DB BR112.1 traffic red ProLine

compatible with Train Simulator 2016/2017

Content

1 Information 3

1.1 DB Class 112 3

1.2 DB Class 112.1 ProLine - Simulation functions 3

1.3 Technical Data DB Class 112.1 3

2 The Locomotive 4

3 Cab and controls 5

4 How to drive and use 6

4.1 Expert-Line and general hints 6

4.2 Start-Up Procedure 6

4.3 Message- and Help system 8

4.4 Battery and HLB 8

4.5 Pantograph and Main Switch 9

4.6 Tap-changer and cruise control system 9

4.7 Brakes 11

The locomotive has three brake systems. 11

4.8 Wheel-slip and Sanding 12

4.9 FML (Traction motor blowers) 12

5 Safety systems 12

5.1 SIFA 86 (driver vigilance system) 12

5.2 PZB 90 12

Overview of PZB 90 13

5.3 LZB I80: 16

6 Other systems 16

6.1 Neutral section 16

6.2 Door control 16

6.3 Destination board control 16

6.4 Faults / Observation 17

6.5 AI Wipers and Pantograph selection 18

7 Scenarios 18

8 Key Layout 19

9 Notes for scenario creators 20

10 Additional thanks 20

1 Information

1.1 DB Class 112

The class 112 from Deutsche Bahn (DB) is an electric locomotive which, was first delivered in 1992 to DB. Overall 90 machines were produced and delivered from 1992 to 1994. The locomotive has two bogies each with two axles. Each axle is powered with an electric motor. The max power is about 4220 kilowatts. The power is controlled with a 31 notch high voltage thyristor tap-changer system. The maximum speed is 160 kmh.

The machines were widely used for commuter services nowadays. Back in the 90s they were also used for fast passenger IR and IC services all over the re-united german country.

1.2 DB Class 112.1 ProLine - Simulation functions

The most important functions are summarised below.

- ✓ Prototypical driving behaviour
- ✓ Tap-changer system with manual control
- ✓ Automatic speed control (like AFB)
- ✓ Multiple unit control system (Version 2) compatible to Bimdzf IR and Bpmbdzf IC driving trailers from DB120EL packages
- ✓ Manual / automatic startup procedure
- ✓ Monitoring function for important values like Voltage, traction temperature
- ✓ Manually selectable pantographs
- ✓ Delayed and smooth controlled e-brake
- ✓ Prototypical PZB 90 / LZB I80
- ✓ SIFA 86
- ✓ Pantograph sparks with sound
- ✓ Switchable instrument lichts
- ✓ Cab light
- ✓ Wipers with speed control
- ✓ Standard TS2016 effects
- ✓ TS2016 camera positions
- ✓ Automatic AI wipers with weather detection
- ✓ Light bulp adjustment for player
- ✓ vR ZZA compatible
- ✓ Prototypical sound optimized for EFX
- ✓ Scenario save/resum compatible

1.3 Technical Data DB Class 112.1

Manufacturer:	LEW / AEG Hennigsdorf	**Build dates**:	1992 – 1994
Type:	Elektric	**Wheel arrangements**:	Bo-Bo
Length over Buffer:	16.64 m	**Mass**:	82,5 t
Max continuous tractive effort:	4000 kW	**Maximum speed**:	160 km/h

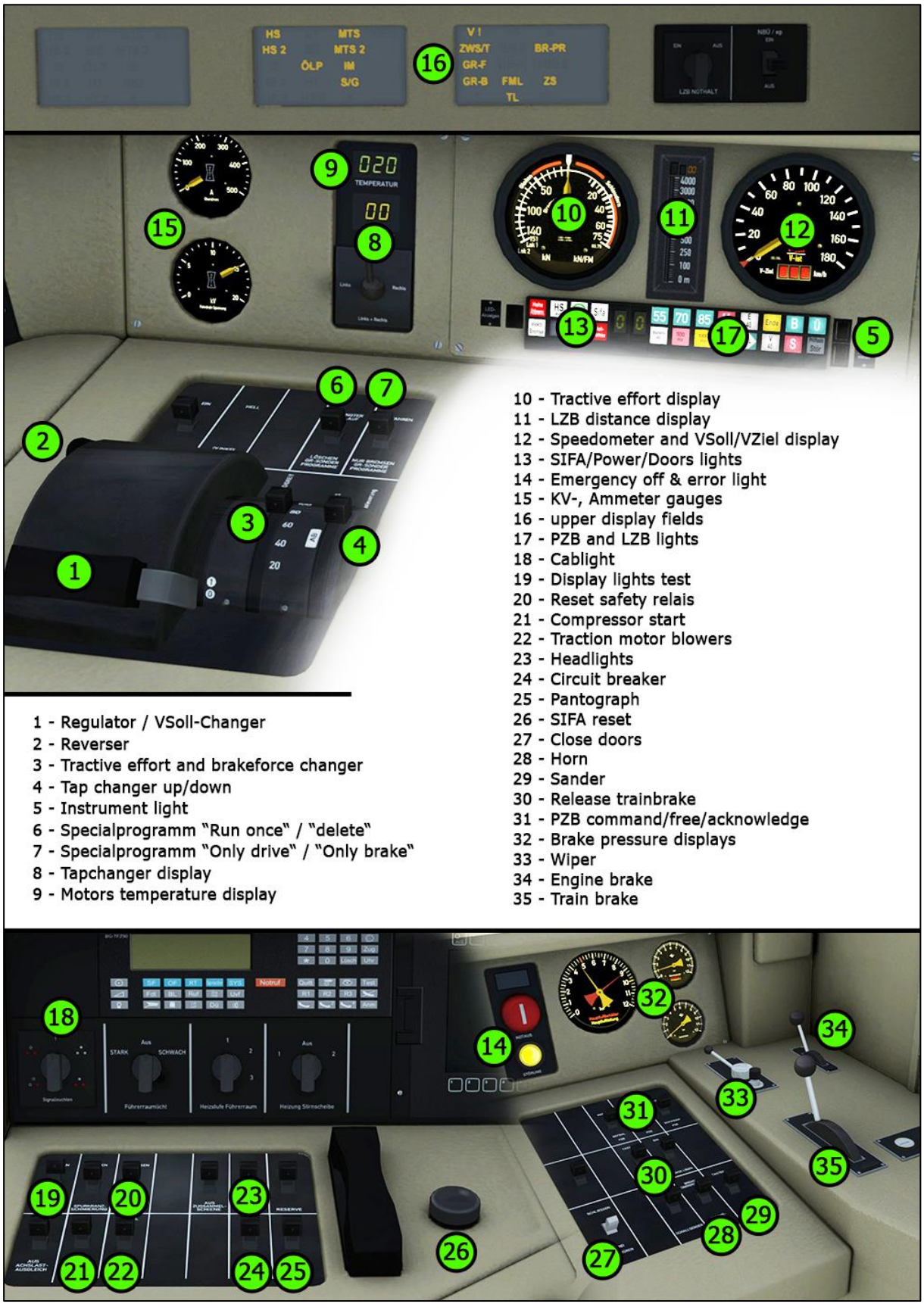
2 The Locomotive

DB Class 112.1 127-6 traffic red / DynNr1

DB Class 112.1 160-7 traffic red / DynNr2

DB Class 112.1 162-3 traffic red / DynNr3

3 Cab and controls



1 - Regulator / VSoll-Changer
2 - Reverser
3 - Tractive effort and brakeforce changer
4 - Tap changer up/down
5 - Instrument light
6 - Specialprogramm "Run once" / "delete"
7 - Specialprogramm "Only drive" / "Only brake"
8 - Tapchanger display
9 - Motors temperature display

10 - Tractive effort display
11 - LZB distance display
12 - Speedometer and VSoll/VZiel display
13 - SIFA/Power/Doors lights
14 - Emergency off & error light
15 - KV-, Ammeter gauges
16 - upper display fields
17 - PZB and LZB lights
18 - Cablight
19 - Display lights test
20 - Reset safety relais
21 - Compressor start
22 - Traction motor blowers
23 - Headlights
24 - Circuit breaker
25 - Pantograph
26 - SIFA reset
27 - Close doors
28 - Horn
29 - Sander
30 - Release trainbrake
31 - PZB command/free/acknowledge
32 - Brake pressure displays
33 - Wiper
34 - Engine brake
35 - Train brake

4 How to drive and use

4.1 Expert-Line and general hints

We are happy to present you with a new locomotive from virtualRailroads for our Expert-Line range. As usual, Expert-Line models are created for customers who are looking for better and more realistic models for TS2016.

We have included some functions in the locomotive, which have been seen before in our other newer Expert-Line models. For example AI wiper functions recognizing the weather and fully automatic Start-Up. A Help System, which shows you detailed messages about what's just happened, especially useful when errors occur.

Please read the following sections carefully to make you familiar with the locomotive and its functions.

Important: The locomotive has push pull equipment and is able to drive in multiple formation. Unfortunately, it is not compatible with our old system known from DB class 111 or DB class 143 SBRE. It is possible to couple additional locomotives to your train, but only two machines in a row can pull or push the train. If there are more than two locomotives in your train, the additional machines are dead like a wagon.

TS2016 problems: If more than one locomotive is coupled to your train, the brake pressure may be reduced. Please keep that in mind when using the locomotive for multiple working.

4.2 Start-Up Procedure

Manual Start-Up:
It is necessary to prepare the locomotive for driving. Each step is based on the real life procedure and needs to be done in the right order:

1. Switch on the battery <Shift+B>
2. Release the handbrake (Key </> or F4/F3 HUD coupling display)
3. Check the main pressure reservoir (HLB) it needs to show you 10 BAR
   If not use <Shift+'> for raise pressure and wait until it shows 10BAR.
4. Set the train brake to 4,7BAR (Important: HLB need to be at 10 Bar before!)
5. Reverser to V <W>
6. Select a pantograph <Shift+P> (selectable: front, rear, both, both down)
7. Raise pantograph <P> (wait until kV displays a value about 15kV)
8. Switch on main power <Z> (HS light in upper displays should turn off)
9. Adjust the TE/BF lever <C> (up) und <Y> (down)
10. Switch on SIFA if needed <Shift+NumpadEnter> or <Shift+7>
11. Switch on PZB if needed <Ctrl+NumpadEnter> or <Shift+8>
12. Switch on LZB if needed <Ctrl+NumpadPlus> or <Shift+6>
13. Switch on the headlight <H> and the instrument lights <I>

Now the locomotive is near ready to drive. Just release the brakes and use one of the two control systems.

Manual startup for multiple traction:
To use the locomotive for multiple working it is necessary to prepare the locomotive for driving with it. Each step is based on the real life procedure and needs to be done in the right order:

1. Switch on the battery <Shift+B>
2. Switch on the battery on 2nd loco <Ctrl+Shift+B>
3. Switch on multiple traction control <Shift+9> and wait for messages (while the system is engaging all controls are locked)
4. Release the handbrake (Key </> or F4/F3 HUD coupling display)
5. Check the main pressure reservoir (HLB) it needs to show you 10 BAR If not use <Shift+'> for raise pressure and wait until it shows 10BAR.
6. Set the train brake to 4,7BAR (Important: HLB need to be at 10 Bar before!)
7. Reverser to V <W>
8. Select a pantograph <Shift+P> (selectable: front, rear, both, both down)
9. Select a pantograph on 2nd loco <Ctrl+Shift+P> (selectable: front, rear, both down)
10. Raise pantographs <P> (wait until kV displays a value about 15kV)
11. Switch on main power <Z> (HS light in upper displays should turn off)
12. Adjust the TE/BF lever <C> (up) und <Y> (down)
13. Switch on SIFA if needed <Shift+NumpadEnter> or <Shift+7>
14. Switch on PZB if needed <Ctrl+NumpadEnter> or <Shift+8>
15. Switch on LZB if needed <Ctrl+NumpadPlus> or <Shift+6>
16. Switch on the headlight <H> and the instrument lights <I>

Automatic startup:
We have integrated an automatic Start-Up procedure to help you.
To start the procedure press <Ctrl+Z>. If you already started the manual procedure, the automatic one will not work!

Once initiated the automatic procedure will show you a big message box and some small boxes, which show you information about the progress of the procedure.
A big message box will appear at the centre of your display when the procedure has finished. The train security systems (SiFa, PZB, LZB) need to be switched on manually.

Important note: If you are driving in multiple the second loco will also start up automatically.

Start-up from Bimbdzf IR or Bpmbdzf IC driving trailers:
The driving trailers from our earlier released BR120EL packages are widely compatible with this locomotive and can be used as the leading vehicle for a push configuration. For the start-up procedure please take a look in their delivered manuals. But beware of the following restriction:

- There is no ability to change into the other end cab to drive in the backward direction. There will then be a problem with the input mappers and some key commands are not working.
- The traction controlling system will not act like you may expect from a pushing class 112.1 because the driving trailers are made for the BR120. But the pushing 112.1 will have their correct max power output and max speeds.

Shut down procedure:
Shutting down the locomotive could only be done manually.

1. Run down power and stop train
2. Set the train brake to Emergency position and TE/BF lever to 0
3. Switch off LZB/PZB if running
4. Reverser to position off
5. Switch off main power
6. Lower pantographs
7. Switch off multiple traction system if running
8. Switch off the headlights and instrument lights
9. Switch off battery (if multiple traction then on 2nd loco too>
10. Apply handbrake

4.3 Message- and Help system

Messages:
The locomotive 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

Messages which are absolutely necessary can´t be switched off.

Active PZB/LZB Help system:
The locomotive has a special help system for the PZB. If you get an emergency brake due to incorrect operation you will get additional information in a message box. There also is an additional yellow needle within the speedometer that tells about the braking curves you need to follow.

4.4 Battery and HLB

Battery voltage:
Before you can start driving with the locomotive the battery needs to be switched on.
You do this by pressing <Shift+B>. The battery can only be switched on when the locomotive is not moving and the reverser is set to 0 (zero). The battery is always fully charged. If you using multiple working setups you need to switch on the battery in second loco as well <Ctrl+Shift+B>.

Main pressure reservoir / HLB:
The main pressure reservoir is very important for driving the locomotive. The braking system and several other systems make use of the HLB. If you start a scenario the HLB is randomly filled. If the pressure is beneath 8,3BAR you need to start the air compressor manually by <Shift+'> to fill the reservoir.

You can check the pressure with the HLB gauge to the right. Without sufficient pressure you can´t operate the main switch or raise the pantographs.

4.5 Pantograph and Main Switch

Pantograph pre-selection:

Before raising a pantograph you need to preselect one or two. Press <Shift+P> to cycle through the four available options *both down*, *Pantograph 1*, *Pantograph 2* and *raise both.* Please look at the messages displayed, especially when you choose both pantographs. Selecting a pantograph is only possible when the locomotive is not moving. If you drive in multiple you need to select the pantograph on second loco as well. Use <Ctrl+Shift+P> to do this. On the 2nd loco there are only 3 positions which are *Pantograph1*, *Pantograph2* or *both down*.

Raising and lowering the pantograph:

To raise the selected pantograph the reverser needs to be set to M and the main pressure reservoir / HLB needs enough pressure. To raise the pantograph, use the switch in the cab or press <P>. Raising and lowering a pantograph is possible when driving the locomotive. This might be necessary when you reach a neutral section. If you drive in multiple the pantograph on the second loco will raise or lower as well.

Switching the Circuit Breaker On or Off:

After you have raised a pantograph you can turn on the main power with the appropriate switch in the cab or with <Z>. The main switch can also be operated when the locomotive is being driven. Please keep in mind: the main switch will be set to off (tripped) when the pantographs are lowered or other disturbances happen. Normally you can switch on the main switch again without any problems, if not a message will inform you why. You can see the actual state of the main switch on the upper displays. If the lamp 'HS' is lit, then the main switch is off and needs to be switched on again. If you drive in multiple the main switch on the second loco will turn on or off automatically.

4.6 Tap-changer and cruise control system

Tap-changer control:

With the tap-changer system you can manually switch between the taps. This is useful if you are driving heavy trains or light engines that you can't control accurately with the cruise control system. By manually changing the taps you can have finer control of the engine. The tap-changer control is active if you set the regulator (VSoll-Steller) to step 1 ('On' in HUD) and only then. Then you select tap up with key <R> or tap down with key <E>. If you press them once, only one tap will change. If you press and hold them, every 500ms a tap will change until it reaches 0 or 31. Note that all monitoring systems are off if you manually change the taps. So watch the ammeter and accelerometer values to avoid overloading the engine.

Cruise control system:

As a second control system this loco is equipped with a cruise control. It is similar to the familiar German 'AFB' but with some limitations. It is not as accurate as the AFB. It tries to hold the selected speed but if you notice that it can't, you have to intervene to ensure that it doesn't go over the line or signal speed limits. The cruise speed is selectable between 20kmh and 160kmh in steps of 10kmh. The selected speed can be read on the HUD or the 'VSoll'

vertical indicator to the left of the central speedometer instrument. Note that after selecting a speed it will take some time to react, so don't worry and give it time. Also make sure the brakes are released. With the brakes applied the cruise control will not work.

Free rundown (important! for Tap-changer and cruise control system):
The free rundown is a very important process when driving this loco. It runs down the tap-changer to notch 0 and so the tractive power is off. Every time you need to brake you must use the free rundown if the tap-changer is not at 0. This is for both control systems. In cruise control do not set the regulator (VSoll-Steller) to 0 to cut the power. Use the free rundown for that. Then brake or just let it coast.

If you want to reapply the power in cruise control, just tap a bit on the regulator in its current position and the cruise control becomes active again. If you want to brake, then brake after the rundown with the train brake. After braking you can't re-apply the power with just a little movement of the regulator because it is locked. Then you need to set it to 0 first and then re-apply. See also 'Regulator lock' section below.

You can slow down with cruise control but not below 20kmh. You can't slow down the train to a stop with it. Cruise control just brakes with the e-brake and only with a maximum deceleration of about 0.7m/s². So set the slower speed early enough.

Special programs for cruise control system:
There are some special settings you can apply while driving with active cruise control:

(Conditional rundown) <Shift+D>:
If you set this to on, after reaching the selected speed the tap-changer will run down and the cruise control will stand by. This is useful for short distances between the stops on commuter services. The actual state of this program you can see on the upper lamp displays (GR-F + GR-B).

(Only drive) <Shift+W>:
Only drive sets the cruise control to a power only state. So it will not brake but only accelerate to the set speed. This is useful for long hill climbs. The actual state is shown by the GR-F lamp in the upper displays.

(Only brake) <Shift+S>:
Only brake does near the same as only drive but the other way. The cruise control will not accelerate but only brake to hold set speed. This is useful to prevent the loco from accelerating on downhill runs. The state is shown by the lamp GR-B in the upper displays.

(Canceling of an active special program) <Strg+D>:
First, only one program can be active. If you switch on another program while one is already active, the active program will stop and the new one selected becomes active. Beware of that while driving on gradients. If only brake is active and you cancel the program or switch to conditional rundown, then it is possible to go over the speed limits. If you hit the free rundown or you make a brake application, then the active program will be deactivated too. So a program is only active until its condition is reached (for conditional rundown) or you brake or hit the delete button.

Regulator lock:
The regulator is locked when:

- An overload occurred because you selected too high a notch with the tap-changer
- You used a brake while the tap-changer is not set to 0 (zero)
- An emergency brake application occurred
- A fault occurred
- The doors of the coaches are open

If the regulator is locked, you can´t notch up or down or set up a speed for cruise control system. The tap-changer will automatically run to notch zero if not in zero.

Neutral position permission:
To unlock the regulator do the following things:

- ✓ Set the regulator to notch 0 (zero)
- ✓ All brakes need to be released
- ✓ Check no emergency braking is active
- ✓ All faults are cleared
- ✓ The main switch is on
- ✓ The doors are closed

4.7 Brakes

The locomotive has three brake systems**.**

- loco brake (direct brake)
- train brake (automatic brake)
- E-brake (electric rheostatic brake)

Loco brake:
When you enter the cab the loco brake is released. This brake is only used to brake the locomotive and not the train. You can also use this brake when starting your train on a hill to prevent the locomotive from rolling back. When you take power, the loco brake should be released.

Train brake:
The train brake is used to brake the whole train. It is a notched brake and can be precisely controlled. Use the brake with care, according to the train weight and track conditions. When you take power the train brake needs to be released.

E-Brake:
The e-brake works on all four traction motors. Because there is no lever for the e-brake in the locomotive both brakes are always combined. The brake force will build gradually with a delay. Please allow for the delay when you need to brake.

How to brake:
Before you can make a brake application, the tap-changer needs to be in notch 0 (zero). For that you have to press key <F>, *free rundown,* to let the tap-changer run down. If you brake while the tap-changer is not in notch 0, the error count will rise up after each power

cut by the brake. If you need to brake in an emergency situation, you can do so without free rundown. But beware; the error count will be raised. To ensure the tap-changer has completed the rundown, take a look at the notch display on the left or the tractive effort meter. Both have to be in position 0. While the system is braking with the e-brake, you can do normal braking without pressing <F>.

4.8 Wheel-slip and Sanding

If you pull a heavy train it is very difficult to prevent the wheels from slipping. If you do not reduce the power the wheels will keep slipping and the main switch will trip. Before this happens you will hear a warning sound. To master difficult situations like climbing up a hill with a heavy train you can use the sander. Use the switch in the cab or press <X> to switch on the sander. Do not use it for too long because the sand boxes will empty. See the fault section for more information.

4.9 FML (Traction motor blowers)

The locomotive has an automatic traction motor blower system. There may be situations where it is necessary to operate the blowers manually. Mostly when you start your drive with high traction effort and slow speed, e.g. regulator at a notch less than 6. Then you can switch on the blowers with <Shift+F> and <Ctrl+F>. See the fault section for more information.

5 Safety systems

5.1 SIFA 86 (driver vigilance system)

The DR class 243 has a SIFA driver vigilance system. When you enter the cab the SIFA is deactivated by default. To switch on the vigilance system please use the key <Shift+NumpadEnter> or <Shift+7>. After switching on press key <Q> or <NumpadEnter> to confirm the initial SIFA test alert.

When SIFA is activated and you are driving, you will get a SIFA alert approx. every 30-38 seconds. Acknowledge the alert by pressing key <Q> or <NumpadEnter>. You have 4 seconds to do so. If you do not respond within 4 seconds you will get a second alert and an additional two seconds to respond. If after this you fail to respond, the SIFA will initiate a normal brake application. To continue driving, acknowledge the alert with key <Q> or <NumpadEnter>. The brakes will release automatically. To bring back the traction power you need to set the regulator to zero, to unlock it, and then you can drive further. Take also care of the tap-changer system. It needs to be in notch 0 before you can reapply the power. And note; each brake application under power will raise the error count value. SIFA system will pause on non-cab camera views.

5.2 PZB 90

The locomotive has a realistic built in PZB90 V1.6 system used in Germany for the speed control of trains.

Use <Ctrl+NumpadEnter> or <SHIFT+8> to switch PZB on or off.
Change the train PZB mode with <Shift+Ctrl+NumpadEnter> or <Ctrl+8>.

After switching on or changing the mode the PZB will start a self-test. The PZB can only be switched on or off and the train mode could only be changed when the train is not moving 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 vR 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 vR 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 in between 4 sec. 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. Switch the help system on or off with <Ctrl+->

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 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 is 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 and the line limit is 60km/h then this takes precedence.

1000Hz Magnet

A passing train will first meet the 1000Hz magnet and the 1000Hz lamp will light 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, but there is 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 be exceeding 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 and this is then 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) magnets that it comes across. You are put in to 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
O (Obere)	165km/h -> 85km/h in 23 seconds	65km/h -> 45km/h in 153m	45km/h constant	45km/h -> 25km/h In 153m
M (Mittlere)	125km/h -> 75km/h in 26 seconds	50km/h -> 35km/h in 153m	45km/h constant	25km/h constant
U (Untere)	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 recommended reading about the German PZB90 system at these links:

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

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5.3 LZB I80:

Function of the implemented LZB (Beta version):

The LZB in this locomotive is near fully implemented but we will state it as beta version for some reasons. It depends on the route work if the LZB will act in a correct way or not. There may be some incorrect received speed restrictions. So please always have a look on the track side signs to drive safely.

Switch on the LZB system with <Ctrl+NumpadPlus> or <Shift+6> and have the PZB switched on before. The LZB then will activate itself if you enter an LZB enabled line.

The LZB end procedure is also implemented near prototypical but will again depend on the correct route work to act like in real world. Maybe the distance to the end is too short or too long or there is no LZB end defined in the route. LZB end will be signaled in the cab with the LZB 'Ende' lamp within the MFA lamps and need to be acknowledged within 10 seconds or you will get an emergency braking applied to a stop.

No AFB running with LZB!

Please note: since the locomotive has only a cruise control that is not able to brake with the pneumatic train brake system, there is not ability to have the LZB controlled the cruise control system. You need to drive manually even under active LZB control. If the LZB is active the VSoll needle around the speedometer will then show the actual LZB target speed and not the actual selected cruise control target speed. To temporally show up the cruise control target speed please press the LZB G lamp within the MFA lamps with the mouse or press <Strg+6> on the keyboard and hold it as long as you want to show it. After release the button the needle goes back to show the actual LZB target speed.

6 Other systems

6.1 Neutral section

The package includes special EL-signals. The locomotive can recognize and react to these signals. Two types of signals are included: Main switch off and Pantograph down.
If you miss one of these signals you will get a warning message. If you pass the pantograph down signal with a raised pantograph the scenario will end.

6.2 Door control

The locomotive has a programmed door control that can be used with different passenger wagons from the vR Shop. If you open the doors you will hear a beeping sound. To close the doors use <Shift+T>. You will again hear a beeping sound until all doors are closed. When the doors are open the regulator is disabled and you can't drive. It may be necessary to engage the loco brake to prevent the train from rolling whilst doors are opened.

6.3 Destination board control

The locomotive can control coaches with the vR destination board system. The DB class 112.1 itself has no destination boards but those on the coupled coaches can be switched with <0> and <Shift+0> (zero).

6.4 Faults / Observation

Electrical fault:

The maximum voltage the locomotive can handle is 450A. If you exceed this value, the power will trip and the main switch will be switched off automatically. If this happens set the regulator to notch zero and switch back on the main switch. After that you can use the regulator normally. To check the amperage, use the right vertical gauge in the upper displays or use the traction effort gauge to left of the speedometer. It should not show more than 50kn/FM. Keep in mind that every electrical fault gives you a higher error count.

Traction motor heating:

To prevent the tractions motors from overheating it is necessary to keep an eye on the traction effort gauge. Please use these maximum values when notching up the power:

- Above 50kN/FM maximum 2min
- Above 40kN/FM maximum 15min
- Below 20kN/FM permanent traction effort

These values are valid when the traction motor blowers are working. You can hear them. If the blowers are not working because off slow speed the following values are valid:

- Above 50kN/FM do not try, after 10sec you will get a fault
- Above 20kN/FM maximum 1:30min
- Below 20kN/FM maximum 3min.

To prevent this rapid overheating, you can switch on the blowers manually with <Shift+F>. If you want to switch the blowers back to automatic mode use <Ctrl+F>. Do not use the off-position for the blowers to avoid damage to the motors.

If you do not use the blower control properly scenarios will be terminated.

Traction motors safety relays fault:

When the power is switched off it is necessary to break the connection between the electrical power and the traction motors. This is normally done when you switch the tap-changer from notch 1 to 0 but this needs to be done too when higher notches are selected and you apply a pneumatic brake. The higher the electrical power is, the higher the possibility for an electrical fault. If that happens too much the safety relays will weld to the chassis and the loco is damaged. In the simulation you stop the train and wait for it to repair itself. You will see a message when you can start driving again. Do not forget to switch back on the main power. To speed up the repair procedure, just try to use the "Trennschuetze zurueksetzen" switch on the left console. Maybe you can clear the problem faster with that (but not every time).

Driving with two raised pantographs:

Normally you use only one raised pantograph. It is allowed to use two raised pantographs in winter when the catenary is heavily iced. Max speed in this case is 110kp/h.
There are no other situations, which allow the use of two pantographs.
How did we integrate this? When it is winter time and you drive with two raised pantographs below 110kp/h, nothing will happen. If you are driving much faster you will get several

warnings until the scenario will be forced to end. It is not winter? You will get several warnings. If you do not obey them the scenario will be forced to end.

6.5 AI Wipers and Pantograph selection

There are some special functions for the locomotive when it is used as an AI vehicle.
If it is raining or snowing, the wipers in driving direction will start automatically.

If you write scenarios by yourself you can decide which pantograph should be lifted when the locomotive is used as AI vehicle. Use the listed code in front of the locomotive number in the editors ID field:

- „SA-00-" = no pantograph will raise up
- „SA-10-„ = pantograph No. 1 will raise uo
- „SA-01-„ = pantograph No. 2 will raise up
- „SA-11-„ = both pantographs will raise up

7 Scenarios

7.1 [BR112] Container cargo
On a cold winter evening you will bring a container train from Rahlstedt to Lubeck.

Duration: 45 Minutes
Difficulty: Hard

7.1 [BR112] Regional Express to Hamburg
Drive a regional express train from Lubeck to Hamburg.

Duration: 50 Minutes
Difficulty: Medium

7.1 [BR112] Regional train to Bad Oldesloe
Drive a regional train from Hamburg to Bad Oldesloe.

Duration: 50 Minutes
Difficulty: Easy

8 Key Layout

Function	add. Key	Key
Automatic Startup procedure	Ctrl	Z
Battery on/off	Shift	B
Battery 2nd loco on/off	Strg+Shift	B
Compressor start	Shift	´
Multiple traction control system on/off	Shift	9
Preselect pantograph	Shift	P
Preselect pantograph 2nd loco	Ctrl+Shift	P
Pantograph raise/lower		P
Main power on/off		Z
Regulator (Speed set) up/down		A / D
Special program *only drive* and *only brake*	Shift	W / S
Special program *conditional rundown* and *delete*	Shift / Ctrl	D
Tap-changer up/down		R/E
Free rundown		F
Tractive effort / brake force lever up/down		C / Y
Reverser		W / S
Traction motor blowers on/auto/off	Shift / Ctrl	F
Train brake	(Num +/-)	; / ´
Engine brake		[/]
Emergency brake		Backspace (←)
Sander		X
SIFA on/off	Shift	NumpadEnter
SIFA reset		NumpadEnter
PZB on/off	Ctrl	NumpadEnter
PZB train mode cycling	Shift+Ctrl	NumpadEnter
PZB Acknowledge	(Numpad Enter)	Page down
PZB / LZB release from monitoring		End
PZB command 40		Del
LZB on / off	Ctrl	NumpadPlus
LZB active: show actual cruise control target speed	Ctrl	6
Horn long / short		Space / B
Close doors	Shift	T
Wipers		V
Wipers speed	Ctrl / Shift	V
Cab light bright/off/dim	(Shift)	L
Instrument light		I
Main light bulb change	Shift	End / Pos1
ZZA position up / down	(Shift)	0
Help system on/off	Shift	[
Message level cycle	Ctrl	]
Switch the message language DE / EN	Ctrl + Shift	M

9 Notes for scenario creators

The AI locomotives run through the automatic Start-up process. This needs some time. A good time allowance to be sure that the Start-up process has finished is 30sec. Don't let trains with a DB class 112.1 start too soon after scenario starts. This causes the locos to drive with lowered pantographs.

Place the locomotives so that cab 1 is leading. This will prevent false detection of the driving direction for placing the driver and raising the correct pantograph.

Please take a note of the immense tractive effort of this locomotive. Since the AI control of TS2016 does not care about that, you should guide the train over a few waypoints with different power proportion settings to prevent a rocket start.

10 Additional thanks

We say Thank you to all people and DTG who helped realizing this locomotive.

Your virtualRailroads Team
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