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GE/GN8618
Guidance on Mechanical Trainstop System Interface Requirements

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Guidance on Mechanical Trainstop System Interface Requirements

Issue record

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One	September 2012	This guidance note has been issued to support GE/RT8018 issue two which is a post-filtering issue and now contains interface measures only.

Superseded documents

This Rail Industry Guidance Note does not supersede any other Railway Group documents.

Supply

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Part 1 Introduction

1.1 Purpose of this document

1.1.1 This document gives guidance on interpreting the requirements of Railway Group Standard GE/RT8018 issue two Mechanical Trainstop System Interface Requirements. It does not constitute a recommended method of meeting any set of mandatory requirements.

1.1.2 All requirements in GE/RT8018 issue two are reproduced in the sections that follow. Guidance is provided as a series of sequentially numbered clauses prefixed 'GN' immediately below the boxed text to which it relates. Where there is no guidance given, this is stated.

1.1.3 Specific responsibilities and compliance requirements are laid down in the Railway Group Standard itself.

1.2 Copyright

1.3 Approval and authorisation of this document

1.3.1 The content of this document was approved by Control Command and Signalling (CCS) Standards Committee on 17 May 2012.

1.3.2 This document was authorised by RSSB on 29 June 2012.

Part 2 Guidance on Track Subsystem Requirements

GN1 Mechanical trainstop systems were developed to provide automatic train protection functionality on metro-style railways. On such lines, the combination of train speeds, density of traffic and close spacing of trains results in an increased level of operational risk compared to mainline railway operation. Mechanical trainstops have been widely applied on lines used by London Underground Ltd (LUL), including lines of the national rail network over which London Underground trains operate. Mechanical trainstops are also used instead of the Automatic Warning System (AWS) and the Train Protection and Warning System (TPWS) on a limited number of other lines of the national network primarily carrying a metro-style passenger service, including Finsbury Park to Moorgate and parts of the Merseyrail system.

GN2 The mechanical trainstop system is made up of two subsystems:

a) An infrastructure subsystem, comprising:

i) Track-mounted trainstop equipment.

And

ii) Tripcock tester equipment and associated indications.

b) A vehicle subsystem (tripcock equipment).

GN3 The mechanical trainstop system operates on the principle of a mechanical interface between track-mounted trainstops and vehicle-mounted tripcocks.

GN4 Each fitted train has tripcock equipment mounted at the front of the leading vehicle on the right-hand side. The tripcock is connected to the train braking system, so that when it is moved to the activated position, an emergency brake application is automatically initiated.

GN5 Each trainstop incorporates a moveable trainstop arm. The trainstop arm is controlled by the signalling system to be in one of two positions, raised (effective) or lowered (ineffective).

GN6 When the trainstop arm is in its raised (effective) position, the tripcock on a passing train strikes the trainstop arm and the tripcock is moved to its activated position. The tripcock remains in the activated position until it is reset from within the driving cab.

GN7 When the trainstop arm is in its lowered (ineffective) position, the tripcock does not come into contact with the trainstop arm and therefore there is no brake application.

GN8 The trainstop arm moves to its lowered position either:

a) When the associated signal shows a proceed aspect.

Or

b) In the case of a speed control application, when the speed of the approaching train is determined to be sufficiently slow.

GN9 The length of the overlap beyond a trainstop fitted signal should be designed to provide a safe stopping distance beyond the trainstop, so that unauthorised movements past the signal are brought to a stand within the overlap when the train is tripped.

GN10 In the case of trainstops on the approach to buffer stops, the length of line beyond the trainstop should be designed to ensure that a train exceeding a safe speed profile is brought to a stand before the buffer stops.

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GN11 Tripcock testers are provided to indicate to the driver that the tripcock is correctly aligned. Trains are not permitted to enter the trainstop protected area if the tripcock is not correctly aligned unless an agreed operational procedure is implemented.

2.1 Criteria for provision of trainstop equipment

2.1.1 On lines where a mechanical trainstop system is the selected method of train protection, and which at 30 January 2000 were used by trains operated by London Underground Ltd, trainstops shall be provided:

a) At all stop signals.

b) At all signals which control access to a line fitted with trainstops, unless another suitable form of overrun protection is provided.

c) For speed control on the approach to all terminal and bay platforms.

2.1.2 On other lines where a mechanical trainstop system is the selected method of train protection, trainstops shall be provided:

a) At all main stop signals, except those which protect plain line only.

b) At all stop signals which control access to a line fitted with trainstops, unless another suitable form of overrun protection is provided.

c) For speed control on the approach to all terminal and bay platforms.

d) For speed control on the approach to a reduction in permissible speed where:

i) The permissible speed on the approach is 60 mph or more.

And

ii) The reduction in speed is one third or more of the permissible speed on the approach.

GN12 Rationale: Train protection systems are provided to reduce the level of operational risk associated with:

a) A train passing a stop aspect.

b) A train approaching a buffer stop at an excessive speed.

c) A train approaching a reduction in permissible speed at excessive speed.

GN13 These fitment rules are consistent with the Railway Safety Regulations 1999, which include a specific exemption applying to lines previously fitted with trainstops that were used by LUL trains before 30 January 2000.

GN14 The Network Rail lines covered by this exemption include:

a) Queens Park to Harrow and Wealdstone.

And

b) Gunnersbury to Richmond.

GN15 This exemption also applies to lines used by Tyne & Wear Passenger Transport Executive, Strathclyde Passenger Transport Executive, and Serco Metrolink Limited; however, none of these systems use mechanical trainstops on lines shared with the mainline network.

GN16 On lines where this exemption applies, provision of a trainstop at every stop signal is compatible with established LUL practice.

GN17 On lines where the exemption does not apply, the mechanical trainstop system is required to meet the train protection requirements of the Railway Safety Regulations 1999, which are based on the functionality provided by TPWS. In this case it is not mandatory to fit trainstops at stop signals protecting plain line sections; however, where AWS is not provided, existing practice is to provide trainstops at all stop signals.

GN18 In respect of 2.1.1b) and 2.1.2b), the overrun protection system should be designed to prevent a trainstop fitted train from entering a line fitted with trainstops when no movement authority is available. Where trap points exist, these will provide an acceptable alternative.

GN19 In respect of 2.1.2d), mechanical trainstop systems are not generally selected as the train protection system on lines where trains operate at 60 mph or more.

2.1.3 On lines where a mechanical trainstop system is the selected method of train protection, trainstops shall also be provided at other locations where an assessment of the risks demonstrates it to be necessary.

GN20 Rationale: Trainstops have the capability of stopping a train automatically and therefore can be used to mitigate collision risk when a train fails to stop at a signal or other limit of movement authority.

GN21 If, on a particular route, it is decided not to fit trainstops at all plain line signals, a risk assessment should be used to identify additional locations where trainstops should be provided to control specific risks.

GN22 Specific situations where trainstops should be considered for use include:

a) Stop signals which protect plain line but have a level crossing within the route beyond them.

b) Stop signals protecting plain line where the severity of a rear end collision could be particularly serious, for example:

i) Where mixed traffic types operate (for example, metro / light rail and freight trains).

Or

ii) In tunnels.

Or

iii) Where trains beyond the signal are most likely to be stationary (for example, at stations).

c) A fixed trainstop immediately before the stopping point at terminal and bay platforms.

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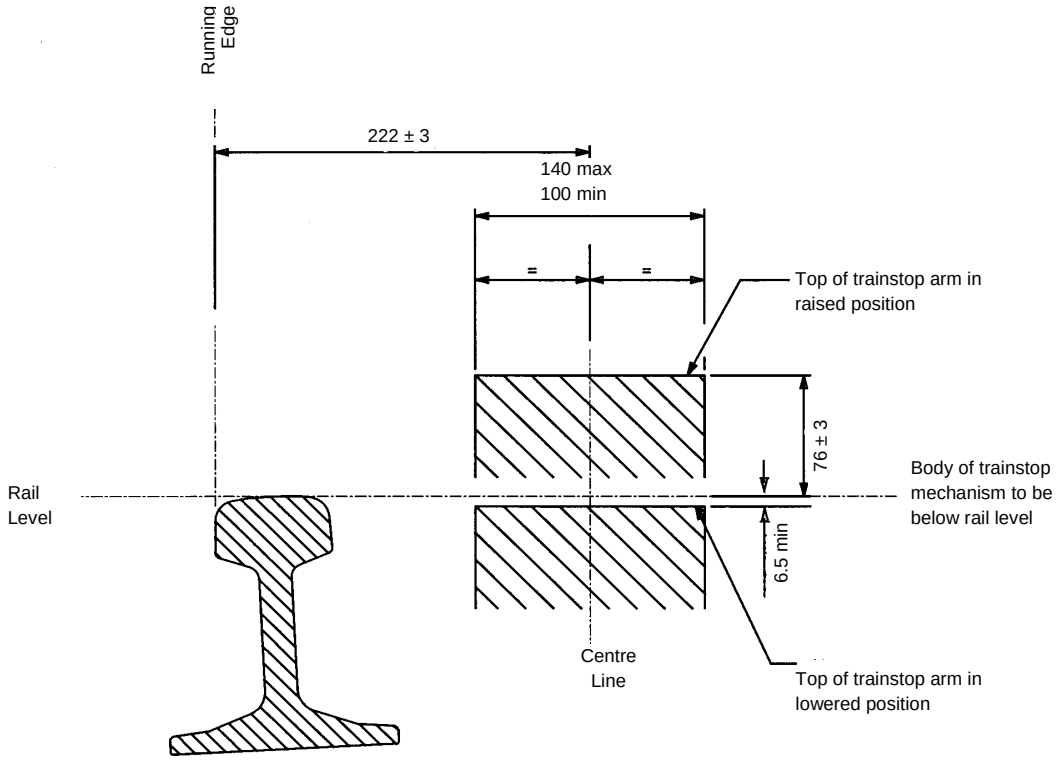
2.2 Trainstop interface parameters

2.2.1 Trainstops shall be fitted to the outside of the right-hand running rail as viewed in the direction to which they apply.

2.2.2 Trainstops shall comply with the parameters shown in Figure 1.



NOTES:

1. View is in the direction of travel of the train.
2. All dimensions are in millimetres.

Figure 1 Mechanical trainstop parameters

GN23 Rationale: Trainstops are fitted so that when the trainstop arm is in the raised position it operates the tripcock equipment fitted to the right-hand side of rail vehicles.

GN24 Rationale: The height of the top of the trainstop arm in the raised and lowered positions is specified to provide technical compatibility with the tripcock in terms of system operation.

GN25 Rationale: The physical parameters and tolerances specified for trainstops are compatible with:

a) The position of tripcocks on vehicles.

And

b) Variations in tripcock position due to vehicle dynamics.

GN26 The risks to be controlled include:

a) A tripcock not being operated when the trainstop is in the raised position.

b) A tripcock being operated when the trainstop is not in the raised position.

c) The trainstop fouling the vehicle envelope.

GN27 Required clearances between trains and infrastructure are set out in GC/RT5212.

GN28 Because trainstops installed on the track are required to physically interact with the tripcocks installed on trains, there has to be a controlled infringement of the normal rules for required clearances between trains and infrastructure.

GN29 Compliance with GC/RT5212 should ensure that:

a) No part of the train, or equipment installed on trains other than tripcocks, should come into contact with trainstops.

And

b) No equipment on the infrastructure other than a raised trainstop arm or a tripcock tester should come into contact with tripcocks on trains.

2.2.3 Trainstops associated with stop signals shall be positioned along the track as near as practicable to the longitudinal position of the signal, but not on the approach to the signal.

GN30 Rationale: When the signal is at danger, a brake application should be initiated as soon as practicable after an unauthorised movement past the signal has occurred.

GN31 Rationale: The trainstop should not initiate a brake application if the train is brought to a stand by the driver before passing the signal.

GN32 The risk being controlled includes a driver not associating a train being tripped with passing a signal displaying a stop aspect.

GN33 It is good practice to position the trainstop within 5 m beyond the signal.

2.2.4 Trainstops provided for speed control applications shall be positioned and controlled to ensure that a brake application is initiated by the trainstop as soon as practicable after an overspeed condition has been detected.

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GN34 Rationale: A train exceeding the permissible speed is a causal factor of a derailment or collision. Trainstops are provided to initiate an emergency brake application whenever a train exceeds a safe speed profile at defined locations.

GN35 In the case of trainstops on the approach to terminal and bay platforms, the position and control of trainstops should be designed to stop the train before it reaches the buffer stops.

GN36 In the case of trainstops provided to enforce speed control on the approach to a reduction in permissible speed, trainstops should be positioned and controlled so that a train will not enter the speed reduction at more than 10 mph over the reduced permissible speed.

2.3 Operation of trainstop equipment

2.3.1 Trainstop arms shall remain in the raised (effective) position at all times unless the criteria are met for moving to the lowered (ineffective) position.

GN37 Rationale: The trainstop system should be capable of stopping any train that is exceeding its movement authority or travelling above the maximum acceptable speed, at any time.

GN38 The normal position of trainstop arms is raised.

GN39 Under failure conditions, including power failure, the trainstop arm should return to the raised position so that it will cause a brake application on the train.

2.3.2 The trainstop arm shall only move to the lowered (ineffective) position:

a) When the associated stop signal is ready to display a proceed aspect.

Or

b) In the case of a trainstop provided for speed control purposes, when sufficient time has elapsed so that the train is known to be travelling at or below the maximum acceptable speed.

Or

c) When a signalled movement authority is available for a train to pass the trainstop in the opposite direction to that for which the trainstop is provided.

GN40 Rationale: The trainstop should not trip a train that is operating within its movement authority and within a safe speed profile.

GN41 The risk being controlled includes a train not being tripped when it exceeds its movement authority or a safe speed profile.

GN42 Trainstops provided for speed control are generally controlled by a timing section of known length which is used to determine the speed of an approaching train. The lowering of the trainstop should be controlled by a timer, which starts when the train is detected at a point on the approach to the trainstop.

GN43 The timer should be set so that, if the train is travelling at or below the maximum acceptable speed, the trainstop will lower before the train reaches it. If the train is travelling at too high a speed the trainstop will still be raised when the train reaches it and the train will be tripped.

GN44 If the tripcock associated with a rear-facing cab hits a raised trainstop provided to control movements in the other direction, it will be deflected in the direction opposite to its normal activation and may cause a brake application. To avoid the possibility of an unwanted brake application and to reduce wear to the trainstop and tripcock from unnecessary contact between them, the trainstop is lowered while a train is passing in the opposite direction.

2.3.3 The trainstop arm shall return to the raised position under any of the following circumstances:

a) As soon as the train has passed the trainstop.

Or

b) When the associated signal is replaced to danger ahead of the train.

Or

c) When there is a loss of power or control to the trainstop equipment.

GN45 Rationale: The trainstop system should be restored as soon as possible to a state that is capable of stopping any train that is exceeding its movement authority or travelling above the maximum acceptable speed.

GN46 Rationale: If a signal is replaced to danger before a train has passed, the trainstop should immediately return to the raised position so that the train is tripped.

GN47 The risk being controlled includes a train not being tripped when it exceeds its movement authority or a safe speed profile.

GN48 The train detection system should be used to control the raising of the trainstop when the signal is replaced to danger by the passage of the train. A timing function may be used to delay the raising of the trainstop arm to ensure that the train is not inadvertently tripped after passing the signal.

GN49 The trainstop equipment and the associated signalling system controls should be designed so that the level of risk associated with safety related failures is acceptable. Safety related failures are set out in GE/RT8106.

GN50 Mechanical trainstops may be operated using electro-mechanical, pneumatic or electro-hydraulic technology. A return mechanism is typically provided to return the trainstop arm to the raised position in the event of a power failure.

2.4 Consistency between trainstop operation and signal aspects

GN51 A proceed aspect should only be displayed towards a signal displaying a stop aspect when the trainstop at the next stop signal and any other trainstops leading up to it are in the raised position.

GN52 A proceed aspect should only be displayed towards a buffer stop when any trainstops on the approach to the buffer stops are in the raised position.

2.4.1 A stop signal shall only display a proceed aspect when the trainstop arm associated with that signal is detected to be in the lowered position.

GN53 Rationale: The proceed aspect means that the train is authorised to pass the signal, on the basis that the line is clear and all moveable infrastructure is detected to be in the required position, including trainstop equipment.

GN54 The risk being controlled includes a driver receiving a movement authority after which the train is unexpectedly tripped after it passes the signal.

2.5 Overlaps associated with mechanical trainstop systems

2.5.1 The overlap provided at a trainstop fitted signal shall be of sufficient length for a train travelling at the permissible speed (or the maximum attainable speed, where this is lower) to stop within the overlap after being tripped by the trainstop.

GN55 Rationale: The overlap provides the safe overrun distance beyond the signal so that a train does not reach a point of potential conflict after passing a stop aspect.

GN56 The risk being controlled includes a train reaching a point of conflict after passing a stop aspect and being tripped by a trainstop.

GN57 An overlap that is capable of containing the movement of a train that has been tripped is sometimes referred to as an 'absolute overlap'.

GN58 The length of an absolute overlap should be compatible with the train stopping distance required, assuming that the train approaches the trainstop at the maximum permissible or attainable speed.

GN59 This is because, where trainstops are used as the primary or only means of train protection and AWS is not provided, drivers do not receive a warning at signals displaying a cautionary aspect. The absolute overlap should control the risk arising from the absence of an AWS warning at the cautionary signal and subsequent intervention at that point if the AWS warning is not acknowledged by the driver.

2.5.2 Where the maximum possible length of the overlap is not compatible with the permissible speed, additional trainstops shall be provided on the approach to the stop signal for speed control purposes so that the train is able to stop within the overlap after being tripped by any of the trainstops.

GN60 Rationale: The overlap provides the safe overrun distance beyond the signal so that a train does not reach a point of potential conflict after passing a stop aspect.

GN61 Rationale: If a train is travelling at too high a speed on the approach to the signal, it should be tripped by a speed control trainstop before reaching the signal. This will reduce the speed of the train early enough to make sure that it will stop before reaching the end of the overlap.

GN62 The risk being controlled includes a train reaching a point of conflict after passing a stop aspect and being tripped by a trainstop.

GN63 The attainable speed at any trainstop beyond the first (including the trainstop at the signal) should be the highest speed at which the train will not be tripped by the preceding trainstop.

GN64 Possible acceleration should only be taken into account if this is considered to be a significant risk, such as on a falling gradient.

2.6 Tripcock testing infrastructure equipment

2.6.1 The infrastructure manager, in consultation with the railway undertaking(s), shall determine where tripcock testing equipment is provided:

a) On trainstop fitted lines.

And

b) On the approaches to trainstop fitted lines.

GN65 Rationale: Drivers need information about the availability of the trainstop system in order to comply with the operational rules on trainstop fitted lines.

GN66 Rationale: Tripcock testers are provided at appropriate locations to check that the tripcock on the train is correctly aligned and in the operationally ready position. The tripcock tester displays a lineside indication so that the driver is able to confirm that the vehicle subsystem is correctly aligned.

GN67 The risk being controlled includes operation of a trainstop fitted train when the position of the tripcock is not compatible with the position of the trainstop arms, resulting in loss of protection.

2.6.2 The consultation process to determine the location of tripcock testing equipment shall take account of the following:

a) The railway undertakings' processes for managing the integrity of tripcocks (for example, checks before entering service, maintenance arrangements, vehicle subsystems for proving the tripcock is correctly aligned and not isolated).

b) The volume and mix of traffic on the route.

c) The number of trainstops on the route.

d) The hazards associated with the particular locations where trainstops are provided.

e) The operational procedures for dealing with trains which fail to operate the tripcock tester.

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GN68 Rationale: Tripcock testing infrastructure should form part of the overall asset management regime for vehicle-mounted tripcocks.

GN69 Tripcock testing equipment is typically provided at the following locations:

a) At locations where trainstop fitted trains enter a line fitted with trainstops, such as depot exits and at converging junctions with non-fitted lines.

And

b) At locations where trains regularly reverse direction.

GN70 The location of each tripcock tester should take account of what needs to be done when a train is found to have a defective tripcock while in service. For example, a train may need to be recessed to allow other trains to pass.

2.6.3 Tripcock testers shall be independent of the operation of both the trainstop equipment and the vehicle subsystem.

GN71 Rationale: Track-based tripcock testing equipment is separate from trainstop equipment and does not depend on the operation of any equipment associated with the tripcock system on board the vehicle.

2.6.4 A trackside indication shall be provided to advise the driver whether or not the tripcock test has been successful.

2.6.5 Each tripcock tester shall display the indications set out in Table 1.

Indication type	**Indication**	**Meaning**
Mechanical trainstop system tripcock tester indication	'TT'	Tripcock test not yet complete
	No indication	Tripcock test successful

Table 1 Tripcock tester indications

GN72 Rationale: Train drivers may be required to stop the train if the trainstop system is indicated to be not operating correctly.

GN73 Rationale: The tripcock tester should provide a distinctive display which is not likely to be confused with any other signal aspect or indication.

GN74 Existing practice on the national rail network is to provide an illuminated alphanumeric indicator similar to a miniature route indicator displaying the letters 'TT'.

GN75 Tripcock testing indicators on LUL lines may be in a different form.

2.6.6 The operation of the tripcock tester shall not cause the vehicle subsystem to change its state.

GN76 Rationale: Tripcock testers are only intended to gauge that the tripcock on the leading vehicle is in the operationally ready position, so that it will be operated by a raised trainstop.

GN77 Rationale: The driver is responsible for controlling the movement of the train on the basis of the indication displayed by the tripcock testing indicator.

GN78 The tripcock tester is typically a device which physically interacts with the tripcock on the train without causing the tripcock to change its position. Alternative devices may be provided to detect the position of the tripcock.

2.6.7 If operation of the tripcock tester includes a mechanical interface with the tripcock on the train, the force necessary to operate the tripcock tester shall be less than that required to activate the tripcock on the train.

GN79 Rationale: During the tripcock testing sequence, the tripcock tester should operate without causing an unexpected brake application.

2.6.8 The tripcock tester shall be compatible with the trainstop parameters set out in 2.2.2.

GN80 Rationale: The active part of the tripcock tester is positioned to interface with the tripcock on the train in a similar manner to a trainstop arm.

GN81 The tripcock tester should not interfere with any other part of the train or with any other equipment mounted in the vicinity.

Part 3 Guidance on Vehicle Subsystem Requirements

3.1 Provision of tripcocks

3.1.1 On a line where a mechanical trainstop system is provided, all trains using the route which are dependent on the mechanical trainstop system for train protection shall be fitted with tripcocks.

GN82 Rationale: Trains should be fitted with trainborne equipment which is compatible with the infrastructure subsystem so that they receive the protection provided by the train protection system.

GN83 If a line is also fitted with another type of train protection system (for example, AWS / TPWS), trains which operate on the line using the other train protection system do not need to be fitted with tripcocks.

GN84 Where trains transition between operation with a mechanical trainstop system and operation with AWS / TPWS or another train protection system, the arrangements should be in accordance with the principles set out in GK/RT0036.

3.2 Interface parameters for tripcocks

3.2.1 Vehicles which come within the fitment criteria set out in 3.1 shall be fitted with a tripcock for each driving position.

GN85 Rationale: The mechanical trainstop system has to operate when the train is driven from any driving position on any vehicle.

3.2.2 Tripcocks shall be positioned:

a) Outside the right-hand running rail in the forward direction of travel.

b) So that the tripcock is activated as soon as practicable after the leading driving cab passes a trainstop.

c) So that the tripcock is fully deflected by a trainstop in its raised position but not in its lowered position.

3.2.3 The envelope for the location of tripcock equipment on vehicles is set out in GM/RT2149.

GN86 Rationale: This provides technical compatibility with the infrastructure subsystem parameters set out in 2.2.

GN87 Rationale: This ensures that a brake application is initiated on the train when required by the control system operating the trainstop to the raised position, or when the trainstop is raised because of a failure condition.

GN88 The dynamic forces required to operate the tripcock and tripcock tester are not defined in this document. The following capabilities should be achieved:

a) The tripcock should be reliably operated by a trainstop in the raised position without causing any damage to the trainstop or its associated mechanism.

And

b) The force required to operate a mechanical tripcock tester should not deflect the tripcock.

GN89 Details of the physical interface parameters between the tripcock and trainstops, and between the tripcock and tripcock testers, should be agreed between the infrastructure manager and the railway undertaking.

GN90 The agreement on physical interface parameters will form part of the process for assessing route compatibility required by GE/RT8270.

3.3 Interface with the train braking system and the driver

3.3.1 Operation of the tripcock shall initiate an emergency brake application, or, where available, an enhanced emergency brake application.

GN91 Rationale: The purpose of the mechanical trainstop system is to stop a train that is exceeding safe operating parameters as soon as possible.

GN92 Where the traction power control is independent of the brake application, the tripcock activation should also shut off the traction power.

GN93 Further requirements for multiple unit train braking systems are set out in GM/RT2044, including enhanced emergency braking.

GN94 Further requirements for the operation of the tripcock subsystem to be recorded on the on-train data recorder, where fitted, are set out in GM/RT2472.

3.3.2 A visual indication that the mechanical trainstop system has initiated a brake application shall be displayed to the driver.

GN95 Rationale: A separate indication is required so that the driver is informed that the brakes have been applied by the trainstop system, and not by another train protection system, by other trainborne systems or by driver action.

GN96 Rationale: The driver needs to know that the train has been stopped by the trainstop system so that the appropriate procedures are implemented before releasing the brakes and restarting the train.

GN97 Requirements for train braking system cab indications are set out in GM/RT2045.

GN98 Some existing rolling stock types do not display a separate indication that the mechanical trainstop system has initiated the emergency brake.

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3.3.3 The emergency brake application, and the associated visual indication shall be maintained until:

a) The train speed is 5 mph or less.

And

b) The tripcock has been reset using the tripcock reset device in the active cab.

GN99 Rationale: If the train has been stopped by the train protection system, the driver is required to comply with specific operational rules before restarting the train. The brakes should only be released after the train has come to a stand and the driver has carried out a specific reset action.

GN100 The risk being controlled is a driver restarting the train without following the required procedures after passing a stop aspect.

GN101 The tripcock reset procedure is set out in operational rules. These procedures should require the driver to apply the brake using the brake controller prior to resetting the tripcock, to prevent inadvertent movement of the train when the tripcock is reset.

3.3.4 The tripcock shall only be reset by operation of the tripcock reset device in the associated driving cab.

GN102 Rationale: So that a tripcock cannot be inadvertently reset from another cab or using a different method.

3.3.5 The tripcock reset device shall not be capable of performing any function other than that of resetting the tripcock subsystem, except that it is permissible to combine it with the uncoupling control on trains that operate only over lines fitted with continuous train detection using track circuits or axle counters.

GN103 Rationale: This is to reduce the level of risk of a driver resetting the tripcock in error when intending to operate another function.

GN104 A separate control device, that is not used for any other function, should normally be provided to reset the tripcock.

GN105 However, it is permissible to combine the tripcock resetting device with an uncoupling control. This is because the uncoupling function will only be used in a cab that is adjacent to another coupled unit. In this case, this cab is not the leading cab and therefore the associated tripcock will not normally be active.

GN106 The combination of these two control functions enables operation of the uncoupling control also to reactivate the tripcock in the cab concerned in readiness for subsequent operation as a separate train.

GN107 Rationale: The combination of the tripcock resetting device with the uncoupling control is only permitted on lines with a signalling system employing continuous train detection to mitigate the risk from inadvertent uncoupling of a train.

GN108 Particular attention should be paid to the procedures for use of a combined tripcock resetting and uncoupling control in circumstances where a train may operate with an active tripcock subsystem in a non-leading cab, for example when assisting a failed train.

3.4 Isolation facilities

3.4.1 Facilities shall be provided to isolate the vehicle subsystem.

GN109 Rationale: It should be possible to isolate the vehicle subsystem on tripcock-fitted vehicles under failure conditions, so that the brakes can be released to allow the vehicles to be moved.

GN110 Rationale: To enable tripcock-fitted vehicles to be operated in multiple, it may be necessary to isolate the tripcocks on intermediate cabs so that they will not be activated by trainstops which return to the raised position after the leading vehicle has passed.

GN111 Rationale: The tripcocks on rear-facing cabs may also be isolated to avoid the possibility of unwanted trips, although these should not occur if trainstops are correctly lowered for opposite direction movements in accordance with 2.3.2c) (see GN44).

GN112 Operational procedures should require the driver to apply the brake using the brake controller prior to isolating the tripcock subsystem, to prevent inadvertent movement of the train when the tripcock is isolated.

3.4.2 The isolation facilities shall not be capable of being operated from the driving position.

GN113 Rationale: To minimise the risk that the trainstop system could be isolated in error.

3.4.3 A visual indication that the equipment is isolated shall be displayed to the driver at the driving position.

GN114 Rationale: To remind the driver that the trainstop system is isolated and that the protection normally provided by trainstops is not available.

Part 4 Guidance on Operating Procedures for Trainstop Systems

4.1 Operational procedures

4.1.1 The infrastructure manager and railway undertakings shall agree, document and implement operational procedures that ensure that the mechanical trainstop system remains effective as a train protection system.

GN115 Rationale: Incorrect or incompatible operational procedures can reduce the effectiveness of the train protection system.

GN116 The agreed operational procedures should address:

a) Trains entering service on a trainstop-fitted line.

b) Trains moving from an unfitted to a fitted line.

c) Trains reversing direction.

d) Trains dividing to form two or more separate trains.

e) Trains joining.

f) Operation during failures of track and vehicle subsystems.

g) Use of vehicle subsystem isolation facilities.

h) Use of trainstop isolation facilities.

4.1.2 It is permissible to secure a trainstop in the lowered position either:

a) During engineering works.

Or

b) When emergency working arrangements are implemented.

GN117 Rationale: At these times, special operational arrangements are established that do not rely on the function of the mechanical trainstop system.

Part 5 Application of this document

5.1 Application - infrastructure managers

5.1.1 Scope

5.1.1.1 The requirements of Part 2 and Part 4 of this document apply to all new infrastructure equipment provided as part of a mechanical trainstop system. The requirements only apply on lines where a mechanical trainstop system is the selected method of train protection.

5.1.1.2 It is permissible for the infrastructure manager to designate specific infrastructure projects, at an advanced stage of development when this document comes into force, for which compliance with the requirements of this document applicable to the design, construction and commissioning of new or altered infrastructure is not mandatory. When designating such projects, the infrastructure manager shall consider:

a) Its responsibilities under its current safety authorisation.

b) The stage reached by the project at the time this document comes into force (for example, approval in principle).

c) Whether compliance is necessary to ensure compatibility with other parts of the infrastructure.

d) Whether compliance is necessary to facilitate the safe working of the railway system having regard to changes to related requirements mandated on another infrastructure manager or a railway undertaking.

e) The economic impact of compliance, but subject to its current safety authorisation in relation to the infrastructure in question.

5.1.1.3 Where any designations are made for infrastructure projects, those projects shall continue to meet the equivalent requirements in the RGSs applying to the project before the designation.

5.1.1.4 Compliance with the requirements of this document relating to inspection, maintenance and in-service condition of infrastructure is mandatory, whether or not the infrastructure concerned is the subject of a designation, as set out above.

5.1.1.5 Action to bring existing mechanical trainstop equipment into compliance with the requirements of this document is not required.

5.1.2 Exclusions from scope

5.1.2.1 There are no exclusions from the scope specified in 5.1.1 for infrastructure managers.

5.1.3 General compliance date for infrastructure managers

5.1.3.1 This Railway Group Standard comes into force and is to be complied with from 01 December 2012.

5.1.3.2 After the compliance date, or the date by which compliance is achieved, if earlier, infrastructure managers are to maintain compliance with the requirements set out in this Railway Group Standard. Where it is considered not reasonably practicable to comply with the requirements, permission to comply with a specified alternative should be sought in accordance with the Railway Group Standards Code.

5.1.4 Exceptions to general compliance date

5.1.4.1 There are no exceptions to the general compliance date specified in 5.1.3 for infrastructure managers.

5.2 Application - railway undertakings

5.2.1 Scope

5.2.1.1 The requirements of Part 3 and Part 4 of this document apply to all work that affects the provision or modification of mechanical trainstop equipment on vehicles. The requirements only apply to vehicles operating on lines where a mechanical trainstop system is the selected method of train protection.

5.2.1.2 Action to bring existing mechanical trainstop equipment into compliance with the requirements of this document is not required.

5.2.2 Exclusions from scope

5.2.2.1 There are no exclusions from the scope specified in 5.2.1 for railway undertakings.

5.2.2.2 The requirements in this document are not applicable to vehicles that operate solely within possessions.

5.2.3 General compliance date for railway undertakings

5.2.3.1 This Railway Group Standard comes into force and is to be complied with from 01 December 2012.

5.2.3.2 After the compliance date, or the date by which compliance is achieved, if earlier, railway undertakings are to maintain compliance with the requirements set out in this Railway Group Standard. Where it is considered not reasonably practicable to comply with the requirements, permission to comply with a specified alternative should be sought in accordance with the Railway Group Standards Code.

5.2.4 Exceptions to general compliance date

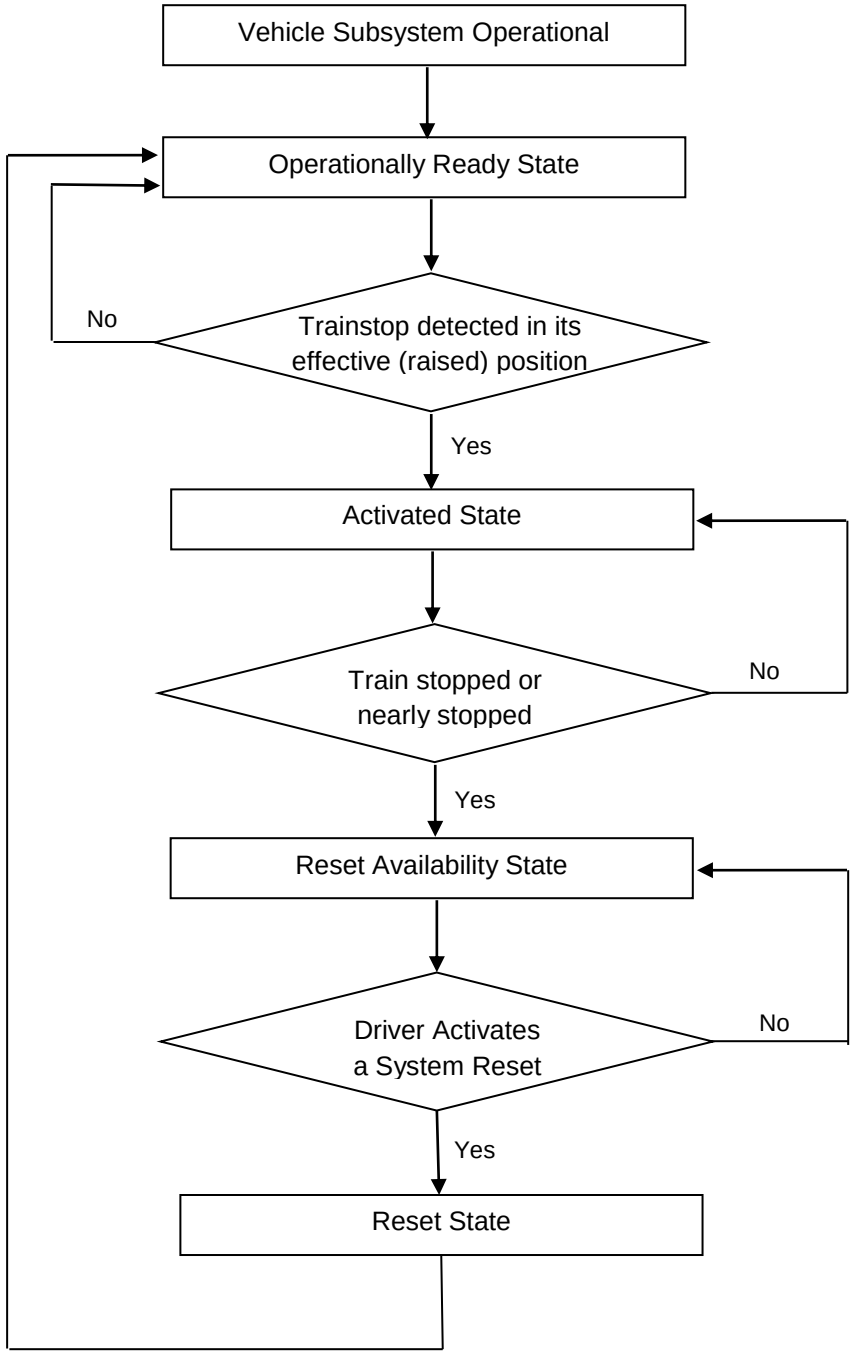
5.2.4.1 There are no exceptions to the general compliance date specified in 5.2.3 for railway undertakings.

5.3 Health and safety responsibilities

5.3.1 Users of documents published by RSSB are reminded of the need to consider their own responsibilities to ensure health and safety at work and their own duties under health and safety legislation. RSSB does not warrant that compliance with all or any documents published by RSSB is sufficient in itself to ensure safe systems of work or operation or to satisfy such responsibilities or duties.

GN118 No guidance is associated with Part 5.

Appendix A Operational States of Vehicle Subsystem



Note: The System Isolation State is not shown

Figure 2 Vehicle subsystem flowchart

Guidance on Mechanical Trainstop System Interface Requirements

GN119 The vehicle subsystem will operate in the defined states set out below, and will change state when the specified conditions are fulfilled. The operational states are shown in the flowchart in Figure 2.

GN120 **Operationally ready state**
When the vehicle driving position is operative the associated vehicle subsystem will be in its operationally ready state. In this state the subsystem is capable of detecting a trainstop in its raised position.

GN121 **Activated state**
When the vehicle subsystem is in its operationally ready state and detects a trainstop in its raised position, it enters its activated state. In this state the subsystem will:

a) Initiate and maintain an emergency (including enhanced emergency where available) brake application.

b) Initiate and maintain a traction power shut-off demand where not inherent in the brake application.

c) Provide a visual indication to the driver that a trainstop brake application has been initiated.

GN122 The transition time of the vehicle subsystem from the operationally ready state to the activated state should be as short as practicable.

GN123 **Reset availability state**
When the vehicle subsystem is in its activated state and the train is stopped or nearly stopped, it enters its reset availability state. In this state the subsystem will:

a) Continue to ensure the brake application is maintained.

b) Continue to ensure a traction power shut-off demand is maintained where not inherent in the brake application.

c) Continue to provide a visual indication to the driver that a trainstop brake application has been initiated.

d) Be capable of being reset by the driver.

GN124 **Reset state**
When the vehicle subsystem is in its reset availability state and the driver has operated the reset device, it enters its reset state. In this state the subsystem will:

a) Cancel the trainstop brake application.

b) Cancel the traction power shut-off demand where not inherent in the brake application.

c) Cancel the visual indication to the driver.

d) Return to the operationally ready state after fulfilling these requirements.

GN125 **System isolation state**

The vehicle subsystem enters this state when the subsystem is isolated by the driver. In this state the subsystem will:

a) Prevent / cancel a trainstop brake application.

b) Prevent / cancel a trainstop-initiated traction power shut-off demand.

c) Provide a visual indication at the driving position to show the system is isolated.

d) Be capable of returning to the operationally ready state when the isolation is removed.

Definitions

Raised (or effective) state (of trainstop)

The status of a trainstop such that it will initiate a brake application on a train passing the trainstop.

Lowered (or ineffective) state (of trainstop)

The status of a trainstop such that it will not initiate a brake application on a train passing the trainstop.

References

The Catalogue of Railway Group Standards gives the current issue number and status of documents published by RSSB. This information is also available from www.rgsonline.co.uk.

RGSC 01	Railway Group Standards Code
RGSC 02	The Standards Manual

Documents referenced in the text

Railway Group Standards

GC/RT5212	Requirements for Defining and Maintaining Clearances
GE/RT8018	Mechanical Trainstop System Interface Requirements
GE/RT8106	Management of Safety Related Control, Command and Signalling (CCS) System Failures
GE/RT8270	Assessment of Compatibility of Rolling Stock and Infrastructure
GK/RT0036	Transitions Between Signalling Systems
GM/RT2044	Braking System Requirements and Performance for Multiple Units
GM/RT2045	Braking Principles for Rail Vehicles
GM/RT2149	Requirements for Defining and Maintaining the Size of Railway Vehicles
GM/RT2472	Data Recorders on Trains – Design Requirements