



# DB Class 151 blue-beige Expert-Line



Compatible with Train Simulator 2016



DB Class 151 blue-beige

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# 1 Information

## 1.1 DB Class 151

The class 151 is a six axle alternating current electric locomotive delivered from 1972 to 1978 to the Deutsche Bundesbahn. The locomotives were built and used for heavy freight services, but also for the commuter and passenger services around the 1980s. Until today the machines running their freight services and can be seen as a pushing service at the well-known gradients in Germany.

The class 151 was built on top of the experiences with the 'Einheitslokomotiven' program and replaces the class 150. Parts of the class 151 are reuses from the older machines, but also there are some new developed techniques in there. The main target was a more reliable and powerful locomotive than the class 150 was. At all 20 machines were equipped with an AK69e automatic coupler to be able to haul the very well-known 5000 tons 'Erzbomber' (long and heavy ore trains).

## 1.2 DB class 151 - Functions available in the Simulation

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

- ✓ Prototypical driving behaviour
- ✓ Tap-changer automatic notching control
- ✓ Manual /automatic Start-Up
- ✓ Monitoring function for important values like Voltage, traction temperature, wheelslip
- ✓ Manually selection of the pantograph
- ✓ Pantograph sparking with sound
- ✓ Delayed and smooth regulated E-Brake
- ✓ Brake modes P-P2-G
- ✓ Brake system with overcharging of the main air pipe pressure
- ✓ High braking for the locomotive brakes
- ✓ Realistic PZB90
- ✓ Zeit-Zeit-Sifa (vigilance alarm)
- ✓ Switchable instrument lights
- ✓ Reading lamp and cab light
- ✓ Separately switch-able wipers with speed control
- ✓ Standard TS2016 Effects
- ✓ TS2016 Camera positions
- ✓ Automatic AI wipers with weather detection
- ✓ Headlight cone control for player
- ✓ vR ZZA and door system compatible
- ✓ Szenario save function compatible
- ✓ Rolling start compatible
- ✓ Ingame language selection
- ✓ Realistic sounds optimized for EFX

## 1.3 Technical Data DB class 151

<b>Manufacturer:</b> Henschel, Krauss-Maffei, Krupp, AEG, BBC, Siemens	<b>Build Dates:</b> 1972 – 1978
<b>Type:</b> Electric	<b>Wheel arrangement:</b> Co-Co
<b>Length / buffer:</b> 19.49 m	<b>Mass:</b> 118 t
<b>perm. Output:</b> 6288 kW	<b>Maximum speed:</b> 120 km/h

## 2 The Locomotive



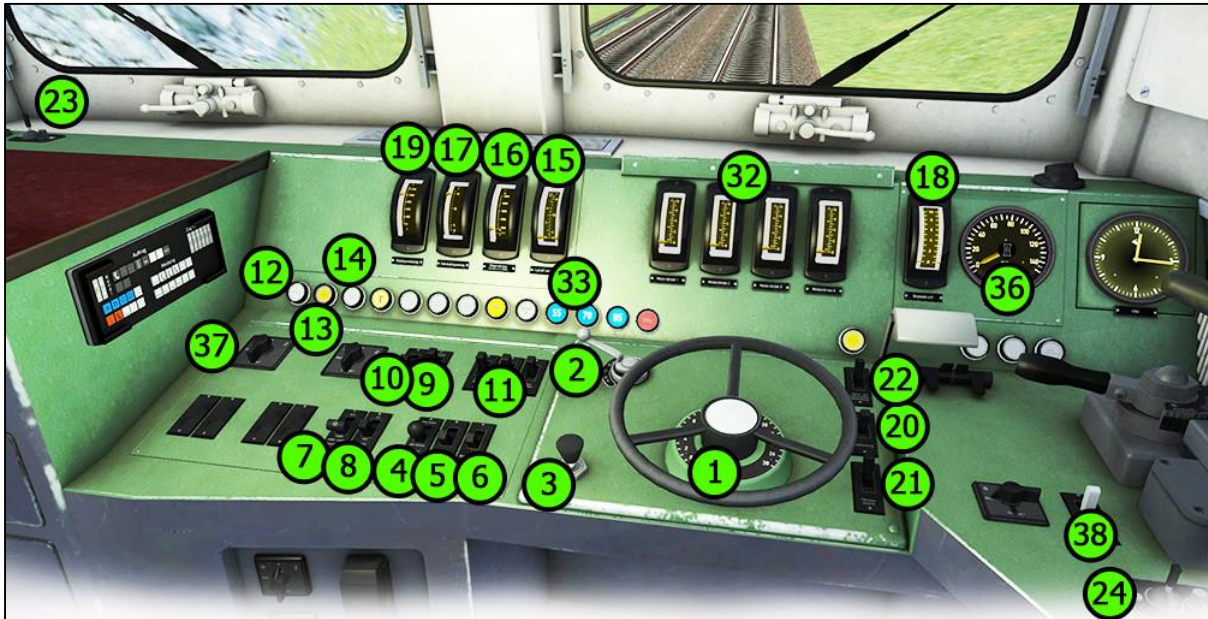
DB class 151 159-1



DB class 151 cabine



## 3 Cab and Controls



- |  |                              |
|--|------------------------------|
| 1 - Regulator                          | 28 - Main reservoir pressure |
| 2 - Reverser                           | 29 - Brake pipe pressure     |
| 3 - SIFA reset                         | 30 - Brake cylinder pressure |
| 4 - Sander                             | 31 - Time reservoir pressure |
| 5 - Wheelslip protection brake         | 32 - Traction motor voltages |
| 6 - Loco brake release                 | 33 - PZB lamps               |
| 7 - Pantograph                         | 34 - Horn                    |
| 8 - Main curcuit switch                | 35 - Dynamic brake decouple  |
| 9 - Traction motor blowers             | 36 - Speedometer             |
| 10 - Compressor start                  | 37 - Heating voltage switch  |
| 11 - PZB Trio Command Free Acknowledge | 38 - Close doors             |
| 12 - Lamp traction motor blower state  |                              |
| 13 - Lamp main curcuit                 |                              |
| 14 - Lamp for faults                   |                              |
| 15 - Traction motor voltage            |                              |
| 16 - Ammeter                           |                              |
| 17 - OHE voltage                       |                              |
| 18 - Brake force dynamic brake         |                              |
| 19 - Heating voltage                   |                              |
| 20 - Headlights                        |                              |
| 21 - Desklight / cablight              |                              |
| 22 - Instrument lights                 |                              |
| 23 - Wiper left                        |                              |
| 24 - Wiper right                       |                              |
| 25 - Train brake                       |                              |
| 26 - Dynamic brake                     |                              |
| 27 - Loco brake                        |                              |



# 4 How to drive

## 4.1 Expert-Line and general hints

We are happy to present you with a new locomotive from virtual Railroads in our Expert-Line range. As usual, Expert-Line models are created for customers who are looking for better and more realistic models for TS2015. Once again we have enhanced functions integrated into the locomotive. For example, we have implemented the brake modes P-P2-G. Care about the sections marked with '**NEW**' in this manual.

Important: This locomotive has push/pull equipment and is able to drive in double formation.

TS problems: If more than one locomotive is coupled to your train, the brake pressure may be reduced or divided by the engines present in consist. Please keep that in mind when using the brakes.

## 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 </>
3. Check the main pressure reservoir (HLB) it needs to show you 10 BAR  
If not use <Shift+;> for raise pressure.
4. Choose brake mode if desired <Ctrl+Shift+;>
5. Set the train brake to 4,7BAR (Important: HLB need to be at 10 Bar before!)
6. Reverser to M (Fst Ein) <W>
7. Choose the pantograph <Shift+P> (Notches: front, back, both,down)
8. Raise the pantograph <P> (wait until the kV value is shown and stable)
9. Switch on the main curcuit <Z> (*Hauptschalter* light must turn off)
10. Switch on SiFa if desired <Shift+7>
11. Switch on PZB if desired <Shift+8>
12. Switch on the headlights <H> and the instrument lights <I> if desired
13. Set the reverser to V or R

### Or manual Start-Up for double formation:

1. Switch on the battery <Shift+B>
2. Switch on the second loco battery <Ctrl+Shift+B>
3. Switch on the double formation system <Shift+9> and await the messages
4. Release the handbrake </>
5. Check the main pressure reservoir (HLB) it needs to show you 10 BAR  
If not use <Shift+;> for raise pressure.
6. Choose brake mode if desired <Ctrl+Shift+;>
7. Set the train brake to 4,7BAR (Important: HLB need to be at 10 Bar before!)
8. Reverser to M (Fst Ein) <W>
9. Choose the pantograph <Shift+P> (Notches: front, back, both, down)
10. Choose the second loco pantograph <Ctrl+Shift+P> (front, back)
11. Raise the pantograph <P> (wait until the kV value is shown and stable)
12. Switch on the main curcuit <Z> (*Hauptschalter* light must turn off)
13. Switch on SiFa if desired <Shift+7>
14. Switch on PZB if desired <Shift+8>

15. Switch on the headlights <H> and the instrument lights <I> if desired
16. Set the reverser to V or R

Now the locomotive is ready to drive.

#### Automatic Start-Up:

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 some small message boxes which show you information about the progress of the procedure.

The train security systems ( SiFa, PZB ) need to be switched on manually.

Please note: a present second class 151EL behind your driven machine will be start up within the automatic start up procedure. If you won't to start up the second loco you need to use the manual start up instead.

#### Shut down procedure:

Shutting down the locomotive could only be done manually.

1. Run down the tractive effort if applied
2. Set the train brake to Emergency position and switch off the E-Brake
3. Set the reverser to M <S> or <W>
4. Switch off the main circuit <Z>
5. Lower the pantographs <P>
6. Switch off the security systems PZB/SIFA (in that order)
7. Switch off the headlight <Shift+H> and instrument lightning <I>
8. Set the reverser to 0 <S>
9. (Switch off the double formation control if activated before <Shift+9>)
10. (Switch off the second loco battery if activated before <Ctrl+Shift+B>)
11. Switch off the first loco battery <Shift+B>

### **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.

#### PZB Help system:

The locomotive has a special help system for the security system PZB.

If you get an emergency brake due to incorrect operation you will get additional information in a message box.

#### Message system language selection:

If the language of the displayed messages is in German and you need to display them in English, then please use the key command <Ctrl+Shift+M> to select the different language.

### **4.4 Battery and HLB**

#### Battery voltage:

Before you can start driving with the locomotive the battery need to be switched on.

You do this by pressing <Shift+B>. The battery could only be switched on when the locomotive is not moving and the reverser is set to 0 (zero). The battery is always fully charged.

#### 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 at the HLB gauge to the upper. Without sufficient pressure you can't operate the main switch or raise the pantograph.

### **4.5 Pantograph and Main Switch**

#### Pantograph pre-selection:

Before raising a pantograph you need to choose 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 especially when you choose both pantographs. Choosing a pantograph is only possible when the locomotive is standing still.

#### 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.

#### Switching the Main Switch On or Off:

After you have raised a 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 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 you will be informed by messages why not.

### **4.6 Regulator**

#### Automatic notching control:

The regulator is used to select the required notch from 0 to 28. The tap changer will then automatically notch up or down to the selected notch at a pre-set speed. If you switch the regulator directly from notch 28 to 0 it will take approx. 12 seconds to reach notch 0. Please keep in mind that selecting too high a notch will result in an overload and the main switch will be tripped. The chosen regulator notch and tractive effort can be checked with the ammeter effort gauge to the left instruments. It should not exceed 600A to avoid an overload. Prevent the use of notch 28 if you want to stay in your timetable.

#### Fast power off:

The fast power of button in the middle of the regulator allows you to shut down the applied traction power immediately. But if you do so the error count on the traction motor safety relays will grow up every time. After a fast power off you need to set the regulator to zero to power up again.

#### Reverser lock:

The reverser is locked when:

- An overload occurred because you selected too high a notch with the regulator



- You used a brake while the reverser is not set to 0 (zero)
- An emergency brake application occurred
- A fault occurred
- The doors of the coaches are open

If the reverser is locked, you can't notch up or down. The regulator is automatically set to notch zero.

#### Neutral position permission:

To unlock the reverser do the following things:

- ✓ Set the reverser 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. The brake is only used to brake the locomotive and not the train. You can use the 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 traction motors. If both train brake and E-brake levers are in the release position, they are automatically combined when the train brake is used.

To use the E-brake independently from the train brake simply decouple the lever with <Shift+D> and move the E-brake lever within 5 seconds before it recouples with the train brake lever again.

#### **NEW – Brake modes:**

The locomotive has three different brake modes (you can maybe call them brake difficulties). They named P, P2 and G. Other locos also have R and R+MG, but this class does not. The main difference between these brake modes are the fill and release rates of the brake cylinder pressures. In mode P and P2 the times are 4 seconds to fill, and 20 seconds to release the brakes. In brake mode P2 the high braking is active and will do an additive pressure to the locomotive brakes above 55kph to raise the brake force.

The brake mode G is the more interesting one for you, the virtual train driver. You need to consider a good portion of think ahead. Fill rates of about 35 seconds and release rates of

more than 90 seconds will attract your attention. Especially long and heavy trains will do react a lot slower than short and light weight trains. The longer the train the longer the times become to fill and release brakes. Do not brake too hard or you will wait a long time before an already clear signal. Brake too weak and you will be thrown over a blocked signal or a 500Hz magnet which exists mostly to prevent the signal pass at danger. At the end you need to wait if you do a mistake with your braking style. Timing and feeling is what you need here. To try it use a 5000 tons' ore train with a double class 151 formation and do a run over the Moselle route (Koblenz-Trier) from Aerosoft.

To switch the brake mode, use the key command <Ctrl+Shift+; >. They get cycled thru.

Please note: there is a possibility to set the brake mode from scenario script and then the mode is forced and can't be switched again from the user's sight. If this happens, you will get a message box on the top right corner that informs you about it.

#### How to brake:

Braking with this locomotive needs a lot experience. You should drive with caution. It is necessary to think at least 1000m ahead. Notch down in good time with the regulator. It is necessary to switch off power before you can use the train brake. Keep in mind: from notch 28 to 0 it takes nearly 12 seconds until you can use the brakes without getting a fault. Check the tractive effort gauge and the transformer voltage gauge to see if power is down to 0 (zero).

#### High braking:

On block braked locomotives there is a system that uses more pressure to brake the loco itself at higher speeds. Block brakes are not as efficient as disc brakes at higher speeds, so they need more pressure to be effective. Above 70km/h the system activates automatically and de-activates if you come back below 55km/h. There is a lamp on the desk that will show you the actual state of the system. It is called "Hohe Abbremsung". The system works automatically, but be aware that due to the additional pressure applied, the locomotive brakes will release more slowly than usual. Release the brakes earlier to prevent too much reduction in speed. The high braking is active only in brake mode P2.

#### Air pipe overcharging, Time reservoir and pressure equalization:

We have implemented a new function for the brake system. A feature of locomotives equipped with a Knorr D2 self-regulating brake lever system is that you can overcharge the air pipe with more than 5BAR pressure. It is used to release brakes that are dragging. But if you do it too often you may cause a brake system fault where you can't release the brakes anymore. That happens when the pressure in the equalizing reservoir grows too high (greater than 0.4 BAR). Normally the over pressure releases very slowly over time. But not if the pressure is too high in the whole system. If you reach that state, you have two options to get the system working again. First one is to simply wait until the pressure is back to normal, which means the pressure in the equalizing reservoir needs to be zero. Second option is to even up the pressures manually. For that you can use the key command <Shift+A> to speed up the equalizing reservoir air release a bit. This function is equipped with some randomness. In real life the process also involves releasing the excess pressure on the whole train, it is not possible to replicate this in TS.

In Order to initiate overcharging, you should hold the train brake against the spring in the max fast release position and watch the pressure gauge. Don't apply overcharging for too long. In real life it is recommended that if possible you do not apply the air brakes again for several minutes after doing this.

## 4.8 Wheel-slip and Sanding

The locomotive is equipped with a wheel-slip protection brake. To activate it use the switch on the desk called "Schleuderschutz". If activated the locomotive will gently apply the block brakes by itself to prevent the axle from slipping to fast.

NEW – Besides the protection brake the locomotive is equipped with a reactive system that will control the tap changer if wheel-slip comes up. If you notch up and it begins to slip the system automatically steps down the taps to a safe value and stops the system from reacting to notch up signals. After this you can't notch up for about 10 seconds, but you can notch down every time you need. After the 10 seconds the system will try to notch up to the selected notch on the tap changer until slip comes up again. So you can try to run the locomotive on the adhesion barrier without a fault. Don't try this on sharp gradients.

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 traction motor blowers on this locomotive are used in manual mode normally. Switch them on before you start your run. The locomotive also has an automatic mode. In that mode the blowers come alive at notch 9 and above and turn off below that notch. The automatic mode is only useful for a light engine. Otherwise you cause faults. You can switch on the blowers with <Shift+F> and <Ctrl+F>.

See the fault section for more information.

# 5 SiFa and PZB (Train protection systems)

## 5.1 SiFa (vigilance alarm)

The locomotive has a working Zeit-Zeit-Sifa (vigilance alarm) which can be activated or deactivated with <Shift+7> 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 switched on 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 lit up on the desk to remind you to press the SIFA button. If you miss this, after 2 seconds you will get a warning beep that will last for a further 2 seconds after which the train will begin braking automatically. You can stop that braking every time with a press on the SIFA button to reset the timer. It's not an emergency braking.

The SIFA will pause if you switch to an outside view. So you can have it switched on even if you want to have some route explorations. Back in cab the SIFA timer runs again from 30secs down.

## 5.2 PZB 90 (point based train protection & control system)

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

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 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 4sec. 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+->

### **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 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 2012 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
<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 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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## 6 Additional Systems

### 6.1 Protective section

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

## 6.2 Door control and train heating

The locomotive has a programmed door control that could be used with different passenger wagons from the vR Shop. If you open the doors the T light positioned at the desk will turn off and you will get a beep sound. After you heard the whistle from outside the train, you need to close the doors with key command <Shift+T>.

When the doors are open the regulator is disabled. It may be necessary to engage the loco brake to prevent the train from rolling.

**NEW** – The door locking system is only active if the train heating is switched on. So you need to turn on the heating system, which is not more than a power source for the coaches given from the locos transformer. To switch it on use the lever-switch (3 way switch) on the upper left corner on the desk. Set it to 1 and hold it shortly before letting it go to its resting position. Then have a look onto the heating voltage gauge above the switch and wait until it stays steady. If the doors are closed the T lamp will lit up, if the doors are already opened the T will come up only for a short time and goes off.

Please note: after a power loss from the transformer, the heating system will shut down and stay there. After each power loss you need to reactivate the heating system again. So if the doors are not closing, check the heating system and maybe switch it on again.

## 6.3 Destination board control

The locomotive can handle coaches with the vR destination board system.

The locomotive 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 600A. If you move over this value power will trip and power 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 second vertical gauge from right on the left desk. It should not show more than 600A. Keep in mind that every electrical fault gives you a higher error score.

### Traction motor heating:

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

- over 330A maximum 2min.
- over 200A maximum 15min.
- under 200A 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:

- over 330A do not try, after 10sec you will get a fault
- over 200A maximum 1:30min.
- under 200A 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 Off for the blowers to avoid damage to the motors.

If you do not use the blower control properly scenarios will be forced to end.

#### Traction motor electrical protection:

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 regulator from notch 1 to 0 but this needs to be done too when higher notches are selected without causing problems. The higher the electrical power, the higher the possibility for an electrical fault. You will see a message when you can start driving again.

#### 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 110km/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 slower than 110km/h nothing happens. 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 machine. If it is raining or snowing the right wiper in driving direction will start automatically.

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

- „SA-00-“ = no pantograph is raised
- „SA-10-“ = pantograph No. 1 is raised
- „SA-01-“ = pantograph No. 2 is raised
- „SA-11-“ = both pantographs are raised

You now can see the result of the preselection in the editor right after entering it into the numbering field.

### **6.6 Double formation and push pull system**

The double formation and push pull system is implemented in version 2. For this there will be a compatibility with only one driving trailer at this time, with the IR/IC DVT from the class 120EL packages. This is not really prototypical because in real life these systems are not compatible. But in TS you can do and to use the DVT with that loco you need to start up them with the fast setup procedure. All coaches between the loco and the DVT need to be vR CM compatible (all coaches from our store doing so).

Compatible locos, but also not in prototypical formation, are the classes 120EL, 156EL, 112.1EL and 243EL. You can use these locos as the second loco and it will work in most situations.

Please note: you can't switch the cabs with these constellations of vehicles because of the different input mappers. So you can't change the driving loco to head up in the opposite direction in one scenario.

## **7 Key Layout**

Function	Key	Key
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Fast Start-Up	Ctrl	Z
Battery Isolating Switch on/off	Shift	B
Battery Isolating Switch on/off loco2	Ctrl+Shift	B
Compressor on	Shift	'
Pantograph Selection	Shift	P
Pantograph Selection loco2	Ctrl+Shift	P
Pantograph up / down		P
Main switch on/off		Z
Regulator		A / D
Regulator fast up / down	>1sec. press	A / D
Reverser		W / S
Traction motor blower	Shift / Ctrl	F
Air pipe pressure aligning	Shift	A
Brake mode selection	Ctrl+Shift	;
Train brake		;/'
E-brake		< / >
E-brake decoupling	Shift	D
Loco brake		[ / ]
Emergency brake		Backsp (←)
Sander		X
SIFA on/off	Shift	7
SIFA Reset		Space
PZB on/off	Shift	8
PZB Wachsam / Acknowledge		Page down
PZB Frei / Free		End
PZB Befehl40		Del
PZB system information	Ctrl+Shift	8
Horn high		B
Horn low		N
Doors closing	Shift	T
Wiper right		V
Wiper left		C
Wiper right fast	Shift	V
Wiper left fast	Shift	C
Wiper right slower	Ctrl	V
Wiper left slower	Ctrl	C
Cab light and Reading lamp	(Shift)	L
Instrument lights		I
Light cone adjustment	Shift	End / Pos1
ZZA up		0
ZZA down	Shift	0
Help system on or off	Shift	[
Message level	Ctrl	]
Message language selection DE/EN	Ctrl+Shift	M

## 8 Hints for scenario creators

The AI locomotives run through the automatically Start-up process. This needs some time. A good time to be sure that the Start-up process has finished is 20sec.

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

Please note the massive tractive effort these locos produce because of the realisation of the tap changer systems. The starting TE is about 1600kN when you were able to raise the full power, which is what TS does with the AI. So please use the markers and the percentile speed values to let them start slowly and smooth.

This Expert-Line is able to follow the save and resume function of TS2016. All important system states are saved, so you can save your scenario and resume it later, without the need to newly set up the locomotive. Please note that some system values are not stored like an active PZB monitoring.

**NEW** – You can set the brake mode from scenario scripting and force that mode so the user can't change it. The control name is 'BrakeMode' and accepts the values 2, 3 and 4. The values are representing the brake modes: 2=P, 3=P3 and 4=G. Fire only once and wait until 4 seconds after scenario start to set it up. Use a message window and fire an event to do so. The forced brake mode is scenario save function and rolling start compatible and will remain after a resume.

**NEW – FreeRoam:** Now you can use our heavy scripted locos in FreeRoam mode with nearly no problems. Except the double formation system, which you can activate too but will lost their sate if you leave the consist to drive another. Also prevent hopping into actual AI driven locos. And do not apply schedules to locos you want to drive.

## 9 Credits

We say Thank You to all people who helped realizing this package.

Your virtualRailroads Team