Presents

The Midland Line

Version: 1.0

Covering 90km of New Zealand's 3ft 6in mountain railway between Springfield and Aickens

Version 1.0

Contents

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Introduction

"The Midland Line" Route is the culmination of over 4 years of work by NZTS Workshops to bring the most accurate addon to Train Simulator as we found possible. Historic photos, aerial imagery, maps, diagrams and consultation with former Railways Staff have all been used to create the route as it would have appeared to those riding the train in the year 1968 – marking the transition from Steam to Diesel on the line. As we have always endeavoured to be as true to life as possible, if you find anything in this add-on inaccurate please don't hesitate to contact us at midland@tsnz.co.nz with your description of what needs changing, if you have a photo or two that would work even better!

The Midland Line

A History in Brief

New Zealand's Midland Line is today world famous as the route of the 'Tranz Alpine' tourist passenger service, but in 1874 when the railway first started to head west from Rolleston, just south of Christchurch in New Zealand's South Island, the goal wasn't to cross the mighty Southern Alps to reach the vast coal fields and forestry on the islands West Coast but instead to access the vast tracts of arable farm land on the Canterbury Plains inland to Springfield.

In the early 1880's the pressure was on to join the West Coast to the ports on the East Coast, though a royal commission soon scuppered the idea of the Government funding the construction. In the mid 1880's the New Zealand Midland Railway company was founded and began work on what would become the South Islands alpine crossing. The company, however, did not have the funding to achieve such a feat, and in 1894 construction halted, forcing the Government to seize the company's assets in 1895.

The route from Westland to Otira, at the foot of the "main divide" was mostly complete at this time though from the east progress had been slow – not surprising considering the 5 viaducts, 5 major bridges and 16 tunnels required to progress from Springfield, at the foot of the alps, to Arthurs Pass – just east of the "main divide".

By 1914 the line has reached Arthur's Pass on the East, and was of course, still at Otira to the west. In the middle lay a mountain range, splitting the two locations by a distance of 14km and a height difference of 359m (1177ft). Knowing that this mountain range would need to be pierced, the Government had, in 1907, begun construction of the "Otira Tunnel" an 8.5km long tunnel, built straight along a 1:33 gradient. 11 years later, in 1918 the tunnel was broken through, at last linking the east and west coasts – but there was still work to be done and it wasn't until 1923 that the first train, hauled its way by electric power from one end to the other.

For 45 years these electric locomotives – the "Eo" class – hauled all manner of goods and passengers up and down the tunnel between Arthur's Pass and Otira before being retired in 1968 for new build replacements. To the east a special type of large steam locomotive the "Kb" class worked trains over the mountains from Springfield to Arthur's Pass and back again while to the west the job fell to smaller

locomotives, the gradients not being as fierce. In the late 1960's New Zealand Railway's was full swing into replacing steam with diesel power and the sound of a Kb tackling the grades was lost to the past, replaced instead with the sounds English Electric built 'Dg' and Mitsubishi built 'Dj' diesel electric locomotives.

Train sizes continued to increase from the opening of the tunnel, coal and timber being the main traffic and as the trains got bigger and heavier the 1968 purchased electric locomotives working the Otira-Arthur's Pass section began to struggle, and so in 1997 the electrification was removed, vast steel doors fitted to the Otira end of the Otira tunnel and massive extractor fans for the diesel exhaust put in place – trains now powering up the tunnel hauled by five 2750-3000hp 'DXC' class diesel-electric locomotives.

The Route for Train Simulator

Our Midland Line Route for Train Simulator covers the toughest section of the route, the 90km from Springfield in the east to Aickens in the west and includes the 8.5km long Otira Tunnel. Set in 1968 the route still has all steam age facilities in place, though the railway has transitioned to diesel. Included in the route are the 1923 built 'Eo' Bo+Bo electric locomotives, especially designed for the challenges of the Otira tunnel, and the 1968 built 'Dj' Bo-Bo-Bo diesel electric locomotive. The late 1960's saw the replacement of both Springfield and Arthur's Pass stations with new, modern designs – due to the earlier buildings both being consumed by fire - while older stations and halts lingered on across the rest of the route.

Route Performance

The Midland Line route for Train Simulator is, by design, very asset heavy. Early in the development stages it became apparent that to have the route 'feel' like the real thing, it was going to need to have very dense scenery.

For this reason, you may suffer from a low frame rate while using this product.

To improve your performance launch Train Simulator and head to your options/settings screen. Decreasing either the **Scenery Density** or **Shadow Detail** sliders massively improves performance for most users. This route was created within the 64-bit version of Train Simulator and may not work correctly in the 32-bit version, we suggested running in 64-bit mode.

Included Rolling Stock

We have modelled a 'typical' spread of wagons, passenger carriages and guard's vans for inclusion in the route. A * or ** in the name that appears in the Scenario Editor lists indicates a variant of the model as outlined in the list below. Some models come with various weathered states and these are indicated in the Scenario Editor lists with one of the following: **(Wth.) (Wth. 1) (Wth. 2)**
You will also notice that various wagons also have a load name present, eg: **(Coal)** or **(Lime).** This indicates what the wagon will be loaded with if marked as loaded in the scenario editor.
A full wagon name might therefore display as: **NZR Class Lc-3 (Lime) (Wth. 1)** which details it is an Lc-3 type wagon, loaded with Lime and with the 1st weathered texture set.
To aid in creating realistic consists in the scenario editor, we have included a **Wagon Weights and Locomotive Loadings** section in this readme inside the **Scenario Editor** section. This details how much each wagon type weighs loaded and empty, as well as total weights that each locomotive type can pull successfully along the length of the route.

Locomotives

'Eo' Class of 1923

Introduced in 1923, the 'E' Class were New Zealand Railways first Electric locomotives and were constructed by English Electric of London, England.
Numbered 2 through 6 (locomotive number 1 was a battery electric for maintaining the overhead system) the 'E' Class was reclassified as the 'Eo' class when further electric locomotives began to enter service elsewhere in the country, the O stood for "Otira" were the locomotives were based.
Rated at 680hp (510kW), the locomotives were capable of developing 14,000lb (63kN) of tractive force and were originally run as single locomotives up and down the 1:33 (3.03%) gradient Otira Tunnel.

However, coal and timber loads soon started increasing and it became common for the “Trams” (as they were affectionately called) to run in a group of 3 with train weights of up to 525 tons on behind for the ascent.
We have provided the ‘Eo’ Class Locomotives as they appeared in the last years of their lives, after being modified from double cab to single cab locomotives, with the ‘modernised’ cabs. The locomotives are provided in 3 different weathering states, so that you can mix and match your locomotives in the consist to your taste.

‘Dj’ Class of 1968

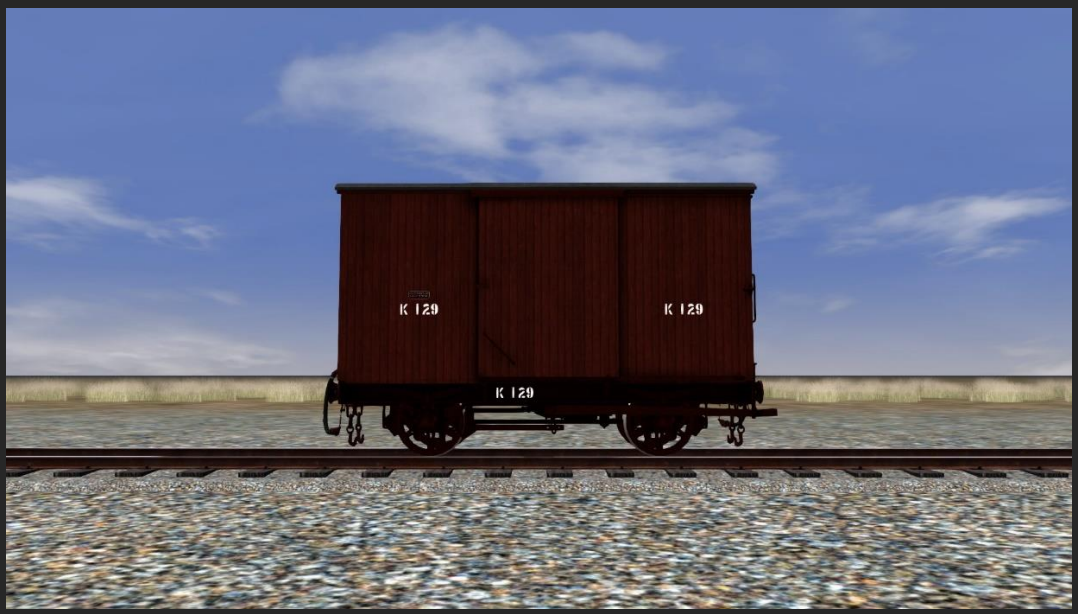
Introduced in 1968, the ‘Dj’ class of diesel-electric locomotive was New Zealand’s South Island’s second type of mainline diesel-electric locomotive after the ‘Dg’ class. The arrival of the ‘Dj’ signalled the end of steam in New Zealand’s South Island, with the class slowly replacing steam on a region by region basis. Built with a loan from the World Bank by Mitsubishi Heavy Industries in Japan, the class of 64 locomotives were rated at 901 hp (672kW) developing a tractive effort of 29,000lb (128kN) and capable of speeds of 60mph (97km/h). Early in their lives problems began to develop with the locomotives, due to the CAT D398 engine fitted and they were later re-engined with turbo versions and later still downrated with reduced power notches being available.
We have provided the ‘Dj’ Class Locomotives as they appeared when they arrived new, in the original ‘Pink and Silver’ (known locally as “Nippon Pink”) livery. This livery faded fast in New Zealand’s harsh sunlight to a light pink colour, which we have provided as one of the two weathered options. The last weathered version represents the class as they were fitted with the yellow and black ‘Dazzle’ striped headstocks/buffer beams. Each of these locomotives’ pre-date the downrating of the engine and so provide the driver with the original experience.

Wagons

Class K-3 Wooden Box Wagon

New Zealand Railways' early general purpose covered wagons were classed 'K' and dated from pre-1890, some of these wagons lasted in service into the 1970's and were likely approaching 100 years old at the time. The 'K-3' class wagon was the third subtype of the original 'K' box wagon built and featured incremental improvements over the previous versions.

Class K-5 Wooden Box Wagon



The 'K-5' class general purpose covered wagon is a slightly larger version of K class box wagon built around 1900.

Class Kp-1 Steel Box Wagon

In the 1960's New Zealand Railways began replacing its earlier wooden wagons with wagons of all steel construction. The 'Kp' Class was introduced in 1968 with 500 wagons and the class eventually totalled 2600 wagons. The K class, once again, denoted a wagon in the 4-wheeled box family, but the large size and steel construction made these wagons a vast improvement over their wooden counterparts.

Class La-4 Steel Highside Wagon

By far and away the most numerous class of wagon on the New Zealand Railways system was the 'La' class of steel "high-side" wagon. First introduced in 1902 the 'La' class with its 8 main types and various sub types eventually totalled 13968 wagons with the final series of wagons being constructed in the early 1950s with the class being withdrawn as a whole by 1990.

The La-4 and La-4a wagons date from the 1920's and can be distinguished from each other by the type of springing and headstocks/bufferbeams provided – with the La-4a featuring leaf over coil springs and

a short section of headstock/bufferbeam in place of the La-4's coil springs and full width headstock/bufferbeam.

Class La-6 Steel Highside Wagon

Introduced in 1930, the La-6 class high-side wagon was a subclass of 'La' wagon numbering almost 3000, one of the largest of the subclasses. We have provided two variants of La-6, one with the upper centre door in place and the other with it missing.

Class Lc-2 Steel Highside Wagon

First introduced as a single trial wagon, (the Lc-1) the New Zealand Railways soon began construction of some 7000+ 'Lc' Class wagons, of two variants the Lc-2 and the Lc-3. The 'Lc' was essentially a larger

capacity ‘La’ wagon and fulfilled many of the same roles in carting all manner of goods, from coal to wool to vehicles. These wagons lasted in service until the year 2000.

Class Lc-3 Steel Highside Wagon

The second batch of ‘Lc’ wagons were built to diagram Lc-3 and introduced in 1957. They featured the ‘ribbed’ ends common of rolling stock constructed in the late 1950’s/early 1960’s by the New Zealand Railways and were slightly larger than the earlier Lc-2 wagons.

Class M-5 Wooden Lowside Wagon

Some 2000+ ‘M’ class, 4-wheeled low/drop side wagons were constructed for the New Zealand Railways, with some wagons dating as early as the formative years of the 3ft 6in railway – the early

1870s. The last of these wagons saw service in 1981 and there were many subclasses. The M-5 was introduced in the early 1900s.

Class U-2 Flat Wagon

New Zealand's first bogied flat deck wagon was the 'U' Class, introduced in the early late 1800s. Utilising a 30ft frame, it was used as the standard frame for many of New Zealand's early bogie wagons The U class was versatile and lasted in service until the 1990s.

Class Uc-3 Tank Wagon

The 'Uc' tank wagon, was a large tank for fuel or oil fitted to the standard 30ft 'U' class underframe and was first introduced as the Uc-1 in 1926. The Uc-3 was introduced in 1927 for fuel transportation and many served long lives with the New Zealand Railways, with modifications being made to improve the walkways during their lives or as replacement tanks were required. Many of these wagons had the

tanks supplied by the oil companies themselves while the New Zealand Railways provided the rolling chassis.

Class V-3 Wooden Box Meat Wagon

The ‘V’ Class was New Zealand Railways first insulated box wagon for the transportation of chilled meats throughout the country. First appearing in 1889 the last of these wagons was finally written off the New Zealand Railways books in 1981. Like most New Zealand Railways wagons there were various subclasses and the route includes the V-3 that first appeared around 1910.

Class Vb-1 Wooden Box Meat Wagon

The `Vb` Class wagon was introduced around 1910 as a larger version of the ‘V’ class wagon with a capacity of 14 tons. The route includes two versions, one as standard and the other marked for ‘CHILLED BEEF’ which some of the class were stencilled with in the 1960s.

Passenger Carriages

Class A

NZR Class A - Gas Lamp Fitted

NZR Class A – Electric Lighting Fitted

New Zealand Railway's bogie carriages, at least those not converted from other classes, have always been classified as class 'A' – this means that despite the fact that there may be numerous differences in length, seating arrangements, age and construction methods, the likelihood is high that the carriage would have been classed A. In the era of the wooden carriage, there was only one subclass known as the 'Aa' class car, and it saw use only in the North Island.
The route includes four variants of 'A' class passenger car – two with gas lighting and two with electric lighting. Those with electric lighting can be distinguished by the large 'Battery Boxes' slung under the car frame. The two types of each of gas and electric lighting included are 'large window' and 'narrow window'.

Class Af Car-van

On branch lines and on mixed trains (those comprising of both passenger and goods) it was common for trains to run with what was known as a 'Car-van'. These carriages, of class 'Af' were altered to have a guard's compartment at one end which allowed trains to run without a guard's van that would otherwise have been required (all trains otherwise in New Zealand ran with a guard's van) which reduced costs of those services. A version with and a version without a lavatory fitted have been included.

Guards Vans

Class F – 30ft

The bulk of New Zealand Railways Guards Vans were classed ‘F’ and, like the carriages, this meant that there were many ages and types of van all running under the same classification. The 30ft wooden van was first introduced in the late 1800’s to run on the express passenger trains comprised of bogied passenger cars (earlier than this 4- and 6-wheel carriages were common). These vans lasted in some instances almost 90 years but by the end of their lives had mostly been relegated to slower moving goods services.

The routes vans come in two types, those fitted with the original style guards look-out windows and post boxes, and those fitted with the later steel style look-outs.

Class F – 50ft

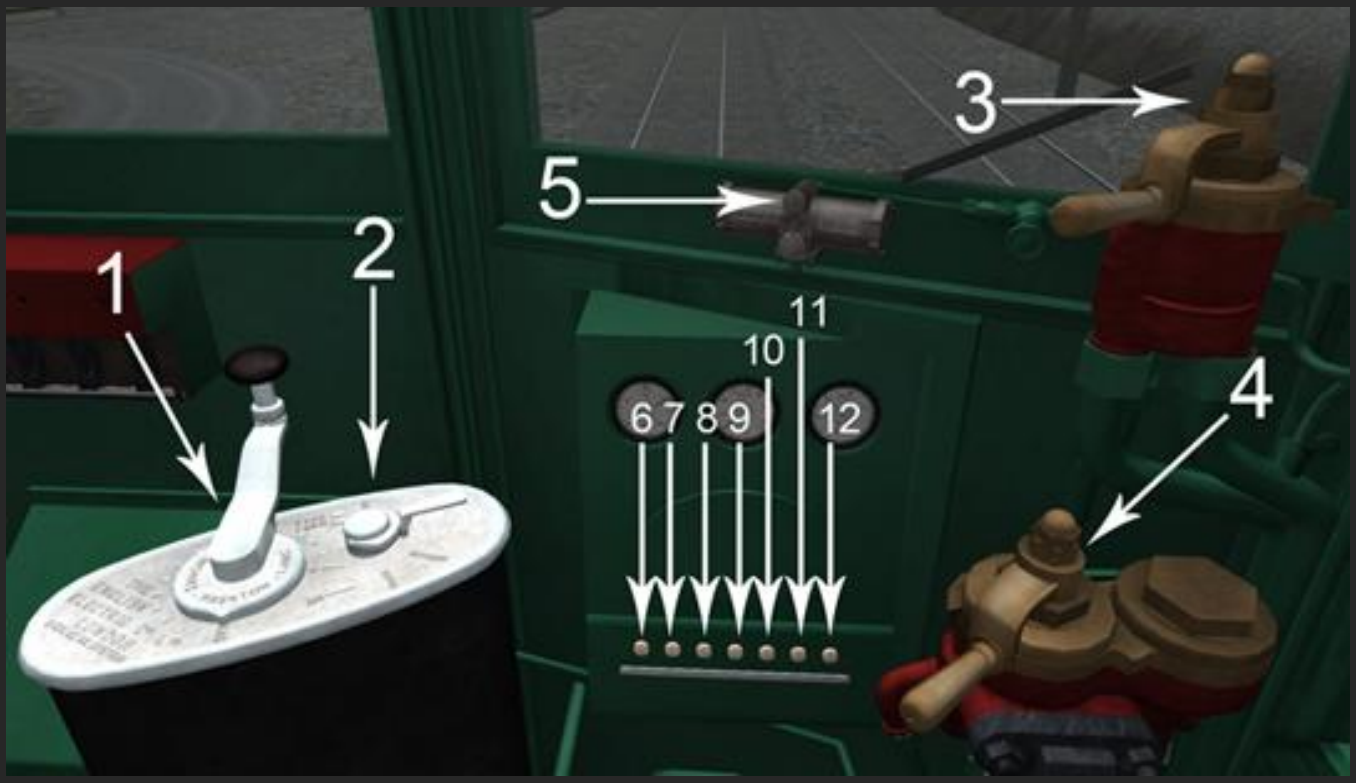
The 50ft version of the guard's van began to appear around 1910 as passenger trains grew bigger and required more and more luggage space. These vans were common on secondary expresses, the occasional premiere express and of course on goods trains. The last of these larger vans lasted until the 1980s – when guards vans were withdrawn entirely from the New Zealand Railways system.
The routes vans come in two types, those fitted with the original style guards look-out windows and post boxes, and those fitted with the later steel style look-outs.

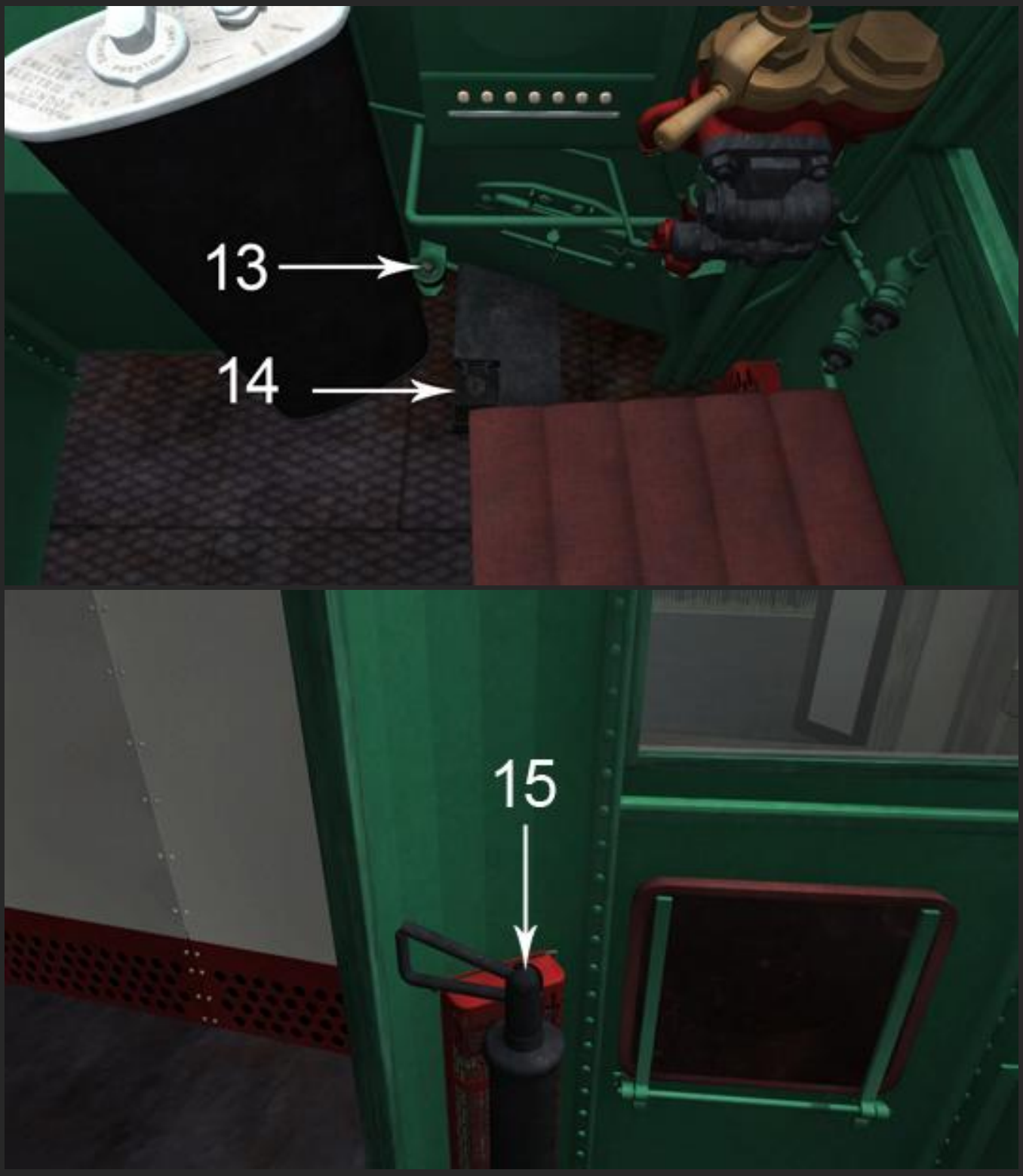
Driving the Locomotives

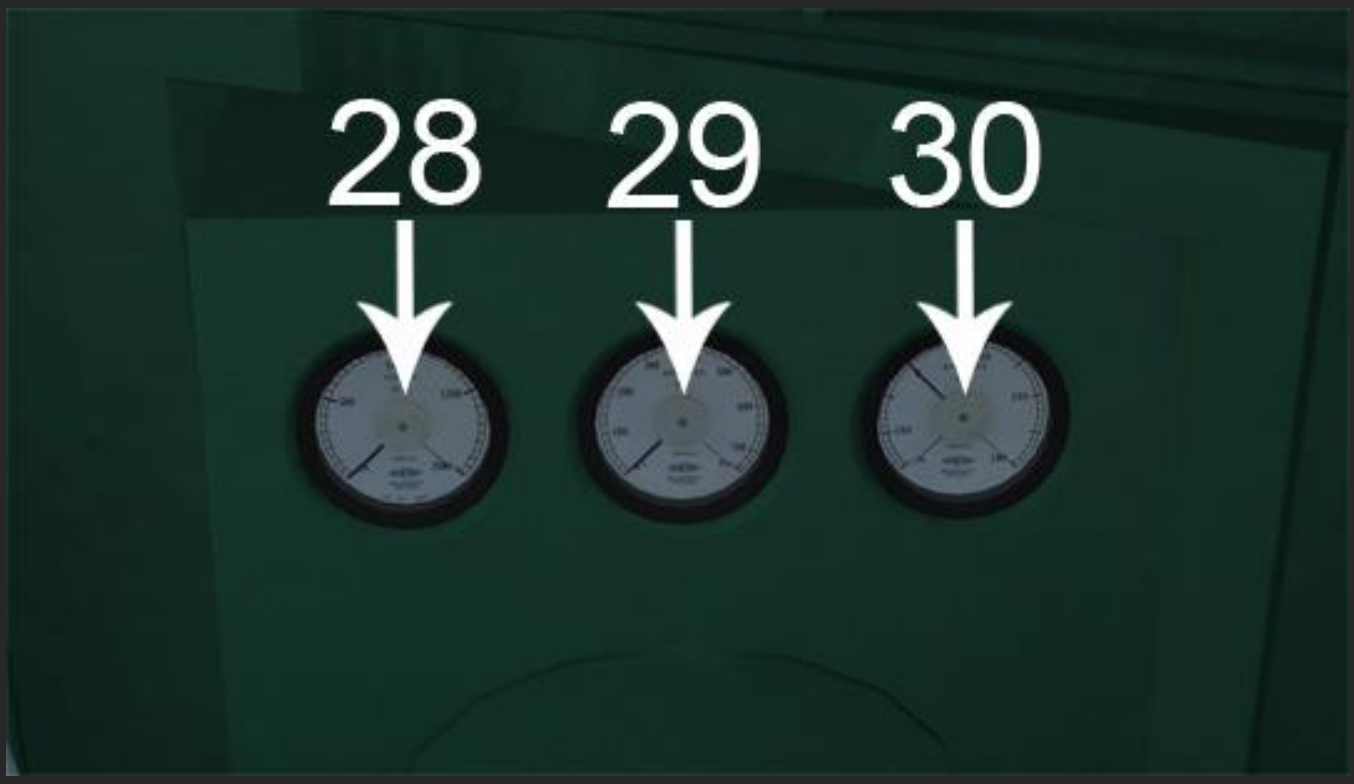
We have aimed to recreate the experience of driving the two locomotives included with the route as accurately as possible. Special attention should be paid to this section to ensure you have the best experience possible.

Class ‘Eo’ – Electric Locomotive

Control Layout







1) Throttle/Dynamic Brake

2) Reverser

3) Train Brake

4) Independent/Locomotive Brake

5) Wiper Control

6) Signal Other Locomotive

7) Release Locomotive Brake

8) Sander

9) Select Pantograph

10) Raise Pantograph

11) Lower Pantograph

12) Over-current Reset

13) Governor Override

14) Horn

15) Handbrake

16) Main Power

17) Compressor Power

18) Headlight Dimmer

19) Cab Light

20) Interior Corridor Light

21) Tail/Marker Light

22) Headlight

23) Cab Heater

24) Gauge/Instrument Lights

25) Compressor

26) Train Brake Gauge

27) Locomotive Brake Gauge

28) Voltage Gauge

29) Ammeter Gauge

30) Traction Moto Ammeter Gauge

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The various controls are explained in detail below, special attention should be paid to the Throttle & Dynamic Brake and Reverser Operations, these operate in a manner that is not typical of most locomotives and their incorrect use can result in the locomotive not moving.

1) Throttle & Dynamic Brake Control & Operation

KEYBOARD: Increase **A** **Decrease** **D**

As explained below the **Reverser (2)** changes the action of the throttle control between Dynamic Brake and Throttle modes.

In Dynamic Brake (reverser set to **Ahead Brake** or **Reverse Brake**), only the first three notches are available for braking power and are designed to hold the train at 25mph on the decent down the Otira Tunnel from Arthur's Pass. For each locomotive the following load schedule applies:

0 – 60 tons: Notch 1

60 – 90 tons: Notch 2

90 – 120 tons: Notch 3

This means a group of three locomotives, in notch three of Dynamic Braking should be able to safely bring a train down the tunnel at 25mph with a trailing weight of 360tons. The dynamic brake should be all that's required to safely bring a train down the 1:33 towards Otira. If you are finding you need air as well, it is likely your train is too heavy.

To select Dynamic Brake, first move the throttle handle to the OFF position, then move the reverser to either AHEAD BRAKE or REVERSE BRAKE (depending which direction you are travelling) then increase the throttle handle to the desired notch (1, 2 or 3).

The throttle, when the reverser is set to **Ahead** (forwards) or **Reverse**, has 15 power notches and an **OFF** position. When at 100% throttle a single locomotive is able to bring 175tons of train UP the Otira Tunnel from Otira at 18mph. This means, for example, that in a group of three locomotives the total weight able to be brought up the tunnel is 545tons.

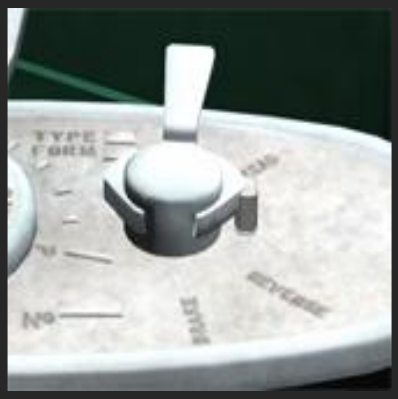
IMPORTANT NOTE: In both Dynamic Brake and Throttle modes a fail safe applies that causes power to be cut when the throttle handle is moved to reduce the power. This means that in order to 'notch down' (eg: from 100% throttle to 80% throttle) the throttle handle **must be moved back down to the OFF position** and **then increased** to the desired new location.

2) Reverser Control & Operation

KEYBOARD: Increase **W** Decrease **D**

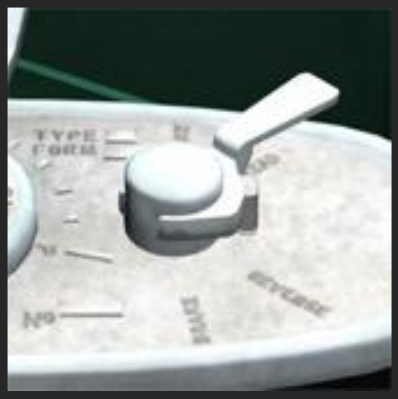
The 'Eo' class electric uses a 5-state reversing handle. The states are ahead brake, ahead (forward), neutral, reverse and reverse brake. This differs from most other diesels and electrics that use only three states – forwards, neutral and reverse.

The reverser position directly affects the operation of the throttle, so it is important to know what each state is. The following table outlines each of the 5 reverser positions and how they affect the locomotives operation.



AHEAD BRAKE

In this position the Throttle Control (1) works instead as the Dynamic Brake control. This means if the reverser is moved to this position when the locomotive is stationary, opening the throttle will not cause the locomotive to move. If you are having difficulty getting the locomotive to move forward, check that the reverser is properly set in the ahead position, not ahead brake.



AHEAD (Forward)

In this position the Throttle Control (1) acts as a throttle and the locomotive will move forward when the throttle is opened.

NEUTRAL

In this position power is cut to the traction motors and no action will take place when the throttle is opened.

REVERSE

In this position the Throttle Control (1) acts as a throttle and the locomotive will move backwards when the throttle is opened.

REVERSE BRAKE

Just like the Ahead Brake position in this position the Throttle Control (1) works instead as the Dynamic Brake control. This means if the reverser is moved to this position when the locomotive is stationary, opening the throttle will not cause the locomotive to move. If you are having difficulty getting the locomotive to move backwards, check that the reverser is properly set in the reverse position, not reverse brake.

3) Train Brake Control & Operation

KEYBOARD: Increase **;** **Decrease** **'**

The train brake fitted to the 'Eo' electric locomotive is a 'No. 4 Westinghouse Train Air Brake'. It has 5 different positions: Release, Running, Lap, Apply and Emergency. The different positions are outlined in the table below.

The Locomotives Braking systems feature the **Advanced Braking** script, originally developed by Mike Rennie, to make the brake operation as realistic as possible.

SHIFT + **CTRL** + **1** or **SHIFT** + **CTRL** + **2** control the difficulty setting for the brake operation.

For each of the handle positions, a pop-up will display at the top-right of the screen to display the brakes current state. If you wish to disable these messages press **SHIFT** + **CTRL** + **B**

RELEASE

Moving the handle to the extreme left releases the train brakes by adding more air to the train brake pipe. If you are low on main reservoir air, or you have a long train, this may take some time. Leaving the handle in this position for too long can cause your brake pipe to overcharge, this results in braking difficulties as the brake pipe pressure is different along the train length.

RUNNING

This is the position the brake handle should be in when the train is moving and you are not coming to a stop. The running position is just to the right of the release position and will maintain a steady 70lb of train brake pipe pressure.

LAP

After making a train brake application (see below) and the desired brake pipe reduction has been made (eg from 70lb to 50lb) the hande should be moved to the lap position, which will maintain the brake pipe pressure at the new application setting.

APPLY

The apply range on the train brake handle controls the speed at which the brake is applied. Further to the right (towards emergency) makes a faster application than closer to the lap position. Watch the train brake gauge (26) to see how much air is being released from the system.

EMERGENCY

Moving the handle to the extreme right sets the brake into emergency, releasing all air from the brake system and bringing the train to a rapid halt.

4) Independent/Locomotive Brake Control & Operation

KEYBOARD: Increase [Decrease]

The train brake fitted to the 'Eo' electric locomotive is a multiple state air brake and can be used in conjunction with the Release Independent Brake Control (7) and Apply Locomotive Brake Control (12). The different positions are outlined in the table below.

RELEASE

Moving the handle to the extreme left releases the locomotive brakes by increasing the amount of air in the locomotive brake system. It will release the locomotive brakes on **all** locomotives if running in multiple.

When running normally this handle should be in the full release (all the way to the left) position.

LAP

Once the desired application amount has been reached (see apply below) the handle should be moved to this position to maintain the desired brake application amount.

APPLY

The apply range on the train brake handle controls the speed at which the brake is applied. Further to the right makes a faster application than closer to the lap position. Watch the locomotive brake gauge (27) to see how many pounds (lb) of force is being applied to the wheel.

5) Wiper Control

KEYBOARD: Toggle On/Off **V**

Turns the windscreen wiper on or off

6) Signal Other Locomotive Control

Used to signal the driver in any trailing locomotives (no function within the simulator)

7) Release Independent/Locomotive Brake Control

KEYBOARD: Press and Hold **CTRL** + ****

Use to 'bail-off' the locomotive/independent brake.

Useful for if you require the train brake to still be applied, but want the locomotive brakes to be released.

NOTE: This control is overridden if the Independent/Locomotive Brake Control (4) is in the APPLY quadrant or the LAP position.

8) Sander Control

KEYBOARD: Toggle On/Off **X**

Turns the sand on or off for better traction.

9) Select Pantograph Control

Toggles which pantograph is selected for the raise/lower controls (rear by default).

10) Raise Pantograph Control

Raises the selected pantograph (rear by default).

11) Lower Pantograph Control

Lowers the selected pantograph (rear by default).

12) Overcurrent Reset Button

Overcurrent Relay Reset Button

13) Governor Override Control

KEYBOARD: Toggle On/Off **L**

Used to 'overcharge' the main reservoir with air. This is an emergency feature required if running downhill without airbrakes to ensure that the locomotive has enough air to keep the train under control.

14) Horn Control

KEYBOARD: Press and Hold **SPACE**

Used to sound the horn

15) Handbrake Control

KEYBOARD: Toggle On/Off **/**

Used to apply the locomotive handbrake.

16) Main Power Control

Turns the main power on or off

17) Compressor Power Control

Cuts power to the compressor circuit entirely.

18) Headlight Dimmer Control

Changes the headlight from dim to bright or visa versa.

19) Cab Light Control

KEYBOARD: Toggle On/Off **C**

Turns the cab light on or off.

20) Interior Corridor Light Control

Turns the interior lights in the corridor behind the cab on or off.

21) Tail/Marker Light Control

Turns the marker light (Located below the cab windows) on or off. If the locomotive is the last unit in a train this light should be set to on.

22) Headlight Control

Turns the Headlight on or off

23) Heater Control

Turns the cab heaters on or off

24) Instrument/Gauge Light Control

KEYBOARD: Toggle On/Off **R**

Turns the gauge lights on or off.

25) Compressor Control

Turns the locomotive air compressor on or off.

26) Train Brake Gauge

Displays how many PSI of air is in the train brake system.

Black Needle: Brake Pipe Pressure

Red Needle: Main Reservoir Pressure

27) Locomotive Brake Gauge

Displays how many PSI of force is being applied to the locomotive brake.

28) Voltage Gauge

Displays the voltage being delivered by the overhead.

29) Current Gauge

Displays the total draw of current by the locomotive, as used by the Traction Motors and any auxiliary items – like air compressors.

30) Ammeter

Displays the amount of amps being used by the traction motors -150 – 0 shows dynamic braking amps, 0-750 shows throttle amps.

Other Controls

Cab Window – Drivers Side

KEYBOARD: Open **U** Close **SHIFT** + **U**

Cab Window – Door Side

KEYBOARD: Open **O** Close **SHIFT** + **O**

Sunvisor

KEYBOARD: Down **Y** Up **SHIFT** + **Y**

Disable/Enable Shadow Casting Lights

KEYBOARD: **SHIFT** + : **CTRL** + **H**

Changes lights along entire active consist from shadow casting to non-shadow casting, useful if you suffer performance issues with shadow casting lights active.

NOTE: Lights cast shadows by default.

Disable/Enable Train Brake Handle Messages

SHIFT + **CTRL** + **B**

Displays Train Brake Handle messages at the top-right of your screen, to indicate the position you currently have the handle in.

NOTE: Turned on by default.

Disable/Enable Wheel Slip Messages

KEYBOARD: SHIFT + CTRL + N

Displays Wheel Slip messages at the top-right of your screen, to indicate if you are currently wheel slipping.

NOTE: Turned on by default.

Consist Weight Display

KEYBOARD: CTRL + W

Displays the weight of the current consist. Useful for generating realistic train weights in the scenario editor.

NOTE: this weight includes the weight of the locomotive(s) at 49.2 tons each. As such a consist weight of 149.2 tons with a single locomotive is 100 tons of trains and 49.2 tons of locomotive.

Track Conditions Setting

KEYBOARD: Increase: SHIFT + 3 Decrease: CTRL + 3

The track conditions are selectable. It starts off as "dry" (making it difficult induce wheelslip unless the train is very heavy), but the slipperiness can be increased progressively through "rain", "snow" and "wet leaves" (very easy to slip).

Ctrl + 3 progressively decreases the slipperiness.

By default this is set to **AUTOMATIC** which will select the friction based on the weather type. Included in the **AUTOMATIC** mode is a FROST setting, which when the season is set to winter, will slowly make the wheel friction decrease over time (starting at 18:30 and reaching maximum slipperiness at 06:00) before maintaining a minimum friction for a period (06:00 until 08:30) before increasing friction again for a period (08:30 until 10:30) this simulates frost-like conditions in winter.

Brake Difficulty Setting

KEYBOARD: Increase: SHIFT + CTRL + 1 Decrease: SHIFT + CTRL + 2

Determines how much retardation there is in the propagation of brake pipe pressure changes between the head end and tail end of the train.

The levels are:

1 - Easiest	2 - Easy	3 - Medium	4 - Hard
No retardation	1/3rd of realistic retardation	2/3rds of realistic retardation	Fully realistic retardation

DEFAULT SETTING

Common Operation Issues

- **LOCOMOTIVE WON'T MOVE FORWARD:** Check that the reverser is in *AHEAD* not *AHEAD BRAKE*

- **LOCOMOTIVE WON'T MOVE BACKWARD:** Check that the reverser is in *REVERSE* not *REVERSE BRAKE*

- **THROTTLE NOT RESPONDING:** Move the control handle to the OFF position then increase to new state

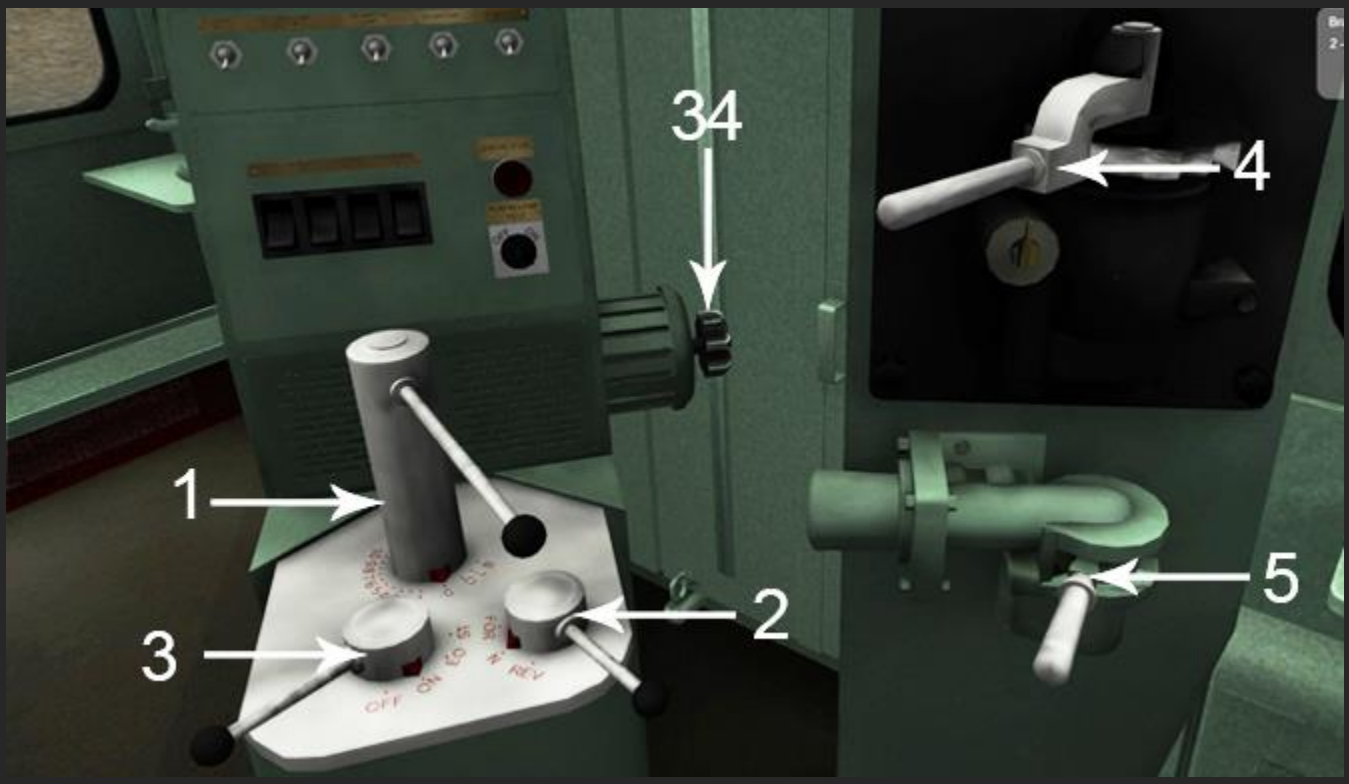
- **DYNAMIC BRAKE NOT WORKING:** Ensure the reverser is in either AHEAD BRAKE or REVERSE BRAKE, move the throttle controller to OFF then increase it to a maximum of notch 3.

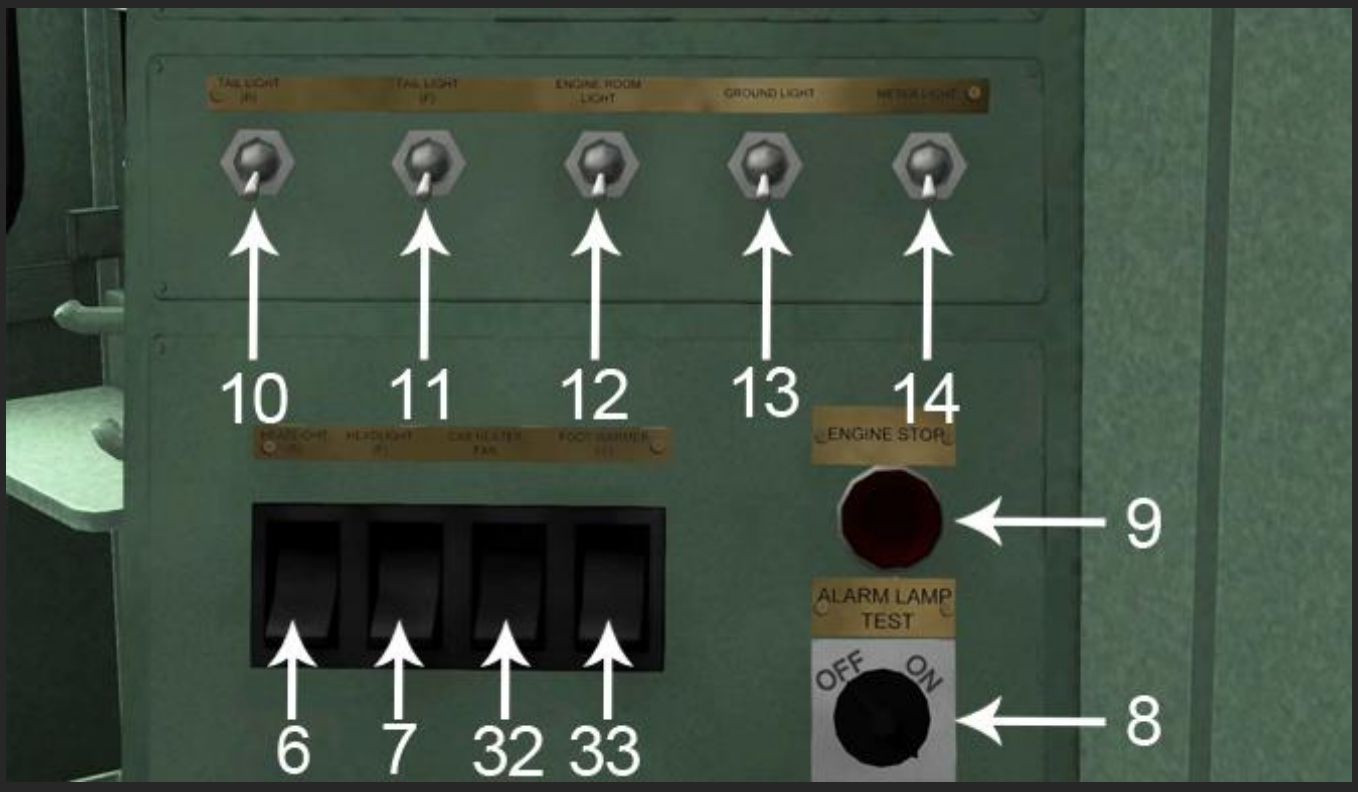
- **NO THROTTLE RESPONSE WHILE BRAKE APPLIED:** Due to an apparent bug with the simulator, it is not possible to 'power-brake' with the Eo.

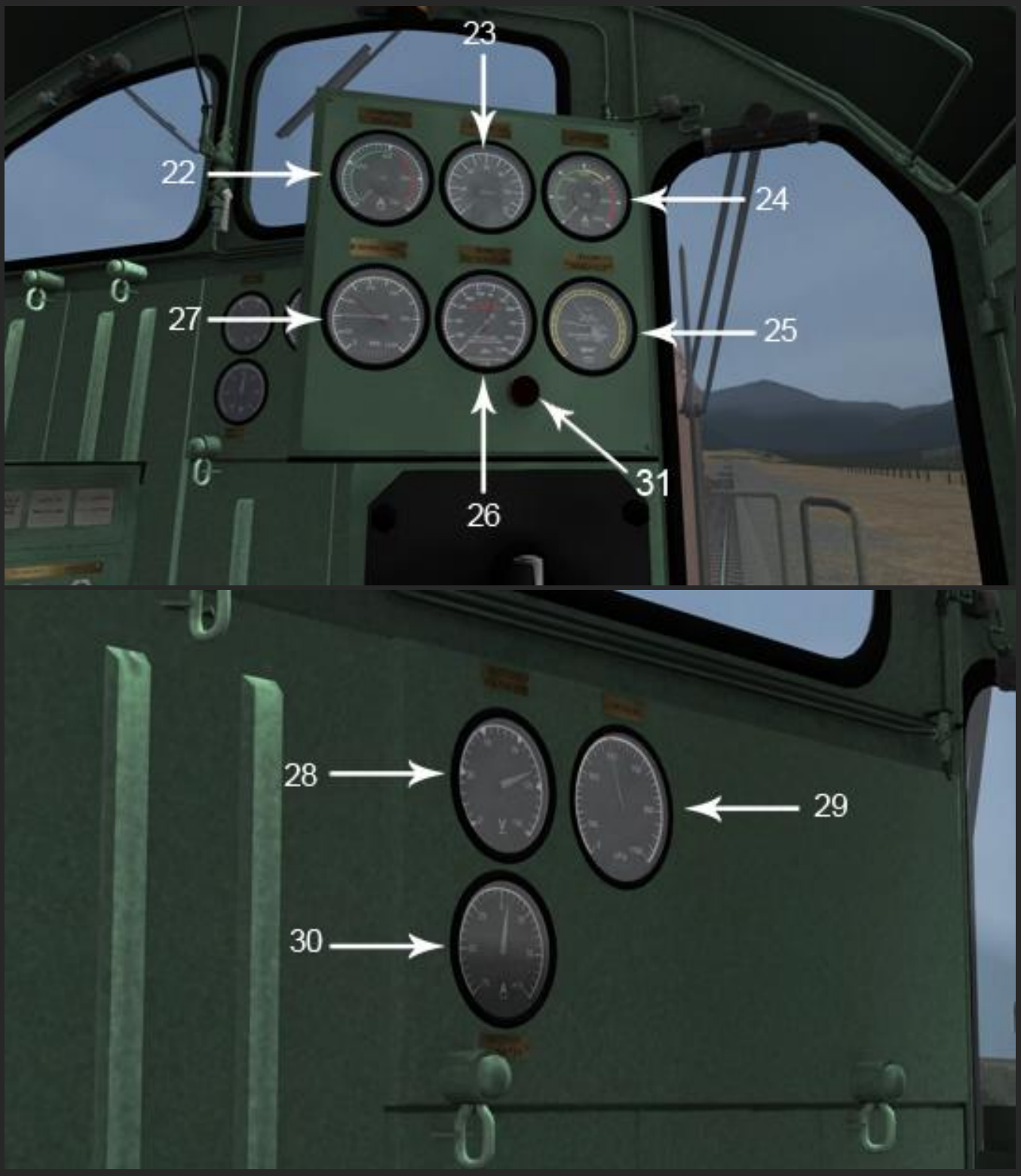
- **LOCOMOTIVE AMPS DROP TO 0, NO POWER WHILE GETTING STARTED OR MOVING:** The locomotive has entered a wheel slip. To simulate this behaviour in the simulator the amps gets set to zero and the 'Reverser' as it appears in the F5 HUD will show 0%.

Class ‘Dj’ – Diesel Electric Locomotive

Control Layout







1) Throttle/Dynamic Brake

2) Reverser

3) Master Controller

4) Train Brake

5) Independent/Locomotive Brake

6) Headlight - Rear

Version 1.0

7) Headlight - Front

8) Alarm Test

9) Emergency Engine Stop

10) Tail/Marker Light - Rear

11) Tail/Marker Light - Front

12) Engine Room Light

13) Ground/Step Light

14) Gauge/Instrument Light

15) Cab Light - Right

16) Sander

17) Anti-Slip Control

18) Headlight Dimmer - Front

19) Headlight Dimmer - Rear

20) Cab Light - Left

21) Horn

22) Dynamic Brake Ammeter

23) Speedometer

24) Main Generator Ammeter

25) Brake Pipe Flow Gauge

26) Brake Pipe Gauge

27) Main Reservoir Gauge

28) Battery Voltmeter

29) Control Air Gauge

30) Battery Ammeter

31) Vigilance Monitor Acknowledgment

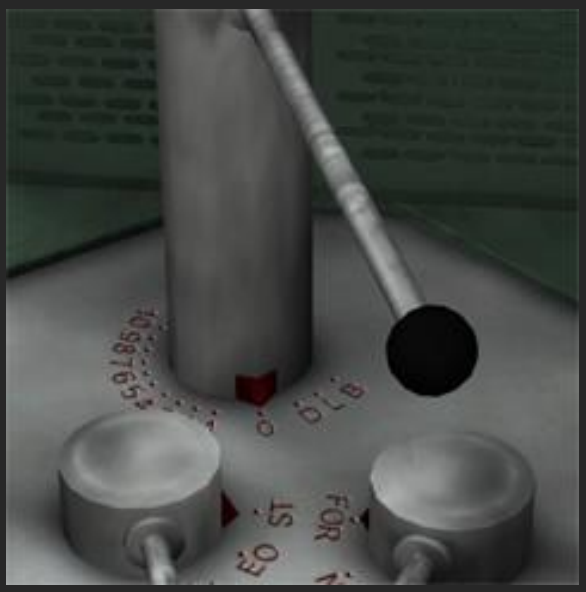
32) Cab Heater Fan Switch

33) Foot Warmer Switch

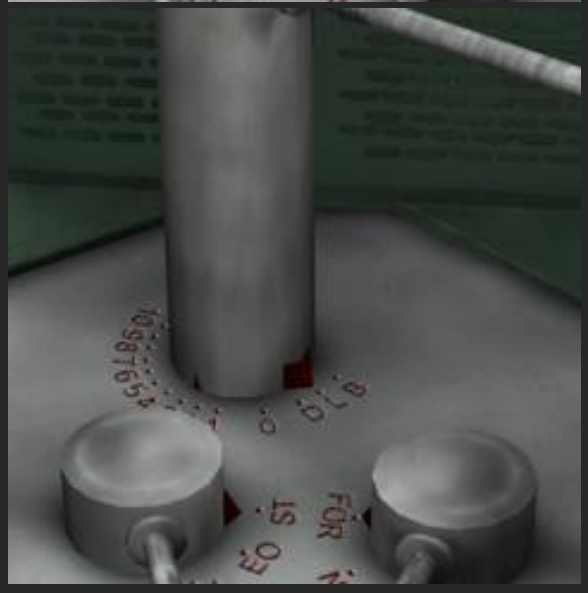
34) Cab Heater Fan Speed

1) Throttle/Dynamic Brake Control & Operation

KEYBOARD: Increase **A** Decrease **D**



Notch '0'
In this position neither the dynamic brake nor throttle is active, this is the 'neutral' position.



Notches ‘1’ – ‘10’

These are the power notches for the throttle, Notch ‘1’ = 10%, Notch ‘10’ = 100%

Notch ‘D’

D = Decrease

In this position dynamic brake amps (and therefore force) is **DESCREASED** back towards 0

IMPORTANT NOTE: If the Dynamic Brake amps are above 0, you will not be able to move the handle into Notch 0, or any power notch until the Dynamic Brake amps have fallen to 0.

Notch ‘L’

L = Lap

In this position, the Dynamic Brake will hold the number of amps that have been built up while the controller was in Notch ‘B’

Notch ‘B’

B = Build

In this position dynamic brake amps (and therefore force) is **INCREASED** slowing the train

2) Reverser Control & Operation

KEYBOARD: Increase **W** **Decrease** **S**

Standard 3 position reverser.

FORWARD: **FOR** Position

NEUTRAL: **N** Position

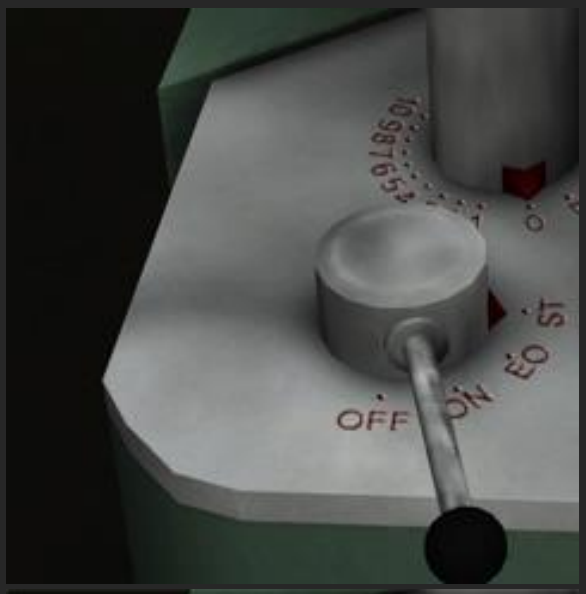
REVERSE: **REV** Position

IMPORTANT NOTE: You may notice that when selecting a position, the F5 HUD does not immediately register it. In reality, the ‘Dj’ class locomotive only selects forward or reverse after the Reverser has been set and the Throttle/Dynamic Brake Control (1) has been moved to Power Notch ‘1’. You will note that it is at this time that the direction is indicated on any HUD. This means that if you are in forward and come to a halt, then select reverse, the reverser will not indicate a change until the Throttle/Dynamic Brake Control (1) has been moved to Power Notch ‘1’ once more.

3) Master Controller Control & Operation

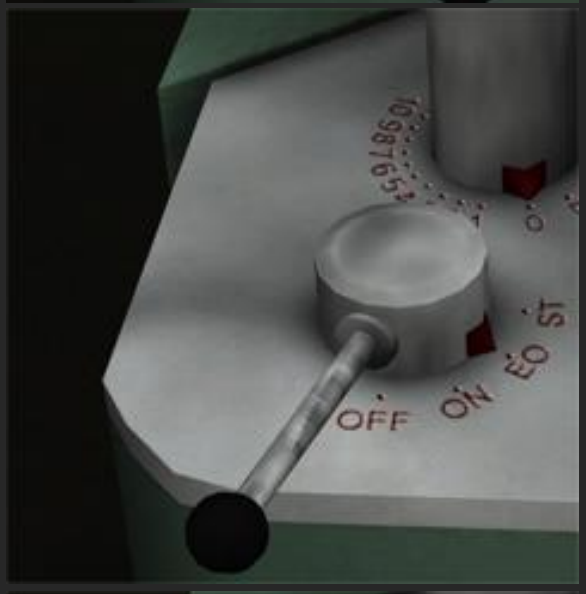
KEYBOARD: Increase **M** **Decrease** **SHIFT** + **M**

The Master Controller directly effects which mode the locomotive is in, and is used for shutting down and starting the locomotive. The reverser needs to be in the NEUTRAL position for this handle to work.



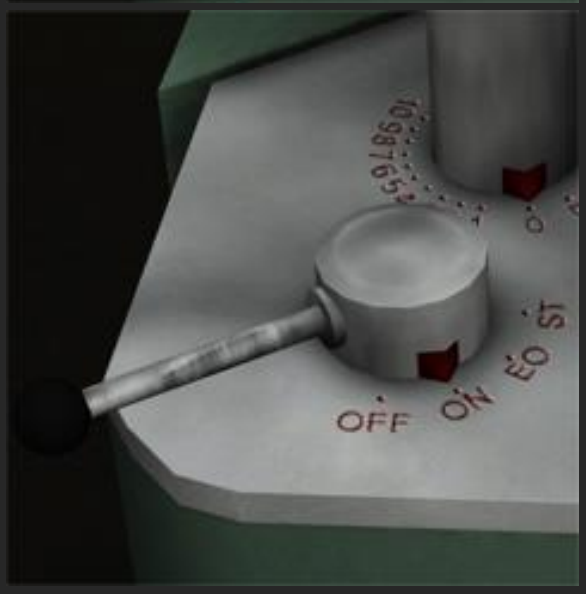
ST

ST is short for ‘Start’, place the handle in this position to start the locomotive.



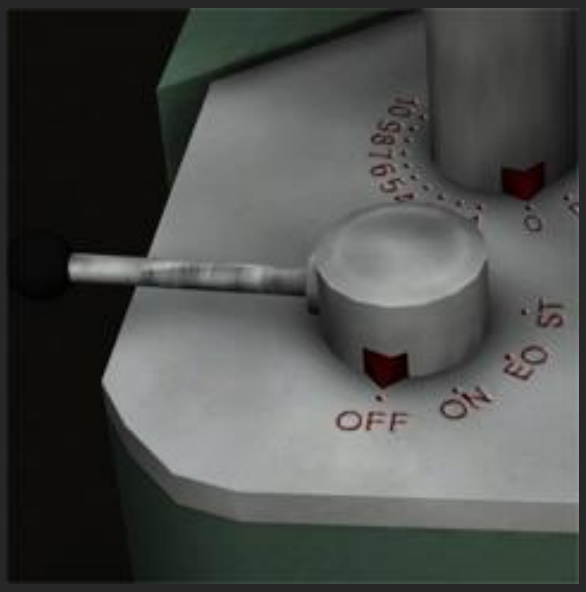
EO

EO is short for ‘Engine Only’, in this position the throttle and reverser will not work. When sitting idle the controller should be placed in this position.



ON

This position is the position the master controller needs to be in for the locomotive throttle and reverser to function.



OFF
When placed in this position the locomotive will shut down.

IMPORTANT: Shutting down the engine while various lights are on **will** discharge the battery over time, eventually making it impossible for the locomotive to be restarted.

4) Train Brake Control & Operation

KEYBOARD: Increase **;** **Decrease** **'**

The 'Dj' Class Locomotive is fitted with a type 26L air brake. It has several different positions as detailed below.

The Locomotives Braking systems feature the **Advanced Braking** script, originally developed by Mike Rennie, to make the brake operation as realistic as possible.

SHIFT + **CTRL** + **1** or **SHIFT** + **CTRL** + **2** control the difficulty setting for the brake operation.

RELEASE
Moving the handle to the far left releases the locomotive brake. The 26L features a sprung handle requiring the handle to be held in the released position until the train brake has fully released (70lb psi of Brake Pipe Pressure)

LAP (Hold Lapped)
This is the normal running position of the handle, once the brake has been released the handle should be returned to this position to maintain brake pipe air.
This position is also used to hold any brake pipe air reduction made in an application – move the handle into the apply range, then back into lap to hold the train brake at a certain pressure.

MINIMUM REDUCTION
Just to the right of the lap position is ‘Minimum Reduction’ this reduces the brake pipe pressure by a set minimum amount (around 8psi) and is ideal for slowing the train before corners.

APPLY
From the minimum reduction position towards the right applies the train brake at various speeds. The further right the faster the reduction.

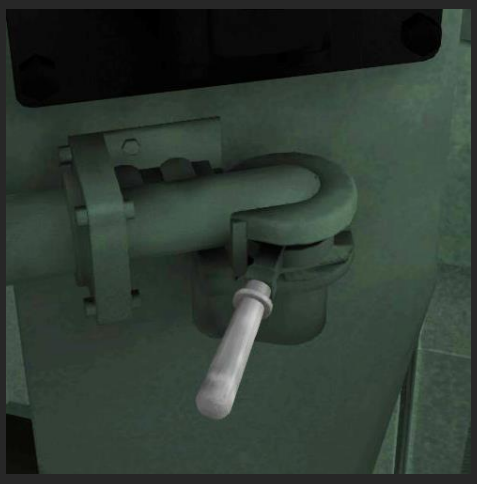
EMERGENCY

At the far right of the handles range is the **Emergency Application**. This will dump all air from the train brake system and bring the train to an emergency stop.

5) Independent/Locomotive Brake Control & Operation

KEYBOARD: Decrease [Increase]

The 'Dj' Class Locomotive is fitted with a type 26L air brake. The locomotive brake is a 'Self Lapping' type and its operation is detailed below.



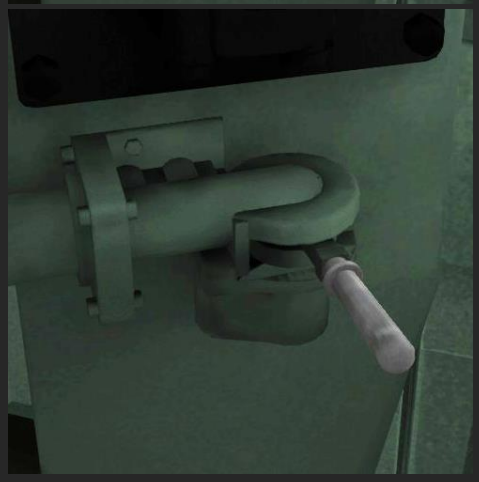
BAIL-OFF

When the Train Brake (4) is applied, the Locomotive Brake can be released separately. This is the 'Bail Off' position and is achieved by having the handle in the release position and then pressing it down (or decrease further with [ ) For this reason the HUD etc will display that the locomotive brake is at 0.10 or 10% when in the release position.

RELEASE

Moving the handle to the far left releases the locomotive brake.

NOTE: Due to the 'Bail-Off' function, when in the release position the HUD displays will indicate that the Locomotive Brake is at 0.10 or 10%. This **is not** a bug.



APPLY

The locomotive brake works as a 'Self Lapping' brake. The further to the right it is moved, the faster the application will be, and leaving the handle in a set position will maintain the brake application at a constant pressure.

6) Headlight Rear Control

Turns the REAR headlight on or off.

7) Headlight Front Control

Turns the FRONT headlight on or off.

8) Alarm Test Control

Tests the various cab alarms.

9) Engine Stop Control

Shuts down the locomotive's engine.

IMPORTANT: Shutting down the engine while various lights are on **will** discharge the battery over time, eventually making it impossible for the locomotive to be restarted.

10) Tail/Marker Light – Rear Control

Turns the REAR marker/tail light on or off.

11) Tail/Marker Light - Front Control

Turns the FRONT marker/tail light on or off.

12) Engine Room Light Control

No effect.

13) Ground/Step Light Control

Turns the cab step lights on or off.

14) Gauge/Instrument Light Control

KEYBOARD: On **I** Off **SHIFT** + **I**

Turns the instrument/gauge lights on or off.

15) Cab Light – Right Control

Turns the driver's side cab light on or off.

16) Sander Control

KEYBOARD: Press and Hold **X**

Applies Sand to the rail for better traction when slipping.

17) Anti-Slip Control & Operation

KEYBOARD: Press and Hold **C**

Applies a small amount of locomotive brake to reduce wheel-slip.

18) Headlight Dimmer – Front Control

Dims the front headlight when on.

19) Headlight Dimmer – Rear Control

Dims the rear headlight when on.

20) Cab Light – Left Control

Turns the assistants side cab light on or off.

21) Horn Control

KEYBOARD: Press and Hold **SPACE**

Used to sound the horn.

22) Dynamic Brake Ammeter Gauge

Displays the current number of amps being generated by the Dynamic Brake – this is somewhat

equivalent to braking force.

23) Speedometer

Displays the current Speed in km/h

24) Main Generator Ammeter Gauge

Displays the amps being drawn by the traction motors.
Overheating the engine by running at too high of an amperage is simulated in this locomotive.
Overheating is triggered at 1 hour at excess of **1500A** or 5 minutes in excess of **2000A**
A warning light will display on the console and a cooldown period will begin, while the light is active the throttle is limited in power to NOTCH 1.

25) Brake Pipe Flow Gauge

Displays the flow of air through the brake pipe. Useful for working out if a brake is still releasing/applying.

26) Brake Pipe Gauge

Displays the brake pipe air information and the amount of air being applied to the locomotive brake cylinders.
RED NEEDLE: Brake Pipe Pressure
WHITE NEEDLE: Locomotive Brake Cylinder Pressure

27) Main Reservoir Gauge

Displays the main reservoir air information
RED NEEDLE: Main Reservoir
WHITE NEEDLE: Equalising Reservoir

28) Battery Voltmeter Gauge

Displays the battery voltage. Both battery amps and volts are directly affected by the number of lights etc that are running.
IMPORTANT: Shutting down the engine while various lights are on **will** discharge the battery over time, eventually making it impossible for the locomotive to be restarted.

29) Control Air Gauge

Displays the amount of air available for the various air operated controls.

30) Battery Ammeter Gauge

Displays the amps being drawn by the locomotive or charged to the battery while the locomotive is running.

31) Vigilance Monitor Acknowledgment & Vigilance Monitor Operation

KEYBOARD: Press **Q**

Acknowledges alarm from Vigilance Monitor. Using the Horn Control (21) or moving the Throttle/Dynamic Brake Control (1) or Sander Control (16) will also acknowledge the alarm.

To **Disable** the Vigilance Monitor use:

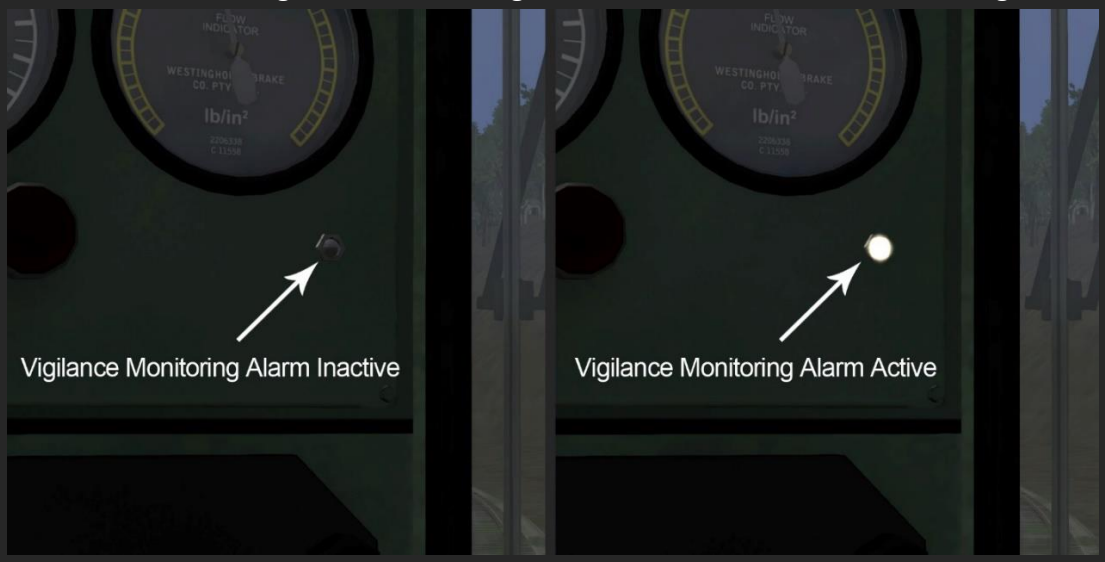
KEYBOARD: **CTRL** **+** **D**

VIGILANCE MONITORING:

If the Master Controller (3) is in the ON position and the Independent/Locomotive Brake Control (5) is released the Vigilance Monitoring device automatically engages.

The vigilance device will sound every 50 seconds if the Horn Control (21), Throttle/Dynamic Brake Control (1) or Sander Control (16) have not been used in the preceding 50 seconds.

This will cause the Vigilance Monitor Light to illuminate as shown in this image:



After 10 seconds the penalty brake will apply, tripping the PCS and cutting power to the throttle. You will receive a notification at the top right hand side of the screen informing you that the PCS has been 'Tripped' and a Vigilance Monitor message stating that the Vigilance Monitor has 'Timed Out' and the Emergency Brake has been applied.

VIGILANCE RESET: If a penalty brake has been applied, you must wait for the brake pipe pressure to reduce to 0psi before you can reset the vigilance device.

To reset:

- Place the Throttle/Dynamic Brake Control (1) in position 0
- Move the Train Brake Control (4) to the EMERGENCY position
- Move the Train Brake Control (4) to the RELEASE position
- Move the Locomotive Brake Control (5) to an APPLY position.
- You will receive a PCS Reset and a Vigilance Monitor Reset notification at the top right hand of the screen.
- Move the Locomotive Brake Control (5) to RELEASE
- Once the Vigilance Monitoring Alarm extinguishes, you will be able to control the locomotive once

more

32) Cab Heater Fan Switch

Turn on/off the Cab heater Fan.

IMPORTANT: Shutting down the engine while the Cab Heater Fan is on **will** discharge the battery over time, eventually making it impossible for the locomotive to be restarted.

33) Foot Warmer Switch

Turn on/off the Driver's Side foot warmer.

IMPORTANT: Shutting down the engine while the Foot Warmer Switch is on **will** discharge the battery over time, eventually making it impossible for the locomotive to be restarted.

34) Cab Heater Speed Control

Control the speed of the Cab Heater Fan.

Other Controls

Cab Window – Drivers Side

KEYBOARD: Open **P** Close **SHIFT** + **P**

Cab Window – Assistants Side

KEYBOARD: Open **O** Close **SHIFT** + **O**

Disable/Enable Vigilance Device

Enabled By Default

KEYBOARD: **CTRL** + **D**

A message box will disable at the top right hand side of the screen stating

Vigilance Monitoring Device
Enabled

OR

Vigilance Monitoring Device
Disabled

When this control is toggled

Disable/Enable Shadow Casting Lights

KEYBOARD: **SHIFT** + **CTRL** + **H**

Changes lights along entire active consist from shadow casting to non-shadow casting, useful if you suffer performance issues with shadow casting lights active.

NOTE: Lights cast shadows by default.

Consist Weight Display

KEYBOARD: **CTRL** + **W**

Displays the weight of the current consist. Useful for generating realistic train weights in the scenario editor.

NOTE: this weight includes the weight of the locomotive(s) at 63 tons each. As such a consist weight of 163 tons with a single locomotive is 100 tons of trains and 63 tons of locomotive.

Track Conditions Setting

KEYBOARD: Increase: **SHIFT** + **3** Decrease: **CTRL** + **3**

The track conditions are selectable. It starts off as "dry" (making it difficult induce wheelslip unless the train is very heavy), but the slipperiness can be increased progressively through "rain", "snow" and "wet leaves" (very easy to slip).

Ctrl + 3 progressively decreases the slipperiness.

By default this is set to **AUTOMATIC** which will select the friction based on the weather type. Included in the **AUTOMATIC** mode is a FROST setting, which when the season is set to winter, will slowly make the wheel friction decrease over time (starting at 18:30 and reaching maximum slipperiness at 06:00) before maintaining a minimum friction for a period (06:00 until 08:30) before increasing friction again for a period (08:30 until 10:30) this simulates frost-like conditions in winter.

Brake Difficulty Setting

KEYBOARD: Increase: **SHIFT** + **CTRL** + **1** Decrease: **SHIFT** + **CTRL** + **2**

Determines how much retardation there is in the propagation of brake pipe pressure changes between the head end and tail end of the train.

The levels are:

1 - Easiest	**2 - Easy**	**3 - Medium**	**4 - Hard**
No retardation	1/3rd of realistic retardation	2/3rds of realistic retardation	Fully realistic retardation

DEFAULT SETTING

Signal Aspects

Two different signalling systems are deployed on the route, these are known locally as SLA (Single Line Automatic) and CTC (Central Train Control) types. **SLA Type** signals are the predominant type on the route, with all signals excepting those at Springfield, Arthur's Pass and Otira being of this type. They are identified by having a single 3 light-aspect head. **CTC Type** signals are those present at Springfield, Arthur's Pass and Otira. They are identified by having two 3 light aspect signal heads.
The following tables indicate what each signal aspect means in relation to train operation.

Stop Types

New Zealand Railways employed two different types of Stop/Danger signal. Those known as **Stop and Stay** and those known as **Stop and Proceed**.

'Stop and Stay' Type Signals

Stop and Stay type signals feature either both signal heads, in CTC Areas, directly above each other or in SLA Areas the signal head directly above the red marker lamp. As the name implies, **a Stop and Stay** type signal requires the train to be brought to a complete stop and to remain stopped until such time as the signal changes aspect. Failure to wait for the aspect to change will result in a Signal Passed at Danger (SPAD).

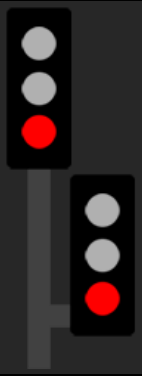
The images below show examples of SLA (left) and CTC 'Stop and Stay' type signals

'Stop and Proceed' Type Signals

Stop and Proceed type signals in CTC Areas feature the lower signal head offset to the right-hand side, or in SLA Areas the red marker lamp offset to the right-hand side. These signals require the train to come to a complete stop, within 50 metres of the signal and to wait for a minimum of 10 seconds. Once the 10 seconds has elapsed the train may proceed past the signal, despite it still displaying a red aspect. Failure to wait will result in a Signal Passed at

Danger (SPAD). In the 2D Map View the signal state will change to Caution when the required time has elapsed, though in the normal world view the signal will continue to display red.

The images below show examples of SLA (left) and CTC 'Stop and Proceed' type signals



SLA – Type

There are three different types of SLA Signal Along the route, the following section outlines their aspects and functions.

SLA Departure Signals

The Departure Signal in the SLA Section is a **Stop and Stay** type signal.

SPECIAL INSTRUCTIONS

When needing to depart a crossing loop, perhaps after having taken the loop track instead of the mainline, this signal will stay at STOP/DANGER until the points have been correctly set and the TAB Key has been pressed. If the section ahead is not already occupied the signal will change to CLEAR NORMAL or CAUTION.

STOP/DANGER

The SLA Departure Signal is a Stop and Stay type signal, that cannot be driven past when it is displaying a red light on the upper head and red light on the marker lamp directly below it.

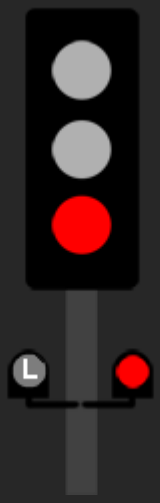
The correct stopping location at a SLA Departure Signal is not at the signal itself – as it stands clear of the points outside of the crossing loop. The correct stopping location is at the nearest FOULING BOARD inside the crossing loop.

	**CAUTION** When the SLA Departure Signal is showing a yellow light, it means that you are clear to proceed, though the signal ahead may be displaying STOP/DANGER.
	**CLEAR NORMAL** When the SLA Departure Signal is showing a green light, it means that you are clear to proceed as per normal, the signal ahead is at CAUTION or CLEAR NORMAL

SLA Arrival Signals

The Arrival Signal in the SLA Section is a **Stop and Proceed** type signal.

	**STOP/DANGER – LOOP LIGHT DARK** The SLA Arrival Signal is a Stop and Proceed type signal, that can be driven past after the train has been stopped for 10 seconds within 50m of the signal. If the points are set for the MAIN LINE, the auxiliary lamp to the left, known as a 'Loop Light' will be darkened. After waiting the required 10 seconds you can then proceed to the FOULING BOARD.

	**STOP/DANGER – LOOP LIGHT ILLUMINATED** The SLA Arrival Signal is a Stop and Proceed type signal, that can be driven past after the train has been stopped for 10 seconds within 50m of the signal. If the points are set for the LOOP, the auxiliary lamp to the left, known as a 'Loop Light' will be illuminated with a white letter L. Typically on arrival the signal will be displaying CAUTION or CLEAR NORMAL until the points have been changed, whereby it changes to STOP/DANGER with the Loop Light illuminated. After waiting the required 10 seconds you can then proceed to the **FOULING BOARD** on the **CROSSING LOOP**
	**CAUTION** When the SLA Arrival Signal is showing a yellow light, it means that you are clear to proceed, though the Departure Signal ahead will be displaying STOP/DANGER. With the 'Loop Light' darkened you will be proceeding to the **FOULING BOARD** on the **MAIN LINE.**
	**CLEAR NORMAL** When the SLA Arrival Signal is showing a green light, it means that you are clear to proceed as per normal, the signal ahead is at CAUTION or CLEAR NORMAL.

SLA Intermediate Signals

The Intermediate Signal in the SLA Section is a **Stop and Proceed** Type Signal

STOP/DANGER

The SLA Intermediate Signal is a Stop and Proceed type signal, that can be driven past after the train has been stopped for 10 seconds within 50m of the signal. The 2d Map will change to CAUTION while the 3d World signal will continue to display STOP/DANGER once the required 10 seconds has passed.

A SLA Intermediate Signal showing this aspect warns that there may already be a train in the section ahead and that the player train should proceed at a speed whereby it can stop safely in half the visible distance.

CAUTION

When the SLA Intermediate Signal is showing a yellow light, it means that you are clear to proceed, though the signal ahead may be displaying STOP/DANGER.

CLEAR NORMAL

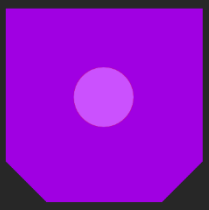
When the SLA Intermediate Signal is showing a green light, it means that you are clear to proceed as per normal,

SLA Fouling Boards

Within the SLA Signalling section, all crossing loops are fitted with **FOULING BOARDS.** These are white rectangular markers lying at a 90 degree angle to the track on the ground. These **FOULING BOARDS** mark the location where a train should stop to remain clear of the other track(s). When entering the crossing loop on either the MAIN LINE or LOOP tracks having passed a **SLA Arrival Signal** at **DANGER/STOP** the fouling board marks the limit the movement can proceed along before waiting for the **SLA Departure Signal** to change to **CAUTION** or **CLEAR NORMAL** (depending on numerous factors, this may require pressing the TAB key).

SLA Points Indicators

In reality, many crossing loops at SLA Stations are protected by sets of 'trap points' used to derail any train attempting to exit a yard or siding before they can enter the operational loop/mainline if the points are not correctly set. While we have not been able to recreate this in the simulator, we have included the points indicators.

	**DANGER** Points ahead are incorrectly set
	**CAUTION** Points ahead are set correctly

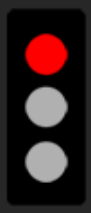
CTC – Type

CTC Signals are present at Springfield, Arthur's Pass and Otira.

CTC Ground Signals and Points Indicators

There are two types of ground signal in use throughout the three CTC Signalled yards, along with points indicators

Two-Aspect Ground Signal

	**STOP/DANGER** A two-light ground signal displaying a red aspect requires the train to stop as the points ahead are incorrectly set.
	**LOW SPEED PROCEED** A two-light ground signal displaying a yellow aspect allows the train to proceed past it at low speed with caution as the points are correctly set, but the track may be occupied.
Three-Aspect Ground Signal	
	**STOP/DANGER** A three-light ground signal displaying a red aspect requires the train to stop as the points ahead are incorrectly set or the train does not have permission to pass the signal. In some circumstances, pressing the TAB key will grant permission to pass a red three-light ground signal displaying red – most commonly to access additional sidings.
	**LOW SPEED PROCEED - CAUTION** A three-light ground signal displaying a yellow aspect allows the train to proceed past it at low speed with caution as the points are correctly set, but the track may be occupied or the next signal ahead may be displaying **Stop/Danger**

	**LOW SPEED PROCEED** A three-light ground signal displaying a green aspect allows the train to proceed past it at low speed with caution as the points are correctly set and the track ahead is unoccupied with the next signal displaying **CLEAR** or **CAUTION**

Arrow Indicators

	**NOT ILLUMINATED** The path is not set for this indicator.
	**ILLUMINATED** When on, the arrow indicator grants permission to pass a signal at danger (if alongside a signal), if moving to a specific road or indicates that the points are set in the direction indicated.

Low Speed Lights

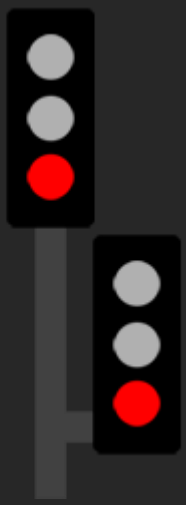
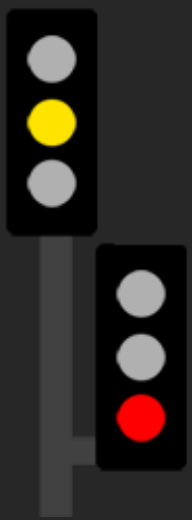
Some **Stop and Stay** type signals are fitted with Low Speed Lights, an additional yellow light with a triangular background. A signal displaying a low speed indicator light allows you to pass it when it is showing STOP/DANGER at a slow speed. The light can be requested at a signal fitted with a **Low Speed Light** by pressing the **TAB** key – there may be a delay of up to ten (10) seconds before permission is granted to pass.

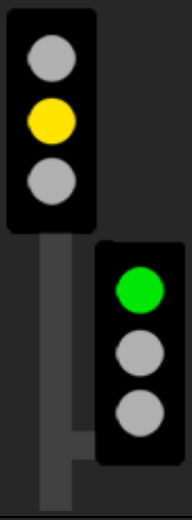
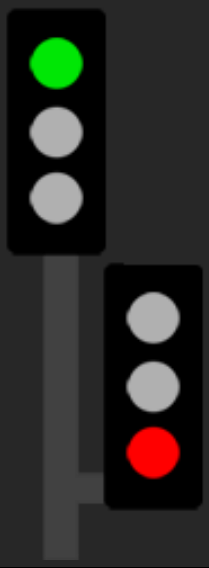
	**STOP/DANGER** When unilluminated the train cannot pass the signal that is otherwise displaying **Stop/Danger**

	**LOW SPEED PROCEED** When illuminated the train can pass the signal that is otherwise displaying **Stop/Danger** at a Low Speed being prepared to stop if required as the track ahead may be occupied.

Stop and Proceed Signals

Stop and Proceed type signals in the CTC Areas of the route largely perform the duties of a 'distant' signal, warning the driver of what state the signal ahead is in.

	**STOP/DANGER** The CTC Stop and Proceed type signal can be driven past after the train has been stopped for 10 seconds within 50m of the signal. The 2d Map will change to CAUTION while the 3D World signal will continue to display STOP/DANGER once the required 10 seconds has passed. A Signal showing this aspect warns that there may already be a train in the section ahead and that the player train should proceed at a speed whereby it can stop safely in half the visible distance.
	**CAUTION – NORMAL** Proceed at Normal Speed, be prepared to Stop as the next signal is at **Stop/Danger**

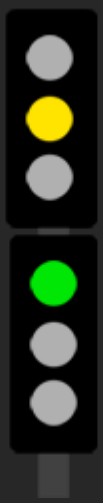
	**CAUTION – MEDIUM** Proceed at Normal Speed, being prepared to reduce speed as the next signal is at **Caution** or **Medium Speed**.
	**CLEAR – NORMAL** Proceed at Normal Speed, next signal is at **Clear** for **Normal Speed**

Stop and Stay Signals

Double Head Type

These signals are fitted with two 3-light signal heads vertically aligned

	**STOP/DANGER** The CTC Stop and Stay type signal cannot be driven past when it is displaying a red light on the upper head and red light on the lower head directly below – unless fitted with a **Low Speed** light (see Low Speed Light Details).
	**CAUTION – NORMAL** Proceed at normal speed, next signal is at **Stop/Danger**
	**CAUTION – MEDIUM** Proceed at medium speed, next signal is at **Stop/Danger**

	**CLEAR – NORMAL** Clear to proceed at normal track speed
	**CLEAR – MEDIUM** Proceed at Medium Speed being prepared to slow at the next signal which is set to **CAUTION** or **CLEAR - MEDIUM**
	**CAUTION – MEDIUM** Proceed at Medium Speed until the next signal, or until the train has cleared the points before resuming normal speed. If exiting a yard, the medium speed restriction applies to the points, otherwise it applies until the next signal. The next signal is set to Clear – Normal or Caution.

Single Head Type

These signals are fitted with a single 3-light signal head with a red marker lamp located directly below it.

	**STOP/DANGER** The CTC Stop and Stay type signal cannot be driven past when it is displaying a red light on the upper head and red light on the marker lamp directly below – unless fitted with a **Low Speed** light (see Low Speed Light Details).
	**CAUTION – MEDIUM** Proceed at medium speed, next signal is at **Stop/Danger**
	**CLEAR – NORMAL** Clear to proceed at normal track speed

Remote Shunt Indicators

Remote Shunt Indicators are present on the Otira East Backshunt and are used to relay shunting information to the locomotive driver. The aspects shown are **advisory** only, which means they can be ignored if required. These indicators were used prior to the availability of radios by the yard shunter to instruct the driver when he was out of sight. When approaching an indicator from the Otira yard, you will approach the side without lights, as they are placed to be viewed when looking *toward* the yard at Otira, which may mean back along your train in some instances.

	**AWAY** Move your train away from the yard points/signal, this aspect will display until your train has cleared the yard points.
	**STOP** Your train has cleared the yard points being monitored by this indicator and you can now safely stop and be clear of them.
	**TOWARD** Move your train towards the yard points/signal. This aspect will display after a stop instruction to inform you that it is clear to proceed back into the yard.

Line Speed Limits and Signs

The New Zealand Railways operates trackage with two separate speeds for Passenger and Freight/Goods services (mixed trains run at the Freight/Goods Speed in most instances).

Normal Speed

The Maximum Line Speed for **PASSENGER** Services is **45mph**
FREIGHT/GOODS Services are limited to **30mph**
When passing a Signal displaying Clear – Normal this is the target speed for the proceeding section.

Medium Speed

When passing a signal indicating Medium Speed, the advised speed for **all services** is **15mph**.

Low Speed

When passing a signal indicating Low Speed, or passing a Stop and Proceed signal after the required ten second wait, the advised speed for **all services** is **10mph** for yards or a speed to allow you to stop safely within **half the visible distance.**

Lineside Speed Boards

Lineside speed boards apply to both services, however if an indicated speed is **greater** than the maximum allowable speed for Freight/Goods Services the speed does not apply. For example, a Freight/Goods service doing 30mph approaches a sign stating 37mph. The Speed for the Freight/Goods service will remain 30mph.

All **YARD** areas are restricted to **10mph** – be aware that this speed is **not** signposted, as per New Zealand Railway Operations of the period.

Lineside Sign Examples

Below are examples of each of the types of line-side sign for speeds and other information you will see along the route. All numbers indicate speed in **MILES PER HOUR**

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	**Advanced Curve Speed Board** A rectangular yellow board with a number denotes the speed for the next curve ahead.
	**Curve Speed Board** Speed for the curve that begins at this board. The limit applies until the end of the train has passed by the matching sign at the opposite end of the curve.
	Permanent Speed Reduction Board This sign denotes a new maximum speed limit for all services until the rear of the train passes its matching opposing sign.
	**Temporary Speed Reduction Advanced Board** This sign denotes that there is an upcoming temporary speed reduction. It begins at the 'C' sign below.
	**Temporary Speed Reduction Begins** A temporary speed reduction begins at this sign, the speed is indicated on the **Temporary Speed Reduction Advanced Board** that is placed ahead of any reduction.

	**Temporary Speed Reduction Ends** The train can resume line speed when the rear of the train passes this board when exiting a temporary speed reduction area.
	**Railway Crossing** Railway crossing ahead, sound whistle/horn if applicable.

Scenario Editor Information

Rolling Stock Placement

In the 1960's New Zealand Railways was extensively using 'Norwegian' or 'Chopper' type couplers, coupled with a single hook at one end of a locomotive or wagon. To recreate this effect the models are fitted with scripted couplers, that rely on a tiny amount of movement to determine the correct orientation. For this reason couplers may not align correctly when you first place the rollingstock in the simulator.

Autonumbering

All rolling stock is set up with autonumbering, to assign a number used by a prototype of that carriage, wagon or locomotive class.

When placing the 'Eo' locomotive, the body or front bogie should have its number changed to match the other, so that both the body and front headstock are numbered '3' for instance.

In all rolling stock that is not a locomotive a **#** symbol can be used to indicate a blank space in the numbering – nothing will display in this location.

Wagons

In order to create clear classification letters all wagons use the symbol ^ to render the correct class, followed by a series of numbers and # symbols.

All **wagons** after the number display by default four # symbols, making the default number look similar to **^1234####.** These #'s can be replaced by any four letters, e.g. ^1234CHCH which will render the given letters, in this case CHCH, on the wagon side. This was common practice by New Zealand Railways to indicate the destination of a given wagon in an abbreviated form.
NOTE: All **LETTERS** much be entered as **UPPER CASE/CAPITALS**

Guards Vans

All **Guard's Vans** render their numbers in the format: **123####** and as with wagons the last four characters can be replaced with any letter and the given letters will be rendered on the van side. Unlike wagons however, this marking was used above the 'dog boxes' on the guard's van, giving the destination for the dog inside instead of the destination of the van.

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For example: Van 322 with a dog bound for Cass would be named 322CASS
NOTE: All **LETTERS** much be entered as **UPPER CASE/CAPITALS**

Passenger Carriages and Car-Vans

Passenger carriages and car-vans use the numbering format: 100#################.
This format differs slightly from the wagons and vans in that the first **seven** (7) locations are reserved for numbers, e.g. **100#################** will display the number 100 on the carriage side and **###1000############** will display the number 1000 on the carriage side. This is to ensure that either 1, 2, 3 or 4 number combinations correctly align on the carriage number plate.
The remaining 12 # entries are for letters used in destination boards, unlike wagons and vans short hand was not used here.
For example: Carriage 1024 destined for OTIRA would be numbered as follows ###1024###OTIRA#### which would ensure the station name displays in the centre of the destination board.
Meanwhile carriage 345 bound for SPRINGFIELD would be number 345####SPRINGFIELD#
NOTE: All LETTERS much be entered as CAPITALS

Wagon Weights and Locomotive Loadings

The following tables outline information for creating realistic consists for use on the route.
Locomotive loads are **per locomotive**. For multiple headed trains, multiply the weight by the number of locomotives, e.g. 2x 'Eo' locomotives would be rated for 200 Tons on a downhill train (unless noted otherwise).
Weights are given in Imperial Long Tons

Locomotive Load Schedules

Eo Class Electric Locomotive

For Consist Weight Display (see 'Eo' Locomotive Controls Section) add 49.2 Tons per Locomotive;
i.e. 100 Tons becomes 149.2 Tons with a single locomotive.

OTIRA TUNNEL UPHILL	OTIRA TUNNEL DOWNHILL
Otira – Arthur's Pass (East Bound)	Arthur's Pass – Otira (West Bound)
175 Tons	100 Tons

Dj Class Diesel Electric Locomotive

For Consist Weight Display (see 'Dj' Locomotive Controls Section) add 63 Tons per Locomotive;
i.e. 100 Tons becomes 163 Tons with a single locomotive.

Freight	Passenger
Aickens – Otira (East Bound)	Aickens – Otira (East Bound)
620 Tons	365 Tons

OTIRA TUNNEL UPHILL
Otira – Arthur's Pass (East Bound)
210 Tons
Maximum Permitted Locomotives: **2**
Maximum Permitted Train Weight for 2 Locomotives: **420 Tons**

Arthur's Pass – Springfield (East Bound)	Arthur's Pass – Springfield (East Bound)
670 Tons	415 Tons

Springfield – Arthur's Pass (West Bound) 510 Tons	Springfield – Arthur's Pass (West Bound) 365 Tons
OTIRA TUNNEL DOWNHILL Arthur's Pass – Otira (West Bound) 400 Tons Maximum Permitted Locomotives: 2 Maximum Permitted Train Weight for 2 Locomotives: 600 Tons Maximum Wagons for 1 Locomotive: 50 Maximum Wagons for 2 Locomotives: 80	
Otira - Aickens (West Bound) 885 Tons	Otira - Aickens (West Bound) 365 Tons

Goods Wagon Weights

Name In Editor	Unloaded Weight (Tons)	Loaded Weight (Tons)
NZR Class K-3	4.5	7.0
NZR Class K-3 (Wth.)	4.5	7.0
NZR Class K-5	4.5	7.0
NZR Class K-5 (Wth.)	4.5	7.0
NZR Class Kp (Silver)	7.88	11.38
NZR Class La-4 (Coal)	4.5	8.0
NZR Class La-4 (Coal) (Wth. 1)	4.5	8.0
NZR Class La-4 (Coal) (Wth. 2)	4.5	8.0
NZR Class La-4a (Coal)	4.5	8.0
NZR Class La-4a (Coal) (Wth. 1)	4.5	8.0
NZR Class La-4a (Coal) (Wth. 2)	4.5	8.0
NZR Class La-4 (Lime)	4.5	8.0

NZR Class La-4 (Lime) (Wth. 1)	4.5	8.0
NZR Class La-4 (Lime) (Wth. 2)	4.5	8.0
NZR Class La-4a (Lime)	4.5	8.0
NZR Class La-4a (Lime) (Wth. 1)	4.5	8.0
NZR Class La-4a (Lime) (Wth. 2)	4.5	8.0
NZR Class La-4 (Timber 1)	4.5	8.0
NZR Class La-4 (Timber 1) (Wth. 1)	4.5	8.0
NZR Class La-4 (Timber 1) (Wth. 2)	4.5	8.0
NZR Class La-4 (Timber 2)	4.5	8.0
NZR Class La-4 (Timber 2) (Wth. 1)	4.5	8.0
NZR Class La-4 (Timber 2) (Wth. 2)	4.5	8.0
NZR Class La-4a (Timber 1)	4.5	8.0
NZR Class La-4a (Timber 1) (Wth. 1)	4.5	8.0
NZR Class La-4a (Timber 1) (Wth. 2)	4.5	8.0
NZR Class La-4a (Timber 2)	4.5	8.0
NZR Class La-4a (Timber 2) (Wth. 1)	4.5	8.0
NZR Class La-4a (Timber 2) (Wth. 2)	4.5	8.0
NZR Class La-6 (Coal)	4.5	8.0
NZR Class La-6 (Coal) (Wth. 1)	4.5	8.0
NZR Class La-6 (Coal) (Wth. 2)	4.5	8.0
NZR Class La-6* (Coal)	4.5	8.0
NZR Class La-6* (Coal) (Wth. 1)	4.5	8.0
NZR Class La-6* (Coal) (Wth. 2)	4.5	8.0
NZR Class La-6 (Coal)	4.5	8.0

NZR Class La-6 (Coal) (Wth. 1)	4.5	8.0
NZR Class La-6 (Lime)	4.5	8.0
NZR Class La-6 (Lime) (Wth. 1)	4.5	8.0
NZR Class La-6 (Lime) (Wth. 2)	4.5	8.0
NZR Class La-6* (Lime)	4.5	8.0
NZR Class La-6* (Lime) (Wth. 1)	4.5	8.0
NZR Class La-6* (Lime) (Wth. 2)	4.5	8.0
NZR Class La-6 (Timber 1)	4.5	8.0
NZR Class La-6 (Timber 1) (Wth. 1)	4.5	8.0
NZR Class La-6 (Timber 1) (Wth. 2)	4.5	8.0
NZR Class La-6 (Timber 2)	4.5	8.0
NZR Class La-6 (Timber 2) (Wth. 1)	4.5	8.0
NZR Class La-6 (Timber 2) (Wth. 2)	4.5	8.0
NZR Class La-6* (Timber 1)	4.5	8.0
NZR Class La-6* (Timber 1) (Wth. 1)	4.5	8.0
NZR Class La-6* (Timber 1) (Wth. 2)	4.5	8.0
NZR Class La-6* (Timber 2)	4.5	8.0
NZR Class La-6* (Timber 2) (Wth. 1)	4.5	8.0
NZR Class La-6* (Timber 2) (Wth. 2)	4.5	8.0
NZR Class La-6* (Timber 1)	4.5	8.0
NZR Class La-6* (Timber 1) (Wth. 1)	4.5	8.0
NZR Class Lc-2 (Coal)	6.7	18.7
NZR Class Lc-2 (Coal) (Wth. 1)	6.7	18.7

NZR Class Lc-2 (Coal) (Wth. 2)	6.7	18.7
NZR Class Lc-2 (Lime)	6.7	18.7
NZR Class Lc-2 (Lime) (Wth. 1)	6.7	18.7
NZR Class Lc-2 (Lime) (Wth. 2)	6.7	18.7
NZR Class Lc-2 (Timber)	6.7	18.7
NZR Class Lc-2 (Timber) (Wth. 1)	6.7	18.7
NZR Class Lc-2 (Timber) (Wth. 2)	6.7	18.7
NZR Class Lc-3 (Coal)	6.7	18.7
NZR Class Lc-3 (Coal) (Wth. 1)	6.7	18.7
NZR Class Lc-3 (Coal) (Wth. 2)	6.7	18.7
NZR Class Lc-3 (Lime)	6.7	18.7
NZR Class Lc-3 (Lime) (Wth. 1)	6.7	18.7
NZR Class Lc-3 (Lime) (Wth. 2)	6.7	18.7
NZR Class Lc-3 (Tarp)	6.7	18.7
NZR Class Lc-3 (Tarp) (Wth. 1)	6.7	18.7
NZR Class Lc-3 (Tarp) (Wth. 2)	6.7	18.7
NZR Class Lc-3 (Timber)	6.7	18.7
NZR Class Lc-3 (Timber) (Wth. 1)	6.7	18.7
NZR Class Lc-3 (Timber) (Wth. 2)	6.7	18.7
NZR Class M-5	3.5	5.46
NZR Class M-5 (Wth.)	3.5	5.46
NZR Class U-2 (Logs)	7.8	15.67
NZR Class U-2 * (Logs)	7.8	15.67
NZR Class U-2 (Timber)	7.8	15.67
NZR Class U-2 * (Timber)	7.8	15.67
NZR Class U-2 ** (Logs)	7.8	15.67

NZR Class U-2 ** (Timber)	7.8	15.67
NZR Class U-2 (Logs) (Wth.)	7.8	15.67
NZR Class U-2 * (Logs) (Wth.)	7.8	15.67
NZR Class U -2 (Timber) (Wth.)	7.8	15.67
NZR Class U-2 * (Timber) (Wth.)	7.8	15.67
NZR Class U-2 ** (Logs) (Wth.)	7.8	15.67
NZR Class U-2 ** (Timber) (Wth.)	7.8	15.67
NZR Class Uc-3	17.5	35.2
NZR Class Uc-3*	17.5	35.2
NZR Class Uc-3 (Wth.)	17.5	35.2
NZR Class Uc-3* (Wth.)	17.5	35.2
NZR Class V-3	12	21.8
NZR Class Vb-1	14.76	29.47
NZR Class Vb-1*	14.76	29.47

Passenger Carriage and Guards Van Weights

Name In Editor	Unloaded Weight (Tons)	Loaded Weight (Tons)
NZR Class F - 30ft	9.8	13.73
NZR Class F - 30ft*	9.8	13.73
NZR Class F (30ft)(Wth. 1)	9.8	13.73
NZR Class F (30ft)* (Wth. 1)	9.8	13.73
NZR Class F (30ft) (Wth. 2)	9.8	13.73
NZR Class F (30ft)* (Wth. 2)	9.8	13.73
NZR Class F (50ft)	19.65	23.58
NZR Class F (50ft)*	19.65	23.58

NZR Class F (50ft) (Wth. 1)	19.65	23.58
NZR Class F (50ft)* (Wth. 1)	19.65	23.58
NZR Class F (50ft) (Wth. 2)	19.65	23.58
NZR Class F (50ft)* (Wth. 2)	19.65	23.58
NZR Class Af	17.71	19.92
NZR Class Af*	17.71	19.92
NZR Class Af (Wth. 1)	17.71	19.92
NZR Class Af* (Wth. 1)	17.71	19.92
NZR Class Af (Wth. 2)	17.71	19.92
NZR Class Af*(Wth. 2)	17.71	19.92
NZR Class A (Gas)	17.71	19.92
NZR Class A (Battery)	17.71	19.92
NZR Class A* (Gas)	17.71	19.92
NZR Class A* (Battery)	17.71	19.92
NZR Class A (Gas) (Wth. 1)	17.71	19.92
NZR Class A (Battery) (Wth. 1)	17.71	19.92
NZR Class A* (Gas) (Wth. 1)	17.71	19.92
NZR Class A* (Battery) (Wth. 1)	17.71	19.92
NZR Class A (Gas) (Wth. 2)	17.71	19.92
NZR Class A (Battery) (Wth. 2)	17.71	19.92
NZR Class A* (Gas) (Wth. 2)	17.71	19.92
NZR Class A* (Battery) (Wth. 2)	17.71	19.92

Acknowledgements

This project would not have been possible without the help of a number of individuals and communities, we apologise if we have left you off the list below.
The Goodman Family
Wilson Lythgoe
Richard Norton
Chris Dawson
George King
Dunedin Railways
Paul Jeffery
Canterbury Railway Society
Dave Hansen
Joe Pickering
Mike Rennie a.k.a. “Smokebox”
New Zealand Rail Geography Facebook Group
RailNZ Prototype Library Facebook Group
Ashburton Railway & Preservation Society
Jacob Stuart

And our long-suffering partners:
Chloe Gibbs and Christina Liefting

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