# Class 50 Locomotive

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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 50 Locomotive 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.
## Technical Information

<table>
<thead>
<tr>
<th><strong>Manufacturer</strong></th>
<th>English Electric at Vulcan Foundry</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Years built</strong></td>
<td>1967 - 1968</td>
</tr>
<tr>
<td><strong>Number built</strong></td>
<td>50</td>
</tr>
<tr>
<td><strong>Engine</strong></td>
<td>English Electric 16CSVT</td>
</tr>
<tr>
<td><strong>Maximum speed</strong></td>
<td>100 mph (161 km/h)</td>
</tr>
<tr>
<td><strong>Length</strong></td>
<td>68 ft 6 in (18.75 m)</td>
</tr>
<tr>
<td><strong>Height</strong></td>
<td>12 ft 9 in (3.89 m)</td>
</tr>
<tr>
<td><strong>Width</strong></td>
<td>8 ft 10 in (2.69 m)</td>
</tr>
<tr>
<td><strong>Weight</strong></td>
<td>115 t</td>
</tr>
</tbody>
</table>
Liveries

BR Blue (Unrefurbished/Pre-TOPS) - BR Blue (UR/Pre-TOPS)

BR Blue (Unrefurbished) - BR Blue (UR)
BR Blue:

- with NRN - *BR Blue*
- with GSM-R and orange cant rail - *BR Blue (GSMR)*

BR Large Logo (Grey Roof):

- without orange cant rail - *BR LL (Grey)*
- with orange cant rail - *BR LL 2 (Grey)*
BR Large Logo (Black Roof):
without orange cant rail - *BR LL (Black)*
with orange cant rail - *BR LL 2 (Black)*

BR Large Logo (Blue Roof) - *BR LL (Blue)*
BR Civil Engineers - *BR Civil Eng*

BR Blue (Laira):

- with NRN - *BR Blue (Laira)*
- with GSM-R - *BR Blue (Laira) (GSMR)*
Great Western Railway - GWR

London, Midland and Scottish Railway - LMS
GB Railfreight - GBRf
**FVX Motorail Wagon**

As well as the locomotive, the ‘FVX’ Motorail wagon is also featured. Both in unloaded and loaded form with vintage vehicles from the early 1980s.
Cab Guide
Driver’s Side

1 - Loco brake handle
2 - Train brake handle
3 - AWS reset button
4 - AWS sunflower
5 - Wheelslip indicator light
6 - Engine stop button
7 - Engine start button
8 - Engine stopped indicator light
9 - Fire alarm test button
10 - ETH status indicator light
11 - Brake cylinder pressure gauge
12 - Brake pipe pressure gauge
13 - Vacuum brake pressure gauge
14 - Speedometer
15 - Ammeter
16 - Main reservoir gauge
17 - Windscreen wiper switch (left)
18 - Instrument light switch
19 - Wheelslip brake button
20 - Horn
21 - Deadman’s pedal
22 - Reverser
23 - Master key
24 - Power handle
25 - NRN radio or GSM-R (refurb only)
26 - Electric Train Heating (ETH) on button
27 - Electric Train Heating (ETH) off button
28 - Headlight switch
**Driver’s Side Ceiling**

29 - Route indicator lights switch
30 - Tail lights switch
31 - Cab light (driver’s side) switch

**Below Driver’s Seat**

32 - AWS isolation switch
33 - Change end switch
Engine Room

34 - Battery ammeter
35 - Brake selector
36 - Compressor emergency switch
37 - Engine start button
38 - Traction motor cut-out switch
Keyboard Controls

Non-standard keyboard controls are listed below:

- **Ctrl+N** - AWS change end switch ON/OFF
- **Ctrl+A** - AWS isolation switch
- **L** - Cab light switch ON/OFF
- **Shift+C** - Clag Factor INCREASE
- **Ctrl+C** - Clag Factor DECREASE
- **E** - Deadman’s pedal (DVD reset)
- **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)
- **I** - Instrument lights switch
- **Shift+W** - Master key IN/OUT
- **Shift+M** - Motor Factor INCREASE
- **Ctrl+M** - Motor Factor DECREASE
- **J** - Route indicator lights switch
- **K** - Tail lights switch ON/OFF
- **R** - Train brake handle shutdown pin IN/OUT
- **Ctrl+Numpad Enter** - Visual aids ON/OFF
- **V** - Windscreen wiper switch LEFT
- **Shift+V** - Windscreen wiper switch RIGHT
Features

Cab Variants

without NRN radio - BR Blue (Unrefurbished) & BR Blue (Unrefurbished/Pre-TOPS)

with NRN radio (optional TPWS)
with TPWS & GSM-R - BR Blue (GSMR), BR Blue Laira (GSMR) & GB Railfreight (50007)

with TPWS & GSM-R (Black) - GB Railfreight (50049)
**Traction Physics**

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 into Train Simulator. In the past, locomotives of this type have been plagued by a limitation where at speed, the amount of power being applied was not proportional to the power handle and as a result, you could happily maintain a high speed with not much power applied. Using our custom scripting, we bypass this limitation and ensure performance matches the real thing as closely as possible.

On top of this, field diverts have been implemented at the correct speeds of 28 mph (35 mph), 44 mph (51 mph) & 58 mph (65 mph). The speeds in brackets are if Electric Train Heating (ETH) is on. Field diverts allow the locomotive to maximise its acceleration as it gains speed. When these take place, the turbocharger briefly rises before falling back to normal. This is in response to the load being increased on the engine.

In addition, we have implemented the performance decrease when supplying Electric Train Heating (ETH). This is calculated by taking the length of the train and estimating its ETH load accordingly. For example, the locomotive will have less power available for traction with an 8 coach rake compared to a 4 coach rake. At its maximum load, equivalent to 14 20 m coaches, ETH will use 15% of available power. ETH can be turned on and off by pressing the relevant buttons in the cab.

Finally, realistic delay times between the power handle being moved and power being applied/removed are implemented. This locomotive is relatively quick to respond so the normal delay is only half a second. When moving to ‘Off’ however, power is removed instantly.
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** (16%) - Brakes are fully released and the brake pipe pressure will read 5 bar.

**1st Application** (32%) - Minimum possible brake force. This equates to around 25% brake force. The brake pipe pressure will read 66.5 psi.

**Service** (32% to 64%) - Brake pipe pressure can be changed as desired between 48.5 & 66.5 psi.

**Full Service** (64%) - Maximum possible brake force. The brake pipe pressure will read 48.5.

**Emergency** (80%) - 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.

**Brake Selector Switch**

The brake selector switch in the engine room (accessible by scrolling through the different cab view angles) allows you to choose either air or vacuum brake mode. On top of that, either passenger or goods timings can be selected. Goods timings are slower than passenger and are used when hauling certain wagons to avoid too much pressure on the couplings.
**Wheelslip Protection (WSP)**

Wheelslip protection 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.

Please see the table below for what to expect during each season and varying weather conditions:

<table>
<thead>
<tr>
<th></th>
<th>Dry</th>
<th>Rain/snow</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spring</td>
<td>No/very little wheelslip</td>
<td>Mild wheelslip</td>
</tr>
<tr>
<td>Summer</td>
<td>No/very little wheelslip</td>
<td>Mild wheelslip</td>
</tr>
<tr>
<td>Autumn</td>
<td>Mild wheelslip</td>
<td>Severe wheelslip</td>
</tr>
<tr>
<td>Winter</td>
<td>Light/mild wheelslip</td>
<td>Very severe wheelslip</td>
</tr>
</tbody>
</table>

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. To attempt to improve adhesion, you may use the ‘Wheelslip brake’, which applies 20 psi to the locomotive’s brakes to scrub the wheel tread.
Cooling Fan Simulation

The sound and function of the cooling fan has been implemented. It is thermostat operated and activates when the engine reaches a certain temperature or power is selected. Please see below for an explanation of each fan stage and when it activates:

- **Idle** - Coolant temperature up to 160°F/71°C.
- **Idle/shutters open** - Coolant temperature between 160°F/71°C & 170°F/77°C.
- **Intermediate** - Coolant temperature between 170°F/77°C & 180°F/82°C.
  and/or when power is applied.
- **High** - Coolant temperature above 180°F/82°C. Tends to only occur during summer and when the locomotive is under power for a prolonged time.

To reflect the variable nature of each locomotive and its efficiency at cooling, each locomotive is given a random efficiency rating at the start of a scenario, just to provide even more variation.

On unrefurbished variants, there is an additional fan at the no.2 end for the rheostatic brake, which runs at a continuous speed regardless of temperature. This separate brake is not simulated but the distinctive 'hoover' like sound is.
**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.

![Dynamic Exhaust Effects](image1.png)

**Variable Traction Motor Volume**

Much like described above in relation to exhaust, 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.
National Radio Network (NRN)

A simple representation of the NRN radio is simulated and is operational refurbished pre-GSM-R 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’.
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.
**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 **S**.

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

4) Look at the battery ammeter in the engine room (cycle through cab view options by using arrow keys) and check there is a positive charge.

5) Test the fire alarm by pressing the fire alarm test button.

6) Lift the train brake handle brake pin by pressing **R** and at the same time, move the train brake handle to ‘Full Service’ (64%) by pressing **semi-colon**.

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

8) Move the train brake handle to ‘Running’ (16%) and confirm the brakes are fully released.

9) Move the train brake handle to ‘Full Service’ (64%) and confirm the brakes are fully applied.

10) Release the handbrake by turning it in an anti-clockwise direction until it will turn no more. This is located on the back wall on the opposite side to the driver’s seat.

After carrying out this procedure, your locomotive will be successfully prepared from cold.
**Bits and Bobs**

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

- Weathered variants of each livery are provided and listed accordingly as ‘W1’, ‘W2’ and ‘W3’ in the scenario editor. Some liveries do not have ‘W2’ or ‘W3’ variants, as in reality, they have never become sufficiently dirty to warrant them.

- All 50 original nameplates are represented in 3D, along with variations depending on livery.

- Motor cut-out switch in the engine room allows one of the three pairs of traction motors to be isolated, or, one of the three pairs to be active. These all result in reduced performance.

- The back walls of the no.1 & no.2 cabs are modelled to represent their differences.

- 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.

- The cooling fan is audible from the no.1 cab.

- Variable speed windscreen wipers.

- Fire bell ringer moves when fire alarm test is carried out.

- As per reality, the speedometer needle wobbles when providing a reading.

- Opening cab doors and windows which are also visible from the outside.

- The visible driver automatically moves to whichever cab you are in, or is leading on an AI train.

- Distinctive ‘hoover’ rheostatic brake cooling fan sound on unrefurbished variants. Taken from a vintage 1980 recording.

- Headcode box light and ‘domino’ marker lights only illuminate on AI before sunrise and after sunset, to reflect the fact these lights are not obviously visible in daylight.
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 S 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’ (64%) by pressing semi-colon.
5) Turn off the tail lights by pressing K.
6) Turn on the route indicator lights by pressing J.
7) On refurbished locomotives, turn on the headlight by pressing H.
8) If applicable, register the NRN or GSM-R.

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’ (14%) 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’ (14%) notch to allow the ammeter to drop.
6) To brake the train, use any ‘Service’ setting on the train brake handle between ‘1st Application’ (32%) & ‘Full Service’ (64%). 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:

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 ‘Class50Pack01’.

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/remove logos 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 (Unrefubished): 1 = 4 cab-side BR logos. 2 = Centre BR logo. 3 = 2 cab-side BR logos.
- BR Blue (Laira) (GSMR): 0 = Remove ‘Hanson & Hall’ logo
- Network SouthEast: 0 = Remove Network SouthEast logo on headcode box
- BR Large Logo (Grey): 1 = Add Network SouthEast logo on headcode box

Snowploughs

To add a 3-piece snowplough, add ;SP=1 to the locomotive number.

Headboard

Add ;HB=1 to the locomotive number to add a headboard to the locomotive. For GB Railfreight livery, it adds the ‘50 Terminator’ headboard and for BR Blue (GSM-R), adds the ‘Pathfinder’ headboard.
**Cold start**
To activate cold start mode on a player train, add `;Cold=1` to the locomotive number.

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

**Train Protection & Warning System (TPWS)**
To add a TPWS unit to the cab, add `;TPWS=1` to the locomotive number.

**Multiple working jumpers**
To remove the multiple working jumpers on unrefurbished variants, add `;J=0` to the locomotive number.

**Headcode**
To add a headcode on unrefurbished variants, add `;HC1=xyxx;HC2=xyxx` to the locomotive number. ‘x’ must be a number and ‘y’ a letter. HC1 applies to the number 1 end of the locomotive and HC2 applies to the number 2 end.

**‘D’ number prefix**
To remove the ‘D’ prefix to the locomotive number on the unrefurbished/pre-TOPS variant, replace ‘D’ with ‘#’.

**Example locomotive number**
50049;TPWS=1;HB=1;SP=1

Key:
50049 - Locomotive number
;TPWS=1 - TPWS unit in the cab
;HB=1 = ‘50 Terminator’ headboard
;SP=1 - 3-piece snowplough
**Scenarios**

**APC50: 1A45 15:55 Paignton - Paddington**
Route = Riviera Line  
Track covered = Paignton - Exeter St. David’s  
Traction = BR Blue 50047  
Year = 1983  
Duration = 1 hour

**APC50: 1A47 14:55 St. Austell - Paddington**
Route = Riviera Line  
Track covered = Newton Abbot - Exeter St. David’s  
Traction = BR Large Logo 50038  
Year = 1983  
Duration = 30 minutes

**APC50: 1C09 06:25 Paddington - Paignton**
Route = Riviera Line  
Track covered = Exeter St. David’s - Paignton  
Traction = BR Large Logo 50036  
Year = 1989  
Duration = 50 minutes

**APC50: 2C35 07:12 Newton Abbot - Exeter St. David’s**
Route = Riviera Line  
Track covered = Newton Abbot - Exeter St. David’s  
Traction = Network SouthEast 50002 & 50049  
Year = 1989  
Duration = 35 minutes

**APC50: 17:30 Norwich - Great Yarmouth**
Route = Wherry Lines  
Track covered = Norwich - Great Yarmouth via Acle  
Traction = BR Large Logo 50050  
Year = 1999  
Duration = 50 minutes

**APC50: 18:24 Great Yarmouth - Norwich**
Route = Wherry Lines  
Track covered = Great Yarmouth - Norwich via Acle  
Traction = BR Large Logo 50050  
Year = 1999  
Duration = 35 minutes
Credits

Nicolas Schichan - Scripting
Bodmin & Wenford Railway - Assistance in recording sounds
Class 50 Alliance - Reference material
Robert Tarling - Sound recording of the distinctive ‘hoover’ cooling fan sound on unrefurbished variants