Class 313

Electric Multiple Unit

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 313 EMU 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 relevant payware add-on packs listed on the product page installed so the scenarios function as intended.

Technical information

Manufacturer	BREL (British Rail Engineering Limited) York
Years built	1976 - 1977
Number built	64
Traction motors	x4 GEC G310AZ / 220hp (164kW) each
Maximum speed	75mph (121km/h)
Coupling type	Tightlock
Length	20.33m per DMS & 19.92m per TS
Height	3.58m
Width	2.82m
Weight	104.5 tonnes per 3 car unit

Liveries

BR Blue/Grey - *BR*

First Capital Connect - *FCC*

First Capital Connect (with Great Northern logos) - *GN*

London Overground - *LO*

Network SouthEast - *NSE*

Silverlink - *SL*

Southern

WAGN - *WAGN*

WAGN (with First Capital Connect logos) - *WAGN (FCC)*

WAGN Promo

Cab guide

Standard

Desk

1 - Brake handle (release/step 1/step 2/step 3/emergency)
2 - Driver's windscreen wiper switch (fast/park/slow)
3 - AWS sunflower
4 - Marker lights switch (off/on)
5 - Tail lights switch (off/on)
6 - Destination blind (manual) light switch (off/on)
7 - Cab light switch (off/on)
8 - Instrument lights switch (off/on)
9 - Headlight switch (off/on)
10 - Foot warmer switch (off/on)
11 - Demister switch (off/on)
12 - Indicator dimmer switch (dim/bright)
13 - Instrument lights dimmer switch (dim/bright)
14 - AWS reset button
15 - Sander button
16 - Power set/reset button
17 - Driver to guard bell button
18 - DRA (Driver Reminder Appliance)
19 - Speedometer
20 - Horn (high/low)
21 - Pantograph down button
22 - Car slider (3/6/9)
23 - Brake gauge
24 - Line light indicator
25 - 25kV indicator
26 - 25kV select/pantograph up button
27 - Circuit breaker indicator
28 - 750V indicator
29 - Doors close button
30 - Reverser (off/for/neutral/rev)
31 - Master key
32 - Driver Safety Device lever (down/up)
33 - Power handle (0/1/2/3/4)

Back wall

34 - Dynamic brake isolator*
35 - Auxiliaries set button
36 - Auxiliaries trip button
37 - Saloon lighting set button
38 - Saloon lighting trip button
39 - Door key switch*
* Not applicable to all liveries

Southern

All items which vary in the refurbished Southern cab are listed below

1 - Destination computer codes
2 - Destination computer
3 - Doors close button
4 - DRA (Driver Reminder Appliance)
5 - Headlight multi-switch
6 - Door interlock indicator
7 - Foot warmer switch (off/on)
8 - Demister switch (off/on)
9 - Cab lights switch (off/on)
10 - Instrument lights dimmer switch (dim/bright)
11 - Line light indicator
12 - MA (motor alternator) running indicator
13 - Driver to guard bell button
14 - Power set/reset button
15 - Sander button
16 - AWS reset button

Keyboard controls

Non-standard keyboard controls are listed below:

Ctrl+B -	Auxiliaries SET
Shift+B -	Auxiliaries TRIP
L -	Cab light ON/OFF
E -	Deadman's pedal UP/DOWN
F7 -	Destination (manual) blind DOWN
F8 -	Destination (manual) blind UP
N -	Destination (manual) blind light ON/OFF
R -	Door close button
Y -	DRA (Driver Reminder Appliance) ON/OFF
C -	Driver to guard bell
F -	DSD (Driver Safety Device) lever DOWN/UP
J -	Dual power alarm reset
Space -	Horn (low tone)
B -	Horn (high tone)
I -	Instrument lights ON/OFF
M -	Marker lights ON/OFF
Ctrl+Z -	Master key IN/OUT
P -	Pantograph UP
Shift+P -	Pantograph DOWN
Ctrl+Shift+R -	Passenger door operation toggle DOO/GOO
Shift+O -	Passenger saloon lighting OFF
O -	Passenger saloon lighting ON
U -	Power SET/RESET
K -	Tail lights ON/OFF
Ctrl+L -	Vestibule light ON/OFF
V -	Wiper switch RIGHT
Shift+V -	Wiper switch LEFT

Features

- High definition textures
- Detailed internal & external audio
- Camshaft traction system
- Prototypical dynamic braking
- Driver only/guard operation option
- Manual and electronic destination displays
- Dual power functionality
- Accurate reverser function
- Traction interlock - power can't be applied with doors open
- Cold start option
- Fully functioning AWS with accurate delay between passing over the magnet and hearing the warning sound
- AWS & TPWS self-test
- DRA (Driver Reminder Appliance)
- Opening cab window
- Cab instrument lighting
- Cab & vestibule light
- User-operable passenger saloon lights
- TSX headlight and rain effects

Camshaft traction system

This pack implements the camshaft system of regulating power, which was commonly used in EMUs such as the class 313 until the 1980s. In the case of the class 313, there is a set of 8 resistances which progressively cut out when powering up, so as to control the current going to the motors. As well as those, the traction motors can be set up in two modes:

Series - All four motors on the DMSO are wired in series.
Series/Parallel - The two motors on each motor bogie are wired in parallel but the bogies together are in series. This offers more acceleration than 'Series'.

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

0 - Traction power is OFF
1 (Shunt) - All resistances are in circuit. This provides minimal acceleration which soon decays. The traction motors are in 'Series' mode.
2 (Series) - As the unit gains speed, resistances are progressively removed from the circuit until they are all removed. As each resistance is removed, acceleration increases.
3 (Series/Parallel) - Once the unit has gone through the steps described above, the traction motors switch to 'Series/Parallel' mode and all resistances are placed back into the circuit. This provides a significant increase in acceleration. As speed increases, pairs of resistances are then progressively removed from the circuit for further acceleration.
4 (Weakfield) - Once the unit has gone through both the 'Series' and 'Series/Parallel' steps, it will start to weaken the field of the traction motors, which once again, provides a further boost in acceleration.

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

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

Driver only/guard operation

In reality, class 313s often operate routes where there is no guard on board the train and as a result, the driver has to close the doors themselves. Please see below on what the relevant procedure is and how to change the type of operation whilst in-game:

Driver only operation (DOO)

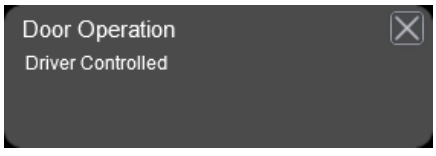
1) Open doors by pressing 'T'.
2) Wait for passengers to finish boarding/alighting and when ready, press 'R', or the 'Doors Close' button on the cab desk, to close the doors. Please note that you can not close the doors when passengers are still boarding/alighting.
3) Once the door interlock light illuminates, you may depart.

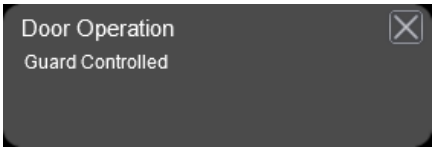
Guard operation

1) Open doors by pressing 'T'.
2) Doors will be closed by the guard once passengers have finished boarding/alighting.
3) Once the door interlock light illuminates, the guard will give you two bells which you must then acknowledge by also giving two bells. This can be carried out by either pressing 'C' or the 'Bell' button on the cab desk.

How to change operation

This can be changed in-game by pressing 'Ctrl+Shift+R', which will produce a visual message in the top-right hand corner of your screen letting you know which option you have selected:





Destination display

Manual blind

All liveries bar *Southern*, feature a manual destination blind which can be changed in-game by using the 'F7' & 'F8' keys. Please see below for a list of the available destinations and their relevant code if you wish to use them via the unit's number on an AI service:

01 Clapham Junction	**11 Kings Cross**	**21 Watford Junction**
02 Colchester	**12 Letchworth G.C.**	**22 Welwyn G.C.**
03 Croxley Green	**13 Liverpool St.**	**23 Willesden Junction**
04 Drayton Park	**14 Moorgate**	**24 Special**
05 Euston	**15 Moorgate via Hertford**	**25 Not In Service**
06 Finsbury Park	**16 North Woolwich**	**26 Depot**
07 Gunnersbury	**17 Richmond**	**27 Blank**
08 Hertford North	**18 St. Albans Abbey**	**28 Red**
09 Hitchin via Hertford	**19 Stevenage**	
10 Highbury & Islington	**20 Stratford**	

Electronic dot matrix display

A fully functioning electronic dot matrix destination display is provided with the *Southern* livery. This display is operated via the internal computer found to the left of the cab.

To display a destination, press 'X' if there's a destination already present, then input the relevant code and press '✓'.

Please see below for a list of destination codes:

28601 Portsmouth Harbour	**28608 Seaford**
28602 Bognor Regis	**28609 Lewes**
28603 Ore	**28610 Special**
28604 Depot	**28611 Littlehampton**
28605 Eastbourne	**28612 West Worthing**
28606 Portsmouth & Southsea	**28613 Not In Service**
28607 Hove	**28614 Brighton**

Dual power functionality

Please see below, for how to change from one power source to another:

AC (overhead wire) to DC (third rail)

1) Press the 'Pantograph Down' button to drop the pantograph.
2) Press the 'Set-Reset' button.

DC (third rail) to AC (overhead wire)

1) Lift the '25kV AC' cover and press the 'Pantograph Up' button.
2) Press the 'Set-Reset' button until the line light indicator illuminates.
3) When you apply power with the pantograph raised in a dual power area, the dual power alarm will sound. To temporarily reset it, press 'J'. This is to serve as a reminder to the driver, that he needs to drop the pantograph if entering a DC area.

Scenario information

For the class 313 to know whether it is in a DC or an AC area, markers must be placed in the scenario. These markers can be found by going to the left-hand 'Track Infrastructure' fly-out. Please see below for when and how to use each marker.

- APW Start of AC: Place where the overhead wires begin
- APW End of AC: Place where the overhead wires end
- APW Start of DC: Place where the third rail begins
- APW End of DC: Place where the third rail ends

Please note that on top of these markers, the ones supplied with the North London Line are also compatible. For scenarios using this route then, no markers need to be placed by the scenario author.

As well as markers, the number of the unit is also used to tell it what kind of area it is in at the start of the scenario. Please see the *Numbering* section below for more information.

Cold start

'Cold start' means the unit is in the following state when it loads:

- Auxiliaries (battery) tripped out
- Traction motor contacts are open
- Saloon lighting is off

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

1) Enter the cab and turn the master key in by pressing 'Ctrl+Z'.

2) Move the reverser from 'off' to 'neutral' by pressing 'S'. As you do this, you will need to depress the DSD lever by holding the 'F' key.

3) Press the right arrow key to view the back wall of the cab and press the 'Auxilaries-Set' button. This closes the battery contacts and allows 110V battery power to liven up the unit.

4) Reset the AWS self-test by pressing 'Q'.

5) If required, turn on the saloon lighting by pressing the 'Lighting-Set' button.

After carrying out this procedure, your unit will be successfully prepared from cold. To get on the move, please follow the instructions on the next page.

Setting up the driver's cab

Please follow the steps below to set up the cab of the class 313 so you are ready to move:

DC (third rail) mode

1) Ensure the reverser is in the 'neutral' position. If it is in 'off', press 'S' to move it to 'neutral'. As you do this, you will need to depress the DSD lever by holding the 'F' key.
2) If you have moved the reverser, cancel the AWS self-test by pressing 'Q'.
3) Ensure the traction motor contacts are closed by pressing the 'Set-Reset' button. This will allow power to be supplied to the motors.
4) Turn off the Driver Reminder Appliance (DRA) by pressing 'Y'.

AC (overhead wire) mode

1) Ensure the reverser is in the 'neutral' position. If it is in 'off', press 'S' to move it to 'neutral'. As you do this, you will need to depress the DSD lever by holding the 'F' key.
2) If you have moved the reverser, cancel the AWS self-test by pressing 'Q'.
3) If the 25kV indicator isn't illuminated, lift the '25kV AC' cover and press the 'Pantograph Up' button.
4) Ensure the traction motor contacts are closed by pressing the 'Set-Reset' button. If the line light indicator isn't illuminated, you must hold the 'Set-Reset' button until it does.
5) Turn off the Driver Reminder Appliance (DRA) by pressing 'Y'.

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

Driving guide

The following steps should allow you to drive the class 313 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 train brake handle to step 1 by pressing the ';' key.

3) Move the power handle to notch 2 by pressing 'A'. At the same time, move the train brake handle to the 'release' position which will ensure you depart without rolling back.

4) From then on, apply further power as you see fit. Please see the *Camshaft traction system* section of the manual for detail on how the power handle functions.

5) To brake the train, you may make applications and releases by moving the handle between step 1 and full service. It is recommended you only use full service as a last resort so as to ensure you always have more brake force available if required.

6) Just before coming to a stop, aim to have the brakes in step 1 so as to provide a smooth stop.

7) In the event of an emergency brake application, you will need to wait for your train to come to a stop. You must then place the reverser in neutral, power handle in off, make sure the brake handle is in emergency and then release.

8) Should you need to place the reverser in 'off' or 'neutral', you will need to depress the DSD lever by holding the 'F' key.

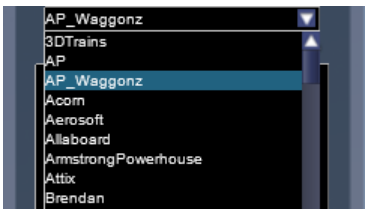
How to use in the scenario editor

How to place

To place a class 313 in the scenario editor, please follow the instructions below:

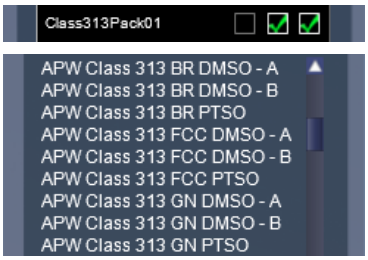
1) In the left-hand rolling stock fly-out, click the object set filter which looks like a blue box with an orange arrow to the right of it.

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



3) Tick the second & third box beside 'Class313Pack01'.

4) The class 313 liveries should now be visible in the left hand rolling stock fly-out.



Numbering

When placing a class 313 in the scenario editor, you are able to control a number of features via the number of the unit.

Example number:

313019625472V741027

Key:
313019 - Unit number
62547 - Coach number
2V74 - Headcode for front blind (BR livery only)
0/1 - Cold start = **0**. Prepared/warm = **1**.
0/1/2/3/4 - AC/DC modes
0 = AC or DC possible but none pre-selected.
1 = DC pre-selected. Voltage change to AC not possible until train passes over AC start marker.
2 = AC pre-selected. Voltage change to DC not possible until train passes over DC start marker.
3 = DC pre-selected. Voltage change to AC possible until train passes over AC end marker.
4 = AC pre-selected. Voltage change to DC possible until train passes over DC end marker.
27 = Last two digits of destination code

Scenarios

APC313: 2K47 19:33 Welwyn Garden City - Moorgate
Route = ECML London - Peterborough
Track covered = Welwyn Garden City - Drayton Park
Traction = First Capital Connect 313064 & 313040
Year = 2014
Duration = 1 hour

APC313: 2V73 14:18 Moorgate - Welwyn Garden City
Route = ECML London - Peterborough
Track covered = Drayton Park - Welwyn Garden City
Traction = First Capital Connect 313058
Year = 2014
Duration = 45 minutes

APC313: 2Y91 17:47 Welwyn Garden City - London King's Cross
Route = ECML London - Peterborough
Track covered = Welwyn Garden City - London King's Cross
Traction = First Capital Connect 313049 & 313024
Year = 2014
Duration = 35 minutes

APC313: 2N01 18:09 Stratford - Richmond
Route = North London Line
Track covered = Stratford - Richmond
Traction = London Overground 313106
Year = 2009
Duration = 1 hour 5 minutes

APC313: 2N88 08:29 Richmond - Stratford
Route = North London Line
Track covered = Richmond - Stratford
Traction = Silverlink 313123
Year = 2007
Duration = 1 hour

APC313: 5L86 15:20 London Euston - Stratford
Route = North London Line
Track covered = Camden Road - Stratford
Traction = London Overground 313101
Year = 2009
Duration = 35 minutes

Credits

Waggonz - Modelling, texturing & scripting

Ronnie Olsthoorn - Additional modelling

AXYZ - Passenger models used under licence

RPD, MTR & Great Northern - Assistance in gathering visual reference and sound recordings

Rik Ryall, Finlay McBride & Thomas Hunns - Beta testing