

Class 455

Enhancement Pack

Volume 1



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How to Install

- 1) Locate where you have downloaded this pack and unzip it. Information on how to do this can be found [here](#).
- 2) Go to the location where you have extracted the files from the .zip file.
- 3) Now find the .exe file called 'Class 455 Enhancement Pack Vol 1'. Double-click this file.
- 4) Follow the steps and by the end of the process, the main part of this pack will have installed.
- 5) If you intend to use any of the included scenarios, make sure you have the requirements installed, as listed on the product page.
- 6) To ensure the cab environment sounds as intended in this pack, please make sure that 'EFX' is ticked within your in-game Audio settings.

Liveries

For any liveries with allocations on both the South Central and South Western region, (SC) & (SW) variants are provided to ensure correct unit numbers appear.

BR Blue/Grey:

with BR logo - *BR*

with BR & Network SouthEast logo - *Ex-BR (NSE)*



Network SouthEast:

with Network SouthEast logo - *NSE1*

with Network SouthEast & BR logo - *NSE1 (BR)*

with Network SouthEast & South London Lines logo - *NSE1 (SLL)*



Network SouthEast Revised

with Network SouthEast logo - *NSE2*

with Network SouthEast & BR logo - *NSE2 (BR)*

with Network SouthEast & South London Lines logo - *NSE2 (SLL)*

with Network SouthEast & South Western Lines logo - *NSE2 (SWL)*

without Network SouthEast logo - *Ex-NSE2*

with Network SouthCentral logo - *NSC*

with Network SouthEast & South London Lines logo - *NSE2 (SLL)*

with South West Trains logo - *NSE2 (SWT1)*

with revised South West Trains logo - *NSE2 (SWT2)*



South West Train - SWT1



Connex:

with Connex South Central & South London Metro logos - CXSC

with Connex logo - CX

without Connex logo - Ex-CX



South Central - SC



Keyboard Controls

Non-standard keyboard controls are listed below:

L -	Cab light ON/OFF
F7 -	Destination blind (secondman's side) DOWN
F8 -	Destination blind (secondman's side) UP
Shift+F7 -	Destination blind (driver's side) DOWN
Shift+F8 -	Destination blind (driver's side) UP
N -	Destination blind light switch ON/OFF
R -	Door close button
U -	Door release buttons (left)
O -	Door release buttons (right)
Y -	Driver reminder appliance (DRA) ON/OFF
C -	Driver to guard call button
H -	Headlight switch CLOCKWISE
Shift+H -	Headlight switch ANTI-CLOCKWISE
Ctrl+R -	Passenger door operation toggle DOO/GO
Ctrl+Numpad Enter -	Visual aids ON/OFF
V -	Wiper switch CLOCKWISE
Shift+V -	Wiper switch ANTI-CLOCKWISE

Features

Variations

Many of the detail differences between the three subclasses (455/7, 455/8 & 455/9) have been simulated in this pack.

Visual

455/8 - Original style front



455/7 - Ex-Class 508 TSO



455/7 (except TSO) & 455/8 - Pressure ventilator grilles



Audio

Different horn and motor alternator (MA) sounds for each subclass.

Two variations of brake release and application sounds:

#1 Variant - 455/7 & 455/8 (455826 - 455874)

#2 Variant - 455/8 (455801 - 455825) & 455/9

Camshaft Traction System

This pack implements the camshaft system of regulating power, the class 455 being the final class of unit to utilise it. This works by progressively cutting out resistances when powering up so as to control the current going to the motors. As well as the resistances, the traction motors can be set up in two modes so as to control current: **Series & Parallel.**

The resistances and traction motor modes are controlled depending on which of the four power handle notches the driver selects:

0 - Traction power is OFF

1 (Shunt) - All resistances are in circuit. This provides minimal acceleration which soon decays. The traction motors are in 'Series' mode.

2 (Series) - As the unit gains speed, resistances are progressively removed from the circuit until they are all removed. As each resistance is removed, acceleration increases.

3 (Parallel) - Once the unit has gone through the steps described above, the traction motors switch to 'Parallel' mode and all resistances are placed back into the circuit. This provides a significant increase in acceleration. As speed increases, pairs of resistances are then progressively removed from the circuit for further acceleration.

4 (Weakfield) - Once the unit has gone through both the 'Series' and 'Parallel' steps, it will start to weaken the field of the traction motors, which once again, provides a further boost in acceleration. If this notch is selected before all resistances have been removed from the circuit, the resistances will be removed quicker than in the lower notches so as to aid acceleration.

At any time, it is possible to halt the progression listed above by selecting a lower power handle position (except 0). For example, if you wish not to take all of the resistances out in the 'Series' notch, you can hold your current level of acceleration by placing the power handle back into the 'Shunt' notch. This is known as 'hand-notching'.

You can only decrease power by returning the power handle to 0, or OFF, and then re-applying the power to your desired notch.

If you find you are unable to obtain power at any point, the traction motors may have overloaded. This is especially likely during wheelslip. To obtain power again, return the power handle to 'OFF' and press the 'Overload Reset' button.

Adhesion

Adhesion between a train's wheels and the rails plays a big part in allowing a train to accelerate or brake. Too little of it and the train will slip or slide. There are a myriad of factors that control the level of adhesion and we have attempted to simulate the most important of these to give a varied and realistic driving experience:

Season

Adhesion is generally good in dry conditions during summer and spring. Slightly decreased adhesion during winter to take account of the increased amount of moisture and possible ice on the rails due to cooler temperatures. Much decreased adhesion during autumn due to leaf mulch.

Weather

Adhesion decreases in wet weather, especially so when rain first starts falling before it has had a chance to clean the railhead. If rain is light, it will take longer for the railhead to be cleaned whereas heavy rain will clean it quicker, resulting in adhesion recovering sooner.

When using the drizzle weather pattern in our Sky & Weather Enhancement Pack, adhesion is particularly poor as the rain hasn't enough force to clean the railhead but still makes it sufficiently wet to worsen adhesion.

Time of Day

Adhesion will decrease somewhat after dusk as the air cools and dew is more likely to form on the railhead. This persists throughout the night until around an hour after sunrise when higher temperatures or the sun dry it out. In our simulation, this factor is reduced during summer to account for warmer temperatures, which on average result in less dew.

Tunnels

When adhesion is poor due to external factors such as weather or season, adhesion will generally improve upon entering a tunnel, which is not as susceptible to these factors. When adhesion is good during dry weather and outside of autumn, adhesion may decrease a little upon entering a tunnel due to their damp nature.

Wheelslip

Wheelslip protection aids the driver when powering or braking during times of poor adhesion.

When wheelslip is encountered during acceleration, a three-stage process takes place:

- 1) The motors can be heard rising rapidly in pitch and the camshaft ceases to progress.
- 2) If the slip does not stop after a second or three, power is cut.
- 3) Once grip is regained, power is reapplied at the notch selected on the power handle.

As a driver, you must assess which power notch is most suitable for the conditions and balance the occurrence of wheelslip with the maximum possible rate of acceleration.

Wheelslide

When wheelslide is encountered during braking, a three-stage process takes place:

- 1) Brake pressure is automatically reduced to try and control the slide.
- 2) Sand is automatically applied if in step 2, step 3 or emergency brake.
- 3) Once the slide stops, brake pressure is returned to the notch selected on the brake handle. If wheelslide reoccurs, the process starts again.

As a driver, you must resist the temptation to reduce the brake yourself as the wheelslip protection will offer the best braking performance.

Gradients

By default in Train Simulator Classic, only gradients of 1 in 185 or steeper have a gravitational effect on a train and this is only suitably realistic on gradients of approximately 1 in 125 or steeper. This means on gradients shallower than 1 in 125, the train does not experience the gravitational forces upon it than it should.

With this information in hand, we have managed to get rid of this limitation by making the train invisibly power or brake itself to simulate the effect that gravity has where Train Simulator Classic by default doesn't do so. This is all invisible to you as the player so you won't suddenly find the power or brake handles moving without your say so, but it does mean you have to drive to the gradients of the route a lot more than before, just like a real driver, especially on mainline routes where gradients rarely reach the severity where Train Simulator Classic has them behave realistically. You will also now find that if trying to recreate real timetabled runs, your timings will much more closely match reality.

Driver Only Operation (DOO)

Full door control is featured in this pack to simulate 'DOO'. Please see below for what the relevant procedure is and how to change the type of operation whilst in-game:

Driver Only Operation (DOO)

- 1) Open the doors by pressing **T+U** (left-hand side) or **T+O** (right-hand side).
Alternatively, you can click the corresponding red buttons in the cab.
- 2) If at a platform, wait for the 'Platform Duties Complete' message to appear in the top-right corner and press **R** to close the doors. If not at a platform, press **R** whenever you wish.
- 3) Once the door interlock light illuminates, you may depart.

Guard Operation (GO)

- 1) Open the doors by pressing **T**.
- 2) Doors will be closed by the guard once passengers have finished boarding/alighting.
- 3) Once the door interlock light illuminates, the guard will give you two bells. Unlike many other units, a driver to guard bell is not fitted and you are not required to return the signal. Many drivers still do though out of habit and do so via the 'Cab-to-Cab' call button which can be pressed by pressing **C**.

How to Change Operation

This can be changed in-game by pressing **Ctrl+R** which will produce a visual message in the top-right hand corner of the screen to let you know which option you have selected.

Player Changeable Destination Display

The destination display can be changed during a scenario by pressing **F7/ F8** for the secondman's side or **Shift+F7/Shift+F8** for the driver's side. Please see below for a list of the available destinations on each livery and their relevant code if you wish to use them via the unit's number on an AI service:

BR Blue/Grey (SC) / Network SouthEast (SC/SLL) / Network SouthCentral / Ex-Network SouthEast (SC) / Connex / South Central Secondman's & Driver's Side

a - Blank	s - New Cross Gate	K - Not in Service
b - Balham	t - Norwood Jcn.	L - Via Carshalton
c - Beckenham Jcn.	u - Purley	M - Via Clapham H. St.
d - Caterham	v - Redhill	N - Via Crystal Palace
e - Charing Cross	w - Sanderstead	O - Via Epsom
f - Clapham Jcn.	x - Selhurst	P - Via Forest Hill
g - Crystal Palace	y - Smitham	Q - Via Gatwick Apt.
h - Dorking	z - South Croydon	R - Via Herne Hill
i - East Croydon	A - Streatham	S - Via Mitcham Jcn.
j - Effingham Jcn.	B - Streatham Hill	T - Via Norbury
k - Epsom	C - Sutton	U - Via Norwood Jcn.
l - Epsom Downs	D - Tattenham Cnr.	V - Via Selhurst
m - Guildford	E - Tulse Hill	W - Via St. Helier
n - Herne Hill	F - Victoria	X - Via Sutton
o - Horsham	G - West Croydon	Y - Via Tulse Hill
p - Kensington Olympia	H - Wimbledon	Z - Via West Croydon
q - Leatherhead	I - Special	
r - London Bridge	J - Depot	

BR Blue/Grey (SW) / Network SouthEast (SW) Secondman's & Driver's Side

a - Blank	r - Strawberry Hill	I - via Effingham Jn
b - Basingstoke	s - Twickenham	J - via Effingham Jn and Epsom
c - Chessington	t - Waterloo	K - via Epsom
d - Clapham	u - Weybridge	L - via Epsom and Effingham Jn
e - Clapham Jct	v - Wimbledon	M - via Kingston
f - Dorking	w - Windsor & Eton R	N - via Kingston and Richmond
g - Effingham Jct	x - Woking	O - via Kingston and Wimbledon
h - Epsom	y - Special	P - via Richmond
i - Guildford	z - Charter	Q - via Richmond and Kingston
j - Hampton Court	A - Not in Service	R - via Twickenham
k - Haslemere	B - Depot	S - via Twickenham and Brentford
l - Horsham	C - Race Special	T - via Wimbledon
m - Hounslow	D - Rugby Special	U - via Wimbledon and Kingston
n - Kensington	E - via Brentford	V - via Woking
o - Kingston	F - via Brentford and Twickenham	
p - Shepperton	G - via Chertsey	
q - Staines	H - via Cobham	

**Ex-Network SouthEast (SW/SWT1/SWT2) / South West Trains
Secondman's Side**

a - Blank	m - Hounslow	y - Special
b - Basingstoke	n - Kensington	z - Charter
c - Chessington Sth	o - Kingston	A - Not in Service
d - Clapham	p - Shepperton	B - Empty to Depot
e - Clapham Jct	q - Staines	C - Race Special
f - Dorking	r - Strawberry Hill	D - Aldershot
g - Effingham Jct	s - Twickenham	E - Ascot
h - Epsom	t - Waterloo	F - Barnes
i - Guildford	u - Weybridge	G - Raynes Park
j - Hampton Court	v - Wimbledon	H - Surbiton
k - Haslemere	w - Windsor & Eton R	I - Teddington
l - Horsham	x - Woking	J - West Croydon

Driver's Side

a - Blank	s - Via Epsom 15	K - Via Wimbledon 17
b - Direct	t - Via Epsom 16	L - Via Wimbledon 18
c - Direct 14	u - Via Epsom 17	M - Via Wimbledon 19
d - Direct 18	v - Via Hounslow 13	N - Via Wimbledon 32
e - Direct 19	w - Via Hounslow 99	O - Via Woking 73
f - Direct 21	x - Via Kingston 21	P - Via Woking 75
g - Direct 23	y - Via Kingston 24	Q - Via Weybridge 14
h - Direct 42	z - Via Kingston 32	R - Olympia 20
i - Direct 58	A - Via Richmond 14	S - Olympia
j - Direct 68	B - Via Richmond 21	T - Junction 20
k - Via Brentford 13	C - Via Richmond 32	U - Junction
l - Via Brentford 57	D - Via Richmond 47	V - For Cleaning
m - Via Brentford 87	E - Via Richmond 58	W - For Servicing
n - Via Brentford 89	F - Via Richmond 68	X - Shuttle
o - Via Brentford 99	G - Via Richmond 89	Y - Race Special
p - Via Chertsey 14	H - Via Surbiton 10	Z - Rugby Special
q - Via Chertsey 98	I - Via Surbiton 30	
r - Via Cobham 42	J - Via Surbiton 42	

Variable Power & Brake Performance

Any train driver will tell you that braking and power performance can vary quite noticeably from unit to unit, despite being within the same class. We have simulated this variance by randomly allocating a 'Brake Factor' & 'Power Factor' every time you drive a unit in the simulator. This factor can reduce or increase performance by a maximum of 8% either way for the brakes and 10% either way for traction power. There is no way of finding out what factor your unit has been allocated except for assessing its 'feel' when powering or braking; just like a real driver!

Variable Traction Motor Volume

As per reality, through wear and tear, some tractions are louder than others. To simulate this, we have implemented a random 'Motor Factor' to each motor bogie which ranges from 1 to 6; 1 being the quietest and 6 being the loudest. This can not be changed by the player.

Automatic Unit Numbering

When placing a unit in the scenario editor or using one in Quick Drive, all vehicles will automatically be given correct unit and coach numbers, instead of you having to select each vehicle and changing their number manually so they match. The unit number is controlled via the MSO vehicle if you wish to change it.

AI Horns

To blow an AI train's horn in a scenario, you must edit the speed limit properties of the section of the track at which you would like the AI train to sound its horn. Please see below for instructions:

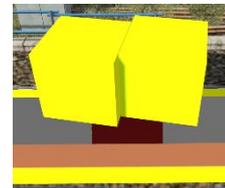
- 1) In the scenario editor, go to the location at which you would like the AI train's horn to sound, and press **Spacebar** 3 times. The track will now display a certain colour which represent its speed limit.

- 2) Go to the top-left-hand fly-out and click the 'Select' icon.

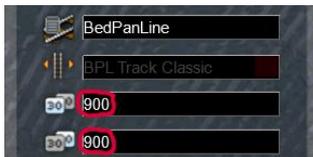


- 3) Hover your mouse over the piece of track where you like the AI horn to sound. A yellow border will appear around the track when it is selected.

- 4) Click and drag the yellow box in either direction until the measurement reading at the bottom of the screen says at least '1.0 metres'.



- 5) Go to the right-hand fly-out and change the two 'Speed Limit' values to '900'.



- 6) Click outside of any menus and the section of track you selected will now say 'Unspecified'. Any AI train which passes over this section of track will now blow its horn.

The manner in which the AI train blows its horn is randomly calculated each time, meaning no horn is ever the same. You may hear a single tone (any post-2007 liveries only), a two tone, a three tone, or now and then, even the infamous 'Ilkley Moor' sequence.

If you wish to be more specific in how and when the horn is sounded, please see the table below for values other than '900' which can be inputted in the speed limit field for different behaviour:

Speed Limit Value	Notes
900	Random number of tones
901	1 tone (low)
902	1 tone (high)
903	2 tone (low/high)
904	2 tone (high/low)
905	3 tone (low/high/low)
906	3 tone (high/low/high)
907	'Ilkley Moor' sequence
921	Same as 900 but 1 in 20 (5%) chance of horn sounding
922	Same as 900 but 1 in 16 (6.3%) chance of horn sounding
923	Same as 900 but 1 in 12 (8.3%) chance of horn sounding
924	Same as 900 but 1 in 8 (12.5%) chance of horn sounding
925	Same as 900 but 1 in 6 (16.6%) chance of horn sounding
926	Same as 900 but 1 in 4 (25%) chance of horn sounding
927	Same as 900 but 1 in 3 (33.3%) chance of horn sounding
928	Same as 900 but 1 in 2 (50%) chance of horn sounding
929	Same as 900 but 1 in 1.33 (75%) chance of horn sounding
930	Same as 900 but intended for use at platform ends*
931	Same as 921 but intended for use at platform ends*
932	Same as 922 but intended for use at platform ends*
933	Same as 923 but intended for use at platform ends*
934	Same as 924 but intended for use at platform ends*
935	Same as 925 but intended for use at platform ends*
936	Same as 926 but intended for use at platform ends*
937	Same as 927 but intended for use at platform ends*
938	Same as 928 but intended for use at platform ends*
939	Same as 929 but intended for use at platform ends*
940	Whistle boards**
950	Tunnels***

* **Platform ends** - Horn will sound only if train is travelling over 50mph, which at platforms of 12 car length or less, ensures that stopping trains do not sound their horn. Also, the point at which the train sounds its horn randomly varies from 1m to however fast the train is travelling. For example, if a train is passing at 125mph, the maximum possible distance it will sound its horn away from the trigger point is 125m. This simulates the propensity for drivers to sound their horn earlier if they are travelling at speed.

**** Whistle boards** - Intended for use at whistle boards. Pre-2007, trains sounded at least two tones at all times of day. From April 2007, following increasing concerns about noise, drivers were instructed to use only a single low tone and only between the hours of 07:00 & 23:00. This was later changed to between 06:00 & 23:59 in 2016.

To simulate this, any pre-2007 liveries will exhibit pre-2007 behaviour (at least two tones/no time restriction) and any post-2007 liveries will exhibit a hybrid of post-2007 & 2016 behaviour (single low tone/between 06:00 & 23:59 only). The point at which the horn sounds varies randomly from 1m to 40m away from the trigger point.

***** Tunnels** - Historically, trains always blew their horn when entering & exiting tunnels to warn potential track workers of their presence. With increased health & safety regulations reducing the presence of track workers in 'live' tunnels, and to allay complaints of increasing noise pollution due to louder modern horns, this requirement was removed on Saturday 6th November 2004.

To simulate this, any pre-2004 liveries will sound at least two tones. The point at which the horn sounds varies randomly from 1m to 40m away from the trigger point.

Whilst these tools are primarily intended for use by scenario creators, they can also be used by route editors to 'bake' these features into a route. The platform end, whistle board & tunnel values being of particular use in this respect.

Finally, due to the custom speed limits being of such a short distance, they do not affect AI train performance or appear as the current speed limit on the F3/F4 HUD. Also, assuming the route you are using is configured to only show signed speed limits (the majority do this), custom speed limits will not appear in the part of the F3/F4 HUD which shows forthcoming speed limit changes.

Bits and Bobs

This section is dedicated to aspects of this pack that don't warrant a dedicated section but are still of note:

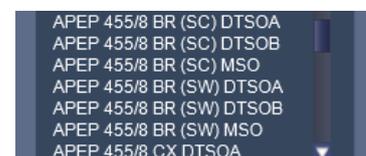
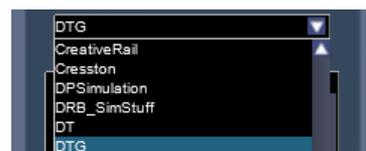
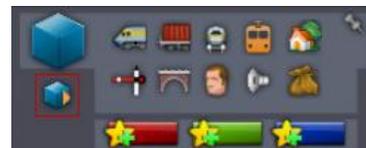
- Higher resolution cab visuals
- Door handrails added that were later removed in the mid-2000s refurbishment.
- 4-step reverser (off/forward/neutral/reverse).
- TPWS lights illuminate during AWS self-test.
- Power cannot be applied if the brake handle is in 'Step 2', 'Step 3' or 'Emergency'.
- If the brake handle is placed in 'Step 2', 'Step 3' or 'Emergency' whilst powering, power will be lost and you must return the power handle to 'Off' before being able to regain power.
- Visual alarms outside of cab when AWS is active.
- The visible driver automatically moves to whichever cab you are in.
- Emergency brake pressure applied when reverser is in 'Off'.
- When moving the reverser away from 'Off', brake pressure will release once the AWS self-test has been reset and the reverser is placed into 'Forward' or 'Reverse'.
- When the sander button is pressed, you must be in a power notch and it will only apply for 10 seconds maximum at a time. If you wish to continue to apply sand after 10 seconds, you must re-press the sander button.
- 1 second delay between train passing over AWS magnet and AWS warning sound occurring. The F3/F4 HUD will show the warning immediately so you must wait 1 second before trying to cancel it.
- Wobbly speedometer needle. Especially at low speed.
- Flash from the line breaker on the MSO visible when cutting power.
- The headlights only provide illumination before sunrise and after sunset. This is to avoid the unrealistic appearance of projected light in broad daylight.
- High quality headlight/marker light & tail light visuals.
- Correct looking tightlock coupler applied.
- A special 'bogie cam' is available if you switch to the right-hand 'head-out' view (**Shift+2 THEN Right Arrow**)
- Wipers operate on AI services if it's raining

How to Use in the Scenario Editor

How to place

To place in the scenario editor, please follow the instructions below:

- 1) In the left-hand rolling stock fly-out, click the object set filter which looks like a blue box with an orange arrow to the right of it.
- 2) Go to the right-hand fly-out which should have appeared. Select 'DTG' from the drop-down menu.
- 3) Tick the second & third box beside 'Class455Pack02'.
- 4) The liveries should now be visible in the left-hand rolling stock fly-out.



Numbering

When placing in the scenario editor, you are able to control a number of features via the number of the unit. Please note that the only number you need to change is the MSO's, as other vehicles in the consist will automatically be numbered correctly using this number.

Reversing Motor Whine

When changing direction, the motors will make a distinctive high pitch whining sound that slowly fades away over time. After one reversal, this sound activates automatically but to enable it at the start of a scenario, add **;RW=1** to the MSO number. This is mostly intended to be used when a scenario starts at a terminus.

Example number:

455803Hj;RW=1

Key:

455803 - Unit number

H - Destination (secondman's side)

j - Destination (driver's side)

;RW=1 - Reversing motor whine activated

Setting up the Driver's Cab

Please follow these steps to set up the cab so you are ready to move:

- 1) Move the reverser to the 'Neutral' position by pressing **S**.
- 2) Cancel the AWS self-test alarm by pressing **Q**.
- 3) Turn the tail lights off and headlights on by pressing **H**. Please that only the 'Day' headlight option is available as per pre-refurbishment units.
- 4) Set your destination by pressing **F7/F8** (secondman's side) or **Shift+F7/Shift+F8** (driver's side).
- 5) Turn the Driver Reminder Appliance (DRA) off by pressing **Y**.

You should now be ready to move off.

Driving Guide

The following steps should allow you to drive in a realistic and safe manner:

- 1) Move the reverser to your desired direction of travel by pressing either **W** for 'Forward' or **S** for 'Reverse'.
- 2) Move the brake handle to 'Step 1' by pressing **;**.
- 3) Move the power handle to 'Notch 2' by pressing **A**. At the same time, move the brake handle to 'Release', to ensure you depart without rolling back.
- 4) From then on, increase power as you see fit. In dry conditions outside of autumn, you should be safe to use 'Notch 4' for the maximum rate of acceleration.
- 5) To brake the train, you may make applications and releases by moving the handle between 'Step 1 and 'Full Service'. It is recommended you only use 'Full Service' as a last resort so as to ensure you always have more brake force available if required.
- 6) Just before coming to a stop, aim to have the brake handle in 'Step 1' so as to provide a smooth stop.

Scenarios

APC455EP: 2N54 19:41 London Victoria - London Bridge

Route = South London Network
Track covered = Victoria - London Bridge
Traction = South Central 455835
Year = 2004
Duration = 25 minutes



APC455EP: 2N98 18:18 London Bridge - London Bridge

Route = South London Network
Track covered = London Bridge - Crystal Palace - London Bridge
Traction = Network SouthCentral 455815 & 455817
Year = 1996
Duration = 45 minutes



APC455EP: 2U14 07:58 West Croydon - London Bridge

Route = South London Network
Track covered = West Croydon - London Bridge
Traction = Connex 455814 & ex-Network SouthEast 456009
Year = 2000
Duration = 30 minutes



Credits

Nicolas Schichan - Advanced scripting

Gü Studios - Modelling of the handrails and original style 455/8 front