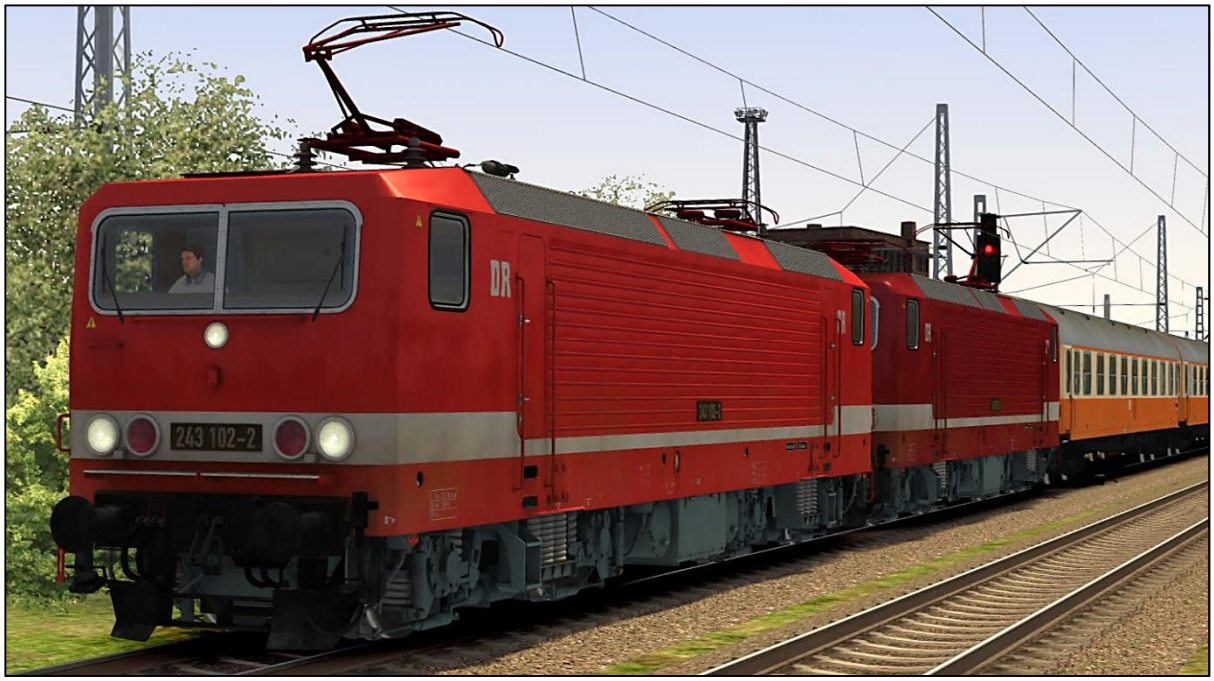
DR BR243 Expert-Line

compatible with Train Simulator 2014



Content

1 Information

1.1 DR Class 243

The class 243 from Deutsche Reichsbahn (DR) is an electric locomotive which was first delivered in 1982 to Deutsche Reichsbahn as 243-001, also known as 'White Lady'. Overall 646 machines were produced and delivered from 1984 to 1991.

The locomotive has two bogies each with two axles. Each axle is powered with an electric motor. The max power is about 3720 kilowatts. The power is controlled with a 31 notch high voltage thyristor tap-changer system. The maximum speed is 120 kmh.

The machines were widely used for fast passenger, commuter and also for freight trains as well. They were built to mainly replace the older DR class 242. Their ability to run in multiple with the DR class 250 makes them versatile machines.

1.2 DR Class 243 Expert-Line - Simulation functions

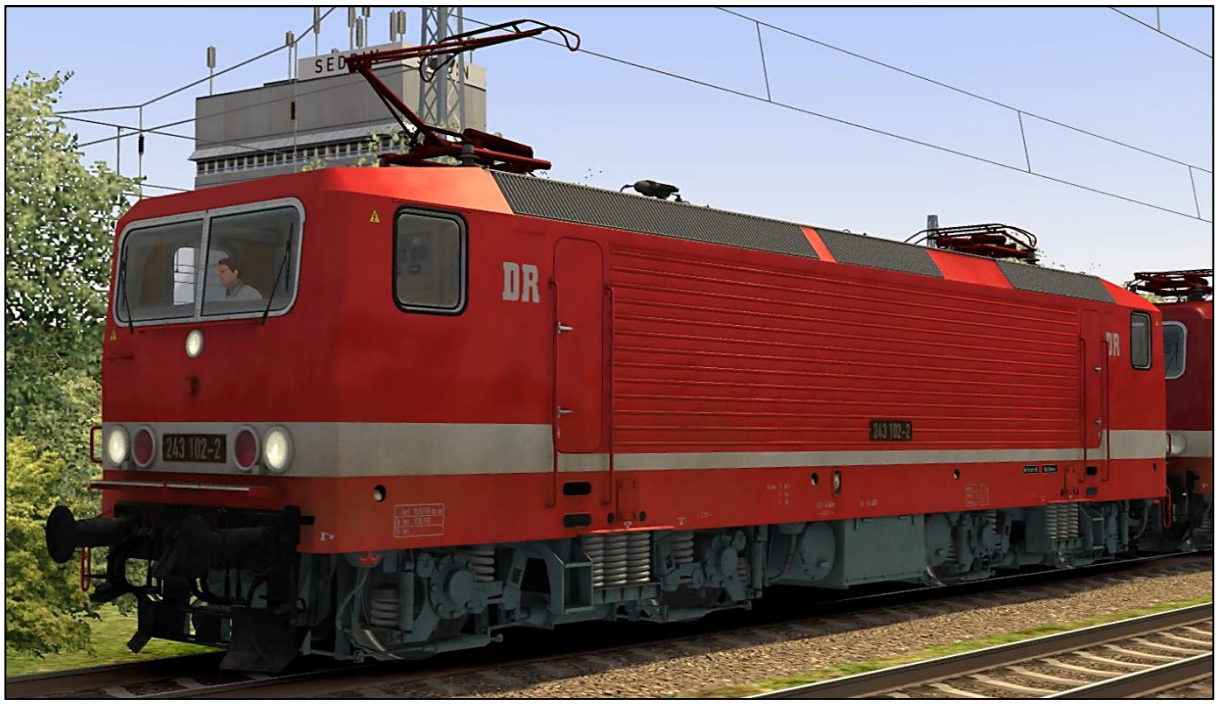
The most important functions are summarised below.

- ✓ Prototypical driving behaviour
- ✓ Tap-changer system with manual control
- ✓ Automatic speed control (like AFB)
- ✓ Multiple unit control system (Version 2)
- ✓ Manual / automatic startup procedure
- ✓ Monitoring function for important values like Voltage, traction temperature
- ✓ Manually selectable pantographs
- ✓ Delayed and smooth controlled e-brake
- ✓ prototypical PZ80R System PZB 90 v1.6
- ✓ SIFA 86 (request-SIFA)
- ✓ Switchable instrument lichts
- ✓ Cab light
- ✓ Wipers with speed control
- ✓ Standard TS2014 effects
- ✓ TS2014 camera positions
- ✓ automatic AI wipers with weather detection
- ✓ Light bulp adjustment for player and AI
- ✓ vR ZZA compatible
- ✓ configuration file
- ✓ prototypical sound optimized for EFX

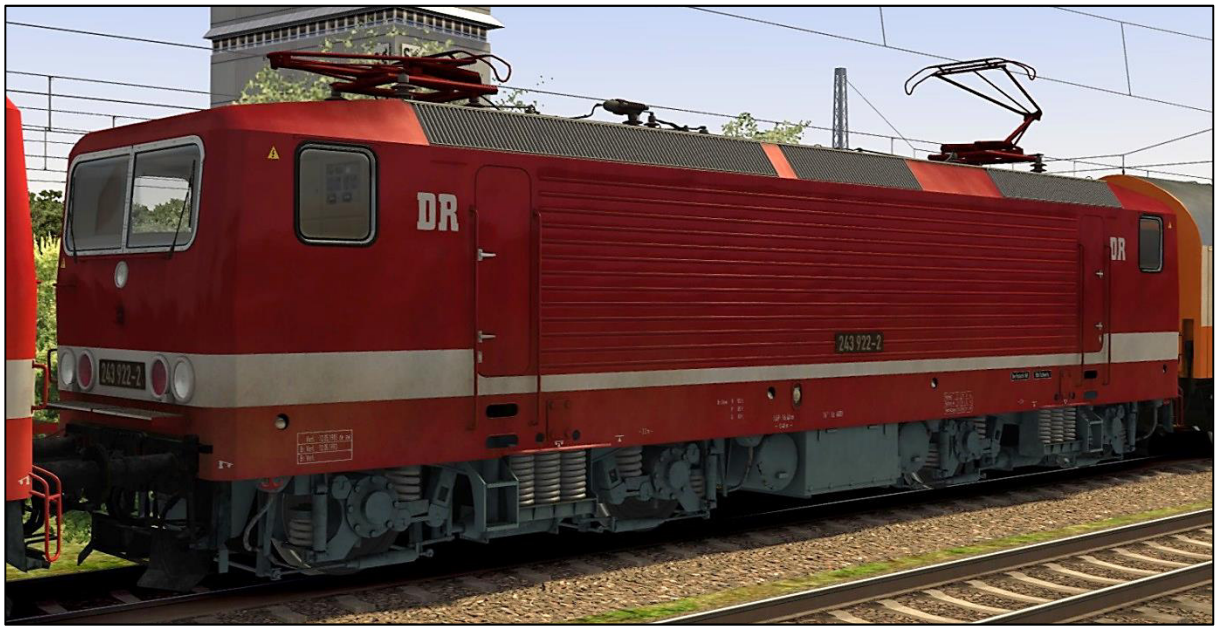
1.3 Technical Data DR Class 243

Manufacturer:	VEB LEW Hennigsdorf	**Build dates**:	1982 - 1991
Type:	Elektric	**Wheel arrangements**:	Bo-Bo
Length over Buffer:	16.64 m	**Mass**:	82,5 t
Max continuous tractive effort:	3500 kW	**Maximum speed**:	120 km/h

2 The Locomotive



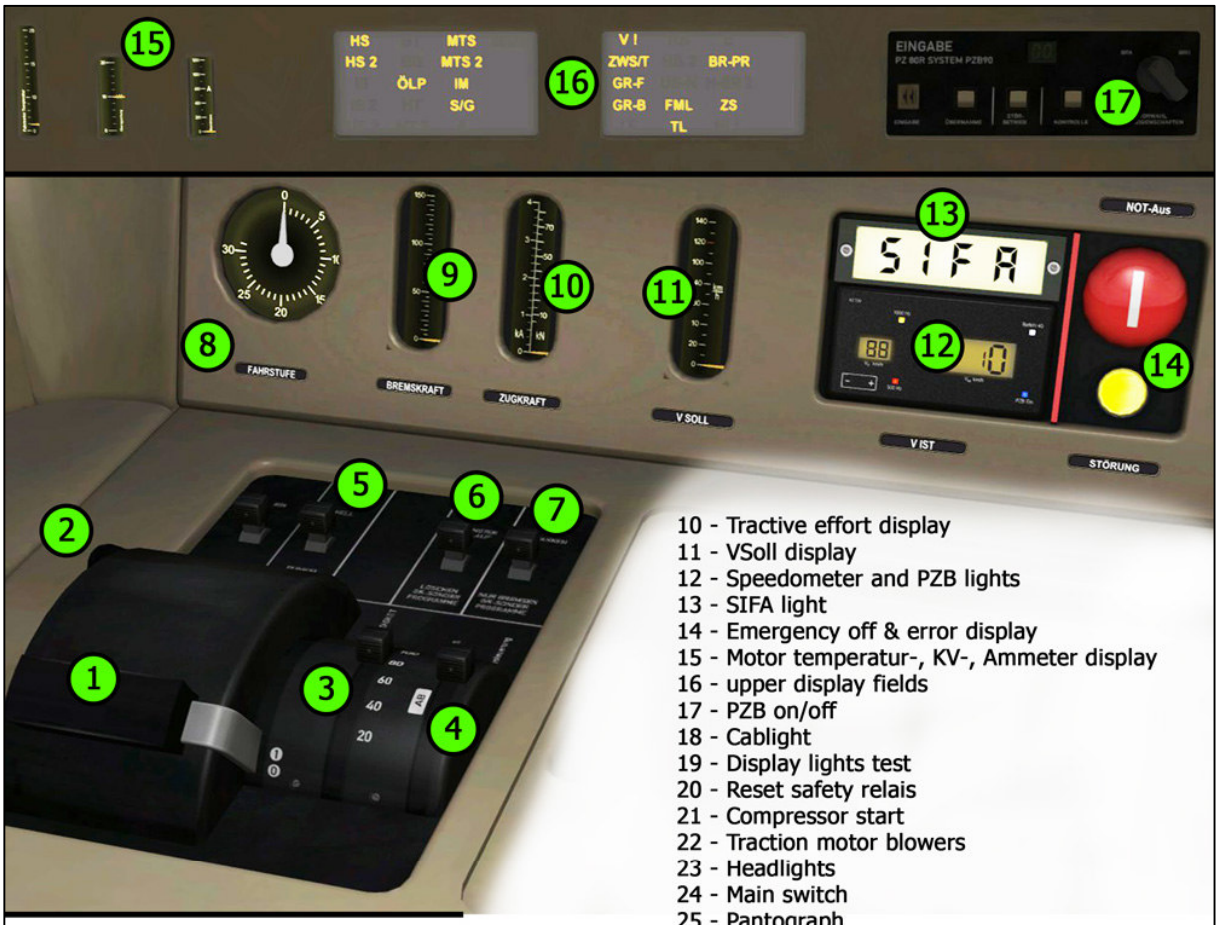
DR Class 243 Karmin red (Editor naming ‘vR BR243 102-2’)



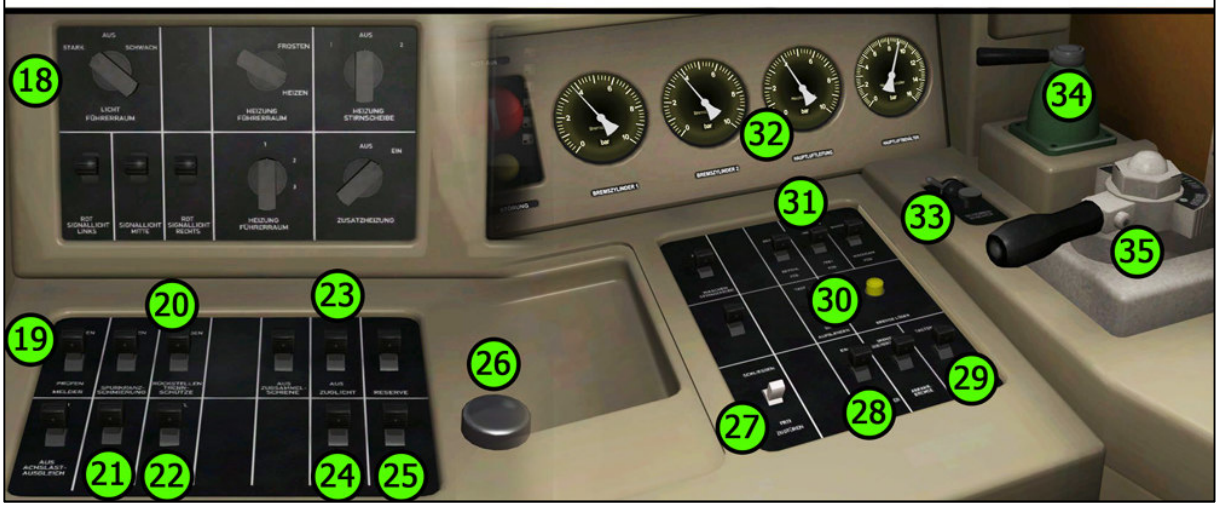
DR Calss 243 Bordeaux red (Editor naming ‘vR BR243 922-2’)

Both color variations are also available with dynamic numbering. In editor naming is: ‘vR BR243 DynNr V1’ and ‘vR BR243 DynNr V2’.

3 Cab and controls



1 - Regulator / VSoll-Changer
2 - Reverser
3 - Tractive effort and brakeforce changer
4 - Tap changer up/down
5 - Instrumentlight
6 - Specialprogramm „Run once" / „delete"
7 - Specialprogramm „Only drive" / „Only brake"
8 - Tapchanger display
9 - Brakeforce display
10 - Tractive effort display
11 - VSoll display
12 - Speedometer and PZB lights
13 - SIFA light
14 - Emergency off & error display
15 - Motor temperatur-, KV-, Ammeter display
16 - upper display fields
17 - PZB on/off
18 - Cablight
19 - Display lights test
20 - Reset safety relais
21 - Compressor start
22 - Traction motor blowers
23 - Headlights
24 - Main switch
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 TS2014.

We have included some functions in the locomotive which have been seen before in our class 103 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. Also a new system for multiple working or push pull configuration was created to stay compatible with the automatic fast setup.

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 (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.

TS2014 problems: If more than one locomotive is coupled to your train, the brake pressure may be reduced and some displays will show wrong or no values. Please keep that in mind when using the locomotive for multiple working. When driving in reverse with more than one locomotive coupled, there may be no tractive effort shown in the appropriate gauge.

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+7>
11. Switch on PZB if needed <Shift+8>
12. Switch on the headlight <H> and the instrument lights <I>

Now the locomotive is near ready to drive. Just release the brakes and us 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+7>
14. Switch on PZB if needed <Shift+8>
15. 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.

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 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 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.

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 Main switch 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 you messages 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 <E> or tap down with key <Q>. 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 40kmh and 120kmh 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 an 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 40kmh. 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 to. 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+7>. After switching on press key <Space> 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 <Space>. 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 <Space>. 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. Also be aware 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.

5.2 PZ80R System PZB 90

The locomotive has a realistic built in PZ80R System PZB90 V1.6 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 other vR locomotives with PZB. The use of the switch will be registered by the PZB system when the switch is released! That is prototypical behaviour and different to other PZB systems installed in vR locomotives. 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+->

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
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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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 DR class 243 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 60kn/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 60kN/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 60kN/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

6.6 Configuration file (Only for experienced users!)

The following pre-selection could be made:

- Light bulb on or off
- AI wiper function on or off
- Message system on or off
- Message system level
- PZB help system on or off
- Traction motor electrical protection on or off
- Sand box will empty on or off
- Error level for traction motor electrical protection
- Standard language for messages (German or English possible)

The configuration file can be found under Scripts\config\
Please only make changes when you really know what you are doing.
Please do not open the file with Word, Wordpad or any other text word processing editor.
Best use notepad or a LUA compatible editor or Notepad.

7 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		E/Q
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	7
SIFA reset		Space
PZB on/off	Shift	8
PZB train mode cycling	Ctrl	8
PZB Acknowledge	(Numpad Enter)	Page down
PZB release from monitoring		End
PZB command 40		Del
Horn long		B
Horn short		N
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		0
ZZA position down	Shift	0
Help system on/off	Shift	[
Message level cycle	Ctrl	]

8 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 DR class 243 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 TS201x does not care about that, you should guide the train over a few waypoints with different power proportion settings to prevent a rocket start.

9 Additional thanks

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

Your virtualRailroads Team
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www.virtual-railroads.de