

Class 378

Enhancement Pack



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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 378 Enhancement 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 requirements installed, as listed on the product page.
- 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.

Liveries

London Overground:

without '5 Car Train' front sticker – LO1

with '5 Car Train' front sticker – LO1 (5)



London Overground Revised – LO2



Keyboard Controls

Non-standard keyboard controls are listed below:

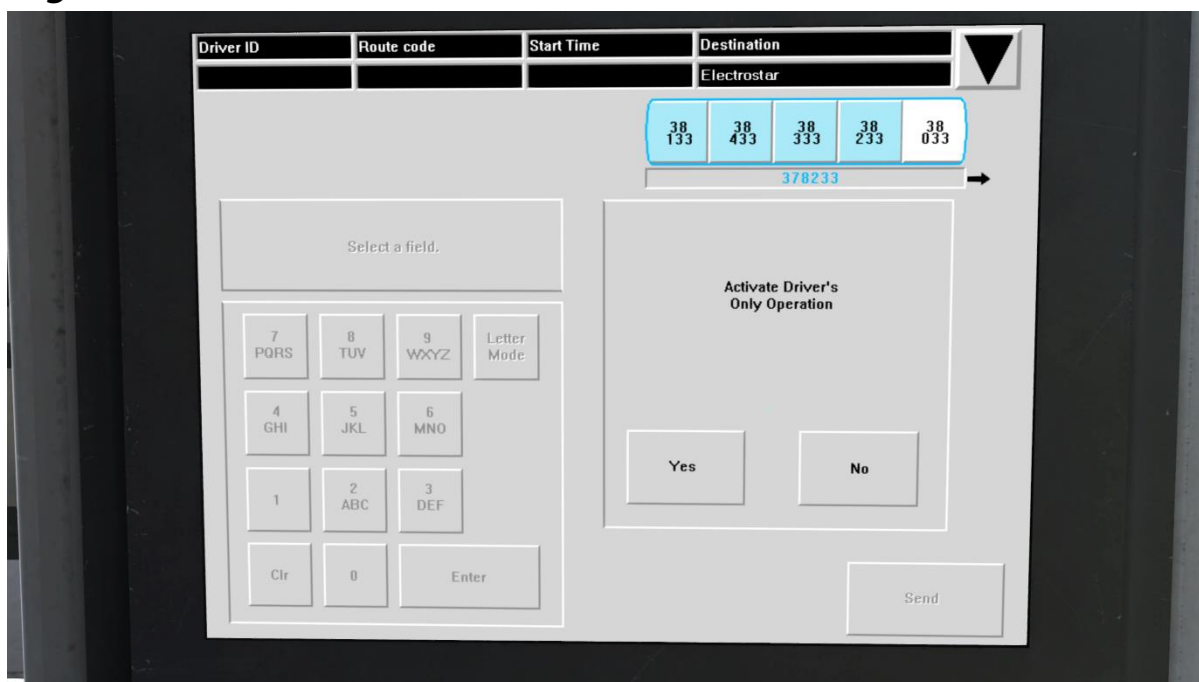
I -	AC system select button
Ctrl+Z -	Aux off button
Z -	Aux on button
Numpad Plus -	Brake hold button
L -	Cab light button ON/OFF
Delete -	DC system select button
E -	Deadman's pedal (DVD reset)
N -	Depot whistle
F7 -	Destination display DOWN
F8 -	Destination display UP
R -	Door close button
U -	Door release buttons (left)
O -	Door release buttons (right)
Y -	Driver reminder appliance (DRA) ON/OFF
C -	Driver to guard bell
Ctrl+D -	Driver vigilance device (DVD) ON/OFF
H -	Headlight switch CLOCKWISE
Shift+H -	Headlight switch ANTI-CLOCKWISE
Shift+W -	Master key IN/OUT
Shift+P -	Pan down button
P -	Pan up button
Ctrl+R -	Passenger door operation toggle DOO/GO
End -	Shoes down button
Page Down -	Shoes up button
K -	Tail lights switch CLOCKWISE
Shift+K -	Tail lights switch ANTI-CLOCKWISE
Ctrl+Numpad Enter -	Visual aids ON/OFF
V -	Wiper switch CLOCKWISE
Shift+V -	Wiper switch ANTI-CLOCKWISE

Features

MITRAC - Train Management System (TMS)

This unit features a Train Management System (TMS) called MITRAC, which is accessed via the IDU (Intelligent Display Unit) to the left of the driver. Many aspects of the unit can be controlled or viewed using this system. Please see below for the screens which have been simulated in this pack.

Log-In



After turning the master key in and moving the reverser out of 'Off', this is the first screen you see.

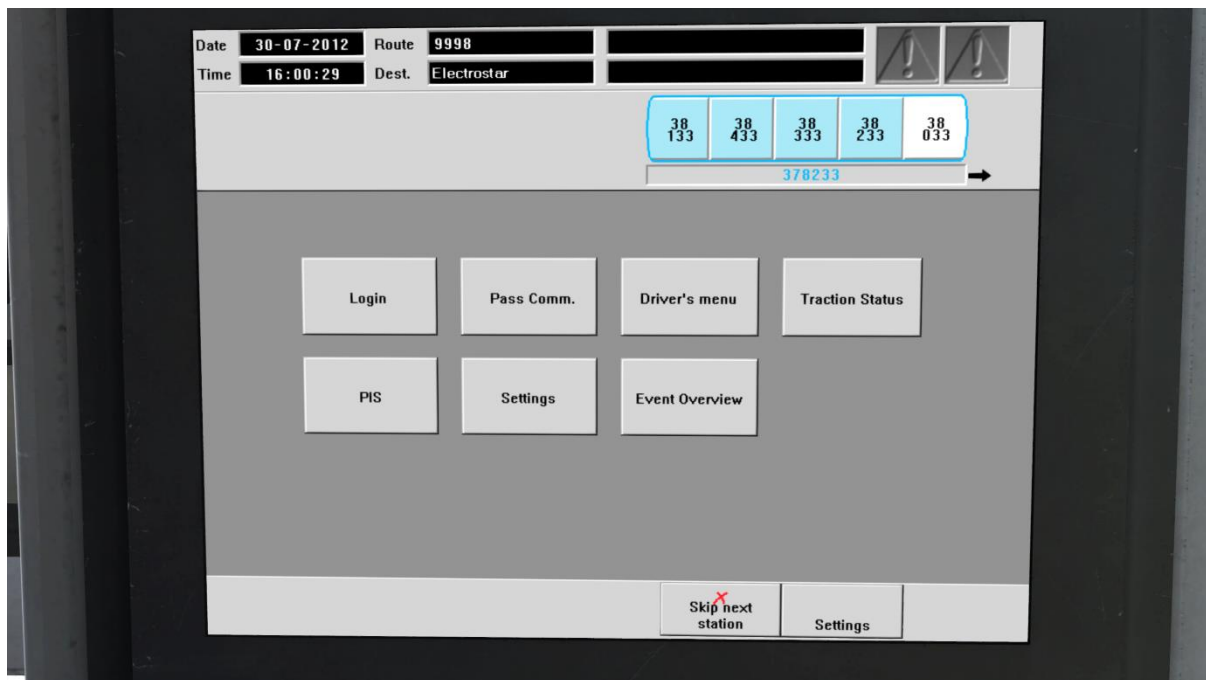
Firstly, you must choose whether to activate Driver's Only Operation (DOO) or not. This allows you to have sole control of the doors if you wish.

You may then log-in. To do this, click the blank space below 'Driver ID' and enter a 5-digit number of your choice, using the keypad, before pressing 'Enter'.

If you wish to display a destination on the front and side of the train, click the blank space below 'Route Code' and enter the relevant 4-digit code, using the keypad, before pressing 'Enter'. The 4-digit codes can be found later on in this manual.

Once you are done, press 'Send' to log-in.

Main Menu



Once you are logged in, you will be presented with the 'Main Menu' which provides access to other screens. To access the screen of your choice, simply click the relevant button. Please note that not all screens are simulated so some will not load if they have not been simulated.

As in common with all screens, your train formation is shown at the top with unit and vehicle numbers.

Driver's Menu

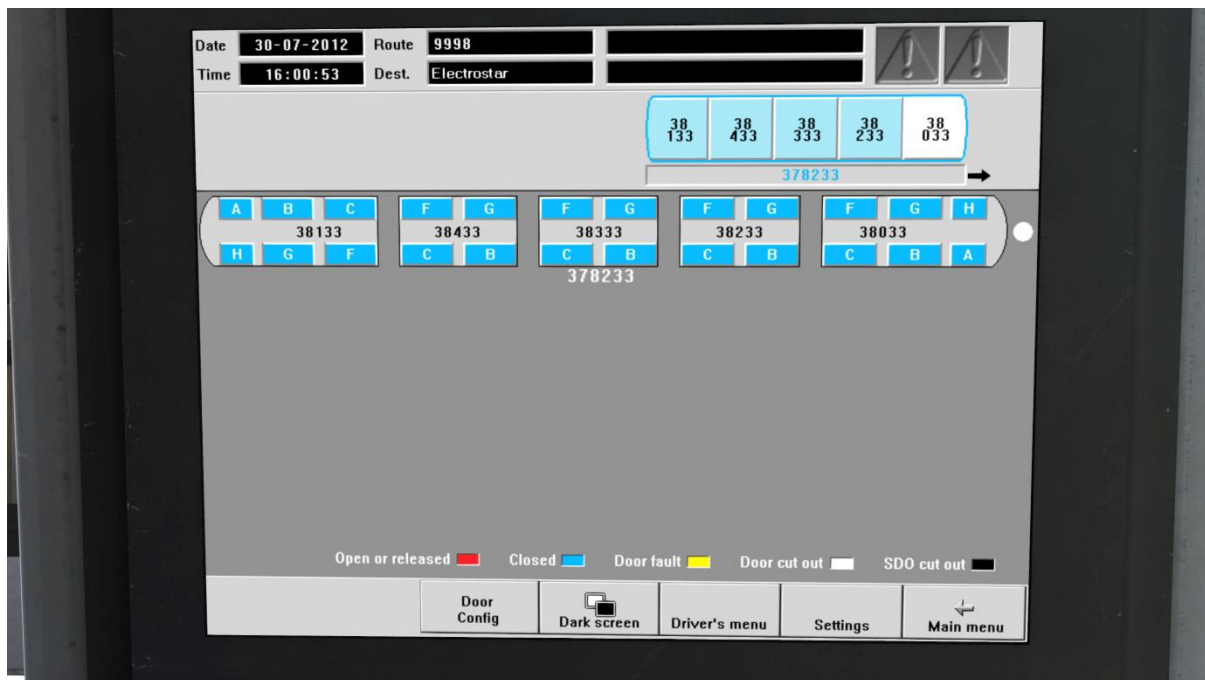


This screen shows the status of the On-Train Monitoring Recorder (OTMR), door isolations, traction sand and Driver's Only Operation (DOO). Out of these four things, only the 'Driver's Only Operation Enabled' indicator is dynamic. The other three are static as their state changes have not been simulated in this pack.

This screen also shows the current simulator time in analogue format.

Relevant shortcuts to other screens are provided at the bottom. Please note that 'Skip next station' is inactive. 'Dark screen' turn off the screen and you will be required to click anywhere on the screen to turn it back on. The other three shortcuts will simply lead you to their respective screens.

Door Status



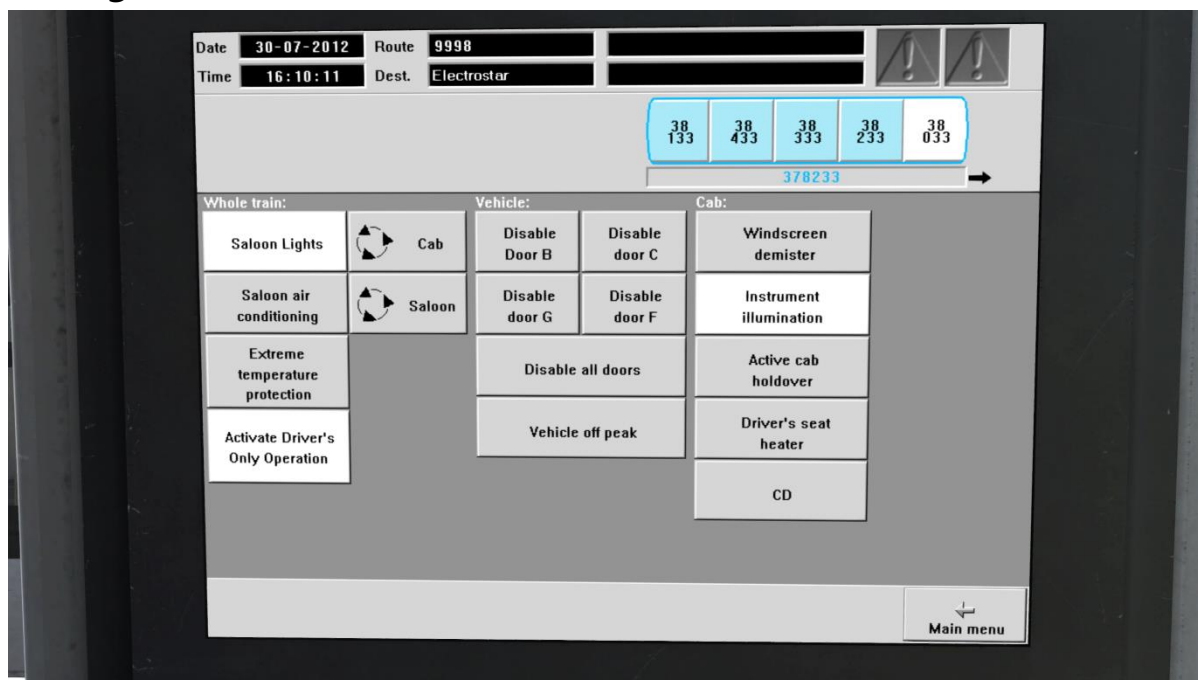
This screen is only accessible from the 'Driver's Menu' and shows the status of all doors on your train.

Traction Status



This screen shows the tractive effort being provided by each pair of traction motors on your train whilst accelerating or braking. It also shows the status of each Motor Converter Module (MCM) & Auxiliary Converter Module (ACM). The MCM is vital to the operation of the traction motors and the ACM powers vital systems on the train.

Settings



This screen allows you to change the following settings:

Clicking 'Saloon Lights' will toggle the saloon lights on and off, as visible from the passenger view. The state shown above with a white background shows that they are currently on. The background will turn grey if they are turned off.

Clicking 'Cab' will toggle the state of the cab air ventilation. The state shown above with a grey background shows that it is currently on. The background will turn white if it is turned off.

Clicking 'Saloon' will toggle the state of the saloon air ventilation. The state shown above with a grey background shows that it is currently on. The background will turn white if it is turned off.

Clicking 'Activate Driver's Only Operation' will toggle the state of Driver's Only Operation (DOO). The state shown above with a grey background shows that it is currently not active. The background will turn white if it is active.

Clicking 'Instrument illumination' will toggle the state of the instrument lights. The state shown above with a white background shows that they are on. The background will turn grey if they are off.

Player Changeable Destination Display

As detailed in the 'MITRAC - Train Management System (TMS)' section of this manual, your destination can be displayed on the front and side of your train. Please see below for a list of the available destinations and their relevant code for the MITRAC, or letter if you wish to use them via the unit's number on an AI service:

9999/a - Blank	1006/h – Dalston Junction	1013/o - Richmond
9998/b - Electrostar	1007/i – Gospel Oak	1014/p - Stratford
1001/c - Barking	1008/j – Harrow & Wealdstone	1015/q – Watford Junction
1002/d – Battersea Park	1009/k – Highbury & Islington	1016/r – West Croydon
1003/e – Camden Road	1010/l – Kensington Olympia	1017/s – Willesden Junction
1004/f – Clapham Junction	1011/m – London Euston	1019/t - Special
1005/g – Crystal Palace	1012/n – New Cross	

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.

Driver Only Operation (DOO)

Full door control is featured in this pack to simulate 'DOO'. Please see below for what the relevant procedure is and how to change the type of operation whilst in-game:

Driver Only Operation (DOO)

- 1) Open the doors by pressing **T+U** (left-hand side) or **T+O** (right-hand side).
Alternatively, you can click the corresponding red buttons in the cab.
- 2) If at a platform, wait for the 'Platform Duties Complete' message to appear in the top-right corner and press **R** to close the doors. If not at a platform, press **R** whenever you wish.
- 3) Once the door interlock light illuminates, you may depart.

Guard Operation (GO)

- 1) Open the 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 acknowledge by also giving two bells. This can be carried out by pressing **C** twice.

How to Change Operation

This can be changed via the MITRAC's 'log-in' screen or by pressing **Ctrl+R**. Either method will produce a visual message in the top-right hand corner of the screen to confirm which option you have selected.

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

Wheelslip protection aids the driver when powering or braking at times of poor adhesion.

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

- 1) The traction sand button illuminates to signify that sand can be placed for a maximum of 10 seconds if pressed. The motors can be heard rising rapidly in pitch and power reduces to control the slip.
- 2) Once grip is regained, power is reapplied at the notch selected on the power brake controller.

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 wheelslide is encountered during braking, a multi-stage process takes place:

- 1) The dynamic brake is disabled and the air brake solely takes over.
- 2) Brake pressure is automatically reduced to try and control the slide.
- 3) Sand is automatically applied if in step 2, step 3 or emergency brake.
- 4) Once the slide stops, brake pressure is returned to the notch selected on the power brake controller. If wheelslide reoccurs, the process starts again.

As a driver, you must resist the temptation to reduce the brake yourself as the wheelslip protection will offer the best braking performance.

Traction Physics

Great care has been taken to accurately simulate the acceleration characteristics of this unit under both AC & DC power.

On AC power, acceleration is quickest, with maximum tractive effort provided up to around 35 mph.

On DC power, acceleration is not quite so quick due to power supply limitations. Maximum tractive effort is reduced by around 20% and is only provided up to around 23 mph.

This means that it will take you longer to reach your desired speed in DC mode compared to AC.

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 or 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.

Neutral Section Functionality

The class 378 will react to the neutral sections available on the WCML Over Shap route and any other route which recreates neutral sections in the same manner. On top of this, they will also function when our own markers and signage are placed in a scenario, which are available in the 'AP/Common' object set filter folder.

Dual Voltage Functionality

Follow the instructions below to change the power source from AC (overhead wires) to DC (third rail) and vice versa.

AC to DC

- 1) Ensure you are travelling at 20mph or less.
- 2) Hold the 'Pan Down' button down until the line light extinguishes.
- 3) Hold the 'DC System Select' button down until it illuminates.
- 4) Hold the 'Shoes Down' button down until the line light illuminates.

DC to AC

- 1) Ensure you are travelling at 20mph or less.
- 2) Hold the 'Shoes Up' button down until the line light extinguishes.
- 3) Hold the 'AC System Select' button down until it illuminates.
- 4) Hold the 'Pan Up' button down until the line light illuminates.

Automatic Unit Numbering

When placing a unit in the scenario editor or using one in Quick Drive, all vehicles 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 'DMOSA' vehicle if you wish to change it.

Coupling Procedure

Please see below for how to couple to another unit in a realistic manner:

- 1) Approach the unit you are going to couple to at caution and come to a stop just short of it.
- 2) Select 'Notch 1' power and ease up to the unit. As soon as you have coupled, apply 'Step 3' brake.
- 3) To ensure the coupling is secure, you must perform a 'pull-away' test. To do this, select 'Reverse' on the reverser and apply 'Notch 1' for a few seconds. If you do not move, the coupling has been successful.
- 4) Hold the 'Couple' button down on the cab desk for 5 seconds. This will connect the two units' air/electrical systems and they shall both appear on the MITRAC.

Uncoupling Procedure

Please see below for how to uncouple from another unit in a realistic manner:

- 1) On the unit you intend to drive after uncoupling, move to the cab next to the unit you are uncoupling from.
- 2) Set up the cab and wait for 'MITRAC' to display the 'Log-In' screen.
- 3) Hold the 'Uncouple' button down until the unit you are uncoupling from disappears from the MITRAC.
- 4) In reality, the unit would now be physically uncoupled too but Train Simulator can not support this. As a result, please use the F3 or F4 HUD to physically uncouple the unit.

Arcing Pantograph



Special attention has been given to simulating arcing between the pantograph and overhead wire.

From one hour after sunrise to one hour after sunset on a dry day, there is only light arcing.

From one hour after sunset to one hour after sunrise, there is moderate arcing to simulate the moisture that tends to build up on the overhead wire once night falls. There is also moderate arcing when raining at any time of day.

During the winter, from one hour after sunset to one hour after sunrise, there is heavy arcing to simulate ice/frost that tends to build up on the overhead wire once night falls. There is also heavy arcing when snowing at any time of day during the winter.

Finally, arcing becomes more frequent as you gain speed.

When arcing, you will visually see it on the pantograph which illuminates the area around it to a varying degree with each arc. Please note that the illumination of the surrounding area will only occur after sunset and before sunrise. This is to avoid the unrealistic appearance of projected light in broad daylight.

You will also audibly hear it if the arcing is moderate or heavy.

Cold Start

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

- Main reservoir, brake cylinder pressures are 0.
- Auxiliaries are tripped
- Pantograph is down and shoes are up

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

- 1) Hold the 'Aux On' button down for 7 seconds.
- 2) The speedometer will carry out a self-test.
- 3) Turn the master key in by pressing **Shift+W**.
- 4) Move the reverser to 'Neutral' by pressing **S**.
- 5) Acknowledge the AWS self-test by pressing **Q**.
- 6) Hold either the 'AC System Select' or 'DC System Select' button down, depending on whether you are below overhead wires (AC) or on the third rail (DC), until it illuminates.
- 7) You will now need to wait 3 minutes for the auxiliary compressor to build up sufficient air pressure to allow you to either raise the pantograph or drop the shoes.
- 8) Once the 3 minutes has elapsed, hold the 'Pan Up' button down if on AC mode, or the 'Shoes Down' button down if on DC mode. Release the button once the line light illuminates.
- 9) You must now wait for the main reservoir pressure to build to 6.5 bar. Once it has done so, you will be able to obtain a brake release.

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:

- Scrolling destinations where they are longer than the front display can show.
- Fully revamped cab visuals with new shading, weathering & reflections.
- Comprehensive selection of 2D nameplates which automatically appear depending on the number of the unit
- Newly modelled 'Aux Off', 'Aux On', 'AC System Select', 'DC System Select' & 'Uncouple' buttons.
- 4-step reverser with 'Off' notch.
- Power brake controller will not move into a power notch unless the reverser is in 'Forward' or 'Reverse'.
- Reverser will not move if power brake controller is in a power notch.
- If the tail lights switch is in 'Auto' mode, tail lights will automatically turn on when the reverser is moved to 'Off' and vice versa.
- TPWS lights illuminate during AWS self-test.
- Train fault acknowledge button illuminates and alarm sounds when keying on.
- 'Safety System Isolated' illuminates on cab desk when 'DVD' is disabled.
- Front roof light only illuminates when the line light is on.
- Correct door open buttons illuminate when doors are open on the relevant side.
- In-cab unit/vehicle number labels.
- Functioning brake hold button which applies the equivalent of step 1 brake. Only operational up to 6 mph.
- The pantograph will drop or shoes will lift if the emergency brake plunger is used.
- Intermittent, slow & fast wiper speeds.
- Visual alarms outside of cab when AWS or DVD are active.
- The visible driver automatically moves to whichever cab you are in.
- Right-hand 'head-out' view is located next to the DMOS motor bogie.

- 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.

How to Use in the Scenario Editor

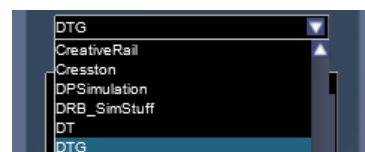
How to place

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.



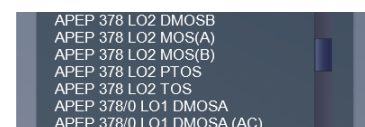
- 2) Go to the right-hand fly-out which should have appeared. Select 'DTG' from the drop-down menu.



- 3) Tick the second & third box beside 'Class378Pack01'.



- 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 unit. Please note that unless otherwise stated, the only number you need to change is the DMOSA's.

Power mode

By default, the power mode of a unit is set to 'DC' (third rail). For the power mode to default to 'AC' (overhead wires), add **;P=AC**. On a player service, this must be added to the number of the lead driving vehicle (DMOSA or DMOSB).

Cold start

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

GSM-R

To restrict the train reporting number and signal number that the player can use to register with on the GSM-R, add **;GSMR=1A22084** to the number of the lead driving vehicle. In this example, **1A22** is the train reporting number and **084** is the signal number.

Numbers

To have silver numbers on London Underground livery, add **;N=1**.

Nameplates

To remove nameplates on a unit, add **;NP=0**.

Example number:

378203h;P=AC;Cold=1

Key:

378203 - Unit number

h - Destination

;P=AC - AC power mode selected by default

;Cold=1 - Cold start

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 **S**.
- 3) Cancel the AWS self-test alarm by pressing **Q**.
- 4) Login to MITRAC via the IDU.
- 5) Check your headlights are set correctly.
- 6) Set your destination in MITRAC via the IDU or by pressing **F7** or **F8**.
- 7) Turn the Driver Reminder Appliance (DRA) off by pressing **Y**.

You should now be ready to move off.

Scenarios

APC378EP: 2N44 09:45 Stratford - Richmond

Route = North London & Goblin Lines
Track covered = Stratford - Richmond
Traction = London Overground 378257
Date = 26th June 2018
Duration = 1 hour 10 minutes



APC378EP: 2N99 05:51 Willesden Junction Low Level - Stratford

Route = North London & Goblin Lines
Track covered = Willesden Junction Low Level - Stratford
Traction = London Overground Revised 378232
Date = 21st June 2021
Duration = 1 hour



APC378EP: 2Y31 14:08 Willesden Junction - Clapham Junction

Route = North London & Goblin Lines
Track covered = Willesden Junction - Clapham Junction
Traction = London Overground 378008
Date = 29th October 2009
Duration = 30 minutes



Credits

Nicolas Schichan - Advanced scripting

James Johnston & David Grieff - Assistance in recording sounds