The
Riviera Line

1 Route Information

1.1 History

The Riviera Line links the city of Exeter with the Torbay resorts of Devon on the south west coast of England. The area is known as the English Riviera due to its mild climate and sandy beaches.

The line from Exeter through to Teignmouth was opened at the end of May 1846 by the South Devon Railway Company. By the end the year it had been extended to Newton Abbot and then onto Plymouth. By the end 1848 a single line branch was opened from Newton Abbot to Torquay - the current Torre station. It was not until 1859 that the Dartmouth and Torbay Railway linked the line from Torre to Paignton.

Built to Isambard Kingdom Brunel's broadgauge (7' $^{1}/_{4}$" / 2,140mm) standard, the original line from Exeter to Teignmouth was single track. It was designed as an atmospheric railway, being driven by air pressure through a pneumatic pipe along the centre of the track supplied by a series of engine houses along the route. This method of propulsion was however short lived and only used between 13 September 1847 and 9 September 1848.

From the time the Torbay line was opened it was operated by the South Devon Railway, until being amalgamated into the Great Western Railway February 1876.

The track was converted to standard gauge (4' 8.5" / 1,435mm) in May 1892 and later widened to double track over a series of years. This widening also required the removal of several tunnels near Teignmouth.

January 1948 saw the nationalisation of the GWR as part of British Railways.

1.2 Exeter St. Davids Station

Designed by Isambard Kingdom Brunel, Exeter St. Davids was opened on 1 May 1844 by the Bristol and Exeter Railway (B&ER) as a broadgauge twin platform terminus.

In 1846 when the South Devon Railway (SDR) opened the line westwards towards Plymouth, a carriage shed was constructed on the south end of the platform, with goods and locomotive sheds to the west between the station and the river Exe being operated jointly by the two companies. One of a number of engine houses to supply the atmospheric power system was also built on the banks of the river near the engine shed but was later demolished. The modern signal box was built on this site much later in its history.

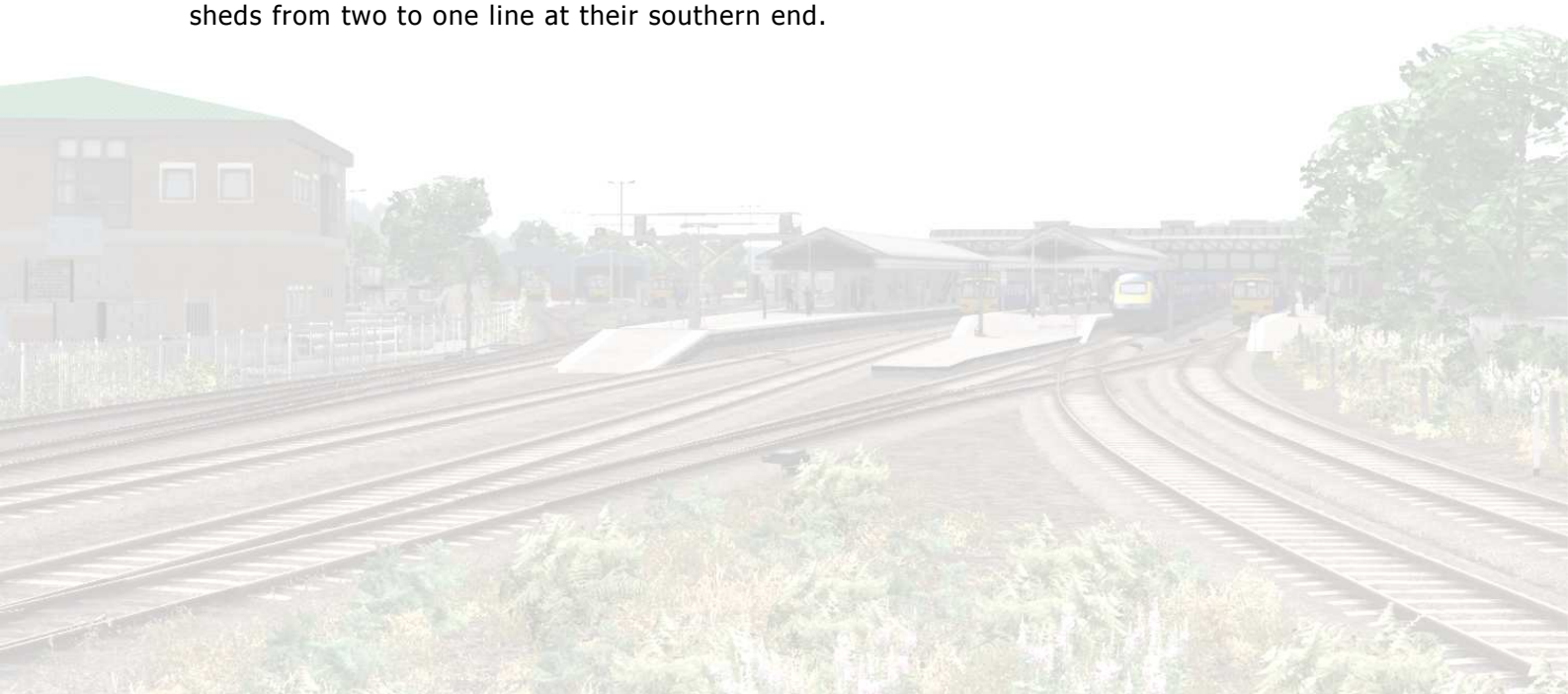
12 May 1851 saw the arrival of the Exeter and Crediton Railway, the junction of which is to the north of the station at Cowley Bridge.

In February 1862, the London and South Western Railway (LSWR) brought a standard gauge line in through a tunnel and down a steep gradient from their own Exeter Central station at Queen Street.

With the operating complexities of separate broad and standard gauge lines between four companies into two platforms, it was soon realised a remodelling of the station was required. This resulted in a new island platform being opened on the west side of the lines. The original up platform at the northern end was closed and the individual train sheds covering the tracks replaced with a single large shed across all the main tracks and platforms. North of the station a level crossing and additional goods shed was constructed. This yard, completed in 1864, was solely for the transfer of goods between trains of the two different gauges.

With the amalgamation of the B&ER and SDR into the Great Western Railway early in 1876, the mainline from Bristol was rebuilt as mixed track allowing broadgauge trains to run through from London Paddington to Penzance and standard gauge trains from Bristol Temple Meads. The entire line was converted over to standard gauge in 1892.

In 1913 the train shed was removed and the platforms extended towards the level crossing, and a second island platform provided to the west. This required the narrowing of the goods sheds from two to one line at their southern end.



1.3 Paignton Station

Opened in August 1859 by the Dartmouth and Torbay Railway, Paignton station serves the southern end of the Torbay extension from Newton Abbot. The line was further extended to Brixham Road (now Churston) in March 1861, with goods traffic being handled by Paignton. Originally laid down as a single track broadgauge line, it was converted to standard gauge in 1892 but not doubled from Torquay until 1910.

This track doubling saw the platforms extended to accommodate the longer trains servicing the seaside resort town. A larger booking office and new canopies were erected. A few years on and a new carriage siding was laid behind the southbound platform and the lines doubled as far as Goodrington Sands.

A new goods shed was opened in June 1931 south of the station. This freed up the original goods shed for parcels traffic and passengers' luggage and a further platform extension.

Following the nationalisation of the Great Western Railway, 1956 saw the opening of further carriage sidings at Goodrington, mostly used to handle the heavy summer Saturday traffic.

At the end of 1972, the line from Paignton to Kingswear was sold as a heritage line. This saw the opening of an independent station alongside the main platform, constructed over the site of the 1930s carriage sidings and known as Queens Park, to serve trains on this line. In 1993 the main station building was demolished and a new booking office moved into the old goods shed.

2 Rolling Stock

A class 143 'Pacer' in First Great Western livery is included with this route. These trains run stopping services.

2.1 Class 143 Diesel Multiple Unit

The British Rail Class 143 is a diesel multiple unit, part of the Pacer family of trains introduced between 1985 and 1986. They originally worked in the North-East of England but were later transferred to Wales and South-West England.

At around the same time as the British Rail Class 142 was in development, a Pacer railbus was being developed by Kilmarnock-based Hunslet-Barclay. The train used a Walter Alexander bus body and entered service in 1985. Again with 2 × 205 bhp (153 kW) diesel engines giving a total output of 410 bhp (306 kW) and a top speed of 75 mph (121 km/h), the class originally had a capacity of 122 passengers per 2-coach unit.

As with all Pacer units, the 2-axle non-articulated wheel arrangement has given rise to problems with wheel noise on low-radius curves and poor ride quality in general. The interiors were completely changed in 2000, with bespoke Chapman high-back seating installed throughout, along with improved fittings, replacing 2+3 bus-style low-back seating; this reduced seating capacity to 106 seats per set.

2.2 Design & Specification

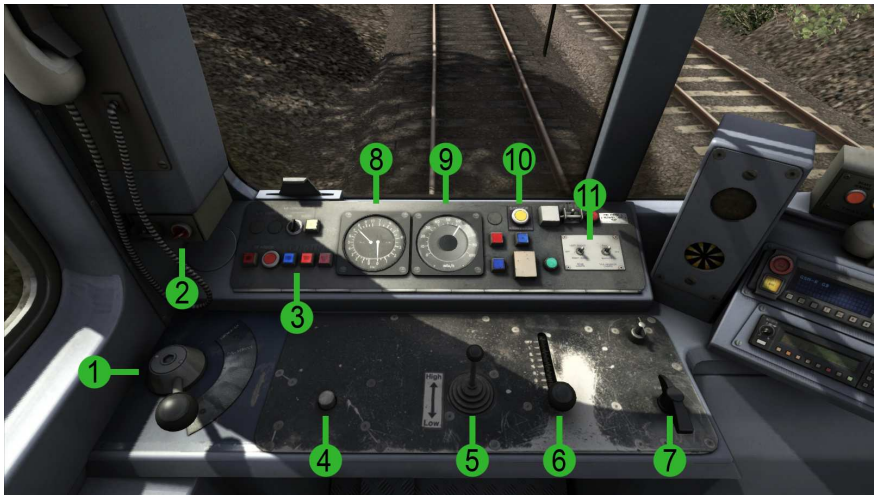
Builder	Hunslet-Barclay & Walter Alexander
Vehicle Weight	24 tonnes
Vehicle Length	49ft 10in (15.2m)
Vehicle Width	8ft 10in (2.7m)
Capacity	106 seats
Vehicle Power	225hp (167.8kW)
Top Speed	75 MPH (120.7kph)
Brake Types	Clasp Brakes, Air
Number Built	25 trainsets

2.3 Class 143 DMSL FGW

2.4 Class 143 DMS FGW

3 Driving the class 143

3.1 Cab Controls



1	Train Brake
2	DRA (Driver's Reminder Appliance)
3	Engine Start / Stop
4	AWS Reset
5	Horn
6	Throttle
7	Reverser
8	Brake Gauge (Main Res & Train Pipe)
9	Speedometer
10	Sander
11	Headlight Control
12	Wipers
13	Dial Lights
14	Cab Light
15	Drivers Fan (Not Shown) (Click to activate)

4 Scenarios

4.1 [143] 1. First Look

Drive the first refurbished Class 143 to Dawlish to see how the commuters like the units.

- **Start Location** Exeter St Davids
- **Duration** 20 minutes

4.2 [143] 2. Preparations

Prepare a Class 143 ready for a driver to take over on a passenger service to Newton Abbot.

- **Start Location** Exeter TMD
- **Duration** 10 minutes

4.3 [143] 3. Service Practice

Drive a Class 143 and get to grips with the service you will be providing.

- **Start Location** Newton Abbot
- **Duration** 40 minutes

4.4 [143] 4. Rescue Diversion

Drive a 143 on a passenger service, but diverting at Newton Abbot to rescue a broken down 143 causing disruptions.

- **Start Location** Paignton
- **Duration** 50 minutes

4.5 [143] 5. Busy Day on the Coast

Take this service down the coast to Paignton, but watch out for the signals. You will be following a delayed service.

- **Start Location** Dawlish
- **Duration** 40 minutes

4.6 [143] 6. Storm Consequences

Battle with the consequences left from a storm that hit last night. Keep a look out for the temporary speed restriction.

- **Start Location** Exeter St Davids
- **Duration** 50 minutes

5 Signals

5.1 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.

2, 3 and 4 aspect signals are used along the route. Each type follows a sequence according to the type.

5.2 Aspect Signals




6 Aspect Signals

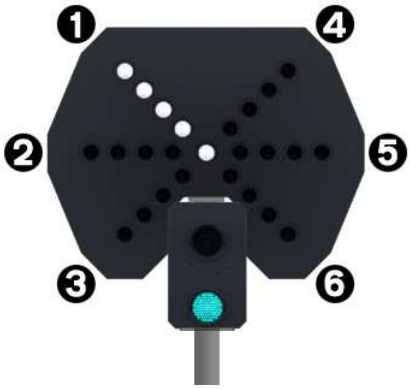
6.1 Theatre Type Signals

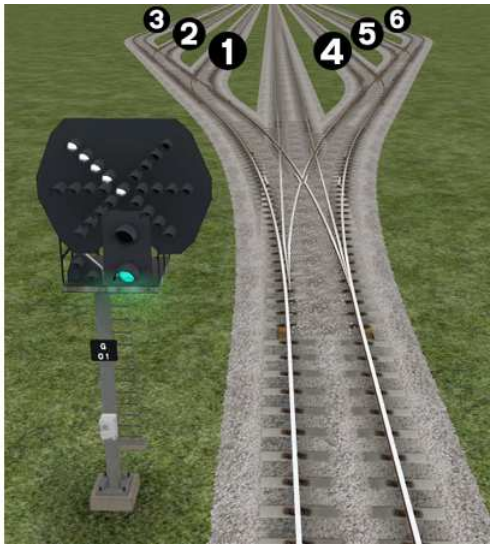
A Theatre alphanumeric route indicator indicates the route to be taken using numbers or letters (or a combination of numbers and letters).

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

6.2 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

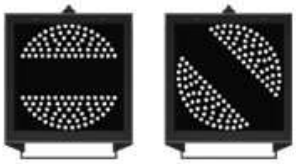
Ground Signals and Position Light Signals (PLS) display their aspects by means of the position and colour of lights. Ground Signals are always illuminated and can have miniature theatre indicators attached whereas PLS only illuminate to allow a train to pass in to an occupied section of line and are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

5.3 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 indicating a straight ahead route, then the higher "main" banner head displays an arm at an upper quadrant angle of 45°.

6 Speed Signs

6.1 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.

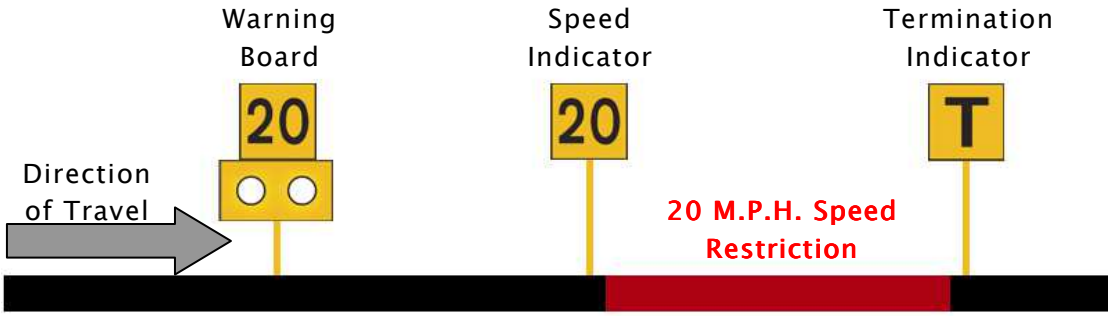
Remember to wait for the complete length of your train to pass these signs before accelerating if the permissible line speed is increasing. If the permissible line speed is decreasing then you must reduce your speed before passing these signs.

6.2 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)

6.3 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.

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.

7 Safety Systems

7.1 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.

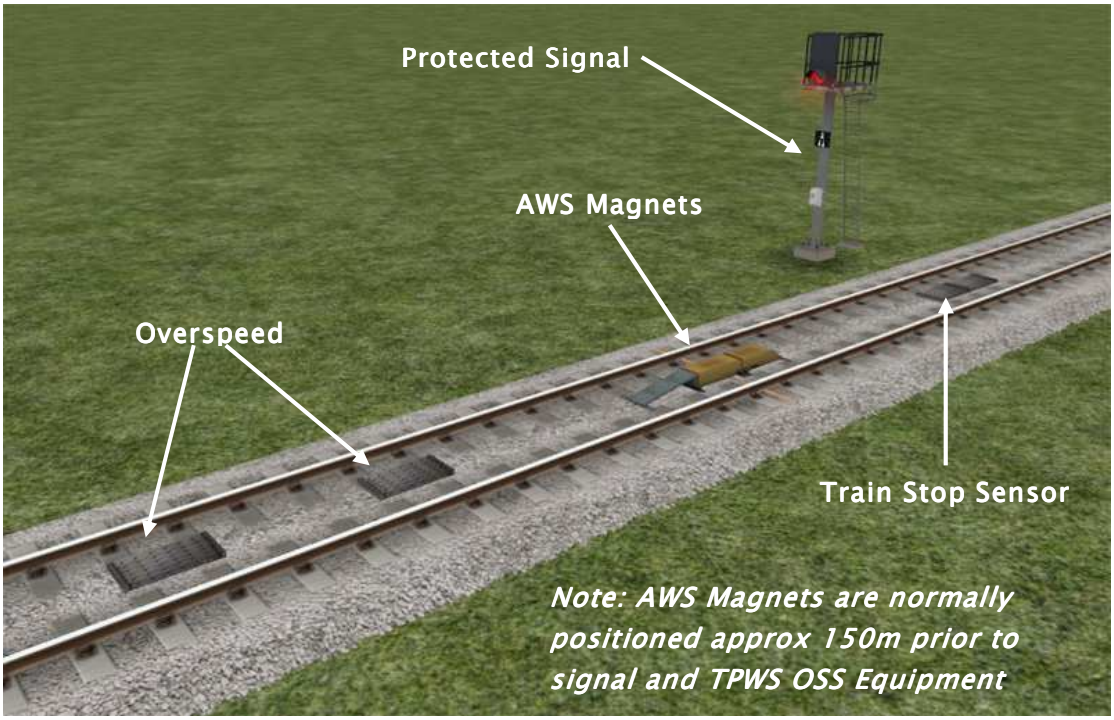
If the signal ahead is displaying a clear aspect (green), a bell (or an electronic ping) sounds in the driver's cab, and the AWS Sunflower indicator displays "all black". No action in respect of the AWS is required of the driver.

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.

7.2 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.

8 Credits

Dovetail Games would like to thank the following people for their contribution to the development of the Class 143.

- Beta Testing Team
- First Great Western - St. Philip's Marsh Depot, Bristol