TS 01280:1.0

CRN SD 010

Standard

Signalling and Design Principles – Locking Arrangements

Issue date: 30 January 2022

Effective date: 30 January 2022

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Document information

Owner:	Director Signals & Control Systems Engineering, AMB, SER
Mode	Heavy rail
Discipline	Signals and control

Document history

Revision	Effective date	Summary of changes
Version 1.1	30 January 2022	TfNSW template applied
Version 2.0	30 January 2022	Internal revision only – no change
Version 3.0	30 January 2022	First full UGLRL release

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10. Locking Arrangements

10.1. General Locking Arrangements Within Routes And Overlaps: Principle 10.1

10.1.1. Introduction

This Principle addresses the requirements for the provision of interlocking between signals (routes), points and ground frames.

10.1.2. Purpose

Interlocking is provided between signals (routes), points and level crossings to ensure that a signal is only cleared for a train to proceed when conflicting signals, points and level crossings are locked in position so that the passage of the train is not endangered.

The interlocking is maintained until the train has passed by the various signals, points and level crossings within the route and it is safe to release all or parts of the locking without endangering the passage of the train.

The interlocking is always extended and enforced by the addition of approach locking and where applicable route holding.

10.1.3. Requirements - General Locking within a Route and an Overlap

If a route from a signal conflicts with another route on the same signal or leads over one or more sets of points or ground frames or reads up to one or more opposing signals (routes) then it shall:

- Lock normal any conflicting routes leading away from the same signal. Refer to figure 1.
- Lock normal any opposing signal routes which lead into the route or its overlap. Refer to figure 1.
- Lock normal or reverse as required any sets of points in line with the direction of the route together with any points providing trap or flank protection to the route or its overlap. Refer to figure 1.
- Lock any ground frames normal in the route or its overlap.
- Lock any trailing points in its overlap in the appropriate direction for which the overlap is set. Refer to figure 2. Refers to Principle 4.9.
- Alternatively, there may be situations (particularly in yards) where trailing points or catch points in the overlap are not aligned with the route to reduce the impact of points failure, or provide flank protection. In this case, any and all conflicting signals will require to be locked.

- Lock normal or reverse any facing points in its overlap only if other locking conditions within or leading into the overlap make this necessary. Refer to figure 2. Refer to Principle 4.9.

Converse locking shall always be applied except in special cases.

The overlap shall be the overlap applicable to normal speed movements, and not conditional low speed overlaps, unless there is a speed supervision system which enforces the movement to keep below the specified restricted speed. In other words the overlap distance for locking is the overlap distance applicable to the highest signal indication which can be displayed when the next signal is at stop, generally the “caution” signal indication.

10.1.4. Flank Protection

Flank protection is the setting of points (often not directly within the route) to protect the signalled movement whether or not other routes are set.

Further to 10.1.3 Item (iii), flank Protection is to be provided wherever possible, when the track layout is suitable and it does not restrict any parallel movement flexibility. Refer to Figure 3.

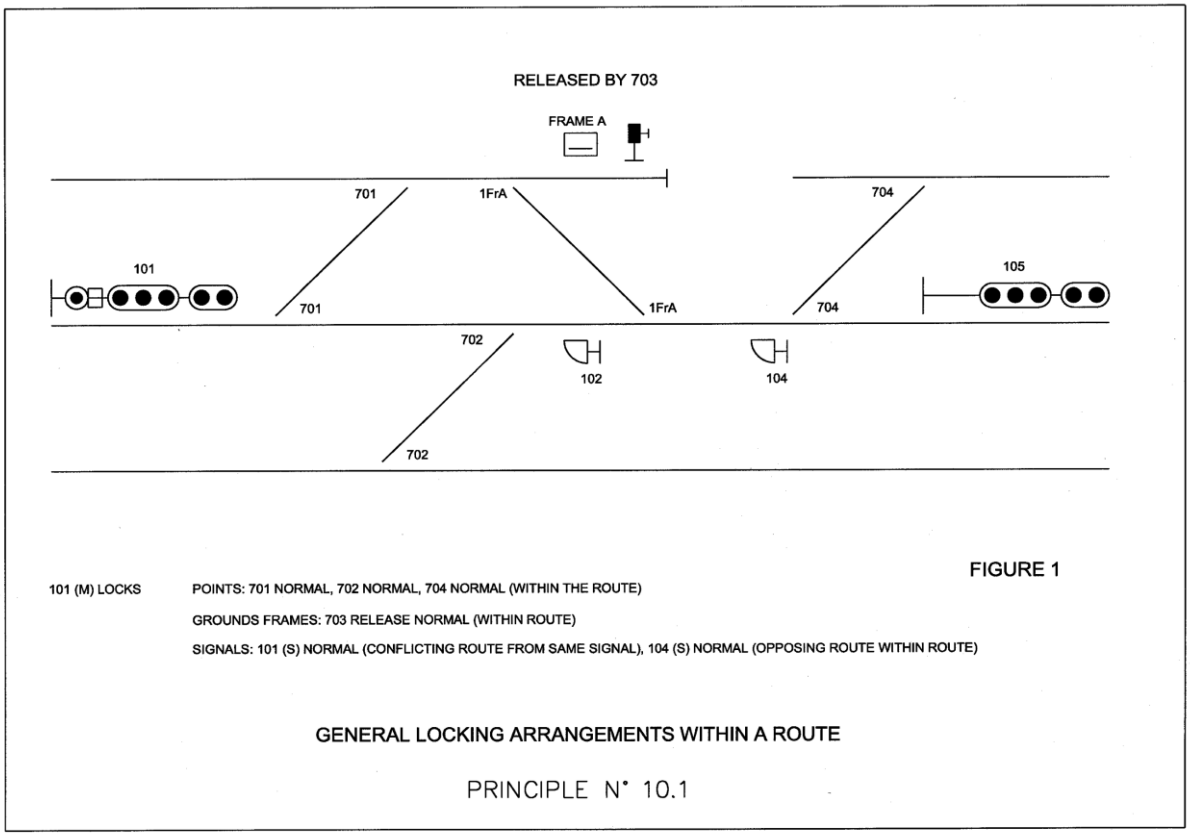

Figure 1 - General Locking Arrangements Within a Route - Principle No.10.1

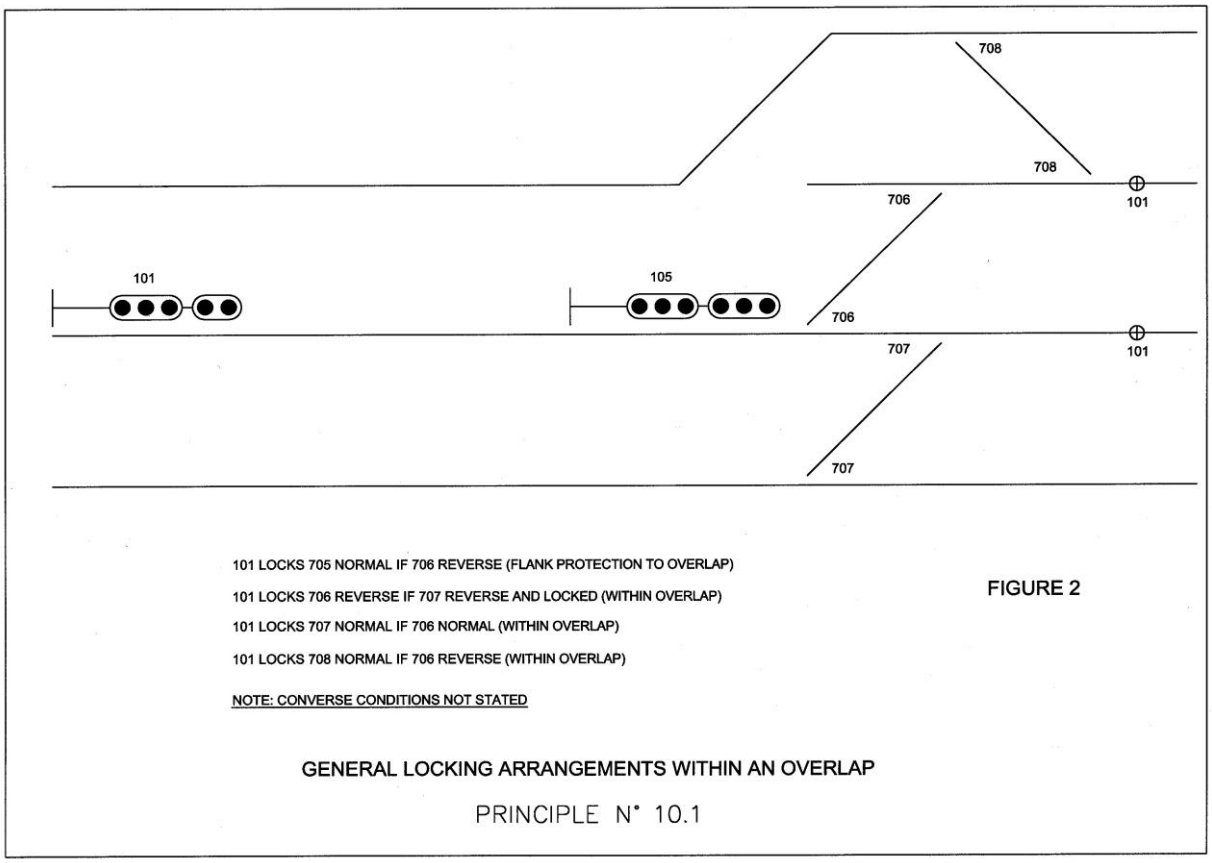

Figure 2 - General Locking Arrangements Within an Overlap - Principle No. 10.1

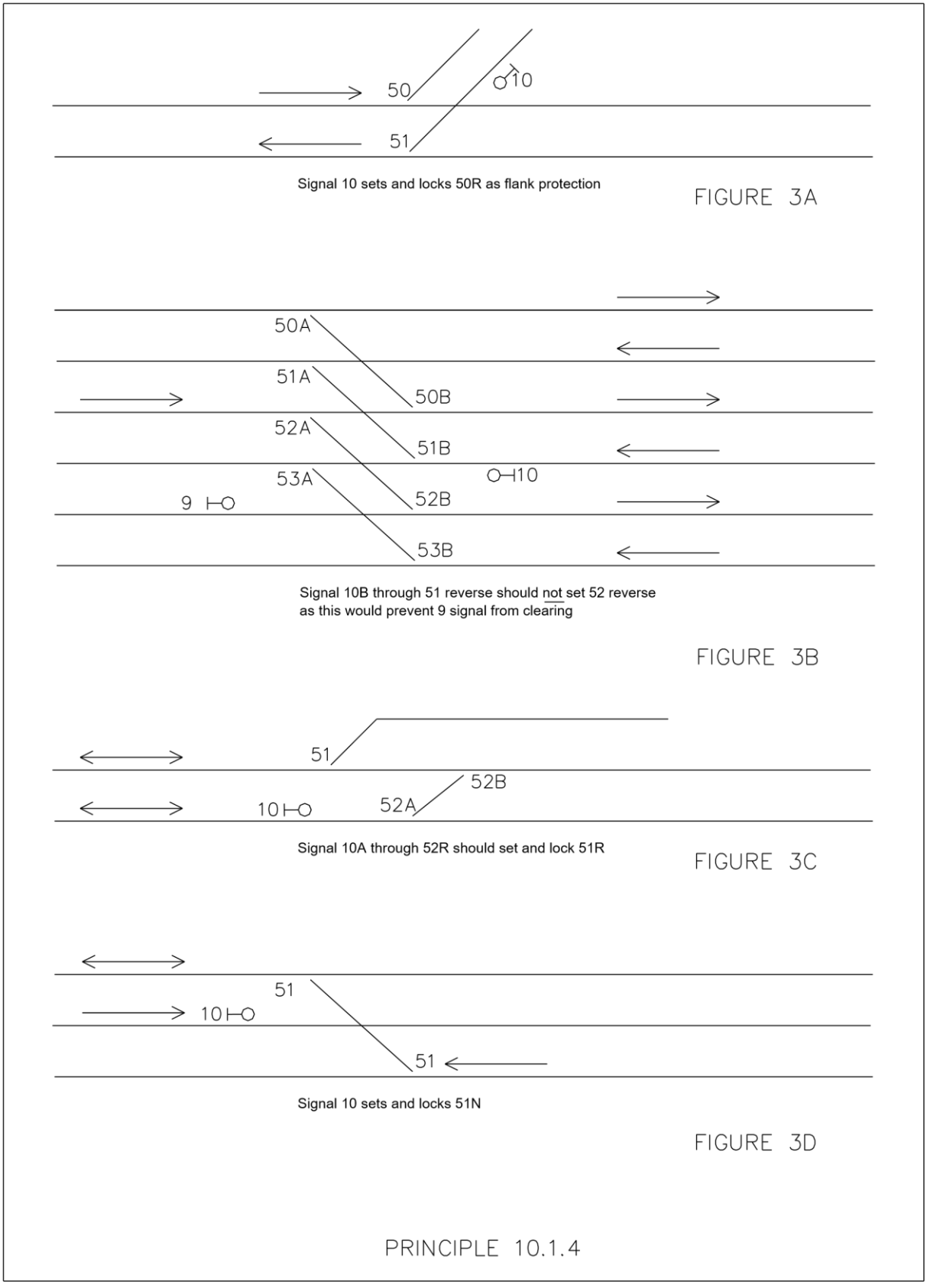

Figure 3 - Principle 10.1.4

10.2. Automatic Route Normalisation: Principle 10.2

10.2.1. Introduction

This Principle addresses the requirements for the provision of automatic route normalisation in both NX and OCS systems.

10.2.2. Purpose

Automatic route normalisation is provided to reduce the work load on an operator by avoiding the need to manually normalise routes after the passage of a train and enable the operator to concentrate on the setting of routes ahead of trains and undertake this task more efficiently. It is also required to enable any automatic route setting functionality.

10.2.3. Requirements - Provision of Automatic Route Normalisation

All controlled signals shall be provided with automatic route normalisation.

10.2.4. NX Systems

If the signal is provided with a berth track circuit then automatic route normalisation shall be initiated provided the approach locking has been released and following the concurrent occupation of the berth track circuit and the first track circuit past the signal and the subsequent clearing of the berth track circuit.

If the signal is not provided with a berth track circuit then automatic route normalisation shall be initiated provided the approach locking has been released and following the occupation and clearance of the first track circuit past the signal.

The objective in either case shall be to ensure that the sequence of track releasing for auto normalisation is different from that for the release of approach locking such that full normalisation of the interlocking can only occur after the two different sequences have been executed. This reduces the probability of situations under which for example, insulated block joint failures could pre-release approach locking simultaneously with normalisation.

Special arrangements will be required if last wheel replacement is applicable to the signal.

10.2.5. OCS System

Automatic route normalisation shall be initiated immediately the first track circuit past the signal is occupied. In this case the first two track circuits occupied release in the approach locking shall not be permitted for main running signal aspects. Also refer to Principle 11.1.6

Special arrangements may be required if last wheel replacement is applicable to the signal.

10.2.6. Other Methods of Automatic Route Normalisation

In some systems the automatic route normalisation may be initiated by a software algorithm and the subsequent transmission of a normalising bit to the interlocking. Special approval is required.