

Class 86

Enhancement Pack



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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 86 Enhancement Pack'. 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 freely available extra stock pack and relevant payware add-on packs listed on the product page installed so the scenarios function as intended.
- 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

BR Blue:

without original TDM jumpers - *BR Blue 1*

with original TDM jumpers - *BR Blue 2*

with revised TDM jumpers & headlight - *BR Blue (Modern)*



InterCity 1:

without original TDM jumpers - *IC1 1*

with original TDM jumpers - *IC1 2*

with original TDM jumpers & black headcode box - *IC1 2 (BHC)*

with original TDM jumpers & headlight - *IC1 3*

with original TDM jumpers, black headcode box & headlight - *IC1 3 (BHC)*

with revised TDM jumpers & headlight - *IC1 4*



InterCity 2:

without original TDM jumpers - *IC2 1*

with original TDM jumpers - *IC2 2*

with original TDM jumpers & headlight - *IC2 3*



InterCity Mainline 1:

with original TDM jumpers - *ICM1 1*

with original TDM jumpers & headlight - *ICM1 2*

with original TDM jumpers & black headcode box & headlight - *ICM1 2 (BHC)*

with revised TDM jumpers & headlight - *ICM1 3*



InterCity Mainline 2:

with original TDM jumpers - *ICM2 1*

with original TDM jumpers & headlight - *ICM2 2*

with original TDM jumpers & black headcode box & headlight - *ICM2 2 (BHC)*

with revised TDM jumpers & headlight - *ICM2 3*



InterCity Swallow - *ICS*



Network SouthEast - NSE



BR Trainload:

with Sector logo - *BR Trainload*

without Sector logo - *Ex-BR Trainload*



Railfreight Distribution:

with Railfreight Distribution logo - *RfD*

without Railfreight Distribution logo - *Ex-RfD*



Parcels



Rail Express Systems - RES



EWS



Anglia - AR



VT



Freightliner Grey - FL1



Freightliner - FL2



Freightliner Powerhaul - FL3



Caledonian Sleeper - CS



86259 'Les Ross' - 86259



Keyboard Controls

Non-standard keyboard controls are listed below:

O -	Anti-slip brake button
Ctrl+N -	AWS change end switch ON/OFF
Shift+Ctrl+B -	Brake type TREAD/DISC
L -	Cab light switch ON/OFF
E -	Deadman's pedal (DVD reset)
C -	Driver to guard buzzer
Ctrl+D -	Driver vigilance device (DVD) ON/OFF
H -	Headlight switch ON/OFF
Space -	Horn (low tone)
B -	Horn (high tone)
I -	Instrument lights switch ON/OFF
J -	Marker lights switch ON/OFF
Shift+W -	Master key IN/OUT
Shift+M -	Motor Factor INCREASE
Ctrl+M -	Motor Factor DECREASE
U -	Notch up/down button
Shift+P -	Pantograph down button
P -	Pantograph up/reset button
F -	Reverser lock button
Ctrl+R -	Rheostatic brake isolation ON/OFF
K -	Tail lights switch ON/OFF
Ctrl+T -	In-cab tap changer audio ON/OFF
R -	Train brake handle shutdown pin IN/OUT
Ctrl+Numpad Enter -	Visual aids ON/OFF
Shift+V -	Windscreen wiper switch LEFT
V -	Windscreen wiper switch RIGHT

Features

External Variations

A number of external variations have been modelled to represent the locomotive throughout the years. Many of these are automatically applied on a per livery basis but if you wish to further amend, instructions can be found in the 'Numbering' section of this manual.

Post-headcode blind removal



Original multiple working jumpers



Plated over original multiple working jumpers



Original TDM jumpers



Revised TDM jumpers



High intensity headlight



Stone Faiveley AMBR pantograph



Brecknell Willis high speed pantograph



BP9 bogies (Class 86/1)



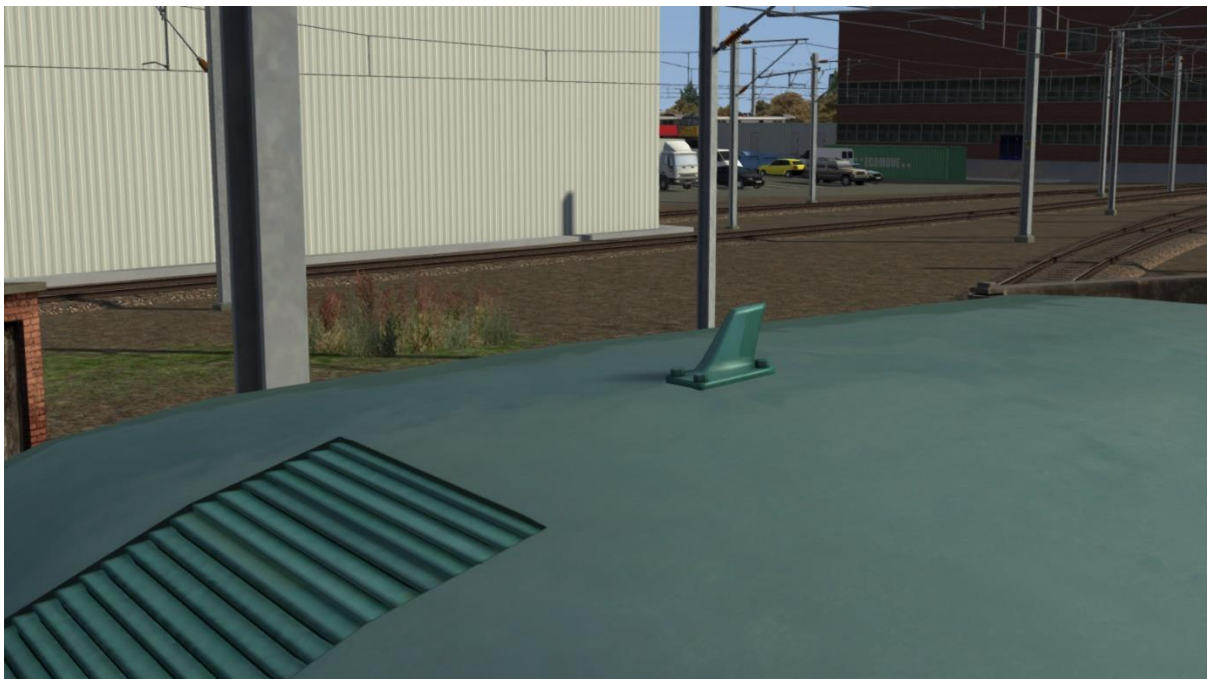
Rectangular buffers



Sandbox cover

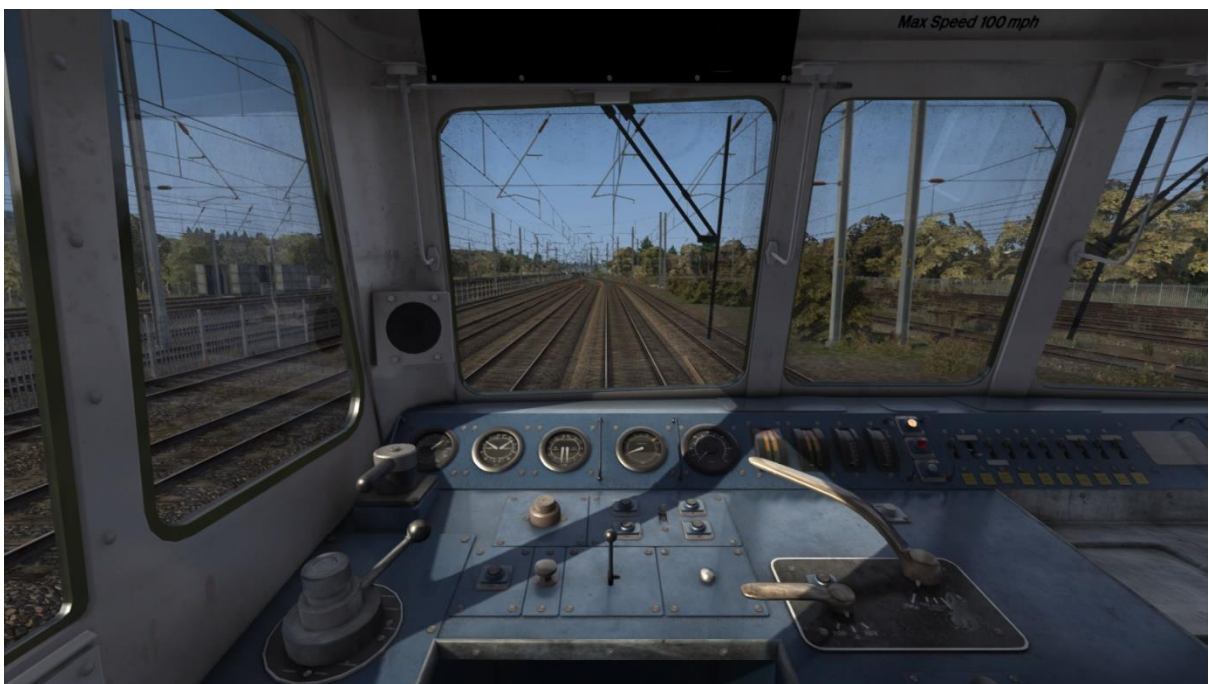


GSM-R antenna



Cab Improvements

The cab has also seen major visual improvement with a full re-texture, which features new shading, weathering & reflections.



Tap Changer

Traction

Great care has been taken to simulate the distinctive 'tap changer' system of power control. Containing 38 notches, this system allows the driver to exercise fine control over traction power. The 86/1 sub-class has 39 notches, the extra notch being a 'weakfield' notch.

The tap changer is controlled by the notching lever in the cab which has six notches:

Off - Power to the traction motors is cut off.

Run Down - The tap changer notches down continuously at approximately 0.65 seconds per notch. This is most commonly used to reduce power sufficiently to avoid a jolt when moving to **Off**.

Notch Down - The tap changer is notched down once every time the driver moves the notching lever from **Hold** to **Notch Down** and back. One single "to and fro" movement is achieved in the simulator by holding **U** and pressing **D** whilst in the **Hold** position.

Hold - The tap changer is held at its current notch

Notch Up - The tap changer is notched up once every time the driver moves the notching lever from **Hold** to **Notch Up** and back. One single "to and fro" movement is achieved in the simulator by holding **U** and pressing **A** whilst in the **Hold** position.

Run Up - The tap changer notches up continuously at approximately 0.65 seconds per notch. This is most commonly used when applying power at speed and should not be used when moving away from a stand.

Your current notch can be viewed on the notch indicator to the right of the cab desk.

Braking

The tap changer is also used to provide braking effort via the rheostatic brake, which uses the traction motors to brake the locomotive. This is done by turning the motors into generators, which convert the kinetic energy of the locomotive into electricity. This excess electricity is sent to a bank of resistors which dissipate the energy in the form of heat. A set of blowers are provided below the resistors, which speed up in proportion to the strength of the rheostatic brake applied; resulting in the classic wailing sound whilst braking.

The rheostatic brake is only active when the notching lever is in **Off**.

The rheostatic brake can be isolated by pressing **Ctrl+R**. The locomotive's tread brakes will then be used instead.

Brakes

Westinghouse Brake Handle

This locomotive is fitted with a dual-brake Westinghouse brake handle which has the following positions:

Release (0%) - This is a sprung load position and when using vacuum brakes, speeds up the exhausters to provide a quicker brake release.

Running (24%) - Brakes are fully released and the brake pipe pressure will read 72.5 psi.

1st Application (40%) - Minimum possible brake force. This equates to around 25% brake force. The brake pipe pressure will read 66.5 psi.

Service (40% to 70%) - Brake pipe pressure can be changed as desired between 48.5 & 66.5 psi.

Full Service (70%) - Maximum possible brake force. The brake pipe pressure will read 48.5.

Emergency (85%) - Maximum possible brake force applied quicker compared to 'Full Service'. The brake pipe pressure will read 0 psi.

Shutdown (100%) - Only accessible by raising the pin (**R** key), the brake handle must be placed in this position when shutting down the cab.

Tread Brake Simulation

By default in Train Simulator, braking performance is constant throughout the speed range so a full brake application at 70mph will have the same level of retardation than at 10mph. This is a fairly good representation of how disc brakes work but for stock with tread brakes, this is not so realistic.

As a result, this pack has scripted brake force to simulate the relatively poor performance at high speed, and the 'bite' at lower speeds where performance increases quite significantly. These tread brake physics are turned on by default as most rolling stock these locomotives have hauled is fitted with this type of brake. If you are hauling disc braked stock such as Mk3 coaches, you can change the brake type by pressing **Shift+Ctrl+B**.

Also, please note that the rolling stock you are hauling must be especially adapted to work properly with our tread brake simulation. If it is not, the correct physics will still occur on the locomotive, and to some degree on the stock behind, except for the extra 'bite' at low speed.

Neutral Section Functionality

This locomotive will react correctly to the neutral sections on the WCML Over Shap route.

When passing a neutral section, it is advisable, but not essential, that you reduce power to a low level to avoid a jolt. Once the line light extinguishes, you must place the notching lever into **Off**, if you haven't already. When the line light returns, you will only be able to regain power once the tap changer has fully notched down.

Occasionally, the line light may not illuminate after passing a neutral section. To fix this, press the **Pan Up/Reset** button to ensure the vacuum circuit breaker (VCB) has closed.

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.

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 Protection (WSP)

A basic form of wheelslip protection is fitted which aids the driver during times of poor adhesion.

This works by looking at the amps on each axle whilst powering. When there is no wheelslip, all four axles will display a similar reading, but if one of them begins to slip and speeds up, this will reduce the amps on this axle. If this results in a 200 amp or more differential, the wheelslip protection system will kick in. This is a two-stage process:

- 1) The anti-slip brake is applied (15 psi loco brake application) and the tap changer continuously notches down.
- 2) Once the wheelslip stops, the anti-slip brake is released and control of the tap changer returns to the notching lever. If wheelslip reoccurs, the process starts again.

Please note that this is a rather crude system and as a result, the protective measures may carry on for a good few seconds after the slip has been corrected. In addition, if slip occurs at low speed where you have only taken a few notches of power, this protection could cause the locomotive to stall. If you fear this might occur, you can over-ride the protection by pressing the anti-slip brake button.

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

Traction Motor Isolation

Due to faults, traction motors are sometimes isolated to allow a locomotive to still operate in service. Isolated traction motors do not provide any traction power.

To isolate traction motors, add **;TM=x** to the locomotive number in the scenario editor. **x** = the number of traction motors you wish to isolate which can be anything from 1 to 3.

The physics will respond accordingly so if you have 2 traction motors isolated for example, you will only have half the normal amount of power at your disposal. Also, when any traction motor is isolated, the rheostatic brake is automatically isolated and on 86/1s, the weakfield power notch is no longer available.

Driver Vigilance Device

A driver vigilance device is provided which sounds every 60 seconds, regardless of control movement, when the reverser is in either **Forward** or **Reverse**. This must be reset using the pedal (**E** key).

Guard to Driver Signal

A simulation of the guard to driver signal has been implemented where you receive two beeps from the guard after the doors have closed. You are then expected to reply with two beeps using the **C** key. Please note that this will only work when using the locomotive either with our *Mk2D-F Coach Pack* or *Mk3A-B Coach Pack*.

For when flag and whistle dispatch is used instead, this feature can be disabled by adding **;G=1** to the locomotive number in the scenario editor.

Variable Power & Brake Performance

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

Variable Traction Motor Volume

The howling of the traction motors is a distinctive feature of this locomotive and we have made a lot of effort to recreate this, using recordings taken on-board preserved 86259.

In addition, locomotives tend to vary in how loud their traction motors are. To simulate this, we have implemented a random 'motor' factor to each locomotive which ranges from 1 to 6; 1 being barely audible and 6 being very prominent. This can also be controlled on the player locomotive by using **Shift+M** and **Ctrl+M**.

Dead Variant

A 'dead' variant of all liveries is provided with a '(Dead)' suffix in the scenario editor. This is identical to a normal variant, except the pantograph is down and will not provide tractive effort in a consist. Ideal for 'dragging'.

Arcing Pantograph



Special attention has been given to simulating arcing between the pantograph and overhead wire.

From one hour after sunrise to one hour after sunset on a dry day, there is only light arcing.

From one hour after sunset to one hour after sunrise, there is moderate arcing to simulate the moisture that tends to build up on the overhead wire once night falls. There is also moderate arcing when raining at any time of day.

During the winter, from one hour after sunset to one hour after sunrise, there is heavy arcing to simulate ice/frost that tends to build up on the overhead wire once night falls. There is also heavy arcing when snowing at any time of day during the winter.

Finally, arcing becomes more frequent as you gain speed.

When arcing, you will visually see it on the pantograph which illuminates the area around it to a varying degree with each arc. Please note that the illumination of the surrounding area will only occur after sunset and before sunrise. This is to avoid the unrealistic appearance of projected light in broad daylight.

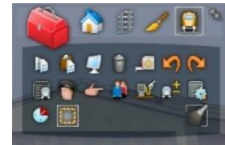
You will also audibly hear it if the arcing is moderate or heavy.

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:

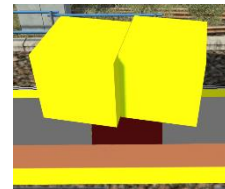
- 1) In the scenario editor, go to the location at which you would like the AI train's horn to sound, and press **Spacebar** 3 times. The track will now display a certain colour which represent its speed limit.

- 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.

Bits and Bobs

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

- A comprehensive selection of 2D nameplates are included for all liveries.
- The 86/1 sub-class has amended physics with a maximum top speed of 110mph.
- 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.
- The headlight only provides illumination before sunrise and after sunset. This is to avoid the unrealistic appearance of projected light in broad daylight.
- Make the tap changer audible within the cab by pressing **Ctrl+T**.
- As per reality, the speedometer needle wobbles when providing a reading.
- Instrument lights illuminate/extinguish gradually and not instantly.
- Variable speed windscreen wipers.
- The visible driver automatically moves to whichever cab you are in, or is leading on an AI train.
- In-cab decals which state the locomotive number, maximum permitted speed and cab number.
- Bodyside data panels show the correct sub-class.

Setting up the Driver's Cab

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

- 1) Ensure the master key is turned in. If not, press **Shift+W**.
- 2) Move the AWS change end switch to 'ON' by pressing **Ctrl+N**. You must ensure the AWS change end switch in the other cab is set to 'OFF'. If it's not, you will receive a warning message.
- 3) If the pantograph is not raised, do so by moving the reverser into 'Forward' by pressing **W** and then pressing the Pan Up/Reset Button by pressing **P**. The notching lever must also be in 'Off'.
- 4) Lift the train brake handle brake pin by pressing **R** and at the same time, move the train brake handle to 'Full Service' (70%) by pressing **semi-colon**.
- 5) Turn off the tail lights by pressing **K**.
- 6) Turn on the marker lights by pressing **J**.
- 7) If applicable, turn on the headlight by pressing **H**.

You should now be ready to move off. For information on this, please see the next page.

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'. If you wish to select 'Reverse', you will need to hold down the 'Reverse Lock' button using the **F** key at the same time.
- 2) Move the brake handle to 'Running' (24%) by pressing **semi-colon**.
- 3) As soon as possible, move the notching lever to 'Notch Up' (80%) and back to 'Hold' (60%) by pressing **A** and **U** at the same time. This will increase the tap changer by one notch for every "to and fro" movement. Do this repeatedly until you have notched up enough power to move your train
- 4) Rail conditions permitting, continue to notch up power whilst aiming to stay in the yellow zone of the ammeter. You may stray briefly into the red zone but not for any length of time. If amps exceed 1585, the traction motors will overload and a fault light will illuminate. You must press the **Pan Up/Reset** button to fix this and regain the line light.
- 5) If you only need to reduce power slightly, you may notch down by moving the notching lever to 'Notch Down' (40%) and back to 'Hold' (60%) by pressing **D** and **U** at the same time. This will decrease the tap changer by one notch for every "to and fro" movement.
- 6) If you are looking to reduce power significantly or shut off completely, you may use the 'Run Down' (20%) notch of the notching lever which will continually notch down the tap changer. When shutting off power, it is advised, but not essential, that you reduce power to a low setting to avoid a jolt when moving to 'Off' (0%), which will shut off power completely. Once moving to 'Off' (0%), you must wait until the tap changer notches down fully to off before being able to reapply power.
- 7) If you wish to apply power at speed, you may use the 'Run Up' (100%) notch of the notching lever which will continually notch up the tap changer. It is not recommended you use this notch from a standing start as you will most likely overload the traction motors.
- 8) To brake the train, use any 'Service' setting on the train brake handle between '1st Application' (40%) & 'Full Service' (70%). To provide a smooth stop, it is recommended to be in '1st Application' as you come to a stop.

How to Use in the Scenario Editor

How to place

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

- 7) 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.



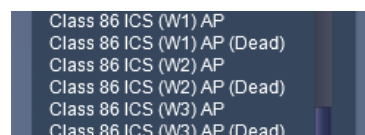
- 8) Go to the right-hand fly-out which should have appeared. Select 'RSC' from the drop-down menu.



- 9) Tick the second & third box beside 'Class86Pack'.



- 10) 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 locomotive.

Logos

You can add logos/decals by adding ;L=x to the locomotive number. Please see what to put as 'x' to receive your desired result on each livery:

- BR Blue: **1** = Cab-side logo. **2** = Central logo.
- InterCity Mainline: **1** = Intercity logo. **2** = Cab-side BR logo.
- InterCity Swallow: **1** = Intercity & swallow logo. **2** = Intercity logo only.
- BR Trainload: **1** = General logo. **2** = RfD logo. **3** = Cab-side BR logo only.
- Parcels & Rail Express Systems: **1** = Cab-side BR logo.
- Anglia Railways: **2** = Centre front window 'Anglia' logo.
- Freightliner Grey: **4** = Freightliner, BR logo & depot plaque. **5** = Freightliner logo only.

Adding ;L=0 will remove the relevant logo/decals.

Numbers

You can change the style of numbers shown on a handful of liveries by adding **;N=x** to the locomotive number.

- InterCity Mainline: **2** = Larger numbers.
- Anglia Railways: **1** = BR font numbers.
- Freightliner: **1** = Original/larger numbers.

Nameplates

You can control the nameplate shown by adding **;NP=x** to the locomotive number.

- The first nameplate carried by a locomotive in its relevant livery. x = **1**
- The second nameplate carried by a locomotive in its relevant livery. x = **2**

For example, for 86240 in InterCity Swallow livery, **;NP=1** shows 'Bishop Eric Treacy' with a red background & **;NP=2** shows 'Bishop Eric Treacy' with a black background.

Adding **;NP=0** will remove any nameplates.

Overhead line warning stickers

In their default state, liveries show the most common style of overhead line warning sticker that they carried; sometimes with no sticker at all. For where this varied within a livery's time period though, **;OHL=x** can be added to the locomotive number.

- InterCity Swallow, BR Trainload & Freightliner Grey: **1** = New style. **2** = Old style.
- Rail Express Systems: **1** = New style.
- EWS: **2** = Old style.

Guard to driver signal

For when flag and whistle dispatch is required instead of the guard to driver signal, add **;G=1** to the locomotive 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 locomotive number. This is mostly intended to be used when a scenario starts at a terminus.

Tail lamp

To add a tail lamp to the no. 1 end, add **;TL=1** to the locomotive number.

To add a tail lamp to the no. 2 end, add **;TL=2** to the locomotive number.

Brake type physics

To apply disc brake physics, add **;BT=D** to the locomotive number.

External variations

By default, we have supplied the locomotive in its most common forms on a per livery basis. If you place a locomotive though and would like to amend its external features, please see below:

No high intensity light

Add **;HL=0** to the locomotive number.

TDM jumpers

Add **;TDM=x** to the locomotive number:

- No TDM jumpers. x = **0**
- Original TDM jumpers. x = **1**

Revised TDM jumpers are applied by default.

Original multiple working jumpers

Add **;J=x** to the locomotive number:

- Original multiple working jumpers. x = **1**
- Plated over original multiple working jumpers. x = **2**

Rectangular buffers

Add **;B=1** to the locomotive number.

Sandbox cover

Add **;SB=1** to the locomotive number.

GSM-R antenna

Add **;GSMR=1** to the locomotive number.

Example locomotive number

86637;J=2;SB=1;GSMR=1

Key:

86637 - Locomotive number

;J=2 - Plated over original multiple working jumpers

;SB=1 = Sandbox cover

;GSMR=1 - GSM-R antenna

Scenarios

APC86EP: 1S76 09:20 Brighton - Edinburgh

Route = WCML Over Shap

Track covered = Preston - Carlisle

Traction = InterCity Swallow 86103

Year = 1995

Duration = 1 hour 30 minutes



APC86EP: 1V04 16:18 Glasgow Central - Bristol Temple Meads

Route = WCML Over Shap

Track covered = Carlisle - Preston

Traction = Rail Express Systems 86210

Year = 1996

Duration = 1 hour 20 minutes



APC86EP: 4S52 07:46 Crewe Basford Hall - Coatbridge

Route = WCML Over Shap

Track covered = Preston - Carlisle

Traction = Freightliner Grey 86639 & 86637

Year = 1998

Duration = 1 hour 50 minutes



Credits

Nicolas Schichan - Scripting

David Grieff & [Les Ross](#) - A special thanks for assistance in recording sounds