



Milepost Simulations



West Highland Line South Helensburgh Upper-Crianlarich-Fort William



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Introduction

The 98 mile long West Highland Line between Helensburgh and Fort William is arguably one of the most scenic railway lines in the British Isles with two impressive summits at County March and Corrour. The West Highland Line opened in 1894 giving Fort William a vital link to Glasgow and the rest of the UK.

The line was built by the West Highland Railway, with only a limited budget to build the line, and was operated by the North British Railway. The route has many gradients and tends to follow the contours of the terrain rather than having expensive large viaducts like the Highland main line to Inverness. During construction, there was difficulty constructing the gradient over the peat bogs of Rannoch Moor so the line is 'floated' on a foundation of tree roots, earth and ash.

The North British Railway later became part of the London North Eastern Railway (LNER) in 1921. In 1948 the LNER was nationalised into British Railways.

The route is set in the early 1980's when the line still had semaphore signalling before Radio Electric Token Block (RETB) was installed.

Route Guide

The route starts at Helensburgh Upper Station above the River Clyde before following the shore of Gare Loch. It passes through the closed stations of Rhu and Shandon before passing the naval base at Faslane which had a railhead during World War II. Today Faslane is where the UK's Trident submarines armed with nuclear missiles are based. Just beyond Faslane is Garelochhead Station, the first traditional West Highland Railway station with an island platform. After leaving Garelochhead the railway runs above Loch Long before turning away briefly for Glen Douglas, the first summit on the line at 564 feet above sea level. At Glen Douglas there is a rail-served MOD munitions depot with exchange sidings. Glen Douglas no longer has a station but there is still a passing loop. North of Glen Douglas the line descends above Loch Long to Arrochar before coming to Arrochar and Tarbet Station.

From Arrochar and Tarbet Station the line follows Loch Lomond. Running above Loch Lomond the line passes Loch Sloy hydroelectric power station. During the power station's construction there was a siding and station here. The line then crosses Creag an Ardain Viaduct, the only stone viaduct on the line, before entering Creag an Ardain Tunnel, the only tunnel on the line when it was originally constructed. The railway leaves Loch Lomond behind at Ardlui and starts its climb up Glen Falloch Summit before descending into Crianlarich.

Crianlarich is an important station with sidings and a shed and is now the junction for the Oban line. After leaving Crianlarich, the line crosses the former Callander and Oban line from Crianlarich (Lower) to Stirling. Crianlarich Lower is still in use (at the time of the route) as timber loading sidings. North from Crianlarich the vegetation changes as the terrain starts to become open moorland. The line climbs up to Tyndrum Upper station on the long gradient to County March Summit, between Ben Odhar to the East and Ben Bhreac-liath to the West. From the summit at County March the line descends down the side of Ben Odhar before rounding the Horseshoe Curve crossing two viaducts and following the side of Ben Dorain before coming to Bridge of Orchy Station.

At Bridge of Orchy Station the line starts the long climb up onto Rannoch Moor. A few miles north of Bridge of Orchy at Achallader the railway continues to head north while the A82 road turns to the west for a different crossing of Rannoch Moor, making the area extremely remote. At Gorton there is a passing loop and signal box. The line comes to Rannoch Station before crossing Rannoch Viaduct and going through Cruach Snow Shed (the only snow shed in the UK) before continuing to the Corroir Summit over the wilderness of Rannoch Moor. Corroir is the highest railway station in the UK with an elevation of 1350 feet above sea level.

From Corroir the line starts its long descent towards Fort William. The line drops down from Rannoch Moor alongside Loch Treig which was created when the Treig Dam was built as part of the hydroelectric scheme for the aluminium smelter at Fort William, where a pipeline runs from Loch Treig. At one time a narrow gauge railway existed between Loch Treig and Fort William to service the pipeline.

After passing the Treig Dam the line comes to Tulloch Station. From Tulloch, the line continues its descent along the River Spean. The line then passes through the Monessie Gorge before coming to Roy Bridge Station, the only open station, apart from Helensburgh Upper, with no passing loop. This is due to the fact the loop was removed in 1956. A few miles after Roy Bridge the line comes to Spean Bridge station. Spean Bridge was once a junction for the line to Fort Augustus at the southern end of Loch Ness. At one time the West Highland Railway planned to build through to Inverness, but this never happened and the line closed in the 1940's. The line then continues its final descent into Fort William below Ben Nevis.

Arriving in Fort William the line passes the Alcan aluminium smelter which is a vital user of rail freight over the line even today. The line then passes Mallaig Junction (now Fort William Junction) where the line to Mallaig turns off to the north. At Mallaig Junction there is a yard and Fort William Depot is just beyond the yard. The mainline continues into the new Fort William station, which was relocated in the 1970's to make way for the Fort William road bypass.

Railway Operations

Throughout the line's history there have only ever been 3-4 passenger trains a day from Glasgow to Fort William. South of Crianlarich, the number of trains increased when BR closed the Crianlarich to Stirling line in 1965 and rerouted the Glasgow to Oban trains over the West Highland Line south of Crianlarich.

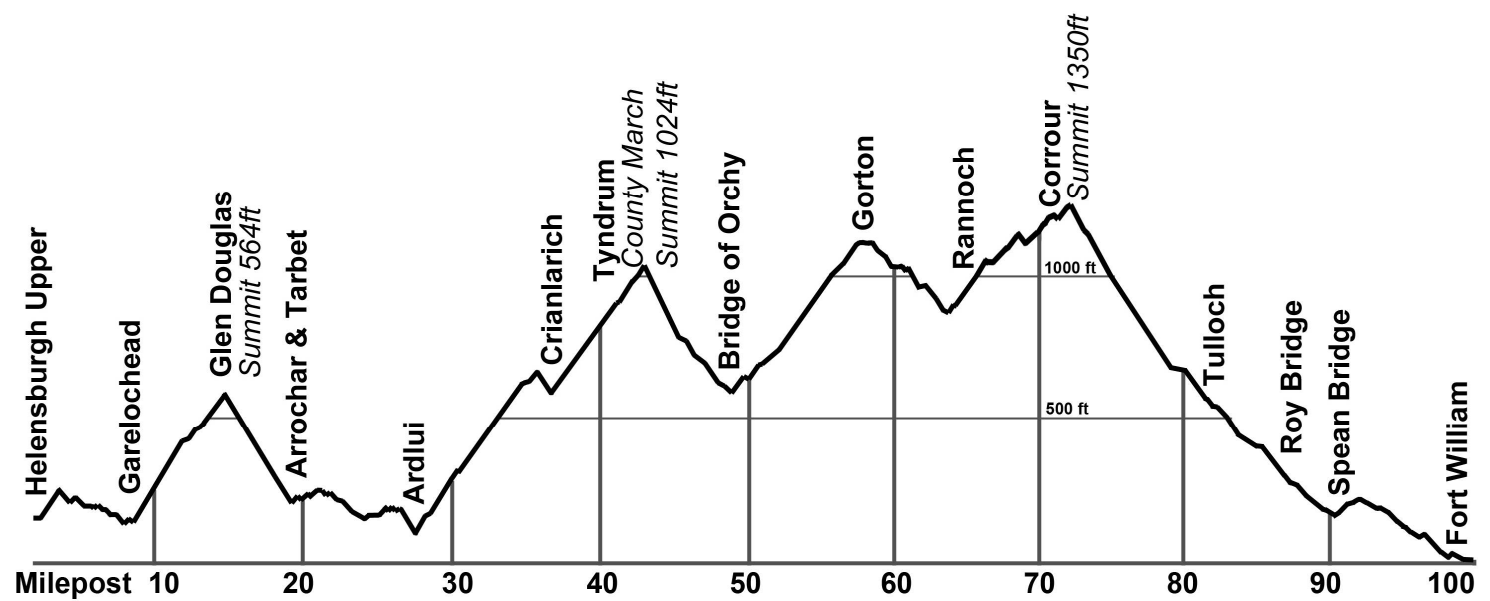
One of the more interesting passenger trains on the line is the through sleeper service from London. Originally starting from London Kings Cross, it was moved to London Euston in the late 1970's. During the period in which the route is set, the sleeping coaches were attached to the morning northbound and evening southbound passenger trains from, and to, Glasgow Queen Street. The through coaches to and from London Euston then went via Stirling and were attached to the London Euston to Inverness sleeper.

The line has always been a popular route for railtours and excursion trains which still run, mainly during the summer, even today.

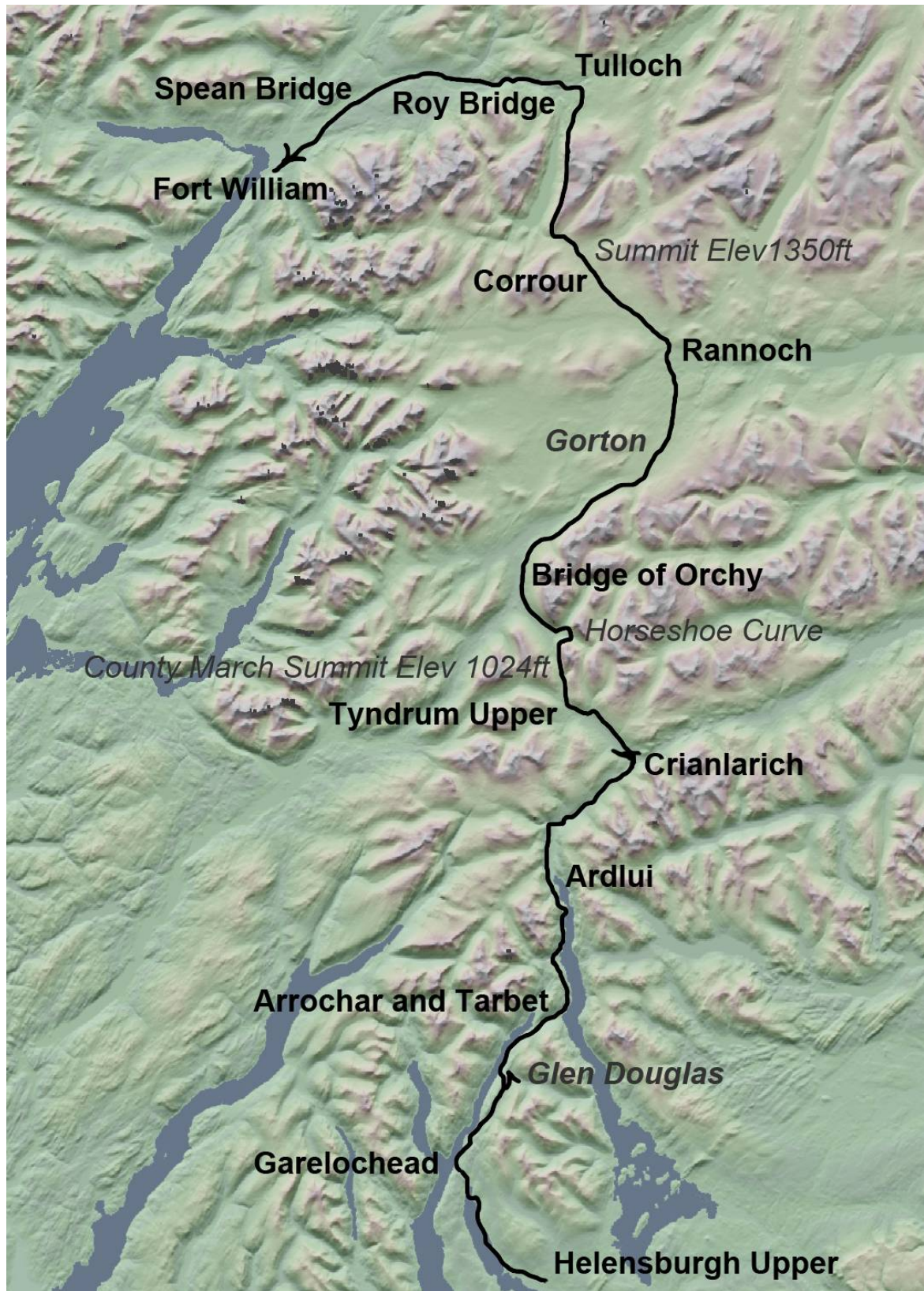
At the time, the line had a surprising amount of local freight for a rural line due to the roads being poor. Most of the freight was moved on Speedlink Wagonload freight

services between Corpach or Mallaig Junction Yard and Mossend. Freight customers included the MOD base at Glen Douglas, logs from Arrochar and Crianlarich, the aluminium smelter and the oil terminal at Fort William, as well as the paper mill at Corpach.

Gradient Profile



Route Map



Locomotive - Class 37



The Class 37 – or ‘English Electric Type 3’ – was ordered as part of the British Railways Modernisation Programme which began in the early 1960s. Introduced between 1962 and 1966, the class has operated on all parts of the UK railway network over the following 50 years. Construction of the 309 locomotives was split between English Electric’s Vulcan Foundry in Newton-le-Willows, and Robert Stephenson & Hawthorns’ of Darlington. The locomotives were initially numbered D6700–D6999 and D6600–D6608 which were later renumbered 37001-37308.

They became the mainstay of locomotive power for InterCity services in East Anglia and later around Scotland, while also working secondary and inter-regional routes for many years.

Designed for both freight and passenger services, the Class was as much at home hauling a heavy goods train as it was pulling passenger coaches. The Western Region even made attempts to convert several examples for 100mph operations.

Type 3 locomotives were originally fitted with boilers for steam heating, but with the withdrawal of non-standard Type 2 and 3 locomotives these were removed and only a select number were fitted with electric train heating equipment. Heavy overhauls of the class took place throughout the 1980's with the intention of prolonging the life of many examples well into the 1990's and beyond.

The Class 37's provided with this route feature Eastfield allocated Class 37/0's between 1980 and 1985.



The three liveries included are;

Basic BR Blue

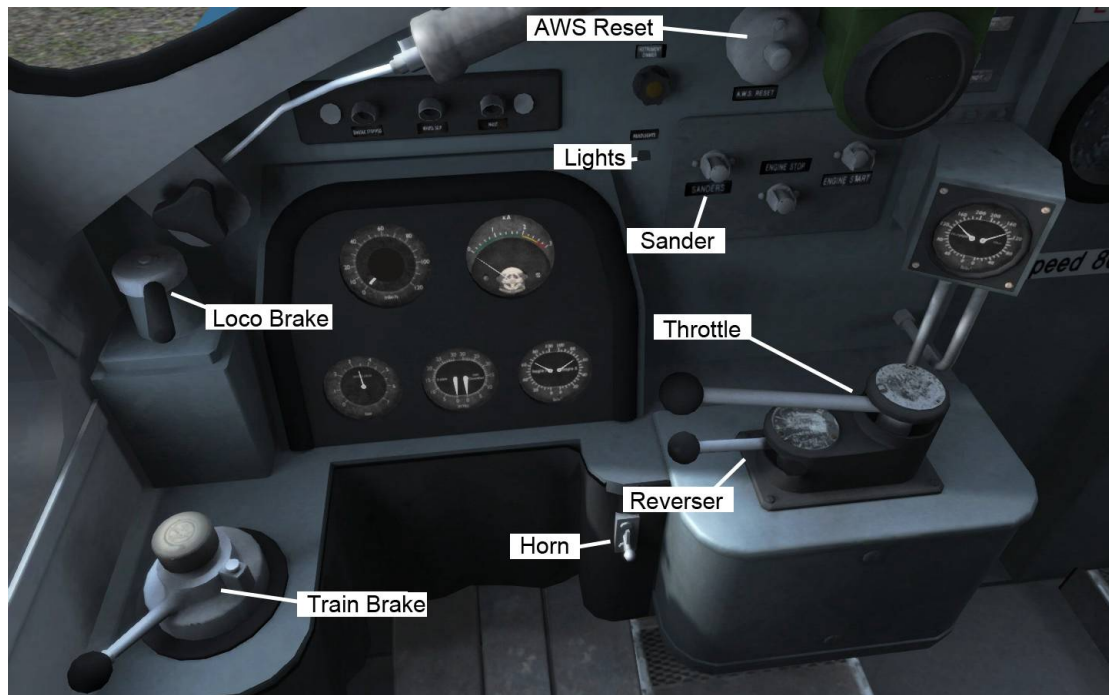
BR Blue with White Stripe which was applied to a few Eastfield based Class 37's in the early 1980's.

BR Large Logo The popular livery was applied to many of the Eastfield based Class 37s starting around 1983.

The table below shows the names and liveries of the Eastfield allocated Class 37/0 included which would have worked the route in the 1980-1985 period.

Number	Name	BR Blue	BR Blue Stripe	Large Logo
37011		✓		✓
37012	Loch Rannoch	✓	✓	✓
37014		✓		
37017		✓	✓	
37018		✓		
37022		✓	✓	
37026	Loch Awe	✓		✓
37027	Loch Eil	✓	✓	✓
37033		✓		
37037		✓	✓	
37039		✓	✓	
37043	Loch Lomond	✓	✓	✓
37051		✓		✓
37081	Loch Long	✓	✓	✓
37085		✓	✓	✓
37090		✓		
37108		✓		
37111	Loch Eil Outward Bound	✓	✓	✓
37112		✓	✓	

Locomotive Controls



The diagram above shows the main controls of the Class 37.

Key board shortcuts

Control	Apply	De-Apply
Reverser	W	S
Throttle	A	D
Train Brake	'	;
Loco Brake]	[
Lights	H	Shift + H
Sander	X	
Horn	Space	

Driving the Class 37/0

The locomotive as modelled has been carefully designed to be driven in the same way as the real thing. Extra care must therefore be taken in some areas, compared to most locomotives in Train Simulator.

As with all diesel-electric locomotives of its era, the diesel engine delivers power through a large electrical generator which is in turn connected to traction motors attached to each axle. There is no mechanical connection between the engine and the wheels. A smaller generator mounted alongside the main generator provides power for auxiliary systems, such as lights and compressors.

The power handle on this locomotive operates in two stages. In the first part of its travel, the engine is held at idle speed and the torque imposed on it by the generator is controlled proportionately to the handle position. In the second part of its travel, the torque permitted is at the maximum value, and the rotation speed of the engine is controlled by handle position. An automatic load regulator controls the generator's output voltage in order to match the demanded torque value. With higher generator torque or engine speed, more electric power is delivered to the traction motors.

Power delivery is indicated on the main ammeter (pictured). Drivers should avoid operation in the YELLOW arc for more than one hour in each duty, and in the RED arc at all times. Operation in the RED arc may trigger the overload protection relay; if this occurs, return the power handle to OFF, wait for the load regulator to return to the lowest position (which may take several seconds), and then reapply power more cautiously.

As the speed of the train increases, the voltage available from the generator becomes insufficient to maintain full power. The traction motors therefore automatically transition into three successive stages of weak-field operation when the load regulator reaches its maximum position. These weak-field stages slightly reduce the efficiency of the motors, but greatly reduce the voltage they need at high speeds. Drivers may notice a brief fluctuation in tractive effort when weak-field stages are taken or removed, and the ammeter reading will also settle on a new value.

Brakes

The Class 37/0 is fitted with a standard BR dual air/vacuum braking system. Most trains these days are air fitted, but the procedure for working vacuum-fitted trains is similar. There are two brake handles, one each for the train brake and the straight-air brake.

The train brake handle has the following positions, indicated on the HUD:

Emergency

The brake pipe is completely vented, causing the brakes throughout the train to be applied as hard and as quickly as possible. Recharging the brake pipe from this condition can take a substantial amount of time on a long train.

Full Service

The brakes are applied fully and at a normal pace throughout the train, and the brake pipe gauge will indicate approximately 3.5 bar. There is a detent to help avoid accidentally pushing the handle beyond this position and into Emergency.

Apply 1-99%

In this range, the train brakes can be controlled in intensity (between the levels defined by Full Service and Initial) without restriction. Drivers are reminded that longer trains will respond more slowly to changes in brake pipe pressure, and will thus require earlier operation of the brakes.

Initial

This is the minimum setting before the train brakes must be completely released. A lower setting would result in brake shoes not reliably pressing against the wheels of the train.

Running

In this position, the brakes throughout the train are fully released. The brake pipe gauge will settle on 5.0 bar under normal conditions.

Release

This is a spring-loaded position in which the handle can be held (using the ';' key or the mouse). When released, it will fall back into the Running position. It is used for rapidly releasing the brakes, and for overcharging the brake pipe to calibrate the train's distributor valves. See the brake overcharge procedure laid out below for details.

The straight-air brake can be continuously varied between 0-100% without restriction. It directly controls the brakes on the locomotive only, and thus responds more quickly but with less force than the train brake. Since the train brake also applies the locomotive's brakes, drivers are reminded not to use the straight-air brake alone to control the speed of the train, except when running light engine.

Drivers will note that the brake pipe will take some time to fully respond on long trains, and should think ahead accordingly. It is always better to brake too early or too much than to overrun a stopping point or the onset of a speed restriction. For small reductions in speed, a slight application of the brake (eg. in Initial) is usually sufficient.

Starting a Train

When the power handle is moved, it may take several seconds for the load regulator and engine speed to settle on the demanded power output. Drivers should resist the temptation to immediately throw the throttle wide open from a standing start, as this is likely to result in an overload condition. A more cautious approach is especially recommended with a heavy train, in difficult conditions, or when shunting.

To start a heavy train on a rising gradient, it will be necessary to hold the train on the straight-air brake while the train brake is released. Only when the train brake is fully released should you take power; when the locomotive develops sufficient power to start the train, release the straight-air brake. Power may then be increased as necessary.

If, however, the train begins to roll backwards down the hill, you **MUST** close the power handle immediately to avoid damage to the locomotive. Use the train brake to bring the train to a stand, check that the straight-air brake is fully applied, and try again.

Train Division in Motion

If the train should divide while in motion, the brake pipe will part at that point, releasing all pressure (or vacuum) to atmosphere and thus automatically applying the brakes on both portions of the train. This automatic operation of the brakes has been mandatory on passenger trains since 1892, and is now standard practice on freight traffic as well.

Such an occurrence will be indicated on the brake gauges as for an emergency application, even though your brake handle may still be in Running or even Release. You should immediately move the power handle to OFF and the brake handle to Full Service, and wait for the train to come to a complete halt.

Your secondman will then examine the train, which may take several minutes, after which he will close the brake pipe at the far end of your portion of the train. With the brake handle in Full Service as instructed above, you will then notice the brake pipe pressure rise slowly as the brake system recharges. You may then proceed to cautiously recover your lost wagons and resume your journey.

Overcharging the Brake Pipe

Different locomotives charge their brake pipes to slightly different pressures, and small leaks along the train cause a slight pressure gradient, resulting in the pressure seen at the far end being slightly less than at the locomotive. In order to avoid dragging brakes - which is dangerous as well as inefficient - drivers are required to perform a Brake Overcharge Cycle whenever taking over a prepared train, after shunting to reverse direction, or when fresh vehicles are coupled to the train. This automatically recalibrates the distributor valves throughout the train to conform to the correct brake pipe pressure.

While some of the latest locomotives are fitted with automatic systems which perform a Brake Overcharge Cycle at the push of a button, the Class 37/0 is a veteran stalwart which requires a little more attention from drivers:

- 1) If the train must be held stationary, apply the locomotive brake fully ('J' key).
- 2) Move and hold the train brake handle to the Release position (hold ';' key) until the brakes are fully released, and then for ONE MINUTE further. The brake pipe pressure will be seen to rise appreciably above the normal 5.0 bar.
- 3) Allow the brake handle to return to the Running position. The brake pipe pressure will now slowly return to 5.0 bar over a period of several minutes. When this has completed, the overcharge cycle is complete.
- 4) If it is necessary to make a train brake application before the pressure has fully returned to 5.0 bar, then the Brake Overcharge Cycle procedure must be restarted from the beginning when next releasing the train brake.

Drivers please note that this procedure has no effect on vacuum braked trains, on which an equivalent calibration is performed by pulling the manual release valves on each vehicle. This task is performed by ground staff when required, and is not the driver's concern.

Passenger Rolling Stock - Mark 1



The Mark 1 coach was the standard coach built by British Railways between 1951 and 1963 to replace older pre-nationalisation coaches. They were the principal coaches on many lines from the 1950's through to the late 1980's.

The route includes the following blue and grey liveried Mk1s: BG, BSK, FK, RMB, SK, SLC, SLF, SLSTP, TSO.

Freight Rolling Stock



The route includes a selection of freight rolling stock with various loads that would have worked freight on the line in the early 1980's including a OAA, OCA, VDA and YGH.

Scenarios

As well as the Career and Free Roam Scenarios the route is set up for Quick Drive so you can start at any station on the line and head in either direction. The Career Scenarios are based on BR Scottish Region working timetables in the early 1980's.

Standard Scenario - West Highlander Railtour

The 4 part West Highlander Railtour gives you a guided tour of the route. Each of the 4 parts lasts roughly 45-50 minutes.

Part 1 - Helensburgh Upper to Ardlui

Part 2 – Ardlui to Bridge of Orchy

Part 3 - Bridge of Orchy to Corrour

Part 4 – Corrour to Fort William

Career Scenarios

Autumn over Rannoch Moor Rannoch to Fort William

Time: 70 minutes **Rating:** Easy **Season:** Autumn

Take a northbound passenger train from Rannoch to Fort William.

Crianlarich Timber Pickup Tyndrum Lower to Crianlarich

Time: 30 minutes **Rating:** Hard **Season:** Spring

Take the Oban-Mossend freight from Tyndrum Lower to Crianlarich Lower to pickup some loaded timber wagons before going to Crianlarich (Upper) Station.

Evening Sleeper Fort William to Rannoch

Time: 70 minutes **Rating:** Easy **Season:** Summer

Take the evening southbound passenger, with through sleeping coaches for London Euston, south from Fort William to Rannoch on a rainy highland evening.

Glasgow Bound Tyndrum Lower to Garelochhead

Time: 70 minutes **Rating:** Easy **Season:** Winter

Take the morning Oban to Glasgow passenger service from Tyndrum Lower to Ardlui on a winter's morning.

Glen Douglas Pickup Glen Douglas to Helensburgh

Time: 35 minutes **Rating:** Medium **Season:** Autumn

Shunt the Mallaig Junction to Mossend Speedlink service (7D19) at Glen Douglas and then continue to Helensburgh Upper where a crew change takes place.

Morning Ballast Gorton to Crianlarich

Time: 45 minutes **Rating:** Medium **Season:** Autumn

Take a ballast train from Gorton to Crianlarich dropping off some wagons at Bridge of Orchy

Morning Speedlink

Mallaig Junction to Corrour

Time: 55 minutes **Rating:** Medium **Season:** Winter

On a snowy winter's morning take a late-running Mallaig Junction to Mossend Speedlink freight service (7D10) as far as Corrour.

Oban Bound

Helensburgh to Crianlarich

Time: 75 minutes **Rating:** Easy **Season:** Spring

Take the 08:20 Glasgow to Oban train (1Y11) from Helensburgh to Crianlarich on a foggy spring morning.

Sleeper Over Rannoch Moor

Crianlarich to Tulloch

Time: 90 minutes **Rating:** Medium **Season:** Summer

Take the Euston to Fort William sleeper service (1S07) from Crianlarich to Tulloch on a sunny Highland morning.

Winter Over County March

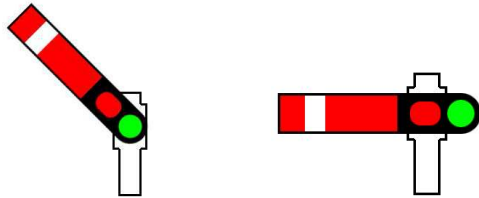
Bridge of Orchy to Ardlui

Time: 50 minutes **Rating:** Medium **Season:** Winter

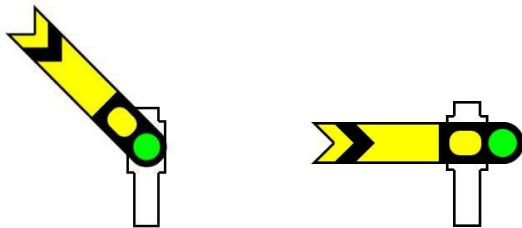
Take a seasonally-short Fort William to Glasgow passenger train on a winter's afternoon from Bridge of Orchy as far as Ardlui.

Signals

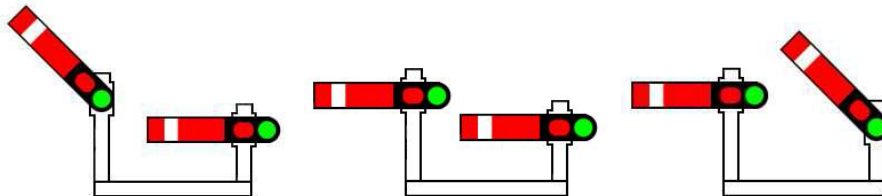
The entire route apart from Fort William station uses semaphore signalling. In the era in which the route is set, token exchange was also required at all passing places so the speed limit through each passing place is set to 15mph. If you are expecting a clear signal and for any reason do not get one you can press 'T' to request permission to pass a signal at danger. Note AWS is not installed on the route as it was not installed on the West Highland Line until after the period in which the route is set.



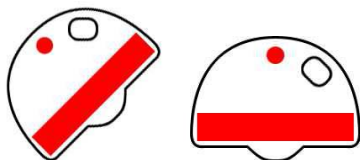
Home Signal - Signal in up position means line ahead is clear. Signal in horizontal position means line ahead is blocked.



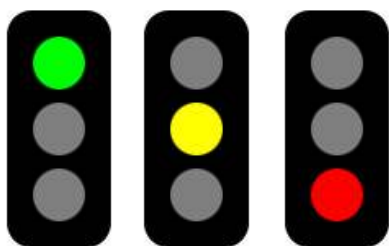
Distant Signal - Signal in up position means following Home signal is clear. Signal in horizontal position means the following Home signal is at danger and you should be prepared to stop.



Junction Signal – The left signal in up position means the left hand line is clear. The right signal in the up position means the right hand line is clear.



Shunt Signal - Shunt signals act like normal semaphore signals. Note shunt signals can be combined at junctions with standard semaphore signals to control access to a less important line or siding.



Colour Aspect (Fort William only) - Green means the line is clear. Yellow means the next signal red. Red means line blocked.



Colour Aspect Shunt Signal (Fort William only) - A lit shunt signal means you have permission to move forward to perform a shunt move.

Signage



Speed Signs - The change of a speed limit. If it is combined with an arrow then it only applies to the track turning off in the direction of the arrow.



Mileposts - The distance in miles from Craigendoran Junction (just under 2 miles South of Helensburgh Upper station). Between Crianlarich and Tyndrum Lower they indicate the distance in miles from Callander on the now closed line.



Whistle Sign - The horn/whistle must be blown normally for an upcoming level crossing.

Credits

Route created by Jonathan Lewis.

Thanks must go to the following people for helping out with various aspects of the route.

Alan Thomson

Jonathan Morton

Jeffrey Douglas

Thanks must also go to all the beta testers that have helped test and provide feedback on the route.