dovetail GAMES

MRCE Dispolok Pack

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Release Version 1.0

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Whilst we do our utmost to reproduce sounds that are accurate and true-to-life, sometimes these sounds may not completely tally with the user's expectation. Due to the nature of the simulation, it is often not possible to reproduce a completely accurate soundscape for a variety of reasons such as limitations with our current technology and occasional inability to gain meaningful access to the locomotives being created. You should therefore regard the audio reproduction for our locomotives as authentic interpretations rather than perfect recreations.

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1 BR266 Background

1.1 History

When British Rail's freight operations were privatised in 1996, a large proportion were bought by English, Welsh and Scottish Railway (EWS). Many of the locomotives that EWS inherited were at the end of their useful life and EWS approached General Motors Electro-Motive Division (EMD) to supply a replacement. EMD offered their JT42CWR model which incorporated General Motors' version of (self-steering) bogies that reduce flange wear, improve adhesion and reduce track load. The locomotive design uses standard EMD components of its era including D43 traction motors.

The new JT42CWR locomotives were finally given the Class 66 designation in the British classification system. 250 were initially ordered and built in London, Ontario, Canada.

In 1998, Freightliner placed an order for locomotives and were subsequently followed by GB Railfreight, and then Direct Rail Services. More recent orders for additional locomotives have seen the introduction of low emission version called JT42CWRM.

This most notable feature of this model is the addition of a third door on the side allowing access to the locomotive body and the addition of an air conditioning unit above the cab. In Germany, units operated by DB Schenker were numbered as Class 247 however to match other Class 66 locomotives operating in Germany the Eisenbahn-Bundesamt (Federal Rail Authority) re-classified them as Class 266.

1.2 Design & Specification

Wheel Arrangement	Co-Co
Locomotive Weight	129.9 tonnes
Vehicle Length	21.35 m (70 ft 1 in)
Vehicle Width	2.64 m (8 ft 8 in)
Fuel Capacity	6,546 L (1,440 Imperial gallons)
Vehicle Power	2,420 kW (3,250 hp)
Top Speed	120 km/h (75 mph)
Brake Types	Air

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2 ER20 Background

2.1 History

As a representative of the EuroRunner family, this diesel-electric locomotive is equally suited for freight and for passenger transport. The most modern diesel engine technology and innovative sound insulation make the ER 20 one of the quietest and lowest emission diesel locomotives in Europe. The three-phase power transmission enables the realisation of the train's electrical energy supply, as well as providing outstanding efficiency across the entire speed and tractive force range.

2.2 Design & Specification

Manufacturer	Siemens
Type	Diesel-Electric
Construction	2003 - 2004
Wheel ArrangementBo-Bo	Bo-Bo
Length	19.275m
Weight	80t
Power Output	235kN
Max Speed	140 km/h

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3 ES 64 F Background

3.1 History

The ES 64 F was commissioned by Deutsche Bahn and built by Krauss-Maffei and Siemens in Munich and Uerdingen from 1995 - 2001. The first series of locomotives were delivered to Deutsche Bahn in March 1998 after years of testing. Used exclusively for freight, they are now used all over Germany with a little under 200 in service.

3.2 Design & Specification

Builder	**Siemens**
Locomotive Weight	86.7 tonnes
Vehicle Length	19.58m
Vehicle Width	3m
Vehicle Power	6,400 kw
Top Speed	140 km/h
Brake Types	Electric Regenerative Braking
Tractive Effort	**300 kN**

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4 ES 64 F4 Background

4.1 History

The EuroSprinter family of electric locomotives, built by Siemens, is a modular concept of locomotives for the European market. The internal Siemens product name is ES 64, with ES for EuroSprinter and the number 64 indicating the 6,400 kW power at rail. Additional information is given in the name and denotes the usage. U for Universal, P as Prototype and F as Freight.

The ES 64 F4 is an electric freight locomotive with 6,400 kW (8,600 hp) power and a top speed of 140 km/h (87 mph), in Germany the reporting name is Class 189. It is also equipped for passenger service, but is rarely used in that role. ES 64 F4 is equipped for all four electric systems commonly used in Europe (15 and 25 kV AC, 1.5 and 3 kV DC). The braking system includes an electrical energy recovery system.
As well as being in service with Deutsche Bahn AG as Class 189, it is also utilized by the Dispolok locomotive pool and also by SBB as Class RE 474.

4.2 Design & Specification

Builder	**Siemens**
Locomotive Weight	87 tonnes
Vehicle Length	19.58m
Vehicle Power	8,600hp (6,400kW)
Top Speed	87 MPH (140km/h)
Brake Types	Air and Electric
Tractive Effort	**67,000 lb (300 kN)**

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5 ES 64 U2

5.1 History

The EuroSprinter is a family of electric locomotives built by Siemens primarily for the European market. The product name for the EuroSprinters is ES 64, ES meaning EuroSprinter and 64 representing the 6400 kW power output from the locos. Different variants are indicated by a letter following the product name. Some examples are: ES 64 'P' meaning Prototype; or ES 64 'F' meaning Freight. Additional classification may be required to designate how many power types the locomotive houses, for example one that could operate on both the 15 kV and 25 kV catenary would be an ES 64 U2.

5.2 Design & Specification

Builder	Siemens
Locomotive Weight	86 tonnes
Vehicle Length	19.28m
Engine Power	6,400kW
Max Speed	230km/h
Power System	15kV & 25kV OHE

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6 Rolling Stock

6.1 BR266 in MRCE livery

6.2 ER20 in Dispolok livery

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6.3 ES 64 F in Dispolok livery

6.4 ES 64 F4 in MRCE Dispolok livery

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6.5 ES 64 U2 in Dispolok livery

6.6 Habbins Wagon

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6.7 Zags 122 Wagon

6.8 Shimmns Wagon

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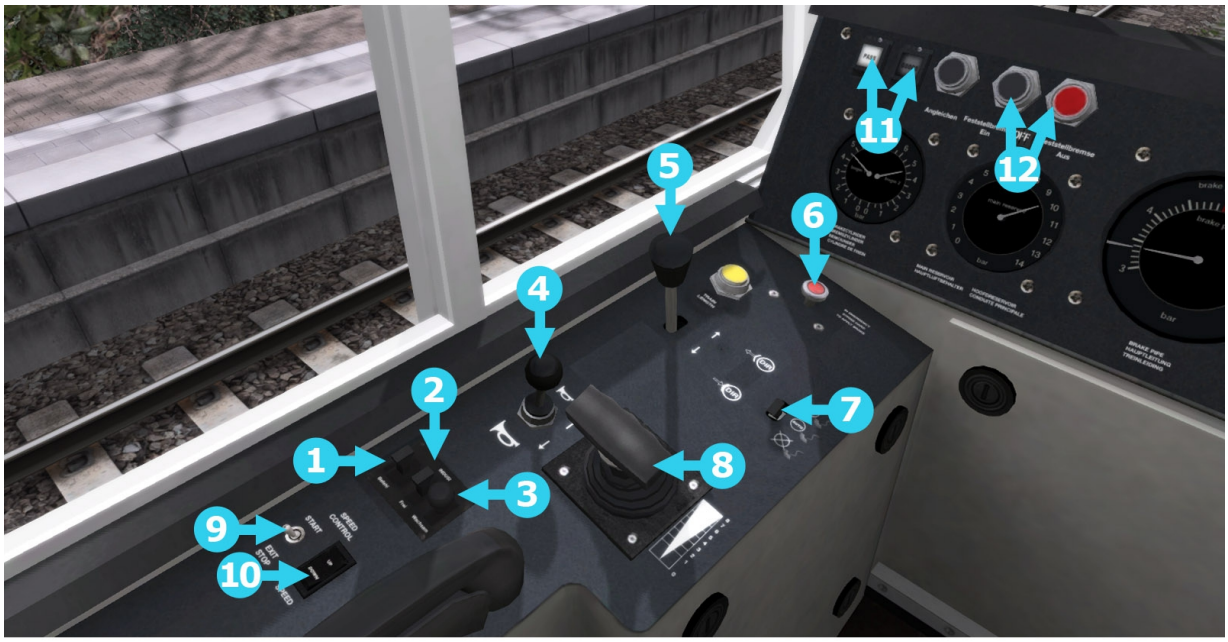
7 Driving the BR266

7.1 Cab Controls



1	PZB Override	10	Set Speed Increase/Decrease
2	PZB Release	11	Passenger / Goods Brake Mode
3	PZB Acknowledge	12	Parking Brake
4	Horn	13	PZB Indicator
5	Loco Brake	14	Wipers
6	Emergency Brake	15	Engine Stop/Start
7	Sander	16	Reverser
8	Power Handle	17	PBL Train Brake
9	Speed Control On/Off		

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7.2 Brake Levers

Both the Train Air Brake and Loco Air Brake levers have three functional positions:
- In the upright position they "Hold" the current brake pressure
- When pulled fully back they gradually "Release" the brakes
- When pushed fully forwards they gradually "Apply" the brakes

The Train Brake lever is centre-sprung both in the cab view and in the game HUD, whereas the Loco Brake lever is only sprung forwards for brake application and can be left resting in the "Release" position when required.

When using the Train Brake lever a target brake pressure can be selected as indicated by the outer needle on the Brake Pipe Pressure Gauge. The actual brake pressure will then gradually change to match the selected target as shown by the larger inner needle.

The rate that the brake pressure changes is dictated by the brake timing selection ("Passenger" or "Goods") as selected and indicated on the main console (item 11 shown on the previous page). When in "Goods" brake timing mode the brake pressure changes more slowly than in "Passenger" brake timing mode.

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7.4 Speed Control

Speed control allows for the driver of the locomotive to maintain a speed once reached by using the throttle. It also allows for increases and decreases of speed.

To operate the speed control, simply follow these steps:

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- Use the throttle to reach the desired speed
- Toggle the Speed Control switch to the "Start" position. (see item 9 in image below)
- To adjust speed use the set speed switch to increase or decrease speed. (see item 10 in image below)
- To deactivate, toggle the Speed Control switch to the "Exit Stop" position

7.5 Key Controls

Function	Keyboard
Activate/Deactivate	K
Increase Speed	Ctrl + C
Decrease Speed	Ctrl + Y

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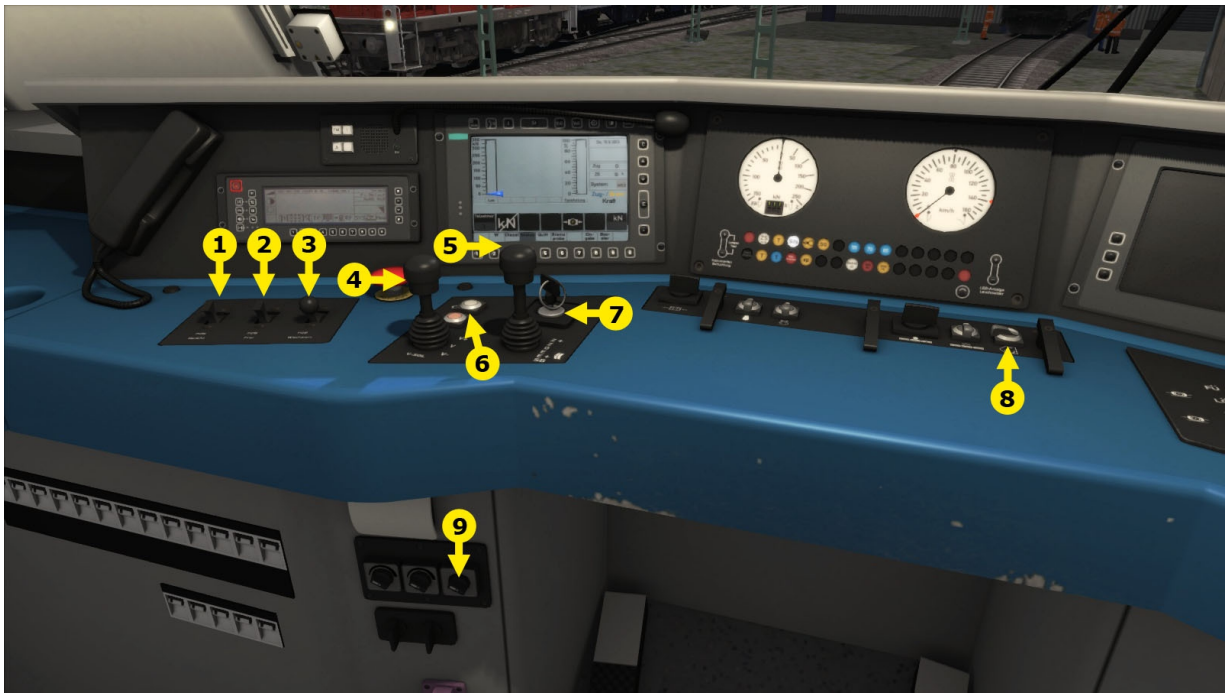
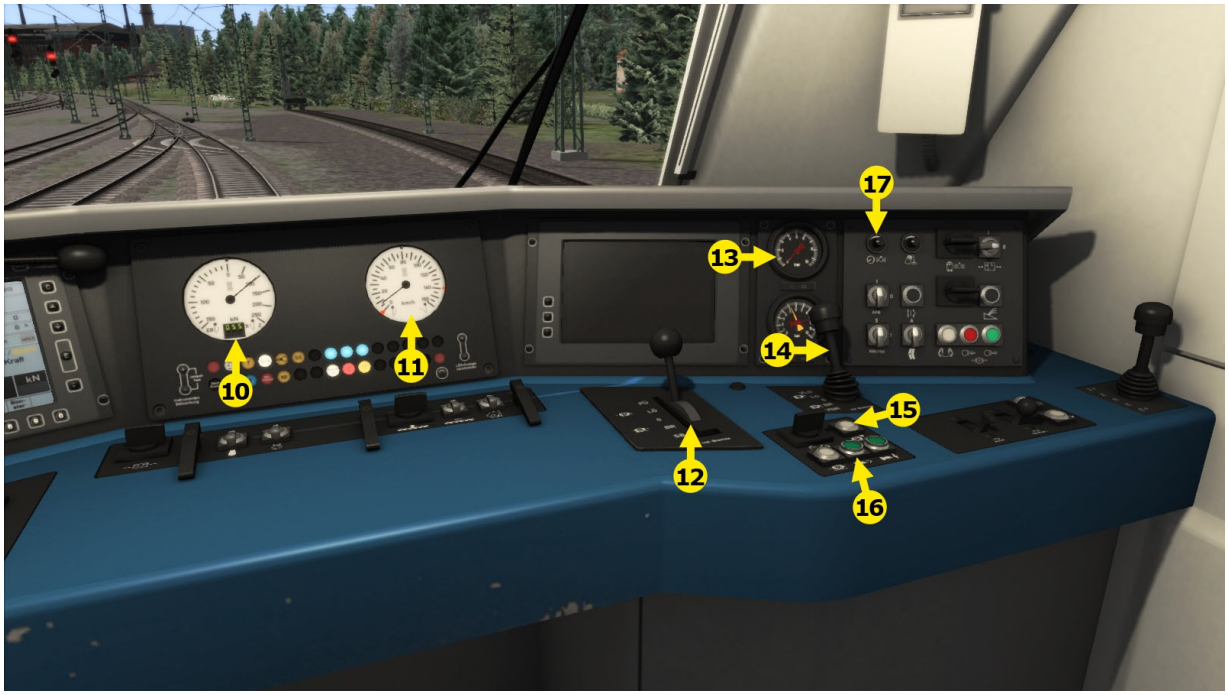
8 Driving the ER20

8.1 Cab Controls





1	PZB Acknowledge	9	Wipers
2	PZB Release	10	Tractive Effort Dial
3	PZB Override	11	Speedometer
4	AFB Control	12	Train Brake
5	Throttle & Dynamic Brake	13	Brake Gauges
6	Reverser	14	Loco Brake

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7	On / Off Key	15	Sander
8	Cab Light	16	Horn

8.2 AFB

AFB stands for Automatische Fahr- und Bremssteuerung – or loosely translated in to English it means "Automatic Driving and Braking Control"

AFB allows the driver of the locomotive to set the target speed and then the computer in the locomotive will apply the throttle to obtain that speed and then keep applying throttle or brake in order to maintain it. You can almost think of it as a kind of Cruise Control for trains.

To operate AFB, simply follow these steps:

1. Set the AFB control to the desired speed. Note on the speedometer a small red triangle "bug" will slide around to the configured speed.

2. Move the throttle control to the desired level of acceleration, at this point the train will begin moving and accelerate to the configured speed.

All speed changes should be managed with the AFB control, simply change the target speed as required and the AFB Computer will apply throttle and brakes appropriately.

If you wish to come out of AFB control and return to manual control, simply set the target speed to 0km/h and then the throttle and brake controllers will return to normal manual functionality.

Keyboard controls

Function	Keyboard

8.3 SiFa

SIFA is short for Sicherheitsfahrschaltung or "Safety Driving Switch".

The SIFA vigilance alerter is disabled at startup, but can be activated or deactivated by pressing 'Shift+Enter(Numpad)'. While activated the SIFA light on the cab dashboard is normally switched off. While the train is moving the driver is required to confirm an alarm every 30 seconds.

When the 30 second alarm is triggered the SIFA light on the cab dashboard will illuminate, after an additional 4 seconds an audible alert will sound. After a further 2.5 seconds the emergency brake will be applied. This can be avoided by acknowledging the alarm at any stage by pressing the 'Enter(Numpad)' key.

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9 Driving the ES 64 F

9.1 Cab Controls

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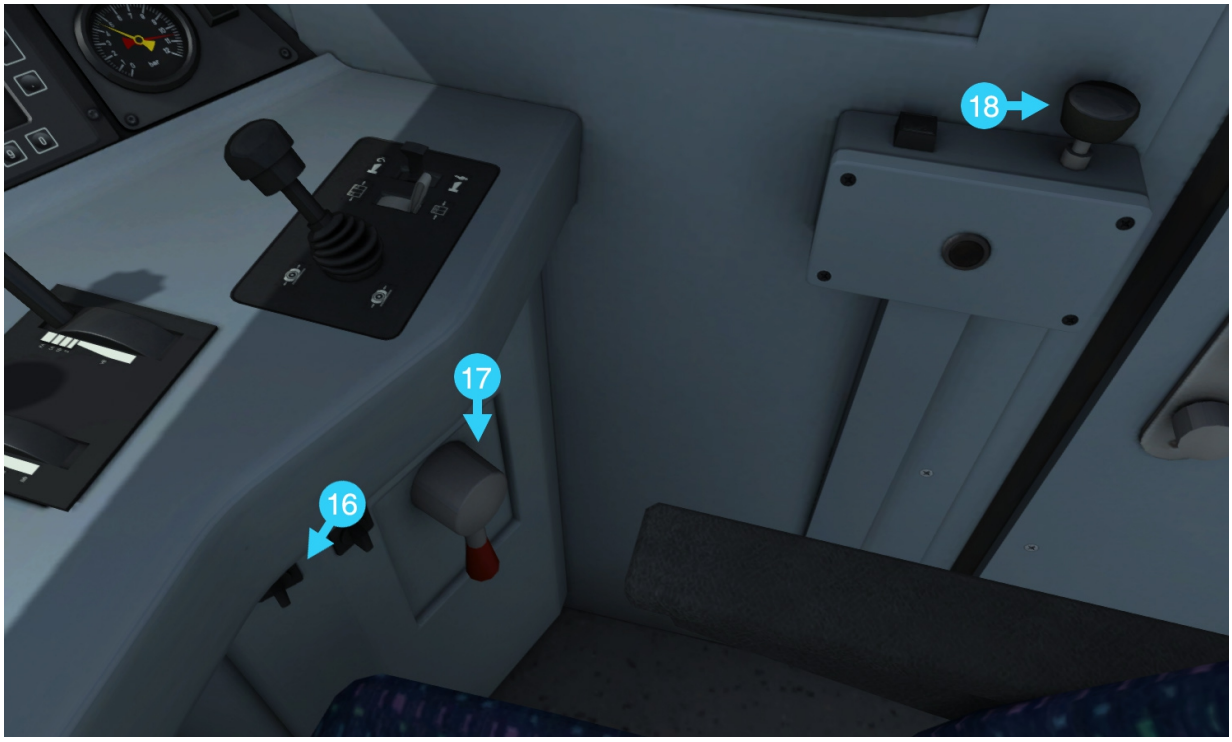

1	PZB Override
2	PZB Free
3	PZB Acknowledge
4	Pantograph
5	Circuit Breaker
6	AFB
7	Throttle
8	Reverser
9	Sander
10	Headlights
11	Cab Lights
12	Train Brake
13	Electric Brake
14	Direct Brake
15	Horn
16	Wipers
17	Emergency Brake
18	Sifa Reset

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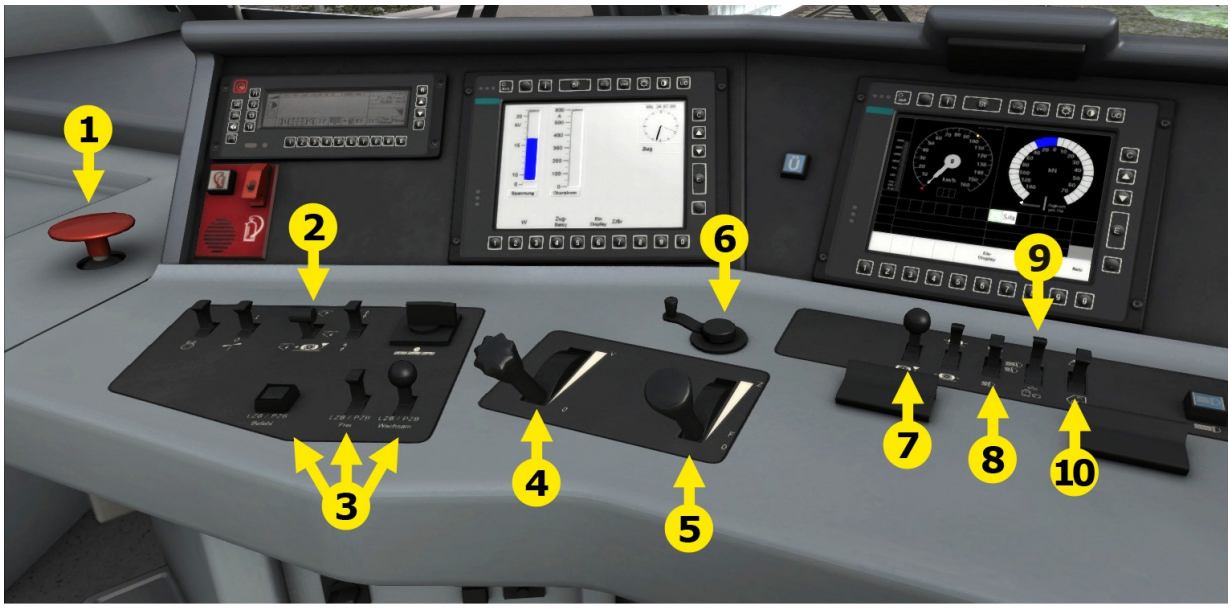
10 Driving the ES 64 F4

10.1 Cab Controls



1	Emergency Brakes	9	Dial Lights (I)
2	Pantograph	10	Cab Light / Desk Light (L & Shift L)
3	PZB	11	Train Brake
4	AFB	12	Engine Brake
5	Power Lever	13	Direct Control Brake *
6	Reverser	14	Horn
7	Sander	15	Wipers
8	Head Lights		

* This is an advanced control and therefore not available on the HUD or Xbox controller.

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11 Driving the ES 64 U2

11.1 Cab Controls

1	Throttle
2	Train Brake
3	Electric Brake
4	Direct Brake
5	Horn
6	Headlights
7	Instrument Lights
8	Cab Light
9	Train Length
10	Sander
11	Wipers
12	Reverser
13	Circuit Breaker
14	Pantograph
15	CDM Free
16	CDM Acknowledge
17	Traction Cooling
18	AFB Speed
19	Battery
20	Pantograph Selector
21	Air Brake Mode
22	Stationary Brake Apply
23	Stationary Brake Release

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12 PZB Signaling System

12.1 PZB

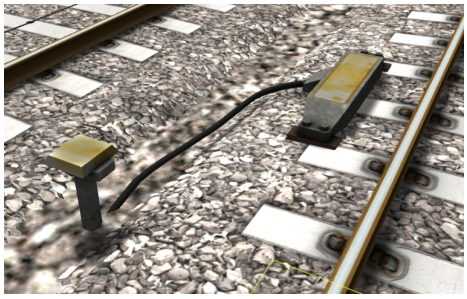
PZB stands for Punktförmige Zugbeeinflussung, loosely translated to English this means "Spotwise Train Control".

Safe distances between trains are managed conventionally through the use of block-based systems.
A given line is broken up in to a series of blocks, and trains are permitted via (green or yellow) signals to enter a block. While a train is present in a block the signal permitting entry is set to red, preventing any more trains from entering.

As railways have developed, more complex control systems and in-cab signalling have been implemented to improve the safety of the railways and to ensure that drivers are fully aware of what is happening around them by requiring them to react in certain ways according to what is happening.

PZB is a complex system and requires that you understand the varying speed limits and the requirement to respond promptly to the signalling system.

12.2 PZB Track Interface



The PZB system incorporates in-cab signalling, this is where the control desk has indicators, alarms and buttons that will react according to the signalling status on the railway. The mechanism by which this works is a series of "balise" magnets placed on the side of the track. An example of one of these magnets is shown in the image on the left.

12.3 In-Cab Indicators

Inside the cab there are lights pertaining to the state of the PZB system as shown in the diagram below:

The white-dashed section shows the lamps related to PZB

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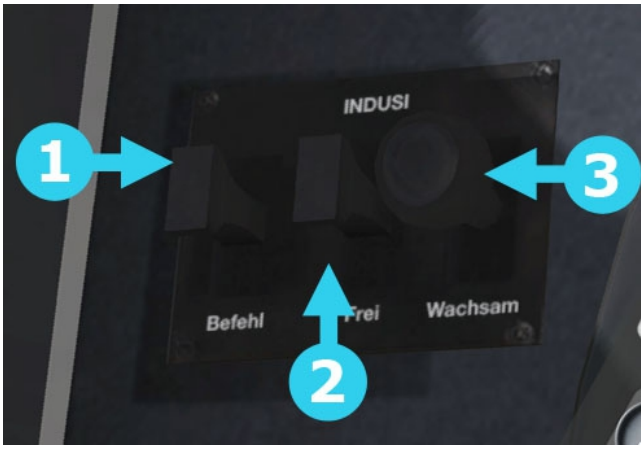
12.4 Cab Controls

There are also three controls on the cab desk that you will need to use in order to interact with the PZB system.



PZB controls on the Cab Desk of a BR266

These three controls, to the left of the control desk on the BR266, are named as follows:

1 – German: Befehl40 / English: PZB Override
2 – German: PZB Frei / English: PZB Release
3 – German: PZB Wachsam / English: PZB Acknowledge

Train Types

The type of train you are driving is important to understanding how PZB actually works and impacts on the speed limits that are imposed while PZB is monitoring your train.

There are three types of train that PZB deals with:

Type O (Obere) - Passenger trains
Type M (Mittlere) – Faster Freight Trains
Type U (Untere) – Slow / Heavy Freight Trains

These modes can be cycled through by pressing Ctrl+Shift

Once PZB is active you can see this in the PZB lamps as follows:

Type O – Lights up the 85 lamp
Type M – Lights up the 70 lamp
Type U – Lights up the 55 lamp

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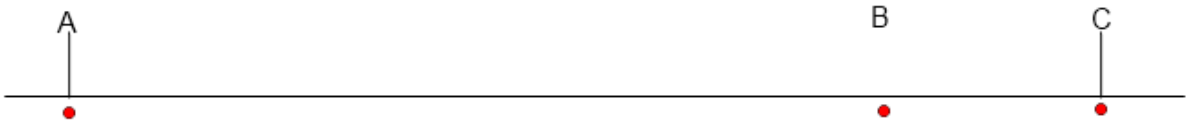
12.5 Key Controls

Function	Keyboard

12.6 Example

For this example we are driving a passenger train, which is a Type O service; the speed limits indicated in this example are therefore specific to that kind of service and will be different for other types of service.



There are three primary points noted in the diagram above:

A – The distant signal, usually some 1.2km from the hazard (such as a converging junction)
B – A point usually about 250m before the guarding signal
C – The guarding signal, normally placed around 200m before the hazard.

Let's take a look at what happens in this simple example as you begin on the left hand side of the image above and progress along the track until you get to the guarding signal on the right. We'll assume that in this case there is a converging junction set against us and therefore the guarding signal is at a stop indication.

As you approach point A, the Distant Signal will show a Yellow indication to let you know that the signal it is reflecting (at C) is at red indicating danger. You will also notice that there is a magnet next to this signal. This is called a 1000hz magnet.

As the signal is at anything other than a green indication the magnet will be energised and the PZB system on-board the train will therefore sense its presence. As the train passes over the 1000hz magnet the driver has up to 4 seconds in which to press the PZB Wachsam / PZB Acknowledge key (Page Down). If the driver fails to do this the PZB system will apply emergency brakes to stop the train.

Note that there is no alert in the cab that we have passed over the 1000hz magnet, the driver is expected to be aware that they have passed a distant signal and react accordingly. Once the PZB Wachsam / Acknowledge control is pressed the display will update to indicate that the locomotive is now in a monitored state. As we are a Type O train, the 85 lamp is lit and the 1000hz lamp lights up.

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As we pass the 1000hz magnet we must not be exceeding 165km/h, regardless of the line speed. If we are then there is a good chance we will not be able to fully stop before the signal at point C and therefore the PZB system will apply emergency brakes.

We now have 23 seconds in which to decrease our speed to 85km/h. If after 23 seconds we are exceeding this speed then the PZB system will apply emergency brakes.

We now continue on towards the guarded signal at no greater speed than 85km/h.

After 700 meters, the 1000hz lamp will go out and we will no longer be monitored. Now the driver can make a decision based on what they can see. Can you see the guarded signal and is it still at a danger indication?

If it is then we continue slowing down to stop. If the signal is now showing a clear aspect, because the hazard has cleared, the driver has the option to release the locomotive from monitoring and they will then be permitted to return directly to line speed. Press the PZB Frei / Release button to do this before the train reaches point B or further restrictions are put in place.

Caution: Be careful to ensure that you only release when the signal is clear; if you release and the signal is not clear when you reach Point B the system will assume that you are incapable of safely driving the locomotive and will apply the emergency brakes.

Assuming the signal is still at danger and we haven't released from monitoring, we will then reach Point B. At Point B there is another track magnet; the 500hz magnet.

As we pass the 500hz magnet we must have slowed down to 65km/h or else we might not be able to stop in time for the signal and the emergency brakes will be applied. There is no need to acknowledge the 500hz magnet. At this point, the PZB lamps on the control desk will change to light up the 500hz lamp, indicating the restriction we're now in.

After passing the 500hz magnet we must now decelerate to 45km/h within 153 meters.

Having slowed down to 45km/h, we can draw up safely to the red signal and stop.

If the signal changes to a clear aspect while we are approaching the signal then we must continue with the 45km/h speed limit as we are still being monitored. It is not possible to release (PZB Frei) from monitoring while under a 500hz restriction. This restriction will continue for 250 meters, taking you past the guard signal, after which you will be able to return to line speed. This is the primary reason for releasing from monitoring before Point B (if and only if the signal is seen to be clear), otherwise you would be tied to running past the clear signal at the much reduced speed limit for an extra 250 meters instead of being able to return to normal line speed earlier.

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If you pull up to the signal and stop because it is still red you may seek to obtain permission from the controller to pass it at danger. If you need to pass a signal that is still showing a red aspect then you will need to use the Befehl40 (Override) key as you approach the red signal.

At Point C the guard signal has the third and final type of magnet, a 2000hz magnet. This magnet will always stop the train if passed and is used to stop trains that pass the signal while it is at danger. Pressing and holding Befehl40 (Override) key stops the PZB system from reacting to the 2000hz magnet. Once the 2000hz magnet is detected, the Befehl40 lamp comes on and you will then be restricted to a speed limit of 40km/h. You should remain at this speed until either you have travelled for 2km, or you have passed a signal showing a clear aspect. Once either of these conditions pass you can press PZB Frei to release from monitoring and return to line speed.

Alternately Flashing PZB Indicators

An additional state, called Restricted Monitoring which may engage while you are travelling under the control of either the 1000hz or 500hz magnets. If you travel below 10km/h for more than 15 seconds or you stop completely at any point, the PZB display will start alternating between two of the speed lamps such as the 70 and 85 lamps, to indicate that restricted monitoring is now in place. Under these circumstances the speed limits to be imposed are reduced further. Full details about speed limits for all types of trains in both normal and restrictive monitoring are below.

PZB Speed Restrictions by Train Type

Type of Train	**Normal Monitoring**		**Restrictive Monitoring**	
	1000hz	**500hz**	**1000hz**	**500hz**
O (Obere)	165km/h -> 85km/h In 23 seconds	65km/h -> 45km/h In 153 meters	45km/h constant	45km/h -> 25km/h in 153 meters
M (Mittlere)	125km/h -> 75km/h in 26 seconds	50km/h -> 35km/h In 153 meters	45km/h constant	25km/h constant
U (Untere)	105km/h -> 55km/h In 34 seconds	40km/h -> 25km/h In 153 meters	45km/h constant	25km/h constant

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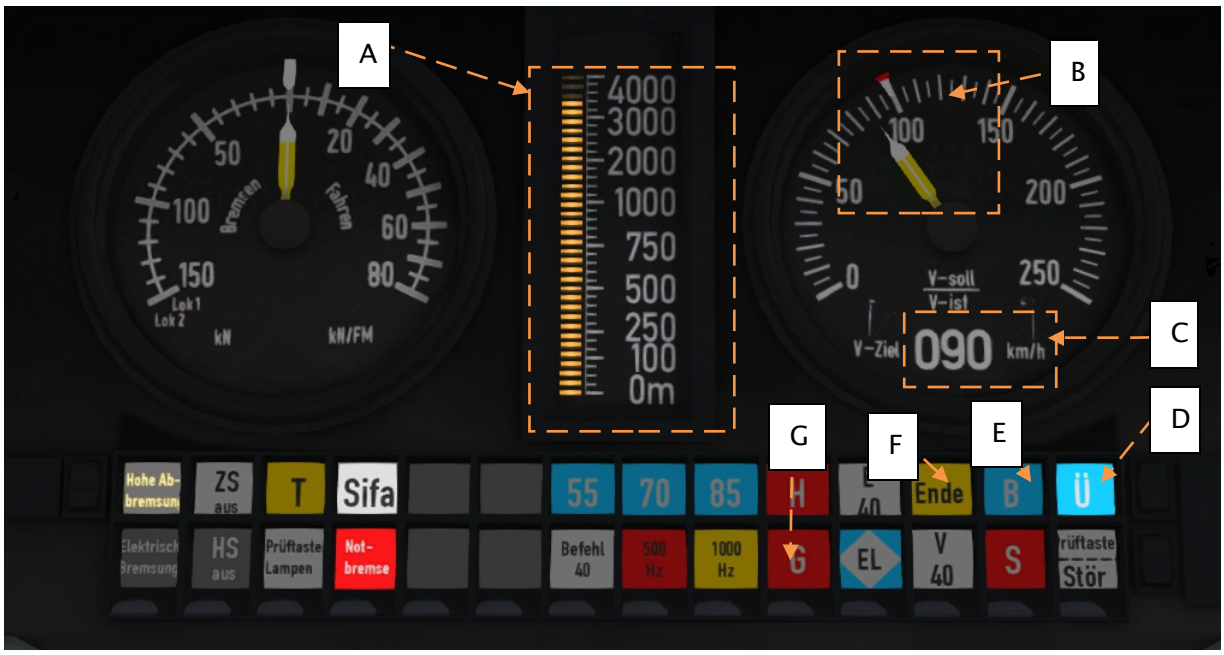
13 LZB Signalling System

The restriction of conventional block signalling is the amount of time taken by trains to ensure they can stop from their first notification of a signal at danger. This affects the maximum speed that trains can operate and is in relation to the length of the block. Unfortunately while lengthening blocks can allow trains to run faster it means that fewer trains can run as the gaps between them get progressively longer.

The modern solution to this problem is to change from fixed block signalling to a dynamic sliding block that protects a range in front of the locomotive that is changing as the locomotive moves.

LZB is controlled by a central control station; each one monitors approximately 100 kilometres of line and informs the on-board LZB computer what speed limit is dynamically being imposed on. The following image shows the displays related to LZB functionality on the locomotive cab dashboard. Note that the displays are standard across all LZB capable locomotives.



In the above example, LZB has been enabled and we can see the following:

A – Distance to next speed change.
B – Target speed taking in to account LZB speed restrictions.
C – Target speed in digit form.
D – Indicator that LZB mode is enabled.
E – Automatic Brake Intervention enabled if lit.
F – LZB mode terminating if illuminated.
G – Overspeed Indicator.

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LZB is automatically enabled as you pass one of these LZB posts as shown in the picture on the left.

If PZB is being used then it is automatically disabled and LZB gets switched on automatically.

If your AFB control is set to 0 (disabled) then the LZB system is simply there to instruct you what to do. If AFB is being used then the target speed will be the lowest of your AFB setting and the current LZB speed restriction.

LZB mode will be automatically disabled when the train passes over an LZB termination balise, such as the one shown in the picture on the right. If PZB was enabled then it will be switched back on as the LZB system is switched off.

You get an in-cab warning that LZB mode is terminating approximately 1.7km before it actually ends with the "Ende" light illuminating and an audible alarm. This warning must be acknowledged by pressing the PZB Frei / Release button or the "End" key on the keyboard – if you do not and LZB Automatic Brake Intervention is enabled then the emergency brakes will be applied.

7.2 Key Controls

Function	Keyboard

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14 Scenarios

14.1 [MRCE] Part 1:

Duration:
Difficulty:

14.2 [MRCE] Part 2:

Duration:
Difficulty:

14.3 [MRCE] Part 3:

Duration:
Difficulty:

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15 Acknowledgements

Dovetail Games would like to thank the following people for their contribution to the development of the MRCE Dispolok Pack.

Beta Testing Team

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