



AUSTRALIAN RAIL TRACK CORPORATION LTD

Discipline: Engineering (Track)

Category: Standard

Disconnection of Signalling Apparatus

SMP 09

Applicability

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| New South Wales | ✓ | Victoria | |

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1 General

Whenever it is necessary to disconnect signalling apparatus (mechanical or electrical) the provisions of Network Rule and Procedure [ANWT 312](#) and [ANPR 704](#) shall be strictly observed. Refer also to Standard [SMP 08](#).

The signalling maintainer in charge of the work shall check that a suitable entry has been made in the 'Train Register Book', and, where practical, sign it after the signaller.

All involved in the work shall ensure there is a common understanding of who is in charge and responsible for these safeworking arrangements.

When it is necessary under the provisions of Network Rule and Procedure [ANWT 312](#) and [ANPR 704](#) for a 'Hand Signaller' to be provided in connection with the disarrangement of interlocking apparatus, or disconnection of points, signals, trainstops or level crossing warning systems from the interlocking, such 'Hand Signaller' shall be provided and work under the directions of the signaller.

Signalling maintainers shall not interfere with the connections until they have assured themselves that the required 'Hand Signaller' is in position.

Safe working form [ANRF 003](#) shall be filled in and countersigned by the Signaller/Train Control representative, in accordance with Network Rule and Procedure [ANWT 312](#) and [ANPR 704](#).

When the work involves the disarrangement of permanent way equipment (e.g. where rails, points or crossings are re-laid, removed or repaired) safeworking form [ANRF 003](#) shall also be used, and signed jointly by the Signalling, Train Control and Civil officers in charge.

When it is necessary for a lever, route push button or panel key to be moved during the execution of the work, the signaller shall be requested to move it.

Signalling maintainers may move levers etc, for the purpose of testing only with the permission of the signaller.

Under no circumstances shall a signalling maintainer operate a lever or withdraw a staff from an instrument as part of a safeworking operation.

When the apparatus which has been disconnected is again in working order, the signalling maintainer shall cause the signaller to make an entry in the 'Train Register Book', counter sign the entry, where practical, and fill in particulars on form [ANRF 003](#) and sign in conjunction with the Signaller/Train Control representative, and Civil representative where applicable.

Whenever any signalling apparatus is electrically disconnected by the removal of fuses, pins or links and the signalling maintainer cannot remain in attendance, then the points of disconnection shall be securely and clearly labelled to prevent the possibility of someone inadvertently replacing the fuse or pin or closing the link.

1.1 Disconnection of Signals

When it is necessary to disconnect an electrically controlled signal to prevent the operation of the signal and maintain it at stop, the signal control circuit fuse shall be removed and in addition, in the case of electrically worked semaphore signals, the signal motor operating circuit fuse shall be removed. The motor operating fuse of the associated trainstop shall also be removed.

On installations such as Sydney, Strathfield where route termination links are provided this facility is used to disconnect the route(s) of the signal concerned instead of removing the common signal control circuit fuse.

On colour light signals, securely disconnect both the active (positive) leg and the common (negative) leg of the signal control relay circuit for the lowest proceed indication in the sequence, typically the caution (HR) relay circuit but in some cases the low speed (LSpR) relay circuit. Also disconnect the active (positive) or common (negative) legs of the signal control relay circuits for the higher indications in the signal.

Advise the signaller of the circumstances and request blocking facilities be applied to the signal lever.

In conjunction with any main line signal being disconnected and maintained at stop, the distant signals or equivalent shall also be arranged to be securely maintained at their correct restrictive indications i.e., the mechanical distant signal shall be disconnected and maintained at caution and, in the case of power worked signals, the signal immediately in rear shall be maintained at caution, or low speed, as applicable, with the respective 90 degree control, lower yellow, lower green or clear relay circuits etc, controlled by the main signal prevented from operating.

The respective control relay circuits for the higher indications of the signal in rear shall be disconnected by manually opening either the active (positive) or common (negative) legs of the circuits.

(Where the respective higher signal indications of the signal in the rear are double switched by the disconnected control relays for the main line signal and where the integrity of these circuits is not in doubt, then the manual disconnection is unnecessary.)

When it is necessary to disconnect a mechanical signal to prevent the operation of the signal, and maintain the signal in the stop position (Caution if distant signal), the catch rod handles shall be disconnected by removing the pivot pin, and a lever sleeve fitted to the lever, and in addition the signal wire is to be slackened off at the wire adjuster or with the GNR wheel for distant signals where provided.

Signals shall not be operated by hand from the stop position. (Should it be necessary to momentarily move the semaphore arm of a stop signal for maintenance, the signalling maintainer shall ensure there is no train approaching that could accept the signal arm movement as authority to proceed.)

1.2 Disconnection of Points – Mechanical

When it is necessary to disconnect mechanical points to prevent their operation the catch rod handles for the FPL lever and the point lever concerned shall be disconnected. Lever sleeves shall be fitted to the FPL lever and the points lever.

The procedures described above render the points inoperative but still safely connected to the interlocking with the points locked in position and the signals detecting and interlocked with the points. In such circumstances, provided the facing points are clipped and SL locked, the signals leading over the points may be left in order.

When it is intended that the points are to be further interfered with, worked on, manually operated or disconnected from the interlocking, then, in addition to the above, the signals protecting the points shall also be disconnected and maintained at stop and the associated distant signals or equivalent (i.e. higher indications of the signals immediately in the rear) are to be disconnected so that these signals are restricted to a caution indication, or low speed, as applicable. Traffic moves shall be conducted with the points clipped and SL locked, and with the disconnected signals handsignalled.

1.2.1 Exception

If it is intended to work on the channel iron lead to the points or facing point lock and the points will not be moved during the course of this work it will be permissible to leave the protecting signals in working order provided the following precautions are observed.

- a) Book the points and facing point lock out of order on form [ANRF 003](#).
- b) Sign the required entry in the Train Register Book
- c) Disconnect the catchrod of both the points lever and the facing point lock lever so that the levers and the interlocking cannot be moved out of correspondence with the points.
- d) Disconnect the plunger of the facing point lock and securely wire the plunger into the plunger casting to securely lock the points.
- e) Secure the points with clip and SL lock.
- f) Provided the detection is in order and no attempt will be made to move the points, the signals leading through the points may be left working.
- g) This procedure can only be adopted while the site is permanently attended by signalling maintainers; if it is required that the protecting signals remain operating while the

signalling maintainers are not in attendance the points must also be spiked and XL locked in accordance with the procedures for 'Crossovers Seldom Used'.

1.3 Disconnection of Points – Power Operated

When it is necessary to electrically disconnect power worked points to prevent their operation, the motor control circuit fuses shall be removed and, in addition, if the points are electropneumatically operated the air shall be cut off, if electrically operated the local power shall be disconnected from the motor. This shall be carried out for each point end worked from the point lever.

Securely and clearly label the points of electrical disconnection to prevent the possibility of someone inadvertently replacing the fuses or closing the links, etc.

Advise the signaller of the circumstances and request blocking facilities be applied to the points lever for the position the points are in.

The method of disconnection of points in computer based interlocking (CBI) areas is described in the respective sections in this manual dealing with the particular type of computer based interlocking.

Note The procedures described above render the points inoperative but still safely connected to the interlocking with the points locked in position and the signals detecting and interlocked with the points. In such circumstances the signals leading over the points may be left operating provided that,

if the electrically disconnected points are to be left unattended or out of use, the facing ends of the points are to be clipped and SL locked and form ANRF 003 is to be filled in.

the interlocking of the signals with the points is in proper working order, and will remain so.

the point switches, connections and operating mechanisms are in proper adjustment and working order, and will remain so,

the electrical detection is in proper adjustment and working order, and will remain so.

the facing point lock is securely plunged and locking the switch hard against the stock rail, with the lock unable to be withdrawn due to the points being electrically (and electropneumatically where applicable) disconnected to prevent their operation.

no attempt will be made to manually unlock or move the points.

the points are to be electrically disconnected for a limited period of time. When points will be out of use for an indefinite period the procedures detailed under 'Crossovers Seldom Used' shall be applied.

If it is intended that the points are to be further interfered with, worked on, manually operated or disconnected from the interlocking, then, in addition to the above, the signals protecting the points shall also be disconnected and maintained at stop and the associated distant signals or equivalent (i.e. higher indications of the signals immediately in rear) are to be disconnected so that these signals are restricted to a caution indication, or low speed, as applicable. Traffic moves shall be conducted with the points clipped and SL locked and with the disconnected signals handsignalled. The requirements of Network Rule and Procedure [ANWT 312](#) and [ANPR 704](#) shall be observed.

Where ESML arrangements (Emergency Switch Machine Lock, Annett Key and attached crank handle) on electric points machines or EOL arrangements on E.P. points machines are provided for the manual operation of power worked points, the disconnection of the points and the protecting signals is accomplished automatically through use of the ESML or EOL arrangements. Similarly where Plug Connector and Key arrangements are utilised with Style D or Style E operated electro-pneumatic points, the affected signals and points are automatically

disconnected. The ESML, EOL or Plug Connector and Key arrangements may be utilised during failure conditions and also for testing of facing point locks and detectors.

Electro-pneumatic points, and particularly those utilising type S valve units, must not be blown over by manipulating the valves unless it is assured that the points and affected signals on all lines have been securely disconnected by use of the EOL arrangements, where applicable, or by disconnection of Plug Connectors, where applicable, or for Style C valve units by manual disconnection of the points detector circuit.

1.3.1 Disconnection of Points for Work on the Points: Points Detection in Working Order

Where work is to be carried out on power worked points fitted with electrical detection, then, in some cases, the signals leading over one or more of the ends of such points, and over the diamond crossings may be left working if it is safe to do so provided the following precautions are observed.

- a) Advise the signaller of the work to be done and request blocking facilities be applied to the points lever.
- b) Fill in form *ANRF 003*. Observe *ANWT 312* and *ANPR 704*.
- c) Electrically disconnect the points and turn the power off (electric or electro-pneumatic) to prevent their operation.
- d) Clip and SL lock the points facing ends which are being worked on or are liable to be affected by the work.
- e) If the points detection is in working order and will remain so, and if all ends that are or could be affected by the work are clipped and locked, the signals over the points may be left working while the signalling maintainer is in attendance to ensure the clips and SL locks are not removed. If the signalling maintainer cannot remain in attendance and if the integrity of the facing point lock cannot be relied upon, then the SL lock is to be changed to an XL lock and the points are also to be spiked, or otherwise the signals leading over the points ends and the diamond crossings are to be disconnected and maintained at stop, until the points are restored to use.

1.3.2 Disconnection of Points for Work on the Points: Points Detection Not in Working Order

1.3.2.1 Normal Case

- a) Advise the signaller of the work to be done and request blocking facilities be applied to the points lever.
- b) Fill in form *ANRF 003*. Observe *ANWT 312* and *ANPR 704*.
- c) Electrically disconnect the points and turn the power off (electric or electro-pneumatic) to prevent their operation.
- d) Clip and SL lock the facing ends of the points.
- e) Clip and SL lock the trailing ends of the points.
- f) Disconnect and maintain at stop the signals leading over the points ends and the diamond crossings and disconnect the mechanical distant signal or restrict the power worked signal in rear to a caution indication (or low speed where applicable).

1.3.2.2 Exceptional Case

Note: The following procedure may also be applied when the points detection equipment has failed and the time to repair and the traffic delays will be extensive (refer to SMP 04).

Where points are booked out of use and are clipped, XL locked and spiked pending removal, the detection, if in order, should be left in circuit and not bridged.)

With the points lying normal the signals leading over the trailing end, and over the diamond crossings on a middle road, may be allowed to work if it is safe to do so, by remaining connected and by bridging detection, provided the following precautions are strictly observed.

- i. Explain the work to and obtain authorisation on Form *ESM2401F-01 Authority for Temporary Bridging of Signalling Circuits* from the appropriate Authorising Officer (see *ESM-24-01*).

Observe the requirements of *ESM-24-01 Bridging or False Feeding of Signalling Circuits*.

- ii. Advise the signaller and request blocking facilities to be applied to the points lever.
- iii. Compile Form *ANRF 003* booking the points out of use, include the notation 'BRIDGED' against the entry of the points booked out of use and sign the form.

Observe the requirements of *ANWT 312* and/or *ANPR 704*, as applicable.

- iv. Electrically disconnect the points and turn the power off to prevent their operation. (Mechanical points shall have the catch handle rod of the point lever and the FPL lever disconnected to prevent their movement.)
- v. In all cases, clip and SL lock the facing ends of the points.
- vi. Also clip and SL lock the trailing end points for traffic movements (in addition to the facing end points) if the work is being carried out on the trailing end points, or if the detection is out of order on the trailing end.
- vii. Disconnect and maintain at 'Stop' the signals leading over the facing ends of the points and disconnect the mechanical distant signal or restrict the power worked signal in rear to a caution indication (or low speed where applicable).
- viii. Disconnect the reverse detector circuit at the same location where the normal contacts are being bridged.
- ix. Bridge the detection contacts for the position the points are lying using regulation jumper wires (see procedure *ESM-24-01*), as follows :-
 - Using the regulation jumper wires, strap and function test the contacts to be bridged to prove they are the correct contacts, then leave the bridging connected.
 - Bridge only the detection contacts that are affected (eg. detector normal contacts or indication box normal contacts or plunger lock normal contacts, as applicable).
 - Do not bridge out the contacts on points ends that are not affected.
 - Do not bridge out the ESML contact (see Note 2 for exception).
 - Apply the bridging at the actual detection contacts where the detection is out of order, if practical. If this is not practical apply the bridging at the nearest respective cable terminals to the contacts themselves and open the cable links leading back to the contacts; correspondence must firstly be proved between the cable terminals and the respective detection contacts.
- x. Once the bridging is applied, function test the point detection contacts at the end that is not affected to verify they are still effectively in the detection circuit.
- xi. Remain in attendance at the points while the bridge is on to ensure the points are not unclipped or unlocked, unless this can be otherwise guaranteed.
- xii. REMOVE the bridging BEFORE the point clips and locks are removed.
REMOVE the bridging BEFORE the points are electrically reconnected.
REMOVE the bridging BEFORE the signals leading over the facing ends are reconnected.
REMOVE the bridging BEFORE reconnecting the reverse detector circuit.
- xiii. Operate the points and function test the detection contacts through to the signallers panel BEFORE the points are booked back into use.
- xiv. Complete the *ANRF 003* form and sign into use.
- xv. Advise the Authorising Officer that the bridging has been removed.

- xvi. Authorising Officer completes form [ESM2401F-01 Authority for Temporary Bridging of Signalling Circuits](#) (see [ESM-24-01](#))

Note 1: Facing end detection in order and facing end not affected by the work.

If the work does not involve the facing end of points, and the detection is not bridged out on the facing end, and if (after the bridging is applied on the point ends affected by the work) the points normal detection on the facing end is tested and proved to be in working order, then, provided the facing end is clipped and SL locked normal and provided all other aspects of the above procedure are observed, the signals leading over the unaffected facing end of the points in the normal direction may be restored to use, if specifically authorised by the Authorising Officer for the temporary bridging.

Note 2: Bridged points detection not permanently attended.

If it is not practical for signalling maintainers to remain in attendance all the time that the bridging is on then other precautions must be taken to ensure that the bridging will not be interfered with and points will not be unlocked or moved or restored to use before the bridging is removed and the detection tested. These precautions need to be authorised and documented.

For example, if it cannot be otherwise guaranteed that the points would not be unlocked and if there could be any train movements (including work trains) over ends of the points in a facing direction, then have those points ends XL locked and spiked; if the bridging is to remain on for an extended period, then also obtain authorisation on form [ESM2401F-01 Authority for Temporary Bridging of Signalling Circuits](#) (see [ESM-24-01](#)) and bridge the ESML detection contact using regulation jumper wires and remove the ESML crank and key and keep it secure in your custody. Make a notation on the [ANRF 003](#) form that the ESML is bridged. Remove the ESML bridging when returning the crank and key.

If unable to remain in attendance while the detection is bridged out, then it will be necessary to close and lock signalling apparatus, disconnection boxes and equipment locations in which case the jumper wires may not remain obvious to any uninformed person becoming involved. Where practical leave the jumper wires protruding, or further disconnect the points near the terminals where the bridging is applied so that to reconnect the points the jumper wires will be noticeable.

Note 3: Work requiring clipped and locked points to be unclipped.

Where one end of a crossover set of points is being worked on and the nature of the work necessitates that the points be unclipped at some stage, then such work is to be carried out with the signals on that line (leading up to and over that end of the points) disconnected and booked out of use with handsignallers provided at the signal(s) for any train movements. The bridging of the points detection on that line must not be applied unless the signalling maintainer can ensure that the points will be kept clipped and locked in the non-conflicting (normal) position except for periods when there is no possibility of any train movement (including work trains) up to the points on that line: the signalling maintainer is to be in attendance when the points are unlocked or unclipped.

Note 4: Testing when points equipment disconnected.

If the planned work involves the renewal of the points wiring or the disconnection and removal of more than one wire from its terminal at the one time, then the procedures for renewal or repair of signalling cables and wires are to be observed with testing of the wiring and points correspondence testing to ensure correct reconnection. If there

are mechanical disconnections or track or permanent way adjustments then it will be necessary to perform facing point lock and detection tests.

1.3.2.3 Unplanned Work During a Planned Possession

If during the course of a planned possession it becomes obvious that the points equipment is at risk of damage and requires to be disconnected to protect the equipment or, if otherwise it becomes necessary to be disconnected, then bridging of the detection to maintain signalling on adjacent roads which are not affected by the possession, is only permitted if authorised and carried out in accordance with the requirements of paragraph 1.3.2.2 above.

1.3.3 Disconnection of Points for Indefinite Period

If it is necessary to disconnect either mechanically or power operated points for an indefinite period, the points must be spiked, clipped and XL locked in accordance with Network Rule and Procedure [ANWT 312](#) and [ANPR 704](#).

1.4 Removal of Sidings

When sidings operated by interlocked points are removed the procedures outlined in Network Rule and Procedure [ANWT 312](#) and [ANPR 704](#) must be observed.

If the siding is not straight railed on the advertised date the points must be spiked, clipped and XL locked and the interlocking equipment disconnected.

[ANRF 003](#) forms must be signed by representatives of each discipline.

Subsequently when the siding is straight railed fresh [ANRF 003](#) forms will be signed and the siding will be deleted from publications.

1.5 Disconnection of Level Crossing Protection

Where it is necessary to electrically disconnect level crossing protection (i.e. type 'F' warnings lights, bells, 1/2 arm booms and/or pedestrian warning lights, audible alarms, booms) to prevent operation of the level crossing protection, the crossing control (XR) fuse is to be removed and, in addition, where up road and down road control relays are provided the circuit fuse for either relay is also to be removed if that circuit is directly affected i.e. when one or all of the approach track circuits have been disconnected. Where 1/2 arm booms are provided the motor control fuses for the up and down booms are to be removed and the booms arranged to be tied up clear of the road. Pedestrian crossing booms are not to be tied up. If the level crossing is situated on a single line then the up and down direction stick relays circuit fuse is also to be removed.

Where the level crossing is situated in an interlocking and protected by home signals the fixed signals protecting the interlocked level crossing are to be disconnected and maintained at stop and the associated distant signals or equivalent (i.e. higher indications of signals immediately in the rear) are to be disconnected so that these signals are restricted to a caution indication or low speed, as applicable.

In addition, hand signallers must be provided at the level crossing and affected signals, if applicable, in accordance with Network Rules and Procedures [ANWT 312](#), [ANPR 704](#), [ANGE 218](#) and [ANPR 715](#).

1.6 Disconnection of Electric Locks and Releasing Switches

When disconnecting a Releasing Switch or Electric lever lock to prevent its operation, the operating circuit fuse is to be removed and the common/negative side is also to be manually open circuited.

A test is then to be made to ensure that the device is inoperative.

1.7 Disconnection of Track Circuits

When disconnecting track circuits the circuit fuses controlling the FEED and RELAY are to be removed.

The disconnection of FEED arrangements are as follows:

- a) For transformer fed track circuits both AC & DC, the transformer primary fuse (typical 120v) and the links on the secondary side of the feed transformer are to be removed.
- b) For battery fed track circuits where no fuse is provided an internal feed cable link on either the positive or negative side of the battery is to be open circuited. Alternatively the feed cable connected to the positive terminal (wing-nut) of the battery may be disconnected.
- c) For Jeumont track circuits the 120v fuse to the transmitter is to be removed.
- d) For Audio Frequency tracks, where a separate power supply is provided the 120v fuse feeding the P/S unit is to be removed. Where the track circuit is fed from a bus bar the fuse (typical 24v) feeding the transmitter is to be removed. Always pull the negative pin or links first before removing the fuse.

The disconnection of RELAY arrangements are as follows:

- a) For both conventional AC and DC track circuits the track side fuse controlling the relay is to be removed, the local fuse for an AC vane track relay need not be removed. Where no fuse is provided i.e. "some battery fed DC track circuits", one of the internal links on the incoming track cable to the relay is to be open circuited
- b) For Jeumont track circuits at least one of the internal links on the incoming cables from the track is to be open circuited.
- c) For Audio frequency track circuits the supply fuse to the receiver is to be removed (typical 24V fuse) or, alternatively, if the unit has its own separate power supply, the 120v+ fuse to the P/S may be removed. Always pull the negative pin or links first before removing the fuse.

In electrified areas, when traction return rails are to be broken (e.g. rerailing of a traction return rail) or traction bonding is to be disturbed, the track circuit equipment in the location is to be isolated by open circuiting the cable leads to the track in both the feed and relay end locations to prevent the potential of any traction return current or other extraneous voltages entering the track circuit equipment. This is not required in the case of jointless track circuits without insulated joints.

1.8 Routine Maintenance

The safeworking procedures set out in the Network rules and Procedures will need to be applied when working on signalling equipment except during routine maintenance where:

- a) there is no interference with the working or interlocking of points, signals or level crossing protection, or where
- b) the work will not disarrange the interlocking or disconnect the signalling equipment from the interlocking but will make points or signals inoperative (or will cause level crossing warning equipment to operate) for a short period of time, provided that an understanding is reached with the signaller and a suitable opportunity between trains exists to enable the work to be completed without detriment either to safety or train working.
- c) If the work cannot be completed within this short time between trains the apparatus concerned must be treated as being defective and the Network rules and Procedures must be applied.
- d) The period of time for this working shall be shorter than the time between trains and less than thirty minutes.

Before undertaking any day to day maintenance authorised by (b) above, the signalling maintainer must advise the signaller what work requires to be done and come to an agreement as to when the work shall be carried out. Both persons must co-operate throughout, as necessary.

Clause b) above may also be applied to work that will make inoperative, for a very short period, the lowering of only one half boom barrier, or the illumination of only one set of lights, of a Type F protected level crossing.

Note: Terms above have the following meanings;

“will make points or signals inoperative” means that points are unable to be moved and that signals are unable to be cleared from the stop position.

“will cause level crossing warning equipment to operate” means that the lights and audible alarms operate and the boom barriers, where applicable, lower to the horizontal position.

“the work will not disarrange the interlocking or disconnect signalling equipment from the interlocking” means that the vital signalling controls and indications (that prevent signals being wrongly cleared, or prevent points being wrongly moved or released, or that operate level crossing warning equipment) will not be interfered with and will remain effective and the work will not defeat any of the protection provided by the signalling system.
