

Class 150/2

Diesel Multiple Unit

AP

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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 150-2 DMU 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.

Technical information

Manufacturer	BREL (British Rail Engineering Limited) York
Years built	1986 - 1987
Number built	85 (150201 – 150285)
Formation	DMS + DMSL (2 car)
Engine	Cummins NT855R5 286hp
Transmission	Hydraulic Voith T211r
Maximum speed	75mph (120km/h)
Coupling type	BSI
Length	20.06m (per car)
Height	3.77m
Width	2.82m
Weight	35.8 tonnes

Liveries

Regional Railways (Sprinter) (with/without full yellow end) -
RR (Sprinter) / RR (Sprinter) 2



Network NorthWest - *NNW*



Regional Railways:

with/without Regional Railways logo - RR / Ex-RR

with Arriva/BR ScotRail/ScotRail/Wales & West/Wessex Trains logo
- Ex-RR (ATN/SR (BR)/SR/WW/WX)



Regional Railways (GMPTE) - RR (GMPTE)



Regional Railways (Centro) (with/without Regional Railways logo) -
RR (Centro) / Ex-RR (Centro)



Regional Railways (Merseyrail) - *RR (MR)*



ScotRail - SR



Anglia Railways - AR



Ex-Anglia Railways (Central Trains) - Ex-AR (CT)



Central Trains (with/without Central Trains logo) - CT / Ex-CT



Network West Midlands - NWM



Wessex Trains (with/without Wessex Trains logo) - WT / Ex-WT



First Great Western - FGW



First Great Western Blue - FGW (B)



Great Western Railway - GWR



Valley Lines:

with Valley Lines logo - VL

with Arriva logo - Ex-VL (ATW)



Arriva Trains Wales (2 headlight variants) - ATW / ATW (NL)



Arriva Trains Wales Revised:
with Arriva Trains Wales logo - ATW2
without Arriva Trains Wales logo - Ex-ATW2



First North Western (with/without Northern Rail logos) -
FNW / Ex-FNW (NR)



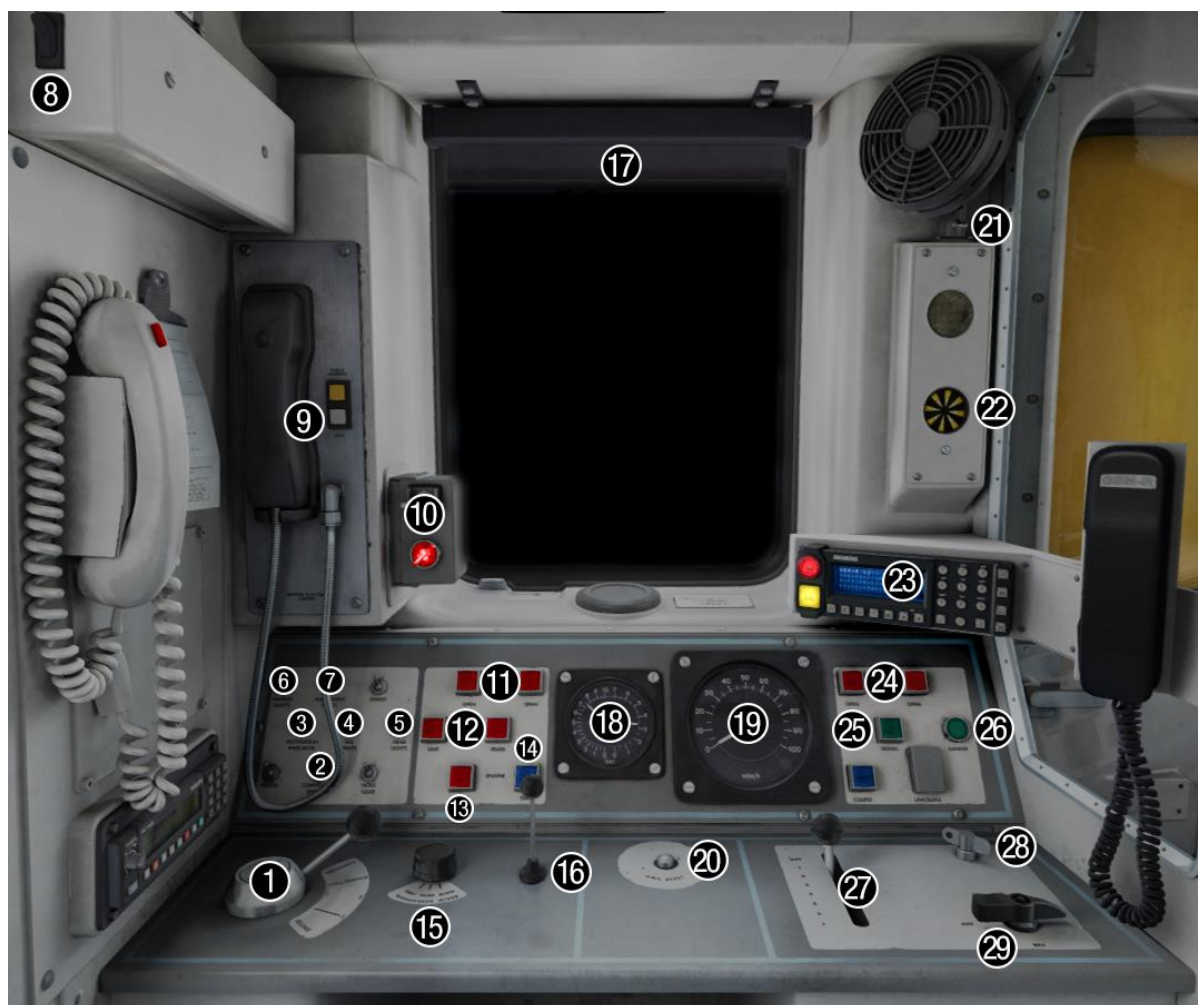
Northern Rail (2 headlight variants & with/without logos) -
NR / NR (NL) / Ex-NR / Ex-NR (NL)



Northern (2 headlight variants) - Northern / Northern (NL)



Cab Guide



- 1** - Brake handle
(release/1/2/full service/emergency)
- 2** - Compressor speed up switch (off/on)
- 3** - Destination light switch (off/on)
- 4** - Tail lights switch (off/on)
- 5** - Head lights switch (off/day/night)
- 6** - Marker lights switch (off/on)
- 7** - Instrument lights switch (off/on)
- 8** - Clipboard light switch (off/on)
- 9** - Cab call button
- 10** - Driver Reminder Appliance (DRA)
- 11** - Door open (left) lights
- 12** - Transmission fault lights
- 13** - Engine stop button
- 14** - Engine start button

- 15** - Windscreen wiper switch
(fast/park/slow)
- 16** - Horn (high/low)
- 17** - Blind
- 18** - Main res. & brake cylinder gauge
- 19** - Speedometer
- 20** - AWS reset button
- 21** - Fan switch (fast/off/slow)
- 22** - AWS sunflower
- 23** - GSM-R (post-2013 liveries only)
- 24** - Door open (right) lights
- 25** - Driver to guard buzzer button
- 26** - Sander button
- 27** - Power handle (off to 7)
- 28** - Master key
- 29** - Reverser (off/reverse/neutral/forward)

Keyboard Controls

Non-standard keyboard controls are listed below:

L -	Cab light ON/OFF
E -	Deadman's pedal (DVD reset)
F7 -	Destination blind UP
F8 -	Destination blind DOWN
Y -	Driver reminder appliance (DRA) ON/OFF
C -	Driver to guard buzzer
Ctrl+D -	Driver vigilance device (DVD) ON/OFF
Z -	Engine start button
Ctrl+Z -	Engine stop button
I -	Instrument lights switch ON/OFF
J -	Marker lights switch ON/OFF
Shift+W -	Master key IN/OUT
O -	Destination indicator light switch ON/OFF
K -	Tail lights switch ON/OFF
V -	Wiper switch ANTI-CLOCKWISE
Shift+V -	Wiper switch CLOCKWISE

Features

- 21 liveries
- Detailed internal & external audio
- Accurate acceleration & braking physics
- Global System for Mobile Communication - Railway (GSM-R)
- Voith T211r hydraulic transmission
- Wheelslip Protection (WSP)
- Wheelslide simulation
- Automatic unit numbering
- Dynamic exhaust effects
- Player changeable destination blind
- Class 150/0 & /9 functionality
- Cold start
- Driver vigilance device (DVD)
- 3 different coloured cab variants (Normal, Great Western & Northern)
- Opening cab windows
- Cab instrument lighting
- Bits and Bobs

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.

Please note that GSM-R is only included for liveries that are relevant for operations post-2013.

Voith T211r Hydraulic Transmission

Great care has been taken in recreating the characteristics of the 2-stage hydraulic transmission used in this unit.

1st Stage - Torque Converter

When accelerating from a standing start, the engine revs up and oil fills the torque converter, which allows acceleration to take place. There is a 2 second or so delay between the engine revving up and the oil filling the converter, which is why these units don't accelerate as soon as power is applied, and is what causes the distinctive, initial surge of rpm before the engine settles. This also explains why you don't get that same initial surge of rpm when powering up from 'Notch 1', instead of 'Off', as the converter is already filled with oil. During this 1st stage, engine rpm is directly controlled via the notch selected on the power handle.

2nd Stage - Fluid Coupling

At 45mph, the oil transfers from the torque converter to the fluid coupling which results in a reduction of engine rpm. During this stage, engine rpm is directly proportional to the speed of the train which means rpm will be the same regardless of which notch is selected on the power handle. All that varies is the load being placed on the engine. As speed increases then, you will gradually hear engine rpm rise in sync.

The unit will stay in this second stage until speed drops below 35mph. At this point, the transmission reverts to the first stage.

Adhesion

Adhesion between a train's wheels and the rails plays a big part in allowing a train to accelerate or brake. Too little of it and the train will slip or slide. There are a myriad of factors that control the level of adhesion and we have attempted to simulate the most important of these to give a varied and realistic driving experience:

Season

Adhesion is generally good in dry conditions during summer and spring. Slightly decreased adhesion during winter to take account of the increased amount of moisture and possible ice on the rails due to cooler temperatures. Much decreased adhesion during autumn due to leaf mulch.

Weather

Adhesion decreases in wet weather, especially so when rain first starts falling before it has had a chance to clean the railhead. If rain is light, it will take longer for the railhead to be cleaned whereas heavy rain will clean it quicker, resulting in adhesion recovering sooner.

When using the drizzle weather pattern in our Sky & Weather Enhancement Pack, adhesion is particularly poor as the rain hasn't enough force to clean the railhead but still makes it sufficiently wet to worsen adhesion.

Time of Day

Adhesion will decrease somewhat after dusk as the air cools and dew is more likely to form on the railhead. This persists throughout the night until around an hour after sunrise when higher temperatures or the sun dry it out. In our simulation, this factor is reduced during summer to account for warmer temperatures, which on average result in less dew.

Tunnels

When adhesion is poor due to external factors such as weather or season, adhesion will generally improve upon entering a tunnel, which is not as susceptible to these factors. When adhesion is good during dry weather and outside of autumn, adhesion may decrease a little upon entering a tunnel due to their damp nature.

Wheelslip Protection (WSP)

Wheelslip protection aids the driver when powering during times of poor adhesion.

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

- 1) Power is automatically reduced and the two gearbox fault lights illuminate in the cab.
- 2) Once the wheelslip stops, power is reapplied to the notch selected on the power handle and the two gearbox fault lights extinguish. If wheelslip reoccurs, the process starts again.

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

Wheelslide

When braking during poor adhesion, it is possible that the wheels will lock up and slide. As with wheelslip, the two gearbox fault lights will illuminate but there is no automatic sander or reduction of the brake, so it is up to you to either apply sand or move the brake handle to a lower step in an attempt to control the slide.

Automatic Unit Numbering

When placing a class 150/2 unit in the scenario editor or using one in Quick Drive, both the DMS & DMSL will automatically be given correct unit and coach numbers instead of you having to select each vehicle and changing their number manually so they match. The unit number is controlled via the DMSL coach if you wish to change it. Please note that the destination display on both driving coaches is also controlled via the DMSL coach.

Dynamic Exhaust Effects

Dynamic exhaust effects mean that the exhaust reacts to what the engine is doing. For example, when in notch 7, 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 vehicle varies depending on how well maintained it is, so to represent this in the simulator, a random 'clag' factor is allocated to each vehicle which ranges from 1 to 10; 1 being the cleanest and 10 being the dirtiest.



Player Changeable Destination Blind

The destination blind can be changed during a scenario by pressing either the F7 or F8 keys. Please see below for a list of the available destinations on each livery and their relevant code if you wish to use them via the unit's number on an AI service:

Regional Railways / Regional Railways (GMPTE, Merseyrail & Sprinter) / Network NorthWest

a - Blank	s - Bangor	K - Newton Abbot
b - Norwich	t - Holyhead	L - Exeter St Davids
c - Great Yarmouth	u - Blaenau Ffestiniog	M - Exmouth
d - Lowestoft	v - Newport	N - Taunton
e - Sheringham	w - Cardiff Central	O - Bristol Temple Meads
f - Ipswich	x - Bridgend	P - Buxton
g - Felixstowe	y - Swansea	Q - Leeds
h - Manchester Piccadilly	z - Maesteg	R - Carlisle
i - Manchester Victoria	A - Fishguard Harbour	S - Blackpool North
j - Manchester Oxford Rd	B - Gloucester	T - Preston
k - Manchester Airport	C - Cheltenham Spa	U - Lancaster
l - Warrington Central	D - Hereford	V - Morecambe
m - Liverpool	E - Birmingham New St	W - Heysham Port
n - Crewe	F - Penzance	X - Depot
o - Wrexham General	G - Newquay	Y - Not In Service
p - Chester	H - Par	Z - Special
q - Bidston	I - Plymouth	
r - Llandudno	J - Paignton	

Ex-Anglia Railways (Central Trains) / Central Trains / Network West Midlands / Regional Railways (Centro)

a - Blank	m - Telford Central	y - Worcester Shrub Hill
b - Birmingham New St	n - Wolverhampton	z - Worcester Foregate St
c - Birmingham Snow Hill	o - Rugby	A - Great Malvern
d - Birmingham Moor Street	p - Northampton	B - Hereford
e - Birmingham Intl	q - Leamington Spa	C - Redditch
f - Coventry	r - Dorridge	D - Longbridge
g - Nuneaton	s - Shirley	E - Walsall
h - Tamworth	t - Stratford-upon-Avon	F - Bletchley
i - Lichfield TV	u - Stourbridge Jn	G - Bedford
j - Rugeley TV	v - Stourbridge Town	H - Depot
k - Stafford	w - Kidderminster	I - Not In Service
l - Shrewsbury	x - Droitwich Spa	J - Special

Regional Railways (ATN) / First North Western / Northern Rail / Northern

a - Blank	s - Nunthorpe	K - Ormskirk
b - Scarborough	t - Wakefield Kirkgate	L - Barrow
c - Rose Hill	u - Warrington Central	M - Whitehaven
d - Hull	v - Manchester Airport	N - Saltburn
e - Selby	w - Wigan Wallgate	O - York
f - Clitheroe	x - Manchester Oxford Rd	P - Sheffield
g - Scunthorpe	y - Knottingley	Q - Crewe
h - Doncaster	z - Newcastle	R - Middlesborough
i - Lincoln	A - Leeds	S - Whitby
j - Harrogate	B - Carlisle	T - Preston
k - Huddersfield	C - Blackpool South	U - Lancaster
l - Metrocentre	D - Blackpool North	V - Morecambe
m - Hexham	E - Liverpool	W - Heysham Port
n - Skipton	F - Manchester Victoria	X - Depot
o - Buxton	G - Manchester Piccadilly	Y - Not In Service
p - Wakefield Westgate	H - Chester	Z - Special
q - Bishop Auckland	I - Southport	
r - Cleethorpes	J - Kirkby	

Regional Railways (SR) / ScotRail / ScotRail (BR)

a - Blank	i - North Berwick	q - Cardenden
b - Glasgow Central	j - Kirkcaldy	r - Glenrothes
c - Glasgow Queen Street	k - Perth	s - Markinch
d - Newcraighall	l - Dundee	t - Dunblane
e - Falkirk Grahamston	m - Edinburgh	u - Cowdenbeath
f - Stirling	n - Haymarket	v - Depot
g - Alloa	o - Aberdeen	w - Not In Service
h - Cumbernauld	p - Bathgate	x - Special

Valley Lines / Arriva Trains Wales / Arriva Trains Wales Revised

a - Blank	q - Coryton	G - Chester
b - Cardiff Central	r - Radyr	H - Bidston
c - Cardiff Queen Street	s - Pontypridd	I - Llandudno
d - Penarth	t - Cardiff Bay	J - Bangor
e - Barry Island	u - Ebbw Vale	K - Holyhead
f - Bridgend	v - City Line	L - Blaenau Ffestiniog
g - Swansea	w - Newport	M - Pwllheli
h - Carmarthen	x - Maesteg	N - Aberystwyth
i - Pembroke Dock	y - Cheltenham Spa	O - Machynlleth
j - Fishguard Harbour	z - Hereford	P - Gloucester
k - Milford Haven	A - Shrewsbury	Q - Llanelli
l - Treherbert	B - Birmingham Intl	R - Depot
m - Aberdare	C - Birmingham New St	S - Not In Service
n - Merthyr Tydfil	D - Crewe	T - Special
o - Bargoed	E - Manchester Piccadilly	
p - Rhymney	F - Wrexham Central	

Regional Railways (WW & WX) / Wessex Trains / First Great Western / First Great Western (Blue) / Great Western Railway

a - Blank	m - Paignton	y - Avonmouth
b - Penzance	n - Newton Abbot	z - Bristol Temple Meads
c - St Ives	o - Exeter St Davids	A - Bristol Parkway
d - St Erth	p - Exmouth	B - Cardiff Central
e - Truro	q - Barnstaple	C - Gloucester
f - Falmouth Docks	r - Taunton	D - Cheltenham Spa
g - Newquay	s - Weymouth	E - Worcester S Hill
h - Par	t - Frome	F - Swindon
i - Liskeard	u - Southampton	G - Weston-S-Mare
j - Looe	v - Portsmouth Hbr	H - Depot
k - Plymouth	w - Westbury	I - Not In Service
l - Gunnislake	x - Severn Beach	J - Special

Anglia Railways

a - Blank	g - Ipswich	m - Colchester
b - Norwich	h - Felixstowe	n - Depot
c - Great Yarmouth	i - Peterborough	o - Not in Service
d - Lowestoft	j - Cambridge	p - Special
e - Sheringham	k - Marks Tey	
f - Cromer	l - Sudbury	

Class 150/0 & /9 Functionality

There are instances where class 150/1s & class 150/2 have been merged into a single 3 car unit to form either a /0 or /9. Using this pack with our separately available [Class 150/1 Enhancement Pack](#), it is possible to simulate this by forming the unit as below:

Car 1

Class 150/1 DMS - Number: **DMSxxx**

xxx = any three digit number

Car 2

Class 150/2 DMSL (front must face Car 3) - Number: **150yyyA**

yyy = the last three digits of your chosen /0 or /9 unit number

A = your chosen destination

Car 3

Class 150/1 DMSL - Number: **150yyyB**

yyy = the last three digits of your chosen /0 or /9 unit number

B = This needs to be a different destination to car 2 as failing to do so will result in the doors not working on car 3. To avoid confusion then, we recommend using the 'Blank' destination.

Cold Start

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

- Main reservoir and brake cylinder pressures are 0
- The engine is shut down

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

- 1) Insert the master key by pressing **Shift+W**.
- 2) Move the reverser to 'Neutral' by pressing **S**.
- 3) Reset the AWS self-test by pressing **Q**.
- 4) Start the engine by holding **Z** until the 'Engine Start' button illuminates.
- 5) You will now need to wait for the compressor to build the air in the main reservoir. You can speed up this process by turning on the 'Compressor Speed Up' switch which increases engine rpm. The compressor is directly linked to the engine so when the engine revs faster, the compressor also does so.
- 6) When the main reservoir reaches 4.5 bar, you have sufficient air to obtain a brake release and get on the move. Ideally though, you want to have between 6.5 & 7.5 bar as if it drops below 4.5 bar, an emergency brake application will occur.

After carrying out this procedure, your unit 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:

- The driver to guard buzzer is inactive when the doors are open. This is to prevent the driver incorrectly giving the right away buzzer.
- The reverser must be placed in 'Neutral' to start the engine.
- Power cannot be applied if the brake handle is in 'Step 2', 'Step 3' or 'Emergency'.
- If the emergency brake applies, power can only be regained by placing the reverser into 'Neutral', brake handle into 'Emergency' & power handle in 'Off'.
- If the brake handle is placed in 'Step 2', 'Step 3' or 'Emergency' whilst powering, power will be lost and you must return the power handle to 'Off' before being able to regain power.
- 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 headlights only provide illumination before sunrise and after sunset. This is to avoid the unrealistic appearance of projected light in broad daylight.

Setting Up the Driver's Cab

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

- 1) Turn the master key in by pressing **Shift+W**.
- 2) Move the reverser to the 'neutral' position by pressing **W**.
- 3) Cancel the Driver Vigilance Device self-test by pressing **E**.
- 4) Cancel the AWS self-test alarm by pressing **Q**.
- 5) Turn off the tail lights by pressing **K**.
- 6) Turn the marker lights on by pressing **J**.
- 7) Turn the headlights on by pressing **H**.
- 8) Turn the Driver Reminder Appliance (DRA) off by pressing **Y**.
- 9) If GSM-R is present, register your train.

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:

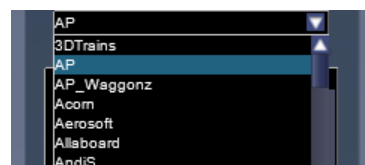
- 1) When you receive two buzzes from the guard, return them by pressing **C** twice.
- 2) Move the reverser to your desired direction of travel by pressing either **W** for forward or **S** for reverse.
- 3) Cancel the Driver Vigilance Device self-test by pressing **E**.
- 4) Move the brake handle to step 1 by pressing **;**.
- 5) Move the power handle to notch 3 by pressing **A** and let the engine rev up. After a couple of seconds, move the brake handle to the release position which will ensure you depart without rolling back.
- 6) From then on, apply further power as you see fit.
- 7) When returning the power handle to off, make sure to hold it in notch 1 for a second or two beforehand. This is to let the power die off before removing it.
- 8) 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.
- 9) Just before coming to a stop, aim to have the brakes in step 1 so as to provide a smooth stop.

How to Use in the Scenario Editor

How to place

To place a class 150/2 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 'Class150Pack01'.
- 4) The class 150/2 liveries should now be visible in the left-hand rolling stock fly-out.



Formation

DMS + DMSL

Numbering

When placing a class 150/2 in the scenario editor, you are able to control the destination and cold start via the number. Please note that you need only change the DMSL number to apply to the whole unit. The DMS number is simply a placeholder.

Example number

150201A;Cold=1;GSMR=1A22084

Key:

150201 - Unit number

A - Destination

;Cold=1 - Add this to the end of the number to activate cold start mode

;GSMR=1A22084 - Add this to the end of the number to restrict the train reporting number and signal number that the player can use to register with on the GSM-R. In this example, '1A22' is the train reporting number and '084' is the signal number.

Scenarios

APC150/2: 2B56 11:10 Swansea - Cardiff Central

Route = South Wales Main Line
Track covered = Swansea - Cardiff Central
Traction = Arriva Trains Wales 150251
Year = 2017
Duration = 1 hour 10 minutes



APC150/2: 2L60 21:15 Maesteg - Cardiff Central

Route = South Wales Main Line
Track covered = Bridgend - Cardiff Central
Traction = Arriva Trains Wales 150245
Year = 2016
Duration = 35 minutes



APC150/2: 2U24 16:07 Taunton - Cardiff Central

Route = South Wales Main Line
Track covered = Bristol Temple Meads - Cardiff Central
Traction = Great Western Railway 150247
Year = 2016
Duration = 1 hour



APC150/2: 05:58 Lowestoft - Norwich

Route = Wherry Lines
Track covered = Lowestoft - Norwich
Traction = Ex-Regional Railways 150237
Year = 2001
Duration = 45 minutes



APC150/2: 10:35 Norwich - Great Yarmouth

Route = Wherry Lines
Track covered = Norwich - Great Yarmouth via Reedham
Traction = Anglia Railways 150227
Year = 2000
Duration = 40 minutes



APC150/2: 16:21 Great Yarmouth - Norwich

Route = Wherry Lines
Track covered = Great Yarmouth - Norwich via Acle
Traction = Anglia Railways 150213
Year = 2000
Duration = 35 minutes



Credits

Nicolas Schichan - Advanced scripting

Arriva Trains Wales - Assistance in recording sounds

Video 125 - Audio samples

Ewan Rutledge - Assistance in gathering reference photographs

[Glen Bowman](#) & ['ARG Flickr'](#) - Photographs for Wessex Trains livery

[Richard Szwejkowski](#), [Jon Candy](#), ['Griffin Guiding'](#) & [Nick Amoscato](#) -
Photographs for Valley Lines livery