



dovetail
GAMES

Class 92 Electric Locomotive



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1 Background

1.1 Background

The British Rail Class 92 is a dual-voltage electric locomotive which can run on 25 kV AC from overhead wires or 750 V DC from a third rail. It was designed specifically to operate services through the Channel Tunnel between Britain and France. Eurotunnel indicates the Class 92 locomotive as the reference for other locomotives which railway undertakings might want to get certified for usage in the Channel tunnel.

Locomotives of this type are operated by GB Railfreight/Europorte 2 and DB Schenker. In France, a number were also owned and operated by SNCF; these were classified as CC 92000 on French railways.

1.2 Design

The fleet of 46 locomotives was built by a consortium of Brush Traction and ABB Traction. Parts construction was sub-contracted, with final construction and commissioning being undertaken at Brush's erecting shops at Loughborough between 1993 and 1996 (First unit was produced from 1992, and was finished in April 1993).

The body shells, shared with the Class 60 diesel locomotives but with a modified front end, were fabricated by Procor (UK) of Horbury and delivered pre-painted in the then-standard triple grey livery. Propulsion is provided by two ABB traction converters using GTO devices, with control via an ABB MICAS-S2. Maximum power is 5 MW (6,700 hp) on 25 kV or 4 MW (5,400 hp) on 750 V; with a tractive effort of 360 kN (81,000 lbf).

The locomotive is fitted with both rheostatic and regenerative braking, in addition to standard Westinghouse air brake equipment. An electrical train bus is fitted to enable two locomotives to work in multiple formation, either double-heading or push-pull train with a Driving Van Trailer or DVT. To reduce the possibility of locomotive failure in the Channel Tunnel, most of the electrical systems are duplicated.

1.3 Operations

Prior to introduction to service, two locomotives (92001 and 92002) were extensively tested at the Czech Railway's test track at Velim near Köln. One locomotive was temporarily moved from here to Vienna Arsenal for climatic testing.

The majority of the class are named after European composers and writers. Post-privatisation the ownership was split between EWS, European Passenger Services, Eurostar (UK) and SNCF.

During 2000 Eurostar (UK) offered their seven members of the class (92020 / 021 / 032 / 040 / 044-046) for sale being surplus to requirements with the non-commencement of sleeper services through the Channel Tunnel. However no buyer could be immediately found so they were decommissioned and stored at Crewe International electric depot. Five of these locomotives have now been purchased by Eurotunnel to be used by their Europorte 2 rail freight undertaking for short haul rail traffic in France. In July 2011 Europorte 2/Eurotunnel purchased the five remaining locomotives that had belonged to SNCF, bringing Eurotunnel's total up to sixteen Class 92s.

In 2009 a project was undertaken with the aim of allowing the class to be modified for operations on High Speed 1: i.e. with TVM signalling. The project received funding from the European Commission and it was anticipated services will begin in early 2010. On 25 March 2011 for the first time a modified class 92 locomotive travelled from Dollands Moor to Singlewell using the TVM430 signalling system. A loaded container train ran for the first time on 27 May 2011, and further trials

with loaded wagons are planned until the end of June 2011. In July 2011 a trial run of wagons carrying curtain walled swap bodies built to a larger European loading gauge was run from Dollands Moor, Folkestone to east London. From 11 November 2011 a weekly service using European sized swap bodies has run between Barking, London and Poland using High Speed 1.

The class is also notable in that the last train ever to travel under British Rail, the 2315 service from Dollands Moor to Wembley on 21 November 1997, was hauled by 92003 Beethoven.

1.4 Liveries

All units were originally painted in a simplified version of Subsector Railfreight livery of two-tone grey livery, but with a dark blue roof the same shade as used on Eurostar trains.

To reflect their Channel Tunnel role, all were fitted with three 'O' shaped tunnel logos, each smaller than the next. Names were mainly blue stickers, but a limited number of locomotives gained cast nameplates. Only 92031 did not receive a name during construction, however it did gain one under EWS ownership. The locomotives were fitted with Crewe Electric depot plaques to reflect their maintenance facility, and to reflect ownership, the nine SNCF owned machines had SNCF branding, six Eurostar owned locos had EPS (European Passengers Services) branding, with the rest having standard cast BR arrows under the drivers window reflecting British Rail ownership.

A number of Railfreight Distribution locomotives "Railfreight Distribution" written along the locomotive side panels with a small RFD logo included. Following the privatisation of British Rail and the EWS purchase of Railfreight Distribution, the intention was to paint the RFD Class 92's into the EWS' gold and dark red colours. In the end, only two locomotives received EWS livery (92001 and 92031). The rest of the locomotives had a large EWS Logo applied halfway along the side.

Six Class 92s allocated to Eurostar retained their two-tone grey livery although there had been a plan to repaint these locomotives into Nightstar two-tone green livery. The combination of rail privatisation, technical problems, and the growth of point to point low cost airlines undermined the Nightstar venture, and the project was abandoned before a single revenue-earning service had even begun. The locomotives remained in two-tone grey until they were purchased by Europorte 2 in the 2000s. Europorte applied the designation "Europorte 2" inside a large Eurotunnel-style circle.

Following the takeover of EWS by DB Schenker, most of the fleet of Class 92s will likely move to DB Schenker Red liveries, matching that on previously repainted Class 66s. 92009 Was the first locomotive to be out shopped in the new DB Schenker Red livery. The name "Elgar" had been removed; and the locomotive was subsequently renamed "Marco Polo" later during August 2011. The new livery has been completed on five locomotives (92009, 92015, 92016, 92031 and 92042). In 2009, locomotive 92017 (formerly Shakespeare) was painted into Stobart Rail's blue and white livery and named Bart the Engine. On 10 March 2011, locomotive 92032 appeared in the new Europorte GB Railfreight livery.

1.5 Technical Specification

TOPS Number	Class 92
Total Produced	46
Wheel Arrangement	Co-Co
Weight	126 tonnes
Length	70ft (21.34m)
Electrical System	25kV AC Overhead & 750V DC 3rd Rail
Power Output	6,760hp (5,040kW) AC 5,360hp (4,000kW) DC
Maximum Tractive Effort	81,000lb (360kN)
Brake Type	Air
Axle load class	RA 7

2 Rolling Stock

2.1 Railfreight Class 92

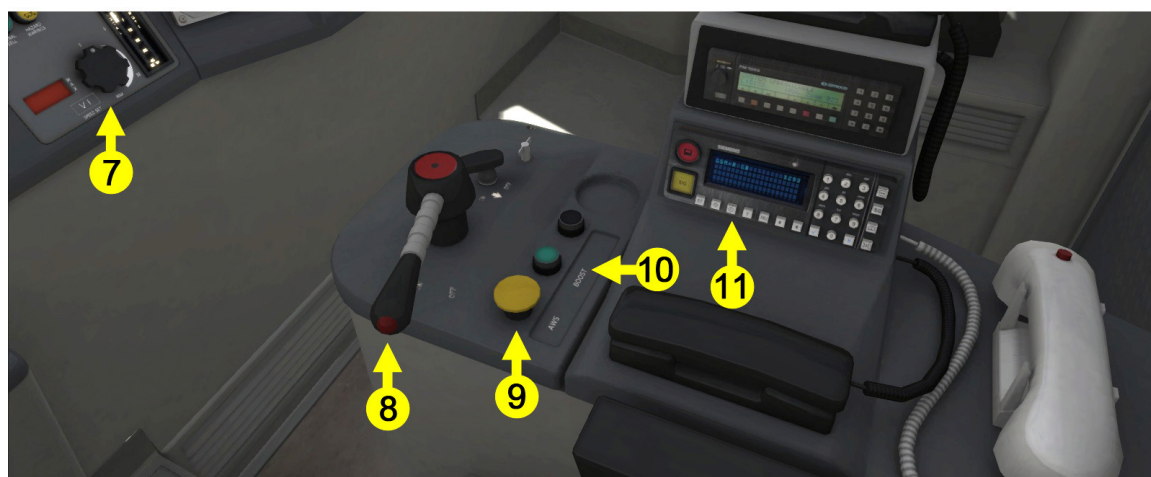
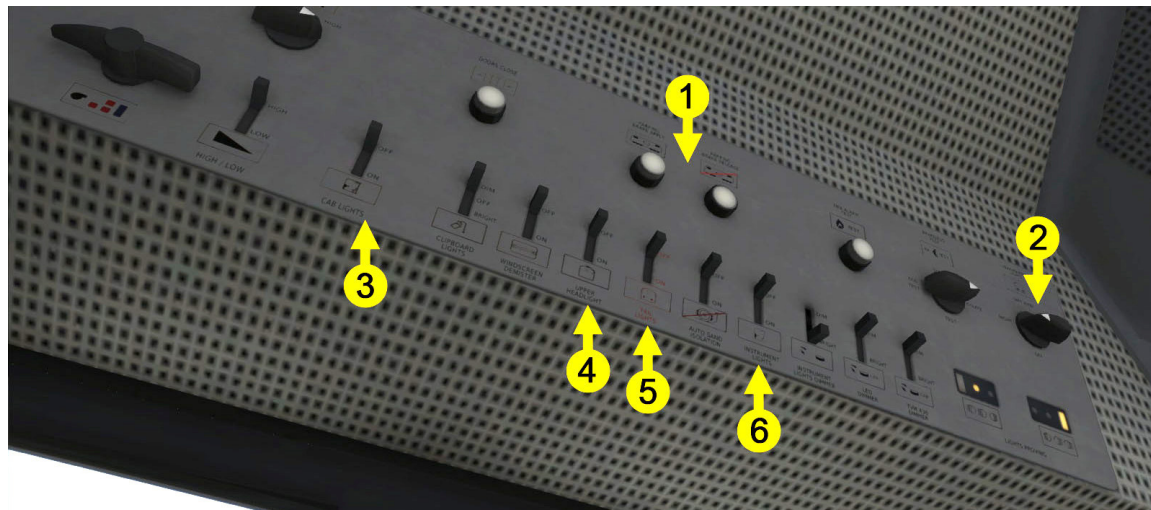


2.2 Megafret Container Wagons



3 Class 92 Cab Diagrams

3.1 Class 92 Main Cab Controls



- | | | | |
|---|---------------------------|----|-------------------------------|
| 1 | Parking Brake (/) | 7 | Speed Selector (Y & C) |
| 2 | Headlights (H & Shift+H) | 8 | Power Handle (A & D) |
| 3 | Cab Light (L) | 9 | AWS & Driver Vigilance* (Q) |
| 4 | Roof Headlight | 10 | Power Boost (Not simulated) |
| 5 | Tail Lights | 11 | GSM-R Radio screen brightness |
| 6 | Instrument Light (Ctrl+L) | - | Glare Blind (U) |

*Driver Vigilance can be disabled/Enabled by pressing CTRL+D



- | | |
|--|---|
| <ul style="list-style-type: none"> 12 Passenger/Goods Brake Timing 13 Passenger/Goods Brake Timing 14 Horn (Space & Shift+Space) 15 PBL Brake (; & ') 16 Direct Brake (, & .) 17 Emergency Brake (Backspace) | <ul style="list-style-type: none"> 18 Wiper Speed 19 Windscreen Wipers (V) 20 Lower Pan/ Raise Shoes (P) 21 Power Mode selector (O & I) 22 VCB Open/Close (Shift+P & Ctrl+P) - Vigilance Reset (NumPad Enter & Q) |
|--|---|

VCB Control - Electric trains are always provided with a circuit breaker to isolate the power supply when there is a fault, or for maintenance. On AC systems they are usually on the roof near the pantograph. There are two types - the Air Blast Circuit breaker and the Vacuum Circuit Breaker or VCB. The air or vacuum part is used to extinguish the arc which occurs as the two tips of the circuit breaker are opened. The VCB is popular in the UK and the air blast circuit breaker is more often seen on the continent of Europe.

When switching between power modes, the VCB is used to prevent shorting between the two power supplies.

4 Driving the Class 92

4.1 Moving the train

To begin moving the Class 92 locomotive:

- Move the **Reverser** into **neutral**.
- Select the correct power mode for the track type using the **Power Mode Selector**. The speedometer will switch between mph and km/h automatically.

*Note: When changing power mode from AC to DC, the **UL1 Line Volts** light will extinguish and the **VCB Local** light will illuminate to indicate the circuit breakers have tripped. The pantograph / shoes will automatically lower / raise and must be manually raised / lowered and VCB closed before being able to apply power*

- If **UL1 Line Volts** is extinguished, toggle the **Pantograph / Shoes Toggle** switch to raise the pantograph / lower the 3rd rail shoes. The **UL1 Line Volts** light should illuminate soon after. If not, ensure you have selected the correct power mode.
- When the **UL1 Line Volts** light is illuminated, press **VCB Close** button, and the **VCB Local** light should turn off to indicate the vacuum circuit breaker is closed.
- Move the directional lever into forward.
- Release the brake by moving the **Direct Brake** to the release position and hold the spring loaded **PBL Brake** in the release position until the brakes are released
- Increase the **Power** handle to start applying power.

4.2 Stopping the train

To stop the Class 92 Locomotive during regular service:

- Move the **Power** handle to 0.
- Move the **PBL Brake** into 'apply' to begin applying the brakes

Emergency braking can be instigated in a number of ways. The unit will automatically apply the emergency brake in response to various safety systems:

- Pressing an **emergency plunger** located on the front panel or the second man's panel. The plunger will remain pressed and the emergency brake will remain applied until the plunger is reset and the emergency alarm is reset
- Passing over a TPWS grid when over speed, or a TPWS grid protecting a signal at a stop aspect.
- Failing to respond to an AWS alarm after a few seconds.
- Failing to reset the vigilance device.
- Over speeding in a TVM block.
- Passing into a non-permissive TVM block with the 000 aspect displayed in cab.

4.3 Troubleshooting

The Class 92 Locomotive has a number of safety systems in place to prevent the unit from moving unintentionally. If the vehicle won't move, check the following:

- **Line Volts** is not illuminated.
 - Ensure the correct power mode is selected and toggle the **Pantograph / Shoes Toggle** to 1. This light should now illuminate
- **VCB Local** is illuminated
 - If **Line Volts** is illuminated, press the VCB Close button to close the circuit breakers. This light should now extinguish
- **Directional Lever**
 - The directional lever must be in the **Forward** or **Reverse** position.
- **Vigilance Alarm** is active
 - Cancel the **Vigilance Alarm** by pressing the **Vigilance Reset** key (simulates re-depressing the Driver's Safety Device pedal)
- **Emergency Alarm** is active
 - Deactivate the vigilance alarm if active.
 - Wait until the train has come to a stop.
- **Power Handle** is above 0
 - Move the **Power Handle** to 0 to reset the handle.
 - *NOTE: If the handle is in a power notch when an interlock is tripped preventing power from being applied, then no power will be applied when the interlock is reset until the **Power Handle** is reset*

5 Scenarios

5.1 Simple & Expert Controls Tutorial: Class 92

Learn about operating the class 92 using simple and expert controls. The controls will be explained before you will be instructed to drive the train out of Carlisle Station. Don't worry, everything will be explained at a comfortable pace.

5.2 Express Freight

Drive a Class 92 on a short freight service to Mossend Freight yard

Take the last section of the 12:16 Carlisle N.Y. to Mossend Down Yard Freight service. You will need to wait for a late Intercity Service to pass before leaving, and then run all the way to Mossend.

- **Duration** **60 minutes**

5.3 Electric Troubles

Drive a freight service to Carstairs.

Drive the 10:32 Coatbridge F.L.T. to Crewe Bas Hall S.S.M as far as Carstairs where another driver will take over.

There has been mention of a slow running Service to London Euston that has had problems ahead. In addition, you will be hauling a damaged Class 92.

- **Duration** **40 minutes**

6 Acknowledgements

Dovetail Games Ltd would like to thank the following people for their contribution to the development of this product.

Beta Testing Team

Ian Bishop - Rolling Stock Audio

