

# West Coast Main Line - Trent Valley



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## I Route Information

### 1.1 History

With a need to provide a more direct route to the North West of England, the Trent Valley Line was built and opened in 1847. Construction started in November 1845 marked with a ceremonial sod-cutting at Tamworth by Sir Robert Peel on 13 November. The Trent Valley Line was opened during 1847 and now forms part of what is called the West Coast Main Line (WCML).

### 1.2 Electrification

The line was electrified during the 1960s to the 25kV AC system. As one of the earlier routes to be energised it features “Mk1” catenary equipment which utilises heavier engineered portal structures compared with later, more modern systems. During modernisation of the route between 2004 and 2008 the catenary was upgraded by replacing many of components mounted to the existing portals (this is now referred to as “UK1” equipment).

### 1.3 2004 – 2008 Route Modernisation

At a cost of around £350 million, Network Rail has carried out significant upgrading of the route. Prior to 2004 the Trent Valley section of the West Coast Main Line had an 11 mile (18 km) long section of track between Tamworth and Armitage that was only double track. With plans to accommodate the new and faster Pendolino trains it became clear that this could not be done in parallel with the existing slower local services. The solution was to increase the number of tracks between Armitage and Tamworth. This upgrade provides four tracks throughout the route from Nuneaton to Colwich Junction.

Work started in 2004 with the need for substantial civil engineering works including bridge replacement and removal of level crossings at Hademore. The new four track section was commissioned in 2008.

Additional works were carried out between Rugby and Brinklow. This increased the existing three tracks to four. The main bottleneck that remains on the route is the 2 mile long section of double track north of Colwich Junction that passes through Shugborough Tunnel.

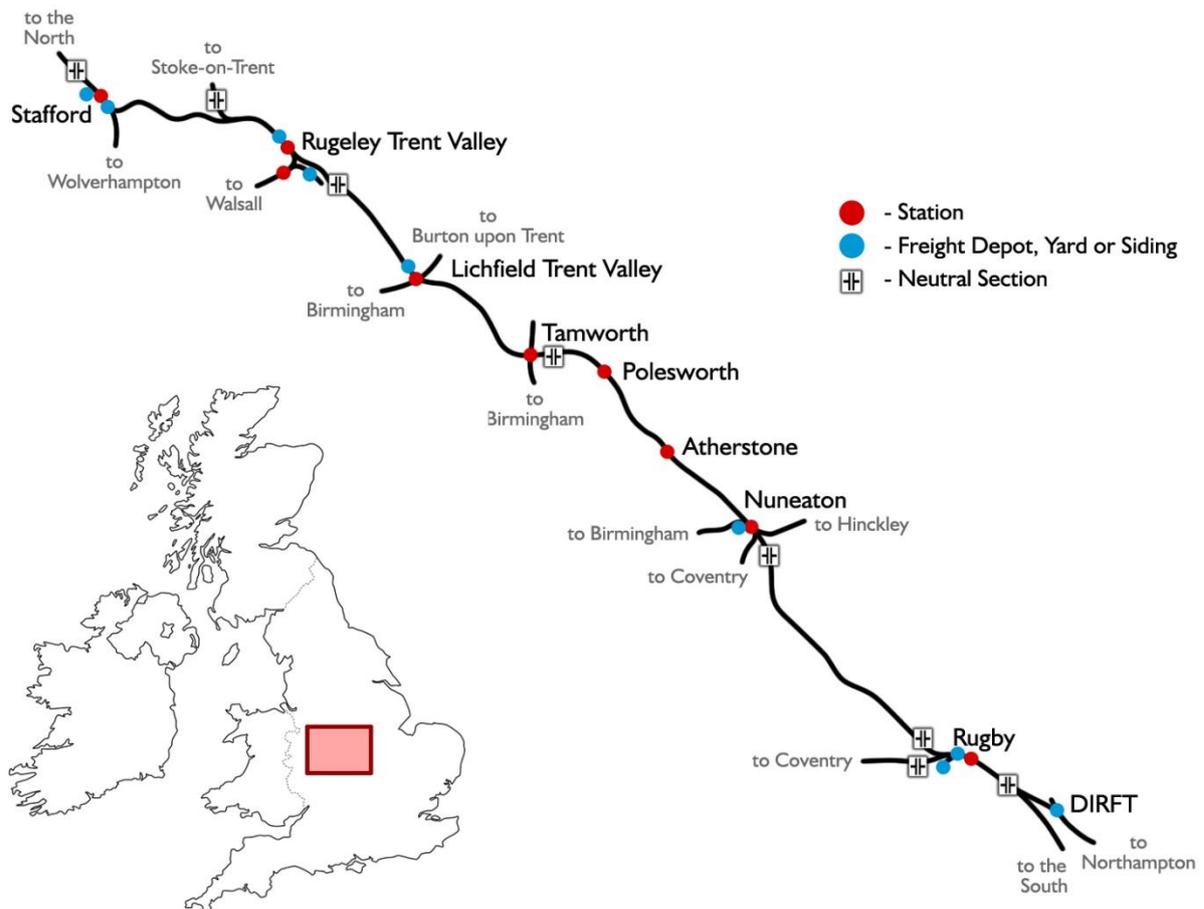
During the modernisation project the whole of the Trent Valley line was resignalled with a large number of new signal gantries being erected and provision being made for bi-directional running on a large proportion of the main line.

### 1.4 Nuneaton North Chord

As part of a nationwide project to free up space on the network a new rail chord was built north of Nuneaton station and opened to traffic late in 2012.

The new chord allows northbound freight traffic to travel through Nuneaton station without blocking passenger service routing on the main line. This is part of a wider programme to create a route for larger 9'6” containers between the port of Felixstowe and the Midlands, North West of England and central Scotland.

## 1.5 Route Map



## 1.6 Route Features

- 9 x Highly detailed and accurate station models with “car-stop” signs
- Over 145 custom modelled under and over bridges based on route surveys
- Over 200 new overhead line equipment and catenary models
- New modern signal gantries
- New green banner repeater and primary route indicator signals
- Operating neutral sections compatible with WCML Over Shap Class 87
- High detail trackside models including high speed point motors, catch pits, drains, cable trunking, elevated trunking, elevated circuit cabinet platforms, signal access walkways and much more!
- Commercial greenhouse installations
- Canals and narrow boat models
- New static road vehicle models and car parks

- Shugborough Tunnel North and South portal models



- Rugeley Power Station



- Armitage Factory
- Nuneaton North Chord (opened during 2012)
- Rugby Cement Works
- Rugby South Flyover
- Hillmorton Interchange
- Daventry International Rail Freight Terminal (DIRFT) Phase 1 and 2



## 2 The Class 66/4 Locomotive

### 2.1 Locomotive History

When British Rail's freight operations were privatised in 1996, “English, Welsh and Scottish Railway” (EWS) bought a large proportion of British Rail's freight operations. Many of the locomotives that EWS inherited were at the end of their useful life and EWS approached General Motors Electro-Motive Division (EMD), to supply a replacement. EMD offered their JT42CWR model which incorporated General Motors' version of (self-steering) bogies that reduce flange wear, improve adhesion and reduce track load. The locomotive design uses standard EMD components of its era including D43 traction motors. The new JT42CWR locomotives were finally given the Class 66 designation in the British classification system (TOPS). Two hundred and fifty were initially ordered and built in London, Ontario, Canada.

Direct Rail Services (DRS), a subsidiary of British Nuclear Fuels (BNFL) ordered ten Class 66/4 locomotives (66401–66410), utilised mainly on intermodal container traffic. Further orders for an additional 24 locomotives were placed with the last entering service during 2008 (66411–66434).

These series 4 versions of the Class 66 were built as “low emission” to meet new, more stringent environmental rules. The main visual design difference is the addition of a mid-body access door to the new equipment required to meet these new emission targets.



#### The included Class 66/4 model features:

- Low emissions variant body design with DRS logos and branding
- PBL “Push and Hold” Train and Loco Brakes
- Selectable “Passenger” or “Goods” brake timings
- Cabin and Instrument Lighting
- Four state Headlight and Tail Light controls with cabin proving panel display
- Operating exterior fuel tank gauges
- Functional Train Length Measurement System
- Opening cabin windows with dynamic wind sound effects
- Five cabin camera positions (including three driving position heights)
- Digital cabin display showing current control states, speed, RPM and tractive effort
- Independent left and right hand windscreen wiper control

## 2.2 Design & Specification

<b>TOPS Number Range</b>	<b>Class 66421 - 66434</b>
<b>Wheel Arrangement</b>	Co-Co
<b>Weight</b>	126 tonnes
<b>Length</b>	70ft 0½in (21.34m)
<b>Width</b>	8ft 8¼ in (2.65m)
<b>Engine Type</b>	GM 12N-710G3B-EC
<b>Power at Rail</b>	3,000hp (2,238kW)
<b>Max Speed</b>	75mph (121km/h)
<b>Fuel Capacity</b>	1,440 gallons (6,546 litres)
<b>Brake Types</b>	Air, Westinghouse PBL3

## 2.3 Cabin Controls - Refer to the illustrations on pages 8 and 9

1	AWS Reset	18	AWS Sunflower Display
2	Warning Horn	19	Driver's Wiper Control
3	Train PBL Air Brake	20	Second Man's Wiper Control
4	Direct Locomotive Air Brake	21	Engine Start and Stop Controls
5	Sander	22	AWS / TPWS Auto Brake Demand Lamp
6	Train Length Button	23	Reverser
7	Emergency Brake Plunger	24	Throttle
8	Main Reservoir and M.R. Pipe Pressure	25	Headlights / Tail Lights Proving Display
9	Bogie Brake Pressures	26	Wheelslip Fault Light
10	Brake Air Flow Indicator	27	Current Throttle Position
11	Brake Pipe Control Gauge	28	Current Reverser Position
12	Passenger / Goods Brake Timing	29	Engine RPM Display
13	Parking Brake Indicator	30	Tractive Effort Display
14	Parking Brake Controls	31	Digital Speedometer (mph)
15	Opening Side Window	32	Cab Light Switch
16	Speedometer (mph)	33	Instrument Lights Switch
17	Ammeter	34	Headlight Mode Switch (Tail Lights switch moves automatically according to the currently selected headlight mode)

## 2.4 Additional Keyboard Controls

<b>L</b> – Toggle Cab Light	<b>SPACE</b> – Horn High
<b>I</b> – Toggle Instrument Lights	<b>CTRL+SPACE</b> – Horn High Soft
<b>U</b> – Toggle Train Length Button	<b>B</b> – Horn Low
<b>Y</b> – Toggle Passenger/Goods Brake Timing	<b>CTRL+B</b> – Horn Low Soft
<b>V</b> – Toggle Left Wipers Switch	
<b>CTRL+V</b> – Toggle Right Wipers Switch	

Note: The Train and Loco Brake levers (3 & 4) are not used when Train Simulator Driving Mode is configured for “Simple Mode” under Game Settings. Under this setting the throttle and brakes are controlled together from the Throttle Lever (24).





## 2.5 PBL Brake Levers

Both the Train Air Brake and Loco Air Brake levers have three functional positions:

- In the upright position they “Hold” the current brake pressure
- When pulled fully back they gradually “Release” the brakes
- When pushed fully forwards they gradually “Apply” the brakes

The Train Brake lever is centre sprung both in the cabin and on the game HUD and the Loco Brake lever is only sprung forwards for brake application and can be left resting in the “Release” position when required.

When using the Train Brake lever a target brake pressure can be selected as indicated by the outer needle on the Brake Pipe Control Gauge. The actual brake pressure will then gradually change to match the selected target as shown by the larger inner needle. The rate that the brake pressure changes is dictated by the brake timing selection (“Passenger” or “Goods”) as selected and indicated on the main console (item 12 shown on the previous page). When in “Goods” brake timing mode the brake pressure changes more slowly.

## 2.6 Train Length Button

When a speed restriction sign indicates an increase in permissible line speed, the driver must ensure that the rear of the train has cleared this sign before increasing train speed. To assist the driver the Train Length Button is provided. To use this system press the button once when the driving cab is parallel with the sign, you will hear a single low audio tone to confirm the measurement system is active. Once the rear vehicle has cleared this same location the driver will hear two short audio tones to confirm this.

## 2.7 Automatic Warning System Self-test (AWS)

When the reverser has been moved from OFF to Forward or Reverse for the first time, the automatic warning system self-test will commence. This is an audible continuous horn which is cancelled by pressing the AWS Reset button or “Q” on the keyboard.

## 3 The Class 350/1 Electric Multiple Unit

### 3.1 Train Overview

The fleet of 30 x 4-car Class 350/1 trains are formed of vehicles originally ordered for Class 450/2 trains. Sets are formed of two Driving Motor Standard Open (DMOS) vehicles, a Trailer Composite Open (TCO) incorporating a first class section and a standard toilet and a Pantograph Trailer Standard Open (PTSO) with a disabled toilet and wheel chair area.

In 2012 the fleet were updated from 100 mph (161 km/h) to a top speed of 110 mph (177 km/h).



#### The included Class 350/1 model features:

- Pantograph Arcing and Illumination Effects
- Neutral Section Functionality (compatible with “WCML Over Shap” route)
- Functional Passenger Information System (PIS) featuring:
  - Driver Selectable Destinations
  - Cabin PIS Display
  - Passenger Compartment Destination Display
  - Automatic Audio Station and Safety Announcements
  - Passenger Compartment Next Station Display (Synchronised with Announcements)
- Functional Train Management System (TMS) featuring:
  - Display of Current Train Configuration (4, 8 or 12 Car Graphic)
  - Clock Display
  - Headlight and Tail Lights Proving Display
  - Display of Dynamic Train Faults (including instructions to correct faults)
  - System Brightness Control
- Four state Headlight and Tail Light controls
- Functional DRA (Driver’s Reminder Appliance)
- Functional Automatic Low Speed Button
- New “Extended Cab” system to allow movement from Cabin to Passenger Compartment

### 3.2 Design & Specification

<b>TOPS Number Range</b>	<b>Class 350101 - 350130</b>
<b>Formation</b>	4-Car (DMSO+TCO+PTSO+DMSO)
<b>Weight (Total 4-Car)</b>	179.3 tonnes
<b>Vehicle Length</b>	66ft 0¾in (20.34m)
<b>Width</b>	9ft 2in (2.79m)
<b>Power Collection</b>	25kV AC Overhead & 750V DC Third Rail
<b>Horsepower</b>	1,341hp (1,000kW)
<b>Max Speed</b>	110mph (177km/h)
<b>Brake Type</b>	Air, (regenerative)
<b>Coupling Type</b>	Outer – Dellner, Inner - Bar

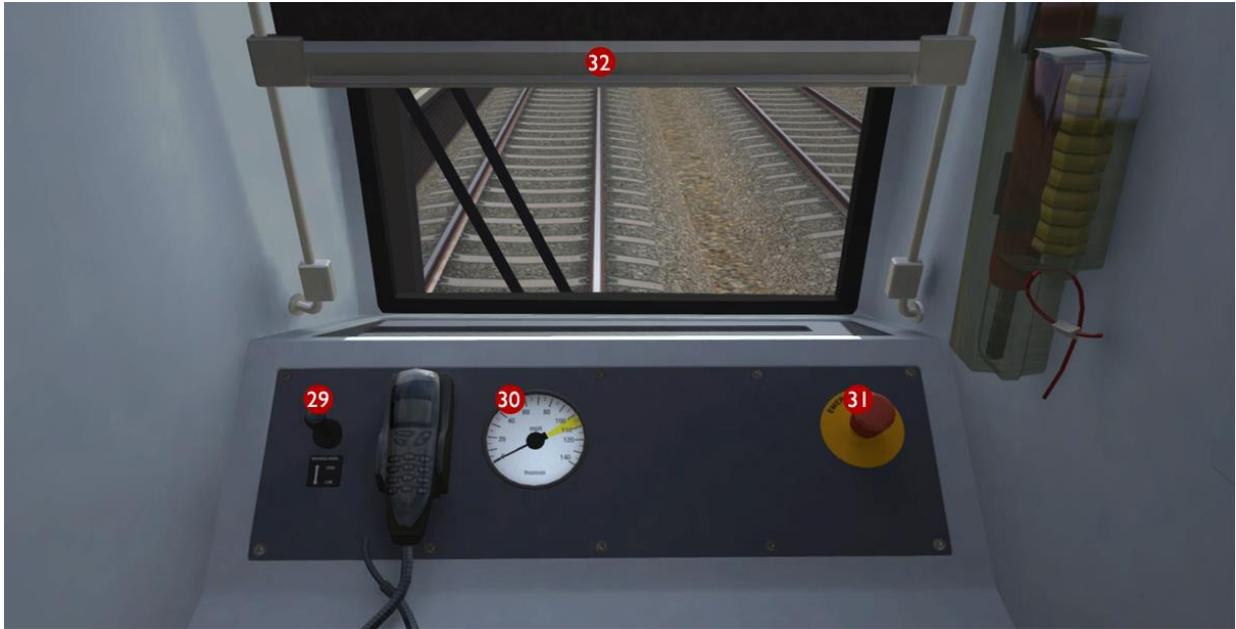
### 3.3 Cabin Controls - Refer to the illustrations on pages 13 and 14

1	Combined Throttle Brake Controller	18	Enable Second Man's Wiper Pushbutton
2	Reverser Switch	19	Doors Locked "Interlock" Lamp
3	Sander	20	Line Light Indicator
4	Cab and Instrument Lights Switch	21	Driver's Emergency Brake Plunger
5	Headlights / Tail Lights Mode Switch	22	Signal Bell
6	Tail Lights Indicator Lamp	23	PIS Destination Select Up
7	Low Speed Selector	24	PIS Destination Select Down
8	AWS Reset	25	Fault Indication Panel
9	Driver's Warning Horn	26	Driver's Sun Visor
10	Brake Cylinder / Main Reservoir Gauge	27	TMS Soft Selection Keys
11	AWS Sunflower	28	TMS Brightness Key
12	Braking / Traction Indicator	29	Second Man's Warning Horn
13	AWS / TPWS Auto Brake Demand Lamp	30	Second Man's Speedometer (mph)
14	Driver's Speedometer (mph)	31	Second Man's Emergency Brake Plunger
15	Pantograph / VCB Switch and Fault Lamp	32	Second Man's Sun Visor
16	DRA (Driver's Reminder Appliance)	33	Automatic Door to Passenger Compartment
17	Windscreen Wipers Switch		

### 3.4 Additional Keyboard Controls

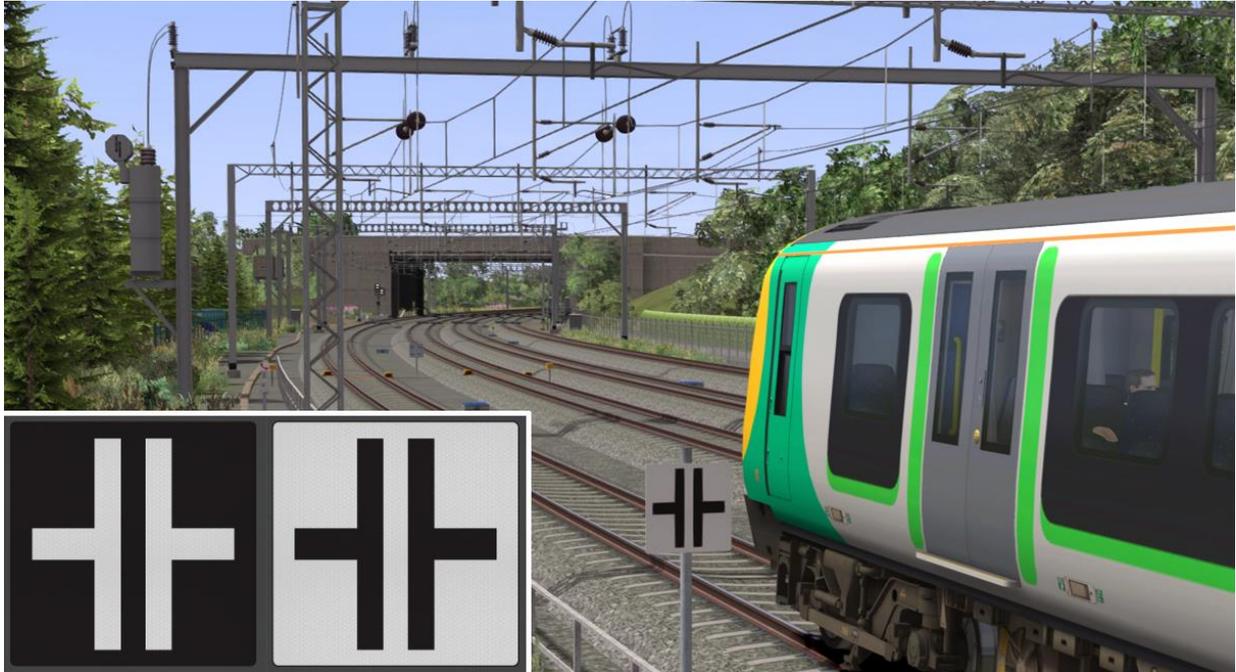
<b>L</b> - Increase Instrument and Cabin Lights Setting
<b>SHIFT+L</b> - Decrease Instrument and Cabin Lights Setting
<b>U</b> - Toggle Low Speed Button
<b>I</b> - Toggle DRA (Driver's Reminder Appliance)
<b>B</b> - Signal Bell
<b>V</b> - Toggle Wipers
<b>CTRL+V</b> - Toggle Enable SMS Wipers Switch
<b>M</b> - Increase PIS Destination Setting
<b>N</b> - Decrease PIS Destination Setting





### 3.5 Neutral Sections

Roughly every 15 miles it is necessary to switch the electric supply to a different phase of the National Grid, in order to balance the load of the railway network across the three electrical phases. To avoid the possibility of bridging two phases, short Neutral Sections are used to separate electrified sections. Older AC electric locomotives can require special driving techniques on approach to neutral sections, however modern multiple units automate the transition through these sections.



Neutral sections are marked for drivers with signs as shown above. A white-on-black sign marks the approach to the neutral section, giving drivers time to prepare the train to pass it. A black-on-white sign marks the beginning of the neutral section itself.

Track magnets automatically open and close the train's main circuit breaker either side of the neutral section. Entering a neutral section under power is permitted but discouraged. Power will be instantly cut off, jolting your passengers. Do not stop your train within a neutral section.

Neutral section locations are also marked on the route map on page 4.

### 3.6 DRA (Driver's Reminder Appliance)

When the DRA switch is set to the on position (indicated by the switch illuminating red) traction power cannot be obtained.

This is designed to help mitigate against the risk of signals being passed at danger after station stops where last signal passed was displaying a caution aspect. To obtain traction power again the driver must ensure the Throttle Brake Lever is in the brake position then switch off the DRA. If the Throttle Brake Lever is in a power notch then



it will need to be returned to the brake position before taking power.

### 3.7 Low Speed Button

The Low Speed Button can be used for slow speed movements such as carriage washing. The button illuminates when operational and limits the power output from the Throttle Brake Controller to notch 1. It also automatically shuts off the power when the train reaches 2mph but it does NOT control the speed of the train. The driver must monitor the train speed and use the brake to reduce speed on falling gradients.



### 3.8 Passenger Information System (PIS)



The driver can cycle through available PIS destination displays using the left and right arrow soft-keys on the PIS panel in the cabin. When active these destinations and associated messages are displayed on the PIS panel, passenger compartment overhead display, DMOS body side displays and exterior train end displays as shown above.

Passenger compartment overhead displays are updated for 60 seconds during audio announcements to show the next station stop.

During career and quick drive scenarios, destination displays also get updated automatically when an audio announcement is broadcast.

Full PIS system technical information is provided at the end of this document for scenario writers.

### 3.9 Train Management System (TMS)



The TMS provides information about the current state of the train. Above left it shows a current train formation of 8 cars and an analogue clock. Above right shows the exterior lighting page that provides the current state of the headlight and tail light lamps (the display has also been dimmed in this image using the TMS Brightness Key).

Real-time train faults are also displayed on the TMS screen when they occur along with instructions on how to correct the current fault. It is not possible to navigate away from a TMS fault screen until the current fault has been cleared.

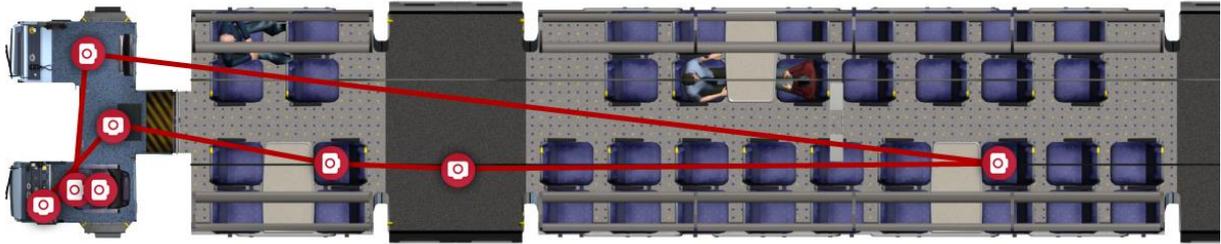
### 3.10 Door Interlock

The Doors Locked “Interlock” Lamp in the cabin illuminates with a blue light to indicate that all passenger doors are currently closed and locked. If any door is open then this blue interlock light is extinguished and the train brake is automatically held on.

### 3.11 Automatic Warning System Self-test (AWS)

When the reverser has been moved from OFF to Forward or Reverse for the first time, the automatic warning system self-test will commence. This is an audible continuous horn which is cancelled by pressing the AWS Reset button or “Q” on the keyboard.

### 3.12 Extended Cab System



The Class 350 DMOS vehicles feature a new “Extended Cab” model that also incorporates the passenger compartment. This new system allows all cab audio including AWS warnings to be heard anywhere within the vehicle and enables camera positions to be linked together for movement around and between cabin and passenger compartments. The interconnecting automatic door is functional and can be opened by clicking on the illuminated door open button.



As each DMOS vehicle in a train “remembers” the current camera position, it is possible to choose your preferred passenger compartment view in the rear DMOS vehicle then toggle between this view and the front cabin view using the Next and Previous Rail Vehicle buttons on the HUD or by pressing CTRL and + together on the keyboard.

## Quick Drive

### 3.13 PIS On-train Announcements

All included Quick Drive scenarios have been provided with Passenger Information System Announcements configured to operate when driving the Class 350/1 train.

When driving other trains and locomotives that are not equipped with a compatible on-board Passenger Information System you will not hear any announcements.

### 3.14 Speed Boards and the HUD



On the West Coast Main Line there are EPS Speed Signs (Enhanced Permissible Speed) as well as the standard speed signs. When driving a Quick Drive scenario from the main menu you will always be shown the enhanced speeds on the HUD. If you have chosen to drive a multiple unit then these HUD speeds will apply to your train. If however you are driving a locomotive, you will need to obey the standard speed signs on the route. Please refer to the Speed Signs section of this manual for further information.

## 4 Signals

### 4.1 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.

### 4.2 Theatre Type Signals

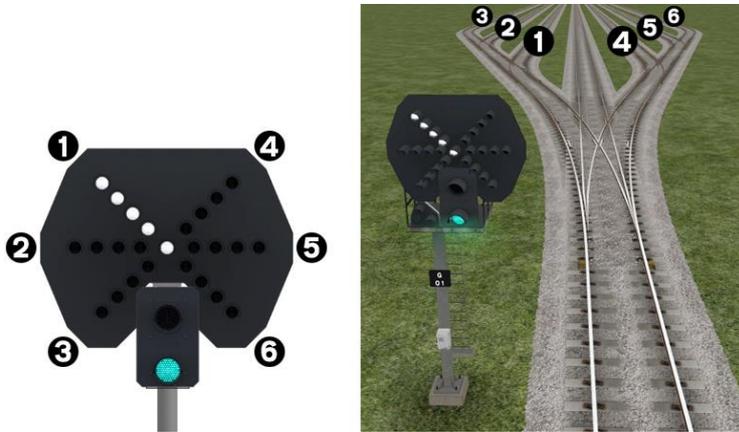


A Theatre alphanumeric route indicator indicates the route to be taken using numbers or letters (or a combination of numbers and letters).

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

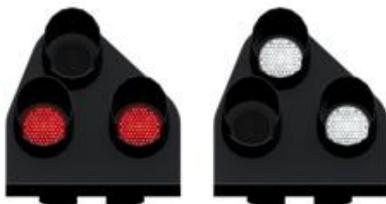
### 4.3 Feather Type Signals

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

### 4.4 Ground Signals and Position Light Signals



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



At Daventry International Rail Freight Terminal (DIRFT) there are fixed aspect danger signals on the departure and arrival lines.

These ground mounted signals always display a main danger aspect, then in addition they display a PLS to allow a train to pass. If the PLS is not illuminated then you will need to contact the signaller for permission to pass.

#### 4.5 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.

#### 4.6 Repeater Signals and Primary Route Indicators



Standard banner repeater signals indicate whether the signal ahead is displaying a proceed aspect or is at danger. Modern fibre optic banner repeating signals, as shown above, consist of a rectangular unlit black background displaying a white circle with a black bar. In certain situations they can also illuminate in green to show that the signal ahead is also displaying a green (clear) aspect.

Arrows are referred to as “primary route indicators” and can be mounted separately or associated with a banner repeater signal. Primary route indicators repeat the feather direction of the signal ahead if it is displaying one. The examples above (from left to right) are indicating the signal ahead is:

- 1) Displaying a Red (Danger) aspect
- 2) Displaying a Green (Clear) aspect with no feather indicators
- 3) Displaying a Single or Double Yellow (Caution or Advanced Caution) with a left diversion feather

Signal Display	Instruction to Driver
Horizontal arm	Be prepared to find the next signal at danger
White arm at an upper quadrant angle of 45°	Next signal is exhibiting a proceed aspect
Green arm at an upper quadrant angle of 45°	Next signal is exhibiting a green (clear) 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 also 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 to which it applies is displaying a proceed aspect. No indication is shown when the signal is at danger.

## 5 Speed Signs



### 5.1 Permissible Speed Indicators

These signs display the permissible speed in miles per hour 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.

If there is an arrow provided in conjunction with the main sign then the permissible speed only applies to the diverting line indicated by the arrow.



### 5.2 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.

If there is an arrow provided in conjunction with the sign then the permissible speed warning only applies to the diverting line indicated by the arrow.



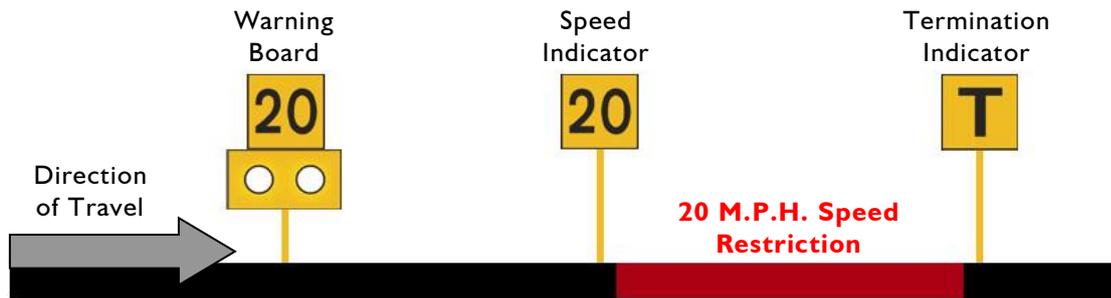
### 5.3 “EPS” Speed Indicators

These signs indicate enhanced speeds for express trains on sections of the route.

The sign on the left indicates a standard permissible speed of 100mph and an enhanced permissible speed of 125mph for express services.

The yellow sign on the right provides an advanced warning of a reduction in enhanced permissible speed ahead and can be ignored by non-express services.

## 5.4 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.
	Restriction Termination Indicator	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.
	Restriction Spate Indicator	This sign identifies that the temporary speed restriction, at that location as previously advised, is now not in force.

## 6 Safety Systems

### 6.1 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 or track sign, 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.

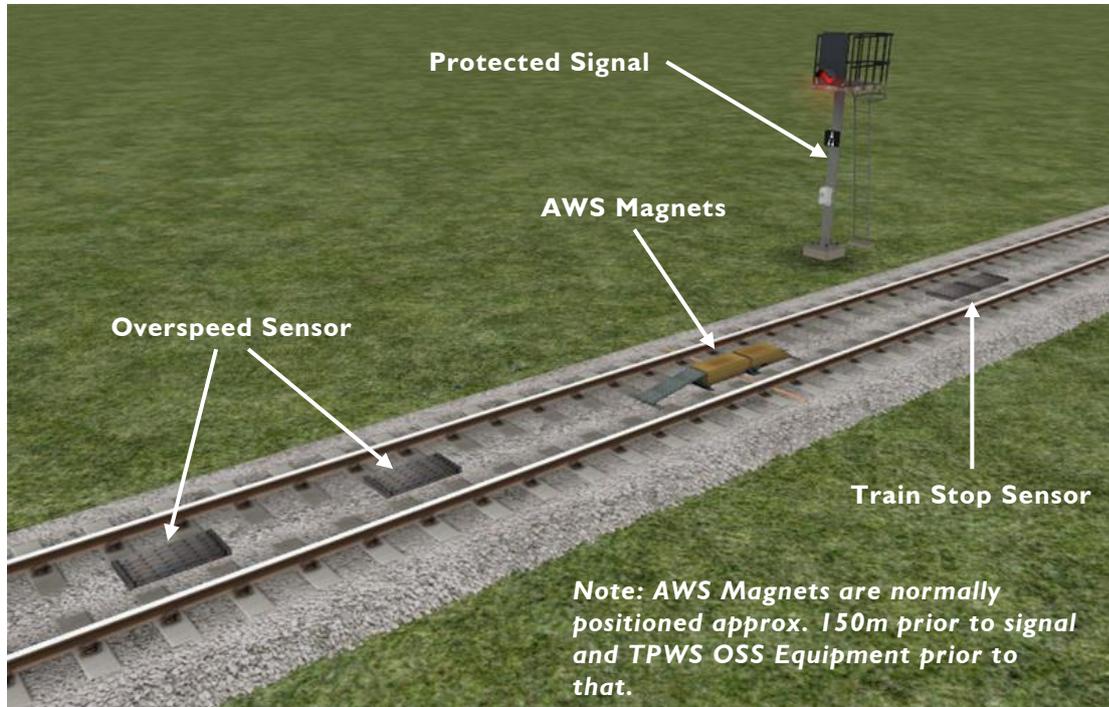
If the signal ahead is displaying a clear aspect (green), a bell (or an electronic ping) sounds in the driver's cab, and the AWS Sunflower indicator displays "all black". No action in respect of the AWS is required of the driver.

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" (AWS Reset) 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 emergency brakes are applied automatically.

Where permanent warning AWS equipment is provided on the approach to reductions in permissible speed, fixed warning boards and 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 emergency brakes are applied automatically.

## 6.2 TPWS (Train Protection and Warning System) – General Overview

The primary purpose of TPWS is to minimise the consequence of a train passing a TPWS fitted signal at danger and a train over speeding 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).



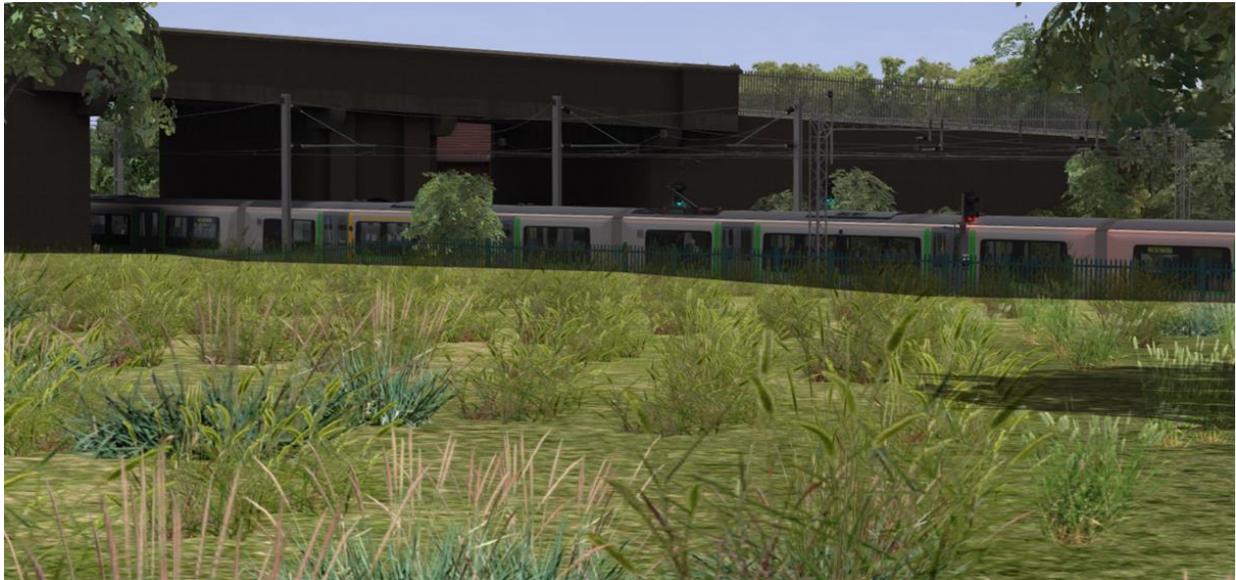
There are two pairs of grids mounted between the running rails. Both pairs consist of an 'arming' and a 'trigger' grid. The first pair, the Overspeed Sensor (OSS), are positioned on approach to the protected signal. The other pair of grids are mounted back to back at the signal location, and these form 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 for that location. The brakes are also 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 predetermined approach speed when you pass over it.

Many platforms with buffer stops are protected by Mini-Overspeed Sensors (usually set with a trigger speed of around 12mph). It is advisable to enter these platforms no faster than 10mph.

## 7 Procedural Flora



This route has been designed making full use of the simulator's procedural flora functionality. We have designed all new ground textures that feature shrubs and grasses. To make these visible and get the best visual experience of the route we advise that you turn this feature on in the main settings menu as shown below. If you are running a less powerful computer you may get an increase in performance if you turn this setting off.



## 8 Content Creators - Terms and Conditions

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### 8.3 Workshop Scenarios

We encourage the non-commercial creation of scenarios for our routes as long as they are distributed through the Steam Workshop.

## 9 Acknowledgements

This route was developed in partnership with Keith Ross, the developer of many other Train Simulator routes including the West Coast Mainline and Western Lines of Scotland. The fidelity we have achieved would not have been possible without Keith's incredible attention to detail and sheer hard work during the project.

We would like to thank Direct Rail Services for their permission to use their branding on the Class 66 locomotive livery and shipping containers included with this product.

Also a big thank you to all our beta testers for their time and feedback.

- end -