

# DB BR 407 'New ICE 3'



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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.

This document contains links to external websites which have been provided for your convenience and may provide you with appropriate additional information to assist you with this product. These links are external third-party websites and we have no control over, or influence of, the content of these sites.

# 1 Information

## 1.1 DB BR 407 - Functions available in the Simulation

The most important functions are summarised below (Not all functions are listed)

- Prototypical driving behaviour
- Complex regulation system with AFB and prototypical LZB
- Prototypical PZB90 V2.0
- Time-Time SIFA
- Delayed and smoothly regulated e-brake
- Magnetic brake simulation
- Pantograph sparks with sound
- Usable front and rear coupler hatches
- Spoken system announcements
- Switchable instrument lights
- Reading lamp and cab light
- Wipers with speed control
- Standard TS2019 Effects
- Scenario save function compatible
- Rolling start compatible
- Realistic sounds optimised for EFX

## 1.2 Technical Data DB BR 407

<b>Manufacturer:</b>	Siemens	<b>Build Dates:</b>	2009 – 2012
<b>Type:</b>	Electric, rotary current	<b>Wheel arrangement:</b>	Bo-Bo+2-2+Bo-Bo+2-2 +2-2+Bo-Bo+2-2+Bo-Bo
<b>Length / buffer:</b>	201 m	<b>Mass:</b>	492 t
<b>perm. Output:</b>	8000 kW	<b>Maximum speed:</b>	320 km/h (AC)



## 2 The Trainset



DB BR 407.0 – 1. Class end wagon 1 with cab (powered)



DB BR 407.1 – 1. Class wagon (transformer wagon)



DB BR 407.2 – 1. Class wagon with board bistro (inverter wagon, powered)





DB BR 407.3 – 2. Class middle wagon



DB BR 407.8 – 2. Class middle wagon



DB BR 407.7 – 2. Class wagon (inverter wagon, powered)





DB BR 407.6 – 2. Class wagon (transformer wagon)

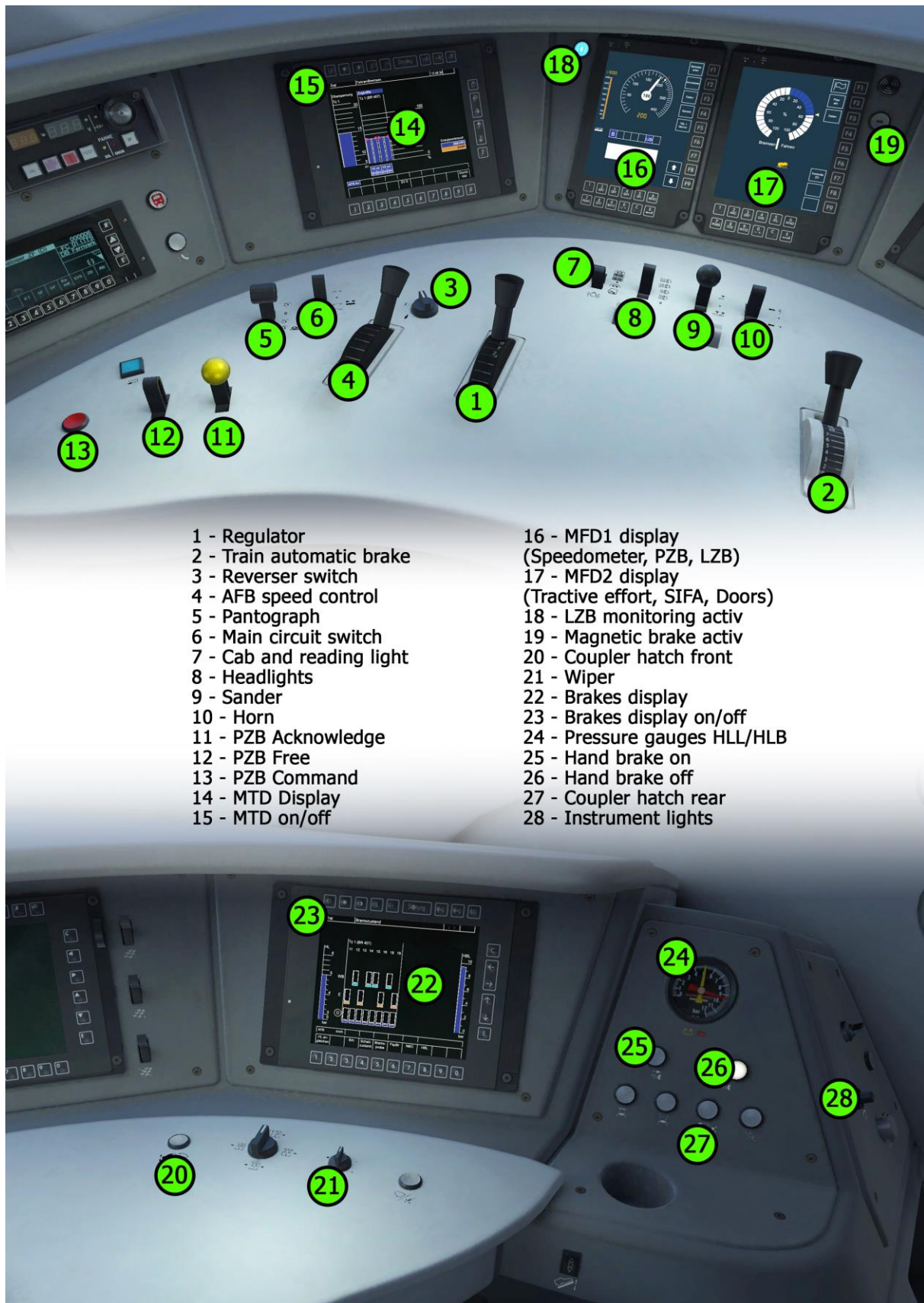


DB BR 407.8 – 2. Class end wagon 2 with cab (powered)



DB BR 407 cabview

### 3 Cab and Controls





## 4 How to Drive

### 4.1 Pro Range General Hints

Pro Range models are created for customers who are looking for a more realistic experience in Train Simulator. Please read this manual carefully to understand how you drive this train properly and without any issues.

### 4.2 Start-Up Procedure

The BR 407 is already set up when a scenario starts. But you can set up some systems if you want - For example, the PZB, LZB and SIFA. For further information, please read the sections below.

### 4.3 Message and Help System

#### Messages:

This train has a special message-and-help system to give you information about events and errors which occur. You can adjust the systems level with <Ctrl+[>. The system is switched on by default and has three levels: 1/only errors, 2/errors and further messages, 3/all messages and debug information for log-mate. Note: Essential messages can't be disabled.

#### PZB/LZB Help system:

The locomotive has a special help system for the security systems PZB and LZB. If you get an emergency brake due to incorrect operation, you'll receive additional information in a message box.

### 4.4 Battery

#### Battery voltage:

Before you can start driving with the train, the battery needs to be switched on; you do this by pressing <Shift+B>. The battery can only be switched on when the train is stationary, and the reverser is set to '0' (zero). The battery is always fully charged. By default, the battery is enabled at the beginning of a scenario.

### 4.5 Pantograph and Main Switch

#### Pantograph selection:

Pantographs will be automatically selected by the train's controlling system. In most situations the rear-most pantograph for the selected overhead voltage system will be used.

#### Raising and lowering the pantograph:

To raise the selected pantograph, the reverser needs to be set to the "Forwards" or "Backwards" position. To raise the pantograph, use the switch in the cab or press <P>. Raising and lowering a pantograph is possible when driving the train. This may be necessary when you reach a neutral section.

#### Switching the Main Switch on or off:

After you've raised the pantograph, you can turn on the main switch with the appropriate switch in the cab or with <Z>. The main switch can also be operated while the train is moving. Please keep in mind that the main switch will be set to "off" (tripped) when the pantographs are lowered, or otherwise disturbed.

## 4.6 Regulator

### Automatic Power Control:

With the regulator you select a desired tractive percentage and the train then will try to reach that selected value. The tractive effort gauge in MFD2 shows you the selected percentage, and the actual applied power, with the orange needle and the blue segmented bar - The orange needle showing your selection, the blue bar the applied power. (You can also see this in a different style on the left MTD display.)

### Regulator Lock:

The regulator is locked when:

- You used a brake while the regulator was not set to '0' (zero).
- An emergency brake application occurred.
- A fault occurred.
- The doors are open.

If the regulator is locked, you can't select a tractive effort value.

### Unlocking the Regulator:

To unlock the regulator the following requirements are needed:

- Set the regulator to '0' (zero).
- All brakes need to be released.
- Ensure the emergency brake is deactivated.
- All faults are cleared.
- The main switch is on.
- The doors are closed.

## 4.7 AFB (Cruise Control)

The train is equipped with AFB (automatic cruise and brake control system). To enable/disable the system you need to follow the steps as described below:

### Switching on whilst stationary:

Requirements:

- The train has started up.
- The regulator is set to '0' (zero).
- The train brake is applied.
- The AFB VSoll-lever is set to '0' (zero).
- There is no active emergency braking applied.

Now use the AFB switch or press <Shift+A> to switch on the AFB system. You'll hear a speech 3 times, the AFB brake will then be applied, the VZiel display on the speedometer gauge will light up with '000' and you'll get a message on the upper-right screen position. The AFB system is now enabled. Set a speed you wish to reach and hold with the VSoll-lever. The VZiel display and the VSoll needle in the speedometer gauge will change and display your actual setting. To start the run, you need to release all brakes and set the regulator to a value higher than '0'. The AFB will release the brake and will attempt to apply power. You can easily change the speed while driving with the VSoll-lever. To prevent the system from wavering around the zero-tractive effort between power and brake force, select a lower regulator value to smooth it out.

Switching on whilst driving:

## Requirements:

- The regulator is set to ‘0’ (zero)
- The AFB VSoll-lever is set to 320 (the maximum value)
- There’s no active emergency braking applied.

Now use the AFB switch or press the keys <Shift+A> to switch on the AFB system. You’ll hear a speech 3 times, the AFB brake will be applied, the VZiel display on the speedometer gauge will light up with ‘000’ and you’ll get a message on the right upper screen position. Set a speed you wish to reach and hold with the VSoll-lever. The VZiel display and the VSoll needle in the speedometer gauge will change and display your actual setting. Set the regulator to the required value and the AFB system begins to do the work.

Switch off:

If you use the AFB switch or press the keys <Shift+A>, you’ll hear a spoken announcement 3 times, the VZiel display goes dark (if LZB is not running), the red VSoll needle moves to ‘0’ (if LZB is not running) and you’ll get a message on the upper right screen position. After that you need to set the VSoll-lever to ‘0’ (zero) position, and then reapply power with the regulator (if needed.)

While LZB is running:

The AFB system can control the speed whilst running in LZB mode. The procedures to switch on and off are the same as described above. Note, that you can’t set a speed with the VSoll-lever that is above the actual LZB maximum speed. However, you can set the VSoll-lever to its maximum value while under LZB control. The system reads out the maximum speed that can actually be set. Of course, you can set a speed below the actual LZB speed to travel slower than the line speed (maybe for LZB controlled freight trains).

Please note:

The AFB works a bit differently under LZB control than if you use it in manual driving mode. When running under LZB while the G is lit, then the AFB VSoll speed runs underset by 10-20kph to avoid exceeding the speed limit. While the G is lit there will be no power applied by the AFB system.

**4.8 Brakes**

The locomotive has three brake systems:

- Train brake (automatic air brake)
- E-brake (electric rheostatic brake)
- W-brake (magnetic rail brake)

Train brake lever:

The train brake lever is used to brake the whole train. It is a notched brake lever and can be precisely controlled. You never control an independent brake in this train with the lever - The brake control system chooses the appropriate brake system for the conditions. Use the brake with care, and according to the train’s weight and track conditions. Note too, that when you want to apply any tractive effort, the train brake lever needs to be in position ‘F’.



Air-brake / E-brake:

The e-brake is automatically coupled together with the train brake lever normally and used with priority over the air brakes. The air brake gets blended in by some conditions (speed, brake lever position). The actual e-brake power is shown within the MFD2's gauge as an orange scale that moves to the left. You also can read the brake power on the brake display's right side where are three bar lines - one for each brake system.

W-brake:

The magnetic rail brake works in conjunction with the position of the brake lever, the demanded brake power and certain other conditions. You can't control it directly. If the w-brake is active, you'll see its state by the lit or not lit W lamp right sides of the MFD2 (tractive effort gauge). You can also see the brake amount within the brake display with the upper bar line (purple colour). Be careful to not apply too much brake power. (The w-brake adds about 40% more brake amount to the train)

How to correctly brake:

This is not an easy question to answer - braking requires practice to get a feeling of how the brakes work together. For a normal brake application, you need no more than a brake lever position at '5'. Beyond that position, the w-brakes and air-brakes are kicking in to match up the demanded brake amount percentage. This could end in an emergency-brake like application that you may not want. Also, be mindful that this train can reach very high speeds, and can require up to 3000 metres of braking distance to reach a complete stop.

**4.9 Wheel-slip and Sanding**

The train is equipped with an automatic wheel-slip protection brake, which the operator would not normally need to be involved with. However, to master difficult situations, such as hill climbing a heavy train in wet conditions, you can use the sander manually, via the in-cab switch or pressing <X>.

**4.10 FML (Traction Motor Blowers)**

The traction motor blowers on this train are used in automatic mode only. In this mode, the blowers become active when the traction motors reach a specific temperature and turn off below that value. You shouldn't normally have any problems with the temperatures, but when the motors get too hot, the regulation system will block any further power application. In such a situation, you'll receive a spoken warning, backed with a message box, and you may need to coast a bit to bring down the temperature. (Temperatures are shown by the PZB info' message function <Ctrl+Shift+8>).

**4.11 Train Formation and Numbering**

This train has predefined possible formations. A train set consists of two units of each 4 wagons. Each 4-wagon unit is a closed traction unit and needs to be formed to run. A 4-wagon unit is composed with the following cars: EW – TW – SW – MW.

EW = End wagon with cab

TW = Transformer wagon

SW = Inverter wagon

MW = Middle wagon

A usable trainset must be formed from a minimum of two of these units. So, a complete train consists of: EW – TW – SW – MW – MW – SW – TW – EW.

Siemens created the Velaro as a modular system where train operating companies can choose the formations for their special needs. DB has chosen an 8-wagon trainset. The Velaro D is a fixed set of wagons and is always composed in the same order of wagon types. The order looks like this:

EW01 – TW02 – SW03 – MW04 – MW05 – SW06 – TW07 – EW08

..or with DB computer numberings:

407.0 – 407.1 – 407.2 – 407.3 – 407.8 – 407.7 – 407.6 – 407.5

There are 17 train sets existing within DB. Each train set does have a fixed train number (1-17) that is displayed at the end wagon's noses left and right sides. The number displayed there is 701 for train number 1, or 717 for train number 17 and so on.

Each wagon has a DB computer number which contains the class, the wagon type number, the trainset number and a control number. So, the first end car of train 14 is with the number 407 014-0 (class 407 – wagon 407.0 – train number 14 – control number 0). The control numbers are calculated by the first 6 numbers of this computer number.

In Train Simulator we've implemented a system to create prototypical numberings for a train set. When you select a consist in Quick Drive or other scenario types, the first end wagon of a train set grabs a number from a list, decomposes it into separate pieces, and sends it down the train so each wagon will calculate its number to be displayed correctly.

**Important: Changing the numbers via the flyout:**

If you want to display a specified train number on a single trainset, you can enter the right number for the first end wagon (EW01) in the usual format: 4070XX? (Always 7 digits). The 4070 is always given for the EW01, the XX is the train number you want to have displayed on that single train set, and the '?' is the control number (there are some calculators on the internet, try searching for 'db prüfziffer berechnen').

Do not change a number from the other wagons. They are there because the Train Simulator engine requires them to identify the wagons in-game for scenario functionality. When you enter a new EW01 number, the EW propagates the number along the train set and changes all the numbers; so, you should not need to enter a unique number for any single wagon

**Double formation:**

You can couple two train sets together. From a technical aspect in Train Simulator they always act as a separate train set. So, the numbering will work well with this since a EW does not send the number in its nose direction to the second train set. You can set the number for each train set independently in its EW01.

When running the Velaro in double formation, the MTD and BD displays will change a bit. They then display a second row of bars for the second train set.

Do not couple the Velaro with other trains in Train Simulator, as it may cause issues. This includes the 403/406, which have been coded differently, and may not work as you expect.

## 5 SiFa, PZB and LZB (Train Protection Systems)

### 5.1 SiFa (Vigilance Alarm)

The locomotive has a working Time-Time-SiFa (vigilance alarm) which can be activated or deactivated with <Shift+7> or <Shift+Numpad Enter>. The purpose of the SiFa is to keep the driver vigilant at all times and to allow the locomotive to come quickly and safely to a stop should the driver become incapacitated or otherwise not be in proper control of the train.

If you enable the SiFa, you have to press the space bar every 30 seconds to reset the timer.

If you forget to reset the SiFa timer, the SiFa lamp will light up on the desk to remind you to press the SiFa button. If you miss this, after 2 seconds you will get a verbal warning that will persist for a further 2 seconds. After which, the train will begin braking automatically and give you an emergency verbal warning. You can stop the brakes each time with a press on the SiFa pedal to reset the timer. This is not considered to be a full emergency brake application.

The SiFa will pause if you switch to an outside view. So, you can have it switched on even if you want to explore the route. Upon returning to the cab view, the SiFa timer will reset its 30 second countdown and resume as normal.

### 5.2 PZB 90 V2.0 (Point-Based Train Protection & Control System)

The locomotive has a realistic built in PZB90 system used in Germany for the speed control of trains. We have now overhauled the whole function with better prototypical operation.

Use <Shift+8> to switch PZB on or off.

Change the train PZB mode with <Ctrl+8>.

After switching on, or changing the mode, the PZB will perform a self-test. The PZB can only be switched on or off, and the train mode can only be changed when the train is stationary, and the reverser is set to "V".

Use the following keys to control the PZB:

- <DEL> = PZB Befehl40 / Command40
- <End> = PZB Frei / Free
- <Page down> = PZB Wachsam / Acknowledge

Important: The use of the PZB Wachsam / Acknowledge switch is different to earlier locomotives with PZB. The use of the switch will be registered by the PZB system when the switch is releasing! That is a prototypical behaviour and different to earlier PZB systems installed in locomotives or other vehicles with PZB equipped. You can switch and hold PZB Wachsam / Acknowledge switch when you pass a 1000Hz magnet but need to release the switch within 4 seconds to avoid an emergency brake.

#### PZB help system:

The help system will assist you when you have no experience with the PZB.

It tells you in a message box why you have an emergency brake application when it occurs.

An additional yellow needle on the speedometer gives you information about the target speed. You can switch the help system on or off with <Ctrl+[>.



### 5.3 Overview of PZB 90

The PZB 90 system is used to ensure that trains are running at correct speeds in certain controlled sections (for example, leading up to signals) and also to ensure that no train can pass a signal at danger.

There are three types of train controlled via the PZB system, these are described as:

Zugart O	Obere (Upper)	Light trains / Passenger trains
Zugart M	Mittlere (Medium)	Heavy trains / Freight trains
Zugart U	Untere (Lower)	Very heavy trains / Freight trains

When you enable PZB with Shift+8 it will start up ready for a Zugart O train.

Zugart can be read in the vR Message window to the right in the cab.

You can use <Ctrl+8> or <Ctrl+Shift+Numpad Enter> to cycle between the train types until you have the one most appropriate for your train. The key differentiators are the maximum speed and the ability to stop, (so a long slow heavy freight train should be a Zugart U, for example.)

In the descriptions below, the process that is followed is exactly the same regardless of the train type selected. What differs are the speed limits that are enforced.



PZB is implemented by means of three kinds of magnets that are placed on the track; these are described as 500Hz, 1000Hz and 2000Hz. These magnets are only powered if their associated signal is set at a non-clear aspect, if the aspect is clear ('green / green') then the magnets have no effect on the train.

For some controlled element, such as a signal, each of the magnets will be placed in the following order:

- 1000Hz - at some remote point on the track such as the distant signal
- 500Hz - usually 250m before the main signal being checked
- 2000Hz - placed at the signal itself

For this description, a **Zugart O** train is assumed.

*Note: In the speed limit descriptions below, the line limit always overrides that given in the description. For example, if the description says that you must be below 85km/h, but the line limit is 60km/h, then the latter takes precedence.*

#### 1000Hz Magnet

A passing train will first meet the 1000Hz magnet and the 1000Hz lamp will illuminate on the PZB display after pressing PZB Wachsam / key Page Down while passing the signal.

On the Train Simulator HUD, the exclamation point indicator will light up with a wasp black/yellow pattern, (Note: There will be no audible indicator.) The driver now has four seconds within which to press the PZB Wachsam button (Page Down). Failure to do this will result in emergency brakes being applied.

Having acknowledged the 1000Hz magnet, the driver now has 23 seconds to drop their speed to 85km/h (Note: A different Zugart ( M or U ) has a different speed ) or emergency brakes will apply.

After the train has passed 700m from the 1000Hz magnet the 1000Hz lamp will go out and at this point the driver *may* choose to press PZB Frei (End) to get out of the speed restriction if, and only if, they can clearly see that the controlled signal is now showing a clear aspect. If the driver presses PZB Frei and then runs over an active 500Hz magnet the train assumes the driver has made a mistake and will apply emergency brakes.

### **500Hz Magnet**

On passing the 500Hz magnet, the train must not exceed 65km/h or the emergency brakes will be applied. The 500Hz lamp on the PZB display will light up. The train now has 153 meters to reduce speed to 45km/h.

The 45km/h speed limit is now in force for the next 250m. It is not possible to release from this with the PZB Frei button.

### **2000Hz Magnet**

If the train passes an active 2000Hz magnet then it will always apply its emergency brakes as the only time this can happen is if the train is passing a signal at danger.

### **Other notes**

If, while under the control of a 1000Hz or 500Hz magnet, the train stops, or spends more than 15 seconds at less than 10km/h, the enforced speed limit will be reduced by a further 20km/h which is called a *restrictive* speed limit. This is indicated on the PZB display by the speed indicators (the top row) alternating between two lamps (70 and 85).

Once the magnet lamp goes out you can press PZB Frei (END) to get out of the restrictive speed limit.

### **Befehl40 (‘Order 40km/h’)**

The Befehl40 button (DEL) allows a special case that instructs the train to *ignore* a 2000Hz (red signal) magnet that it comes across. You are put into an enforced speed limit of 40km/h while this is active, exceeding this limit will cause the emergency brakes to apply.

To pass the red signal press and hold DEL for PZB Befehl40 until the Befehl40 light lights up.

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

### Further Reading

You can find more information on the German PZB90 system at the websites listed below:

- <http://www.marco-wegener.de/technik/pzb90.htm>
- <http://www.sh1.org/eisenbahn/rindusi.htm>

## 5.4 LZB (Continuous Line Based Protection & Control System)

### Function of the implemented LZB:

The LZB in this locomotive is near fully implemented. To switch on the LZB system, first ensure that PZB has been enabled, and then press <Shift+6> or <Ctrl+Numpad Plus>. The LZB then will activate itself if you enter an LZB-enabled line.

For the LZB end procedure, LZB end will be signaled in the cab's MFD1 with the LZB 'Ende' text message, and needs to be acknowledged within 10 seconds. Failure to do so will result in application of the emergency brakes, bringing the loco to a complete stop.

### Important to know!

As with the PZB emergency braking, you need to release from the LZB emergency braking following a complete stop. To do so, press the "PZB-Befehl" (PZB command) switch and hold it down for about 4 seconds.

### Known problems:

The LZB system does not take into consideration the train's maximum speed set for the consist it hauls. The maximum speed of the train is 320kph and will always be the displayed maximum speed under LZB control, even if you're only allowed to drive at a lower speed. There is a situation where the max speed is set to lower values on the LZB systems. This happens when the PZB train mode is set to "U" which restricts your max driving speed to 105kph.



## 6 Additional Systems

### 6.1 Door Control and Train Heating

The train has a door interlock system. If you open the doors the “Doors-open” icon on the MFD2 will turn on. The doors will close automatically and then you need to set the regulator to zero to unlock the regulator. When the doors are open the regulator is locked.

### 6.2 Coupler Hatches

There are some special functions for the train’s coupler hatches when it’s used as a player train.

You can control the coupler hatches by the two independent buttons within the cab. In Train Simulator it’s mainly for visual reasons.

To open the hatch on the end wagon you’re in, press the ‘hatch front’ button on the desk or <Shift+K>. The hatch will open slowly and when it has opened, a light will go on at the front and on the button itself. With a further press on that front hatch button, you can toggle the coupler light on or off if the hatch is opened. You can’t close the hatch with the buttons. It will close automatically when speed goes over 30km/h.

If not already coupled, you can open the rear-end wagon’s hatch with the ‘hatch rear’ button on the right console, or with the key command <Ctrl+K>. As soon as opened the ‘hatch rear’ button will illuminate. (Note: That the rear coupler light will not illuminate and won’t be able to be toggled) Once opened, the rear hatch will not manually closable – It will close automatically at loco speeds of 30km/h and above.

When two train sets are already coupled at a scenario’s start, the hatches will open automatically on these end wagons.

When creating scenarios, you can decide if the coupler hatch of a non-coupled head should be open. To do so, type in the listed code after the trains number in the editor fly out ID field:

- -hatch = hatch opens and stay open for scenario start

You can see the result of the selection in the editor right after entering it into the numbering field. Again, keep in mind that the hatches close automatically when you reach 30km/h or above.

## 7 Key Layout

Function	Key	Key
Battery Isolating Switch on/off	Shift	B
Coupler hatch front open / toggle coupler light (when hatch open)	Shift	K
Coupler hatch rear open	Ctrl	K
Pantograph up		P
Pantograph down	Ctrl	P
Main circuit switch on		Z
Main circuit switch off	Ctrl	Z
Regulator		A / D
Reverser		W / S
Cruise control speed set		Y / C
Cruise control on / off	Shift	A
Train brake		; / '
Emergency brake		Backsp (←)
Sander		X
SIFA on/off	Shift Shift	NumpadEnter 7
SIFA Reset		Q or Numpad Enter
PZB on/off	Ctrl Shift	NumpadEnter 8
PZB train mode cycling	Shift+Ctrl	NumpadEnter
PZB Acknowledge		Page down
PZB Release monitoring		End
PZB Command 40		Del
PZB system information	Ctrl+Shift	8
LZB on/off	Ctrl Shift	NumpadPlus 6
Horn high		Space
Horn low		N
Wipers	(Shift)	V
Headlights	(Shift)	H
Cab light / Desk light	(Shift)	L
Instrument lights		I
Blind up	Shift	Page Up
Blind down	Shift	Page Down
Help system on or off	Shift	[
Message level	Ctrl	[
Speech announcement system test (takes time)	Ctrl+Shift	7
Doors system reset	Ctrl+Shift	T

## 8 Hints for Scenario Creators

Please place the train so that head 1 points in the direction of driving. This will prevent a false detection of the driving direction for placing the driver and raising the correct pantograph.

This Pro Range is able to follow the save-and-resume function of TS2019 and later. All the important system states are saved, so you can save your scenario and resume it later. It's also suitable for rolling starts. Please note that some system values are not stored, (such as active PZB monitoring.)

## 9 Acknowledgements

Dovetail Games would like to thank the following people for their contribution to the development of DB BR 407 'New ICE 3':

The Beta Testing Team  
Maik Goltz  
Jordi Blumberg