that the track is to gauge at the points, looking for signs of excessive wear or movement of the track that would affect the safe or reliable operation of the points equipment.

The signalling maintainer shall notify the Infrastructure Manager or nominated representative of any undue movement or wear of the track at the points and request rectification of same. This shall also be recorded into the Defect Management System or other nominated system to record the issue and request for rectification work. The priority or time to correct should also be recorded.

In routine testing of facing point locks and point detection, the signalling maintainer carrying out the tests shall liaise with the network controller so that testing is conducted without detriment to safety or train working.

The signalling maintainer carrying out the tests shall arrange for the signals protecting the points concerned to be securely maintained at stop during testing.

Where adjustment is required the signals protecting the points are to be booked out of use for traffic movements in accordance with the Safe Working Rules before commencing adjustment.

2.2 Adjustments

If, during testing under normal operation, the switches do not fit up hard against the stock rail with some spring then the points drive may need adjustment.

If, during testing under normal operation, the facing point lock plunger is tight with the point switch blades fitting hard up against the stock rail then the points may need adjustment.

If, during gauge testing it is found that the facing point lock lever can be put fully home with the gauge between the point switch and stock rail, then adjustment is necessary.

Before adjustment, ensure that there is no movement due to loose F.P.L. casting or movement of stock rail or chairs.

Adjustment shall be immediately made as follows:

- Loosen the two bolts at the joint in the lock rod, sufficiently to allow the disengagement of the serrations. Adjust the lock rod bar accordingly and re engage the serrations at the required new position. Tighten the bolts.
- If the required adjustment is 3.2mm or less, or if the lock rod is of the non serrated type, shims shall be used.
- If the extent of wear is such that a properly adjusted lock cannot be obtained, the worn fittings shall be replaced.

3 Facing Point Lock and Detection Testing – Combined Point Machine

3.1 General Procedure

All point machines shall be periodically tested to ensure reliable operation of the points and that, with the facing point lock engaged the switches are held within 3.2mm of the running face of the stock rail, and to ascertain if the "slide" chairs in the vicinity of the points rodding have worn, or the stock rails have worn or the track gauge has varied.

The signalling maintainer shall confirm that the track is correct to gauge at the points, looking for signs of excessive wear or movement of the track that would affect the reliable operation of the points equipment. The gauge at the switch blades shall be between 1431mm and 1440mm. Measurements outside these ranges shall be reported as defects.

The signalling maintainer shall notify the Infrastructure Manager or nominated representative of any undue movement or wear of the track at the points and request follow up rectification. This shall also be recorded into the Defect Management System or other nominated system to record the issue and request for rectification work. The priority or time to correct should also be recorded.

In routine testing of facing point locks and point detection, the signalling maintainer carrying out the tests shall liaise with the network controller so that testing is conducted without detriment to safety and train working. The train controller is to place affected controlled signals at stop before the testing is allowed to commence.

The signalling maintainer carrying out the tests shall either use the ESML or EOL arrangements where available, or arrange for the signals protecting the points concerned to be otherwise securely maintained at stop during testing.

Where ESML or EOL arrangements are used, the signals protecting the points concerned must first be placed at stop and approaching trains brought to a stand before the ESML or EOL keys are taken.

Where ESML or EOL arrangements are not being used and adjustment is required, the signals protecting the points are to be booked out of use for traffic movements in accordance with Network rules and procedures before commencing adjustment.

3.2 Facing Point Lock

The points shall be operated both normal and reverse to see if the switches fit hard up against the stock rail and if the point lock plunger enters and withdraws from the notch freely and with sufficient clearance. If there is a failure in the tests then adjustments shall be made in accordance with the manufacturer's equipment manual.

The manual testing of the facing point lock shall be undertaken without inducing switch roll. If switch roll is induced, then the test is null and shall be repeated. The switch shall be moved away from the rail face before repeating.

The lock shall not enter with a switch opening of 3.2mm but shall enter with a switch opening of 2mm.

The facing point lock test shall be carried out using gauges for openings of 3.2mm and 2mm between the stock rail running face and the switch at a position approximately, and not more than, 75mm back from the tip of the switch.

3.3 Detection

The standard setting for points detection is expressed as detector contacts "just made at 4mm" and "visibly open at 6mm".

This means that the detection contacts will be electrically made (not necessarily fully compressed) at a 4mm switch opening.

"Visibly open at 6mm" means that, at a 6mm switch opening, detector contacts of the type which can be seen are to be clearly broken (i.e. by not less than 1mm) even though the contact drive may not have fully completed its stroke.

For sealed micro-switch contacts, at a 6mm switch opening the detector normal (or reverse) contacts are to be fully opened with the respective R-NI (or N-RI) contacts made, (This can be checked using the 6mm gauge with a voltmeter connected across the normal contacts then across the R-NI contacts, or across the reverse contacts then across the N-RI contacts, as the case may be.)

For semi sealed contacts such as those in Westinghouse point machines and detectors, where the contacts cannot be clearly seen, the contact must be electrically open at a 6mm switch opening, this can be checked with a voltmeter.

Detector contacts are not to be adjusted to be broken at a switch opening of 4mm or less. With track vibration such fine adjustment could lead to 'bobbing' detection failures and/or excessive wear and flats on rollers within detector mechanisms causing irregularities if not identified and corrected during routine maintenance.

Particular attention should be given to Westinghouse M2, M2D, M23A, M70 and M3A machines to ensure that flats have not developed on the roller in the contact drive cam follower nor on the roller on the detector slide.

The detection test shall be carried out using gauges for openings of 4mm and 6mm between the stock rail running face and the switch at a position approximately, and not more than, 75mm back from the tip of the switch.

Back drive detectors, where fitted, should be adjusted to be broken at approximately 8mm switch opening (at the back drive detector) and made with a switch opening of 6mm (at the back drive detector)

Note - With trailing points it may be permissible to increase the detection limit from 6mm up to 8mm under certain circumstances as follows:

- *This increased limit is necessary to avoid failures and delays to traffic*
- *There is no signalled move through the trailing points in the facing direction*
- *There is no reversing move where part of the train would be set back through the points in a facing direction.*
- *The condition causing the inability to obtain reliable detection at the lower limits is to receive attention to correct the problem.*
- *The approval of the ARTC Executive Manager Standards & Systems or nominated representative is obtained.*
- *A record is kept of such arrangements in the Signal Maintenance Engineer's Office.*
- *Approval is to be sought using an Engineering Waiver.*

On single blade catchpoints, detection of the open switch position, usually the normal position, may be coarsely adjusted to make at about 13mm, measured from the switch stop, i.e. with the points open at least 100mm.

4 Gauge For Facing Point Lock and Detection Testing

4.1 Gauge

Testing of Facing Point Locks and Detection shall be undertaken with a standard ARTC Gauge. This Gauge shall be in accordance with the ARTC drawing. The Gauge shall have a serial number and be calibration tested every two years. If the Gauge is damaged or outside of tolerances for testing it shall be replaced. Tolerance is +/- 5% of the nominated value.