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Guidance on Lineside Signal Aspect and Indication Requirements

Issue One: December 2014

Rail Industry Guidance Note for GK/RT0058

GK/GN0658

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Guidance on Lineside Signal Aspect and Indication Requirements

Issue record

Issue	Date	Comments
One	December 2014	Original document. This guidance note is the result of an analysis of the lineside signalling system interfaces with authorised users. The guidance given in this guidance note is consistent with implementing a lineside signalling system that is interpretable, which is a pre-requisite of implementing a Control Command and Signalling (CCS) trackside sub-system that supports interpretability compatibility.

Superseded documents

The following Railway Group Standard is superseded, either in whole or in part as indicated:

Superseded documents	Sections superseded	Date when sections are superseded
GK/RT0045 issue three Lineside Signals, Indicators and Layout of Signals	2.1.1a; 2.1.1b; 2.1.2; 2.2.1.1; 2.2.1.2a; 2.2.1.2b; 2.2.1.3a; 2.2.1.3b; 2.2.1.4a; 2.2.1.4b; 2.2.1.4c; 2.2.1.4d; 2.2.2.2; 2.2.4.7; 2.2.4.8; 2.2.5.3; 2.2.5.5; 2.2.5.6; 2.2.5.8a; 2.2.5.8b; 2.2.6.1; 2.2.6.5; 2.2.6.6; 2.2.6.9; 2.2.7.2; 2.2.7.5; 2.2.8.3; 2.2.8.5; 2.3.1.1; 2.3.1.5; 2.3.2.5; 2.3.3.2; 2.3.3.3; 2.4.1.2; 2.4.2.2; 2.4.3.2; 2.4.5.2; 2.4.6.5; 2.4.6.6; 2.4.7.3; 2.4.8.2; 2.4.8.7a; 2.4.8.7b; 2.5.1.1a; 2.5.1.1b; 2.5.2.1; 2.5.3.1a; 2.5.3.1b; 4.1.8; 7.1.1; 7.2.1; 7.3.1; 7.3.2	07 March 2015

GK/RT0045 issue three Lineside Signals, Indicators and Layout of Signals, ceases to be in force and is withdrawn as of 07 March 2015.

Supply

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Part 1 Introduction

G 1.1 Purpose of this document

- G 1.1.1 This document gives guidance on interpreting the requirements of Railway Group Standard GK/RT0058 issue one Lineside Signal Aspect and Indication Requirements. It does not constitute a recommended method of meeting any set of mandatory requirements.
- G 1.1.2 Part 2 provides the rationale and guidance for the signal aspect and indication requirements set out in GK/RT0058 Part 2.
- G 1.1.3 Appendices A to D provide further rationale and guidance relevant to the appearance of signal aspects and indications and their meaning.
- G 1.1.4 Appendix E provides guidance about the purpose of signal aspects and indications and interpretability.

G 1.2 Scope of this document: technical compatibility

- G 1.2.1 Three areas of technical compatibility are relevant to lineside signalling systems:
- a) Readability.
 - b) Interpretability.
 - c) Driveability.
- G 1.2.2 This guidance note provides rationale and guidance relevant to interpretability. Further guidance about the relationship between readability, interpretability and driveability is given in GE/GN8602 (when published).
- G 1.2.3 The scope of this document does not include compatibility of lineside signal aspects and indications with train driving processes when an in-cab signalling system is in use.

G 1.3 Applicable Standards

- G 1.3.1 The eventual aim is to publish all of the technical compatibility requirements relevant to lineside signalling systems in the following Railway Group Standards:
- a) GK/RT0057 sets out the requirements relevant to product readability performance.
 - b) GE/RT8101 sets out the requirements relevant to lineside signalling system readability in the operational context.
 - c) GK/RT0058 sets out the requirements for signal aspects and indications to be interpretable (appearance and meaning).
 - d) GK/RT0070 sets out the requirements for signalling layouts to be driveable.
 - e) GE/RT8102 sets out the requirements for lineside signalling system driveability assessment in the operational context, which is part of the route compatibility assessment before a new or modified lineside signalling system is taken into use.

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- G 1.3.2 In addition to compliance with Railway Group Standards, signalling layout designs should take account of:
- a) Signalling standards published by the infrastructure manager.
 - b) Rail Industry Standards and Guidance Notes, including:
 - i) GK/GN0657.
 - ii) GK/GN0658.
 - iii) GK/GN0670.
 - iv) GE/GN8601.
 - v) GE/GN8602.

G 1.4 The structure of this document

- G 1.4.1 All requirements from Railway Group Standard GK/RT0058 are reproduced with a grey background in this document.
- G 1.4.2 Guidance is provided as a series of sequentially numbered clauses prefixed 'G' immediately below the greyed text to which it relates.
- G 1.4.3 Specific responsibilities and compliance requirements are laid down in the Railway Group Standard itself.
- G 1.4.4 The symbols used in the signalling layout examples comply with BS 376-1:2012 Railway Signalling Symbols, Part 1.

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G 1.6 Approval and authorisation of this document

- G 1.6.1 The content of this document was approved by Control Command and Signalling (CCS) Standards Committee on 16 October 2014.
- G 1.6.2 This document was authorised by RSSB on 24 October 2014.

Guidance on Lineside Signal Aspect and Indication Requirements

Part 2 Rationale and Guidance for Lineside Signal Aspect and Indication Requirements

G 2.1 Signal aspect and indication appearance

- G 2.1.1 The design parameters set out in GK/RT0058 specify the steady state appearance of permitted signal aspects and indications. Further guidance and requirements about signalling transitions, including approach control functionality, are set out in GK/RT0036, GK/GN0670 and GE/GN8612.

Extract from GK/RT0058

Section 2.1 Signal aspects and indication appearance

- 2.1.1 Each lineside signal shall continuously present the relevant signal aspect, except where the signal is configured with approach lighting functionality.

- G 2.1.2 Rationale: Lineside signals should be visible and readable whenever authorised users need to use them to understand signal section or block section limits.

- G 2.1.3 Rationale: The consistent pattern of signal aspects in the field of vision helps authorised users to correctly understand their position within the overall infrastructure layout. Intermittently lit signal aspects would result in a variable appearance and make it more difficult for authorised users to form this understanding.

Extract from GK/RT0058

Section 2.1 Signal aspects and indication appearance

- 2.1.2 A signal shall be configured with approach lighting functionality only if both of the following criteria apply:
- a) The signal does not contribute to the overall readability of signals on other lines.
- And
- b) The relevant signal aspect is readable whenever the signal is approached by a train on the line to which it applies.

- G 2.1.4 Rationale: The signal aspect should be readable so that the driver can confirm the MA applicable to the train being operated.

- G 2.1.5 Approach lighting functionality should be implemented only if a signal sighting assessment confirms that the overall readability of signal aspects and indications will be unaffected or improved by extinguishing a signal aspect until it is needed to convey MA information applicable to an approaching train.

- G 2.1.6 The following situations are examples of where approach lighting functionality can be of benefit:

- a) Where an isolated stop signal is provided at the end of a siding or loop, to reduce the likelihood that drivers of trains operating on the parallel running line would misread the stop aspect as applicable to their train.

And

- b) In the case of a line with a very low train frequency (for example, one train a day or less), the signalling system could be designed to extinguish complete groups of signals when the railway is not being used, to reduce power consumption. In this case, all potential users of the signalling system should be considered, and the design of the signalling control system should take account of the likelihood of signalling system failure.

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G 2.1.7 Where approach lighting functionality is provided, the signal aspect is normally extinguished and should illuminate before the train to which it applies reaches the furthest point at which the authorised user should detect the signal aspect. The point at which the signal aspect is visible may be further away than the point at which the signal aspect is readable.

G 2.1.8 Further rationale and guidance about signal sighting and signal readability assessment requirements are given in GE/GN8601.

Extract from GK/RT0058

Section 2.1 Signal aspects and indication appearance

2.1.3 The interruption of signal aspects and indications that are not designed to flash shall not exceed a single period of 250 mS in any one hour.

G 2.1.9 Rationale: More frequent or longer interruptions observed by authorised users would increase their potential as a distraction or a cause of misinterpretation.

G 2.1.10 In some cases, signalling system technology incorporates a self-test function that results in a brief interruption to the generated display at defined intervals. The permitted interruption parameters are consistent with solid state interlocking systems currently applied in Great Britain (GB).

Extract from GK/RT0058

Section 2.1 Signal aspects and indication appearance

2.1.4 Signalling information shall be conveyed using only the signal aspects and indications set out in Table 1.

G 2.1.11 Rationale: Authorised users interpret the information being conveyed by the signalling system using individual display appearance and display combinations.

Extract from GK/RT0058

Table 1 Displays that convey signalling information

Type of information being conveyed	Conveyed by	Clause or Table reference	
		Individual displays	Display combinations
Movement authority (MA)	Signal aspect	Tables A.1 to A.14	2.2
Repeat MA	Banner repeater indication	Table A.15	Not applicable
Routing	Junction indication	Table B.1	2.3
	Alphanumeric indication	Table B.3	
Repeat routing	Preliminary junction indication	Table B.2	Not applicable
MA + routing	Semaphore junction signal OFF aspect	Tables A.9, A.11 and A.12	2.2
	Flashing signal aspect	Table A.13	Not applicable
	Splitting distant signal aspect	Not applicable	Table A.14
Repeat MA + routing	Splitting banner repeater indication	Not applicable	Table A.16

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Type of information being conveyed	Conveyed by	Clause or Table reference	
		Individual displays	Display combinations
Locally monitored system status	Coloured light signalling indication	Tables C.1 to C.5	2.4
	Alphanumeric indication		
Operating instruction	Coloured light signalling indication	Tables D.1 and D.2	
	Alphanumeric indication		

Table 1 Displays that convey signalling information

- G 2.1.12 Rationale: A consistent appearance helps authorised users to reliably interpret the information being conveyed. A more variable appearance has the potential to increase misinterpretation risk.
- G 2.1.13 GK/RT0058 Appendices A, B, C and D are set out so that individual displays can be selected on the basis of the information that should be conveyed to authorised users.
- G 2.1.14 In some cases the same display is used to convey more than one type of information, which places a greater reliance on authorised users to correctly interpret the information being conveyed. Further rationale and guidance about non-preferred signal aspects and indications are given in the Appendices.
- G 2.1.15 GK/RT0058 sections 2.2, 2.3 and 2.4 set out the requirements for display combinations, which are provided where either:
- The information being conveyed by an individual display is not enough on its own to support the authorised user's understanding of the operational requirement (for example, a junction indication is always presented with a signal aspect).
- Or
- Separate (operationally compatible) information is conveyed at the same time and at the same location (for example, an MA and a train dispatch instruction at a station).
- G 2.1.16 Further rationale and guidance about conveying sets of information using signal aspect and indication combinations are given in G 2.2.
- G 2.1.17 Alphanumeric displays are used to convey a wide range of information types. The particular characters being presented and the operational context in which they are presented help to make them interpretable. Further rationale and guidance about the relationship between alphanumeric indications and the information being conveyed are given in Appendices B, C and D.

G 2.2 Signal aspect and indication combinations

G 2.2.1 Signal aspect combinations

Extract from GK/RT0058

Section 2.2 Signal aspect combinations

2.2.1 Signal aspect combinations shall be presented only in accordance with Table 2.

- G 2.2.1.1 Rationale: Authorised users should not be presented with signal aspect combinations that convey conflicting or illogical MA information because they would be faced with having to decide which information should take precedence. Signal aspect combinations should only be used to convey logical sets of information. Further rationale and guidance about the signal aspect combination configuration are given in GE/GN8601.

Guidance on Lineside Signal Aspect and Indication Requirements

Extract from GK/RT0058

Table 2 Signal aspects that use display combinations

Signal aspect type	Display combination requirements
Subsidiary position light signal OFF aspects	A position light signal aspect presented with a colour light signal red aspect or stop board, as set out in A.3, A.4 or A.5.

- G 2.2.1.2 Further rationale and guidance about subsidiary position light signal OFF aspects are given in Appendix A, sections G A.3, G A.4 and G A.5.

Extract from GK/RT0058

Table 2 Signal aspects that use display combinations

Signal aspect type	Display combination requirements
Splitting distant signal aspects	Two colour light signal aspects presented together, as set out in A.13.

Rationale: Colour light splitting distant signal aspects are more readable than semaphore splitting distant signal aspects. No semaphore splitting distant signals remain within the GB mainline railway.

- G 2.2.1.3 Further rationale and guidance about splitting distant signal aspects are given in Appendix A, section G A.13.

Extract from GK/RT0058

Table 2 Signal aspects that use display combinations

Signal aspect type	Display combination requirements
Semaphore main stop and distant signal arm combinations	The distant arm shall: a) Be positioned below the associated main stop arm and on the same signal post. And b) Be presented in the OFF position only when the associated main stop arm is also presented in the OFF position.

- G 2.2.1.4 Rationale a): The main stop arm is positioned uppermost so that it is prominent, which helps authorised users to interpret the MA information, irrespective of the distant signal aspect. Authorised users understand that the main stop arm is always positioned uppermost.
- G 2.2.1.5 Rationale b): The information conveyed by the distant arm is only relevant when the main stop arm is in the OFF position. When the main stop arm is in the ON position, no MA is available. A distant OFF aspect presented in combination with a main stop aspect would convey conflicting MA information.
- G 2.2.1.6 Further rationale and guidance about semaphore signal aspects are given in Appendix A, sections G A 1, G A 9, G A.10, G A.11 and G A.12.
- G 2.2.1.7 Figure G 1 shows the permitted upper quadrant semaphore main stop and distant signal aspect combinations. The same signal arm ON and OFF aspect combinations apply also to lower quadrant signals.
- G 2.2.1.8 Upper and lower quadrant semaphore signal arms should not be combined within the same signal.

Guidance on Lineside Signal Aspect and Indication Requirements

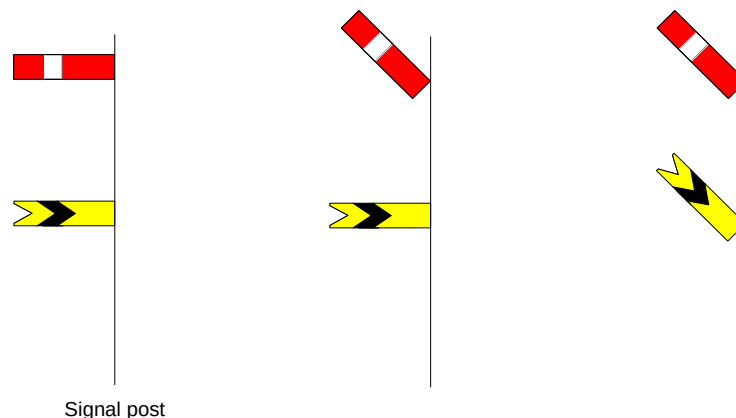


Figure G 1 Permitted semaphore stop and distant signal arm combinations

- G 2.2.1.9 The main stop arm and distant arm controls should incorporate a function to prevent the distant OFF aspect from being inadvertently presented when the main stop arm is in the ON position.

Extract from GK/RT0058

Table 2 Signal aspects that use display combinations

Signal aspect type	Display combination requirements
Semaphore main and subsidiary signal arm combinations	The calling-on (subsidiary) arm shall: a) Be mounted below the associated main stop arm (and where provided, the associated distant arm), and on the same signal post. And b) Be presented in the OFF position only when the associated main stop arm is in the ON position.

- G 2.2.1.10 Rationale a): The main stop arm is uppermost so that it is prominent, which helps authorised users to interpret the limit of MA information, irrespective of the subsidiary aspect. Authorised users understand that the main stop arm is always positioned uppermost.
- G 2.2.1.11 Rationale b): Authorised users interpret which type of MA is available using the combination of signal arm positions. Only one MA should be conveyed at a time by each signal. A signal that presents a main proceed-aspect and a subsidiary proceed-aspect would convey conflicting MA information.
- G 2.2.1.12 Further rationale and guidance about semaphore calling-on signal aspects are given in Appendix A, section G A 4.
- G 2.2.1.13 Figure G 2 shows the appearance of permitted upper quadrant semaphore main and subsidiary signal arm combinations. The same signal arm ON and OFF aspect combinations apply also to lower quadrant signals.
- G 2.2.1.14 Upper and lower quadrant semaphore signal arms should not be combined within the same signal.

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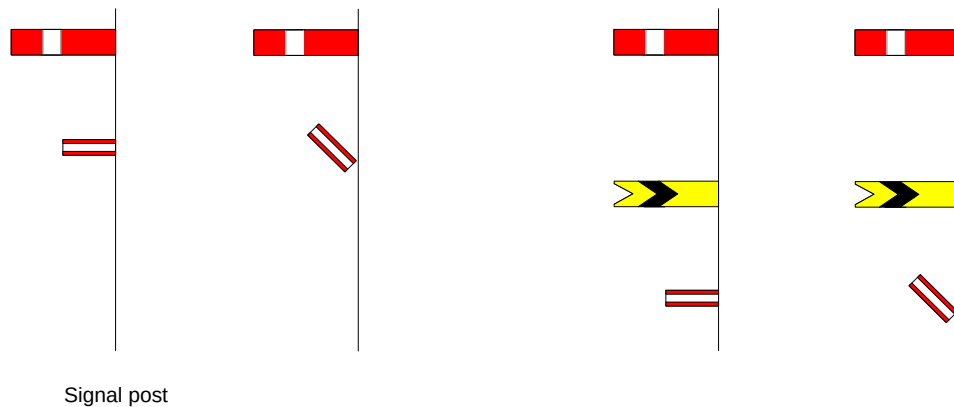


Figure G 2 Permitted semaphore main and subsidiary signal arm combinations

Extract from GK/RT0058

Table 2 Signal aspects that use display combinations

Signal aspect type	Display combination requirements
Semaphore junction signal arm combinations	As set out in 2.2.2 and 2.2.3.

G 2.2.1.15 Semaphore junction signals and semaphore shunting signals use stop arm and / or disc combinations to convey the MA and routing information needed by authorised users to understand which route is set and decide if any action is required to control the speed of the train on the approach to the junction.

G 2.2.1.16 There are two semaphore junction signal arm combination types:

- Stepped multiple signal arms that use spatial compatibility with the track layout to indicate the direction of the route that is set and which permissible speed applies at the junction.

And

- Stacked multiple arms / discs, which do not use spatial compatibility and are more difficult to interpret. This arrangement should only be perpetuated on existing signals to overcome space limitations, for example, where shunting discs are positioned at a low level between adjacent lines.

G 2.2.1.17 Further rationale and guidance about the alternative method of conveying routing information using an alphanumeric route indication in combination with a semaphore OFF aspect are given in G 2.5.

G 2.2.1.18 Further rationale and guidance about semaphore junction signalling layout design, including the requirements for conveying routing information, are given in GK/GN0670 and GE/GN8612. Until these documents are published, the requirements for conveying routing information at semaphore shunting signals should follow the principles for providing route indicators at independent position light signals set out in GK/RT0045 section 5.1.2.

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Extract from GK/RT0058

Table 2 Signal aspects that use display combinations

Signal aspect type	Display combination requirements
Co-acting signal aspects	Duplicated signal aspects.

Table 2 Signal aspects that use display combinations

G 2.2.1.19 Further rationale and guidance about co-acting signals are given in GE/GN8601.

Extract from GK/RT0058

Section 2.2 Signal aspect combinations

- 2.2.2 Semaphore junction signals that convey routing information using stepped, multiple stop arms shall meet the following principles:
- A separate stop arm shall be provided for each route.
 - The relative horizontal position of each stop arm shall correspond with the direction of the applicable diverging route relative to the other signalled routes beyond the junction.
 - The uppermost stop arm shall apply to the route with the highest permissible speed.
 - The relative vertical position of the other stop arms shall correspond with the relative permissible speed on each diverging route.

- G 2.2.1.20 Rationale a) and b): Where authorised users need to obtain routing information at a semaphore signal, this arrangement uses spatial compatibility with the track layout to help them work out which route is set. Authorised users interpret this by comparing the relative position of the signal arm displaying the OFF aspect with the position of the other stop arm(s) displaying the ON aspect(s).
- G 2.2.1.21 Rationale c) and d): Where authorised users need to obtain routing information at a semaphore signal, the relative vertical position of each stop arm helps them to decide which permissible speed applies on the route that is set.
- G 2.2.1.22 Where the same permissible speed applies to more than one route, the applicable signal arms should be mounted at the same height.
- G 2.2.1.23 Further guidance about using spatial compatibility to convey routing (directional) information on the approach to a diverging junction is set out in G 2.3 and G 2.5.
- G 2.2.1.24 Figure G 3 shows an example of a semaphore junction signal that uses stepped multiple stop arms to convey MA and routing information applicable to three directions (straight ahead, left hand and right hand) that have different permissible speeds.

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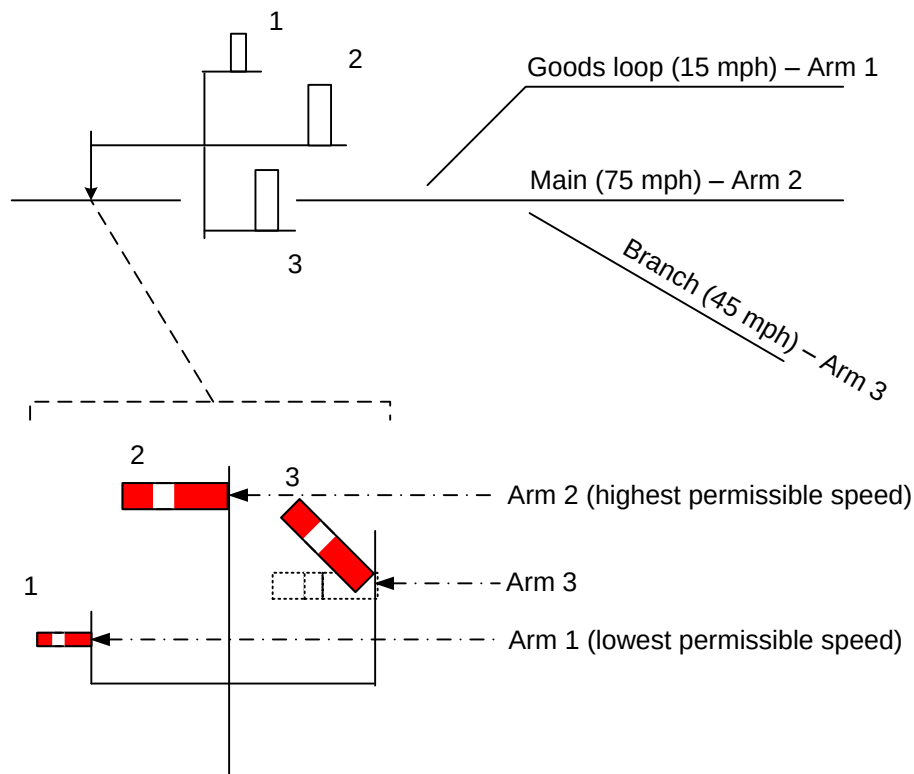


Figure G 3 Example of a semaphore junction signal displaying stepped arms applicable to three routes with an MA shown towards the Branch (route 3)

Extract from GK/RT0058

Section 2.2 Signal aspect combinations

2.2.3 Semaphore junction signals that convey routing information using stacked, multiple stop arms or discs shall meet the following principles:

- A separate stop arm or disc shall be provided for each route.
- The uppermost stop arm or disc shall correspond with the most extreme left-hand route.
- The relative vertical position of each additional stop arm or disc shall correspond with the extent of the divergence from left to right.

G 2.2.1.25 Rationale: Where authorised users need to obtain routing information at a semaphore signal, a consistent relationship between signal arm / disc vertical position and the route that is set helps them to interpret the MA and the direction of the route that is set. They do this by comparing the vertical position of the signal arm displaying the OFF aspect relative to the position of the other stop arm(s) displaying the ON aspect(s).

G 2.2.1.26 The stacked arrangement is non-preferred and should not be used for new signals because:

- Unlike the stepped arrangement, the arrangement of signal arms does not support spatial compatibility with the track layout (see G 2.5).

And

- Unlike the stepped arrangement, the height of the signal arm does not correspond with the relative permissible speed.

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- G 2.2.1.27 Instead, for new semaphore signals, if there is a need to convey routing information, a signal arm / disc and alphanumeric route indication combination should be provided because it conveys more descriptive information about the route that is set.
- G 2.2.1.28 Figure G 4 shows an example of a semaphore junction signal that uses either stacked, multiple stop arms or discs to convey routing information applicable to three routes.

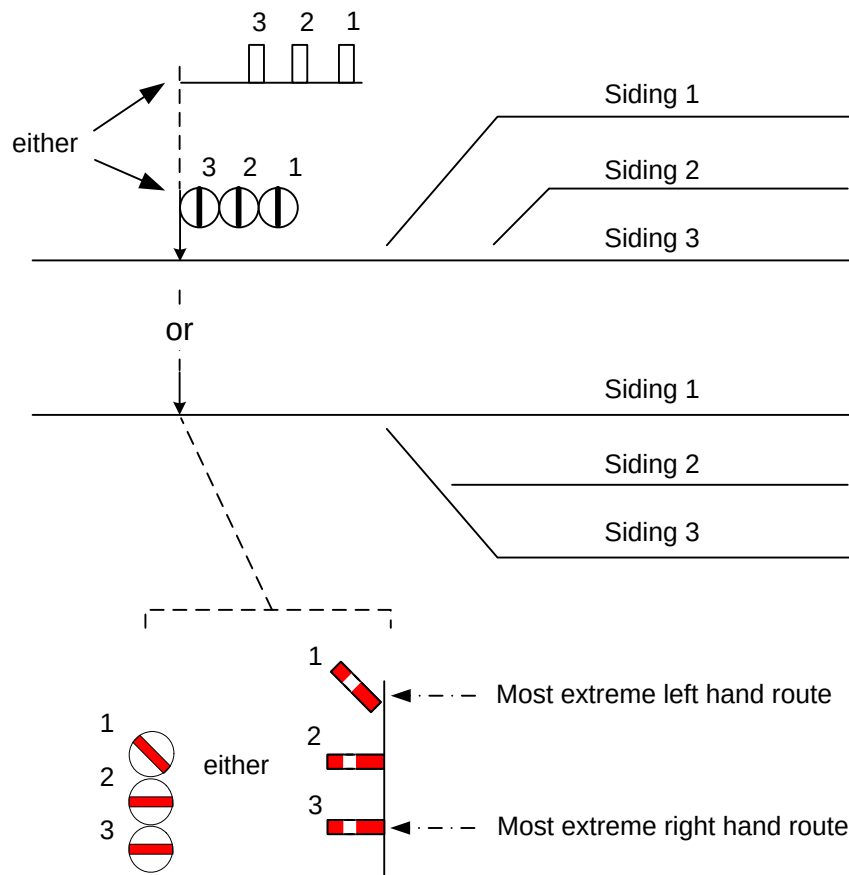


Figure G 4 Example of a semaphore shunting signal that displays stacked arms or discs applicable to three routes (showing left- and right-hand divergences), with an MA along siding 1

G 2.3 Signal aspect and route indication combinations

Extract from GK/RT0058

Section 2.3 Signal aspect and route indication combinations

2.3.1 Junction signal aspect and route indication combinations shall be presented only in accordance with Table 3.

- G 2.3.1 Rationale: Signal aspect and route indication combinations convey the MA and routing information needed by authorised users to understand which route is set and to decide if any action is required to control the speed of the train on the approach to the junction.
- G 2.3.2 Further rationale and guidance about junction signal aspect and route indication design parameters are given in GE/GN8601.
- G 2.3.3 Further rationale and guidance about conveying routing information on the approach to diverging junctions are given in GK/GN0670 and GE/GN8612.

Guidance on Lineside Signal Aspect and Indication Requirements

Extract from GK/RT0058

Table 3 Signal aspect and route indication combinations

Junction signal type	Junction signal aspect type	Permitted route indication type
All junction signals	Stop aspect	None (#1)
#1 See 2.3.2		

G 2.3.4 Rationale: A stop aspect and route indication combination presents an authorised user with conflicting information, as follows:

a) No MA is available.

And

b) Routing information, implying that an MA is available.

G 2.3.5 Rationale: The authorised user might be misled by the route indication into moving the train before an MA is available.

G 2.3.6 Rationale #1: Further rationale and guidance about route indication-proving functionality are given in G 2.3.25 to G 2.3.27.

Extract from GK/RT0058

Table 3 Signal aspect and route indication combinations

Junction signal type	Junction signal aspect type	Permitted route indication type
Colour light signal	Proceed-aspect (#2)	Junction indication
#2 See 2.3.3		

G 2.3.7 Rationale: A junction indication presented on its own would neither be recognisable as a valid indication, nor be interpretable.

G 2.3.8 Rationale: The junction indication should be read with the signal aspect, in order to convey the directional information. The signal aspect provides the reference that allows authorised users to distinguish between left-hand and right-hand indications and therefore interpret the direction of the divergence.

G 2.3.9 Further rationale and guidance about junction indications are given in Appendix B.

G 2.3.10 Figure G 5 shows examples of a colour light junction signal displaying left- and right-hand junction indications that have the same appearance:

a) A position 2 junction indication for a left-hand divergence.

Or

b) A position 5 junction indication for a right-hand divergence.

Guidance on Lineside Signal Aspect and Indication Requirements

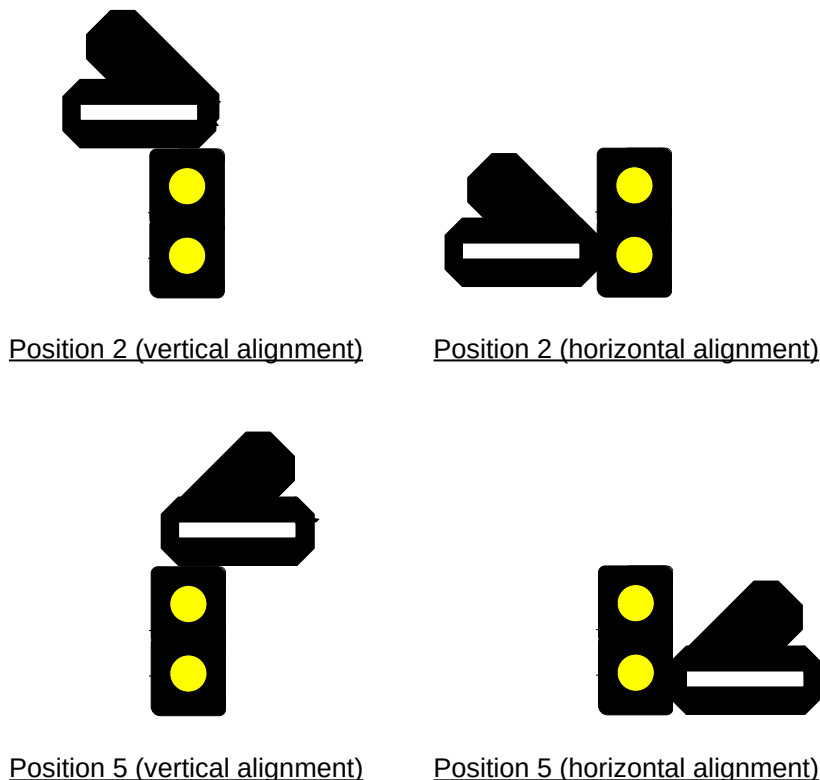


Figure G 5 Example colour light signal aspect and junction indication combinations (position 2 and position 5 shown)

Extract from GK/RT0058

Table 3 Signal aspect and route indication combinations

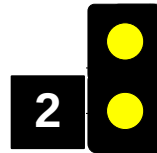
Junction signal type	Junction signal aspect type	Permitted route indication type
Colour light signal	Proceed-aspect (#2)	Alphanumeric indication
#2 See 2.3.3		

- G 2.3.11 Rationale: Authorised users interpret route and destination information using the alphanumeric characters presented with the signal aspect.
- G 2.3.12 The signal aspect qualifies the alphanumeric indication as a route indication. Alphanumeric indications presented on their own are used to convey other types of information. Figure G 6 shows two examples of a colour light signal aspect and alphanumeric route indication arrangement.

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Vertical arrangement



Horizontal arrangement

Figure G 6 Example colour light signal aspect and alphanumeric route indication combinations

Extract from GK/RT0058

Table 3 Signal aspect and route indication combinations

Junction signal type	Junction signal aspect type	Permitted route indication type
Colour light signal	Proceed-aspect (#2)	Junction indication and Alphanumeric indication
#2 See 2.3.3		

- G 2.3.13 Rationale: Authorised users interpret the direction of the divergence using the angle of the junction indication and its position relative to the signal aspect, and interpret route and destination information using the alphanumeric characters.
- G 2.3.14 A colour light signal aspect with a junction indication and an alphanumeric route indication increases the complexity of the information being conveyed and should be presented only where operational benefit arises from it.
- G 2.3.15 This combination has the advantage of conveying directional information that can be interpreted before the alphanumeric route indication is readable. For example, the junction indication can provide an early indication of a diverging route set towards a platform loop or whether the principal route is set. When the diverging route is set, the alphanumeric route indication provides further information later on about which platform the train is to use.
- G 2.3.16 Figure G 7 shows an example of a colour light signal aspect presented in combination with a junction indication and an alphanumeric route indication. The junction indication becomes readable first so that the driver is able to understand that the MA is for a left-hand diverging route. The alphanumeric route indication becomes readable after the train has begun to decelerate and allows the driver to understand that the route is set into platform 3. The signal sighting assessment process is used to confirm that the driver has enough time to read both indications in sequence.

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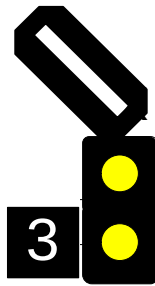


Figure G 7 Example of a junction signal displaying a position 1 junction indication and alphanumeric route indication combination

Extract from GK/RT0058

Table 3 Signal aspect and route indication combinations

Junction signal type	Junction signal aspect type	Permitted route indication type
Semaphore signal	Proceed-aspect	Alphanumeric indication (#3)
#3 See 2.3.4		

- G 2.3.17 Rationale: Authorised users interpret route and destination information using the alphanumeric characters presented with the signal aspect.
- G 2.3.18 Rationale #3: Further rationale and guidance about differentiating between route indications presented with main, subsidiary and shunting signal aspects are given in G 2.3.31 to G 2.3.34.
- G 2.3.19 An alternative method of conveying routing information in semaphore signalling areas is to provide a separate signal arm / disc for each route.
- G 2.3.20 Figure G 8 shows three examples of semaphore signal arm / disc and alphanumeric route indication combinations.

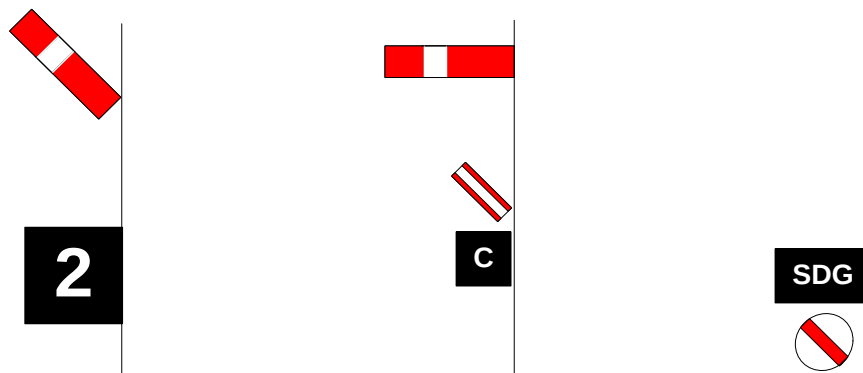


Figure G 8 Examples of semaphore signal aspect and route indication combinations

Guidance on Lineside Signal Aspect and Indication Requirements

Extract from GK/RT0058

Table 3 Signal aspect and route indication combinations

Junction signal type	Junction signal aspect type	Permitted route indication type
Independent or subsidiary position light signal	Proceed-aspect	Alphanumeric indication (#3)
#3 See 2.3.4		

Table 3 Permitted signal aspect and route indication combinations

- G 2.3.21 Rationale: Authorised users interpret route and destination information using the alphanumeric characters presented with the signal aspect.
- G 2.3.22 Rationale #3: Further rationale and guidance about differentiating between route indications presented with main, subsidiary and shunting signal aspects are given in G 2.3.31 to G 2.3.34.
- G 2.3.23 Figure G 9 shows two examples of position light signal aspect and alphanumeric route indication combinations.

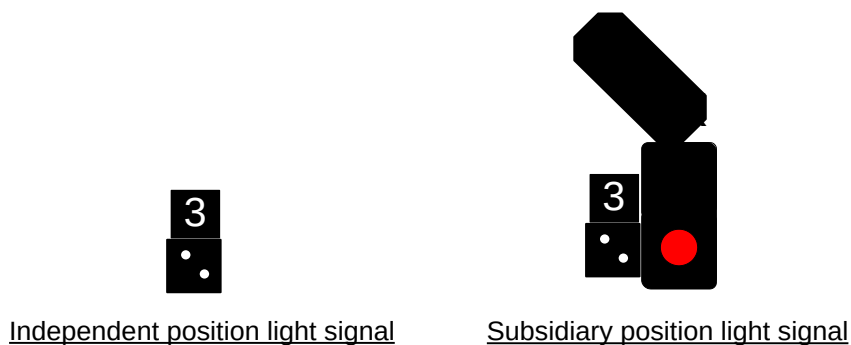


Figure G 9 Examples of position light signal aspect and route indication combinations

- G 2.3.24 Further rationale and guidance about subsidiary signal aspects are given in G 2.2.1.

Extract from GK/RT0058

Section 2.3 Signal aspect and route indication combinations

2.3.2 A route indication and stop aspect combination shall be presented only for route indication-proving purposes immediately before the proceed-aspect is presented.

- G 2.3.25 Rationale: An incorrectly presented route indication has the potential to increase misinterpretation risk. Unless there is no operational risk associated with misreading, the signalling system should be designed to confirm that the route indication is properly presented before the proceed-aspect is presented.
- G 2.3.26 Where route indicator proving is provided, the proceed-aspect should be presented as soon as possible after the route indication has illuminated. Three seconds should provide enough time to complete the route indicator-proving function. Any longer would increase the probability of a driver error.

Guidance on Lineside Signal Aspect and Indication Requirements

- G 2.3.27 If the route indication is detected to be incorrectly presented, the main stop aspect should continue to be presented.

Extract from GK/RT0058

Section 2.3 Signal aspect and route indication combinations

2.3.3 A route indication shall not be presented in combination with any of the following signal displays:

- Flashing single yellow.
- Flashing double yellow.
- Any splitting distant signal aspect where both signal heads are illuminated.

- G 2.3.28 Rationale: A junction signal aspect and route indication combination that conveys routing information applicable to two diverging junctions would be confusing to authorised users and would therefore increase the level of misinterpretation risk.

- G 2.3.29 Figure G 10 shows an example of where this restriction would apply to signals that present junction approach flashing aspects and / or splitting distant aspects. Signals AB 101 and AB 103 present flashing aspects to convey advance routing information on the approach to signal AB 105. Flashing aspects are not presented on the approach to signal AB 701 because AB 103 displays the position 1 junction indication.

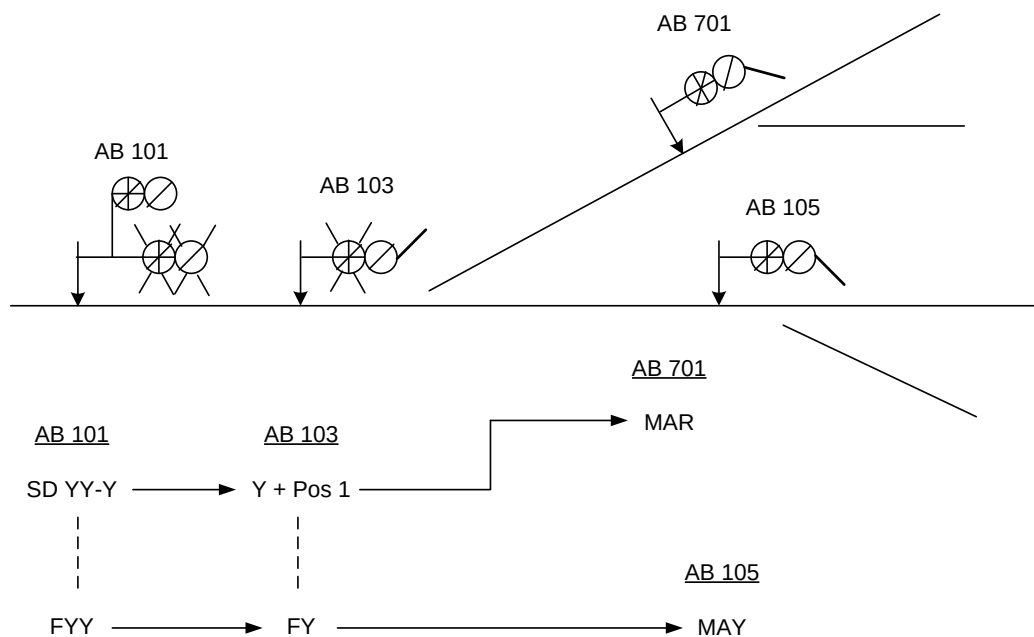


Figure G 10 Example of a flashing aspect presented at a junction signal

- G 2.3.30 Further guidance about methods of conveying advance routing information on the approach to diverging junctions is given in GK/GN0670 and GE/GN8612.

Guidance on Lineside Signal Aspect and Indication Requirements

Extract from GK/RT0058

Section 2.3 Signal aspect and route indication combinations

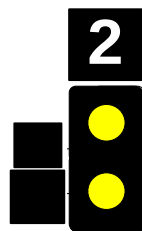
2.3.4 When an alphanumeric route indication is presented by a main stop signal that also incorporates a subsidiary signal aspect (unless the exception set out in 2.3.5 applies):

- a) The alphanumeric route indications presented with main proceed-aspects shall be in a different position to any alphanumeric route indications presented with the subsidiary aspect.

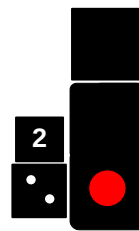
And

- b) Any alphanumeric route indications presented with the subsidiary aspect shall appear to be at least 50% smaller than the alphanumeric route indications presented with the main proceed-aspects.

- G 2.3.31 Rationale: If the signal aspect and route indication are not read at the same time, then there is an increased chance that the authorised users will misinterpret the MA. The different combinations help to address the risk that the authorised user will incorrectly perceive an MA conveyed by a main aspect when the route indication applies to a subsidiary signal route (which may be a permissive MA).
- G 2.3.32 The preferred arrangement for displaying alphanumeric route indications at main and subsidiary signals is set out in 2.3.4. Figure G 11 shows an example of alphanumeric route indications that use different position and size parameters to help authorised users correctly interpret the MA and routing information being conveyed.



When a main route is set



When a subsidiary route is set

Figure G 11 An example of different alphanumeric route indications presented with main proceed-aspects and subsidiary position light signal aspects

- G 2.3.33 The terms 'standard alphanumeric route indicator (SARI)' and 'miniature alphanumeric route indicator (MARI)' are sometimes used to describe equipment that displays alphanumeric route indications.
- G 2.3.34 Further guidance about signal and route indicator combination design parameters is given in GE/GN8601.

Extract from GK/RT0058

Section 2.3 Signal aspect and route indication combinations

2.3.5 A main stop signal shall present alphanumeric route indications that have a similar size and positional relationship with the main and subsidiary aspects only if the following criteria apply:

- a) Physical environment and structure gauge limitations mean that compliance with 2.3.4 is not feasible.

And

Guidance on Lineside Signal Aspect and Indication Requirements

- b) A signal sighting assessment confirms that sufficient mitigation will be available to control the risk from a driver misinterpreting the MA.

- G 2.3.35 Rationale: Physical limitations sometimes mean that it is not always possible to present alphanumeric route indications that are significantly differentiated by display size and position. In this case, the signal sighting assessment process should be used to confirm that the proposed signal and indicator design supports readability and interpretability at that location.
- G 2.3.36 Such arrangements are non-preferred because they increase the likelihood that a driver will misinterpret the MA after reading the route indication.
- G 2.3.37 The signal sighting committee should recommend such an arrangement only to overcome limited clearance constraints (for example, a signal located in a tunnel).
- G 2.3.38 Further guidance about signal sighting assessment of alphanumeric route indications is given in GE/GN8601.

G 2.4 Signal aspect and supplementary indication combinations

Extract from GK/RT0058

Section 2.4 Signal aspects and supplementary indication combinations

- 2.4.1 Signal aspect and supplementary indication combinations shall be presented, only as set out in Table 4.

- G 2.4.1 Rationale: The supplementary information conveyed by the indications set out in GK/RT0058 Table 4 is compatible with the MA information conveyed by the associated signal aspect. Other types of information would conflict with the MA information being conveyed and therefore should be conveyed on its own.
- G 2.4.2 GK/RT0058 Table 4 sets out all permissible combinations.
- G 2.4.3 Complex combinations of signal aspects, route indications and signalling indications should be avoided because they have the potential to increase misinterpretation risk. In most cases, a maximum of three separate displays should be sufficient to convey the MA, routing and any supplementary information needed at each location.

Extract from GK/RT0058

Table 4 Signal aspects and supplementary indication combinations

Signal type	Signal aspect	Permitted supplementary indication	Additional permitted supplementary indication
Stop signal (excluding stop board)	Stop aspect	'TT'	None

- G 2.4.4 Rationale: On some lines fitted with a mechanical train-stop system, the 'TT' indication is presented at the first stop signal beyond the trip-cock test equipment to provide information that the trip-cock test has failed. In this case, the signal also denotes the limit of MA for that train when the train protection system might not be capable of stopping the train if it exceeds the MA.
- G 2.4.5 Rationale: All other supplementary indications are associated with train dispatch procedures or train movements and so are incompatible when a train does not have an MA.

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Extract from GK/RT0058

Table 4 Signal aspects and supplementary indication combinations

Signal type	Signal aspect	Permitted supplementary indication	Additional permitted supplementary indication
All stop signals	Proceed-aspect	'CD' or 'RA' (#1)	None
		Loading / unloading indication	
		Flashing white light	
Isolated distant signal		'CD' or 'RA' (#1)	None
#1 Where both indications are presented at the same signal, the 'RA' indication shall supersede the 'CD' indication			

- G 2.4.6 Rationale: The information conveyed by the permitted supplementary indications is compatible with the availability of an MA.
- G 2.4.7 Rationale #1: The train should not be dispatched until the doors have been closed.
- G 2.4.8 The signalling system should include a control to prevent the 'RA' indication from being presented when the signal is displaying a stop aspect. Correct operation of train dispatch indications is also managed using operational procedures.

Extract from GK/RT0058

Table 4 Signal aspects and supplementary indication combinations

Signal type	Signal aspect	Permitted supplementary indication	Additional permitted supplementary indication
Banner repeater	ON aspect	None	

- G 2.4.9 Rationale: All supplementary indications are associated with train dispatch procedures or train movements and so are incompatible when a train does not have an MA.

Extract from GK/RT0058

Table 4 Signal aspects and supplementary indication combinations

Signal type	Signal aspect	Permitted supplementary indication	Additional permitted supplementary indication
Banner repeater	OFF aspect	'CD' or 'RA' (#1)	None
#1: Where both indications are presented at the same signal, the 'RA' indication shall supersede the 'CD' indication.			

- G 2.4.10 Rationale: The 'CD' or 'RA' indications are compatible with the availability of an MA.
- G 2.4.11 Rationale #1: The train should not be dispatched until the doors have been closed.
- G 2.4.12 At a station, a banner repeater indicator may be used to provide the function of a signal OFF indicator and combined with the 'CD/RA' indications.
- G 2.4.13 Further information about signalling indications associated with train dispatch systems is given in GE/GN8560.