GWR Steam Railmotor

Contents

Introduction

Thank you for purchasing the GWR Steam Railmotor DLC for Train Simulator.

The locomotive design is unusual, albeit the forerunner of more modern diesel and electric multiple units, and in Advanced Mode should provide an experience like no other to date.

Please read the manual thoroughly, especially to get the best from Advanced Mode, and enjoy reliving a piece of railway history.

All the best,

Pete Gillam (karma99 on Steam and various forums)

Victory Works

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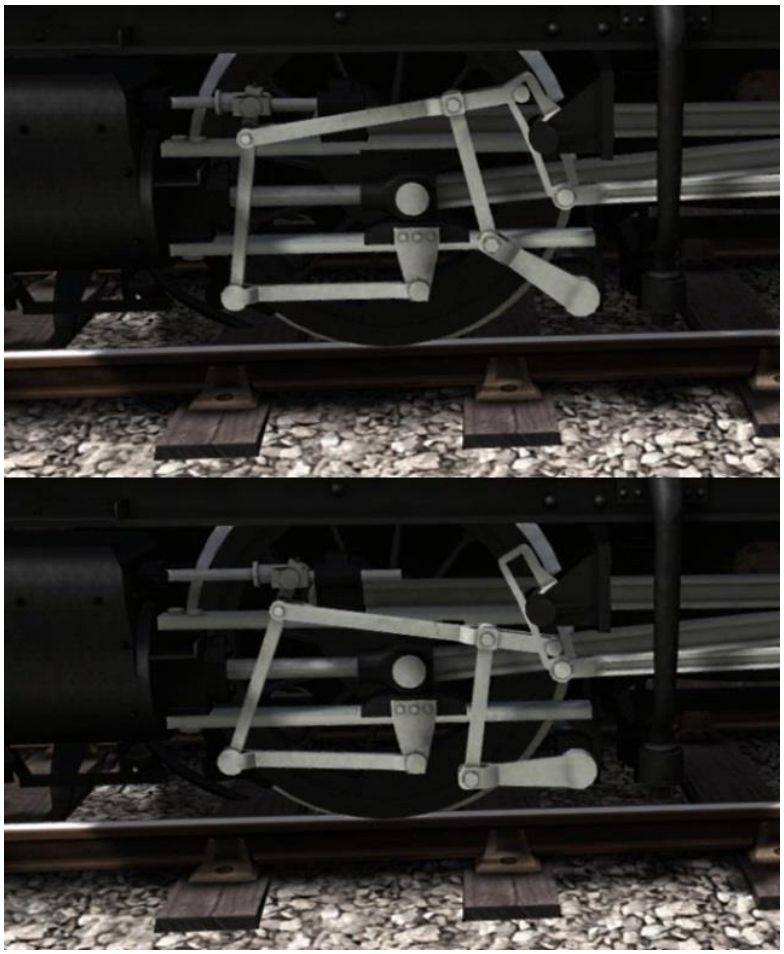


Features

- Unique style of steam locomotive provides unique driving challenges
- Simple, standard and advanced driving modes
- Xbox controller support ***SIMPLE AND STANDARD MODES ONLY***
- Two completely different driving cabs ***STANDARD AND ADVANCED MODE ONLY***
- Two very different driving experiences ***ADVANCED MODE ONLY***
- Simulated steam chest ***ADVANCED MODE ONLY***
- Cylinder cock management when driving from the front cab ***ADVANCED MODE ONLY***
- Boiler management with priming possible ***ADVANCED MODE ONLY***
- Notched reverser (front cab) and regulator (rear cab) ***ADVANCED MODE ONLY***
- Animated valve gear with two forward and two reverse positions
- Dynamic steam and smoke colour and quantity
- Dynamic driver location based on direction of travel
- Opening cab doors, windows and roof hatch
- "Hand operated" window wipers ***ADVANCED MODE ONLY***
- Lighting throughout the carriage and additional firebox effects
- Custom sound sets for each driving cab
- Dynamic destination boards can be set to any location via scenario locomotive number (up to 12 characters)
- Refuelling via coal sacks and water hose
- Ground platform support with animated steps using special scenario marker – requires ground level platforms to be added/included with route
- Power bogie test rig as a standalone, driveable locomotive with all control animations and drive motion visible from external and driving views

Background

The GWR railmotor came into existence at a time when the railways were starting to encounter competition from electric street tramcars and motor buses. A better service was needed urgently on suburban routes and branch lines and after success was had with steam railmotor units by the London & South Western Railway in Southsea the GWR followed suit.

The design was similar to a standard passenger coach but with a boiler attached directly to a driving bogie at one end as a “standalone” power unit and a rolling bogie with a rear vestibule cab at the other for driving in reverse.

In total the Great Western Railway built 99 steam railmotors, numbered from 1 to 99 between 1903 and 1908. There were many designs and the locomotive represented here is of the Q diagram which were numbered from 73 to 80 and built in 1906.

There were actually 112 power units built and these could be exchanged during maintenance.

The design provided some unique challenges, primarily being the distance between the driver and the fireman when being driven from the rear cab (vestibule). This normally symbiotic relationship had to be conducted via a series of bell pushes and the fireman's duties were greatly increased when the driver was at the other end doing little more than accelerating or braking.

Meanwhile the driving cab was far from standard with a vertically mounted boiler providing power directly to the rotating bogie below it via Walschaerts gear which meant that the driver’s and fireman’s controls, usually mounted on a static back head, would rotate with the boiler/bogie combination making coaling while in motion very difficult. In addition to the movement the firebox hole was very small, very low down (slightly below the floor) and when the firebox doors were opened while the locomotive was moving the extreme draught would cause the fire to lose all temperature and could also cause the pipes in the boiler to crack. Due to these reasons the steam railmotors were only coaled during stops.

The railmotor also had other unusual features such as walk-over seats which could be flipped for travel in either direction, a handbrake in both cabs and sander on both the powered and rolling bogies, retractable steps for stopping at ground level stations so the passengers could ascend to the doorway and a hand operated windscreen wiper in both cabs.

Despite all these oddities the railmotors lives were short lived due to other issues.

The relatively small passenger accommodation was a problem during busy periods. To counter this, trailers were constructed with remote cabs and linked driving equipment however after adding the extra weight of these the power from the small boiler was insufficient, especially on longer routes that had steep gradients. The need for frequent servicing of all steam engines meant that the railmotors could be unavailable when required for frequent passenger services and due to the dirty nature of steam locomotive maintenance it was found that keeping the passenger areas clean was very difficult and time consuming.

Most railmotors were converted into auto-coaches which also had remote cabs but were attached to a standard steam locomotive fitted with special linking equipment and the power units were scrapped. An Auto-train had the benefits of a railmotor but was much more flexible and easier to maintain. The first GWR railmotor was withdrawn in 1914 and the last in 1935.

Interest in these short lived forerunners to modern DMU/EMU's has recently been renewed due to the hard work in restoring GWR railmotor No. 93 (and its trailer No. 92) to full running order.

Scenarios

5 scenarios are included for the West Somerset Railway DLC.

More scenarios will be added to the Steam Workshop, including some using custom versions of routes with added ground platforms (see section below)
http://steamcommunity.com/profiles/76561197993421982/myworkshopfiles/

The locomotive running in both directions and bogie test rig are also available in Quick Drive.

SRM 1] What on Earth?

After a lot of hard work the power bogie for GWR Steam Railmotor No. 80 has been restored to running condition and it's now time for testing.
You're task today is to drive it - very carefully - from the shed at Washford to Minehead for further inspection before it can be added to the coach frame.

SRM 2] Trials and Tribulations

Railmotor No. 80 has been restored and is ready for her main test run.
Your job is to make sure everything is working correctly and deal with any problems that happen along the way.

SRM 3] The Big Day

Today is a very special day.
It is the inaugural run of GWR Steam Railmotor No. 80 which has been restored through much hard work and is going to drive as much of the passenger route of 1911 from Minehead to Taunton as possible.
You are tasked with the first part from Minehead to Williton where another driver will take over.
As well as your passengers who are all dressed in period costume there are lots of other activities on the railway today for photo opportunities including a special freight train.

SRM 4] And the rain came down – There

A wet Saturday in October and you are driving the 14.20 service to Minehead stopping at all stations between Bishops Lydeard and Minehead on the real WSR 2013 Green timetable.

SRM 5] And the rain came down – Back

Drive Railmotor No. 80 backwards using the rear vestibule cab to Bishops Lydeard using the real WSR 2013 Green timetable.
This is the return journey on the same wet October Saturday. It looks like the rain might have stopped for the moment though.

This scenario is especially challenging in ***Advanced Mode***
Please read the appropriate section below for full details on this realistic simulation option.

Control Modes

There are 3 ways to drive the Steam Railmotor

Simple Mode

This is selected using the menu in Train Simulator and provides a simple stop/go, forwards/backwards set of controls via the simulators built in HUD.

Standard Mode

This is the default mode if you choose to drive in Expert mode using the Train Simulator menu. The locomotive will operate with more complex controls and can be driven just using the F4 HUD or an Xbox controller.

Advanced Mode

This is an advanced mode for those who want a more realistic experience and introduces features such as condensed water in the cylinders, overfilling the boiler, notching of the reverser or regulator and a completely different driving experience in the rear vestibule. To achieve these extra functions using a keyboard is required, although this can be used in conjunction with mouse operation of the F4 HUD.

Auto-fireman is best set to OFF to use this mode. An “intelligent” fireman will take over whilst driving from the vestibule; from the driving cab it’s just more fun for you!

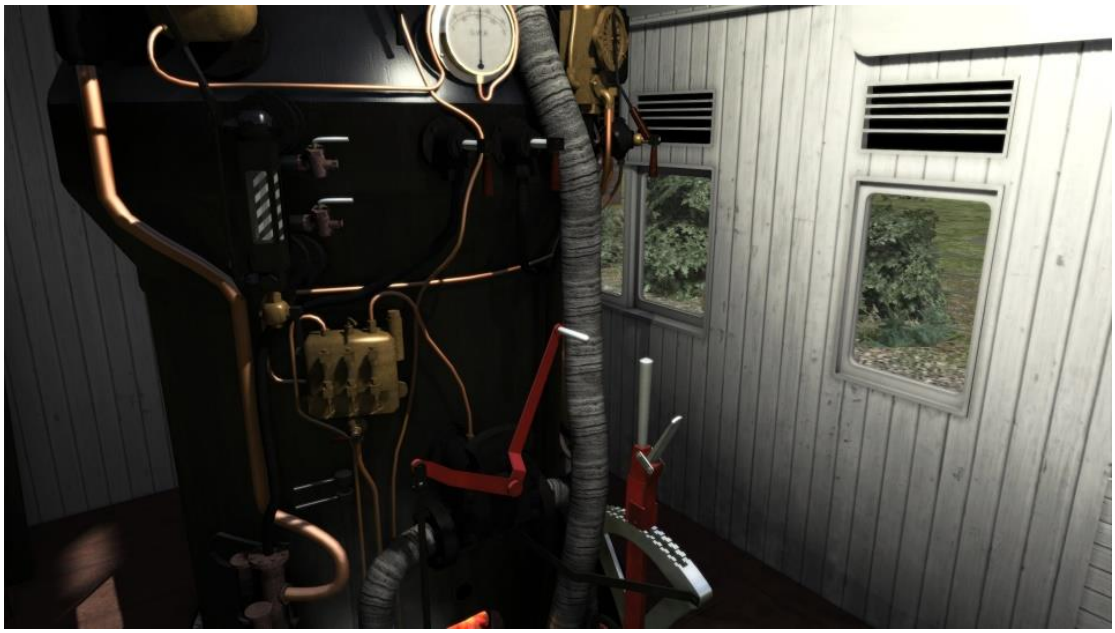
To enter Advanced Mode you can press Control A at any time, and this will also turn it off again.

The ***Advanced Mode*** controls and features are denoted below.

Hard-core Mode

There is no setting for this but if you use the F3 HUD (or no HUD at all!) and drive in Advanced Mode using only the cab controls via the mouse (no keyboard or Xbox controller) then you can consider yourself hard-core! You probably spend your spare time patting your head, rubbing your stomach and solving quadratic equations at the same time, and Victory Works salute you!

Driving Cab Controls



This is the primary driving cab of the railmotor. It contains the boiler with all of the controls mounted on it and a bunker full of coal.

Listed below are the controls available when driving in standard and advanced modes, with notes on additional information that is unique to advanced and will be required to drive the locomotive in this mode.

1. Regulator

This controls the amount of steam allowed into the cylinders, hence directly controlling the speed in conjunction with the reverser.

Keys: A,D

Advanced Mode

The steam chest is simulated. This will add a small delay and smoothing to the increase and decrease of the regulators power.

2. Reverser

This is like the gears on a car. It is usual to start with the reverser set at 75 percent cut-off (fully forwards), at the maximum travel of the mechanism. As you pick up speed it is usual to set it to reduce the cut-off. This allows economic driving as well as decent speed whilst hauling a load.

Keys: W,S

Advanced Mode

Please note to move the reverser successfully, the regulator must be nearer to closed than fully open. Failure to do so will ensure that when the reverser lock is removed the reverser will be thrown out of your hands to the bulkhead putting it in full cut-off.

To move the reverser requires the hand lock to be taken off. To do this, press and hold the E key on the keyboard, move the reverser to the required position, and then release the hand lock (let go of the E key). Because of this speed is usually controlled more by the regulator than is common on screw reverser equipped locomotives. Due to the difficulty in changing the position, ensure you select a cut-off that you won't need to adjust before you reach the beginning of the gradient. Failure to assess the gradient correctly may result in a stall.

Key: E

3. Cylinder Cocks

Advanced Mode

Never move away from more than a short standing start without ensuring that these are open. When a locomotive sits static for any amount of time, water condensation builds up in the cylinders. Thus when the piston is in motion, and because water does not compress, the cylinder will explode.
The cylinder cocks are designed to expel this condensed water and should be opened for at least 4 turns of the locomotive wheels when the locomotive sets off after being stationary for some time.
If you own the GWR 56xx DLC, this version of the cylinder cocks condensation has a longer delay before starting and is more forgiving. You will need to clear them at the start of a scenario (the assumption that you've been stationary a while) and then on long stops of more than 2 minutes.

Key: C

4. Firebox

Ensure the firebox doors are fully open to allow maximum stoking. A related tool is the coal box door in the coal bunker. When the firebox door is open, pull the coal box door open to regulate the input of coal into the firebox.

Key: F
Keys: R, Shift R (stoking)

Advanced Mode

Due to the sudden rush of cold air into the vertically mounted firebox/boiler and the motion and very low position of the firebox hole, Steam Railmotors were only stoked while stationary. Due to this the firebox doors and coal door will not open while you are moving so you will need to pile on as much coal as possible during stops.
Note: Although the F4 HUD “coal button” can be clicked and will illuminate, the fire doors and coal door will not open and no coal will be added to the fire while moving.

5. Blower and Boiler Pressure Gauge

The most useful application of the blower is when the regulator is at idle. Since there is no throughput of steam when at idle, air flow is minimised and therefore the fire loses heat. In some circumstances (such as when the safety valve is going off) this is acceptable but if you need to get some pressure into the boiler while the regulator is closed then fully opening the blower will force air over the fire, increasing temperature and then boiler pressure. It is good practice to turn off the blower again when you open the regulator to save on unnecessary steam usage.

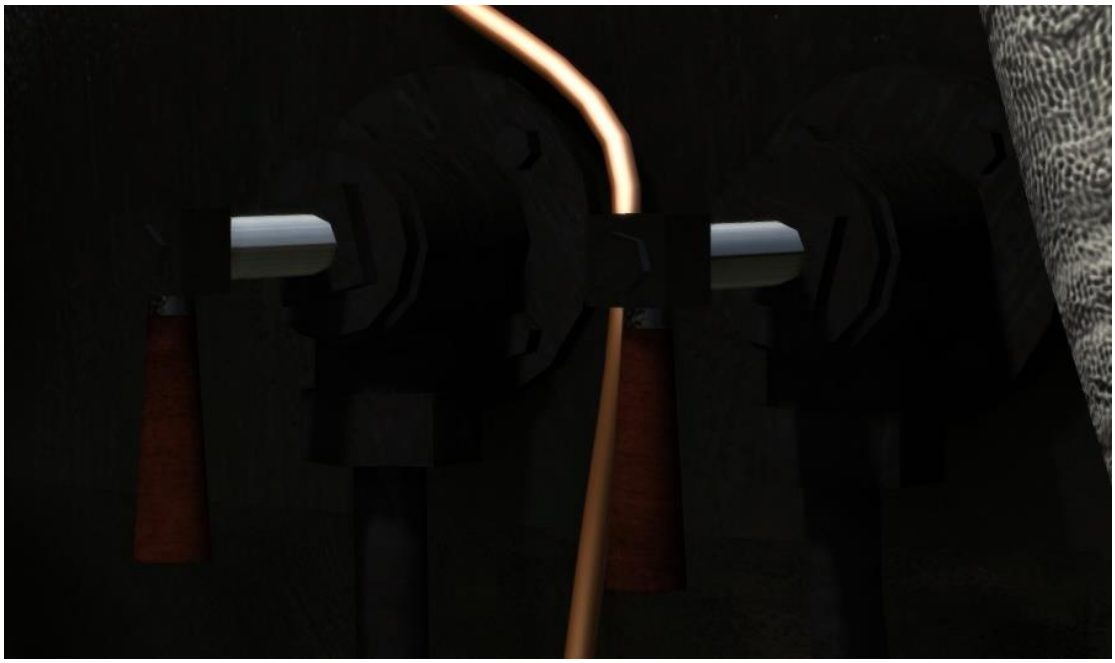
Keys: N, Shift N

The boiler runs best at around 150-155 psi. At 160 psi the safety valve will start to hiss gently as the pressure builds, releasing a small amount of steam. At 165 psi the safety valve will open and the excess steam will vent quickly and noisily. If the boiler is still continuing to gain pressure a second larger valve will open at 170 psi. Both valves close again when the boiler is under 160 psi.

6. Damper (right of image)

Another tool related to the firebox. This helps control the heat of the firebox, closing it will reduce the air flow through the fire, thereby lowering heat and steam production. Opening it will allow more air in, hence producing more heat and steam.

Keys: M, Shift M



7. Exhaust injector (left of picture)

This takes steam from the cylinders and recycles it to blast water from the tank into the boiler. It's a method preferable when you are running low on steam, but want more water.

Key: I

Live steam injector (right of picture)

Performs the same task as the Exhaust injector but uses live steam from the boiler, rather than exhaust steam. This is the preferred method when you have lots of steam and you want to transfer water from the tank into the boiler quickly.

Key: O

8. Live (upper) and Exhaust (lower) water taps

Ensure each of these is open for the appropriate Live or Exhaust injector control
Keys: K, Shift K / L, Shift L

9. Boiler Gauge Glass

A pipe attached to the boiler leading to a strong glass tube indicating the level of water that is currently in the boiler. If this reaches the bottom then the fusible plugs will melt and relieve the boiler pressure whilst providing a warning to the locomotive crew.

Advanced Mode

Overfilling the boiler (past 100%) at high pressure can force water into the cylinders and cause the same problems as having condensed water from standing still. If you overfill the boiler open the cylinder cocks immediately and leave them open until the water level in the glass drops below full.

10. Vacuum Brake and Brake Pressure Gauge

The vacuum brake is used to pull the brake pads away from the wheels by creating a vacuum in the pipes connected to them. The brake in the driving cab has 3 settings, brake off which forces a vacuum into the pipes and takes the brakes off, brake on which lets air into the pipes and applies the brakes, and brake running which holds the vacuum steady at its current pressure.
The brake pressure gauge shows the current pressure in the system, from 0 (on) to 25 (off).

Keys: ‘ (apostrophe), ; (semicolon)

11. Sander (left of image)

The sander assists in starting without slipping and also halts slips when ascending hills covered with leaves or light snow.

Key: X, Shift X

12. Whistle

Steam train whistles are powered by steam from the boiler and are used to signal a trains approach, warn of danger and often to signify departure.

Key: Space

13. Handbrake

A hand operated screw that applies the brakes to the power bogie without the need to release the vacuum in the brake pipes. Unusually mounted in the coal bins at the front of the cab, in reality these were rarely used on railmotors with the vacuum brake being sufficient.

Key: /

14. Wiper

Above the driving window (left) is a hand operated wiper. This can be used to clear rain, snow and dirt directly in the driver's view.

Key: V

Advanced Mode

 Release Version 1.0

In advanced mode the wiper operates in a single sweep for each key press or wiper click as a hand operated wiper would do. The F4 HUD wiper button still runs continuously as this cannot be overridden - you should not use it in Advanced Mode, that's cheating!

15. Train heating equipment

The Masons Valve and fine adjustment controls are used for the application of steam heat through the passenger compartments. Click and drag with mouse.

16. Ventilation

Working in the cab of any steam locomotive is hot work. To aid in the comfort of the crew you can open any windows, doors or the roof panel. Click and drag with mouse.

17. Lights

The lights in the railmotor have 3 settings: off, lamps and passenger area on, cab lights on. Sometimes when driving at night when the lamps are required to be lit it is necessary, due to glare on the windows, to have the cab lamps turned off.
The lamps will show clear (front) or red (back) based on the current cab being used.

Key: H, Shift H

18. Passengers

Passengers in the railmotor travel between the two driving cabs and have middle doors to enter and exit the coach areas. There is also a luggage storage area with doors opened by the guard.

Key: T

Rear Cab (Vestibule) Controls

To change driving ends in the railmotor press Ctrl and = together.
IMPORTANT: ONLY do this when the railmotor is stationary. If you change cabs in motion you may end up in the wrong appearance cab and/or have all of the controls locked out.

You will also want to press the right arrow key so you can drive from the right hand side – especially if it's raining as this side has the windscreen wiper.

1. Regulator

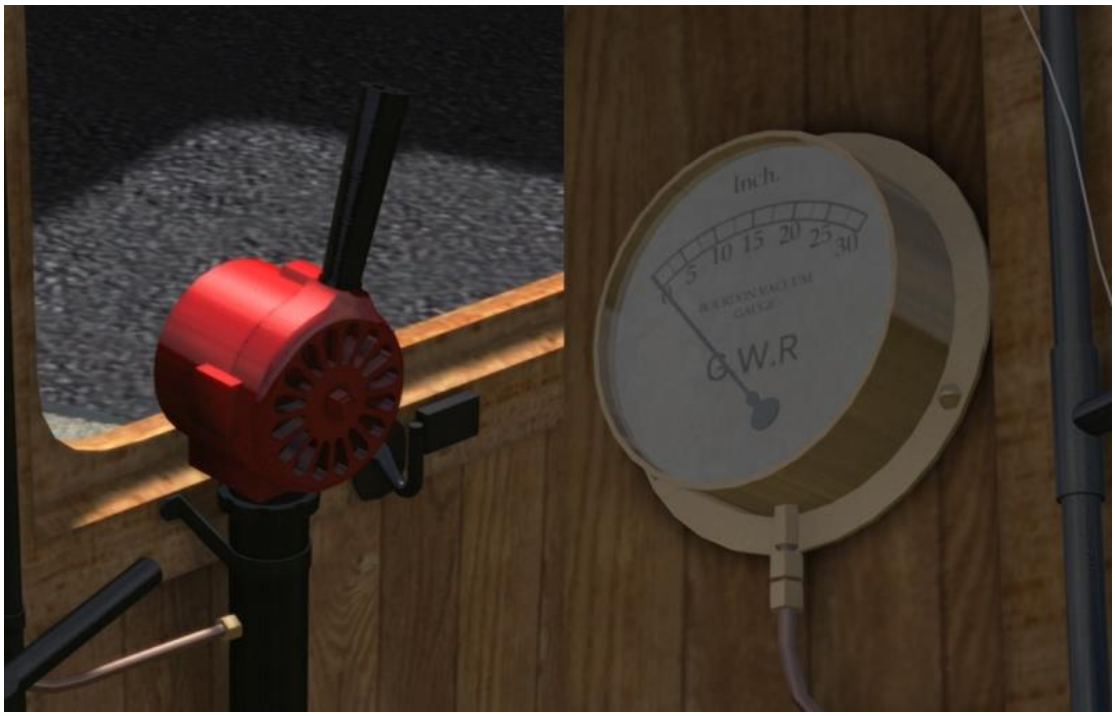
This controls the amount of steam allowed into the cylinders, hence directly controlling the speed in conjunction with the reverser.
Keys: A,D

Advanced Mode

To move the regulator requires the hand lock to be taken off. To do this, press and hold the E key on the keyboard, move the regulator to the required position, and then release the hand lock (let go of the E key).

When you need the fireman to change the notch on the reverser (see below) you MUST close the regulator first or he won't comply.

Key: E



2. Vacuum Brake and Brake Pressure Gauge

The vacuum brake is used to pull the brake pads away from the wheels by creating a vacuum in the pipes connected to them. The brake in the driving cab has 3 settings, brake off which forces a vacuum into the pipes and takes the brakes off, brake on which lets air into the pipes and applies the brakes, and brake running which holds the vacuum steady at its current pressure.
The brake pressure gauge shows the current pressure in the system, from 0 (on) to 25 (off).

Keys: ‘ (apostrophe), ; (semicolon)

Advanced Mode

The brake control in the vestibule is connected to the same pipe system as the brake in the driving cab but cannot open the brake ejector directly and to leave this open all the time would waste steam. Therefore using it relies on some communication with the fireman to create the vacuum to release the brakes. See below for a full description on how to drive from the vestibule.

3. Sander

The sander assists in starting without slipping and also halts slips when ascending hills covered with leaves or light snow.

Key: X, Shift X

4. Handbrake

A hand operated screw that applies the brakes to the power bogie without the need to release the vacuum in the brake pipes. In reality these are rarely used on Railmotors with the vacuum brake being sufficient.

Key: /

5. Whistle

Steam train whistles are powered by steam from the boiler and are used to signal a trains approach, warn of danger and often to signify departure. The line in the vestibule is linked directly to the whistle on the boiler in the driving cab.

Key: Space

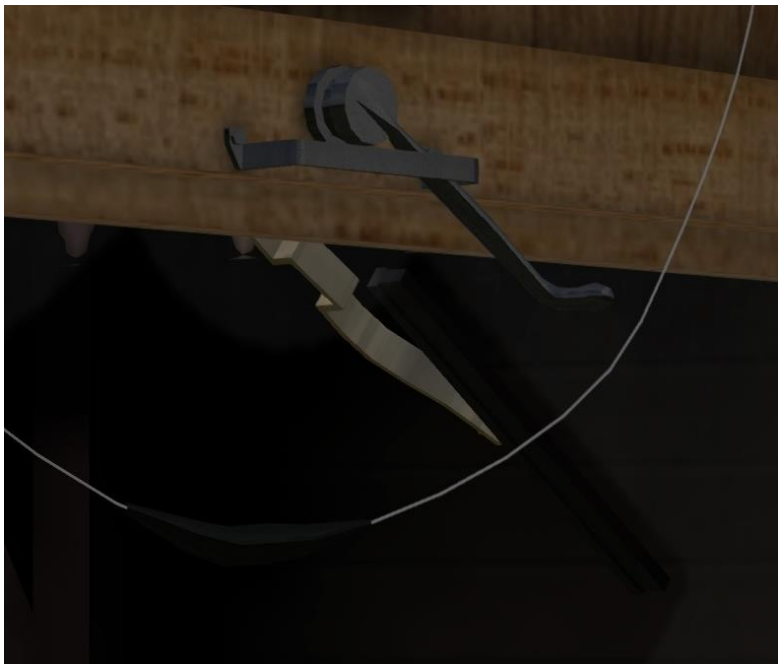
6. Bell

In a standard British steam locomotive it is rare to have a bell fitted and then they are usually a backup form of warning to the whistle.

In the railmotor the bell in the vestibule is your communication device to talk to the fireman who is busy managing the controls in the driving cab. You will use it to tell him to release the brakes, notch up the reverser and when you're stopped so he can get on with the furious job of shovelling coal onto the fire which can only be done while stationary.

There is a useful plaque on the bell and bell button box summarising the meaning of the number of bell rings. See below for a full description on how to drive from the vestibule.

Key: B



7. Wiper

Above the driving window (left for the front cab, right for the rear cab) is a hand operated wiper. This can be used to clear rain, snow and dirt directly in the driver's view.

Key: V

Advanced Mode

In advanced mode the wiper operates in a single sweep for each button press, wiper click, HUD wiper button click. It does not move continuously. Well, it is hand operated!

8. Ventilation

Although far from the hot firebox and boiler you can still open the windows and doors of the vestibule for ventilation. Click and drag with mouse.

Vestibule Driving in Advanced Mode

Advanced Mode ONLY

In simple and standard driving modes the vestibule is just another cab, but at the back.

In advanced mode you can have the full experience of being separated from your fireman and a bulk of your controls and being expected to talk with him via a series of bell rings.

In the vestibule the usual tasks of notching up (moving the reverser as you gain and lose speed) and opening and closing the cylinder cocks are performed by the fireman.

In Train Simulator terms, assuming you are not using the auto-fireman, then the jobs of using the blower, adding coal to the fire and filling up the boiler are also taken away from you as if the fireman in the cab is now performing them.

In addition you will need to request the fireman to create the vacuum to release the brakes.

All of this is performed either by the fireman's own intelligence (cylinder cocks, coaling, watering and blower) or by communicating with him using the bell above the vestibule right hand window – the one with the wiper above it; this would be the usual position for the vestibule driver to stand.

Bell sequence and their meanings
These are repeated on a plaque by the bell button, above the right hand window.

1. Start
    - **a.** If stationary or slow the reverser is set to 75%. Brake release remains enabled if already requested
    - **b.** If moving (over 12mph) then reverser is set to 28%. Brake release is disabled
2. Stop
    - **a.** If in motion the reverser is set to 75%. Brake release is disabled
    - **b.** If stationary the reverser is set to 0%. Brake release is disabled
3. Brakes Off
    - **a.** Brake release is enabled and the brake vacuum will not hold steady, steam (and therefore boiler pressure) is used by this until the signal for **Start b.** or **Stop** is sent to the fireman

Push the bell quickly in succession to tell fireman what you need him to do. There will be a delay and then a confirmation of the same number of bells. Wait for the confirmation before the next request.

Driving procedure from the vestibule

Ready to leave

- 1 bell to get reverser to 75%
- 3 bells to release the brake
- Move vestibule brake to the far right to release
- Open regulator as brakes release
- Once the brake vacuum is at 25 inches, move the brake back to central position

When at speed (over 12mph)

- Close the regulator to stop the fireman getting injured
- 1 bell to get reverser to 28%
- Open the regulator

Slowing for stop

- 2 bells to set reverser to 75% for finer control of approach
- Important: At this point the brake release is not available, so any brake you apply will remain on until you stop or request another brake release from the fireman (which if repeated is sure to make him angry!). Therefore be frugal in braking, measure the distance to stop against your slowing speed and apply the brake accordingly. Stop, go, stop, go braking is not a part of the proper driving of any steam locomotive.

When Stopped

- 2 bells to set reverser to 0%
- Important: This tells the fireman that you are stationary for a while so he can tend the fire if required. He will stop when it is back up to size or he receives 1 bell for start.

Locomotive Numbering

When a railmotor is added to a scenario the number will be randomly chosen from a list between 73 and 83 but this can be changed using the right hand fly out when the locomotive is selected.

The number has 15 digits in total, e.g. #78##############

The first digit denotes whether the carriage sections should be populated with people.
M shows people in modern clothing. P shows people in period clothing. Anything else shows no passengers.

The next 2 digits are the number shown on the front, rear and sides of the locomotive.

The last 12 digits are used to put text on the destination boards on the front, rear and sides. There must always be 12 digits (initially set as # characters) so # is used to add an empty space between words or to pad the start and end to centralise the text.

e.g. ###truro#### Pontygwaith# bishops#lyd.

Letters A to Z are catered for, they can be entered in upper or lower case but are always shown in an upper case style, as well as & (ampersand) ‘ (apostrophe) and . (period)

Ground Platforms and Scenario Objects

The Railmotor has many unusual features, one of which is the step arrangement at the passenger doors. These were operated by the guard using a lever inside the porch when the locomotive stopped at ground level platforms. These were added to branch lines when a quick and cheap pick up/drop off stop was required rather than a full station with raised platforms.

The steps on this model are fully functional however they require the platforms to be set up in the simulator and a special Ground Platform Marker added at each end of the platform to tell the railmotor when it is next to them.

Unfortunately at the current time although you can add platform markers and static scenery to scenarios, you can't add lofted items and this means you can't add the passenger spawning platform areas to a scenario. Due to this the ground platforms need to be added to the **route** and can't be added on an ad hoc basis to a **scenario**.

The special Ground Platform Marker can be added directly to the route or just to scenarios that feature the railmotor – if you do the latter then you will need to be add it to every ground platform on every scenario that requires a pick up there.

Train Simulator 2014 introduced a new feature to the build menu which allows you to clone a route very easily. It also allows you to upload these cloned and modified routes to the Steam Workshop so the intention is to create some specific railmotor versions of certain routes, add some ground platforms and upload these so they can be downloaded for free.

You can also do this yourself for any route, or include ground platforms in new routes you are building.

Once you have added some scenery to look like a ground platform and laid down a platform loft (either an invisible one or hide the platform just under the ground) and platform marker you have all you need on the route.

To add the marker, tick the VictoryWorks /GWRSteamRailmotor assets in the object filter. Under the **Miscellaneous** tab find the asset called **Ground Platform Marker (for Steam Railmotor)** and place it in the middle of the track by the platform. Place the first link past one end of the platform and the second link past the other end. Make sure it is longer than the area where the railmotor will stop. Once these are placed, drop the small orange/blue marker below the ground so it can't be seen.

Important: Make sure that the links are not placed dividing the links of a signal as this may cause odd signalling problems.

Also included with the railmotor are the coal sacks and hose which are used in some of the provided scenarios for refuelling.

You can add these into your own routes or scenarios by entering the editor and ticking the VictoryWorks/GWRSteamRailmotor assets in the object filter**.** Under the **Miscellaneous** tab you can then select the **Coal Sacks – Refuelling Point** or **Hose – Refuelling Point** and place them on the route – you also need to place the attached link at the point on the track where the locomotive needs to stop.

Acknowledgements

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- Stuart Galbraith for his work on the loco performance and constant advice, ideas and critique
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