



EAST COAST MAINLINE LONDON TO PETERBOROUGH

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1 Route Information

1.1 History

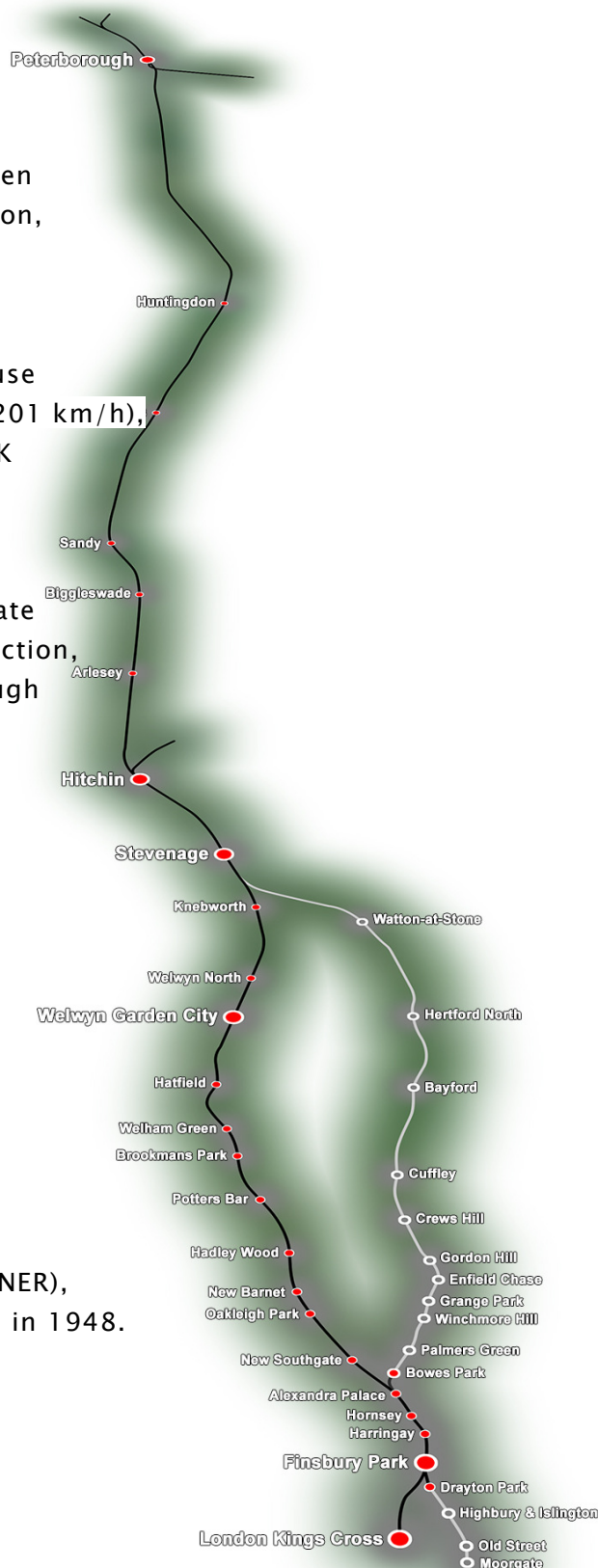
The East Coast Mainline (ECML) is a 393-mile (632km) high-speed railway link between London, Peterborough, Doncaster, York, Darlington, Newcastle and Edinburgh.

The line is classed as a high-speed railway because most of it meets the speed criteria of 125 mph (201 km/h), and made the ECML the fastest mainline in the UK until the opening of High Speed 1 in 2007.

The East Coast Mainline was built by three separate railway companies, each working on their own section, with the intention of linking up to form the through route that became the East Coast Mainline.

- **The North British Railway**
(Edinburgh to Berwick-on-Tweed)
- **The North Eastern Railway**
(Berwick-on-Tweed to Shaftholme)
- **The Great Northern Railway**
(Shaftholme to Kings Cross)

In 1923 these three companies were merged and became the London and North Eastern Railway (LNER), which went on to become part of British Railways in 1948.



Kings Cross Station



Kings Cross station opened in 1852 and took its name from the Kings Cross area of London, named after a monument to King George IV, which was eventually demolished in 1845.

Today, Kings Cross station is the London hub of the great Northern Railway and the southern terminus of the East Coast Main Line, one of the UK's major railway networks. Some of its most important long-distance destinations are Leeds, Newcastle and Edinburgh. It also hosts outer-suburban services



to Hertfordshire, Bedfordshire and Cambridgeshire, as well as fast regional services to Cambridge, Kings Lynn and Peterborough. Kings Cross is one of the busiest railway hubs in the UK.

Peterborough Station



Peterborough station opened in 1850 and is located approximately 76.5 miles (123.1 km) north of Kings Cross. The station is a major interchange, benefiting from serving both the north–south ECML services, as well as East–West long–distance and local services.

It was the first station on the ECML to be electrified so consequently has the first mast to be installed as part of the electrification project, which can be found behind platform 1.



Line Features



The line is mainly four tracks, however there are two twin-track sections; the first is near Welwyn North Station as you cross the Viaduct and pass through two tunnels and the second is between Huntingdon and Peterborough.



1.2 Rolling Stock

An East Coast HST (High Speed Train) is included with this route. These trains typically run services from Kings Cross to Inverness and Aberdeen via Edinburgh (lines north of Edinburgh are not electrified).



First Capital Connect run suburban and commuter services north from Kings Cross using Class 365 EMUs (Electric Multiple Units). The Class 365 is also included with this route.



2 Class 365 Electric Multiple Unit

2.1 Class 365

The Class 365 electric multiple units were built by ABB/Adrantz in York from 1994.

All Class 365 units in service have received front-end cab modifications by WAGN (West Anglia Great Northern) to supply them with air conditioning. This new front-end design has given the Class 365 the nickname "The Happy Train" due to its smiling appearance!



All 40 Class 365 units currently in service have received interior refurbishment. The two toilets on-board were also repainted. These units are all in FCC (First Capital Connect) livery, with the exception of four units that display WAGN advertising.

2.2 Design & Specification

TOPS Number	Class 365
Unit Numbering	365501–365541
Formation	DMCO(A)+TSO+PTSO+DMCO(B)
Unit Weight	151.62 tonnes
Vehicle Length	68ft 6in (DMCO/DMSO), 65ft 10in (TSOL+PTSOL)
Vehicle Width	9ft 3in (2.8m)
Body Construction	Aluminium body with steel ends
Power Collection	25kV AC Overhead Line Electrification
Vehicle Power	1,684HP (1,256kW)
Design Speed	100 MPH (161km/h)
Coupling Type	Tightlock

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Brake Types	Air Regenerative
Seating	12 First & 255 Standard

3 Creating a Class 365 train set

3.1 Scenario Editor (if creating new scenarios)

To get the Class 365 ready for selection in a scenario that is not located on the East Coast Mainline, you will need to enable it in the object set filters, which will add it to the rolling stock browser list.

Follow these steps:

1. Enter the Scenario Editor. (Note: If a route is locked it will need to be unlocked first before you can enter the Scenario Editor. Unlock by clicking the padlock icon in the bottom right of the screen).
2. Click the Object Set Filter button (the small blue cube on the middle left panel).
3. In the new window which opens on the right hand side, select the following:
RSC / ECMLS
The Class 365 vehicles will now appear in the list of rolling stock.
4. You may need to repeat this process on other routes or scenarios where you wish the Class 365 to be available.

3.2 Assigning Destinations and Numbers

For developers wishing to make use of the units in their own scenarios and routes, it is possible to customise the Destination Display during creation of a scenario. This allows the train to correctly display an appropriate destination and nameplates if appropriate. In order to display a specific destinations and nameplates, the correct value must be entered into the vehicle properties window. This number consists of a 13 digit value containing both letters and numbers.

The 13 digit value is arranged like so: **FFFFFFNSSSSD**

FFFFFF	= the Unit number displayed on the front of the driving vehicle
N	= the Nameplate or use # if no nameplate required (See the list below)
SSSS	= the Vehicle number displayed on the side of the coach
D	= the Destination (See the list below)

Example : 365506A65899p

(where "A" is for "The Royston Express" and "p" is for "Peterborough")

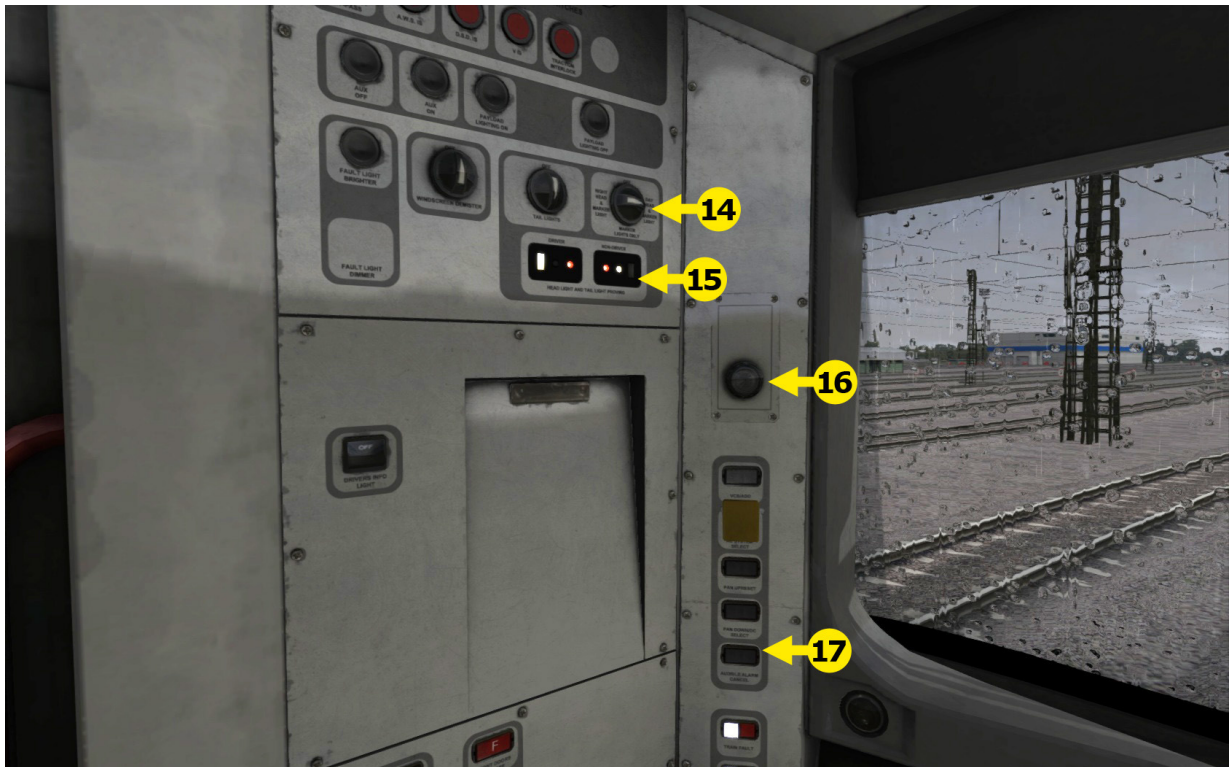
So the above value results in unit 365506, with vehicle number 65899, displaying "Peterborough" as the destination.

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a	Alexandra Palace	j	Liverpool Street	s	Stevenage
b	Potters Bar	k	Kings Cross via Stevenage	t	Letchworth Garden City
c	Class 365	l	Hertford North	u	Huntingdon
d	Drayton Park	m	Moorgate	v	Manningtree
e	Ely	n	St Neots	w	Welwyn Garden City
f	Finsbury Park	o	Colchester	x	Not in Service
g	Gordon Hill	p	Peterborough	y	Special
h	Hitchin	q	Peterborough via Stevenage	z	Blank
i	Ipswich	r	Kings Lynn		
A	The Royston Express	B	Hornsey Depot	C	Captain George Vancouver
D	The Fenman	E	Robert Stripe – Passengers' Champion	F	The Intalink Partnership
G	Rufus Barnes – Chief Executive of London Travelwatch for 25 years	H	Daniel Edwards – Cambridge Driver 1974–2010		

4 Driving the Class 365

4.1 Cab Controls



Main console		7	Speed Set/Cruise Control	14	Headlight Switches
1	Emergency Brake	8	AWS Sunflower Display	15	Headlight Display
2	Reverser	9	Wipers	16	DRA
3	Combined throttle and brake	10	Horn	17	Pantograph Controls
4	Brake Gauges	11	Cab Light		
5	Speedometer	12	Sander		
6	AWS Acknowledge	13	Dash Light		

4.2 Driver Reminder Appliance (DRA)

The class 365 is equipped with a Driver Reminder Appliance (DRA). This is a manual switch which, when set, prevents the driver from applying power to move their train. It should be set when stopping at a station and unset when moving off – but only after confirming a proceed signal aspect.



- To set the DRA, click the DRA plunger. The plunger will glow red when set.



- To unset the DRA, click the plunger again. The plunger will no longer glow red.

4.3 Troubleshooting

The Class 365 Electric Multiple Unit has a number of safety systems in place to prevent the unit from moving unintentionally. If the vehicle won't move, check the following:

- **Line Light** is not illuminated.
 - Ensure the pantograph is up and press the **Pantograph** button or press the P key. This light should now illuminate.
- **DRA** light is illuminated
 - Toggle the **DRA** button so the light is not illuminated to allow the vehicle to apply power.
- **Directional Lever**
 - The directional lever must be in the Forward or Reverse position.
- **Emergency Alarm** is active
 - Deactivate the vigilance alarm if active.
 - Move the combined power / brake to the emergency position and release to deactivate the emergency alarm.
- **Combined power / brake** handle is in a power notch
 - Move the combined power / brake handle to notch 0 to reset the handle.

5 Scenarios

5.1 Peterborough Nene Sidings Departure Tutorial

Drive from Carriage Sidings into Peterborough Station to learn the basics of operating the controls on the Class 365.

- **Duration** **10 Minutes**
- **Start Location** **Nene Carriage Siding**

5.2 Kings Cross Empty Stock Tutorial

Drive from Kings Cross to Hornsey Depot to learn the basics of operating the controls on the Class 365.

- **Duration** **15 Minutes**
- **Start Location** **Kings Cross**

5.3 Peterborough Southbound Stopper

A passenger service from Peterborough to London Kings Cross.

- **Duration** **75 Minutes**
- **Start Location** **Peterborough**

5.4 North to Hitchin

A passenger service from Kings Cross to Hitchin.

- **Duration** **40 Minutes**
- **Start Location** **Kings Cross**

5.5 Welwyn Garden City – Down Slow from London (Part 1)

Drive a local stopping passenger service from London Kings Cross to Welwyn Garden City.

- **Duration** **45 Minutes**
- **Start Location** **Kings Cross**

5.6 Welwyn Garden City – Back Up to London (Part 2)

Drive a return southbound stopping passenger service back from Welwyn Garden City to London Kings Cross.

- **Duration** **50 Minutes**
- **Start Location** **Welwyn Garden City**

5.7 Back to Bounds Green

Drive an early evening High Speed Train (HST) service from Peterborough to London Kings Cross and then take the empty stock to Bounds Green Depot for stabling.

- **Duration** **80 Minutes**
- **Start Location** **Peterborough**

5.8 The Staff Train

An early morning passenger service from Peterborough to Kings Cross Station.

- **Duration** **80 Minutes**
- **Start Location** **Peterborough**

5.9 In a Hurry

An evening passenger service from London Kings Cross to Peterborough.

- **Duration** **50 Minutes**
- **Start Location** **Kings Cross**

6 Signals

6.1 Main Signal Head Aspects



Colour light signals are used for controlling running movements. They display aspects by means of red, yellow and green coloured lights.

Signal Aspect	Description	Instruction to Driver
Red light	Danger	Stop.
Single yellow light	Caution	Proceed: be prepared to stop at the next signal.
Double yellow lights	Preliminary caution	Proceed: be prepared to find the next signal displaying one yellow light.
One flashing yellow light	Preliminary caution for a diverging route	Proceed: Be prepared to find the next signal displaying one yellow light with feather junction indicator for diverging route(s).
Double flashing yellow lights	Indication of diverging route ahead of the next but one signal	Proceed: Be prepared to find the next signal displaying one flashing yellow light.
Green light	Clear	Proceed: The next signal is displaying a proceed aspect.

6.2 Theatre Type Signals



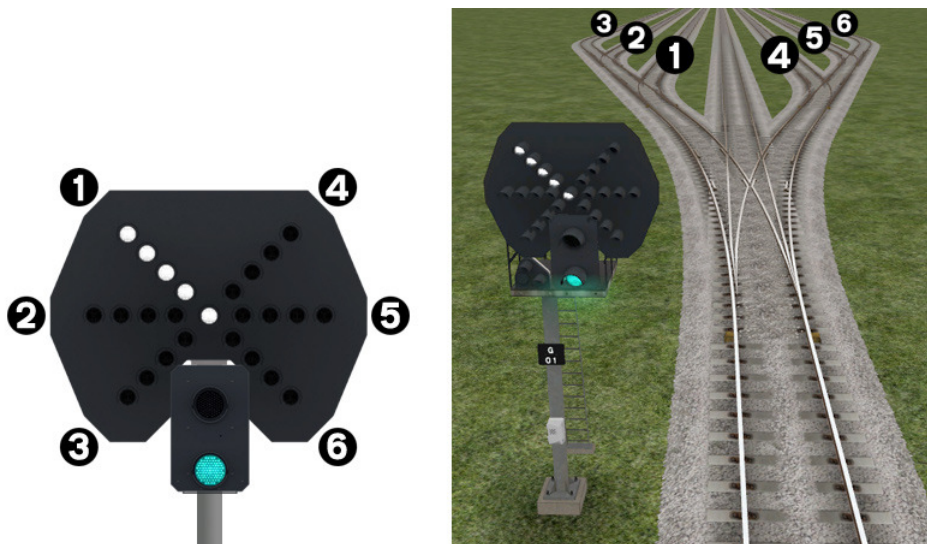
A Theatre alphanumeric route indicator indicates the route to be taken using numbers or letters (or a combination of numbers and letters).

A Theatre indicator is often used to show the arrival platform number for a service.

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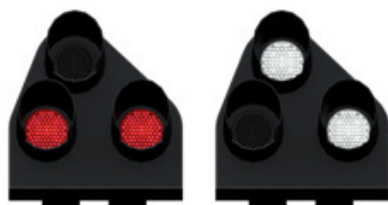
Feather Type Signals

A Feather junction indicator indicates a diverging route to be taken by the angle at which a line of five white lights is displayed. (*Position 1 shown*)



Feather Indication	Instruction to Driver
No Feather Indication	Obey main aspect, straight-ahead route is set
Position 1 indication	Obey main aspect, expect divergence to left
Position 2 indication	Obey main aspect, expect divergence to left more extreme than that for position 1
Position 3 indication	Obey main aspect, expect divergence to left more extreme than that for position 2
Position 4 indication	Obey main aspect, expect divergence to right
Position 5 indication	Obey main aspect, expect divergence to right more extreme than that for position 4
Position 6 indication	Obey main aspect, expect divergence to right more extreme than that for position 5

6.3 Ground Signals and Position Light Signals



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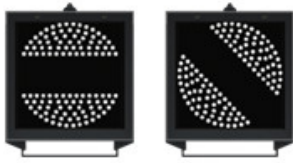
Ground Signals and Position Light Signals (PLS) display their aspects by means of the position and colour of lights. Ground Signals are always illuminated and can have miniature theatre indicators attached whereas PLS only illuminate to allow a train to pass in to an occupied section of line and are mounted as an addition to a main signal head.

Signal Aspect	Description	Instruction to Driver
Two red lights	Danger	Stop.
No aspect (where associated with a main aspect)		Obey main aspect.
Two white lights	Caution	The line ahead may be occupied. Proceed cautiously towards the next stop signal, stop board or buffer stops. Be prepared to stop short of any obstruction. The associated main aspect (where provided) may be passed at danger

6.4 Entering an Occupied Section of Track

During a scenario your train may be scheduled to enter a platform or section of track that is already occupied by another train or rolling stock. In this situation you should stop at the red signal protecting this section of track as normal. Once your train has stopped press the TAB key on your keyboard to request permission from the signalling centre to enter the occupied section of track. When your train movement is approved the signal will illuminate the two white lights on the position light signal if it has one.

6.5 Repeater Signals



A banner repeater signal indicates whether the signal ahead is displaying a proceed aspect or is at danger. Modern fibre optic banner repeating signals, as shown opposite, consist of a rectangular unlit black background displaying a white circle with a black bar.

Signal Display	Instruction to Driver
Horizontal arm	Be prepared to find the related signal at danger
Arm at an upper quadrant angle of 45°	Related signal is exhibiting a proceed aspect

Repeater signals are intended to provide a driver with advance information of a signal that may be obscured on approach. A train does not need to stop at a repeater signal, only at the related signal if it is at danger.

Splitting banner signals provide two banner signal heads combined to form a splitting banner repeating signal. These are used to indicate the aspect of a signal with a feather junction indicator. If the related junction signal is displaying an illuminated feather then the lower banner head displays an arm at an upper quadrant angle of 45°. Alternatively, if the related junction signal is not displaying an illuminated feather and is indicating a straight ahead route then the higher “main” banner head displays an arm at an upper quadrant angle of 45°.

Another type of repeater is an “OFF” platform indicator.



Signal OFF indicators are provided to assist train dispatch staff. An OFF indicator displays the illuminated word ‘OFF’ only when the signal(s) to which it applies is displaying a proceed aspect. No indication is shown when the signal is at danger.

7 Speed Signs

7.1 Permissible Speed Indicators



These signs display the permissible speed in M.P.H. applicable to the section of line beyond the sign up to the commencement of any subsequent permissible speed section.

Remember to wait for the complete length of your train to pass these signs before accelerating if the permissible line speed is increasing. If the permissible line speed is decreasing then you must reduce your speed before passing these signs.

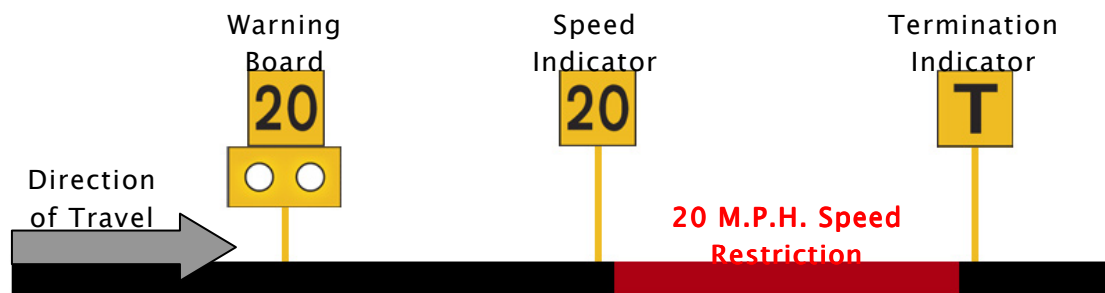
7.2 Permissible Speed Warning Indicators



These signs provide advance warning of a reduction in permissible speed ahead. Permanent AWS Ramps (Automatic Warning System) are often installed in conjunction with these signs. In these cases the driver must cancel the AWS warning when triggered on approach to these signs.

(See safety systems section of this manual)

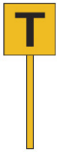

7.3 Temporary Speed Restrictions



Temporary speed restrictions are normally put in place when engineering works and track maintenance is taking place. These temporary speed restrictions are advised in the drivers’ weekly operating notice and in this simulation are advised in your scenario briefing. The normal sequence of trackside signage is shown above.

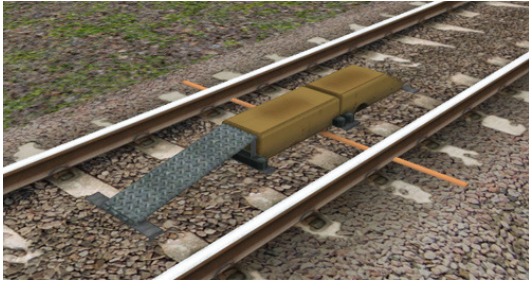
However, when line speeds need to be reduced at short notice they are referred to as an “Emergency Speed Restriction” and are additionally protected by providing an “Emergency Indicator” prior to the temporary speed restriction warning board. The emergency indicator has two synchronous flashing white lights.

Temporary Sign	Description	Instruction to Driver
	Emergency Indicator	This sign warns that there is a warning board ahead for an emergency speed restriction that has not been previously advised.
	Warning Board	This sign provides warning of a restriction speed indicator ahead.
	Repeater Warning Board	This sign provides a reminder of a restriction speed indicator ahead. It is normally used where a driver has set off from a platform after passing a warning board
	Restriction Directional Arrow	This sign is always associated with either a warning board, a speed indicator or a spate indicator.
	Restriction Speed Indicator	This sign indicates the start of a temporary speed restriction with the value shown in M.P.H. You must reduce your speed before passing these signs.

	<p>Restriction Termination Indicator</p>	<p>This sign identifies the end of a temporary speed restriction. Remember to wait for the complete length of your train to pass this sign before accelerating back to normal line speed.</p>
	<p>Restriction Spate Indicator</p>	<p>This sign identifies that the temporary speed restriction, at that location as previously advised, is now not in force.</p>

8 Safety Systems

8.1 AWS (Automatic Warning System)



AWS is provided to give train drivers in-cab warnings of the approach to signals, reductions in permissible speed and temporary/emergency speed restrictions, and to apply the brakes in the event that a driver does not acknowledge cautionary warnings given by the system.

As a train approaches a signal, it passes over AWS track equipment (magnets) which are fixed to the sleepers between the running rails. The magnets are sensed by a receiver mounted under the leading end of the train.

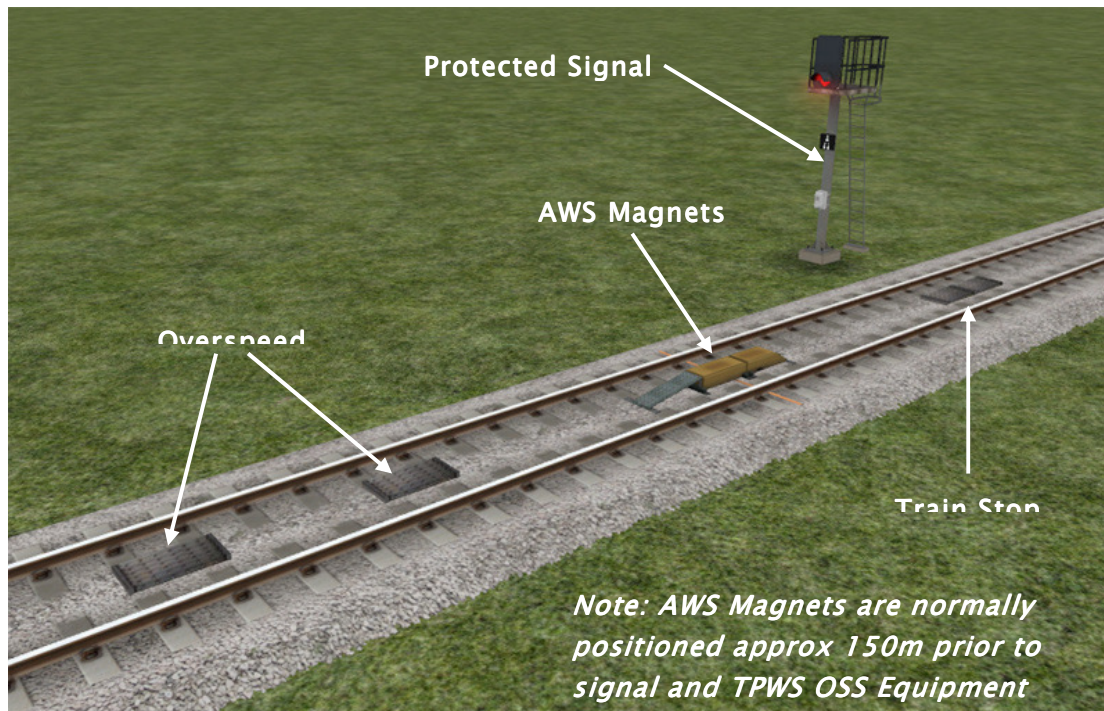
If the signal ahead is displaying a clear aspect (green), a bell (or an electronic ping) sounds in the driver's cab, and the AWS Sunflower indicator displays "all black". No action in respect of the AWS is required of the driver.

If the signal is displaying a caution or danger aspect (yellow, double yellow or red), a horn sounds in the driver's cab and the display shows "all black". The driver has to acknowledge the warning by pressing the "AWS Acknowledgement" push button. When the driver operates the push button, the horn is silenced and the AWS Sunflower changes to a segmented yellow and black circular display. If the driver fails to acknowledge the warning horn within a set time period, the brakes are applied automatically.

Where AWS equipment is provided on the approach to reductions in permissible speed and temporary/emergency speed restrictions, the cab equipment always operates in a manner equivalent to the approach to a signal displaying a caution or stop aspect. The driver receives a warning and has to respond to it accordingly; otherwise the brakes are applied automatically.

8.2 TPWS (Train Protection and Warning System)

The primary purpose of TPWS is to minimise the consequence of a train passing a TPWS fitted signal at danger and a train overspeeding on approach to a TPWS fitted signal at danger. TPWS track equipment is only active when the signal that they are protecting is displaying a danger aspect (red).



There are two pairs of grids mounted between the running rails. Both pairs consist of an 'arming' and a 'trigger' grid. The first pair, the Overspeed Sensor (OSS), are positioned on approach to the protected signal. The other pair of grids are mounted back to back at the signal location, and these form the Train Stop Sensor (TSS).

The emergency train brakes are automatically applied if a train passes over an active Overspeed Sensor faster than a predetermined speed (in this simulation this preset speed is between 20 and 25 M.P.H. dependent on line speed and location). The brakes are also automatically applied if a train passes over an active Train Stop Sensor at any speed, as the signal it is protecting must be at danger.

After passing a signal displaying a caution aspect (single yellow) it is advisable to reduce your train speed to anticipate the approach to the next signal. It may be at danger and therefore the TPWS Overspeed Sensor will be active and will trip an emergency stop if your train speed is greater than the preset approach speed when you pass over it.

TPWS “Mini OSS” grids are also installed at terminus stations. These grids are positioned approx 50m prior to the buffer stops and are preset to 12 M.P.H. Your train must be traveling at less than 12 M.P.H. when passing over these grids when arriving in to these platforms.

9 Credits

Railsimulator.com would like to thank the following people for their contributions during the development of ECML London – Peterborough.

Project Manager / Track and Signalling

Alan Thomson

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Duncan McCafferty

Laura McConnachie

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3D Artists

Lee Wallace (Lead Artist)

Matthew James Price

Chris Linington

Perry Stringer

Class 365 EMU Production

Chris Luck

Ben Jervis

Michael Whiteley

Scenario Production

Duncan McCafferty

Laura McConnachie

Robert McGregor

Adegbemiga Adeleye