

Class 455

Enhancement Pack

Volume 2



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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 2'. 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

South West Trains Revised:

with South West Trains logo - *SWT2*

with South West Trains logo & AC motors - *SWT2 (AC)*

with South Western Railways logo - *Ex-SWT2 (SWR)*



Southern:

with Southern logo - *SN*

with Southern logo & PRM compliant door alarms - *SN (PRM)*



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 - Revised south western 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 (DC units only):

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

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

DC & AC Traction Physics

DC (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.

AC Traction System

During 2016 & 2017, South West Trains re-tractioned their 455s with AC motors to reduce maintenance requirements. From a driver's perspective, this is a much-simplified system compared to the old camshaft and most significantly, does not require you to shut off power to reduce power. Please see below for a description of what occurs in each power notch:

0 - Traction power is OFF

1 - This is considered a shunt notch and on level track, your train will not accelerate above 10 mph.

2 - Around 25% power

3 - Around 40% power

4 - 100% power

Whilst official documentation suggests notches 1, 2 & 3 should offer 25%, 50% & 75% power respectively, the reality is as described above. This proves troublesome in poor adhesion conditions with notch 4 often resulting in wheelslip and notch 3 not supplying enough power to make good progress. This is something you will need to battle with, just like a real driver.

The AC traction system also features dynamic braking which means the traction motors will assist in braking until around 7 mph. When dynamic braking is active, you will see a reduced reading on the brake pressure gauge compared to a conventional DC unit. Finally, dynamic braking will not occur when the emergency brake is applied.

Other smaller changes were also made during this re-tractioning and these are listed below:

- If you have power applied whilst in step 1 brake for more than 10 seconds, power will be automatically cut.
- Brake pressure reverts to emergency when the doors are released. Once the doors are closed and you have interlock, you will need to wait 3 seconds and ensure you have the reverser in either forward or reverse for the brakes to release.
- Different air brake equipment installed with much quieter release sounds.

- Cooling fans fitted to aid the cooling of the traction motors. These will run at low speed 11 minutes after power was last applied and at high speed for 1 minute after the dynamic brake was last active.

The AC traction system is present on the *SWT (AC)* & *Ex-SWT (SWR)* variants.

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 on DC units, the camshaft ceases to progress.
- 2)** On DC units, if the slip does not stop after a second or three, power is cut. On AC units, power is immediately reduced.
- 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. On AC units, the dynamic brake will stop and the air brake will fully take over.
- 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. Additionally, on AC units, the dynamic brake will remain disabled until you release and apply the brakes again.

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

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.

Global System for Mobile Communication-Railway (GSM-R)



Beginning in 2013 and completed by 2016, Global System for Mobile Communication - Railway, more commonly known as GSM-R, replaced the existing National Radio Network (NRN) & Cab Secure Radio (CSR) systems. This communication system and its accompanying unit has been simulated to the best of our ability within the simulator. Please see below for how to register & deregister your train:

Registering

- 1) Move the reverser away from 'Off' or hold down either the 'Registration' or 'Accept' button for 5 seconds. The GSM-R unit will begin a boot up sequence.
- 2) When 'GSM-R GB' appears, the unit has successfully booted.
- 3) Press the 'Registration' button in the top right-hand corner.
- 4) Using the numerical keys, insert your 4-character train reporting number (headcode), followed by the signal number you are standing at in a 3-digit format. For example, signal WH84 would require you to enter '084'. If you wish to delete a character, press the 'x' button.
- 5) Press the '✓' button.
- 6) Registration will take a moment. Once it has completed, you will hear a double beep and the train reporting number will appear in the top right-hand corner of the display.



Deregistering - Method 1

If you are closing down the driving desk, use this method.

- 1) Move the reverser to 'Off'.
- 2) Deregistration will automatically begin and you will be given the opportunity for a short moment to retain the registration by pressing the '✓' button. Simply do nothing if you would like to continue with the deregistration.
- 3) Deregistration will take a moment. Once it has completed, the train reporting number will no longer be displayed.

Deregistering - Method 2

If you wish to keep the driving desk active after deregistering, use this method.

- 1) Press the 'Registration' button in the top right-hand corner.
- 2) A prompt will appear on the unit saying 'Confirm deregister?'.
- 3) Press the '✓' button.
- 4) Deregistration will take a moment. Once it has completed, the train reporting number will no longer be displayed.

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:

Southern

Secondman's Side

a - Beckenham Junction	j - Guildford	s - Streatham Hill
b - Caterham	k - Horsham	t - Sutton
c - Charing Cross	l - Kensington Olympia	u - Tattenham Corner
d - Coulsdon Town	m - London Bridge	v - West Croydon
e - Crystal Palace	n - London Victoria	w - Wimbledon
f - Dorking	o - Norwood Junction	x - Special
g - East Croydon	p - Purley	y - Depot
h - Epsom	q - Redhill	z - Not in Service
i - Epsom Downs	r - Selhurst	A - Blank

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	

South West Trains Revised

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% (DC)/8% (AC) 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.

Bits and Bobs

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

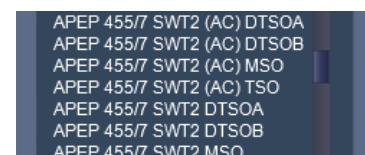
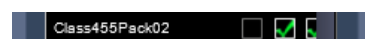
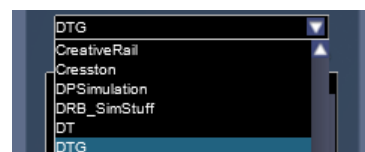
- Higher resolution cab visuals
- 4-step reverser (off/forward/neutral/reverse).
- TPWS lights illuminate during AWS self-test.
- Power cannot be applied if the brake handle is in 'Step 2', 'Step 3' or 'Emergency'.
- If the brake handle is placed in 'Step 2', 'Step 3' or 'Emergency' whilst powering, 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 (DC only).
- 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
- Revised LED destination display visuals on Southern livery
- Selected destination stated on the TrainFX screen to the left of the driver's cab window on Southern livery

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.

GSM-R

To restrict the train reporting number and signal number that the player can use to register with on the GSM-R, add **;GSMR=1A22084** to the number of the lead driving vehicle. In this example, **1A22** is the train reporting number and **084** is the signal 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 and is only for use on DC traction units.

Example number:

455863Hj;RW=1

Key:

455863 - 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) Register the GSM-R if applicable.
- 5) Set your destination by pressing **F7/F8** (secondman's side) or **Shift+F7/Shift+F8** (driver's side).
- 6) 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: 2F60 19:03 Woking - Waterloo

Route = Portsmouth Direct Line - Waterloo to Portsmouth

Track covered = Woking - Waterloo

Traction = South West Trains 455864 & 455916

Year = 2012

Duration = 50 minutes



APC455EP: 2G09 07:16 Wimbledon - Guildford

Route = Portsmouth Direct Line - Waterloo to Portsmouth

Track covered = Wimbledon Park Depot - Claygate

Traction = South West Trains 455913 & 455728

Year = 2017

Duration = 40 minutes



APC455EP: 2J37 14:06 Waterloo - Hampton Court

Route = Portsmouth Direct Line - Waterloo to Portsmouth

Track covered = Waterloo - Hampton Court

Traction = South West Trains 455732 & 455708

Year = 2017

Duration = 40 minutes



Credits

Nicolas Schichan - Advanced scripting

Gü Studios - Modelling of the revised south western style 455/8 front