HAMBURG TO LÜBECK

dovetail GAMES

CONTENTS

CONTENTS **2**
1 ROUTE INFORMATION **4**
1.1 History 4
1.2 The Route 5
1.3 Focus Time Period 5
1.4 Rolling Stock 5
2 GETTING STARTED **6**
2.1 Recommended Minimum Hardware Specification 6
3 DB BR145 ..... **7**
3.1 Cab Controls 8
3.2 Keyboard Guide 9
4 DB BR218 ..... **10**
4.1 Cab Controls 12
4.2 Keyboard Guide 13
5 DBAG BR 294 ..... **14**
5.1 Cab Controls 15
5.2 Keyboard Guide 18
6 AFB TRAIN POWER CONTROL **19**
6.1 Key Controls 19
7 SIGNALLING **20**
8 SIFA **24**
8.1 Key Controls 24
9 PZB SIGNALLING SYSTEM **25**
9.1 PZB Track Interface 25
9.2 In-Cab Indicators 26
9.3 Cab Controls 26
9.4 Train Types 27
9.5 Key Controls 27
9.6 Example 28
10 LZB SIGNALLING SYSTEM **31**
11 SCENARIOS **33**
11.1 1. [218] Lübeck to Hamburg: Part 1 33
11.2 2. [218] Lübeck to Hamburg: Part 2 33
11.3 3. [218] Hamburg to Lübeck: Part 1 33

11.4 4. [218] Hamburg to Lübeck: Part 2 33
11.5 5. [218] Rescue Requirement 33
11.6 6. [294] Impartial Marshal 33
11.7 7. [145] Hardship Harbour 33

12 RAILFAN MODE SCENARIOS 34

12.1 [RailfanMode] Bad Oldesloe 34
12.2 [RailfanMode] Hamburg Hbf 34
12.3 [RailfanMode] Lübeck Hbf 34

13 CREDITS 35

1 ROUTE INFORMATION

1.1 History

The Hamburg-Lübeck railway was opened in 1865 and is one of the most important routes in the State of Schleswig-Holstein. It connects the two cities of Lübeck and Hamburg and is also a part of the Vogelflugline (Literally translated as bird flight line). The Vogelflugline is a railway that connects Hamburg in Germany to Copenhagen in Denmark, with the use of a 19km (12 mile) ferry link that the trains use to cross the water that separates the two countries.

From Lübeck, the railway heads in a South-Westerly direction. A majority of the terrain is undulating, agricultural land and the line crosses the river Rave three times. Bad Oldesloe is the most important intermediate stop along the line, as this allows connections to the hourly services to Bad Segeberg and Neumunster. The section of railway between Ahrensburg and Rahlstedt runs alongside the Stellmoor tunnel valley and in Hamburg, the line crosses the rail freight bypass followed by running next to the S-bahn line for the rest of the journey.

The initial plans to build a direct railway between Hamburg and Lübeck were drawn up in 183. However, because the Danish Authorities refused to allow a direct line to be constructed through Holstein-Gluckstadt, which was ruled by the King of Denmark, the line between Lübeck and Buchen was built by the Lübeck-Buchen Railway Company (Lübeck-Buchener Eisenbahn, LBE). This would allow trains from Lübeck to connect to the Berlin-Hamburg railway, but it also meant that trains to Hamburg had to go via Buchen which was a 32km longer journey than the original plans. The direct line was finally opened by the LBV on 1st August 1865 and it only took 10 years before the track needed to be duplicated.

Trains run a half-hourly service from the morning until the evening, Monday-Friday and hourly services on weekends. The line has the highest passenger numbers in Schleswig-Holsten.

From 2017, an extensive upgrade of the line between Hamburg and Bad Oldesloe will begin to take place for S-Bahn operations. The upgrade includes the addition of 4 new stations - Claudiusstraße, Bovestraße, Holstenhofweg and Pulverhof, and also in 2018, a level crossing at the Hammer Straße in Marienthal will be replaced by an underpass, which is seen as something that has to be done if the S-Bahn extension is to be successful.

1.2 The Route

The Hamburg-Lübeck Railway is a scenic route that runs south-west from Lübeck through mostly rural, rolling terrain, crossing the Trave River three times and running along the Stellmoor tunnel valley between Ahrensburg and Hamburg-Rahlstedt.

There are 15 stations located along its length.

1.3 Focus Time Period

The time period for this Route DLC is based around the present day (2015).

1.4 Rolling Stock

The DB BR218 has double decker coaches and provides the regional stopping service on the route.
The DB BR145 with IC coaches which provides the inter-city service in the route.
The DBAG BR 294 provides freight services.

2 GETTING STARTED

2.1 Recommended Minimum Hardware Specification

The Hamburg-Lübeck route is highly detailed, feature rich and incorporates detailed night lighting. Therefore, it will benefit from a higher PC specification.

- Windows XP with latest service pack installed / Windows Vista / Windows 7 / Windows 8
- Processor: 2.8 GHz Core 2 Duo (3.2 GHz Core 2 Duo recommended), AMD Athlon MP
- RAM - 2.0GB
- GFX - 512 MB with Pixel Shader 3.0 (AGP PCIe only)
- SFX - Direct X 9.0c compatible

3 DB BR145

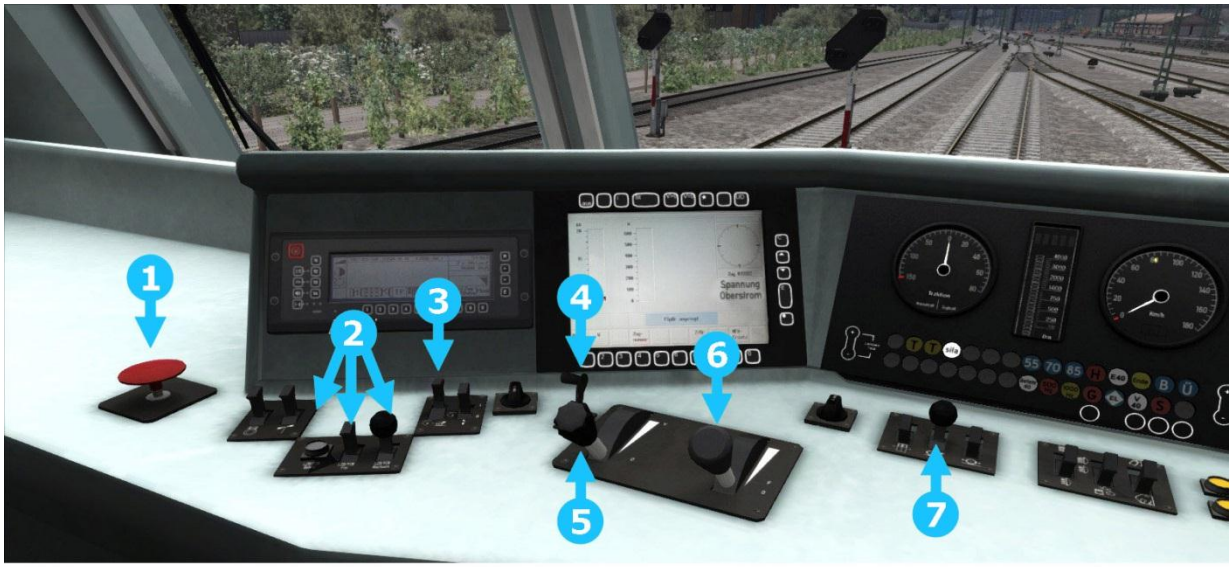
The DB BR145 is a Bo'Bo' mainline electric locomotive built by Adtranz primarily for the Deutsche Bahn at the end of the 1990s. The BR145 is primarily a freight locomotive but was also used for passenger operations.

The AdTranz DB BR145 derives from the prototype locomotive 128 001 (also known as 12X) that was built by AEG and Henschel; like competitor Krauss-Maffei's 127 001, it uses asynchronous electric motors to drive the locomotive: based on experiences gained from DB BR 120.

TECHNICAL DATA

Builder	Adtranz
Weight	80 tonnes
Length	62ft (18.9m)
Engine Power	5,632hp (4,200kW)
Max Speed	87 MPH (140km/h)
Tractive Effort	33,721 lb (150 kN)

3.1 Cab Controls



1 – Emergency Brake
2 – PZB
3 – Pantograph
4 – Reverser
5 – AFB
6 – Power Lever
7 – Sander
8 – Lights
9 – Instrument Lights
10 – Cab Light
11 – Train Brake
12 – Dynamic Brake
13 – Horn
14 – Wipers
15 – Direct Engine Brake

3.2 Keyboard Guide

Key Equivalent	Action
A / D	**Throttle.** Increase or Decrease Throttle.
; / ‘	**Train Brake.** Increase or Decrease Train Brake.
[/]	**Direct Brake.** Increase or Decrease Direct Brake.
, / .	**Dynamic Brake.** Increase or Decrease Dynamic Brake.
Y or C	**AFB.** Increase / Decrease AFB.
W / S	**Reverser.** Move reverser control Forward or Backward.
Tab	**Signals.** Request Permission to Pass Signal Ahead.
Ctrl + Tab	**Signals.** Request Permission to Pass Signal Behind.
G or Shift + G	**Junction.** Change state of Junction Ahead / Behind.
Space	**Horn**. Press once to sound the Horn.
T	**Load/Unload.** Press once to load/unload passengers or freight.
H or Shift + H	**Headlights.** Turn headlights On / Off.
P	**Pantograph.** Raise and lower the selected pantograph.
Backspace	**Emergency Brake**
V	**Windscreen Wipers**. Press once to switch on and again to switch off.
Ctrl + Shift + C	**Couple manually**
Shift + Enter	**SIFA Toggle**
Enter	**SIFA Acknowledge**
Shift + Ctrl and +	**LZB Toggle (only needed for Non-LZB routes)**
Ctrl and +	**LZB Automatic Brake Intervention Toggle**
Ctrl + Enter	**PZB Toggle**
Page Down	**PZB Wachsam / Acknowledge**
End	**PZB Frei / Release**
Delete	**PZB Befehl40 / Override**
L	**Cab Lights.** Toggle the Cab lights on and off.
/	**Handbrake.** Press to toggle the train Handbrake on and off.
X	**(Expert) Sander.** Causes sand to be laid on the rails next to the wheels to assist with adhesion. Press and hold to activate sander, let go to stop.

4 DB BR218

The DB BR218 (before 1968 the DB BR V 164) are a class of 4 axle, diesel hydraulic locomotives acquired by the Deutsche Bundesbahn for use on main and secondary lines for both passenger and freight trains.

The class represents the final major revision of the DB V 160 family of locomotives; retaining preferred features of the antecedent locomotives including a hydrodynamic brake and a single engine, which provides electrical train heating via a generator as well as tractive power. The class was also the most numerous of the family, providing the backbone of the Deutsche Bundesbahn's main-line diesel locomotive traction from the 1970s up to the reunification of Germany.

Despite being displaced from many workings by DMUs, electrification, and inherited DR BR 130s, as recently as 2009 a significant number of the class remained active throughout Germany.

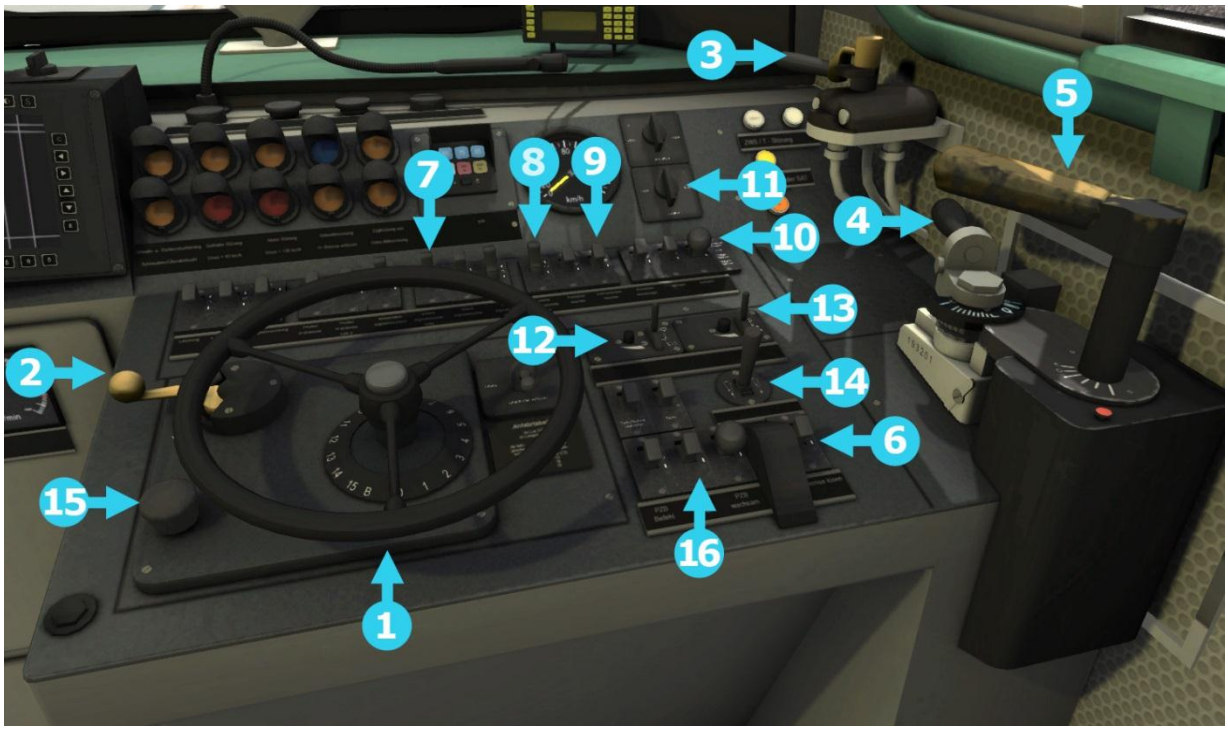
The design of the series is fundamentally the same as the rest of the V 160 family. All four axles are driven via cardan shafts by a Voith two speed hydraulic transmission which in turn is driven by a diesel engine with fuel and oil tanks. This engine is located between the bogies under the main frame on either side of the centrally located transmission.

Externally these locomotives are very similar to the other members of the class such as the superstructure is made from sheet steel, forming a shell. The tractive and braking forces are transmitted to the main frame of the locomotive via transverse beams attached to the main longitudinal supporting beams. The framework is supported on coil sprung bogies.

TECHNICAL DATA

Power Type	Diesel-Hydraulic
Weight	79.5t
Length	53ft 9.7” (16.4m)
Engine Power	2,764bhp (1,840kW)
Max Speed	87mph (140km/h)
Brake Types	Hydrodynamic Brake
Tractive Effort	Maximum: 53,000lbf (235kN)

4.1 Cab Controls



1 – Throttle Wheel
2 – Direction Controller
3 – Straight Air Brake Handle
4 – Train Brake Handle
5 – Dynamic Brake
6 – Train Brake Release
7 – Headlight Control
8 – Cab Light Switch
9 – Instrument Lights
10 – Sander
11 – Startup/Shutdown
12 – Wiper and Wiper Speed (Left Side)
13 – Driver Wiper and Wiper Speed
14 – Horn Lever
15 – SIFA Reset
16 – PZB Controls

4.2 Keyboard Guide

Key Equivalent	Action
A / D	**Throttle.** Increase or Decrease Throttle.
; / ‘	**Train Brake.** Increase or Decrease Train Brake.
[/]	**Direct Brake.** Increase or Decrease Direct Brake.
, / .	**Dynamic Brake.** Increase or Decrease Dynamic Brake.
W / S	**Reverser.** Move reverser control Forward or Backward.
Tab	**Signals.** Request Permission to Pass Signal Ahead.
Ctrl + Tab	**Signals.** Request Permission to Pass Signal Behind.
G or Shift + G	**Junction.** Change state of Junction Ahead / Behind.
Space	**Horn**. Press once to sound the Horn.
T	**Load/Unload.** Press once to load/unload passengers or freight.
H or Shift + H	**Headlights.** Turn headlights On / Off.
Backspace	**Emergency Brake**
V	**Windscreen Wipers**. Press once to switch on and again to switch off.
Ctrl + Shift + C	**Couple manually**
Shift + Enter	**SIFA Toggle**
Enter	**SIFA Acknowledge**
Ctrl + Enter	**PZB Toggle**
Page Down	**PZB Wachsam / Acknowledge**
End	**PZB Frei / Release**
Delete	**PZB Befehl40 / Override**
L	**Cab Lights.** Toggle the Cab lights on and off.
/	**Handbrake.** Press to toggle the train Handbrake on and off.
X	**(Expert) Sander.** Causes sand to be laid on the rails next to the wheels to assist with adhesion. Press and hold to activate sander, let go to stop.

The BR218 has two selectable gear ratios which can be changed using the E key as long as the reverser is in the neutral position (there is no in-cab control). Low ratio should be used for lower speed freights and will allow a maximum speed in the region of 90 km/h (60mph), and the high ratio should be used for higher speed freights to allow a maximum speed of 140 km/h (90mph).

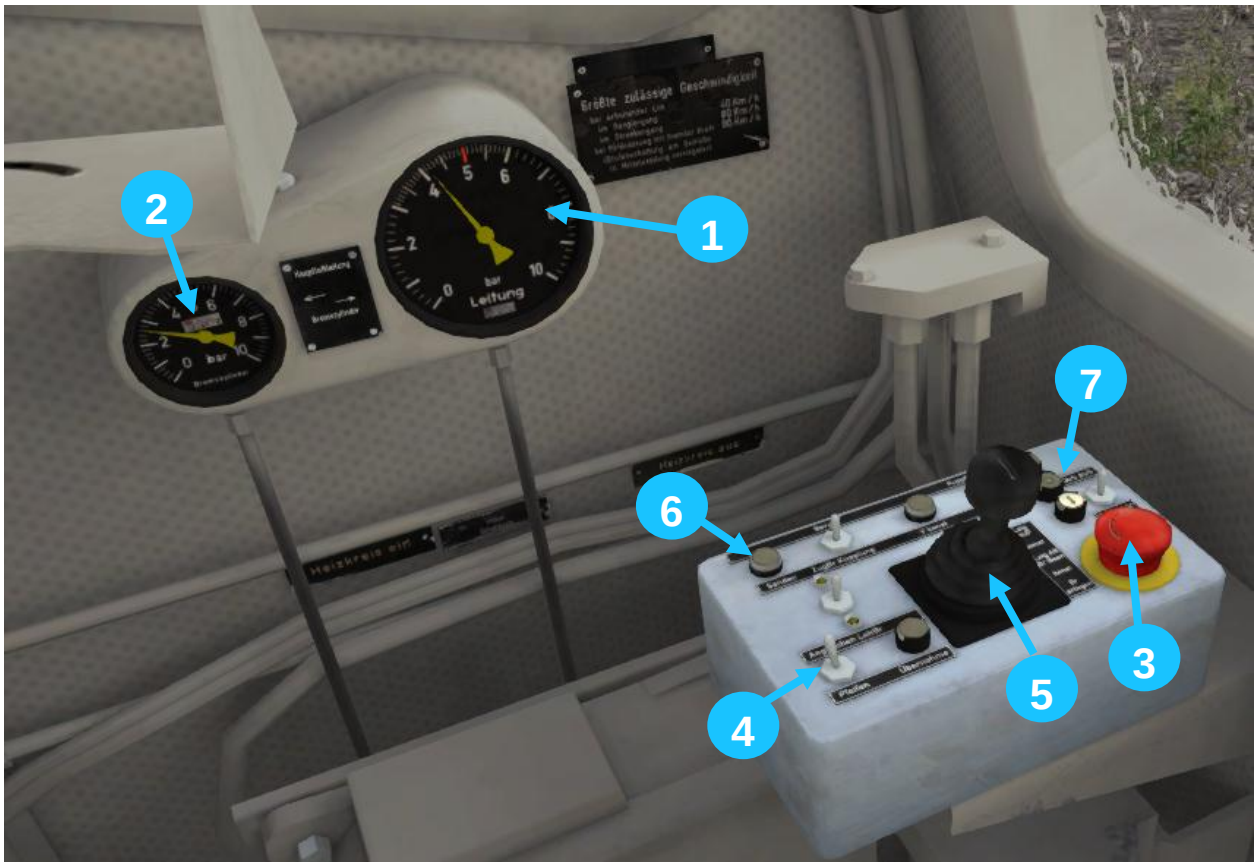
5 DBAG BR 294

Built between 1966 and 1971, the V90 locomotive is a standard diesel Freight Shunter for Deutsche Bahn. The limited railway traction design provides a locomotive of extreme versatility and reliability. Still going strong today, the newly named BR 294 locomotives can be found all over the network.

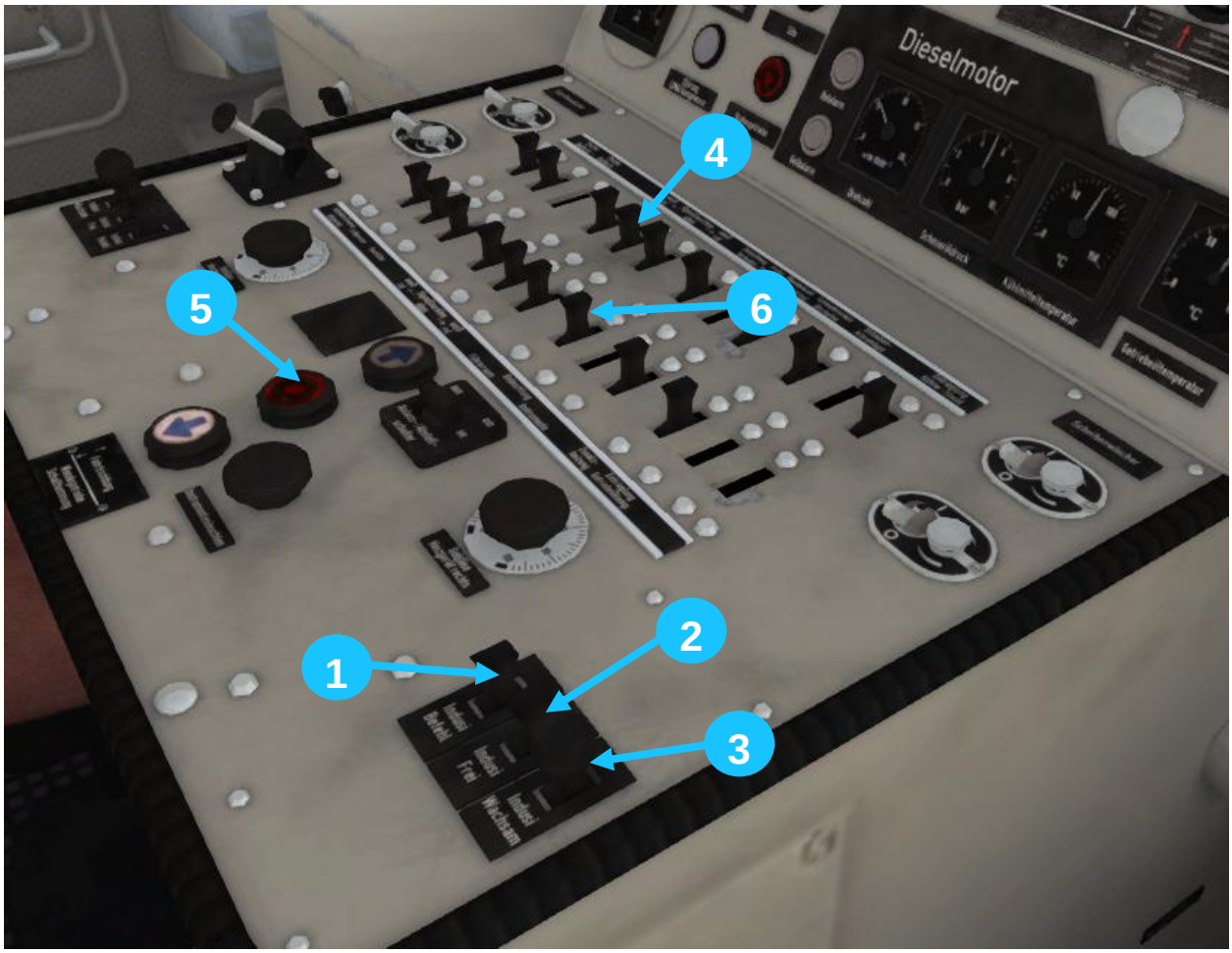
TECHNICAL DATA

Total Built	511
Weight	78t
Length	45’10” (14m)
Engine Power	1,350Hp (1,007kW)
Max Speed	50 mph (80 km/h)
Fuel Capacity	500gal (2,273L)

5.1 Cab Controls



1 – Brake Cylinder Pressure
2 – Main Brake Air Line
3 – Emergency Brake
4 – Horn
5 – Combined Train Brake and Throttle
6 – Sander
7 – Reverser



1 – PZB Befehl40 (Override)
2 – PZB Frei (Free)
3 – PZB Wachsam (Acknowledge)
4 – Headlights
5 – Reverser
6 – Cab light (highlight)

7 – PZB Lamps
8 – Speedometer

5.2 Keyboard Guide

Key Equivalent	Action
A / D	**Throttle.** Increase or Decrease Throttle.
W / S	**Reverser.** Move reverser control Forward or Backward.
[/]	**Locomotive Brake.** Decrease or Increase Locomotive Brake.
Space	**Horn.** Press once to sound the Horn.
T	**Load/Unload.** Press once to load/unload passengers.
Tab	**Signals.** Request Permission to Pass Signal Ahead.
Ctrl + Tab	**Signals.** Request Permission to Pass Signal Behind.
H or Shift + H	**Headlights.** Turn headlights On / Off.
Backspace	**Emergency Brake**
V	**Windscreen Wipers.** Press once to switch on and again to switch off.
G or Shift + G	**Junction.** Change state of Junction Ahead / Behind.
Ctrl + Shift + C	**Couple manually**
Ctrl + Enter	**PZB Toggle**
Page Down	**PZB Wachsam (Acknowledge)**
End	**PZB Frei (Release)**
Delete	**PZB Befehl40 (Override)**
L	**Cab Lights.** Toggle the Cab lights on and off.

6 AFB TRAIN POWER CONTROL

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. The computer will keep applying throttle or brake in order to maintain the target speed. 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. Release the brakes.

3. 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.

6.1 Key Controls

Function	Keyboard
Increase	Y
Decrease	C

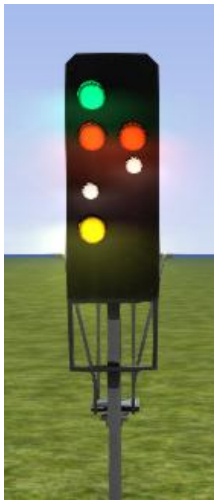
7 SIGNALLING

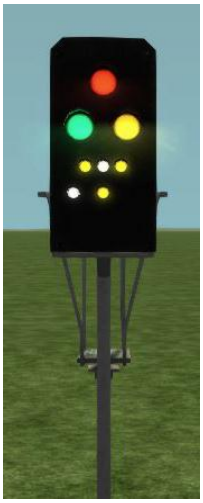
The signalling system employed on German Railways is extremely complex to understand at first; however, in reality each signal you encounter will be composed of one or more straight forward signals to give the final post.

This manual doesn't attempt to cover all the possible signal types and variations, but it should provide sufficient background as to let you work out what each signal post you come across is telling you by explaining the component parts. Note that any signal of a given type that you see should be interpreted the same whether it is on a post, on the ground, on a gantry or in any other position.

In the examples below, the image shows the signal with all lights on so that you can clearly see where they are. The description of the signal describes the various combinations of lights and what they mean when lit. The small code before the description is the technical name by which that combination of lights is known.

HP	KS	Description

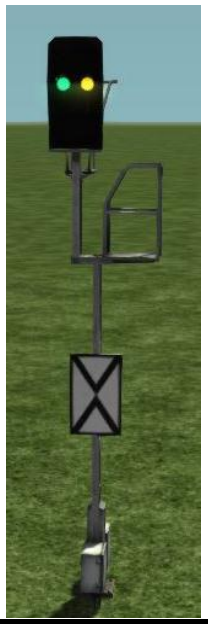




Signal Type: Hp/Ks

This signal protects entry to a block.

Hp0 – Red, Stop - do not proceed
Hp1 - Green: Clear to proceed
Hp2 – Yellow and Green: Caution, Proceed at 40km/h
Sh 1 – Red and Double White: Shunting permitted



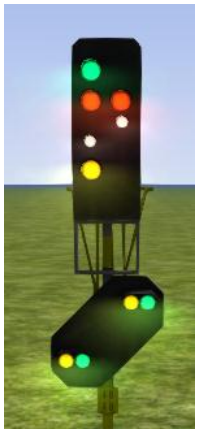
Signal Type: Hp/Ks Vr

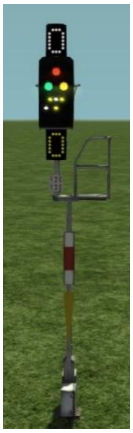
Vr signals are Distant Signal types and indicate to you what you should expect the *next* active signal to be showing.

Vr0 – Two Yellow – Caution, expect stop
Vr1 – Two Green – Expect Clear
Vr2 – Green/Yellow – Expect Caution with 40km/h restriction

Note the "X" post board at the bottom, any signal which has this board is indicating that the signal is to be interpreted as a Distant Signal. If this sign is not present the signal is at a reduced distance for braking and will display a white light on the top left edge.

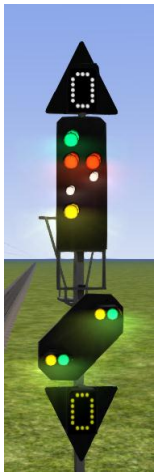
HP	KS	Description

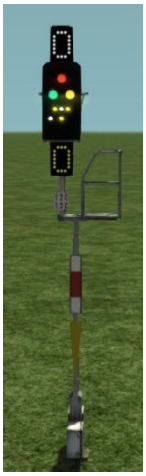




Combined Signal Type: Hp/Ks Vr

This is an example of a combined signal; in this case the example shown is an “Hp Vr” combination. The functions of the individual signal heads are identical to those explained above but they are placed on the same post.

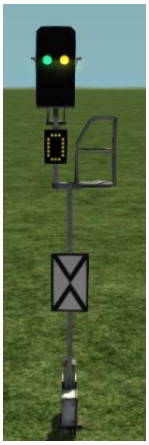




Combined Signal Type: Hp/Ks Vr Zs3 Zs3v

An example of how the signalling can begin to look very complex; however this is simply four signal types combined on to one post. Here you can see:

- permission to enter the next block on the Hp signal
- indication of the signal state for the next signal on the Vr signal
- speed restriction starting from this signal via the Zs3 at the top
- speed restriction in place from the next signal via the Zs3v at the bottom



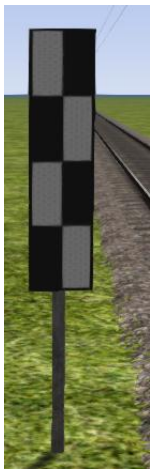
Combined Signal Type: Hp/Ks Vr Ks Zs3v

This signal combination combines the distant Vr signal with the speed at the next signal in the Zs3v signal.

Signal Type: Hp Shunt

This very simple signal will often be found as a ground frame or on a small post and is frequently used in yards and sidings. It has two indications:

Two Red lights – Stop, do not proceed
Two White Lights – Proceed



Post Type: Ne4 Chessboard

The Ne4 Chessboard is used to tell you that a signal that would normally be at this position has been placed in an alternative location; this could be further away from the track or on the other side of the track.

The Ne4 board is always located where the signal would normally expect to be positioned.

Post Type: Lf6 Advance Warning Speed Post

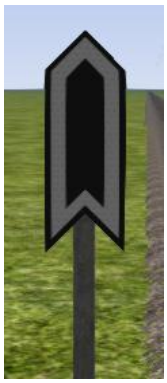
This speed post provides advance warning that a speed limit change is going to take place. In the example shown, the speed will soon be changing to 40km/h. Following an Lf6 you can expect an Lf7 to mark the start of the new speed limit.

Post Type: Lf7 Speed Post

This speed post marks the beginning of a change in speed limit. The example indicated marks the beginning of a 40km/h speed limit and you should not be exceeding this speed as you pass the post.

Post Type: Arrow Indicator

Where there might be confusion about which track a sign is associated with, a small arrow is placed to indicate which line the information applies to. In this example the Lf7 speed restriction applies to the track on the left of the post.



Post Type: Zs10 End of Speed Restriction

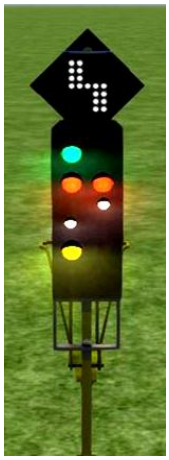
This post indicates the end of a speed restriction started by a Zs3.

Post Type: Zs3 Speed Post

New speed limit takes effect immediately from this point. Shows one white number indicating the tenth the speed allowed from this point. This is normally used in conjunction with main signals. Permanent speed restrictions are instead indicated using Lf type signs.

Post Type: Zs3v Distant Speed Post

Shows one yellow number indicating the tenth of the speed allowed from the point where the following Zs3 signal is found. This plate is normally used in conjunction with distant (e.g. Vr) signals.



Post Type: Zs6 Wrong Line Working

This track change display is used to indicate that wrong line running (left hand) is to be used from this signal. It is only used in combination with main signals and only on lines where wrong line working is frequent.

8 SIFA

SIFA is short for Sicherheitsfahrschaltung or “Safety Driving Switch”.

The SIFA vigilance alarm is disabled when starting a scenario, but can be activated (or deactivated) by pressing ‘Shift+Enter (Numpad)’. While activated, the SIFA light on the cab dashboard is switched off. The driver is required to acknowledge the alarm every 30 seconds if the train is moving.

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. Following a further 2.5 seconds, the emergency brake will be applied. This can be avoided by acknowledging the alarm at any stage. This can be done by pressing the ‘Enter (Numpad)’ key.

8.1 Key Controls

Function	Keyboard
Activate/Deactivate	Shift+Enter (Numpad)
Alarm Acknowledge	Enter (Numpad)

9 PZB SIGNALLING SYSTEM

PZB stands for Punktförmige Zugbeeinflussung. Loosely translated to English, this means “intermittent train protection”.

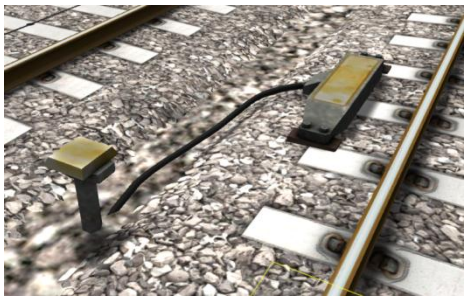
Safe distances between trains are managed conventionally through the use of block-based systems.

A given line is broken up into 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 to enter.

As railways have developed, more complex control systems and in-cab signalling have been implemented to improve the safety of the railways. To ensure that drivers are fully aware of what is happening around them, they are required to react to various alert systems depending on the situation.

PZB is a complex system that demands a very good understanding of the varying speed limits and the requirements to respond promptly to the signalling system.

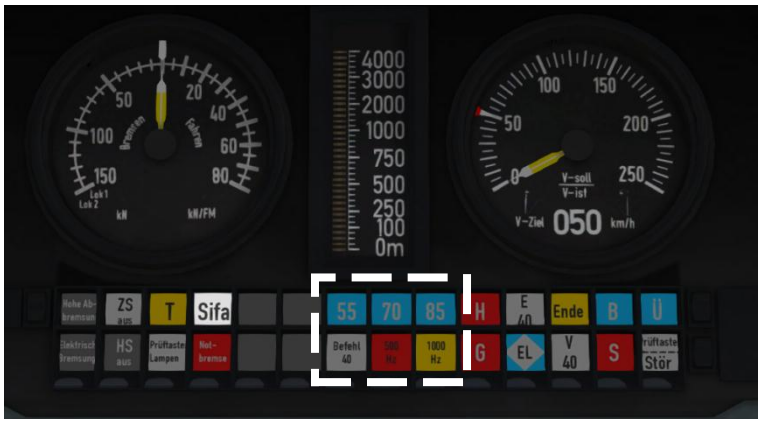
9.1 PZB Track Interface



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.

9.2 In-Cab Indicators

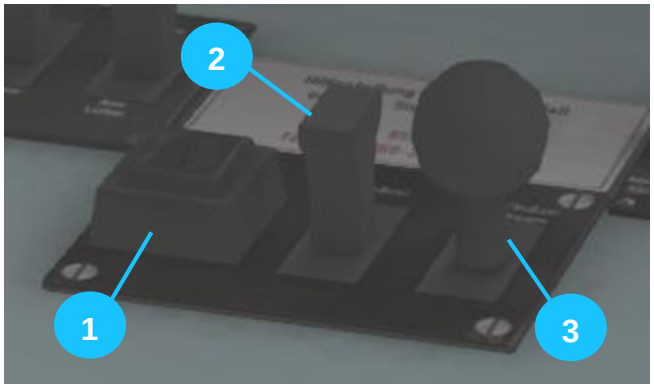
Inside the cab, there are lights indicating the current state of the PZB system (as shown in the diagram below):



Take a look at the picture above. The section inside of the white dashed box shows the lights related to the PZB. It would be worth noting that the controls in the DB BR146 are similar but are not identical.

9.3 Cab Controls

There are also three controls on the cab desk that you can use to interact with the PZB system.



PZB controls on the Cab Desk of a BR101 (other locomotive controls would be similar but not identical)

These three controls, to the left of the control desk on the BR101, are named as follows:

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

9.4 Train Types

The type of train you are driving is important in understanding how the PZB system works. It's also important to have a good understanding of the impact the PZB system has on the various speed limits.

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

The implementation of the PZB system within locomotives on the Munich to Rosenheim route automatically identifies the correct type of train. This is based on the train type configurations in the scenario. 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

9.5 Key Controls

Function	Keyboard
Activate/Deactivate	Ctrl+Enter(Numpad)
Acknowledge	Page Down
Release	End
Override	Delete

9.6 Example

For this example, we are driving a passenger train. The speed limits indicated in this example are therefore specific to a Type O service and will be different to the two other services.

There are three primary points noted in the diagram above:

A – The Distant Signal is usually around 1.2km from the hazard (such as a converging junction).
B – A point usually about 250m before the Guarding Signal.
C – The Guarding Signal is normally placed around 200m before the hazard.

Let's take a look at what happens in this simple example. We 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 indicating that you should stop.

As you approach point A, the Distant Signal will show a yellow light to let you know that the signal at C is a red light, 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 light, the magnet will energise and the PZB system on-board the train will 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/ Acknowledge key (Page Down). If the driver fails to do this, the PZB system will apply the emergency brakes in order to stop the train.

Note that there is no alert in the cab when we pass over the 1000hz magnet. This is because 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 light and the 1000hz light will be activated.

We must not be exceeding 165km/h (103m/h) as we pass the 1000hz magnet, regardless of the line speed. If we are, there is a good chance we will not be able to fully stop before the signal at point C. Therefore, the PZB system will apply the emergency brakes.

We now have 23 seconds in which to decrease our speed to 85km/h (53m/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 than 85km/h (53m/h).

After 700 meters, the 1000 Hz 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 red, indicating danger?

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 500 Hz magnet.

As we pass the 500hz magnet, we must have slowed down to 65km/h (40m/h) or else we might not be able to stop in time for the signal. If that's the case, the PZB system will apply the emergency brakes. There is no need to acknowledge the 500hz magnet. At this point, the 500hz light on the control desk will activate, indicating the current restriction. After passing the 500hz magnet, we must now decelerate to 45km/h (28m/h) within 153 meters.

Having slowed down to 45km/h (28m/h), we can draw up safely to the red signal and stop.

If the signal changes to a clear aspect while we are approaching, then we must continue with the 45km/h (28m/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.

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 to do so 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 (25m/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

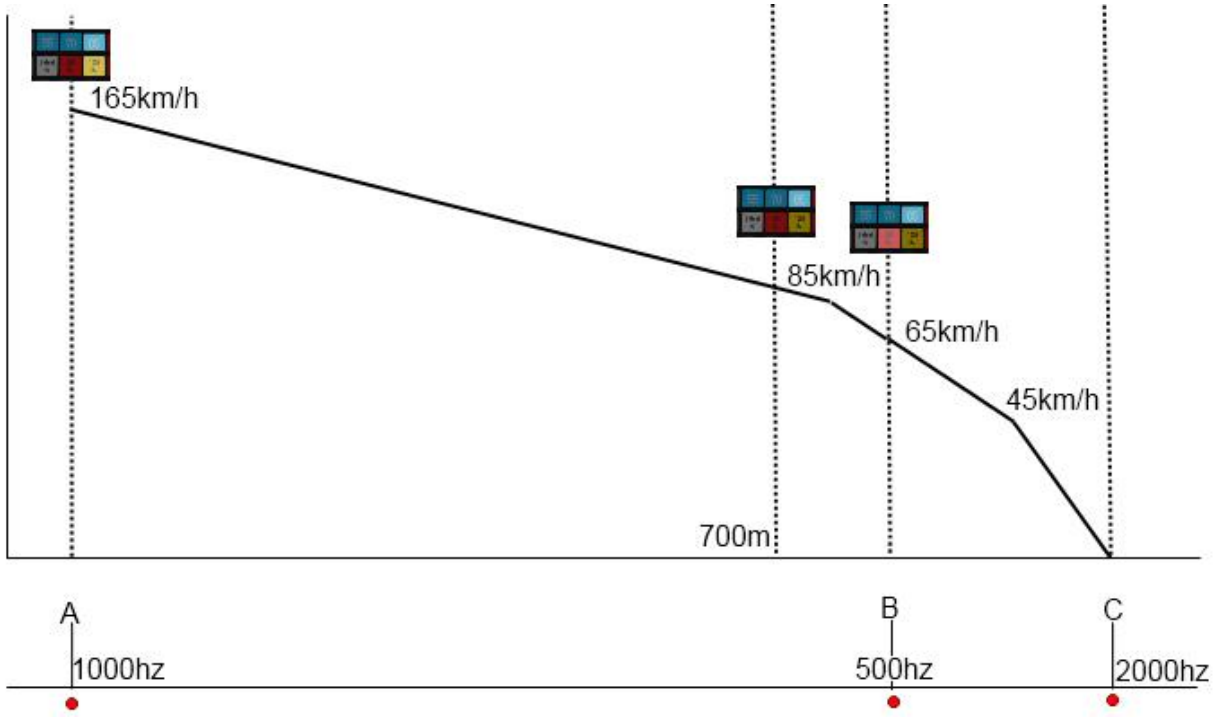
There is an additional state called Restricted Monitoring, which may engage while you are travelling under the control of either the 1000hz or 500hz magnets. If you travel below 10km/h for more than 15 seconds or you stop completely at any point, the PZB display will start alternating between two of 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

Example Run Graph

Here's a graphical layout of what happened in our example run, indicating the magnets, speed limits and what you would expect to see in the PZB indicator lamps.

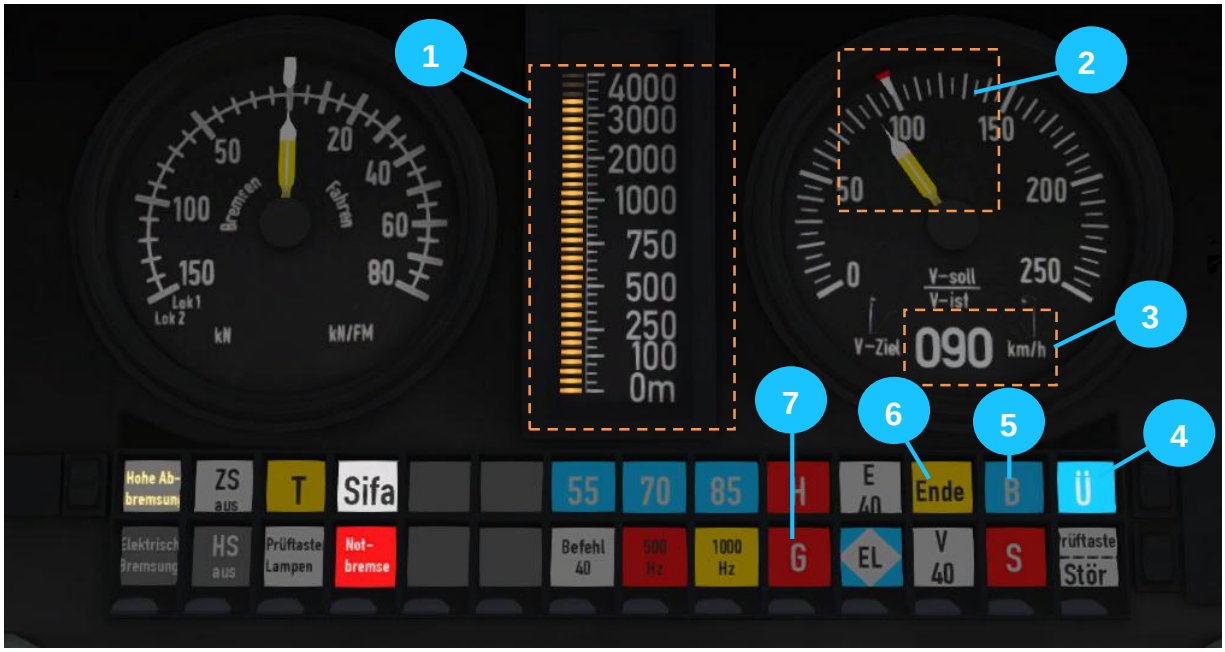


10 LZB SIGNALLING SYSTEM

The restriction of conventional block signalling is based on the amount of time taken by trains to ensure they can stop from their first notification of a signal at danger. This affect the maximum speed that trains can operate. The speed is determined by the length of the block. Unfortunately, while lengthening the block 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, which changes 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 is being imposed. The following image shows the displays related to LZB functionality on a BR101 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:

1 – Distance to next speed change
2 – Target speed taking in to account LZB speed restrictions
3 – Target speed in digit form
4 – Indicator that LZB mode is enabled
5 – Automatic Brake Intervention enabled if lit
6 – LZB mode terminating if illuminated
7 – Overspeed Indicator

LZB is automatically enabled as you pass one of the LZB posts, as shows 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 on 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 the PZB system was enabled previously, it will be switched back on when 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.

11 SCENARIOS

For driving tutorials, please visit the Academy from the main TS2016 menu screen*

11.1 1. [218] Lübeck to Hamburg: Part 1

Starting at Lübeck, head to Bad Oldesloe driving the DAB cabcar with a BR218 pushing at the rear.

Duration: 20 Minutes
Difficulty: Easy

11.2 2. [218] Lübeck to Hamburg: Part 2

Continue this Lübeck toi Hamburg service, at Bad Oldesloe to Hamburg Hbf. You are still in a BR218 with DAB coaches.

Duration: 30 Minutes
Difficulty: Easy

11.3 3. [218] Hamburg to Lübeck: Part 1

A southbound passenger service from Hamburg to Lübeck. Service 218 105-5 was earlier delayed and has just left ahead of you. With heavy snow falling and fog creeping in, signal checks will be harder than usual.

Duration: 30 Minutes
Difficulty: Hard

11.4 4. [218] Hamburg to Lübeck: Part 2

Continue this Hamburg to Lübeck service, at Bad Oldesloe. You are still delayed behind service 218 105-5 and weather conditions are still pretty rough. Signal checks are still as crucial as ever.

Duration: 25 Minutes
Difficulty: Hard

11.5 5. [218] Rescue Requirement

A freight service developed a fault earlier on the mainline. The containers were collected by another service and delivered to their destination. 218 146-9 was moved to a siding at Bad Oldesloe to free up the mainline. Head there now, collect her and bring her back to Lübeck for maintenance.

Duration: 50 Minutes
Difficulty: Very Hard

11.6 6. [294] Impartial Marshal

You've just received your assignment for the day. You'll need to marshal together a consignment that is due for delivery to Lübeck later on.

Duration: 40 Minutes
Difficulty: Medium

11.7 7. [145] Hardship Harbour

Join 145 01015 midway through its consignment delivery this evening. You're currently being held at Ahrensburg to allow 218 128-7 through. When the signal clears head for Lübeck Harbour.

Duration: 40 Minutes
Difficulty: Medium

12 RAILFAN MODE SCENARIOS

Railfan Mode provides a unique chance to observe and enjoy the operations of trains without the pressure and involvement of driving them. Railfan Mode scenarios are positioned at various key points along the route and provide camera functionality to sit back and watch the action unfold.

These scenarios are located on the **Drive** screen under the **Career** tab.

12.1 [RailfanMode] Bad Oldesloe

Located at Bad Oldesloe, observe the operations and passing trains from a good vantage point. See what you can capture as the action unfolds.

Duration: 10 Minutes
Difficulty: Easy

12.2 [RailfanMode] Hamburg Hbf

Located at Hamburg Hbf, observe the operations and passing trains from a good vantage point. See what you can capture as the action unfolds.

Duration: 10 Minutes
Difficulty: Easy

12.3 [RailfanMode] Lübeck Hbf

Located at Lübeck Hbf, observe the operations and passing trains from a good vantage point. See what you can capture as the action unfolds.

Duration: 10 Minutes
Difficulty: Easy

13 CREDITS

Artists:
Lee Wallace
Lauren McKellan
Laura McConnachie
Matthew Price
Duncan McCafferty
Finlay Pearston
Gemma Craig
Janine Feerick
Ross McCafferty

Track:
Rob Payne

Scenarios:
Rob Payne
Ade Adeleye
Jordan Searle

Route Builders:
Laura McConnachie
Duncan McCafferty
Finlay Pearston
Gemma Craig
Janine Feerick
Ross McCafferty

Signals:
Jeffrey Douglas

Sounds:
Adam Rose

Special Thanks:
Peter Why
Chris Luck