Interlocking Principles

Synopsis
This document mandates the principles of interlocking of signals, points and other parts of the signalling system so that the safe operation of trains is ensured.

Submitted by

Paul Woolford
Standards Project Manager

Authorised by

Anne Blakeney
Acting Controller, Railway Group Standards

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# Interlocking Principles

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Part A

A1 Issue record

<table>
<thead>
<tr>
<th>Issue</th>
<th>Date</th>
<th>Comments</th>
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</thead>
<tbody>
<tr>
<td>One</td>
<td>May 1997</td>
<td>Original document Supersedes SSP5 and GS/ST0081</td>
</tr>
<tr>
<td>Two</td>
<td>April 2000</td>
<td>Replaces issue one Supersedes SSP62. Until SSP080 is withdrawn, where the requirements of this document and SSP80 conflict, this document takes precedence</td>
</tr>
<tr>
<td>Three</td>
<td>June 2000</td>
<td>Replaces issue two Compliance clause amended</td>
</tr>
<tr>
<td>Four</td>
<td>June 2003</td>
<td>Replaces issue three Supersedes SSP057 section 2 and all of SSP080</td>
</tr>
</tbody>
</table>

Revisions have not been marked by a vertical black line in this issue because the document has been revised throughout.

This document will be updated when necessary by distribution of a complete replacement.

A2 Implementation of this document

The publication date of this document is 7 June 2003.

This document comes into force on 2 August 2003.

The dates by which compliance with the requirements of this document is to be achieved are set out in Part B2. Where those dates are later than the date on which this document comes into force, this is to give Railway Group members additional time to plan and commence implementation so as to achieve full compliance by the dates set out in Part B2.

This document supersedes the following Railway Group Standards, either in whole or in part as indicated:

<table>
<thead>
<tr>
<th>Railway Group Standard</th>
<th>Issue No.</th>
<th>Title</th>
<th>RGS sections superseded by this document</th>
<th>Date(s) as of which sections are superseded</th>
</tr>
</thead>
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<tr>
<td>SSP080</td>
<td>1</td>
<td>Controls Required for Routes and Signals</td>
<td>All sections</td>
<td>2 August 2003</td>
</tr>
<tr>
<td>SSP057</td>
<td>N/A</td>
<td>Signals Leading Over Facing Points</td>
<td>Section 2</td>
<td>2 August 2003</td>
</tr>
</tbody>
</table>

SSP057 and SSP080 are withdrawn with effect from 2 August 2003.

A3 Scope of Railway Group Standards

The overall scope of Railway Group Standards is set out in Appendix A of GA/RT6001. The specific scope of this document is set out in Part B2.
A4 Responsibilities

Railway Group Standards are mandatory on all members of the Railway Group* and apply to all relevant activities that fall into the scope of each individual’s Railway Safety Case. If any of those activities are performed by a contractor, the contractor’s obligation in respect of Railway Group Standards is determined by the terms of the contract between the respective parties. Where a contractor is a duty holder of a Railway Safety Case then Railway Group Standards apply directly to the activities described in the Safety Case.

* The Railway Group comprises Network Rail Infrastructure Limited, Rail Safety and Standards Board Limited, and the train and station operators who hold railway safety cases for operation on or related to infrastructure controlled by Network Rail Infrastructure Limited.

Network Rail Infrastructure Limited is known as Network Rail.

Rail Safety and Standards Board Limited is known as RSSB.

A5 Health and safety responsibilities

In issuing this document, RSSB makes no warranties, express or implied, that compliance with all or any documents published by RSSB is sufficient on its own to ensure safe systems of work or operation. Each user is reminded of its own responsibilities to ensure health and safety at work and its individual duties under health and safety legislation.

A6 Technical content

The technical content of this document has been approved by:

Jeff Allan, Principal Signalling and Telecommunications Engineer, RSSB

Enquiries should be directed to RSSB – Tel: 020 7904 7518.

A7 Supply

Controlled and uncontrolled copies of this document may be obtained from the Industry Safety Liaison Dept, Rail Safety and Standards Board, Evergreen House, 160 Euston Road, London NW1 2DX.
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Interlocking Principles

Part B

B1 Purpose
This Standard contains the mandatory requirements for the principles of interlocking of signals, points and other parts of the signalling system so that the safe operation of trains is ensured.

B2 Application of this document

B2.1 To whom the requirements apply
This document contains requirements that are applicable to duty holders of the infrastructure controller category of Railway Safety Case.

B2.2 Compliance requirements
The requirements of this document are mandatory for new Network Rail controlled infrastructure and for alterations to existing Network Rail controlled infrastructure for which Approval in Principle is given on or after 2 August 2003.

When Approval in Principle is given before 2 August 2003, but the infrastructure has not yet been brought into service, the design shall be reviewed and, where reasonably practicable, brought into line with the requirements of this document. Where it is not reasonably practicable to do so, the situation shall be regularised by means of a non-compliance or derogation (see clause B2.2.1).

Action to bring existing interlockings into compliance with the requirements of this document is not required, provided that they were compliant with the standards applicable at the time they were brought into service. Where it is known, or becomes known, that existing interlockings do not comply with the requirements of this document, action to bring them into compliance is required when the signalling installation as a whole is renewed. It is permissible for a complete interlocking to be renewed on a ‘like-for-like’ basis, that is, commensurate with the standards that were in force at the time of its original installation.

B2.2.1 General compliance requirements
Until the compliance date or the date by which compliance is achieved (if earlier), the applicable requirements of the predecessor documents shall continue to be met (see Part A for details).

After the compliance date, or after the date by which compliance is achieved (if earlier), Railway Group members shall not deviate from the requirements set out in this document.

Where it is considered not reasonably practicable, to comply with the requirements set out in this document, authorisation not to comply shall be sought in accordance with GA/RT6001, GA/RT6004 or GA/RT6006.

B3 Definitions

Approach locking
The application of locking to a route that shortens the movement authority previously given to a train. The locking is released after a time interval during which the train has either come to a stand at the signal or has entered the route (when route locking is then applied).

Comprehensive approach locking
The locking is applied only when a train would be affected by the shortening of its movement authority.

Approach locked when cleared
The locking is applied whenever the movement authority is given.
Interlocking Principles

Conditional locking
Interlocking between two signalling functions which is dependent upon the state of other signalling functions.

Control device
A lever, switch, signalling panel button, VDU monitor target area/tracker ball combination or other device operated by the signaller to set points and routes, clear and replace signals and operate other signalling functions.

Degraded situation
A failure has occurred which prevents the signaller giving the desired lineside aspect to a train.

Exit signal
The signal (or buffer stop/stop board/siding) to which a train traversing a route is directed.

Interlocking controls
Requirements associated with signalling functions, by which a function is locked or released depending on the position or state of other functions. Interlocking controls are grouped into levels:

- **Aspect level**
  Controls that are required to be satisfied before a signal can display a proceed aspect. These controls are not reciprocal.

- **Locking level**
  Controls between signalling functions that are required to be satisfied before a route can be set. This locking is usually (but not always) reciprocal.

- **Locking level release**
  Controls that are required to be satisfied before the locking on a route or section of a route is released. Controls on conflicting routes are released by the train clearing track sections. Controls on opposing routes are also sometimes released by the occupation, after time, of track sections.

Interlocking system
Equipment that applies the interlocking controls (also referred to as ‘interlocking’).

Locked
The state of any signalling function or item of equipment when it is prevented from changing state or position by other parts of the signalling system (conditionally or unconditionally).

Movable infrastructure
Points, controlled level crossings, swing bridges and derailleurs.

Movement authority
The permission given by the signalling system via a signal or by other means for a train to proceed.

Opposing locking
Locking applied to a route by a route set in an opposing direction.

Direct opposing locking
Two routes in opposite directions that do not require any sets of points in the opposite position. There is therefore no basis on which to apply conflicting locking.
Interlocking Principles

Indirect opposing locking
Two complete routes that are conflicting in that they require at least one set of points in a different position. However, cancellation of one route with a train part way through the route releases the locking on these points which, when moved, create the conditions for a direct opposing route to be set. Indirect opposing locking is applied to prevent the setting of the route that has become opposing.

Oversetting (also known as restroking or pumping)
The setting of a following route to the same exit before a previous movement has cleared the route and/or overlap.

Proceed on Sight Aspect
Proceed on Sight Aspect (PoSA) is a signal aspect for use during lineside signalling failures to instruct a driver to enter a signal section (see GE/RT8071).

Proved
Evidence provided by electrical or other means that a function is in a specified state.

Release
The removal of locking on a function, for example, the removal of route locking or the unlocking of a function such as a ground frame.

Route
The path along a section of track between one signal and the next.

Route locking
A form of locking that maintains locking associated with points or a route until after a train has passed clear of the function being locked (also known as maintained locking).

Sequential locking
Locking applied to successive running signals to enforce the replacement of one lever (and its associated arm or aspect where such repeating is provided) before the lever controlling the signal in rear is free to be pulled.

Set
Successful completion of the setting process, that is, the conditions sought during the setting process have been met.

Signalling function
A signal, set of points or other equipment (as defined by control tables) forming part of the signalling system.

Track locking
The locking of a signalling function when a track section over the movable infrastructure concerned is occupied.

Track section
A portion of railway line having fixed boundaries and for which the train detection system provides information on its state of occupancy to the signalling system (see GK/RT0011).

Other defined terms are included in GK/RT0002.

B4 Principles
This document supports HM Railway Inspectorate Safety Principle 20.

‘The signalling system should provide for the safe routeing, spacing and control of trains.’
Interlocking Principles

Part C  Design requirements

C1  Safety requirements

C1.1  General
Signalling functions and other parts of the signalling system shall be interlocked to minimise the likelihood of collision and derailment and consequential personal injury or damage. This shall apply during normal working and during failure of any part of the interlocking system or signalling equipment that is set, locked, proved or released by the interlocking.

C1.2  Facilities to be provided
The interlocking system shall provide facilities that enable the signaller to:

a)  request movement authorities
b)  withdraw movement authorities
c)  set signalling functions

as necessary to secure routes in the required position for the safe movement of trains.

C1.3  Safety integrity
The safety integrity of new interlocking systems shall be SIL4, as defined in BS EN 50129.

C2  Control of incidental risk

C2.1  Exceedence of movement authority
The interlocking system shall be designed so that the likelihood of, and consequence to, a train exceeding its movement authority is minimised. (Related requirements are set out in Gi/RT7006.)

C2.2  Interfaces
The risk associated with the interface of interlocking systems to:

a)  remote control and data transmission systems
b)  power supplies
c)  control and display systems
d)  other interlocking systems or sub-systems
e)  trackside signalling equipment
f)  imported electro-magnetic interference (EMI)

shall be identified and controlled to maintain the safety integrity of the system.

The risk and its associated control measures shall be documented.

C2.3  Secondary hazards
The risk accruing from secondary hazards introduced by the fail-safe design of the interlocking that result in degraded situations (for example, handsignalling) shall be identified, controlled and documented.

C2.4  Relaxation of controls
The controls for regulating the speed of trains specified in this document shall apply to the signalling systems in track circuit block areas equipped with colour light signals or cab signalling.
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In areas equipped with other forms of block system, these controls shall, if reasonably practicable, be incorporated into the signalling system. Otherwise, the requirements shall be met by the provision of instructions issued to signallers. It is permissible for:

a) track locking and route locking of trailing points and other movable infrastructure (but not interlocking by signals and/or routes) to be relaxed where the section of track concerned is clearly visible from the controlling point and it is not practicable to provide train detection and/or electric lever locks

b) route locking of directly opposing movements clearly visible from the controlling point (but not interlocking of signals and/or routes) to be relaxed, provided that the signals aspects are controlled by the intervening track sections that would otherwise require route locking

c) approach locking of signals associated with low-speed non-passenger movements (for example, shunting signals) to be relaxed, as permitted in GK/RT0063, where the section of track concerned is visible from the controlling point. It is also permissible for this relaxation to be applied to other signals (for example, non-block signals) if it is not practicable to provide train detection

d) approach locking (if a signal is clearly visible from a ground frame), track locking and/or route locking to be omitted, as permitted in GK/RT0061, if the ground frame is protected by the method of block working, or it can otherwise be demonstrated that the risk is controlled.

C2.5 Train detection

The interlocking shall monitor the sequential occupation and clearance of track sections to minimise the risk arising from loss of train detection leading to premature release of route or point locking.

C3 Movement authorities

C3.1 Block system

Movement authorities shall be controlled to ensure that a safe distance between trains is maintained at all times. A movement authority shall allow only one train to occupy any section of line, except that it is permitted for a movement authority to allow entry to an occupied section of line where permissive working or shunting movements are allowed (see GK/RT0044).

C3.2 Class of movement authority

A route between an entrance signal and the associated exit signal shall be designated as being one of the following classes:

<table>
<thead>
<tr>
<th>Class</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main</td>
<td>The route and designated overlap are clear.</td>
</tr>
<tr>
<td>Warning</td>
<td>The route is clear but only a restricted overlap is provided. A different control device is operated from that used for the associated main class route (see GK/RT0064).</td>
</tr>
<tr>
<td>Calling-on</td>
<td>The route is occupied. This class of route has the same physical route as the associated main class route; the control arrangements are set out in GK/RT0044.</td>
</tr>
<tr>
<td>Shunt</td>
<td>The route is required for shunting purposes; it is permitted to be clear or occupied. Where the shunt class route has (exceptionally) a main class route also.</td>
</tr>
</tbody>
</table>
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<table>
<thead>
<tr>
<th>Class</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proceed on Sight Aspect (PoSA)</td>
<td>The route is provided for use during degraded situations. Such movement authorities shall in all cases prove that the points and other movable infrastructure over which the movement is authorised are locked and proved in the required position. The control device is different to that provided for other routes.</td>
</tr>
</tbody>
</table>

Table 1

The requirements for signal aspects are set out in GK/RT0031 and GE/RT8071. The requirements for signallers’ control arrangements are set out in GK/RT0025.

C4 Interlocking

C4.1 Interlocking system

The interlocking system shall ensure all of the following:

a) a movement authority is given only when it is safe to do so, and controlled so as to minimise the risk of the end of movement authority being exceeded

b) points and other movable infrastructure are set to and locked in the correct position for any movements which are authorised over them or for which they provide protection

c) any movement authority is capable of being withdrawn on demand

d) interlocking and route locking associated with a movement authority is only released when it is safe to do so.

C4.2 Interlocking controls

The signalling system shall include interlocking controls between signals and:

a) other signals capable of giving conflicting movement authorities

b) controlled level crossings, points and all other movable infrastructure which present and detect a hazard to moving trains (see GI/RT7004 and GI/RT7012)

c) automatic level crossings with one or more signals positioned between the strike in point(s) and the level crossing (see GI/RT7012)

d) other interfaces to the infrastructure which detect the possibility of a hazard to moving trains

e) train detection systems that prove the presence, absence, position or direction of trains (see GK/RT0011)

f) lockout devices for staff protection (see GK/RT0030).

Details of locking and aspect level controls for the various classes of route are set out in Appendices 1 and 2 respectively.

C4.3 Ground frames and switch panels

Where an item of trackside signalling equipment is not directly controlled from the interlocking, appropriate releasing, proving, control and monitoring arrangements shall be provided such that the interlocking cannot issue a movement authority.
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unless that signalling equipment is locked in the required position (see GK/RT0061).

Unless signals are provided that are slotted or otherwise controlled by the signaller via the interlocking, the controls on the release of an indirectly controlled function shall assume that movements will occur in any direction under the control of local fixed signals or handsignals.

C5 Setting and locking of routes

C5.1 General
C5.1.1 Methods of route setting
The setting of a route for a controlled signal shall only commence following a request for that route to be set by either:

a) the signaller operating the relevant control device(s), or
b) automatic route setting (ARS) systems.

C5.1.2 Route availability
For route setting systems, the interlocking shall check that the route requested is available. A request for an available route shall initiate the movement of points and other moveable infrastructure controlled from the interlocking (subject to the requirements of clause C5.1.4). The request shall either:

a) prevent points from responding to requests not associated with the route being set, or
b) re-check the called positions of points before completion of route setting, aborting route setting if incorrect.

Where routes extend over more than one interlocking and/or signaller’s control area, it is permissible for the component parts of the routes to be checked for availability and set independently.

C5.1.3 Route preselection
If the interlocking system permits storage (preselection) of route requests at locking level before setting commences, the associated risk shall be taken into account in the design.

C5.1.4 Route setting process
The setting of a route shall only be possible when all of the following are satisfied:

a) all points and other movable infrastructure are in their required positions (or, in the case of route setting systems, available to move to the required positions)
b) no opposing or conflicting routes are set or in use (except where opposing locking is omitted) or a time delay is enforced sufficient to ensure that any previously authorised movement has come to a stand
c) all other locking level controls, listed in Appendix 1, that are specified in the control tables for that route are met.

Once the route has been set, locking shall be applied to all items of movable infrastructure required by the route (except for hinge points of swinging overlaps). This locking shall be maintained in accordance with section C6.4. Approach locking in accordance with GK/RT0063 shall be applied when the signal is ready to clear. The route locking and the approach locking shall be proved effective in the signal aspect controls.
C5.1.5 Automatic signals
It is permissible for signals to be designed for continuous automatic operation where they have no conflicting or opposing routes and do not interlock with any movable infrastructure. In such cases it is not necessary to provide route setting. The signaller shall be provided with a replacement device that, when operated, prevents the signal being cleared or replaces it to danger.

C5.1.6 Controlled signals working automatically
It is permissible to provide an automatic working facility for controlled signals. The automatic working facility shall only be enabled when the route is set and shall permit the signal to be used for subsequent trains without resetting the route. When the automatic working facility is cancelled by the signaller, this shall not affect a route already set. The automatic working facility shall be cancelled when the associated route is cancelled.

It is permissible to provide automatic working facilities for main and (where required by the infrastructure controller) warning class routes but not for calling-on, shunt or PoSA class routes.

C5.1.7 Warning routes – step up/down
A warning class route that has been set and then subsequently stepped up (for example, by setting a forward route from the exit signal) before the signal has cleared as a warning route, shall have interlocking applied to the full overlap for the main class route. The entrance signal shall then display an unrestricted main aspect.

When an automatic working facility applies to a warning class route and is set to work in automatic mode for that route, the overlap shall (unless required otherwise by the infrastructure controller), revert (step down) to the restricted overlap conditions following the passage of each train for which the full overlap conditions applied.

C5.1.8 Calling-on class routes
The requirements for the setting of calling-on class routes are set out in GK/RT0044.

C5.1.9 Opposing locking omitted
It is permissible to omit locking between opposing shunt class routes to allow signals for both directions to be clear at the same time, and so enable repeated forwards and backwards shunting movements. This facility shall be provided only where specifically required by the infrastructure controller.

Where such opposing shunt signals have been cleared at the same time, the following criteria shall apply:

a) replacement of signals shall be by signaller control only
b) release of approach locking shall be by expiry of time only
c) release of route locking shall require all track sections between the opposing signals to be clear.

The purpose of the above constraints on route release is to control the risk of points being moved whilst shunting is still in progress.

C5.1.10 Bi-directional signalling
The direction of traffic on a line signalled for bi-directional running (see GK/RT0032) shall be determined by the operation of a direction control or by setting a route onto the line in the required direction. It is permissible for the directional controls on a bi-directional line to be biased to favour the predominant direction of running. The contraflow direction shall then be established by the operation of a direction control or by the setting of a route onto the line in the contraflow direction.
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The directional route locking shall be maintained until all the signal sections comprising the bi-directional line are clear.

A signal designed for continuous automatic operation on a bi-directional line shall not be regarded as an opposing route, provided the interlocking only permits traffic in one direction at a time.

C5.2 Overlaps
C5.2.1 Overlap setting
The setting of a route requiring an overlap (see GK/RT0064) shall be possible only if there is no conflicting or opposing route or overlap set that conflicts with the overlap. The setting of such an overlap shall inhibit all such routes or overlaps.

Where a preferred overlap is specified, this shall be set, if available.

C5.2.2 Overlap locking
Locking shall be applied to all trailing points in an overlap, but shall not be applied to facing points in an overlap where the points lead to another permitted and available overlap for the same route.

In the event of a train passing a signal at danger, the overlap locking shall be maintained.

C5.2.3 Time of operation locking
Time of operation locking shall be applied where it is required to move facing points, the tips of which are located a distance beyond the first track section block joint ahead of an exit signal, such that a train overrunning the signal at a speed of 15 mph would reach the points before they have completed their movement.

Calculation of this distance shall take account of both:

a) the time taken for the interlocking to action the request to move the points

b) the usual time of operation of the points.

Where the traffic pattern requires that trains are frequently required to approach the exit signal at danger, or frequent overlap swinging occurs, consideration shall be given to the application of time of operation locking to facing points positioned at greater distances from the first track section block joint, commensurate with the risk involved were this signal to be passed at danger.

Release of this locking shall require the signal berth track section to be one of the following:

c) clear

d) occupied for a time sufficient to ensure that an approaching train has come to a stand at the signal.

Time of operation locking shall be applied when a main class route is set up to the signal, but not usually when a shunt or warning class route is set. It is not required for calling-on or PoSA class routes.

C5.3 Preset shunting signals
The setting of all classes of route shall require any facing shunting signals in the route to be clear before the main (presetting) signal clears. It is permissible for this to be achieved automatically.

Where a shunting signal is equipped with a PoSA facility, this shall not be used when the signal is used in a preset mode. Instead, where a PoSA route presets a shunting signal the preset shunting signal shall clear to its usual ‘OFF’ aspect.
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C5.4 Oversetting
It is permissible for a following route to be set to the same exit before a previous movement has cleared the route and/or overlap.

C5.5 Non-track circuit block systems
Where other than a track circuit block system is provided for the signalling of trains, the block system shall control the setting of the route (which may involve the release of a token) where opposing locking is necessary. Where there is no requirement for opposing locking, it is permitted that the block system controls only the signal aspect.

C6 Interlocking of points and other movable infrastructure

C6.1 Method of control
Points shall be either controlled direct from the interlocking system or indirectly via a local operator, for example by means of a ground frame.

C6.2 Independent point control
When points have been set and locked on the signaller’s individual control device provided for those points, they shall not be capable of being moved by the route setting function.

C6.3 Conditions for movement
Points shall only be permitted to move if they are free of all of the following conditions:

a) interlocking (locking level)
b) track locking (including dead, foul and flank locking)
c) time of operation locking
d) route locking
e) overlap locking (other than for swinging overlaps).

Where movable infrastructure is operated locally, it is permitted for the above conditions to be applied to the signaller’s release.

C6.4 Route locking
Locking on points in a route shall be maintained until the movement has reached (or passed clear of) the track locking sections. Locking on flank and trap points shall be maintained until the train has passed beyond the position where the protection is required, in accordance with section C9.1c) of this document. Locking on points in the overlap shall be maintained until the protection afforded by the overlap is no longer required (see section C9.3).

C6.5 Foul track locking
The occupation of a foul track section shall prevent the movement of points to a position where an unauthorised movement could conflict with any vehicle standing foul. It is permissible for points to be called towards an occupied foul track section. It is also permissible for foul track locking to be conditional upon points in the foul track being set for a non-conflicting direction.
C6.6  Protected releases
C6.6.1  Mechanically operated points
It is permissible to provide a sealed release for mechanically operated points to permit the movement of a set of points within a route where operational difficulties are caused by track section occupation due to equipment failure. The only control functions that shall be bypassed are:

a) track locking (including foul track locking)
b) route locking.

Sealed releases shall not be provided at ground frames.

C6.6.2  Other infrastructure
It is permissible to provide protected releases to free infrastructure that is locked or otherwise inoperative due to equipment failure. The release shall be accessible by one of the following:

a) breaking a glass or paper seal
b) operation of a non-resettable counter
c) operation of a key
d) entry of a password.

C7  Control of lineside signal aspect
C7.1  General
C7.1.1  Controls
A signal shall only clear from its most restrictive aspect when the appropriate conditions for the controls listed in Appendix 2 are satisfied.

These conditions shall continue to be proved at least until the train has entered the route to which the signal applies. Unless otherwise permitted (see Appendix 2), loss of such proving shall cause the signal to revert to danger.

C7.1.2  Provision of cautionary aspects
The signalling system shall control signal aspects to provide each train with sufficient warning of the need to stop at a signal at danger, or reduce speed by a required location, in accordance with the aspect sequences specified in GK/RT0032.

C7.1.3  Reading through controls
Where it is possible to see signals beyond the signal that a train is approaching, it is permissible for the signal(s) beyond to be controlled to more restrictive aspect(s) where risk arises from reading through.

It is also permissible for similar controls to be applied where risk arises from misreading of signals on parallel lines.

C7.2  Approach control
C7.2.1  Main routes
Approach control shall be applied:

a) to maintain the required aspect sequences for junction signalling (see GK/RT0032)
b) where signal spacing would otherwise be deficient for the permissible speed of trains (see GK/RT0032)
c) where required by the train protection system.
C7.2.2 Warning class routes
Warning class routes shall be subject to approach control to reduce the train speed to a level consistent with the restricted exit signal overlap.

C7.2.3 Calling-on class routes
The requirements for the approach control of calling-on class routes are set out in GK/RT0044.

For calling-on class routes, the signal shall only be permitted to display a movement authority when the relevant track sections are occupied. Stepping up from and stepping down to a calling-on route is prohibited.

C7.2.4 Shunt class routes
Shunt class routes from main signals shall be approach controlled where necessary to ensure that the movement enters the route at an appropriate speed. Stepping up or down of shunt class routes is prohibited.

C7.2.5 PoSA class routes
PoSA class routes from main signals shall be approach controlled (although failure of the approach track section may render it ineffective). Stepping up or down of PoSA routes is prohibited.

C7.3 Proving of aspects and indications
Where the failure of all or part of a main signal aspect or indication (including TPWS equipment, where provided) could lead the driver to interpret the signal as less restrictive, aspects and indications shall be proved (see GK/RT0031). When such proving indicates that an aspect or indicator is not lit, or is mutilated such that it could be misinterpreted, one of the following shall apply:

a) the signal shall step down to a more restrictive aspect (preferred option)

b) the aspect of the preceding signal shall be restricted to ensure that the movement authority is not exceeded.

Similar controls shall be applied in respect of limit of shunt (LOS) indicators and the danger aspects of position light signals protecting conflicting passenger routes.

Buffer stop lamps shall not be proved alight in the controls of the signal(s) reading up to the buffer stop.

C7.4 Control of distant signals
A distant signal shall only clear from its most restrictive aspect when all the associated stop signals ahead have been cleared. Where provided, track sections between the distant signal and the associated stop signal(s) shall be proved clear. Where this control is not possible, the signaler shall be provided with a means of placing or maintaining the distant signal to its most restrictive aspect (for example, a separate lever or a replacement switch).

A replacement switch shall also be provided for distant signals reading from absolute block sections or where reading up to stop signals protecting controlled level crossings.

A distant signal shall require the stop signal ahead to be alight. An outer distant (where provided) shall require the inner distant off and alight.
C7.5 Banner repeater signals  

C7.5.1 Method of control  
A banner repeater signal shall only display an ‘OFF’ aspect when the signal repeated is off. Where track sections permit, the banner signal shall be replaced immediately after the passage of each train, except where one of the following situations apply:

a) where special replacement conditions apply to the signal repeated by the banner signal (an equivalent means of replacement of the banner signal shall be applied)

b) where the banner signal is located on a station platform and is used for train despatch purposes.

C7.5.2 Vehicles between banner and signal  
Where permissive working or shunting movements enable a signalled movement to approach the banner signal while the track between the banner and its associated signal is occupied, or where hazard would arise for any other reason, the banner repeater shall not clear if there are vehicles between the banner repeater and the signal that it is repeating.

C7.6 Other indicators  
Other indicators working in conjunction with signals (for example, ‘OFF’ and ‘RA’ indicators) shall be controlled by the aspect of the signal repeated, such that the indicator does not give a less restrictive indication than the signal.

C7.7 Approach lighting of signal aspect  
In exceptional circumstances, if required for signal sighting reasons, it is permissible for a signal aspect to be extinguished when all the following conditions apply:

a) no route is set up to the signal

b) no train is approaching within reading distance of the signal (see GK/RT0031)

c) confusion will not be caused to the driver of a train approaching the signal on an adjacent line.

C8 Withdrawal of movement authorities  

C8.1 Replacement by signaller  

C8.1.1 Normal replacement facility  
The signaller shall at all times be able to replace a stop signal to danger, for example:

a) for a controlled signal, by use of a control device to cancel the associated route or directly replace the signal. The associated indication shall confirm that the signal is displaying a red aspect

b) for an automatic signal, by use of a replacement facility. When operated, the associated indication shall confirm that the signal is displaying a red aspect.

C8.1.2 Emergency replacement facilities  
For route setting systems, additional control devices shall be provided to enable all signals in a defined area to be replaced to danger, in either of the following circumstances:

a) in an emergency (but the status of the interlocking shall not be affected)

b) if the control devices normally used to replace individual signals to danger can become inoperative due to system or equipment failure.
C8.1.3 Preset shunting signals
For route setting systems, the signaller shall be provided with a control device to replace a preset shunting signal aspect to danger, which is separate from the control device provided for the associated presetting signal. The replacement of a preset shunting signal shall place and maintain at danger the associated presetting signal and any other preset shunting signals in rear of the one that has been replaced.

The replacement of a presetting signal to danger shall, if the train has not passed the presetting signal, also replace any preset shunting signals in the route.

After the train enters the route, restoring the presetting signal device shall have no effect on the preset signals. Once the presetting signal has been replaced, an emergency replacement facility shall be provided, whereby the restoration of any preset control device shall replace all the preset signals in the route.

C8.2 Replacement by passage of train
C8.2.1 Options
Where automatic replacement is possible (for example, colour light signals), a signal shall usually be replaced to its most restrictive aspect as soon as the train driver has passed the signal. It is, however, permissible to provide other signal replacement arrangements to satisfy local operating requirements, for example:

a) at controlled signals – where the front of a train is required to be beyond the signal when starting from a platform
b) at controlled signals – where propelling moves necessitate keeping the signal clear until the whole train has passed it
c) at shunting signals
d) at automatic signals – where a combined berth/overlap track section is provided.

The use of delayed replacement shall be avoided, so far as practicable, where there is a risk of reading through from the signal in rear.

Preset shunting signals shall usually replicate the replacement conditions of their associated main signal, when in preset mode.

C8.2.2 Signal not replaced by first track section
Where a signal is not replaced by the first track section beyond the signal ahead, and the latter has delayed replacement (last wheel off berth and/or second track), the signal ahead shall be proved to have been replaced in the aspect of the signal in rear. This is to prevent the possibility of a momentary false aspect on the rear signal when a train clears the berth track section of the signal ahead.

C8.2.3 Disengagement of signal
Except as permitted by clause C5.1.6, the automatic replacement of a controlled signal in accordance with clause C8.2.1 shall result in the signal being maintained at its most restrictive aspect until the signaller or automatic route setting system makes a fresh request for the route to be set.

C8.2.4 Critical locations
Special consideration shall be given to signal replacement controls and the position of the associated track section boundary where identification of train position by the signaller and the interlocking system is critical, for example:

a) platform starting and mid-platform signals where trains could stop part-way beyond the signal
b) signals up to which permissive or shunt moves can be made
Interlocking Principles

c) sidings and headshunts where to-and-fro moves take place
d) signals at the point of reversal.

Information on the position of the first track section joint beyond the signal for various applications is set out in Appendix 3.

C8.2.5 Stop signals not replaced by passage of a train
Where it is not possible for stop signals to be replaced by the passage of a train (for example, signals worked mechanically), sequential locking shall be provided (see GK/RT0039).

C8.2.6 Replacement of distant signals
On lines where permissive block working applies, a distant signal shall be replaced to its most restrictive aspect immediately after the passage of each train. On other lines, it shall be replaced by occupation of the first available track section beyond the signal.

C9 Releasing of routes

C9.1 Release of route locking
Release of the route (locking level release) shall require all of the following:

a) cancellation (by the signaller or by train operated route release)
b) release of approach locking (see GK/RT0063)
c) no train on the route or, where sectional release of route locking is provided, no train between the start of the route (entrance) and the section of route locking in question, inclusive.

It is permissible, where required by the infrastructure controller, for the route locking to be released upon a train being timed to a stand short of the berth track section of the exit signal.

C9.2 Preset shunting signals
Shunting signals, when preset, shall carry the approach and route locking conditions applicable to the running signal that has preset them. However, use of the preset signal control device to effect replacement (see clause C8.1.3), shall not initiate release of locking.

C9.3 Release of overlap locking
Where no route is set beyond the exit signal, the release of the overlap shall require the route up to the exit signal to have been cancelled and one of the following conditions:

a) no train in the route
b) a train has been proved to be at a stand at the exit signal
c) a sufficient time has elapsed to ensure that an approaching train has come to a stand at the exit signal.

C9.4 Swinging overlaps
Where facing points in an overlap move to swing the overlap, the release of the existing overlap shall require one of the following conditions:

a) the new overlap is locked and the points have completed their movement
b) the new overlap is available (points set or free and track sections clear).

If the new overlap is not detected as complete within the usual time of operation of the points, the outer signal shall be replaced. Clause C5.2.3 mandates the
circumstances in which time of operation locking is to be applied to facing points in the overlap.

**C10  Emergency and engineering controls**

Interlocking systems shall have facilities (as specified by the infrastructure controller) for controls to be applied or removed to protect emergency or engineering situations. Examples include controls to:

a) permit or prevent the setting of each route

b) apply or remove temporary approach control of the entrance signal by its berth track section(s)

c) permit or prevent the clearance of each signal

d) permit or prevent the movement of points and other movable infrastructure

e) change the state of a track section as recorded in the interlocking system to permanently occupied.
# Interlocking Principles

## APPENDIX 1

(The content of this Appendix is mandatory)

### Locking level controls required before a route can be set

Each class of route shall require all the locking level controls that are applicable to the route being set.

For lever frames, the controls shall be applied by mechanical locking or to the signal lever lock (see GK/RT0039).

N/A: Not applicable

<table>
<thead>
<tr>
<th>Control</th>
<th>Main class</th>
<th>Warning class</th>
<th>Calling-on class</th>
<th>Shunt class</th>
<th>PoSA class</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Control from another control point enabled</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>2 Technician’s route disable not effective</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>3 Opposing routes normal and opposing signals have been controlled to danger and are free of approach locking</td>
<td>Yes</td>
<td>Yes (restricted overlap)</td>
<td>Yes; (overlap N/A)</td>
<td>Yes (unless opposing locking omitted)</td>
<td>Yes; (overlap N/A)</td>
</tr>
<tr>
<td>4 Routes normal from signals that can be preset by this route</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>5 Patrolman’s lockout control normal</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>6 Staff protection lockout control normal</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>7 Other classes of route from this signal normal</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>8 Opposing route locking in route and overlap normal (other than conditional overlap locking when an alternative overlap is available)</td>
<td>Yes</td>
<td>Yes (restricted overlap)</td>
<td>Yes; (overlap N/A)</td>
<td>Yes (unless opposing locking omitted)</td>
<td>Yes; (overlap N/A)</td>
</tr>
<tr>
<td>9 Points in route and overlap, and required for trapping and flank set to correct position or free to be called (other than facing overlap points where an alternative overlap is available)</td>
<td>Yes</td>
<td>Yes (restricted overlap)</td>
<td>Overlap N/A</td>
<td>Yes (overlap N/A where permissive working applies)</td>
<td>Yes; (overlap, trapping or flank N/A)</td>
</tr>
<tr>
<td>10 Ground frames in route and overlap, and required for trapping and flank set to correct position. Includes ground frames operating mechanically worked level crossings</td>
<td>Yes</td>
<td>Yes (restricted overlap)</td>
<td>Yes; (overlap N/A)</td>
<td>Yes</td>
<td>Yes; (overlap, trapping or flank N/A)</td>
</tr>
<tr>
<td>11 Movable bridges or other structures in route and overlap, locked and detected in correct position</td>
<td>Yes</td>
<td>Yes (restricted overlap)</td>
<td>Yes; (overlap N/A)</td>
<td>Yes</td>
<td>Yes; (overlap N/A)</td>
</tr>
<tr>
<td>12 Condition of track section associated with permissive working (applicable at time of setting route) # If separate route exit device for calling-on route not provided.</td>
<td>Track section clear#</td>
<td>N/A</td>
<td>Track section occupied</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

Table 2
### Table 2 (Cont’d)

<table>
<thead>
<tr>
<th>Control</th>
<th>Main class</th>
<th>Warning class</th>
<th>Calling-on class</th>
<th>Shunt class</th>
<th>PoSA class</th>
</tr>
</thead>
<tbody>
<tr>
<td>13 The route has not been preset by another route</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>Yes</td>
<td>N/A</td>
</tr>
<tr>
<td>14 Bi-directional block release available or direction already established</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>15 Signal ahead route not set</td>
<td>N/A</td>
<td>N/A</td>
<td>Yes</td>
<td>N/A</td>
<td>Yes (sequential locking applies)</td>
</tr>
<tr>
<td>16 Controlled level crossings (other than where automatic lowering is provided)</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>
APPENDIX 2
(The content of this Appendix is mandatory)

Aspect level controls required before a movement authority can be given

Controlled signals

Display of a movement authority at a controlled stop signal shall require all the aspect level controls required by Railway Group Standards applicable to the class of route set as specified by the control tables. It is permitted for aspect level controls denoted by an asterisk to be effective at time of clearing the signal only. Loss of any other controls shall result in the signal reverting to its most restrictive aspect.

For lever frames, the controls shall be applied by mechanical locking/detection or to the signal lever lock (see GK/RT0039). All controls shall be present at time of clearing.

N/A: Not applicable

<table>
<thead>
<tr>
<th>Ref</th>
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<th>Main class</th>
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<th>PoSA class</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Route set and locked to exit signal</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>2</td>
<td>Slot from another control point ‘OFF’</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>3</td>
<td>Technician’s aspect disable not effective</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>4</td>
<td>Opposing routes normal (including bi-directional controls)</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes (unless opposing locking omitted) (overlap N/A where permissive working applies)</td>
<td>Yes</td>
</tr>
<tr>
<td>5</td>
<td>Opposing route locking in route and overlap normal (other than conditional overlap locking when an alternative overlap is available) (including bi-directional controls)</td>
<td>Yes (restricted overlap)</td>
<td>Overlap N/A</td>
<td>Yes (unless opposing locking omitted) (overlap N/A where permissive working applies)</td>
<td>Yes (overlap N/A)</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Points in route are in the correct position, locked and detected</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>7</td>
<td>Facing points in overlap are in the correct position, locked and detected, unless a nominated alternative overlap is available, when it is permissible for the points to be free, with detection inhibited during the time that they are being called to a new position</td>
<td>Yes (restricted overlap)</td>
<td>N/A</td>
<td>Yes (overlap N/A where permissive working applies)</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Trailing points in overlap are in the correct position, locked and detected</td>
<td>Yes (restricted overlap)</td>
<td>N/A</td>
<td>Yes</td>
<td>N/A</td>
<td></td>
</tr>
</tbody>
</table>

Table 3
Table 3 (Cont’d)

<table>
<thead>
<tr>
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<th>PoSA class</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>Points in the route and overlap required for trapping and flank locked and detected* in correct position</td>
<td>Yes</td>
<td>Yes (restricted overlap)</td>
<td>Yes (overlap N/A where permissive working applies)</td>
<td>Route flank points called if available but not detected</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Ground frames in the route are locked and detected normal (unless required to have been operated for the route, when the ground frame points shall be detected in the correct position)</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Ground frames in the overlap are locked and detected normal</td>
<td>Yes</td>
<td>Restricted overlap</td>
<td>N/A</td>
<td>Yes</td>
<td>N/A</td>
</tr>
<tr>
<td>12</td>
<td>All train detection devices in the route indicate that the line is clear</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes, other than track section(s) specified to be occupied</td>
<td>Where specified by infrastructure controller</td>
<td>N/A</td>
</tr>
<tr>
<td>13</td>
<td>All train detection devices foul of the route indicate clear</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>N/A</td>
</tr>
<tr>
<td>14</td>
<td>All train detection devices in the overlap, including foul tracks (conditional if necessary), indicate that the line is clear</td>
<td>Yes</td>
<td>Restricted overlap</td>
<td>N/A</td>
<td>Yes</td>
<td>N/A</td>
</tr>
<tr>
<td>15</td>
<td>Train detection devices required for overrun or flank indicate clear</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>N/A</td>
</tr>
<tr>
<td>16</td>
<td>Signals that precede are ‘OFF’</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>17</td>
<td>Signals that have been preset by the route are ‘OFF’</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>18</td>
<td>The signal has not been disengaged (unless the route has been set to work automatically)</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>19</td>
<td>Barriers at controlled (including remote and CCTV) level crossings in route are proved down* and crossing clear control operated</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Barriers called down only</td>
</tr>
<tr>
<td>20</td>
<td>Automatic level crossing ‘stopping/non-stopping’ controls effective</td>
<td>Yes</td>
<td>Yes</td>
<td>N/A</td>
<td>N/A</td>
<td>Yes</td>
</tr>
<tr>
<td>21</td>
<td>Automatic level crossing and staff warning system timing controls effective</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>22</td>
<td>Junction and route indicators required to be proved are alight (see section C7.3)</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>
### Table 3 (Cont'd)

<table>
<thead>
<tr>
<th>Ref</th>
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<th>PoSA class</th>
</tr>
</thead>
<tbody>
<tr>
<td>23</td>
<td>Approach control conditions satisfied</td>
<td>For junctions where specified</td>
<td>Yes</td>
<td>Yes</td>
<td>From main signal where specified (see clause C7.2.4)</td>
<td>Yes</td>
</tr>
<tr>
<td>24</td>
<td>Signal ahead alight, including TPWS ‘not failed’ (and associated stop signal if next signal is a distant) or controls off (see section C7.3b) Not applicable to semaphore signals</td>
<td>Yes</td>
<td>Yes</td>
<td>N/A</td>
<td>Yes (except where permissive working applies)</td>
<td>N/A</td>
</tr>
<tr>
<td>25</td>
<td>Banner repeater ahead alight and ‘ON’ or controls ‘OFF’</td>
<td>Yes</td>
<td>Yes</td>
<td>Banner ahead ‘ON’</td>
<td>Yes</td>
<td>N/A</td>
</tr>
<tr>
<td>26</td>
<td>Tunnel signal controls satisfied</td>
<td>Yes</td>
<td>Yes</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>27</td>
<td>Reading through controls satisfied</td>
<td>Yes</td>
<td>Yes</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>28</td>
<td>Patrolman’s and other lockout controls satisfied</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>29</td>
<td>Movable infrastructure in route or overlap detected in position and locked</td>
<td>Yes</td>
<td>Yes (restricted overlap)</td>
<td>Yes (overlap N/A)</td>
<td>Yes (overlap N/A where permissive working applies)</td>
<td>Yes (overlap N/A)</td>
</tr>
<tr>
<td>30</td>
<td>Temporary approach control not applied</td>
<td>Yes</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>31</td>
<td>Trip wire or tell-tale not operated</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>N/A</td>
</tr>
<tr>
<td>32</td>
<td>‘All-signals-on’ or signal group replacement controls not operated</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>33</td>
<td>Block release*, as per section C5.5</td>
<td>Yes</td>
<td>Yes</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>34</td>
<td>Flashing yellow and splitting distant proving satisfied. See GK/RT0032, clauses B10.6.5 and B10.7.3</td>
<td>Yes</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>35</td>
<td>Approach and route locking has been applied</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>36</td>
<td>PoSA on signal ahead not cleared</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>Yes</td>
</tr>
<tr>
<td>37</td>
<td>Signaller’s controlling device not withdrawn</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>38</td>
<td>Suppressed AWS controls on bi-directional lines satisfied</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>N/A</td>
</tr>
<tr>
<td>39</td>
<td>Measuring track section controls satisfied (Lime St. control)</td>
<td>N/A</td>
<td>N/A</td>
<td>Yes</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>
Automatic signals

Display of a movement authority at an automatic signal shall require all the relevant aspect level controls.

<table>
<thead>
<tr>
<th>Ref</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Technician’s aspect disable not effective</td>
</tr>
<tr>
<td>2</td>
<td>All train detection devices in the route indicate that the line is clear</td>
</tr>
<tr>
<td>3</td>
<td>All train detection devices in the overlap indicate that the line is clear</td>
</tr>
<tr>
<td>4</td>
<td>Automatic level crossing and staff warning system timing controls effective</td>
</tr>
<tr>
<td>5</td>
<td>Signal ahead alight, including TPWS ‘not failed’ (and associated stop signal if next signal is a distant) or controls off (see section C7.3b). Not applicable to semaphore signals</td>
</tr>
<tr>
<td>6</td>
<td>Tunnel signal controls satisfied</td>
</tr>
<tr>
<td>7</td>
<td>Reading through controls satisfied</td>
</tr>
<tr>
<td>8</td>
<td>Temporary approach control not applied</td>
</tr>
<tr>
<td>9</td>
<td>Trip wire or tell-tale not operated</td>
</tr>
<tr>
<td>10</td>
<td>Patrolman’s and other lockout controls normal</td>
</tr>
<tr>
<td>11</td>
<td>Opposing routes normal (including bi-directional controls)</td>
</tr>
<tr>
<td>12</td>
<td>Bi-directional block release available or direction already established</td>
</tr>
<tr>
<td>13</td>
<td>‘All-signals-on’ or signal group replacement controls not operated</td>
</tr>
<tr>
<td>14</td>
<td>Facing points in overlap detected either way</td>
</tr>
</tbody>
</table>

Table 4
Signal replacement – additional information

The distances quoted below are the positions of track section joints relative to signals that have been historically used to ensure appropriate replacement of signals to danger. They are provided here for information purposes only, and are not mandatory. Nevertheless, application of these distances will usually ensure compliance with the relevant mandatory requirements of the Standard.

<table>
<thead>
<tr>
<th>Type of signal</th>
<th>Position of first track section joint beyond signal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Controlled signals with first wheel replacement.</td>
<td>Between 5 and 20 m.</td>
</tr>
<tr>
<td>Platform starting and mid-platform signals at which trains stand with the front of the train beyond the signal.</td>
<td>As close as possible and not more than 5 metres (to inform signaller of the train position and apply route locking correctly).</td>
</tr>
<tr>
<td>Sidings and headshunts where to-and-fro moves take place.</td>
<td></td>
</tr>
<tr>
<td>Signals where the first track section is not proved in aspects of signal in rear (that is, an overlap is not proved).</td>
<td>Not less than 3.5 m (to avoid overhang of a train standing on the first track section such that part of it is in rear of the signal).</td>
</tr>
</tbody>
</table>

Table 5
Interlocking Principles

References

Railway Group Standard and other Railway Group Documents

GA/RT6001  Railway Group Standards Change Procedures
GA/RT6004  Temporary Non-Compliance with Railway Group Standards
GA/RT6006  Derogations from Railway Group Standards
GE/RT8071  Control Facilities for use during Signalling Failures
            (expected to be published Spring 2004)
GI/RT7004  Requirements for the Design, Operation and Maintenance of Points
GI/RT7006  Prevention and Mitigation of Overruns – Risk Assessment
GI/RT7012  Requirements for the Design, Operation and Maintenance of Level Crossings
            (expected to be published Winter 2003)
GK/RT0002  Glossary of Signalling Terms
GK/RT0011  Train Detection
GK/RT0025  Signalling Control and Display Systems
GK/RT0030  Signalling Lockout Systems for the Protection of Personnel On or Near the Line
GK/RT0031  Lineside Signals and Indicators
GK/RT0032  Lineside Signal Aspect Sequences
GK/RT0039  Semaphore and Mechanical Signalling
GK/RT0044  Controls for Signalling a Train onto an Occupied Line
GK/RT0061  Shunters Releases, Ground Frames, Switch Panels and Gate Boxes
GK/RT0063  Approach Locking and Train Operated Route Release
GK/RT0064  Provision of Overlaps, Flank Protection and Trapping

The Catalogue of Railway Group Standards and the Railway Group Standards CD-ROM give the current issue number and status of documents published by RSSB.