Class 47 Locomotive Volume 1

AP

Contents

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 47 Locomotive 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 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.

Overview

Focusing on the late 1970s through to privatisation in the late 1990s, volume 1 represents a very changeable era for both British Rail, and the class 47 itself. With over 500 locomotives built and such immediate utility across the entire network, the class saw many liveries and modifications. We have done our best to represent the vast array of modifications made to the class over this period, both inside and out, along with a substantial set of liveries and associated nameplates.

Liveries

Italics are what the livery is called in the scenario editor.

BR Blue:

Domino headcode box – *BR Blue 1*

Plated headcode box - *BR Blue 2*

Headlight – *BR Blue 3*

Headlight with orange cant rail - *BR Blue 4*

BR Blue (Silver Roof):

Domino headcode box – *BR Blue 1 (S)*

Plated headcode box - *BR Blue 2 (S)*

Headlight – *BR Blue 3 (S)*

Headlight with orange cant rail - *BR Blue 4 (S)*

Headlight with orange cant rail & NSE logo - *BR Blue 4 (S) (NSE)*

BR Large Logo:

Without orange cant rail - *BR LL*

Without orange cant rail & NSE logo - *BR LL (NSE)*

With orange cant rail - *BR LL 2*

With orange cant rail & NSE logo - *BR LL 2 (NSE)*

BR Railfreight:

Without orange cant rail - *BR RF*

With orange cant rail - *BR RF 2*

BR Railfreight Red Stripe - *BR RF Red*

BR Departmental

BR Civil Engineers - *BR Civil Eng*

BR Trainload:

Without faded logos - *BR TL*

With faded logos - *BR TL (Faded)*

Railfreight Distribution:

Without EPS logos - *RfD*

With EPS logos – *RfD (EPS)*

Unbranded – *RfD (UB)*

Parcels:

With BR logo – *Parcels*

Without BR logo – *Parcels (UB)*

With NSE logo – *Parcels (NSE)*

Rail Express Systems:

With BR logo & Crewe Diesel depot plaque – *RES*

Without BR logo & Crewe Diesel depot plaque – *RES (UB)*

Network SouthEast – *NSE1*

Network SouthEast Revised:

With BR logo – *NSE2 (BR)*

Without BR logo – *NSE2*

InterCity:

With InterCity logo – *IC*

With ScotRail logo – *IC (SR)*

ScotRail:

With ScotRail logo – *SR*

Unbranded – *SR (UB)*

With NSE logo – *SR (NSE)*

InterCity Mainline – *ICM1*

InterCity Mainline Revised – *ICM2*

InterCity Swallow:

Early to mid 1990s – *ICS1*

Mid to late 1990s – *ICS2*

Red bufferbeam – *ICS (Red)*

Cab Guide

Driver's Side

1 - Train brake handle
2 - Headlight switch (if applicable)
3 - Loco brake handle
4 - AWS reset button
5 - Horn
6 - Windscreen wiper switch (left)
7 - Anti-slip button (on power handle)
8 - Power handle
9 - Reverser
10 - Master key
11 - Engine stopped indicator light
12 - Wheelslip indicator light
13 - Alarm fault light
14 - Engine start button
15 - Engine stop button
16 - AWS sunflower
17 - Main air reservoir pressure gauge
18 - Bogie brake pressure gauge
19 - Vacuum brake gauge
20 - Speedometer
21 - Brake pipe pressure gauge
22 - Ammeter
23 - Steam heat pressure gauge (if applicable)
24 - Train heat indicator
25 - Overload reset button
26 - Fire alarm test button
27 - Train heat off/on buttons (if applicable)
28 - Train heat off/on buttons (if applicable)
29 - Compartment (engine room) lights switch
30 - Footwarmer switch
31 - Cab heater 1 switch
32 - Cab heater 2 switch
33 - Tail light switch
34 - Demister switch
35 - Instrument lights switch
36 - Train classification indicator (marker lights) switch
37 - NRN radio

Non Driver's Side Above Cab Door

38 - Cab light switch
39 - Brake mode indicator

Back Wall

40 - AWS isolation switch
41 - AWS change end switch
42 - Handbrake

Cab Variations

Many cab variations have been modelled to represent each individual locomotive as accurately as possible. These will automatically appear depending on the livery/number of the locomotive you are driving.

Weathering

The external condition of the locomotive you're driving is also reflected in how dirty the cab is. If your locomotive is externally shabby, then the cab will be too.

Propelling Advisory Control System (PACS)

Fitted to Rail Express Systems locomotives in the mid 1990s, this system assisted with propelling mail trains at slow speed. This is visually but not functionally simulated.

Slow Speed Control (SSC)

Many 47/0s & 47/3s were fitted with slow speed control to allow the loading & unloading of Merry Go Round (MGR) coal trains. This is functional.

Scottish 47/7s

Beginning in 1979, a number of class 47s were fitted with push-pull equipment in order to work with Mk2 DBSOs between Edinburgh & Glasgow. In the cab, this manifested itself with a telephone to speak to the guard, a driver to guard signal & a brake valve to carry out brake tests. The driver to guard signal is functional.

47401 - 47420

47401 to 47420 were fitted with Westinghouse brake equipment instead of the standard Davies & Metcalfe. Also, due to electrical differences, their ammeters read from 0 to 5000 amps instead of the standard 0 to 10,000 amps.

Ammeter

Over the years, many locomotives progressively received a newer style ammeter. We have represented this and on pre-1998 locomotives, there is a low chance of having the new style ammeter. On post-1998 locomotives, there is a high chance of having the new style ammeter.

Original ammeter New style ammeter

Mug Plate

Some locomotives were fitted with a plate for a driver to place their mug of tea on.

Air-Only Gauge Layout

When the majority of class 47/8s had their vacuum brake capabilities removed, the vacuum brake gauge was removed and the speedometer centred.

When Rail Express Systems class 47/7s had their vacuum brake equipment removed, some had the vacuum brake gauge removed and the resultant gap covered. If driving one of these locomotives, there is a chance you will see this.

Anti-Slip Button

On post 1998 locomotives, the anti-slip button is relocated to the left-hand side of the cab desk as a standard button fitting. This was due to the button on the power handle knob becoming unreliable.

Steam Pressure Gauge

On locomotives fitted with a boiler or pre-1998 47/0s which used to have a boiler, a steam pressure gauge is visible next to the ammeter. This is purely aesthetic and not functional.

Headlight Switch

If your locomotive is fitted with a headlight, the relevant switch will be visible to the left of the main air reservoir gauge.

Seats

Post-1998 locomotives are fitted with more modern ‘Chapman’ seats

Original

Modern ‘Chapman’

Gaffer Tape

Class 47s are notorious for being draughty. To combat this, most locomotives had gaffer tape applied over the most common entry points. There is however a low chance of having a cab not so fitted.

NRN Radio

In the 1980s, the NRN radio was fitted to all locomotives. This resulted in the addition of a central console which the radio is mounted to.

Keyboard Controls

Non-standard keyboard controls are listed below:

O -	Anti slip brake button
Ctrl+N -	AWS change end switch ON/OFF
Ctrl+A -	AWS isolation switch
Shift+Ctrl+B -	Brake type TREAD/DISC
L -	Cab light switch ON/OFF
Shift+C -	Clag Factor INCREASE
Ctrl+C -	Clag Factor DECREASE
E -	Deadman's pedal (DVD reset)
C -	Driver to guard signal (47701 to 47717 only)
Ctrl+D -	Driver vigilance device (DVD) ON/OFF
Z -	Engine start button
Ctrl+Z -	Engine stop button
F -	Fire alarm test button
H -	Headlight switch ON/OFF
Space -	Horn (low tone)
B -	Horn (high tone)
Shift+H -	Horn Factor UP
Ctrl+H -	Horn Factor DOWN
I -	Instrument lights switch
Shift+W -	Master key IN/OUT
Shift+M -	Motor Factor INCREASE
Ctrl+M -	Motor Factor DECREASE
Shift+R -	Rattle Factor INCREASE
Ctrl+R -	Rattle Factor DECREASE
J -	Train classification indicator (marker lights) switch
K -	Tail light switch UP
Shift+K -	Tail light switch DOWN
R -	Train brake handle shutdown pin IN/OUT
Ctrl+T -	Turbocharger chirp ON/OFF
Ctrl+Numpad Enter -	Visual aids ON/OFF
V -	Windscreen wiper switch RUN/FASTER
Shift+V -	Windscreen wiper switch OFF/PARK/SLOWER

External Variations

As with the cab, many external visual variations have been modelled to represent each individual locomotive as accurately as possible. We have researched to the best of our ability which variations apply to which locomotive on a per livery basis and this is automatically applied in-game depending on locomotive number. If desired, these can be customised by amending the locomotive number in the scenario editor. See the ***Numbering*** section of this manual. Please find a comprehensive list below of the variations included.

Domino headcode box

Plated headcode box

Plated headcode box (black)

Plated headcode box (sealed marker lights)

Plated headcode box (yellow sealed marker lights)

Flush front (inset marker lights)

Flush front (flush marker lights)

Headlight

Scottish headlight

Body skirt

No body skirt

Short range fuel tanks

Long range fuel tanks

Batteries only

Original tail lights

Rail Express Systems tail lights

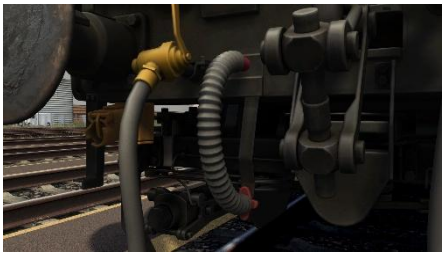
ETH equipment variant 1

ETH equipment variant 2

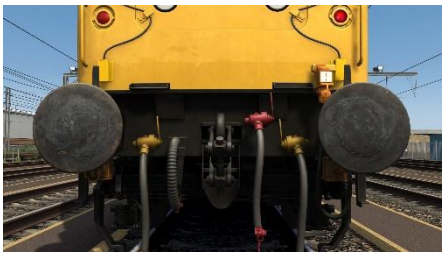
RCH jumper cables

TDM jumper cables

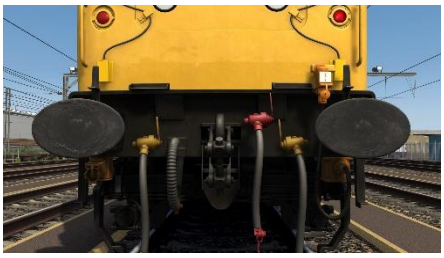
Vacuum pipe



Round buffers



Oval buffers



Square buffers

NRN radio antenna

Horn grille covers

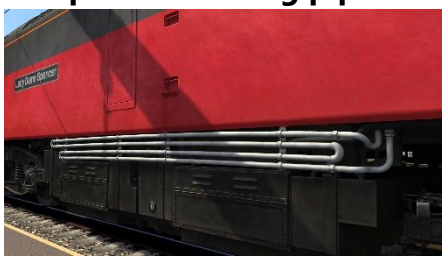
Anti-slip door steps

Green spot multiple working

Green spot multiple working 47/9

Slow speed control bogie box

Compressor cooling pipes



Boiler

No boiler

Plater over boiler

Nameplates

400+ 2D nameplates are provided. Please see below for examples of just a few of them.

Features

Physics

Traction

Great care has been taken to simulate the traction physics of this locomotive. When recording the sounds used in this pack, we also recorded the speedometer and ammeter and this information has been translated accordingly.

Load Timings

Maximum tractive effort can be obtained until around 13mph where it then starts tailing off exponentially as speed increases. Unlike a class 37 though which can achieve maximum tractive effort from a standing start in just a few seconds if full power is selected, a class 47's load regulation system is rather more sophisticated. If selecting full power from a standing start, the amps will rise to around 3000 in the first 3 seconds, they will then remain fairly stable for 6 seconds, before slowly increasing to 8000 (maximum tractive effort) over the next 15 seconds or so. If you have ever watched a class 47 depart a station, this is why after the initial rev up of the engine, there is a lull in the exhaust note before it then starts kicking in again as the engine reacts to the extra load being placed on it as amps rise.

When applying power, above 13mph, amps rise at a similar speed but without as much of a break between the initial application of power and the slow ramp up to maximum possible tractive effort.

When reducing power, amps fall off smoothly, broadly in line with engine RPM, unless you go to 'Off' and then power is removed instantly. As a result, when shutting off power, it is recommended you move to 'On' notch (10%) and wait for the amps to fall and settle before moving to 'Off'.

Field Diverts

Field diverts have been implemented at the correct speeds of 33mph, 45mph & 60mph. Field diverts allow the locomotive to maintain a smooth tractive effort curve throughout its full speed range. When these take place, the amps rise briefly before falling back to normal.

Variable Performance

Any driver will tell you that traction performance can vary quite noticeably from one locomotive to another depending on mechanical variations. We have simulated this variance by randomly allocating a 'Power Factor' every time you drive 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!

Wheelslip Protection (WSP)

A crude form of wheelslip protection is fitted to these locomotives which aids the driver during times of poor adhesion.

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

1) Power is automatically reduced and the wheelslip indicator light illuminates in the cab.
2) Once the wheelslip stops, power is reapplied to the selected power handle setting and the wheelslip indication light extinguishes. If wheelslip reoccurs, the process starts again.

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.

The anti-slip button (key **O**) can also be used to apply 20psi of locomotive brake pressure. This aids adhesion by scrubbing the wheel tread.

Adhesion

There are a myriad of factors that control the level of adhesion which in turn controls whether a train slips or not. 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.

Brakes

Davies & Metcalfe/Westinghouse Brake Handle

Most locomotives are fitted with a dual-brake Davies & Metcalfe brake handle. 47401 to 47420 are fitted with a Westinghouse equivalent. Both have 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 (20%) - Brakes are fully released and the brake pipe pressure will read 5 bar.

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

Service (40% to 68%) - Brake pipe pressure can be changed as desired between 48.5 & 66.5 psi.

Full Service (68%) - Maximum possible brake force. The brake pipe pressure will read 48.5.

Emergency (82%) - 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.

Anti-Slip Button

Depending on the era of your locomotive, there is an anti-slip brake button on either the knob of the power handle (older locos), or on the left-hand side of the cab desk (newer locos). Pressing this applies 20psi of locomotive brake pressure to aid adhesion.

Brake Selector Switch

The brake selector switch on a class 47 is located in the engine room which isn't simulated. To select whether you wish to run in air or vacuum brake mode, as well as passenger or goods timings, look to the indicator above the non-driver's side cab; click it and drag to the left or right. Goods timings are slower than passenger and are used when hauling most wagons to avoid too much pressure on the couplings.

If your locomotive is air-only, you will not be able to select either vacuum mode.

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.

Variable Performance

As with power, a random 'Brake Factor' is allocated to simulate varying braking performance. This factor can reduce or increase performance by a maximum of 10% either way.

Coolant

The temperature of the engine coolant has been simulated to try and ensure the radiator shutters & fans operate as you would expect depending on a number of factors; ambient temperature and how hard the locomotive is working being the most obvious.

To achieve this simulation to a realistic level, a number of factors are taken into account. It's almost impossible to gauge exactly how all of these factors affect cooling performance but we have used our best guess by observing the state of the radiator shutters/fans in different operating conditions.

- **Fan speed**: The faster the cooler group fan spins, the higher the cooling performance.
- **Engine load**: The higher the load on the engine, the more heat that is created. This operates on a delay so if going from off to full power for example, it will take 60 seconds for the full heating effect of this power change to take effect. This takes into account the heating time of the engine components and the time it takes for the coolant to be pumped around the system before it reaches the thermostat.
- **Random factors**: For both fan speed and engine load factors, a random multiplier is calculated separately to simulate varying levels of mechanical condition where some cooler groups will run more efficiently than others and some engines will produce more heat than others.
- **Ambient temperature (season)**: Cooling performance is at its lowest during summer and highest during winter due to the outside ambient temperature.
- **Ambient temperature (month)**: If using month specific sunrise and sunset times in our Sky & Weather Enhancement Pack 2.0, cooling performance is tailored accordingly. For example, if you are driving a scenario in September, cooling performance will be better than the default 'Summer' setting which is based on the hottest months of July or August.
- **Ambient temperature (time of day)**: When ambient temperatures are likely to be highest in the middle of the day, cooling performance is reduced compared to during the night. This is most pronounced in summer when cooling performance is reduced by half at the hottest part of the day between 13:00 & 17:00. This is when you are most likely to experience the engine derating. If it is raining during the summer, it is assumed the temperature is lower than if not.

- **Coolant temperature**: With all other factors treated as constant, temperature rises quicker at lower temperatures and slower at higher temperatures. If you think of a boiling kettle, it's a lot quicker to heat water from 20 to 30 degrees than 90 to 100 degrees.

The following things happen depending on temperature:

- At 158°F, the radiator shutters will open when power is applied
- At 163°F, one set of radiator shutters will stay open regardless of whether power is applied
- At 168°F, the roof fans will start spinning and both sets of radiator shutters will stay open regardless of whether power is applied
- At 178°F, the roof fans will spin at full speed
- At 198°F, the 'Alarm' fault light will illuminate on the cab desk regardless of power handle position to indicate 'High Water Temperature'. This warns the driver that the coolant is in danger of boiling dry. This fault light will not extinguish until coolant temperature falls below 158°F. If power is not eased off, you will run the risk of the engine shutting itself down. This is rather rare and not a risk unless running in the hottest months of July & August, in the middle of the day, with full power applied for a prolonged amount of time.

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 of 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.

Slow Speed Control (SSC)

Some locomotives are fitted with slow speed control to allow movement at a controlled low speed for ballast dropping or 'Merry-Go-Round' (MGR) loading/unloading. We are fairly confident we have fitted this to the correct locomotives based on their number and livery but should you wish to amend this, see the ***Numbering*** section of this manual. Please see below for instructions on how to use it:

1) With the train at a stand and the reverser in 'Engine Only', select the required speed setting on the slow speed control switch. The slow speed speedometer will now be active.
2) To move, move the reverser to 'Forward', release the brakes and move the power handle to around the ¼ mark (33%).
3) The load regulator will now automatically regulate the power required to keep the locomotive at the selected speed. If on a downhill gradient, you may need to apply the brake to regulate speed.
4) To deactivate, come to a stand, move the reverser to 'Engine Only' and move the slow speed control switch to 'Off'.

National Radio Network (NRN)

A simple representation of the NRN radio is simulated on all applicable liveries. To set the NRN zone, please follow the instructions below:

1) Turn the radio on by pressing the button below the volume control on the left-hand side of the console.
2) Enter the three-digit zone number by using the numpad.
3) To confirm this, press the green button below the British Rail arrows symbol. The NRN is now successfully set up.
4) If you see an NRN zone change sign (pictured below), you must change the zone number manually. Do this by simply entering the new three-digit zone number on top of the old one.

NRN zone placement in scenarios

NRN zones cover very large areas so it is entirely possible you will not change areas during a scenario but should you wish to do so, a sign is included in this pack and must be placed by the scenario author.

This sign can be found by selecting 'AP/Common' in the 'Object Set Filter' and browsing for 'AP NRN Sign' in the left-hand 'Track Infrastructure' fly-out. To place it, simply place the marker on the track your train will be passing through, double click the sign, and input the three-digit area number in the right-hand fly-out. Please note that this must be three-digits so zone 65 would be '065'.

Driver Vigilance Device (DVD)

A driver vigilance device was fitted in the 1980s which ensures the driver is alert. When the reverser is placed into forward or reverse, a high-pitched alarm sounds every 60 seconds which must be reset by lifting the DSD pedal by pressing **E**. If you fail to reset the alarm within 5 seconds, an emergency brake application will occur.

The driver vigilance device is isolated by default in our simulation so press **Ctrl+D** if you would like to activate it.

As a point of interest, the sealed marker lights at the no.2 end of the locomotive are due to the fitting of the DVD. The existing marker lights were simply a translucent material which allowed the bulbs behind to shine through. The space the bulbs occupied was needed for the DVD equipment so they were removed and replaced with sealed marker lights which have an integrated bulb.

Alarm Fault Light

The alarm fault light in the cab can illuminate for a variety of reasons when applying power from off. Please see below for a list of causes:

- Brake pipe pressure below 45 psi in air brake mode
- Vacuum pipe pressure below 12.5 inHg in vacuum brake mode
- Main reservoir pipe pressure below 65 psi.

Even if the fault condition has rectified itself, you must return the power handle to off and try applying power again.

The only exception to the above is in the case of a high water temperature (HWT) indication. If this occurs, the alarm fault light will illuminate regardless of power handle position.

Tail Lights

As built, only one tail light could be shown at either end of the locomotive. This was to recreate the convention of a single tail lamp at the rear of a train. As convention changed for locomotives, a modification was carried out in the mid to late 1990s to have both tail lamps illuminated when selecting either ‘LHS’ or ‘RHS’ on the tail light switch.

This has been simulated so any locomotive with the modern type of overhead line warning sticker which was introduced in 1998, will have both tail lights illuminated.

Trailing Mode

To simulate this locomotive shut down in a consist or with the engine idling but not providing any power, we have provided a 'Trailing' version which can be found in the scenario editor with a '(Trail)' suffix.

By default, the engine will be idling but to have it shut down, add **;Dead=1** to the locomotive number.

Dynamic Exhaust Effects

Dynamic exhaust effects mean that the exhaust reacts to what the engine is doing. For example, when on full power, the engine will produce more exhaust than it would when idling. Also, when revving up, exhaust thickens before thinning out when rpm settles. Equally, when revving down, exhaust thins. On top of that, when starting up, exhaust rises in sync with the sound of the engine revving up. Finally, in reality, the smokiness of each locomotive varies depending on how well maintained it is, so to represent this in the simulator, a random 'clag' factor is allocated to each locomotive which ranges from 1 to 10; 1 being the cleanest and 10 being the dirtiest. This can also be controlled on the player locomotive by using **Shift+C** & **Ctrl+C**.

Brake Block Sparks

Any tread braked locomotive is prone to the odd spark under heavy braking but class 47s are particularly known for it due to the Sulzer engine's propensity for leaking oil. This inevitably leaks through the engine room floor and reaches the bogies, which then ignites when the temperature of the brake blocks is hot enough. When a perfect storm of conditions line up, it can create quite the fireworks!

We have simulated this and is dependent on the following factors:

- **Speed**: Brake blocks will heat up quicker the faster you are moving
- **Brake pressure**: The harder the brake block is pressed upon the wheel tread, the quicker it will heat up
- **Oily bogies**: A locomotive's propensity to spark is usually down to how recently the bogies have been cleaned of oil. Your locomotive will be allocated a random 'Oily Factor' upon load which will dictate the severity of sparks.

Cold Start

'Cold Start' means the locomotive is in the following state when it loads:

- Main reservoir, brake cylinder pressures are 0.
- Engine is stopped
- Handbrake is applied

To prepare a locomotive from cold, please follow the instructions below:

1) Turn the master key in by pressing **Shift+W**.

2) Move the reverser to 'Engine Only' by pressing **W**. This will start the engine priming pump. Leave this running for 60 seconds.

3) Press and hold the engine start button until the engine fires and the engine stopped indicator light extinguishes.

4) Test the fire alarm by pressing the fire alarm test button on the back wall.

5) Lift the train brake handle brake pin by pressing **R** and at the same time, move the train brake handle to 'Full Service' (68%) by pressing **semi-colon**.

6) Now wait for the main reservoir to build to 80 psi.

7) Move the train brake handle to 'Running' (20%) and confirm the brakes are fully released.

8) Move the train brake handle to 'Full Service' (68%) and confirm the brakes are fully applied.

9) Release the handbrake by turning it in an anti-clockwise direction until it will turn no more.

After carrying out this procedure, your locomotive will be successfully prepared from cold.

Audio

This section of the manual is dedicated to outlining audio aspects of the pack which are not necessarily self-evident and require explanation.

Engine

Using recordings from 47596 at the Mid Norfolk Railway, we have attempted to capture every nuance of the classic Sulzer 12LDA28-C engine.

To achieve this, for the sake of the audio simulation, we have divided the power handle into 9 invisible notches and edited individual rev up sounds for every possible combination between these 9 notches. This means that you will nearly always hear a dedicated rev up sound will all of its quirks & character rather than using loops simply increased or decreased in pitch. This requires a lot more work but the difference is night and day.

In addition, a class 47 sounds completely different revving up from a standing start compared to around 13mph or above where the engine is at maximum load. As a result, each rev up sound has two versions, a standard start version and a 13mph or above version.

Turbocharger

The distinctive turbocharger scream is represented in this pack and particularly audible from the no.2 end cab.

In addition to this, some locomotives' turbochargers have been known to chirp due to carbon build-up on the turbine blades. Our research suggests some locomotives do this fairly soon after revving up and the chirp occurs at frequent intervals. There is a 1 in 50 chance of you having a locomotive with this interesting sonic feature. It can also be turned on and off by pressing **Ctrl+T**.

Alternatively, 'good' locomotives producing more power than most have been known to begin chirping after a prolonged period of full power. A chance of having one of these locomotives is also simulated and is tied in with our 'Power Factor' feature. This type of chirping can not be turned on and off with a key command.

Finally, if you are lucky enough to have a 'chirper', look out for the puff of exhaust smoke every time the chirp occurs.

Horn

Variants

As is the case with much older rolling stock, every horn tends to sound different between locomotives. To simulate this, we have provided seven horn variations under the guise of 'Horn Factor'.

Upon loading a scenario, your locomotive is randomly allocated one of these horns on a per end basis. No.1 end will therefore sound different to no.2 end. If you wish to change the Horn Factor, press **Shift+H** or **Ctrl+H**.

Please see below for a list of where we recorded each horn variant and from which locomotive. Note that class 57s have the same horns as class 47s:

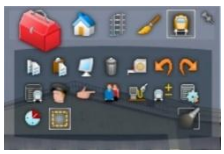
1 – 47402 – East Lancashire Railway
2 – 47402 (Other End) – East Lancashire Railway
3 – 47596 (No.1 End) – Mid Norfolk Railway
4 – 47596 (No.2 End) – Mid Norfolk Railway
5 – 57605 – Old Oak Common
6 – 57010 – Crewe Gresty Bridge
7 – 57010 (Other End) – Crewe Gresty Bridge

AI

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:

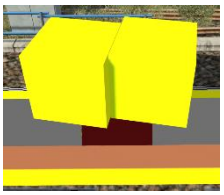
1) In the scenario editor, go to the location at which you would like the AI train's horn to sound, and press **Spacebar** 3 times. The track will now display a certain colour which represent its speed limit.

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 of 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.

Compressor

Class 47s are fitted with two compressors which both run in air brake mode. Only one runs in vacuum brake mode.

Due to wear and tear, each compressor tends to run at a slightly different speed resulting in a change of pitch. To simulate this, each compressor is allocated a random pitch factor so when you hear the second compressor start up shortly after the first, it will often be distinct in sounding different.

Traction Motors

Locomotives can vary quite significantly in how loud their traction motors are. To simulate this, we have implemented a random 'Motor Factor' which ranges from 1 to 6; 1 being barely audible and 6 being very prominent. This can also be controlled by using **Shift+M** and **Ctrl+M**.

Cab

The hot plate in a class 47 cab is notorious for rattling. A 'Rattle Factor' has been simulated which ranges from 1 to 6; 1 being barely audible and 6 being very prominent. This is end dependent so no.1 end might be rattlier than no.2 end or vice versa. This can also be controlled by using **Shift+R** and **Ctrl+R**.

Bits and Bobs

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

- Compressor(s) only run when reverser is away from 'Off'. The only exception is 47701 to 47717 which were modified to have their compressors work regardless of reverser position. This allowed them to work with Mk2 DBSOs.
- If using a locomotive numbered 47701 to 47717 with our Mk2D-F or Mk3A-B coaches, a guard to driver signal will sound in the cab once the doors close. This simulates operation with a Mk2 DBSO. To activate this, you will need to add **;G=1** to the locomotive number in the scenario editor.
- 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.
- Fire bell visibly vibrates when tested.
- As per reality, the speedometer needle wobbles when providing a reading.
- Opening cab doors and windows which are also visible from the outside.
- During the summer, there is a chance a bug will splatter itself on your windscreen. If it is within the reach of the windscreen wiper, you can clean it off by operating the wiper.

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) Ensure the reverser is in 'Engine Only'. If not, press **W** to do so.
3) 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.
4) Lift the train brake handle brake pin by pressing **R** and at the same time, move the train brake handle to 'Full Service' (68%) by pressing **semi-colon**.
5) Turn off the tail lights by pressing **K**.
6) Turn on the train classification indication (marker) lights by pressing **J**.
7) If applicable, turn on the headlight by pressing **H**.
8) If applicable, register the NRN.

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

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 'Running' by pressing **semi-colon**.
3) As soon as possible, move the power handle to 'On' (10%) by pressing **A**.
4) As soon as you observe a reading on the ammeter, you may increase power as you see fit.
5) When powering down to 'Off' (0%), it is good practice to pause for a few seconds in 'On' (10%) notch to allow the ammeter to drop.
6) To brake the train, use any 'Service' setting on the train brake handle between 'Intial' (40%) & 'Full Service' (68%). To provide a smooth stop, it is recommended to be in 'Initial' as you come to a stop.

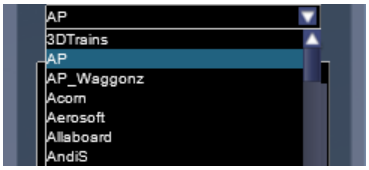
How to Use in the Scenario Editor

How to place

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

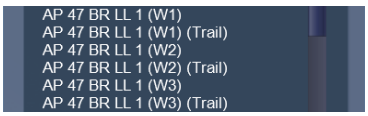
1) In the left-hand rolling stock fly-out, click the object set filter which looks like a blue box with an orange arrow to the right of it.

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



3) Tick the second & third box beside 'Class47Pack01'.

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 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** = BR. **2** = Network SouthEast.
- BR Large Logo: **1** = BR. **2** = Scottie dog. **3** = Highland Rail. **4** = Network SouthEast. **5** = Cockney sparrow (position 1).

  6 = Cockney sparrow (position 2). **7** = Cockney sparrow on engine room door.
- BR Railfreight: **1** = Railfreight. **2** = Cockney sparrow (position 1).

  3 = Cockney sparrow (position 2).
- BR Trainload: **1** = Distribution. **2** = Petroleum. **3** = Metals. **4** = Construction.
- InterCity: **1** = InterCity. **2** = ScotRail. **3** = ScotRail & Highland Rail (position 1). **4** = ScotRail & Highland Rail (position 1).
- InterCity Mainline:. **2** = InterCity.
- InterCity Swallow: **1** = INTERCITY (no.1 end). **2** = INTERCITY (no.2 end).

3 = INTERCITY (no.1 end) & no swallow. **4** = INTERCITY (no.2 end) & BR arrows plaque.

- Network SouthEast: **1** = Large side logo. **2** = Front logo.

  3 = Cockney sparrow (position 1). **4** = Cockney sparrow (position 2).

  5 = Cockney sparrow (position 3). **6** = Cockney sparrow (position 4).

  7 = Cockney sparrow (position 5).

- Parcels: **2** = Network SouthEast (cab side).

  3 = Network SouthEast (cab side & front).

- ScotRail: **1** = ScotRail. **2** = ScotRail & scottie dog. **3** Scottie dog.

  4 = Network SouthEast & scottie dog.

Adding **;L=0** will remove all listed logos/decals.

Numbers

You can control the numbers shown by adding **;N=x** to the locomotive number. Please see what to put as 'x' to receive your desired result on each livery:

- BR Large Logo: **1** = Large numbers with space between second and third digit. **2** = Slightly smaller numbers with no space between second and third digit.
- BR Trainload: **1** = Side numbers with space between second and third digit. Front numbers with last three digits of number.

  2 = Side numbers with space between second and third digit.

  3 = Side numbers with no space between second and third digit. Front numbers with last three digits of number.

  4 = Side numbers with space between second and third digit. Larger front numbers on non driver's side with last three digits of number.

  5 = Side numbers below engine room window. Large front numbers on headcode box with last three digits of number.

- InterCity Mainline: **1** = Small black side numbers.

  2 = Large white side numbers.

- InterCity Swallow: **1** = Side numbers with space between second & third digit.

  2 = Lower side numbers with no space between second and third digit.

- Railfreight Distribution: **1** = Side numbers with close spacing between digits.

  2 = Side numbers with wider spacing between dgiits.

Nameplates

You can control the nameplate shown by adding **;NP=x** to the locomotive number. The simulator will automatically place the correct nameplate on the locomotive by looking at the number and livery.

- 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**
- The third nameplate carried by a locomotive in its relevant livery. x = **3**

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

Plaques

You can control plaques shown by adding **;DP=x** to the locomotive number:

BR Civil Engineers, BR Deparmental, BR Trainload & Transrail liveries

- No depot plaque. x = **0**.
- Ripple Lane depot plaque. x =**1**
- Tinsley depot plaque. x =**2**
- Immingham depot plaque. x =**3**
- Eastfield depot plaque. x =**4**
- Crewe electric depot plaque. x =**5**

In addition to these, on applicable liveries, the British Rail plaque can be shown by adding **;BR=1** to the locomotive number or removed by adding **;BR=0**.

Rail Express Systems

- Crewe diesel depot plaque. x = **1**

Railfreight Distribution

- Tinsley depot plaque. x =**1**
- Tinsley depot plaque (red). x = **2**.

Overhead Line Warning Stickers

By default, the most applicable style of overhead line warning sticker is applied on a per livery basis. Where liveries spanned two kinds of sticker, you may wish to change this. You can do this by adding **;OHL=x** to the locomotive number.

- Original style. x = **1**.
- 1980s/1990s style. x = **2**.
- Modern yellow style. x = **3**.

White Cab Windows

To add white cab windows to applicable liveries, add **;W=x** to the locomotive number.

- Front cab windows. x = **1**.
- Front & side cab windows. x = **2**.
- No white windows. x = **0**.

Brake Mode

By default, all locomotives are set to air/passenger timings brake mode. To set a different brake mode by default, add **;BM=x** to the locomotive number.

- Air/goods timings. x =**AG**.
- Vacuum/passenger timings. x =**VP**.
- Vacuum/goods timings. x =**VG**.

Brake Type Physics

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

Cold Start

To activate cold start mode on a player train, add **;Cold=1** to the locomotive number.

NRN

To add/remove an NRN radio, add **;radio=x** to the locomotive number.

- NRN radio added. x = **1**.
- NRN radio removed. x = **0**.

NRN Auto Set

To have the NRN radio already active when a scenario starts, add **;NRN=x** to the locomotive number. x = 3-digit NRN zone number.

Tail Light

To add a tail light to the no. 1 end, add **;TL=1** to the locomotive number.
To add a tail light to the no. 2 end, add **;TL=2** to the locomotive number.

Guard to Driver Signal

If using a locomotive numbered 47701 to 47717 in combination with our Mk2D-F or Mk3A-B coaches, add **;G=1** to the locomotive number to receive a guard to driver signal when the coach doors close. This is to simulate operation with a Mk2 DBSO.

Slow Speed Control (SSC)

To add slow speed control, add **;SSC=1** to the locomotive number.

Electric Train Heating (ETH)

To have ETH on upon loading a scenario, add **;ETS=1** to the locomotive number.

Variations Configuration

All locomotive numbers have a **;Config=x** entry and this must be left alone to ensure the correct variations are applied to that numbered locomotive. If desired though, some of these variations can be overridden by adding further entries to the locomotive number. Please see below for more information:

Snowploughs

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

- No snowploughs. x = **0**
- Snowploughs. x = **1**

Front/Headcode Box

Add **;no1front=x** and/or **;no2front=bch** to the locomotive number depending on which end you wish to change.

- Dominos. x = **bhc_dom_old**
- Plated. x = **hc_dom**
- Plated (black). x = **bhc_dom**
- Plated with sealed marker lights. x = **hc**
- Plated (black) with sealed marker lights. x = **bhc**
- Flush with inset marker lights. x = **flush**.
- Flush with flush marker lights. x = **flush2**.

Headlight

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

- No headlight. x = **0**
- Headlight. x = **1**
- Scottish headlight. x = **2**

Tail Lights

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

- Original tail lights. x = **old**
- Rail Express Systems tail lights. x = **res**

Front Body Skirt

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

- No skirt. x = **0**
- Skirt. x = **1**

Electric Train Heating (ETH) equipment

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

- Variant 1. x = **1**
- Variant 2. x = **2**

Jumper Cables

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

- RCH jumper cables. x = **1**
- TDM jumper cables. x = **2**
- No jumper cables. x = **0**

Multiple Working Equipment

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

- Green spot multiple working socket. x = **1**
- Green spot multiple working socket - 47/9. x = **2**
- No multiple working socket. x = **0**

Buffers

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

- Round buffers. x = **round**
- Oval buffers. x = **oval**
- Square buffers. x = **square**

Boiler

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

- Boiler outlet. x = **1**
- Plated boiler outlet. x = **0**

This is not applicable to 47/3s as they were not built with boilers.

Fuel Tanks

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

- Short-range. x = **short**
- Long-range. x = **long**
- Batteries only. x = **bat**

Anti-slip Cab Door Plates

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

- No plates. x = **0**
- Plates. x = **1**

Horn Grille Covers

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

- No horn covers. x = **0**
- Horn covers. x = **1**

Example locomotive number

47540;Config= BRCivil;BR=1;DP=2;ploughs=1

Key:

47540 - Locomotive number

;BR=1 - British Rail plaque

;DP=2 = Tinsley depot plaque

;ploughs=1 - Snowploughs

Scenarios

APC47: 1E00 07:03 Liverpool Lime Street - Newcastle
Route = Huddersfield Line –Manchester to Leeds
Track covered = Manchester Victoria - Leeds
Traction = BR Large Logo 47407
Date = 15th February 1988
Duration = 1 hour 5 minutes

APC47: 5M76 08:36 Heaton T&RSMD - Crewe South Yard
Route = Huddersfield Line –Manchester to Leeds
Track covered = Leeds - Stalybridge
Traction = Rail Express Systems 47565
Date = 30th September 1993
Duration = 1 hour 5 minutes

APC47: 5F23 04:37 Old Oak Common - Westbury
Route = Just Trains – South Western Expressways - Reading
Track covered = Reading - Westbury
Traction = Network SouthEast Revised 47714
Date = 13th September 1989
Duration = 1 hour 5 minutes

APC47: 1F23 06:46 Westbury - Paddington
Route = Just Trains – South Western Expressways - Reading
Track covered = Westbury - Reading
Traction = Network SouthEast Revised 47714
Date = 13th September 1989
Duration = 1 hour 25 minutes

APC47: 1V46 09:10 Liverpool Lime Street - Plymouth
Route = Just Trains – South Western Expressways - Reading
Track covered = Bristol Temple Meads – Exeter St Davids
Traction = InterCity Swallow 47844
Date = 5th November 1996
Duration = 1 hour 5 minutes

APC47: 1M93 10:14 Great Yarmouth - Birmingham New Street
Route = Wherry Lines
Track covered = Great Yarmouth – Norwich
Traction = BR Trainload 47236
Date = 28th August 1993
Duration = 35 minutes

APC47: 1P24 07:30 London Liverpool Street - Great Yarmouth
Route = Wherry Lines
Track covered = Norwich – Great Yarmouth
Traction = InterCity Mainline Revised 47568
Date = 14th July 1990
Duration = 45 minutes

Third Party Restriction

Prior permission must be sought if you would like to repurpose any aspect of this pack on a train that isn't a Class 47.