

London Overground Class 313 EMU

AP

Waggonz



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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

Cab guide



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



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 CLOCKWISE
Shift+V -	Wiper switch ANTI-CLOCKWISE

Features

- [Advanced and HUD versions](#)
- High definition textures
- Detailed internal & external audio
- [Camshaft traction system](#)
- Prototypical dynamic braking
- [Driver only/guard operation option](#)
- [Manual destination display](#)
- [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
- Headlight and rain effects

Advanced and HUD versions

Advanced

The 'advanced' version of the class 313 is represented in the simulator with a suffix of 'ADV' and includes all of the features listed in this manual. Basic controls such as the throttle and brake can be controlled using the F4 HUD display but many other features cannot. The xBox controller cannot be used at all.

HUD

The 'HUD' version of the class 313 is greatly simplified and doesn't include some of the features listed in this manual. It can mostly be driven like any other electric multiple unit and is fully compatible with both the F4 HUD display and xBox controller. Please note though that if you need to change or select a power source, this still needs to be done via the mouse or keyboard.

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)

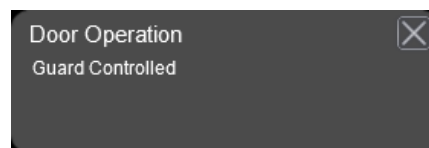
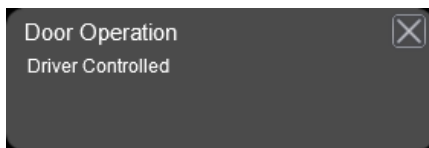
- 1) Open doors by pressing 'T'.
- 2) Wait for passengers to finish boarding/alighting and when ready, press 'R', or the 'Doors Close' button on the cab desk, to close the doors. Please note that you can not close the doors when passengers are still boarding/alighting.
- 3) Once the door interlock light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



Manual destination display

The manual destination blind 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	

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'. If you wish to press it with the mouse, it can be found to the right of the 'pantograph down' button. 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 the 'advanced' version of the 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 'Auxiliaries-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. Please note that only the steps listed in bold must be carried out when using the 'HUD' version:

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:

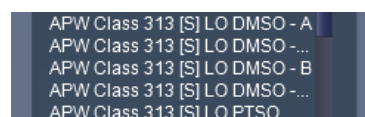
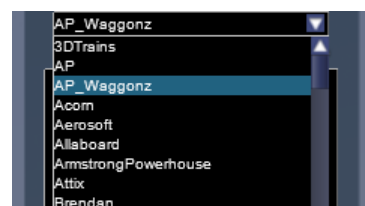
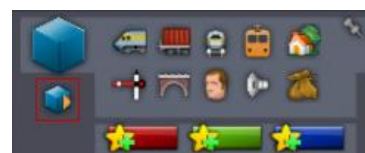
- 1) Move the reverser to your desired direction of travel by pressing either 'W' for forward or 'S' for reverse.
- 2) Move the train brake handle to step 1 by pressing the ';' key.
- 3) Move the power handle to notch 2 by pressing 'A'. At the same time, move the train brake handle to the 'release' position 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 'Class313Pack03'.
- 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:

313019625471027

Key:

313019 - Unit number

62547 - Coach number

0/1 - Cold start = **0**. Prepared/warm = **1**. ('Advanced' version only - omit number on 'HUD' version)

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

[313] 2N01 18:09 Stratford - Richmond

Route = North London Line
Track covered = Stratford - Richmond
Traction = London Overground 313106
Year = 2009
Duration = 1 hour 5 minutes



[313] 2N88 08:29 Richmond - Stratford

Route = North London Line
Track covered = Richmond - Stratford
Traction = London Overground 313123
Year = 2008
Duration = 1 hour



[313] 5L86 15:20 London Euston - Stratford

Route = North London Line
Track covered = Camden Road - Stratford
Traction = London Overground 313101
Year = 2009
Duration = 35 minutes



Important note

There are two versions of each scenario:

[313ADV]: Uses the 'advanced' version of the class 313

[313HUD]: Uses the 'HUD' version of the class 313

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