

Typ	Train Simulator 2020 - Addon
Autor	Benjamin Ebrecht
Version	1.05
Datum	01.08.2020
Kontakt	ebrecht@trainteam.berlin



Preface

Dear Customer,

thank you for your interest in our product “Die Baureihe 481”. With this Add-on you have purchased a very special realisation, as it is our very first to be based upon a vehicle model series made from scratch in the DTG Train Simulator. We have created a completely new, modular script-system to replicate the specific functions of the Berlin S-Bahn, following in an appropriately long time of development. The time was well spent: next to many very detailed characteristics like flickering lights and correctly calculated switching sparks, we also could implement entirely new systems such as an independent simulation of passengers for realistically packed trains and an extendable, fully functioning IBIS (Integrated-Board-Information-System) for the destination display and announcements.

Another specialty is the fact that, in addition to the vehicle, we also managed to put a whole route into the package. Cheers to Jan Bleiß! He allowed us take the S25 part of his Add-on route “Berlin-Leipzig” and fit it to our needs for this package. Together with him, we look forward to see the fully finished S25 (to Henningsdorf); announced for 2020, with this route our vehicle will be able to fully play its potential...

As usually, we have added some local colour to our scenarios and as a further addition the S-Bahn classes 475 (“Stadtbahner”) and 480 (“Toaster”) are included in the package.

Please note the extensive contents and complex vehicle functions of this manual.

By the way: its worth looking into our Forums “www.trainteam.berlin/forum” or our facebook page “<https://www.facebook.com/TrainTeamBerlin>”. This way you will stay updated for patches and follow up products. In that sense, we wish you at least as much fun with this Add-on, as we had creating.

TrainTeamBerlin
 Berlin, June 2020

Table of contents

Preface 1

The Team & acknowledgements 3

System requirements 3

Installation & Configuration 4

The route "S25 Südast" 5

The class 481 6

 Overview of the drivers cabin 8

 Quick start..... 11

 Controls 12

 Vehicle operation in detail 14

 Configuration of the vehicle 33

 Final notes / FAQ..... 35

Other (AI-)Vehicles 37

 Class 114/143 37

 Class 475..... 39

 Class 480..... 41

 Class 481 42

Scenario-Objects 44

Scenarios 45

Instructions for modders 54

Appendix 64

 Terminal – Error list..... 64

 IBIS – route list 65

 IBIS – destination codes – special destinations 65

 IBIS - destination codes - Stations..... 66

 IBIS – Train groups 71

The Team & acknowledgements

Here, the team members may proudly present and introduce themselves:

Software programming: TrainTeamBerlin

Distribution: TrainTeamBerlin

Benjamin Ebrecht	3d-Models, Sound, Scripting, Repaints, Scenarios, Manual (german)
Jan Bleiß	Route S25-Südast extracted for this Add-on
Daniel Kirchner	3d-Models
Nick Zimmermann	3d models
Benjamin Duven	Announcements
Carsten Grenkowitz	legwork „Stadtbahner-roll band“
Leo Kühnert	manual translation
Patrick Polzin	model information
Erik Korbiel	information and data
User "seppdemba"	model information
Roman Glos	detail input and support
"Herr Bimmelmann"	detail input
"Zahnabst & Verkehrsente"	tireless support

Furthermore, we want to thank all the other (partly anonymous) helpers and licensors who made their contribution for this Add-on to succeed in production. Also very special thanks to the tireless beta-testers and supporters who did their part in making this Add-on as detailed as it is.

One or more textures on 3D models used in this add-on were created with images from CGTextures.com. These images may not be redistributed by default, please visit www.cgtextures.com for more information.

System requirements

Processor (CPU):	Quad Core 3 GHz
Memory (RAM):	8192 MB
Graphics Card (GPU):	DirectX 10 capable o. better, 1024 MB physical VRAM
Free HDD space:	1700 MB
Soundcard:	SoundBlaster or compatible

Software:

- mandatory: Train Simulator 2020
- mandatory: Steam-DLC "European Loco & Asset Pack" (for Objects/Scenarios)
- optional: TrainTeamBerlin "Scenario pack Vol. 1" or "Scenario pack Vol. 3" (only required to play the added scenarios)

The Add-on was developed for Train Simulator 2020.

Please note that the Add-ons require the newest version respectively.

Installation & configuration

Installation:

To install the Add-on execute the Installer (.exe file). Follow the instructions and install the package into the main RailWorks folder. (It will normally be detected automatically).

You have to choose a keyboard layout while installing the add-on. If you are using a keyboard with British or American layout ("QWERTY"), we suggest to choose the "English" layout as the default German input mapper is optimised for keyboards using German layout ("QWERTZ").

The installation is finished afterwards.

Please Note: In case the setup has not finished properly or the installation is not complete, because of improper local configuration or false positives of protective software (Antivirus, Firewall etc.) the setup might be blocked. In that case, make sure the setup has not been blocked and will not be blocked by protective software, this can be done by reconfiguring or temporarily disabling protective software.

Uninstallation:

If you wish to remove „Die Baureihe 481“ from your hard drive, go to your start menu folder „Program Files → TrainTeamBerlin → Baureihe 481“ the context menu item „uninstall“ and follow the instructions. The Add-on is now removed from your PC.

Please Note: Some folders for vehicles are used by more than one Add-on. Uninstalling this Add-on will result in loss of all the data in that folder. Other Add-ons made by TrainTeamBerlin might need to be reinstalled after uninstalling this Add-on.

Configuration:

You can configure the behaviour of the vehicle to your personal needs with numerous settings. For more info read the chapter (Configuration of the vehicle)

External hardware controllers can control the vehicle. For example the „RailDriver“, the throttle lever of a joystick can be used to accelerate or decelerate (brake) and the pedals of a PC steering wheel set can be used as a vigilance device.

The route "S25 Südast"

In addition to the vehicle model, this Add-on also delivers a whole route for TrainSimulator 2020. It is about the „S25 Südast“ (S25 South Branch) between Berlin Potsdamer Platz and Teltow Stadt. This route was extracted from the Add-on „Berlin – Leipzig“ and was cleared to be released with this Add-on by its creator Jan Bleiß. The whole team thanks him for this.

The route has been shortened to the “S-Bahn” part and has been customized visually and functionally. The vehicle BR 481 works with track-sided triggers that are already built into to tracks. The following trigger types have been built in already:

- PIS-Trigger "Next Station" - set from Teltow to Potsdamer Platz
- Passenger light trigger - only for driving into a Tunnel. For exiting, please set it yourself depending on time of day.
- Departure trigger - set from Teltow to Potsdamer Platz
- 3rd rail gaps - Teltow Stadt incl. INIT-Trigger for ZAT
- are entirely marked

ZAT is a system in which the train driver himself instead of station personnel does the clearance check for departure. Zp9/10 is a signal indicating clearance to close the automatic doors and departure.

The following triggers have not been set globally:

- departure config - if needed, set differing Zp9/10-timings
- operational announcements - if needed, amend yourself
- passenger exchange - if needed, amend yourself
- sander reservoir - if needed, differ from default
- terminal errors - if wished, amend yourself

The Add-on also contains a scenario script as well as a template to create an F10 info-window (compare chapter departure). The following departure modes have been set if no clearance mode is being overwritten by scenario specific triggers:

Teltow Stadt	ZAT
Lichterfelde Süd	Zp9/10
Osdorfer Straße	Zp9/10
Lichterfelde Ost	Zp9/10
Lankwitz	ZAT
Südende	ZAT
Priesterweg	Zp9/10
Südkreuz	ZAT
Yorckstraße	Radio
Anhalter Bahnhof	Zp9/10
Potsdamer Platz	Zp9/10

The class 481

Here we will highlight the included vehicles and discuss their specific functionality.

Historic abstract: After the fall of the Berlin Wall both S-Bahn systems quickly grew together again. Within short timeframes, routes were (re)established. The BVG (West Berlin Public Transport Company) and DR (East German National Rail Service) bought new Trains in 1990, regardless, the decision to develop a new model type has been made. Built in Henningsdorf near Berlin, the new trains were manufactured by AEG/DWA, later Adtranz and Bombardier Transportation and were delivered between 1996 and 2004.

These 500 Quarter-Trains (smallest ready for operation motor & coach train set) replaced older models like the classes 475-477 which got the nicknames „Stadbahner“ and „Nietrenko“ - regarding their humming motors, they were an important part of the Berlin Cityscape. Similar can be said about the class 481 – visual features and the characteristic sound gave it nicknames like „Taucherbrille (diving goggles) and „Heulsuse“ (cry-baby). Thanks to the retention of the traditional paint and the classic „closing-doors-sound-triad“ the model 481 harmonically gets in line of the Berlin vehicle history.

Multiple incidents, which caused in the „S-Bahn Crisis“, moulded its service time resulted in shorter maintenance intervals and a lower top speed of 80km/h (~50mi/h). Today, numerous customisations have been recorded, including the replacement of the roller blind displays, the removal of the first class, the addition of a new ATC system and the recently started redesigns including a new varnish.

The model conversion corresponds to the typical stock product of this model series and shows the „as is“ condition between 2005 and 2015. This model already contains the repurposed first class compartments, but not the ATC system ZBS and the driving assistance system FASSI.

In addition there are some paintwork schemes whose examples are partly of newer date:

- "Factory issue": Yellow chassis und red roof edges as well as a red window frame (until ca. 2004)
- Advertisement "Adagio": black decal Advertisement Train with mirror ball visuals (ca. 2016 - 2018)
- Advertisement "DDR-Museum": blue-white „first of a kind“ of an Advertisement-Train for the DDR-Museum in Berlin City (ca. 2016 - 2019)
- Advertisements "Donuts": Colourful visuals (mostly orange) for a donut franchise. (ca. 2015 - 2018)
- Advertisement "Hertha BSC": blue decal train with a football theme (2017)



Consists: For all varnishes there are preload consists, which are also available in the „Quick Drive“ mode.

"Quick Drive": the „S25 Südast“ route delivers two quick drive mode scenarios. Start points are Potsdamer Platz storage siding and Teltow Stadt station.

Scenarios: Furthermore, with the vehicle there are eight Standard-Scenarios. Those display rather complex operational situations, therefore it is advised to read the scenario description in the back part of this Manual. At least we advise attention to the text boxes in the scenario. In addition, there is a driving school scenario included to ease your access to the controls.

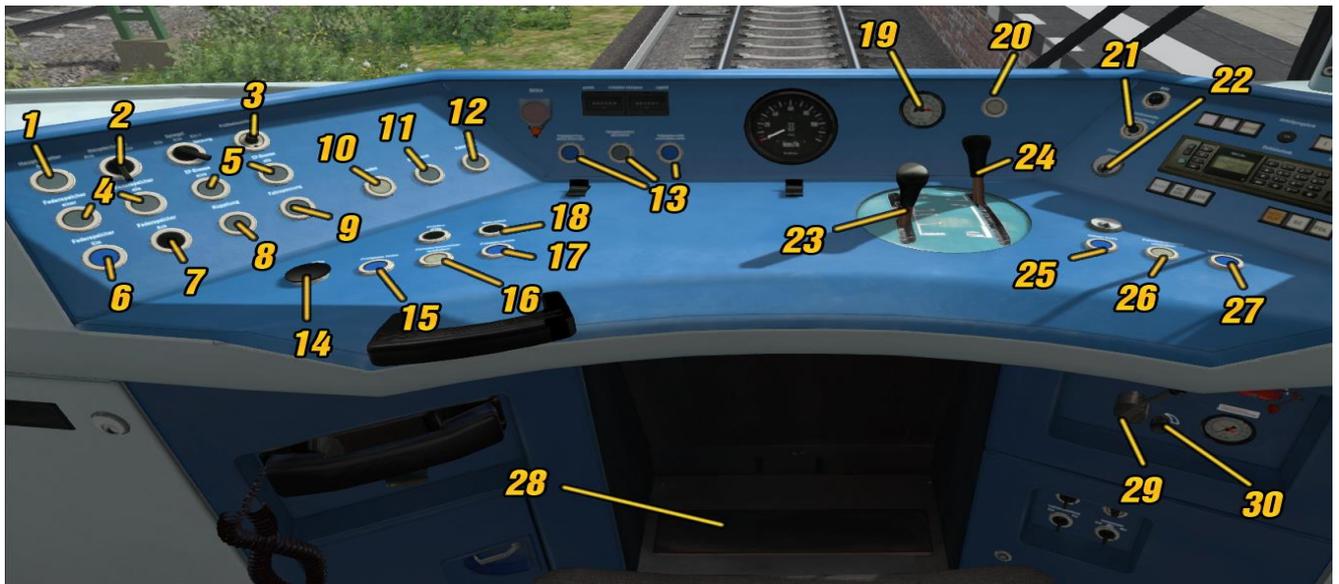
About this documentation: In the following part the specific functions of the BR 481 will be explained in detail, this happens in separate topics, because not all of the topics are relevant for each user.:

- Overview of the drivers cabin
- Quick Start
- Description of the Controls in Detail
- Configuration of the Vehicle
- Instructions for building your own Scenarios, upgrading of the Vehicle etc. (relevant only for modders and tinkerers)
- Final Notes / FAQ

Overview of the driver's cab

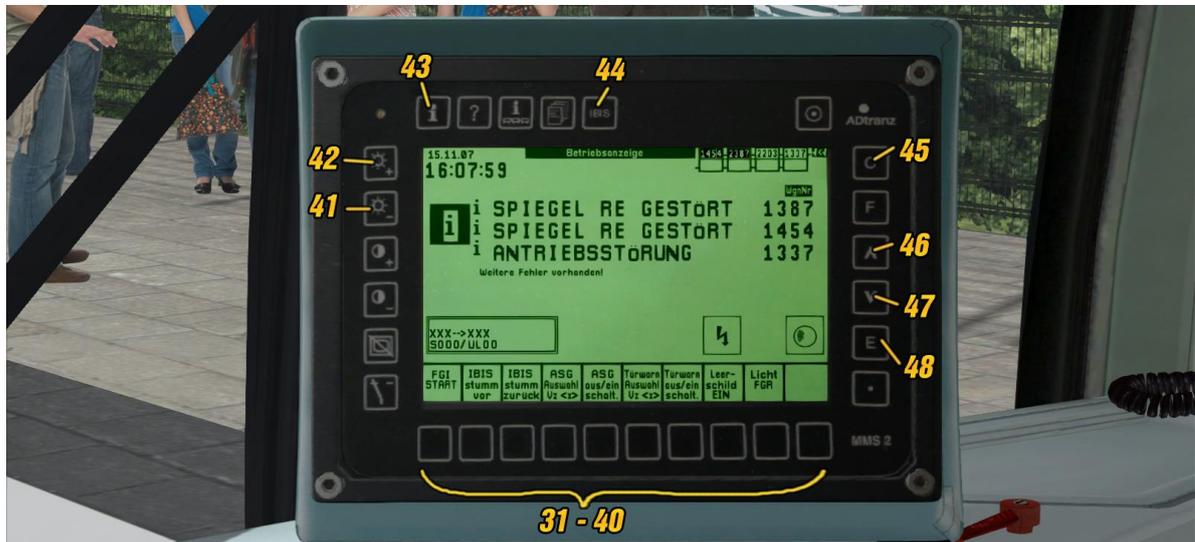
Please note that this manual describes the English version of the keyboard layout for the Class 481 that can be chosen when installing the addon.

Driver console



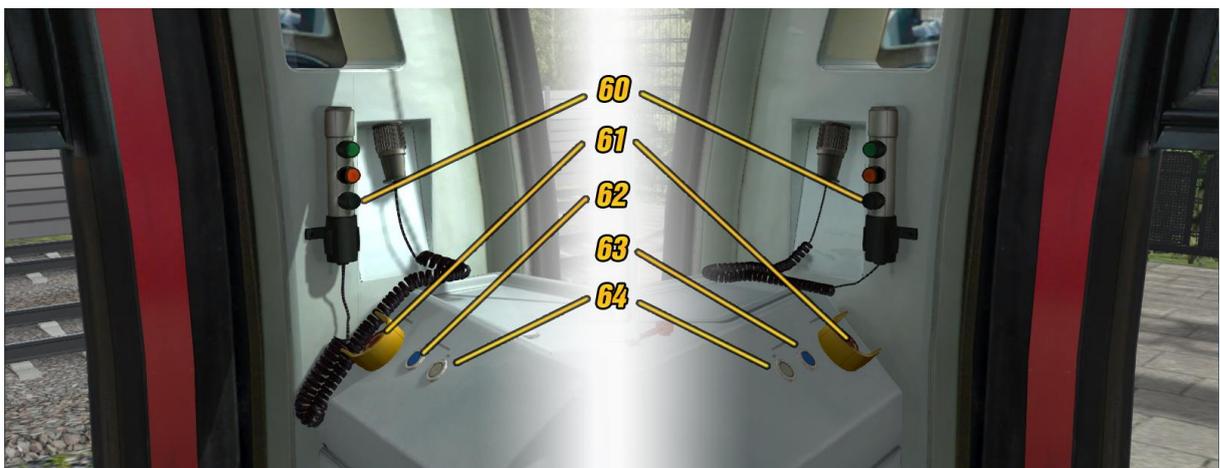
- | | | | |
|------|--|------|--|
| (1) | Indicator light "main switch off" | (18) | Switch "Macrophone" (Signal Horn)(M) |
| (2) | Switch "Main switch" on/off
(Ctrl + Z / Ctrl + Shift + Z) | (19) | Double pressure gauge / main brake pipe pressure and brake cylinder pressure |
| (3) | Driver's desk illumination, step less
(Ctrl + L / Ctrl + Shift + L) | (20) | SiFa light indicator (vigilance) |
| (4) | Indicator light "spring accumulator" one/all | (21) | Instrument lightning, step less
(L / Shift + L) |
| (5) | Indicator light "EP-Brakes" one/all | (22) | Control switch-Lock with
Control switch key
(K / Shift + K / Ctrl + Shift + K) |
| (6) | Switch "spring accumulator brakes on" (N) | (23) | Reverser and speed control lever (W / S) |
| (7) | Switch "spring accumulator brakes off" (Shift + N) | (24) | Throttle and brake lever (A / D) |
| (8) | Indicator light "coupler" | (25) | Switch "left driver cabin door" open (0) |
| (9) | Indicator light "voltage" | (26) | Switch "close driver cabin doors" (-) |
| (10) | Switch „sander“ (X) | (27) | Switch "right driver cabin door" open (=) |
| (11) | Indicator light "Emergency Brake" | (28) | SiFa foot button (vigilance) (Shift + Space bar) |
| (12) | Light Switch "Fahrsperr" (Numpad Enter) | (29) | Valve "wipers" (V / Shift + V) |
| (13) | Status-Indicator light „passenger doors“ | (30) | control wheel wiper-interval, step less (Ctrl + V / Ctrl + Shift + V) |
| (14) | SiFa pushbutton (vigilance) (Space Bar) | | |
| (15) | Switch "passenger door clearance left" (P) | | |
| (16) | Switch "close passenger doors" ([) | | |
| (17) | Switch "passenger door clearance right" (]) | | |

Terminal



- | | |
|---|---|
| (31 - 40) SoftKeys with changing functionality (Shift + 0 to Shift + 9) | (44) HardKey Ibis-Screen (Shift + /) |
| (41) HardKey "darker display" (Shift + NUM /) | (45) HardKey correction (Shift + Backspace) |
| (42) HardKey "brighter display" (Shift + NUM *) | (46) HardKey "upward" (Shift + page up) |
| (43) HardKey Info-Screen (Shift + ') | (47) HardKey "downward" (Shift + page down) |
| | (48) HardKey "Enter" (Shift + Enter (NUM)) |

Side consoles of cab view



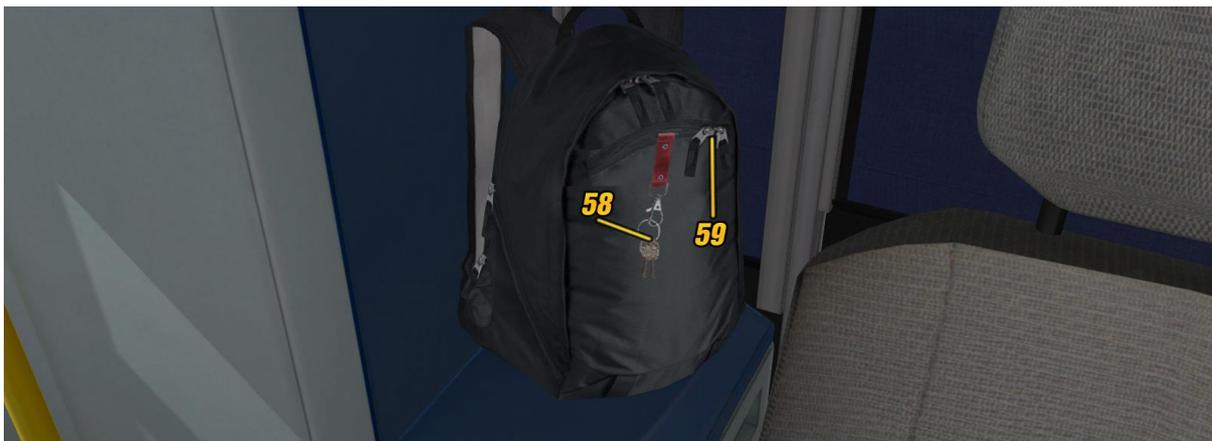
- | | |
|---|--|
| (60) ZAT Announcement (') | (63) Switch "right driver cabin door" open (-) |
| (61) Pushbutton "Emergency brake" (Backspace) | (64) Switch "close driver cabin doors" (=) |
| (62) Switch "left driver cabin door" open (0) | |

Wall mounted console (left side, behind the seat)



- | | |
|--|---|
| (49) Volt meter "battery voltage" | (54) Switch "Headlights" normal/red/white
(Ctrl + H /Ctrl + Shift + H) |
| (50) Volt meter "3rd rail voltage" | (55) Sensing device "Battery" on/off
(B / Shift + B) |
| (51) switch "Fahrsperr" on/off
(Ctrl + Enter (NUM)/Shift + Enter (NUM)) | (56) Sensing device "interior lighting"
(Ctrl + J / Ctrl + Shift + J) |
| (52) Switch "SiFa" on/off (vigilance)
(Ctrl + Space/Shift + Space) | (57) Switch "cabin lighting"
(J / Shift + J) |
| (53) Switch "Headlights" disaster/of/on (H /
Shift + H) | |

Backpack



- | | |
|---|--------------------------------------|
| (58) Driver switch keys
(K / Shift + K / Ctrl + Shift + K) | (59) Backpack open/close (Shift + K) |
|---|--------------------------------------|

Quick Start

Complete Start-up

1. Battery main switch on.
2. Get the keys from the backpack (behind the driver seat).
3. Put the keys into the drive switch lock.
4. Unlock the drive switch.
5. Main switch on.
6. Release spring accumulator brakes.

Changing the drivers cabin

1. Enable spring accumulator brakes.
2. Zero out speed control and throttle levers.
3. Lock the main switches and remove the key.
4. Change the driver’s cabin.
5. Unlock the main switch with the key.
6. Release the spring accumulator brakes.

Input IBIS-Data for route at the Terminal

1. Get IBIS-Data for scenario (if a scenario is prepared: F10 key)
2. Get IBIS-Menu Hardkey „IBIS-Screen“
3. Start route input Softkey 3. Type in line number consisting of up to two digits.
4. Confirm with Hardkey “Enter”, tour number input starts, type tour number consisting of up to two digits.
5. Confirm with Hardkey “Enter”, destination input begins, input up to three digit destination ID number. (check the appendix for a list)
6. Confirm with Hardkey “Enter”, departure input begins, input up to three digit of the current location (check appendix for a list), confirm with Hardkey “Enter”.
7. Start the Passenger Information System using Softkey 0 „FGI Start“

Driving Operation

1. Enable headlights, if needed also console illumination and coach lights.
2. Set reverser and desired velocity with the speed control lever (pre set is shown by a needle in the speedometer)
3. Start-up: Push throttle lever to maximum (Holding brake is being released/Traction force is set)
4. During the ride: Use SiFa (vigilance) pushbuttons if needed
5. Stop the train: Move the throttle and brake lever back below a zero position to decelerate with the desired braking force (all brakes systems are automatically controlled)

Passenger interchange

ZAT-Departure

1. Open passenger doors.
2. Open driver cabin doors and get out.
3. Announcement „Please board the train“.
4. After passenger interchange, make announcement „Please stand back“.
5. If needed, repeat the announcement
6. Close passenger doors.
7. Get back into the Train and close the driver cabin door.
8. Depart.

Departure via signal
Zp9/Zp10

1. Open passenger doors.
2. Wait for signal Zp10.
3. Close the doors.
4. Wait for signal Zp9.
5. Depart.

Departure via Radio

1. Open passenger doors.
2. Wait for the acoustic radio order to close the doors.
3. Close passenger doors.
4. Wait for acoustic radio order to depart.
5. Depart.

Controls

Please note that this section is used for describing the "English" keyboard layout for the Class 481 that can be chosen while installing the addon.

Automatic start-up	Z
Open / close Backpack	Shift + K
Main key into the: lock / backpack	CTRL + K / CTRL + Shift + K
Console: Unlock / Lock	K
Battery main switch: on / off	B / Shift + B
Main switch: on / off	CTRL + Z / CTRL + Shift + Z
Reverser and Speed control: up / down	W / S
Throttle and brake lever: up / down	A / D
Headlights: disaster / on / off	H / Shift+H
Headlights: normal / red / white	CTRL + H / CTRL + Shift + H
Cab light: on / off	J / Shift + J
Interior lightning: on / off	CTRL + J / CTRL + Shift + J
Instrument lightning: on / off	L / Shift + L
Console illumination: on/off	CTRL + L / Shift + CTRL + L
Passenger doors left: force open	P
Passenger doors: close	[
Passenger doors right: force open]
Left driver cabin door: open	0
All driver cabin doors: close	-
Right driver cabin door: open	=
ZAT Announcement	'
Info-Box for departure modes	F10 (<i>if set up</i>)
Wipers: up / down	V / Shift + V
Wiper interval: slower / faster	CTRL + V
Spring accumulator brakes: engage	N
Spring accumulator brakes: disengage	Shift + N
Confirm SiFa (vigilance)	Space
Confirm SiFa (vigilance) (Foot)	Shift + Space
SiFa (vigilance) : on / off	CTRL + Space/Shift + Space.
ATC system "Fahrsperr": on / off	CTRL + Enter (Num) / Shift + Enter (Num)
"Fahrsperr" mode wanted pass	Enter (Num)
Emergency brake	Backspace
Sander: Enable	X

TS2020 – Class 481

Macrophone (Signal Horn)	M
Sunscreen: Pull down	Y
Sunscreen: Push up	Shift + Y

Terminal Softkey 0	Shift + 0
Terminal Softkey 1	Shift + 1
Terminal Softkey 2	Shift + 2
Terminal Softkey 3	Shift + 3
Terminal Softkey 4	Shift + 4
Terminal Softkey 5	Shift + 5
Terminal Softkey 6	Shift + 6
Terminal Softkey 7	Shift + 7
Terminal Softkey 8	Shift + 8
Terminal Softkey 9	Shift + 9
Terminal Hardkey Enter	Shift + Enter
Terminal Hardkey Correct	Shift + Backspace
Terminal Hardkey scroll up	Shift + Page up
Terminal Hardkey scroll down	Shift + Page down
Terminal Hardkey brighter	Shift + * (Num)
Terminal Hardkey darker	Shift + / (Num)
Terminal Hardkey Info-Screen	Shift + '
Terminal Hardkey Ibis-Screen	Shift + /

Operation of the train in detail

Preface/Train enumeration

The BR 481 is equipped with the new TTB-scripting-system ("TTB MESFET"). The System subdivides all functionality in core- or functionality modules. Each module assumes a specific sub-function and offers interfaces for access to, or through other modules. The central modules and functions are to be discussed for the BR 481 now.

Train enumeration a train is a central component of the present scripting-system. Independently to the fact if the real vehicle would be enumerated, this is done in Railworks for vehicles that are equipped with the "TTB-MESFET" system.

The Train Enumeration functionality serves the purpose of collecting central data of the train set and to recognize or determine the status of the trains in the consist. Most of the collected data can be accessed after train enumeration in the Log-File (if logging is enabled). The primary condition for a successful train enumeration is the correct initialisation of the core modules in the scripting system and a successful DRM check.

The train enumeration is especially important for setting the status of the train as an AI (computer operated train) or as a player operated train and the hierarchy within the player controlled train set (master-slave vehicles). This status decides which functionality modules are loaded. This results in the necessity to do a new train enumeration each time a coupling manoeuvre is done by compatible vehicles or a new train is used.

The current train enumeration data for Class 481 train sets is to be shown in the Terminal of the driver cabin (check the chapter Terminal for more information)

Note for the Class 481: These train sets are **NOT** intended to be used as AI. For that purpose there is a resource optimized, separate vehicle in railworks, recognizable by the name addition "KI" for trains and train sets.

Start-up:

Depending on the scenario, the BR 481 has to be set up before the operation can start. If a complete start-up cycle is required, the following steps have to be undertaken:

- Battery main switch (55) must be engaged (button B or using the mouse)
- Backpack (59) must be opened (CTRL + K or pull right with the mouse)
- On the opened backpack, there is a set of keys (58). Put the main key into the lock (grab the key with the mouse and pull left or press Shift + K). The key can also be grabbed from the lock and put back on the backpack (pull right with the mouse or press Shift + K)
- The drive switch (22) must be unlocked using the main key (K). Just now, the reverser and speed control lever and the throttle and brake lever are unlocked.
- Main switch (2) must be engaged (CTRL + or mouse). If successful: the indication light „Main switch off“ turns dark. If it is unsuccessful, either the pantograph is not mounted (here in game it is by default always mounted), the battery main switch is not in “on” position or the console has not been unlocked”. In this case, check all the conditions and try again.
- The spring accumulator brakes are initially applied. Release them by pressing the button “spring accumulator brakes off” (7) or the shortcut Shift + N.

- The vehicle can alternatively be activated automatically: Press the Z button, this will take a few seconds and is finished once the indicator light „main switch off“ gets dark.

- The automatic activation sequence can also be done partly beforehand by using a scenario script to make the train ready to go. For more information, check the chapter: Instructions for modders.

Changing the driver cabin:

Changing the driver cabin is similar to the original process quite simple.

Before leaving the driver cabin:

- Fix the vehicle in position by applying the spring accumulator brakes (6)
- Zero the reverser and speed control lever (23)
- Zero the throttle and brake lever. (24)
- The control switch (22) must be locked (an activated main switch will not jump back to the disabled position)
- Remove the key (58) and secure it in your backpack so it can't be stolen at the platform when walking to the back cabin ☺

Now change the drivers cabin using the hotkeys Ctrl and + or Ctrl and -. New train enumeration is automatically done. If you changed to a driver cabin at the other end of the train set, master train state will be set respectively.

After entering the new driver cabin:

- Take the keys out of your backpack (59) and put it in the lock of the control switch
- Unlock the control switch lock (22).
- Check the condition alerts on the terminal.
- If needed repeat other necessary action for activating the train.
- Release the spring accumulator brakes (7).

Operation:

Operating a train is fairly easy:

- Reverser and speed control (23) are combined into one lever (W/S)
- Throttle and brake controls (24) are combined into one lever. (A /D). Depending on the tractive force level of the brakes and other conditions there will be „brake blending“, basically the combination of electronic and pneumatic brakes.
- The vehicle is equipped with a holding brake, which will be applied once the train comes to a full stop. It will stay engaged for as long as no traction force is requested.
- A skid- and slip protection system is integrated into the drive controller (ASG) and automatically defuses if a skid or slip situation occurs.

In the following part, we want to highlight the subsystems taking part in regular operation in detail.

Speed control:

The speed control of the class 481 is only connected to the traction control of the vehicle, it does not control the brakes. Manual braking is always necessary! In addition, the speed control will not effectively slow down the vehicle if the desired speed is exceeded (for example when driving down hill or the desired speed is lowered). Cruise control will only disable traction.

Moving the speed control lever for pre-setting velocity and direction above or below a neutral position (W/S or mouse) will enable the cruise control and set the desired speed (shown in the speedometer by a red needle). Operation without speed control is not possible. Moving the reverser to the backwards position will always pre-set 25km/h. In forward direction, it will increase the desired speed in steps of 5km/h (10km/h if the desired speed goes beyond 80km/h).

The primary condition for velocity pre-set is that the throttle and brake lever is in a neutral or a drive position. The pre-set can also be done in a brake state but the red needle will not move. It will do so, after the lever is set into at least a neutral position. So a pre-set velocity will be remembered after a manual braking process. (For example when stopping at a station).

Hint: The Class 481 has just one notch for setting traction force - you can slowly increase the acceleration on slippery rails by cautious approach using the speed control lever because the acceleration is harmonically decreased when being close to the desired speed.

Brake control:

The Class 481 is equipped with a brake control that controls the different brake systems automatically depending on the current situation. As a driver, you will only operate the combined throttle and brake lever. Brake blending will be carried out automatically.

- By default during operational braking manoeuvres only the electric brake will be used
- Below 7 km/h, the EP-Brake (pneumatic) will be added.
- At full stop, the pneumatic holding brake is active.
- Forced braking and emergency braking will minimize the stopping distance by combining dynamic and pneumatic brake.
 - In case of a defect quarter-trains engine ("weight sailor"), the EP-Brake will also be added to compensate for missing dynamic brake force and to generate similar braking force.

Quick/ Emergency/ Forced braking manoeuvres:

In case of an emergency braking manoeuvre, those are prioritized higher than operational braking manoeuvres.

- An emergency braking will be displayed with the light indicator „Emergency brake“ (11).
- An emergency brake manoeuvre can be achieved by hitting the palm-button „emergency brake“ (61) close to the driver cabin doors or by fully pulling back the Acceleration/brake lever (24).
 - A forced braking by the SiFa system (vigilance) or "Fahrsperre" are operationally classified as an emergency braking manoeuvre.
 - To release the emergency brake, the Throttle and brake lever must be set to neutral position.
 - ALL conditions that have caused the emergency braking manoeuvre must be resolved. Therefore, some operations on the SiFa (vigilance) or "Fahrsperre" might have to be undertaken.
 - The reverser state will be remembered during an emergency braking manoeuvre.

Holding Brake:

The Class 481 is equipped with a Holding brake: as soon as the vehicle is stopped, it will be applied so the vehicle cannot move away. This is active even if the throttle and brake lever is in a neutral position. As soon as traction force is being requested, the holding brake will be released and the traction force will be set. The brake pressure is dependent on the mass of the vehicle, therefore the brake pressure might change while standing because many passengers enter or leave the train.

Spring accumulator brake:

The spring accumulator brake is used as a parking brake and is active at the start of a game. Engaging the spring accumulator brake is done by pressing the switch "Spring accumulator on" (6) on the left side of the drivers console or through pressing the N key. Releasing it is done by pressing the button "spring accumulator off" (7) on the left side of the driver console or by pressing the Shift+N keys. The status of the spring accumulator brakes can be seen by checking the indicator lights "spring accumulator single" (4) (at least one of them is active) and "spring accumulator all" (5) (all of them are active), which can also be found on the left side of the driver console. Conditions for engaging the spring accumulator brakes are a successful Train enumeration, an enabled battery main switch and a main air pressure of at least 6 bars. To release the brakes, the control switch must be unlocked as well.

The status of the engaged spring accumulator brake is also displayed in the terminal by a suitable icon.

Malfunctioning traction controller

It is possible to simulate "weight gliding" trains. Those quarter trains (or single wagons) cannot create traction force out of technical errors. In the simulation, singular vehicles can be flagged with a "malfunctioning traction controller", resulting in a reduced tractive force making it harder to stay on time. Naturally, in this case the maximum braking force is reduced as well. For this reason, the brake controller partially engages the EP-brake (pneumatic brake) for compensation.

It is explained how to flag a vehicle as malfunctioning in the chapter „Instructions for modders. “

Head lights

The head and tail lights are following, similar to the original, a different pattern than you know from Train Simulator: the primary condition for the use of the lights is always the active battery main switch. Operation of the lights is done by using the switch "Signallichter" (53).

- The switch "Signallichter" (53) is disabled by default. It can be switched to the positions „Havarie“ (disaster), „aus“ (off) and „ein“ (on), it can be switched using the mouse or bi-directional using the H key or the Shift+H keys.
- At the switch placement „Aus“ the lights are turned off.
- At the switch placement „Ein“ the lights are turned on. Depending on the position of the of the reverser and speed control lever the head or taillights are turned on. In a neutral position, end of train signal lights are activated at both ends of the train.
- The switch placement „Havarie“ equals the „Ein“ placement, but forces the head lights to be on at the active driver cabin.

The Switch for the light mode (54) offers the placements „normal“ and „rot“ (red)/ „weiß“ (white). The mode "rot/weiß" (red/white) forces the headlights to show signal Zg3 (2x white, 1x red) in states which would normally lead to the signal Zg1 (3x white). The signal Zg3 was former used as signal for the workers at a worksite that a train is approaching on the wrong track while construction work phases.

Driver cabin illumination

The illumination of the driver cabin can be switched on at the wall mounted console (57) or using the J key or the Shift+J keys. The main battery switch needs to be enabled. The installed tube light will flicker visually and acoustically at first before it is operational.

Instrument illumination

The Instrument lighting (21) is controlled in the active driver cabin by using the step less control wheel on the right console or using the L key and the Shift+L keys. The battery main switch has to be activated.

Console illumination

The console illumination for the active driver cabin is controlled using the step less control wheel on the left side of the console, alternatively you can use the Ctrl+L or Shift+L keys. The battery main switch has to be activated.

Interior lighting

The interior lighting (56) is controlled for the entire train set by using the mouse on the console or using the Ctrl+J (on) or Ctrl+Shift+J (off) keys. The battery main switch has to be activated. Also, the interior lighting will flicker before it is operational.

In addition the interior lighting can be automatically controlled using the script triggers „ TTB Trigger PassLight OFF“ and „ TTB Trigger PassLight ON“.

These triggers are accessible in the scenario editor and have to be placed on the rail used by the player in the driving direction. By passing the trigger, a message will be sent to the train enabling or disabling the lights. It is possible, that the triggers are already installed in some routes, for example when moving through tunnels (check chapter route “S25 Südast”)

This trigger function is used to simulate the automatic switching of the interior lighting (in front of and after tunnels) that achieved through pre programmed IBIS route data in reality.

The status of the enabled interior lighting is displayed on the terminal by a suitable icon.

Wipers

The wipers are controlled by a valve (29) on the lower right side of the console or by using the V key or the shift+V keys. For operation, the wipers need a minimum main air pressure of 6 bars. They are 4 modes:

- Park
- off
- wipe
- wipe in intervals

The modes Park and off do the same in this simulation, whereas in reality the park mode moves the wipers to a pre defined position and the mode off plainly stops them where they are.

The interval length can be controlled step less by using the screw wheel (30) or using the Ctrl+V or the Ctrl+Shift+V keys.

Vigilance device (SiFa)

The so called „SiFa“ is a safety function of locomotives and train sets that is meant to make sure the driver is able to handle the train properly, if he is not the train will be forced to stop.

The implementation used here is an electronic request vigilance device. That means the driver has to confirm a request that occurs in random intervals between 30 and 50 seconds but latest after 400 m. Without and active request, the button has no confirming or resetting function, this prevents conditioned or subconscious activation of the SiFa. If there is a SiFa request, the indicator light in the middle of the console lights up. In addition, an acoustic warning signal will be enabled after 4 seconds. Without acknowledging the SiFa request, the brake controller will apply a force braking after another about 3 seconds.

A SiFa forced brake can be released during the ride, but must be treated like any other forced braking. The throttle/brake lever must be set to a zero position before any tractive force can be applied again. There is also an implemented hysteresis curve: The first SiFa alert has to be confirmed when exceeding 7 km/h, but the SiFa is activated until the trainset comes to a stop. This means an SiFa request started while braking may lead to a forced brake when standing as well.

The SiFa can be confirmed with a palm button (14) on the driver console or by using the space bar. Also, the SiFa can realistically be confirmed by a foot pedal (28). This is possible in the simulation, too: The pedal can be held down and briefly lifting the foot will confirm the SiFa request. Also, the simulation supports the use of a PC racing wheels pedal set to b used as a SiFa pedal.

More information under:

<http://www.trainteamberlin.de/forum/index.php?showtopic=1375>

It is possible to En- or Disable the SiFa during the simulation. This can be done b using the key combinations listed below or by switches on the wall-mounted console (52) behind the driver seat. En- Disabling only works while the train is stationary.

SiFa: confirm	Space
SiFa: confirm foot pedal	Shift + Space
SiFa: enable	CTRL + Space
SiFa: disable	CTRL+Shift + Space

Note: If SiFa is enabled or disabled by default when starting the simulation can be altered in the Settings. (check chapter “Configuration of the vehicle”)

"Fahrsperre" ATC system

The ATC system "Mechanische Fahrsperre" (translated: mechanical train stop) is the train protection system of the S-Bahn Berlin and is originated in the 1930s. Utilising mechanical rail stops located by main signals and able to switch their position depending on the signal state. If a signal aspect "stop" is ignored, information is mechanically transferred to the train and a force-braking manoeuvre is initiated.

This system is entirely implemented. If the "Fahrsperre" function is active, the corresponding indication light "Fahrsperre" (train stop) lights up permanently.

Passing signals showing "stop" aspect leads to forced braking and the indicator light "Fahrsperre" darkens. The force brake can only be released in a stationary condition. If the train is stationary, the Throttle/brake lever has to be moved into a neutral position. After doing so, the indicator light switch "Fahrsperre" (12) must be pressed and the indicator will light up again. In reality, this is a liability operational action that must be recorded in a written way and might lead to other actions – in the game this is not the case.

Furthermore, it can be necessary to pass an active "Fahrsperre" wayside element, for example when doing shunting moves. The related function of the train protection system is called "wanted pass" – to do this, the light indicated switch "Fahrsperre" (train stop) (12) needs to be pressed during normal operation: the light will turn off for 15 seconds and passing signals showing "stop" aspects is possible. After 15 seconds, the indicator will light up again and normal operation is re-established. Also, this is a liability operational action that must be recorded in a written way and might lead to other actions – in the game this is not the case here, too.

It is possible to disable or enable the train stop during the game. This can be done using the key combinations listed below or by pressing the corresponding button on the wall-mounted console behind the driver seat (51). Dis- and enabling only works in a stationary vehicle.

Light indicated switch „train stop"	Enter (Num)
Enable train stop	CTRL + Enter (Num)
Disable train stop	Shift + Enter (Num)

Note: The train stop can be toggled on or off in the settings menu, the off setting will cause it to be always off at the start of a new simulation. (check the chapter "Configuration of the vehicle" for more info)

Driver cabin door

The left and right driver cabin doors can be opened separately by the player. For this, the switches on the outer left and right side of the driver console can be used. (62) / (63). The switch for close will always close both doors (64). The shortcuts for the door controls are:

Open left driver cabin door	0
Close driver cabin doors	-
Open right driver cabin door	=

Please note: the driver cabin doors are locked using a finite force when opened. This means that the doors can close on their own when acceleration overrides the door locking force. This is implemented in the game as well.

Passenger doors

The passenger doors are implemented as close to the original controls as the Train Simulator allows. The doors can be controlled with the switches on the left side of the driver console (15) - (17).

- Doors can be opened when decelerating below the speed threshold of about 7km/h. The switch for opening the doors will force open the doors and they will open randomly.
- Closing the doors will only be successful if the passenger interchange is finished. There will be a warning signal after which the doors will slightly randomly close like in the original.
- In the background, a full monitoring system controls doors states. It can be followed using the indicator lights. This will also influence other systems. Open doors lock the traction force.
- If you still manage to accelerate beyond the speed threshold of 7km/h all the passenger doors will close automatically.

The Railworks internal passenger interchange (by pressing the T key) will also start by using the keys P and }. This will only work when the train is stationary though. If the doors are tried to be opened while the train is still moving the T key has to be pressed again after the train has become stationary. The well-known key "T" will still work, but just in stationary state and without letting the player choose the side to open.

Open all passenger doors on the right	P
Close all passenger doors	[
Open all passenger doors on the left]

Passenger interchange

A special feature is the particular detailed passenger interchange: A full train set can visually be packed with up to 1000 passengers, of which a lot will be using the standing room. The simulation of that many passengers required us to implement a completely new control system of the passenger currents which we have developed completely independent from the Railworks-internal standards.

To use this function, it is necessary to feed the vehicle with proper information before every stop of how many passengers will enter and leave the train. If this does not happen, default values will be used that are close to the Railworks-standard making the train slowly become more packed continuously.

During regular operation, there are no distinctive things to consider and no additional operational interactions to be undertaken to make the passenger interchange work as intended. For the use of the passenger simulation in your own scenarios, check the chapter: "Instructions for modders."

Departure modes

Basically this Add-on offers three methods of departure:

- Departure via Signal Zp9 / Zp10
- Departure via station personnel (Radio)
- Self clearance by ZAT-Departure

The scripting system allows displaying detailed information about the three departure modes if needed by pressing the F10 key. This Info-Box can only be displayed when the creator of the current scenario has set this up beforehand. The implementation into the game is explained in the chapter "Instructions for modders." Usually each station uses a predefined departure method so that route knowledge makes the F10 superfluous. Over the course of time, the departure methods have changed at each station, also depending on special operational conditions the departure method can be changed.

In the following the three departure methods will be explained in detail:

Departure with the Zp9 mode

With this mode, the station supervision personnel will control the passenger interchange and carry out appropriate announcements ("Please enter the train; "please stand back" for the passengers on the platform, they will also tell the driver when the doors might be closed, and departure can be initiated via two trackside signal indicator lights. Those signals are on an additional display mounted to the regular departure display.

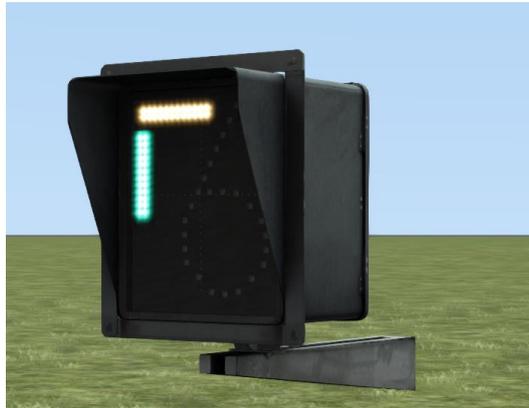


Image: Additional display showing the signal Zp10 ("close doors", white) and Zp9 ("depart", green). It is usually mounted below the main display.

If the station supervision personnel have finished the passenger interchange, it will trigger the Zp10 signal: a horizontal, white strip appears. This is the signal to close the doors. When the doors are closed, the supervision will confirm that nobody is stuck in a door and nothing else is in the way of a safe departure. If that is the case, the Zp9 signal will be triggered and a vertical green strip appears on the display: The signal to depart.

Departure via Radio-Modus

This mode also features station supervision. Like within the Zp9 mode the supervision will carry out the announcements ("Please enter the train"; "please stand back") for the passengers on the platform. The clearance for closing the doors and departure will be done using a radio connection. The passenger announcements will be audible during and after the passenger interchange process in the outside perspectives. After the announcement "Zurückbleiben bitte" (please stand back) the supervision will check the doors and then get into contact with the driver. Those radio calls are only audible in inside views and depending on IBIS setting may contain the train identification: "Zug Paula nach Wannsee Türen schließen (Train "Paula" heading Wannsee: close the doors). After that, the supervision will check if all the doors are closed make sure, that nobody is stuck in a door and nothing else is in the way of a safe departure. They will get into contact with the driver again: "Zug Paula nach Wannsee abfahren." (Train "Paula" heading Wannsee: depart). Thereby the train is cleared for departure.

Departure by ZAT-Modus

ZAT is a shortcut for "Zugabfertigung durch den Triebfahrzeugführer" (Clearance by driver) and has been introduced in the 2000s during the economisation process. The whole process of clearance for departure is done by the driver himself. Stations using the ZAT method are easily recognizable by a black and white ZAT sign (see image below). It is possible that a station has a foldable ZAT sign because at daytime, the station is a Zp9 station and during nighttime, it is a ZAT station.



Image: ZAT sign on the platform to signal the departure method.

In the game a ZAT departure works like this:

- Door clearance left (15) / right (17) (Keys P / })
- Driver cabin door left (25, 62) / right (27, 63) open (Keys 0 / =)
- Stand up from the driver seat and enter the platform (Arrow keys left / right)
- Announce „please enter the train“ using the corded microphone (60) (Key ')
- Monitor passenger interchange
- Announce „please stand back“ (60), when passenger interchange has finished (Key ')
- If necessary repeat the announcement (60) to stand back (Key ')
- Close passenger doors (16) (Key [)
- Enter the driver cabin (Arrow keys left / right)
- Close the driver cabin doors (26, 64) (Key -)
- Depart.

Further notes (partly for modders):

- the ZAT sign is available as scenery object in the scenario editor and can be placed on any station on a new scenario.

- the announcement system is built generically and can be extended by the modder. A so-called "Stimmenpaket" (voice pack) consists of two playlists using the .xml file format and a set of announcement audio files using the .ogg file format. One voice pack is pre-installed. If need arises new voice packs can be created or added from an external source.

- at the start of the game a random voice pack will be chosen and activated for the entire simulation/scenario and be used for the ZAT announcements.

Mirrors

Mirrors allow the driver to see if the passenger interchange has been finished from inside the driver cabin and that nobody is stuck in a door. Unfortunately, the Train Simulator does not possess a fitting 3d-shader for mirrors; they cannot be made actually reflecting anything. Regardless, we have animated them to behave as they do in reality.

- By opening the passenger doors, the mirror will be extended while the vehicle is stationary.
- When accelerating the mirrors will be retracted once, the speed threshold of 10km/h has been exceeded.
- When changing the driver cabin, the mirror of the former cabin will be retracted while the mirror of the new cabin will be extended if the passenger doors are open while the cabin is being changed.

A manual control of the mirrors is not possible.

Sander

The sanding device can be used to increase the rolling friction at the wheel-rail contact. During manual operation, the sanding process also works when the train is stationary. For this the switch “sander” (key X) can be used, conditions for the sander to work are:

- Enabled battery switch
- Unlocked driver console
- Reverser state not neutral

The sanding device has a limited supply of sand – if it is empty, information is displayed in the game and the sanding device can no longer be used. An empty sand reservoir will set the maximum speed to 60 km/h.

Also, the vehicle has an automatic sanding mode. It will be activated during the ride if the skid and slip protection is active and when a quick- or emergency braking manoeuvre has to be undertaken.

The fill status of the sand tank is set in the options file or by overriding scenario settings (for example to force an empty sand reservoir). For more information, check the chapters “Configuration of the vehicle” and “Instructions for modders”.

3rd rail gap

Realising power supply with a 3rd rail on the side is a specialty itself. The design applied at the S-Bahn Berlin is a one of a kind. Out of technical reasons, short parts of the routes have to be passed without a 3rd rail (mostly when passing switches); this influences regular operation.

The implementation of the class 481 has its own functionality module to recognize and simulate gaps in the 3rd rail. Passing those gaps have the following effects:

- The characteristic noise of (dis-)mounting of the pantograph
- During single (dis-)mounting processes a visible and audible rip spark occurs. The probability of a spark happening can be set up in the configuration file (check the chapter "Configuration of the vehicle").

If there is a whole quarter train (two rigid connected wagons) in a 3rd rail gap it cannot be connected to the electric supply. The traction force and the dynamic brakes force are zeroed for this quarter train until it reconnects to the 3rd rail. Whether the currently active quarter train is in a gap or not is indicated by the indicator light "Fahrspannung" (9) (operational voltage).

The implementation in the game is done by signal triggers. On the route "S25 Südast" all, the necessary triggers are already set. For scenarios on different routes, please check the chapter Instructions for modders."

Sun shade

The sunshade can be pulled down and up at any time. To pull it down, just "grip" the lower part of it using the mouse and pull it down or hold the Y key. It is a blind with a latching function. To pull it up again, pull at the cord with the mouse or press the Shift+Y keys for as long as the desired position is reached.

Interior view

The vehicle has a detailed interior view from the perspective of the passengers (5 key) with special features:

- Multiple seating positions are selectable
- Static running PIS dot matrix text as soon as the battery switch is enabled
- PIS-Station announcements are audible
- Animated passenger doors incl. side selective doors, door signal lights and signal sound
- Controllable interior lights incl. flickering
- Passenger simulation is also visible in passenger view

Terminal and error list

The terminal is enabled or disabled by the battery main switch (55). The hardkeys on the top left (43/44) switch between the operational view and IBIS-Base screen. The terminal offers the following information:

- In-Game time (top left)
- Current train enumeration/recognized train set incl. vehicle number (top right)
- Current error list (middle, only operational screen)
- Icon, if the vehicle is provided with current (bottom right)
- Icon, if the interior lighting is turned on (bottom right)
- Icon, if the spring accumulator brakes are engaged (bottom right)
- Info box displaying current IBIS-Data (bottom left)
- Grid for effective allocation of the soft keys (31-40) (line below)

The terminal screen brightness can be set in 6 steps using the hard keys (41/42) on the left side. A few seconds after the last input the screen will turn a bit darker and then turns fully dark.

Train enumeration and error data are displayed with a 4 digit code, the first digit means:

- 1 = class 481
- 2 = class 482
- S = collective message

And the following three digits for the order number of the quarter train. In the train enumeration display, the "Master"-quarter train (the one with the active driver cabin) has a black background, the others are classified as "slave".

Failure simulation

All of the failures listed in the terminal do not influence operation and are currently to be seen as a gimmick.

The failure list can be scrolled through using the hard keys on the right side (46/47), if the list contains more than three entries ("Weitere Einträge vorhanden" = "more entries present" will be displayed on the screen)

At the beginning of the game a random failure list already exists and as the game continues, some might randomly be added. Further, more failures can be added using the script-trigger "TTB Trigger Terminal Next Failure" (check chapter "Instructions for modders" for more information).

IBIS

The „Integrated on-Board Information System“ (IBIS) is also controlled via the terminal and the IBIS itself controls the destination display and the announcements. On the IBIS base screen (check chapter Terminal) you can select the following options using the soft keys:

- Line
- Tour
- Start (station)
- Destination (station)

The choice of the tour influences the categorisation to a train group as well as the possibility to load a tour list (check below)

It is initially possible to set up freely a destination display without using the passenger information system (PIS) at all. The following combinations are possible:

- Line 0 / tour 0 / destination (Destination code + 300) => changing text "Pendelverkehr" (shuttle traffic) / "<destination code>"
- Line 0 / tour 0 / Destination > 900 => Display of special destinations (check list)
- Line x / tour 0 / Destination <300 => free choice of line/destination combinations without PIS.
- Line x / tour between 87 and 99 / destination < 300 => reserve tour numbers, free choice of line/destination combinations without PIS.

The selectable destination codes to switch to a station name are listed in the appendix. You can also find possible line numbers, train groups and special destinations with their corresponding codes in the appendix.

It is generally possible to switch the destination to an empty display using the corresponding soft key on the terminal. The empty display only contains the line number but no longer the destination. When using a tour list, the announcement of the final destination will automatically trigger the empty display, which can be corrected manually.

It is also possible to load a tour list, those combine:

- Line number
- Tour number
- Associated train group
- Line profile incl. information about passed stations (possibly only one way)

They are located in the folder "Assets\TrainTeamBerlin\TTB_BR481\Scripts\IBIS". Naming is done by the pattern: "TTB_IBIS_S<Line number>_<tour number>.lua" Those tour lists can be edited and extended considering the data in this manual. Also, consider that editing the tour lists requires editing of the corresponding announcement playlist.

Furthermore it's possible to priority-load altered IBIS tour lists with existing line-tour-combinations from a scenario folder (subfolder "IBIS" in a scenario folder) instead of loading them from the global database. They are ONLY valid for the scenario itself and will be loaded as a priority.

For using the priority load functionality, you have to mark the scenario folder in the scenario by using the trigger "TTB Trigger Set scenario folder". Write the GUID-combination „<route folder>,<scenario folder>" in the right text field of the signal flyout.

Loading a list in the game can be done by the input of the associated combination of line and tour numbers into the IBIS. If the correct tour list is correctly loaded, it is only possible to enter start and destination codes following the relation from the tour profile. Also on the IBIS, base screen the train group will be displayed if the tour list has successfully been loaded. Normally the IBIS-Inputs belonging to a scenario will be displayed in the F10 window.

The fulfilled condition of a successfully loaded tour list enables the „Fahrgastinformationssystem" ("FGI", "PIS" in English) to be started using the softkey (31) (bottom left). Announcements will be played if the PIS are active. If the PIS is disabled, the automatic station switching in the rolling band display will be still active but no audible announcements will be present.

Station forwarding can be done manually (silently) in both directions. The automatic forwarding function including the next announcement is done via a wayside trigger installed on the route. These can be permanently installed on the route (as it is the case on the delivered "S25 Südast" route) or they have to be manually placed in the scenario editor – in this case, use the "TTB Trigger FGI Next Station" and place it on the track where the station forwarding is supposed to happen. The announcements are played corresponding to the linked playlist of the tour list. If the final destination is reached, the suitable announcement to ("leave the train") is played automatically. Station announcements are only audible within the train.

Prefab tour lists that are included with the add-on are:

Linie	Zuggruppe	Umläufe	Relation
S1	P - Paula	1 - 19	Potsdam Hbf - Wannsee - Oranienburg
S1	P I - Panther	51 - 69	Potsdam Hbf - Wannsee - Oranienburg
S1	P II - Pastor	31 - 39	Potsdam Hbf - Wannsee - Oranienburg
S1	P III - Pelikan	71 - 79	Potsdam Hbf - Wannsee - Oranienburg
S1	Keine o. Reserve	20 - 30, 40 - 50, 70, 80 - 99	Potsdam Hbf - Wannsee - Oranienburg
S15	P III - Pelikan	1 - 9	Südkreuz - Potsd. Platz - Hbf - Waidmannslust
S15	P II - Pastor	31 - 39	Südkreuz - Potsd. Platz - Hbf - Waidmannslust
S15	Keine o. Reserve	10 - 30, 40 - 99	Südkreuz - Potsd. Platz - Hbf - Waidmannslust
S2	W - Wulf	1 - 19	(Rangsdorf -) Blankenfelde - Bernau
S2	W I - Wespe	51 - 69	(Rangsdorf -) Blankenfelde - Bernau
S2	W II - Wilhelm	31 - 39	(Rangsdorf -) Blankenfelde - Bernau
S2	W III - Weichsel	71 - 79	(Rangsdorf -) Blankenfelde - Bernau
S2	Keine o. Reserve	20 - 30, 40 - 50, 70, 80 - 99	(Rangsdorf -) Blankenfelde - Bernau
S25	V - Viktor	1 - 9	Teltow Stadt - Hennigsdorf
S25	V I - Vampir	31 - 39	Teltow Stadt - Hennigsdorf
S25	Keine o. Reserve	10 - 30, 40 - 99	Teltow Stadt - Hennigsdorf
S26	L - Ludwig	1 - 9	Teltow Stadt - Waidmannslust
S26	V I - Vampir	31 - 39	Teltow Stadt - Waidmannslust
S26	L I - Lerche	51 - 59	Teltow Stadt - Waidmannslust
S26	Keine o. Reserve	10 - 30, 40 - 50, 60 - 99	Teltow Stadt - Waidmannslust
S3	B - Berta	1 - 19	Erkner - Spandau (- Falkensee)
S3	B I - Bussard	51 - 59	Erkner - Spandau (- Falkensee)
S3	B II - Benno	31 - 39	Erkner - Spandau (- Falkensee)
S3	Keine o. Reserve	20 - 30, 40 - 50, 60 - 99	Erkner - Spandau (- Falkensee)
S31	B - Berta	1 - 19	Erkner - Spandau (- Falkensee) („S3X“)
S31	B I - Bussard	51 - 59	Erkner - Spandau (- Falkensee) („S3X“)
S31	B II - Benno	31 - 39	Erkner - Spandau (- Falkensee) („S3X“)
S31	Keine o. Reserve	20 - 30, 40 - 50, 60 - 99	Erkner - Spandau (- Falkensee) („S3X“)
S4	A - Anton	1 - 9	Westhafen - Südring - Gesundbrunnen
S4	A I - Adler	51 - 59	Westhafen - Südring - Gesundbrunnen
S4	A II - August	31 - 39	Westhafen - Südring - Gesundbrunnen
S4	A III - Amsel	71 - 79	Westhafen - Südring - Gesundbrunnen

S4	Keine o. Reserve	10- 30, 40- 50, 60 – 70, 80 – 99	Westhafen - Südring - Gesundbrunnen
S41	A - Anton	1 – 9	Ring im Uhrzeigersinn
S41	A I - Adler	51 – 59	Ring im Uhrzeigersinn
S41	A II - August	31 – 39	Ring im Uhrzeigersinn
S41	A III - Amsel	71 – 79	Ring im Uhrzeigersinn
S41	Keine o. Reserve	10- 30, 40- 50, 60 – 70, 80 – 99	Ring im Uhrzeigersinn
S42	R - Richard	1 – 9	Ring gegen Uhrzeigersinn
S42	R I - Reiher	51 – 59	Ring gegen Uhrzeigersinn
S42	R II - Rudolf	31 – 39	Ring gegen Uhrzeigersinn
S42	R III - Regine	71 – 79	Ring gegen Uhrzeigersinn
S42	Keine o. Reserve	10- 30, 40- 50, 60 – 70, 80 – 99	Ring gegen Uhrzeigersinn
S45	U - Ulrich	1 - 9	Gesundbrunnen - Bundesplatz – Flugh. BER
S45	U - Uhu	51 - 59	Gesundbrunnen - Bundesplatz – Flugh. BER
S45	Keine o. Reserve	10 – 50, 60 - 99	Gesundbrunnen - Bundesplatz – Flugh. BER
S46	D - Dora	1 – 9	Gesundbr. - Westend - Königs Wusterhausen
S46	D I - Delphin	51 – 59	Gesundbr. - Westend - Königs Wusterhausen
S46	D II - Dietrich	61 – 69	Gesundbr. - Westend - Königs Wusterhausen
S46	Keine o. Reserve	10-50, 60, 70-99	Gesundbr. - Westend - Königs Wusterhausen
S47	K - Konrad	1 – 9	Gesundbr. – Hermannstraße - Spindlersfeld
S47	K I - Kondor	51 – 59	Gesundbr. – Hermannstraße - Spindlersfeld
S47	Keine o. Reserve	10 – 50, 60 – 99	Gesundbr. – Hermannstraße - Spindlersfeld
S5	E - Emil	1 - 19	Strausberg Nord – Spandau (- Falkensee)
S5	E I - Elster	51 - 69	Strausberg Nord – Spandau (- Falkensee)
S5	E II - Eiche	31 – 39	Strausberg Nord – Spandau (- Falkensee)
S5	E III - Erna	71 – 79	Strausberg Nord – Spandau (- Falkensee)
S5	S - Sirius	81 – 85	Strausberg Nord – Spandau (- Falkensee)
S5	E - Emil	20 – 30, 40 – 50, 70, 80, 86 – 99	Strausberg Nord – Spandau (- Falkensee)
S6	K - Konrad	1 – 9	Südkreuz – Potsd. Platz – Hbf – Jungfernheide
S6	K I - Kondor	31 – 39	Südkreuz – Potsd. Platz – Hbf – Jungfernheide
S6	Keine o. Reserve	10 – 30, 40 – 99	Südkreuz – Potsd. Platz – Hbf – Jungfernheide
S7	O - Otto	1 - 19	Potsdam Hbf - Ahrensfelde
S7	O I - Olaf	51 – 69	Potsdam Hbf - Ahrensfelde
S7	O II - Olive	31 – 39	Potsdam Hbf - Ahrensfelde
S7	Keine o. Reserve	20 – 30, 40 – 50, 70 – 99	Potsdam Hbf - Ahrensfelde
S75	T - Theodor	1 – 9	Wartenberg – Spandau (- Falkensee)

**TS2020 – Class 481**

S75	T I - Tapir	51 – 59	Wartenberg – Spandau (- Falkensee)
S75	Keine o. Reserve	10 – 50, 60 – 99	Wartenberg – Spandau (- Falkensee)
S8	N - Nordpol	1 – 9	Wildau – Birkenwerder
S8	N I - Neiße	51 – 59	Wildau – Birkenwerder
S8	N II - Natter	31 – 39	Wildau – Birkenwerder
S8	Keine o. Reserve	10 – 30, 40 – 50, 60 – 99	Wildau – Birkenwerder
S85	N I - Neiße	1 – 9	Grünau - Waidmannslust
S85	Keine o. Reserve	10 – 99	Grünau - Waidmannslust
S86	N II - Natter	1 – 9	Grünau – Buch
S86	Keine o. Reserve	10 – 99	Grünau – Buch
S9	C - Cäsar	1 – 9	BER - Warschauer Str. - Spandau (- Falkensee)
S9	C I - Celsius	51 – 59	Flughafen BER – Pankow - Blankenburg
S9	C - Cäsar	31 – 39	BER - Warschauer Str. - Spandau (- Falkensee)
S9	Keine o. Reserve	10 – 30, 40 – 50, 60 – 99	BER - Warschauer Str. - Spandau (- Falkensee)

Italic: Contains future or (half)imaginary line routes.

Configuration of the Vehicle

The modules of the scripting system for the class 481 offer the opportunity to set many options by the player. That means, every user can customise their vehicle to his/her liking – where it serves the fun factor, even outside of realistic boundaries. ☺

The customisation happens in the settings file **TTB_BR481_Options.lua**, which can be found in the folder:

```
..\railworks\Assets\TrainTeamBerlin\TTB_BR481\Scripts\Options
```

In this file all pre-sets are done. Every setting is explained within the file itself and the range of possible values is specified.

- At first, the language can be chosen under **options.LANGUAGE** : Log-outputs (live in game and log-files) are influenced by this option. The languages German ("GERMAN") and English ("ENGLISH") are pre-installed. You can also create and integrate your own language files (check the chapter „Instructions for modders“ for more information).
- The option **options.DEBUG_MODE** manages the mode of debug outputs - it is irrelevant for regular operation.
- Furthermore, the Log mode can be set up using **options.LOG_MODE** field. It is possible not to generate any log output, outputs that are only visible in game and outputs that are visible in game and in a separate file as well. Output files can be found in the folder:

```
..\railworks\Assets\TrainTeamBerlin\TTB_BR481\Scripts\Logs
```

and are saved with the naming pattern: TTB_<vehicle number>_Log.txt. There will be a new log file for each vehicle. In the event of functional or operational errors, you can use the log files for tracing which operations caused it or where you can start to look for an approach to solving the issue. Therefore, it can be helpful to add the log file to support requests (especially the file of the active driver cabin). All log files will be deleted when starting a new game.

- Setting **options.SIFA_MODE** defines if the SiFa is enabled or disabled by default at the start of the game. It can be enabled or disabled in game independent of this pre set.
- The setting **options.FAHRSPERRE_MODE** defines if the "Fahrsperr" ATC system is enabled or disabled by default at the start of a new game. It can be enabled or disabled in game independent of this pre set.
- The option **options.SANDER_RESERVOIR** defines the contents of the sand reservoir in a regular case. The setting is to be understood as remaining seconds of usage and can be set to any number between 0 and 9999. If a scenario pre-sets a value, this setting will be temporarily overwritten.
- The parameter **options.SPARK_PROBABILITY** influences the probability of a rip spark when (dis)mounting the pantograph in a 3rd rail a gap. Values between 1 and 0 are accepted. If the pre-set is 1, a spark will always happen and 0 will never cause a spark. When choosing a value between 0 and 1, mind that the pre-set is used for calculating the probability for each singular vehicle. The probability for a full train set (8 vehicles) will be significantly higher than defined.

- The value `options.BRAKE_SQUEAL_PROBABILITY` defines how often you will hear the brakes squeal. Values between 0 and 1 are accepted. Next to this setting value, other factors like weather, season and if the pneumatic brakes are, even used influence the brake squeal probability. In a humid environment, a train with disabled engine (so it uses the pneumatic brakes with higher priority) will squeal with a higher probability. This option value will be used to the calculation within those external boundaries.
- The option `options.REGULATOR_NOTCHED` influences the throttle- and brake lever and describes if it automatically falls back to zero when the throttle is engaged if it has not been notched at full tractive force state. The values 0 and 1 are accepted. Commendable would be the setting 1 (enabled), but according to personal preference, you can use 0 for disabling the functionality. Zeroing this option can be helpful if a hardware controller like the rail driver or a joystick with throttle lever is connected.

Final notes / FAQ.

Here you can find further helpful clues and notes that can be important for a smooth and error free operation of the vehicle.

AI traffic

TrainTeamBerlin follows a strict separation of vehicles meant for player control and those who are supposed to be used **only** by the AI in the course of a scenario. (“AI Traffic”, “AI” as abbreviation of “Artificial Intelligence”)

The well-equipped player vehicle is resource hungry and not equipped for mass use in AI traffic schemes. We strongly advise to use the included, modified AI variants of our vehicles to be used in the scenario editor for setting up AI train sets. Those are specially made for AI use in larger numbers and at the same time to preserve PC-hardware resources. This manual contains further notes and clues as these AI train sets can be easily configured. (for example destination displays)

Control mode

The present vehicle is fit to operate within the boundaries of the simulation platform „Railworks“ and to deliver an as realistic as possible simulation of the larger original. It is therefore **not intended** to be controlled in the simple control mode (HUD, Keys, and F3/F4).

It is possible to disable many of the new, complex functions for an easy and pure fun operation, regardless, this should always happen in the **expert controls** mode.

Saving a scenario/rolling start

The present vehicle is not meant to save scenarios. It is generally possible to use the save function but the context of the scripts that are running in the background will very likely not fit the status saved in game. Operational errors and at least weird behaviour of single systems is to be expected, the same is to be expected for the “rolling start” function.

Because the scenarios using this vehicle have a defined length, this should not be a large problem.

Changing the driver cabin

When changing the driver cabin, nothing special has been considered. The second, newly entered cabin must be set up partially again but in the sense of realism, it is recommended to lock the driver console and put the keys into the backpack.

Creating scenarios

As presented in the manual, the class 481 has numerous extra functions that were programmed and need special care when creating your own scenario. Many of those functions are controlled by triggers that are explained in each sub chapter. The included route "S25 Südast" minimises the effort of setting up triggers, because they are already set up (as far as useful for scenarios). It is possible that further scenario-templates are going to be released for other routes. It is recommended to check in on www.trainteam.berlin to stay informed as needed.

Vehicle versions

It was necessary to create several vehicle versions for each livery due to program internal reasons. These vehicle versions are used in dependency of the length of the player trainset length. Each vehicle has a name suffix - the "2/4" vehicles are used for consists of two quarter trains (4 vehicles), "3/4" for three quarter trainsets (6 vehicles) and "4/4" for full length trainsets (8 cars). This specialty is already implemented for the scenarios and preload consists (that can be used in "Quick Drives") delivered within this addon. Please pay attention to this circumstance when creating your own scenarios and preload consists.

FAQ: Should further questions arise, also consider reading the current findings and insights in the support forums under <http://www.trainteam.berlin/forum>. Also, relevant findings will be added to the FAQ under <https://www.trainteamberlin-shop.de/en/rw-vehicles/s-bahn-class-481>.

Other (AI) Vehicles

The vehicles presented in the following are meant to be AI vehicles for the AI traffic schemes in scenarios. The locomotives are not equipped to be controlled by the player, the wagons however can be operated by the player but possess limited functionality.

Class 114/143



- Activation folder in scenario editor: **GermanRailroadsRW \ Rollmaterial**
- Set with 5 locomotives of the classes 114 and 143 with original sound.
- automatic raising pantograph:
 - normal: back pantograph
 - first Locomotive of double traction: front pantograph
 - flagged as damaged: both pantographs down

- included versions:

- 114 015	traffic red, DB Regio, destination display
- 143 344	MEG, red
- 143 589	traffic red, DB Regio, no destination display
- 143 877	traffic red, DB Regio, destination display
- 143 911	RBH, blue/silver

- destination display (pixel exact original) can be set up using DynamicNumbering
 - Wagon number contains a letter that predefines a destination display
 - available displays: (next page)

A	RE5 Falkenberg (Elster)	K	RE4 Luckenwalde
B	RE5 Lutherstadt Wittenberg	L	RE4 Ludwigsfelde
C	RE5 Rostock	M	RE4 Jüterbog
D	RE5 Stralsund	N	RE4 Wismar
E	RE5 Neubrandenburg	O	RE4 Wittenberge
F	RE5 Jüterbog	P	RE4 Lutherstadt Wittenberg
G	RE5 Halle (Saale)	Q	RE4 Falkenberg (Elster)
H	RE5 Berlin Gesundbrunnen	R	RE4 Rathenow
I	RE5 Berlin Südkreuz	S	RE4 Stendal
J	RE5 Berlin Hbf	T	RE4 Schwerin Hbf
		U	RE4 Berlin-Spandau
		V	RE4 Berlin Hbf
		W	RE4 Berlin Südkreuz
X	RE3 Stralsund Hbf	e	RE9 Berlin Schönefeld Flughafen
Y	RE3 Schwedt	f	RE9 Flughafen Berlin-Brandenburg BER
Z	RE3 Elsterwerda	g	RE9 Berlin Südkreuz
a	RE3 Wünsdorf-Waldstadt	h	RE9 Berlin Hbf
b	RE3 Berlin Gesundbrunnen		
c	RE3 Berlin Südkreuz		
d	RE3 Berlin Hbf		
i	RE7 Belzig	n	RB22 Michendorf
j	RE7 Berlin Ostbahnhof	o	RB22 Potsdam Hbf
k	RE7 Berlin Wannsee	p	RB22 Berlin Schönefeld
l	RE7 Dessau	q	RB Lutherstadt Wittenberg
m	RE7 Wünsdorf Waldstadt	r	RB Leipzig Hbf
t	Nicht einsteigen (do not enter)	s	RB Bitterfeld
u	Ersatzzug (replacement train)		
v	[leeres Zuglaufschild] [empty display]		

Class 475



- Activation folder in scenario editor: **TrainTeamBerlin \ TTB_BR475_KI**
- Modernized class 475 (ex-BVG) in its last state of service as well as a decorated Christmas train. (preload consists are available)
- Original sound
- Passenger doors are closing minimally out of sync like the original ones, leading to the characteristic door close sound (after closing the doors a further holding of 6-8 seconds is recommended)
- The Christmas train has 4 digits at the end of the vehicle number, for example: 475_001-2_2012 - the last 4 digits show a year number that is defined by using four numbers.
- Also, the stock train uses parts of the vehicle number (DynamicNumbering) to control visual parts. The pattern follows **475_001-2_aabc** with
 - aa = tour number
 - b = line
 - c = destination
- Tour numbers (aa) can be formed using the digits 0-9,
 - "_" creates an empty sign
- usable line codes ("b") are:

S1	!	S5	%
S2	"	S6	&
S25	+	S7	/
S26	-	S75	*
S3	§	S8	(
S4	\$	S9)
S45	#	S10	=
S46	~		

→ the available destination codes are like the already assigned class 480 & 481 destination codes:

a	Oranienburg	z	Ring via Westkreuz
b	Frohnau	A	Papestraße
c	Potsdam Stadt	B	Bundesplatz
d	Wannsee	C	Flughafen Schönefeld
e	Bernau	D	Westend
f	Buch	E	Königs Wusterhausen
g	Blankenfelde	F	Hermanstraße
h	Lichtenrade	G	Spindlersfeld
i	Priesterweg	H	Schöneweide
j	Papestraße	I	Rathaus Spandau
k	Potsdamer Platz	J	Mahlsdorf
l	Teltow	K	Hoppegarten
m	Lichterfelde Süd	L	Strausberg
n	Lichterfelde Ost	M	Strausberg Nord
o	Priesterweg	N	Potsdam Stadt
p	Papestraße	O	Ahrensfelde
q	Potsdamer Platz	P	Westkreuz
r	Nordbahnhof	Q	Wartenberg
s	Gesundbrunnen	R	Birkenwerder
t	Schönholz	S	Zeuthen
u	Tegel	T	Grünau
v	Hennigsdorf	U	Waidmannslust
w	Erkner	V	Grünau
x	Hauptbahnhof	W	Pankow
y	Ring via Ostkreuz	X	Flughafen Schönefeld

→ You can force a wagon to be empty (no passengers) by adding the parameter “_PASS=0” to the vehicle number. Adding the parameter to one vehicle will force the whole consist to be empty.

Because of separated line and destination codes, some destinations are displayed twice. The visuals are exactly like the destination display used in the 1990s.

Class 480



- Activation folder in scenario editor: **TrainTeamBerlin \ TTB_BR480_KI**
- 1st and 2nd series vehicles available (with preload consists for each)
- sounds like the original
- Passenger doors are closing minimally out of sync like the original ones leading to the characteristic door close sound (after closing the doors a further holding of 6-8 seconds is recommended)
- Automatic animation of the mirror during passenger interchange.
- Driver cabin door opens and closes automatically to simulate ZAT-departure.
- You can force a wagon to be empty (no passengers) by adding the parameter “_PASS=0” to the vehicle number. Adding the parameter to one vehicle will force the whole consist to be empty.
- Destination display can be set up via DynamicNumbering
 - wagon number contains a letter to pre set a destination on the display:

a	S1 Oranienburg	r	S25 Nordbahnhof	I	S5 Spandau
b	S1 Frohnau	s	S25 Gesundbrunnen	J	S5 Mahlsdorf
c	S1 Potsdam Hbf	t	S25 Schönholz	K	S5 Hoppegarten
d	S1 Wannsee	u	S25 Tegel	L	S5 Strausberg
e	S2 Bernau	v	S25 Hennigsdorf	M	S5 Strausberg Nord
f	S2 Buch	w	S3 Erkner	N	S7 Potsdam Hbf.
g	S2 Blankenfelde	x	S3 Ostbahnhof	O	S7 Ahrensfelde
h	S2 Lichtenrade	y	S41 Ring	P	S75 Westkreuz
i	S2 Priesterweg	z	S42 Ring	Q	S75 Wartenberg
j	S2 Südkreuz	A	S45 Südkreuz	R	S8 Birkenwerder
k	S2 Potsdamer Platz	B	S45 Bundesplatz	S	S8 Zeuthen
l	S25 Teltow Stadt	C	S45 Flughafen Schönefeld	T	S8 Grünau
m	S25 Lichterfelde Süd	D	S46 Westend	U	S85 Waidmannslust
n	S25 Lichterfelde Ost	E	S46 Königs Wusterhausen	V	S85 Grünau
o	S25 Priesterweg	F	S47 Herrmanstraße	W	S9 Pankow
p	S25 Südkreuz	G	S47 Spindlersfeld	X	S9 Flughafen Schönefeld
q	S25 Potsdamer Platz	H	S47 Schönevide		

Class 481



- Activation folder in scenario editor: **TrainTeamBerlin \ TTB_B-WT_KI-Verkehr**
- Train set of the Class 481 (S-Bahn Berlin) with original sound
- randomly opening/closing door, procedure inspired by ZAT-departure, incl. opening driver cabin doors.
- Varnish variations:
 - Traditional colours
 - Colouring like the first delivery ("Delivery paintwork")
 - Class 481-mod: modernized version from 2019
 - Advertisement "Club", black
 - Advertisement "DDR-Museum", blue-white (GDR-Museum)
 - Advertisement "Donuts", Pop-Decals
 - Advertisement "Football", blue
- Preload consists included
- The destination display has two modes:
 - a) classic pre-set via Dynamic Numbering
 - Train number contains a letter, determining the destination on display
 - possible display pre-sets are listed on the next page
 - b) Pre-set via vehicle parameter
 - made for complex cases that cant be solved using a)
 - add a command to the vehicle number
 - The command always possesses the format: "ZZA=XX,YYY" so a vehicle number may look like: "481_001-1a_ZZA=01,134" which displays as "S1 Friedenau".
 - XX depicts a line number (without S), include leading zeroes (S1 = 01)
 - YYY depicts the destination station, include leading zeroes
 - Line and destination codes are to be taken from the appendix of this manual
 - Possible input modes are:
 - Line 0 / destination (destination code + 300) => rotation display "Pendelverkehr" (shuttle traffic) / "< destination code>"
 - Line 0 / destination > 900 => display of special destinations (check appendix)
 - Line x / destination <300 => free choice of Line-/ destination combinations

Possible displays of the DynamicNumbering mode:

a	S1 Oranienburg	z	S42 Ring
b	S1 Frohnau	A	S45 Südkreuz
c	S1 Potsdam Hbf	B	S45 Bundesplatz
d	S1 Wannsee	C	S45 Flughafen Schönefeld
e	S2 Bernau	D	S46 Westend
f	S2 Buch	E	S46 Königs Wusterhausen
g	S2 Blankenfelde	F	S47 Herrmanstraße
h	S2 Lichtenrade	G	S47 Spindlersfeld
i	S2 Priesterweg	H	S47 Schöneweide
j	S2 Südkreuz	I	S5 Spandau
k	S2 Potsdamer Platz	J	S5 Mahlsdorf
l	S25 Teltow Stadt	K	S5 Hoppegarten
m	S25 Lichterfelde Süd	L	S5 Strausberg
n	S25 Lichterfelde Ost	M	S5 Strausberg Nord
o	S25 Priesterweg	N	S7 Potsdam Hbf.
p	S25 Südkreuz	O	S7 Ahrensfelde
q	S25 Potsdamer Platz	P	S75 Westkreuz
r	S25 Nordbahnhof	Q	S75 Wartenberg
s	S25 Gesundbrunnen	R	S8 Birkenwerder
t	S25 Schönholz	S	S8 Zeuthen
u	S25 Tegel	T	S8 Grünau
v	S25 Hennigsdorf	U	S85 Waidmannslust
w	S3 Erkner	V	S85 Grünau
x	S3 Ostbahnhof	W	S9 Pankow
y	S41 Ring	X	S9 Flughafen Schönefeld

→ You can force a wagon to be empty (no passengers) by adding the parameter “_PASS=0” to the vehicle number. Adding the parameter to one vehicle will force the whole consist to be empty.

Scenario Objects



→ Activation folder in scenario editor: **TrainTeamBerlin \ TTB_Scenarios (Objects)**
TrainTeamBerlin \ TTB_BR481 (Signals)

→ Set with numerous objects and equipment made for rail traffic
 → all objects are available in the scenario editor
 → Signals:

- Sh2 ("end of track") panel sign (with(out) mount for rail profiles)
- ZAT-sign
- Extra signal display to use the signals Zp9/Zp10

→ Construction objects

- Many objects used in construction for decorating temporary construction sites next to the route
- Using the „construction-rail-routes“ as „train sets“ that can be placed on rail tracks, present tracks can be hidden or flagged as “off limits.” Pre-set consists are available. There are a few sets of fences with and without gravel. Note: there are separate end pieces for the “train sets” which have to be manually set to the respective end.
- available regular decorative items for construction sites:

- | | |
|--|---------------------------------------|
| - Digger | - 2 different excavation-Container |
| - Bulldozer | - 2 different excavation-Container |
| - Steamroller | - Cable drum single and 4x on pallets |
| - Scaffolding | - Sand- and rubble piles |
| - Construction crane large and small | - foliated concrete parts |
| - concrete mixer, mobile on two wheels | - other accessories |

Scenarios

In this chapter, we would like to highlight some of the pre set scenario assignments. We will have a look over some base scenario data of each one and give clues that can be helpful to solve each assignment.

TTB BR481 01: Driving lesson

Vehicle: Class 481 traditional paintwork

Difficulty: easy

Season / weather: summer / clear

Time: 12:00

Duration: 0:25 hours

Description: You are in the terminal loop „Lichterfelde Süd“ in this tutorial you will learn step by step:

- how to start up the train*
- how to drive the train*
- how to switch the direction*
- how the passenger interchange and the three departure modes work*

Therefore, transfers ride to „Lichterfelde Ost“ will be undertaken with constant guidance. After the directional change in the other terminal loop, a passenger ride back to “Lichterfelde Süd” will be driven.

IBIS-Data Transfer ride:

Line number: 0

Tour: 0

Destination code: 993 (Test train)

Start code: --

IBIS-Data passenger ride:

Line number: 25

Tour: 3

Destination code: 85 (Lichterfelde Süd)

Start code: 86 (Lichterfelde Ost)



TTB BR481 02: Shuttle traffic

Vehicle: Class 481 traditional paintwork
 Difficulty: medium
 Season / weather: summer / clear
 Time: 21:41
 Duration: 0:40 hours

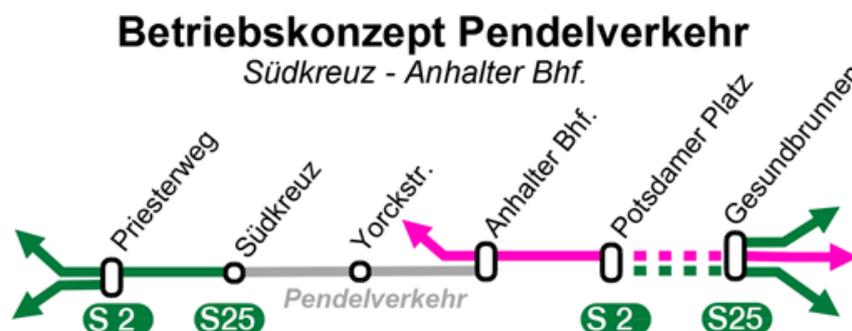
Attention: if you have problems concerning the exit signal of Anhalter Bahnhof so that the scenario ends: please deactivate the point "passing a red signal ends the scenario" in your game settings.

Description: Between Südkreuz and Anhalter Bahnhof, shuttle traffic ("Pendelverkehr") with a 20-Minute interval has been arranged. You will take over the commuting train this evening. Some operational specialties have to be considered:

- The shuttle train is locked in on a blocked rail track
- Signals showing „stop“ aspect can be ignored and have to be passed using „wanted pass“
- Switch areas and end-of-line stations have a speed limit of 40 km/h

You will ride the route between „Südkreuz“ and „Anhalter Bahnhof“ bidirectional twice. Please consider all operational hints given during the scenario and the changed departure methods on each station.

Südkreuz	after	21:43
Yorckstraße		21:46
Anhalter Bahnhof	21:51 -	21:53
Yorckstraße		21:55
Südkreuz	22:00 -	22:03
Yorckstraße		22:06
Anhalter Bahnhof	22:11 -	22:13
Yorckstraße		22:15
Südkreuz	at	22:20



IBIS-Data:

Line number: 0
 Tour: 0
 Destination code: 375 (shuttle mode: Anhalter Bhf) and 383 (shuttle mode: Südkreuz)
 Start code: --

TTB BR481 03: Out of sand in Winter

Vehicle: Class 481 traditional paintwork

Difficulty: medium

Season / weather: winter / snowy

Time: 10:35

Duration: 0:35 hours

Description: On one of the rare snowy days in Berlin, you take over the train between “Teltow Stadt” and „Potsdamer Platz.” Because the sand reservoir is empty, your top speed is set to 60km/h and your train is flagged as “to be replaced”. Will you be able to stay on schedule?

Teltow Stadt	after	10:36
Lichterfelde Süd		10:42
Osdorfer Straße		10:44
Lichterfelde Ost		10:46
Lankwitz		10:48
Südende		10:51
Priesterweg		10:54
Südkreuz		10:57
Yorckstraße		10:59
Anhalter Bahnhof		11:02
Potsdamer Platz	at	11:04

IBIS-Data:

Line number: 25

Tour: 12

Destination code: 74 (Potsdamer Platz)

Start code: 84 (Teltow Stadt)



TS2020 – Class 481

TTB BR481 04: Storm front

Vehicle: Class 481 traditional paintwork

Difficulty: hard

Season / weather: autumn / stormy

Time: 6:03 PM

Duration: 1:40 hours

Description: On a stormy day, you will take over one of the last reinforcement trains of the day in "Lichterfelde Süd." Shortly after the beginning, the effects of the storm become noticeable.

This scenario is especially long and complex because it covers many operational activities. On multiple occasions, the TAB-Key will be used. Signals using the added Zs1 signal (a white blinking light) can be passed without the TAB-Key or further activities. Always consider the text notifications and the announcements of the dispatcher.

[Spoiler!] You will be rapidly rearranged multiple times and have to take over short-haul rides between Teltow Stadt and Lichterfelde Ost/Lankwitz/Priesterweg.

Kehranlage		18:03
Lichterfelde Süd		18:08
Osdorfer Straße		18:10
Lichterfelde Ost		18:12
Kehranlage		18:15-18:18
Lichterfelde Ost		18:20 (+7)
Osdorfer Straße		18:23 (+7)
Lichterfelde Süd		18:25-28 (+10)
Teltow Stadt	at	18:31 (+10)
Teltow Stadt	after	18:35
Lichterfelde Süd		18:38
Osdorfer Straße		18:40
Lichterfelde Ost		18:42
Lankwitz	at	18:44
Lankwitz	after	18:51
Lichterfelde Ost		18:53
Osdorfer Straße		18:56
Lichterfelde Süd		18:58
Teltow Stadt	at	19:01
Teltow Stadt	after	19:05
Lichterfelde Süd		19:08
Osdorfer Straße		19:10
Lichterfelde Ost		19:12
Lankwitz		19:14
Südende		19:16
Priesterweg	at	19:19
Priesterweg	after	19:27

Südende		19:29
Lankwitz		19:31
Lichterfelde Ost		19:33
Osdorfer Straße		19:36
Lichterfelde Süd		19:38
Teltow Stadt	at	19:41

IBIS-Data:

IBIS-Data at the beginning:

Line number: 25
Tour: 8
Destination code: 85 (Lichterfelde Süd)
Start code: 74 (Potsdamer Platz)

IBIS-Data after Lichterfelde Ost:

Line number: 25
Tour: 8
Destination code: 84 (Teltow Stadt)
Start code: 86 (Lichterfelde Ost)

IBIS-Data after Teltow Stadt (1. turnaround):

Line number: 25
Tour: 8
Destination code: 154 (Lankwitz)
Start code: 84 (Teltow Stadt)

IBIS-Data after Lankwitz:

Line number: 25
Tour: 8
Destination code: 84 (Teltow Stadt)
Start code: 154 (Lankwitz)

IBIS-Data after Teltow Stadt (2. turnaround):

Line number: 25
Tour: 8
Destination code: 107 (Priesterweg)
Start code: 84 (Teltow Stadt)

IBIS-Data after Priesterweg:

Line number: 25
Tour: 8
Destination code: 84 (Teltow Stadt)
Start code: 107 (Priesterweg)

TTB BR481 05: Weight glider

Vehicle: Class 481 "Donuts"
 Difficulty: difficult
 Season / weather: autumn / rainy
 Time: 9:13
 Duration: 0:30 hours

Description: It is a typical autumn day when one of the quarter trains of your six wagon train set has a malfunctioning traction controller – you are going to have to deal with a weight glider. Try to stay on schedule as best you can despite the lowered tractive force. Your train is flagged for replacement. Therefore, move the train to another tour at "Lichterfelde Süd" and continue to "Teltow Stadt."

Potsdamer Platz	after	09:17
Anhalter Bahnhof		09:19
Yorckstraße		09:22
Südkreuz		09:24
Priesterweg		09:27
Südende		09:29
Lankwitz		09:31
Lichterfelde Ost		09:33
Osdorfer Straße		09:35
Lichterfelde Süd		09:39
Teltow Stadt	at	09:43

IBIS-Data in the beginning:

Line number: 25
 Tour: 8
 Destination code: 85 (Lichterfelde Süd) / 84 (Teltow Stadt)
 Start code: 74 (Potsdamer Platz)

IBIS-Data after Lichterfelde Süd:

Line number: 25
 Tour: 2
 Destination code: 84 (Teltow Stadt)
 Start code: 85 (Lichterfelde Süd)

TS2020 – Class 481

TTB BR481 06: Rush hour (almost) like back then

Vehicle: Class 481 "Delivery paintwork"

Difficulty: easy

Season / weather: summer / clear

Time: 16:57

Duration: 0:55 hours

Description: This scenario takes place in the year 2004: Traffic on the S25 is dominated by the Class 480 and while the "North-South-Mainline-Tunnel" is, still under construction and scheduled to be finished for the Football World Championship 2006... Let us take you on this time travel! You will take over your train in "Lichterfelde Süd" and drive it to "Potsdamer Platz", turn around in the local storage sidings and drive it back to "Lichterfelde Süd."

Lichterfelde Süd	after	17:00
Osdorfer Straße		17:02
Lichterfelde Ost		17:04
Lankwitz		17:07
Südende		17:09
Priesterweg		17:12
Südkreuz		17:14
Yorckstraße		17:17
Anhalter Bahnhof		11:20
Potsdamer Platz	at	11:22
Potsdamer Platz	after	17:27
Anhalter Bahnhof		17:29
Yorckstraße		17:32
Südkreuz		17:35
Priesterweg		17:38
Südende		17:40
Lankwitz		17:43
Lichterfelde Ost		17:45
Osdorfer Straße		17:48
Lichterfelde Süd	at	17:50

IBIS-Data Outward:

Line number: 25

Tour: 3

Destination code: 74 (Potsdamer Platz)

Start code: 85 (Lichterfelde Süd)

IBIS-Data Return:

Line number: 25

Tour: 3

Destination code: 85 (Lichterfelde Süd)

Start code: 74 (Potsdamer Platz)

TTB BR481 07: Early dispatch

Vehicle: Class 481 traditional paintwork

Difficulty: easy

Season / weather: summer / clear

Time: 5:45

Duration: 0:45 hours

Description: Early morning you get your train out of the storage sidings at „Anhalter Bahnhof“ and ride it to “Potsdamer Platz”. There you change the direction in the storage sidings and take over the passenger ride to “Teltow Stadt”.

Potsdamer Platz	after	05:57
Anhalter Bahnhof		05:59
Yorckstraße		06:02
Südkreuz		06:05
Priesterweg		06:08
Südende		06:10
Lankwitz		06:13
Lichterfelde Ost		06:15
Osdorfer Straße		06:18
Lichterfelde Süd		06:20
Teltow Stadt	at	06:23

IBIS-Data:

Line number: 0

Tour: 0

Destination code: 997 (Nicht einsteigen)

Start code: ---

After Potsdamer Platz:

Line number: 25

Tour: 8

Destination code: 84 (Teltow Stadt)

Start code: 74 (Potsdamer Platz)

TTB BR481 08: Last ride of the tour

Vehicle: Class 481 Advertisement "Adagio"

Difficulty: medium

Season / weather: autumn / rainy

Time: 20:14

Duration: 0:25 hours

Description: This Friday evening, you take over the last reinforcement ride of the day for the line S25, starting at „Potsdamer Platz“. Drive the train to "Lichterfelde Süd" and park it in the storage sideways.

Potsdamer Platz	at	20:17
Anhalter Bahnhof		20:19
Yorckstraße		20:22
Südkreuz		20:25
Priesterweg		20:28
Südende		20:30
Lankwitz		20:33
Lichterfelde Ost		20:35
Osdorfer Straße		20:38
Lichterfelde Süd		20:40

IBIS-Data in the beginning:

Line number: 25

Tour: 10

Destination code: 85 (Lichterfelde Süd)

Start code: 74 (Potsdamer Platz)

Instructions for modders

In the following paragraph, we would like to offer information and instruction to all users who like to be creative with the Train Simulator. This Add-on offers numerous interfaces to customise or extend the vehicle and to create special operational situations.

Implement custom language packs

Almost all script outputs (in game and in log file) are taken from a language file located in:

```
..\railworks\Assets\TrainTeamBerlin\TTB_BR481\Scripts\Language
```

At first, German and English language files are already included. Any user can add other language files without need for altering the scripting system.

The language selection is done with the setting file located in:

```
..\railworks\Assets\TrainTeamBerlin\TTB_BR481\Scripts\Options
```

In this file, other pre-sets can be set. Each of the options is also explained within the file.

- The language can be set by altering **options.LANGUAGE**. The pre-sets „GERMAN“ and „ENGLISH“ are available. If the user adds a custom pack, the file named <LANGUAGE>.lua (for example FRANCAIS.lua) has to be in the same folder. To activate the file, change the parameter in the options file to „<LANGUAGE>“ (for example “FRANCAIS”). Inaccurate integration of the language file (by a typing error or missing file) will lead to the „Language Unknown“-Error as in game output: „##LU##“. If single entries in an edited language file are missing, the „String Unknown“-error will be issued: „##SU##“.

Entering vehicle parameters

To add scenario specific properties to a vehicle during scenario creation a parameter can be added to the vehicle number. Multiple parameters can be added separating the inputs by underscores:

Example: 481_001-6_<Parameter1>_<Parameter2>

At the start of the game, the parameter information will be retrieved and the vehicle number will be automatically shortened so functions like DynamicNumbering with automatically generated vehicle numbers will still work. As a result, you will unfortunately not find a properly written number on the model in the scenario editor. Also, when entering a wagon number to scenario instructions, (for example "shunt") the vehicle number must be entered **WITHOUT** a parameter.

Set up a malfunctioning traction controller

To tell the vehicle that its drive controller is defect, enter the parameter "ASG=0" . Regularly a full quarter train will be disabled (two walkable fixed wagons). The vehicle number will become then:

481_001-6_ASG=0

Sand reservoir parameter

The filling of the sand reservoir at default game start can be altered using the setting *options.SANDER_RESERVOIR*. Unit is "time of usage in seconds".

To tell the vehicle a new filling that deviates from the default value, the parameter SANDERRES=X will be used, whereas X is the new usage duration in seconds. A new vehicle number might look like:

481_001-6_SANDERRES=50

Configuring passenger exchange at scenario start platform

The Parameter PASSNEXT=Txxx+yyy-zzz can be used for telling the master state vehicle (= vehicle with active cab) to set the passenger exchange configuration when starting the scenario. Please take details from the corresponding chapter **Implement a passenger interchange in custom scenarios**. The rail vehicle number might look like

481_001-6_PASSNEXT=T030+120-000

Controlling a vehicle via scenario script

It is possible to influence the vehicle using the scenario editor while making own scenarios. Examples might be the automatic start up, opening the driver cabin doors or triggering announcements/sounds (check further down for more info) In the folder:

..\railworks\TTB-Material\TTB_BR481\SzenarioSkript-Template

you can find a pre-set scenario script that already contains the base for adding the following possibilities. You are allowed to use and publish this one within freeware scenarios. To use the template, the files stated must be copied to your own scenario folder.

Auto start up via scenario script

The automatic start-up can be finished if desired by executing this scenario script line:

```
SysCall ( "PlayerEngine:SetControlValue", "AutoSetupByScript", 0, 1 );
```

(Function "BR481-AutoAufruersten" in the template-Script).

It is also possible to start a "quick start up" automatically where the train is fully set up after the start. The automatic quick start up can be finished if desired by executing this scenario script line:

```
SysCall ( "PlayerEngine:SetControlValue", "AutoSetupByScript", 0, 2 );
```

(Function "BR481-AutoSchnellAufruersten" in the template-script). This function is useful if the train needs to be fully set up when the scenario starts.

You can set up the situation where a driver takes over a train from another driver with a locked driver console and activated spring accumulator brakes. This state can be enabled in a split second using the scenario script (for example right after scenario start). The automatic partly done start up can be finished if desired by executing this scenario script line:

```
SysCall ( "PlayerEngine:SetControlValue", "AutoSetupByScript", 0, 3 );
```

(Function "BR481-AutoTeilAufruersten" in the template-Script).

Opening the driver cabin doors via scenario script

→ Automatic opening of the left or right driver cabin doors can be initiated via Scenario Script.

```
SysCall ( "PlayerEngine:SetControlValue", "DoorCabLeftOpenByScript", 0, 1 );
```

(Function "BR481-SpielerFahrerTuerLinksAuf" in the template-script) for the left door or

```
SysCall ( "PlayerEngine:SetControlValue", "DoorCabRightOpenByScript", 0, 1 );
```

(Function "BR481-SpielerFahrerTuerRechtsAuf" in the template-script) for the right door.

Trigger actions using track sided triggers

The add-on ships with numerous triggers, which can be used to build scenarios and routes to trigger effects within the player, train when passed. The following table offers a compact overview:

Trigger	Function
<i>TTB Trigger 3rd rail gap START</i>	Marks the start of a gap in the 3rd rail. Already pre-set for the route "S25 Südast". Needs extra input (check below)
<i>TTB Trigger 3rd rail gap END</i>	Marks the ending of a gap in the 3rd rail. Already pre-set for the route "S25 Südast". Needs extra input (check below)
<i>TTB Trigger Depart sig: Radio</i>	Marks the departure method of the next station: Radio-Departure (overrides pre placed trigger if placed after it).
<i>TTB Trigger Depart sig: ZAT</i>	Marks the departure method of the next station: ZAT-Departure (overrides pre placed trigger if placed after it).
<i>TTB Trigger Depart sig: Zp9</i>	Marks the departure method of the next station: Zp9-Departure (overrides pre placed trigger if placed after it).
<i>TTB Trigger FGI Next Station</i>	Marks the place where the announcement for the next station is done, already pre placed for "S25 Südast".
<i>TTB Trigger Terminal Next Failure</i>	Marks where a terminal error is added, needs extra input (check below).
<i>TTB Trigger Opr Announcements Next</i>	Triggers an additional operational announcement (check below)
<i>TTB Trigger Opr Announcements INIT</i>	Triggers a playlist with extra operational announcements for a scenario (check below)
<i>TTB Trigger Passengers INIT</i>	Pre sets the number of passengers when starting the scenario. (check below)
<i>TTB Trigger Passengers Next</i>	Pre sets data for next passenger interchange.(check below)
<i>TTB Trigger PassLight OFF</i>	Disables interior lighting if passed.
<i>TTB Trigger PassLight ON</i>	Enables interior lighting when passed.
<i>TTB Trigger Zp9 / Zp10 Waiting time</i>	Configures the time to wait when doing Zp9/Zp10 departure (for a fixed departure time for example)
<i>TTB Trigger Set Scenario folder</i>	Sets the scenario folder for priority loading IBIS tpurlists from scenario folder

Marking 3rd rail gaps

These triggers will mark the beginning and the end of a 3rd rail gap depending in driving direction. Therefore, you will need two triggers for one end of a 3rd rail, and for a whole gap, you will need four triggers. They are named in the selection list:

- "TTB Trigger 3rd rail gap START" (for the beginning of a gap) and
- "TTB Trigger 3rd rail gap END" (for the end of a gap)

An „R“ (right) or an „L“ (left) has to be entered in the signal flyout to determine on which side of the tracks the 3rd rail is located (in direction of the signal link).

These triggers are already set up in the route „S25 Südast“.

Trigger a terminal failure message

Further failure messages can be shown at the terminal screen using the trigger "TTB Trigger Terminal Next Failure". The trigger can be put at the track in the scenario editor to support scenario flows. You have to enter a numeral code of the desired error message (possibly with leading zeroes) in the signal flyout. A list of error message codes can be found in the appendix. The error message will be delivered to the active train cab's terminal after passing the trigger with the master quarter train.

Setting up departure modes in custom scenarios

Each of these three departure methods can be set up using a scenario dependent trigger:

- Departure via signal Zp9 / Zp10 ("TTB Trigger Depart sig: Zp9")
- Departure via station supervision radio ("TTB Trigger Depart sig: Radio")
- Self clearance using ZAT-Departure ("TTB Trigger Depart sig: ZAT")

Each trigger is to be set before a station and it is valid for the next station only.

If there is no trigger to be recognized in front of a station, the Zp9 mode is automatically active, this may end in announcements on the platform. There will not be any issues if the station is not equipped with a Zp9 signal device.

Hint: If a station is already equipped with a departure trigger, it can be overridden by simply placing another trigger behind(!) it in driving direction. This can be useful e.g. if a ZAT-Station is manned with personnel because of a mass event.

In addition, many scenarios usually begin with a standing train that have a passenger interchange before moving for the first time. If this first interchange shall be conducted with a different departure method than the Zp9 standard, a trigger might be set as well. Place them in close distance in front of the players train for activating their initial functionality. A "0" (zero) has to be entered in the right field of signal flyout text-window. This will trigger a departure mode change of the player train when starting a scenario.

Configuring the Zp9/Zp10 departure signal device

The stations might already be equipped with a Zp9 signal device. The signal device ("TTB Zp9-10 mit Anzeiger und Halter ") can be placed in scenarios as well if this is not the case. It is placed as a signal . Orientate link 0 of the signal in driving direction of the train.

The trigger "*TTB Trigger Zp9 / Zp10 Waiting time*" can be used for configuring them in a scenario. The display must be controlled with a timer, because bidirectional communication - train → signal - is not possible in RailWorks. The signal device counts the time, the train has been stationary in front of it. After X seconds it triggers the Zp10 - Zp9 sequence depending of the configured timer. Typing in a static departure time is optionally possible. The necessary waiting time for your self-placed signal device is configured using the corresponding trigger.

There to the trigger has to be set up in driving direction **DIRECTLY IN FRONT** of the signal link of the signal display on the rail. Enter the desired time in the signal flyout text window (right text field). There are two modes for that:

→ **Waiting time mode:** A waiting period in seconds is entered into the signal flyout. After this period, the Zp10-Zp9 sequence is going to be initiated.

→ **Timestamp mode:** The Zp10-Zp9 sequence will be initiated in the earliest to a fixed time of day, but still after a minimum of 34 seconds of immobility. The desired time of day needs to be entered into the signal flyout in the format HH:MM:SS.

Example: Entering the time 17:00:00 will lead to a train incoming at 16:55:00 to wait for five minutes and depart at 17:00:00. If a train is late at 17:02:00 it will be cleared for departure at 17:02:34.

Note: If no separate trigger is set for the Zp9 display, the pre-set waiting period will be 34 seconds in length. This corresponds well to the RailWorks default of 35 seconds.

Implement a passenger interchange in custom scenarios

To fully utilise the passenger simulation of the class 481 in the scenario editor, triggers have to be used. Consider the following guidelines for building scenarios:

→ The player train can be crowded with a particular amount of passengers at the beginning of a new simulation. By using the trigger "**TTB Trigger Passengers INIT**" this will be set up in the scenario

editor. This trigger can be placed **anywhere** on the track and does not need to be passed by the train set to be effective. The amount of passengers has to be entered in one of the two text boxes. This is not the amount of passengers per wagon, but for the whole train. If no triggers are set, the amount of passengers will be randomly chosen.

→ You can set up instructions for the train set on how many passengers will leave and enter the train consecutively and how long this will take for the following passenger. That is the purpose of the trigger "**TTB Trigger Passengers Next**" if it is placed on the track. The data input pattern is "**Txxx+yyy-zzz**". The part „xxx“ defines the interchange duration in seconds, (here it is useful to cut the time depicted in the assignment list by a few seconds). The digits for „yyy“ and „zzz“ describe the amount of passengers **entering (yyy)** and **leaving (zzz)** the train. All numbers might have to be entered with leading zeroes. Inputs which may lead to conflicts (more passengers leaving than passengers present) will be correctly calculated by the game and do not result in issues. The input T015-000-999 will lead to all passengers leaving the train within 15 seconds.

The data is transmitted to the train once a trigger is passed and put to use at the next station. Once transmitted, the Data is valid for a single use. If no trigger is set, the passenger interchange will be calculated using pre-set values.

→ Special case: If a scenario starts with a train already standing at a platform, it is not possible to pass the trigger for transmitting data to the train. You can use a parameter instead a trigger in that special case (see corresponding chapter above). It has to be added to the rail vehicle number using the pattern **_PASSNEXT=Txxx+yyy-zzz** of the vehicle that has the active cab when starting the scenario (= master vehicle). Handing over passenger exchange data via vehicle parameter only works in the special case for configuring the first platform stop after starting the scenario.

Note: Due to program limitations, once placed triggers cannot be edited. If you want to change your entries, the trigger has to be deleted and a new trigger must be created.

Additional note: The 3D Models of triggers do not have to be hidden or placed underground. They are only visible in editor and will visually disappear in the game. Therefore the creator can set the triggers well visible on the track. They are equipped with icons simplifying to identify trigger functions.

Creating an Info-Window concerning departure modes

The scripting system allows scenario info to be displayed by pressing F10. This window will inform the player on scenario specific departure modes used on scenario stations. This window must be set up by the scenario creator though.

An .html document named **TTB_BR481_DepartureSignallingInfo.html** must be created in the respective translation sub-folders used by the scenario ("de", "en", ..).

Numerous premade template materials can be found in the folder `..\railworks\TTB-Material\TTB_BR481\Abfertigungs-Info\Templates`. This is intended to help creating your own scenario Info-files.

Note: You are allowed to use the pictures delivered in the templates folder in your own freeware scenarios and to publish them as part of the scenarios.

Adding scenario specific announcements.

In addition to the pre-set announcements for stations and platforms, it is possible to create and implement your own announcements for custom scenarios. An exemplary use for that is to transmit orders from the operation centre via radio or to start a passenger interaction (maybe if the player forgot to illuminate the interior during the darkness of a tunnel or night).

Implementing such files must be done using the .ogg audio format and the already known .xml playlists. The file of the playlist must be named "TTB_BR481_OperationalAnnouncements.xml".

The scenario specific announcements are always located in the respective language sub-folder ("de", "en", ..). Depending on the active localization of the game, the playlists have to be saved multiple times but they can still refer to the same audio files. This offers the opportunity to translate the announcements themselves. The vehicle will not use the TrainSimulator language setting to display text-based announcements, but its own current setting (check the options sub-chapter above for more info).

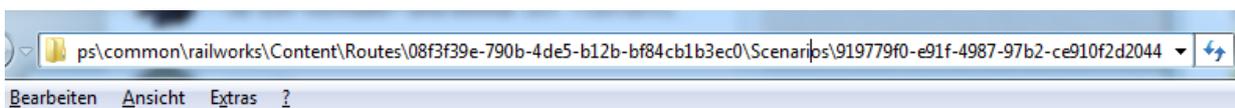
The configuration is managed in two steps:

→ initially the vehicle has to be informed of the playlist that is going to be used – unfortunately, the TrainSimulator is unable to automatize this process. The trigger "TTB Trigger Opr Announcements INIT" has to be used for that. It has to be placed on the track for configuring the vehicle when passed.

Folder names of the route and the scenario have to be entered - **separated by a comma** - to the signal flyout. The pattern is:

<Name of the route folder>,<Name of the scenario folder>

The following example shows, how the folder structure deduces



the entry

08f3f39e-790b-4de5-b12b-bf84cb1b3ec0,919779f0-e91f-4987-97b2-ce910f2d2044

for the trigger. This will lead to loading the playlist:

..\railworks\Content\Routes\08f3f39e-790b-4de5-b12b-bf84cb1b3ec0\Scenarios\919779f0-e91f-4987-97b2-ce910f2d2044\en\TTB_BR481_OperationalAnnouncements.xml

– provided you use the English language setting for the Class 481.

→ In the second step an announcement from the playlist that just has been loaded will be played,

this can happen on two different ways:

Announcement via signal trigger

For the first case, triggers will be used to produce an announcement from the newly implemented playlist. Thereto the trigger "TTB Trigger Opr Announcements Next" must be placed on the track for producing the announcement when passing it. Two parameters separated by a comma must be added to the text field of the signal flyout.

Next to the input index as second parameter, the first letter will determine the "play mode":

"I"	Mode "Inside"	→ Announcement will only be played inside of the train
"O"	Mode "Outside"	→ Announcement will only be played outside of the train
"B"	Mode "Both"	→ Announcement will be played in both views

The following two examples demonstrate the required entries:

"O,2"	→ The announcement indexed „2“ will only be played outside of the train
"B,123"	→ The announcement indexed „123“ will be played in all views

Triggering an announcement via scenario script

In this second case, an announcement will be triggered from the playlist triggering corresponding events of the scenario script. A template script already containing those entries can be found in

`..\railworks\TTB-Material\TTB_BR481\SzenarioSkript-Template`

The playing modes are „inside“, „outside“ and „both“ again. The pre-set script contains the event entries 01-10 combined with all possible playing modes. These are working with the pattern:

BR481-Ansagexy-mode

Whereas xy determines the sound index and mode defines the mode.

The desired event can be triggered by entering it into the event trigger box of a scenario command (check picture below) as well as through programming in the scenario script.

This opens up many possible ways to play additional .ogg announcements, for example:

- Triggering a shunting announcement after coupling (via scenario command)
- Triggering a radio announcement after an AI train action (via scenario command)
- Triggering a passenger complaint if the interior lighting is not enabled in the dark (via scenario script programming)

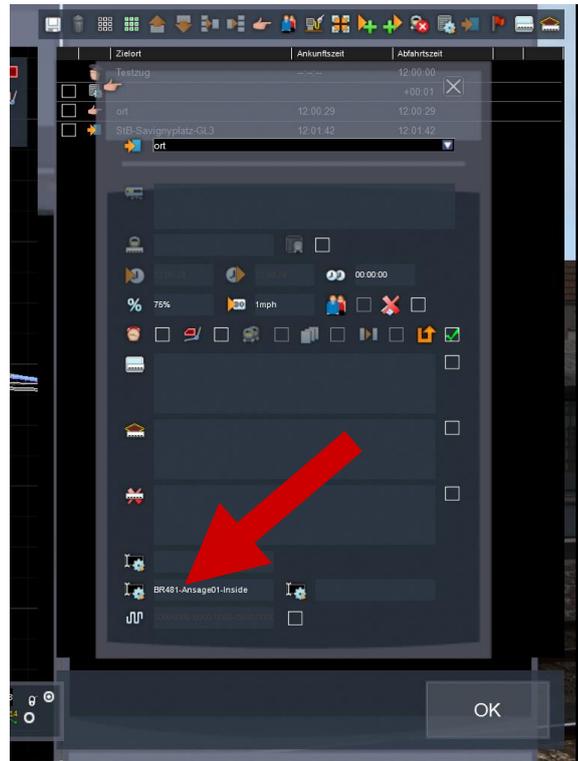


Image: Triggering a scenario specific announcement by entering the event name in a scenario command (here: "only play announcement 1 only inside")

Example: Triggering the event "BR481-Ansage09-Both" in the scenario editor will lead to the announcement indexed "9" to be played in both the inside and outside view of the train.

Note: You are allowed to use the scenario script template delivered in the templates folder in your own freeware scenarios and to publish them as part of the scenarios.

Appendix

You can find a couple of useful overviews and insights within the appendix. They are not necessarily important to the usual driving operation of the Add-on but are especially useful to users who build scenarios and want to modify the vehicle:

Terminal – Failure list

The following failures can be sent to the in game terminal via the two digit codes on the left side:

01	=	Public adress is malfunctioning (ELA gestört)
02	=	Emergency brakes are malfunctioning (Störung Notbremse)
03	=	Door 11 is malfunctioning (Tür11 Störungsmeldung)
04	=	Door 4 is malfunctioning (Tür 4 Störungsmeldung)
05	=	3 rd rail gap (Stromschienenlücke)
06	=	Power unit failure (Antriebsstörung)
07	=	Public adress system failure (ELA Anlage gestört)
08	=	Power unit failure (Antriebsstörung)
09	=	Traction failure (Antrieb gestört)
10	=	collector shoe rip left (Schleifschuhabriß links)
11	=	collector shoe rip right (Schleifschuhabriß rechts)
12	=	Traction air unit failure (Traktionslüfter n b)
13	=	FGR heater failure (FGR Heizung gestört)
14	=	Sander malfunctioning (Sandstreuer gestört)
15	=	Train stop failure (Fahrsperre gestört)
16	=	Left mirror malfunctioning (Spiegel links gestört)
17	=	Right mirror malfunctioning (Spiegel rechts gestört)
18	=	Device air unit 3 failure (Gerätelüfter 3 gestört)
19	=	FGI malfunctioning (FGI Störung)
20	=	SiFa failure (Störung SiFa)
21	=	Flange oilers malfunctioning (Spurkranzschmierung gestört)

IBIS – Line list

The following lines can be displayed by the IBIS:

S1	S46
S11	S47
S12	S48 (display: S46)
S15	S49 (display: S46)
S18 (display: S1)	S5
S2	S51 (display: S5)
S21	S52 (display: S5)
S22	S53 (display: S5)
S24 (display: S25)	S6
S25	S61 (display: S45)
S26	S7
S27 (display: S25)	S72 (display: S7)
S3	S75
S31 (display: S3X)	S76 (display: S75)
S33 (display: S3)	S8
S35 (display: S5)	S81 (display: S8)
S37 (display: S3)	S82 (display: S8)
S4	S85
S40 (display: S47)	S86 (display: S85)
S41	S87 (display: S85)
S42	S9
S43 (display: S41)	S91 (display: S9)
S44 (display: S42)	S92 (display: S9)
S45	S10

IBIS – Destination codes – special destination displays

The following special destinations can be displayed by the IBIS by using the combination Line S0 / tour 0:

992	=	Shuttle traffic (Pendelverkehr)
993	=	Testing train (Probezug)
994	=	Special train (Sonderzug)
995	=	workshop train (Werkstattzug)
996	=	city round trip (Stadtrundfahrt)
997	=	Do not enter (Nicht einsteigen)
998	=	Follow announcements (Ansage beachten)

IBIS - Destination codes - Stations

The following stations can be displayed as a start and destination by the IBIS (Raise the value by 300 to make it display the alternating [Destination] ↔ "Pendelverkehr" (Shuttle traffic) without a line number:

001	=	[Empty display]
002	=	OKS Ostkreuz
003	=	KLH Karlshorst
004	=	KP Köpenick
005	=	FRH Friedrichshagen
006	=	ERK Erkner
007	=	BAB Babelsberg
008	=	GBS Griebnitzsee
009	=	WS Wannsee
010	=	GD Grunewald
011	=	[Empty display]
012	=	WKR Westkreuz
013	=	CHB Charlottenburg
014	=	ZOO Zoologischer Garten
015	=	HBF Hauptbahnhof
016	=	FRI Friedrichstraße
017	=	ALE Alexanderplatz
018	=	PD Potsdam Hauptbahnhof
019	=	WRS Warschauer Straße
020	=	WAB Wartenberg
021	=	HF Ostbahnhof
022	=	SHB Sellheimbrücke
023	=	AHR Ahrensfelde
024	=	MAR Marzahn
025	=	SPH Springpfuhl
026	=	STN Strausberg Nord
027	=	ST Strausberg
028	=	HPN Hoppegarten
029	=	MDF Mahlsdorf
030	=	WT Wuhletal
031	=	[Empty display]
032	=	LO Lichtenberg
033	=	TP Treptower Park
034	=	SW Schöneweide
035	=	GA Grünau
036	=	ZN Zeuthen
037	=	KW Königs Wusterhausen
038	=	[Empty display]
039	=	[Empty display]
040	=	FHS Flughafen Schönefeld
041	=	GBA Grünbergallee
042	=	AGL Altglienicke

**TS2020 – Class 481**

043	=	BRN	Bernau
044	=	BU	Buch
045	=	BPB	Blankenburg
046	=	PKR	Pankow
047	=	SAL	Schönhauser Allee
048	=	GFB	Greifswalder Straße
049	=	[Empty display]	
050	=	SPF	Spindlersfeld
051	=	[Empty display]	
052	=	OR	Oranienburg
053	=	BI	Birkenwerder
054	=	HN	Hohen Neuendorf
055	=	BIR	Ring UZS
056	=	GSR	Gesundbrunnen / Ring
057	=	BIR	Ring GUZS
058	=	[Empty display]	
059	=	ZD	Zehlendorf
060	=	LIW	Lichterfelde West
061	=	JLB	Julius-Leber-Brücke
062	=	RST	Rathaus Steglitz
063	=	SGR	Schöneberg
064	=	FOH	Frohnau
065	=	WIN	Wittenau
066	=	WAI	Waidmannslust
067	=	SNL	Schönholz
068	=	HND	Hennigsdorf
069	=	HLS	Heiligensee
070	=	GS	Gesundbrunnen
071	=	WDD	Wedding
072	=	NB	Nordbahnhof
073	=	[Empty display]	
074	=	POP	Potsdamer Platz
075	=	AHU	Anhalter Bahnhof
076	=	TG	Tegel
077	=	RSF	Rangsdorf
078	=	BF	Blankenfelde
079	=	MAH	Mahlow
080	=	LRD	Lichtenrade
081	=	[Empty display]	
082	=	MF	Marienfelde
083	=	PAP	Südkreuz
084	=	TLS	Teltow Stadt
085	=	LIS	Lichterfelde Süd
086	=	LIO	Lichterfelde Ost
087	=	EIC	Messe Süd
088	=	WLN	Messe Nord / ICC
089	=	TF	Tempelhof
090	=	HER	Herrmannstraße

**TS2020 – Class 481**

091	=	[Empty display]
092	=	NKN Neukölln
093	=	BW Baumschulenweg
094	=	[Empty display]
095	=	[Empty display]
096	=	[Empty display]
097	=	BUP Bundesplatz
098	=	HAL Halensee
099	=	WES Westend
100	=	JUN Jungfernheide
101	=	WHH Wuhlheide
102	=	WF Westhafen
103	=	[Empty display]
104	=	OLS Olympiastadion
105	=	PIC Pichelsberg
106	=	SRW Stresow
107	=	PRS Priesterweg
108	=	FKS Falkensee
109	=	SPD Spandau
110	=	BHZ Buchholz
111	=	GGs Yorckstraße
112	=	HBS Hackbuschstraße
113	=	ADL Adlershof
114	=	ARF Alt-Reinickendorf
115	=	ATS Attilastraße
116	=	BEV Bellevue
117	=	BFE Bergfelde
118	=	BRF Bernau-Friedenstal
119	=	RB Betriebsbhf Rummelsburg
120	=	SCF Betriebsbhf Schöneweide
121	=	BEU Beusselstraße
122	=	BDF Biesdorf
123	=	BIS Birkenstein
124	=	BOR Borgsdorf
125	=	BOS Bornholmer Straße
126	=	BGT Botanischer Garten
127	=	BCH Buckower Chaussee
128	=	EBD Eichborndamm
129	=	EIC Eichkamp Messe
130	=	EIW Eichwalde
131	=	FB Feuerbachstraße
132	=	FAL Frankfurter Allee
133	=	FRD Fredersdorf
134	=	FRU Friedenau
135	=	FFO Friedrichsfelde Ost
136	=	GSE Gehrenseestraße
137	=	HKM Hackescher Markt
138	=	HST Heerstraße

**TS2020 – Class 481**

139	=	HGM	Hegermühle
140	=	HEI	Heidelberger Platz
141	=	ZEP	Zepernick
142	=	HED	Hermsdorf
143	=	HI	Hirschgarten
144	=	HSH	Hohenschönhausen
145	=	HO	Hohenzollerndamm
146	=	HUM	Humboldthain
147	=	IP	Innsbrucker Platz
148	=	JB	Jannowitzbrücke
149	=	KBO	Karl-Bonhoeffer-Nervenklinik
150	=	KAR	Karow
151	=	KD	Kaulsdorf
152	=	KHD	Köllnische Heide
153	=	LST	Landsberger Allee
154	=	LAK	Lankwitz
155	=	LEN	Lehnitz
156	=	MEA	Mehrower Allee
157	=	MEX	Mexikoplatz
158	=	MM	Mühlenbeck-Mönchmühle
159	=	NG	Neuenhagen
160	=	NI	Nikolassee
161	=	NPL	Nöldnerplatz
162	=	OSP	Oberspree
163	=	ORS	Oranienburger Straße
164	=	OSS	Osdorfer Straße
165	=	PHD	Pankow-Heinersdorf
166	=	PEN	Petershagen Nord
167	=	PWA	Plänterwald
168	=	POE	Poelchaustraße
169	=	PLA	Prenzlauer Allee
170	=	RD	Rahnsdorf
171	=	RW	Raoul-Wallenberg-Straße
172	=	RGT	Röntgental
173	=	RH	Rummelsburg
174	=	SAP	Savignyplatz
175	=	SC	Schichauweg
176	=	SLS	Schlachtensee
177	=	SFL	Schönfließ
178	=	SZF	Schulzendorf
179	=	SO	Sonnenallee
180	=	STO	Storkower Straße
181	=	STR	Strausberg Stadt
182	=	SDE	Südende
183	=	SDG	Sundgauer Straße
184	=	TGN	Tiergarten
185	=	UDL	Unter den Linden
186	=	WI	Wildau

187	=	WIG	Wilhelmshagen
188	=	WM	Wilhelmsruh
189	=	WLN	Witzleben
190	=	WOK	Wollankstraße
191	=	WAF	Waßmannsdorf
192	=	FBB	Flughafen BER
193	=	AS	Albrechtshof
194	=	SFD	Seegefeld
195	=	NAS	Nauener Straße
196	=	PB	Perleberger Brücke
197	=	BDT	Bundestag
198	=	GLD	Gleisdreieck

IBIS – Train groups

Here is a list of all available train groups.

Linie	Zuggruppe	Umläufe	Relation
S1	P - Paula	1 - 19	Potsdam Hbf - Wannsee - Oranienburg
S1	P I - Panther	51 - 69	Potsdam Hbf - Wannsee - Oranienburg
S1	P II - Pastor	31 - 39	Potsdam Hbf - Wannsee - Oranienburg
S1	P III - Pelikan	71 - 79	Potsdam Hbf - Wannsee - Oranienburg
S1	Keine o. Reserve	20 - 30, 40 - 50, 70, 80 - 99	Potsdam Hbf - Wannsee - Oranienburg
S15	P III - Pelikan	1 - 9	Südkreuz - Potsd. Platz - Hbf - Waidmannslust
S15	P II - Pastor	31 - 39	Südkreuz - Potsd. Platz - Hbf - Waidmannslust
S15	Keine o. Reserve	10 - 30, 40 - 99	Südkreuz - Potsd. Platz - Hbf - Waidmannslust
S2	W - Wulf	1 - 19	(Rangsdorf -) Blankenfelde - Bernau
S2	W I - Wespe	51 - 69	(Rangsdorf -) Blankenfelde - Bernau
S2	W II - Wilhelm	31 - 39	(Rangsdorf -) Blankenfelde - Bernau
S2	W III - Weichsel	71 - 79	(Rangsdorf -) Blankenfelde - Bernau
S2	Keine o. Reserve	20 - 30, 40 - 50, 70, 80 - 99	(Rangsdorf -) Blankenfelde - Bernau
S25	V - Viktor	1 - 9	Teltow Stadt - Hennigsdorf
S25	V I - Vampir	31 - 39	Teltow Stadt - Hennigsdorf
S25	Keine o. Reserve	10 - 30, 40 - 99	Teltow Stadt - Hennigsdorf
S26	L - Ludwig	1 - 9	Teltow Stadt - Waidmannslust
S26	V I - Vampir	31 - 39	Teltow Stadt - Waidmannslust
S26	L I - Lerche	51 - 59	Teltow Stadt - Waidmannslust
S26	Keine o. Reserve	10 - 30, 40 - 50, 60 - 99	Teltow Stadt - Waidmannslust
S3	B - Berta	1 - 19	Erkner - Spandau (- Falkensee)
S3	B I - Bussard	51 - 59	Erkner - Spandau (- Falkensee)
S3	B II - Benno	31 - 39	Erkner - Spandau (- Falkensee)
S3	Keine o. Reserve	20 - 30, 40 - 50, 60 - 99	Erkner - Spandau (- Falkensee)
S31	B - Berta	1 - 19	Erkner - Spandau (- Falkensee) („S3X“)
S31	B I - Bussard	51 - 59	Erkner - Spandau (- Falkensee) („S3X“)
S31	B II - Benno	31 - 39	Erkner - Spandau (- Falkensee) („S3X“)
S31	Keine o. Reserve	20 - 30, 40 - 50, 60 - 99	Erkner - Spandau (- Falkensee) („S3X“)
S4	A - Anton	1 - 9	Westhafen - Südring - Gesundbrunnen
S4	A I - Adler	51 - 59	Westhafen - Südring - Gesundbrunnen



S4	A II - August	31 – 39	Westhafen - Südring - Gesundbrunnen
S4	A III - Amsel	71 – 79	Westhafen - Südring - Gesundbrunnen
S4	Keine o. Reserve	10- 30, 40- 50, 60 – 70, 80 – 99	Westhafen - Südring - Gesundbrunnen
S41	A - Anton	1 – 9	Ring im Uhrzeigersinn
S41	A I - Adler	51 – 59	Ring im Uhrzeigersinn
S41	A II - August	31 – 39	Ring im Uhrzeigersinn
S41	A III - Amsel	71 – 79	Ring im Uhrzeigersinn
S41	Keine o. Reserve	10- 30, 40- 50, 60 – 70, 80 – 99	Ring im Uhrzeigersinn
S42	R - Richard	1 – 9	Ring gegen Uhrzeigersinn
S42	R I - Reiher	51 – 59	Ring gegen Uhrzeigersinn
S42	R II - Rudolf	31 – 39	Ring gegen Uhrzeigersinn
S42	R III - Regine	71 – 79	Ring gegen Uhrzeigersinn
S42	Keine o. Reserve	10- 30, 40- 50, 60 – 70, 80 – 99	Ring gegen Uhrzeigersinn
S45	U - Ulrich	1 - 9	Gesundbrunnen - Bundesplatz – Flugh. BER
S45	U - Uhu	51 - 59	Gesundbrunnen - Bundesplatz – Flugh. BER
S45	Keine o. Reserve	10 – 50, 60 - 99	Gesundbrunnen - Bundesplatz – Flugh. BER
S46	D - Dora	1 – 9	Gesundbr. - Westend - Königs Wusterhausen
S46	D I - Delphin	51 – 59	Gesundbr. - Westend - Königs Wusterhausen
S46	D II - Dietrich	61 – 69	Gesundbr. - Westend - Königs Wusterhausen
S46	Keine o. Reserve	10-50, 60, 70-99	Gesundbr. - Westend - Königs Wusterhausen
S47	K - Konrad	1 – 9	Gesundbr. – Hermannstraße - Spindlersfeld
S47	K I - Kondor	51 – 59	Gesundbr. – Hermannstraße - Spindlersfeld
S47	Keine o. Reserve	10 – 50, 60 – 99	Gesundbr. – Hermannstraße - Spindlersfeld
S5	E - Emil	1 - 19	Strausberg Nord – Spandau (- Falkensee)
S5	E I - Elster	51 - 69	Strausberg Nord – Spandau (- Falkensee)
S5	E II - Eiche	31 – 39	Strausberg Nord – Spandau (- Falkensee)
S5	E III - Erna	71 – 79	Strausberg Nord – Spandau (- Falkensee)
S5	S - Sirius	81 – 85	Strausberg Nord – Spandau (- Falkensee)
S5	E - Emil	20 – 30, 40 – 50, 70, 80, 86 – 99	Strausberg Nord – Spandau (- Falkensee)
S6	K - Konrad	1 – 9	Südkreuz – Potsd. Platz – Hbf – Jungfernheide
S6	K I - Kondor	31 – 39	Südkreuz – Potsd. Platz – Hbf – Jungfernheide
S6	Keine o. Reserve	10 – 30, 40 – 99	Südkreuz – Potsd. Platz – Hbf – Jungfernheide
S7	O - Otto	1 - 19	Potsdam Hbf - Ahrensfelde
S7	O I - Olaf	51 – 69	Potsdam Hbf - Ahrensfelde
S7	O II - Olive	31 – 39	Potsdam Hbf - Ahrensfelde
S7	Keine o. Reserve	20 – 30, 40 – 50, 70 – 99	Potsdam Hbf - Ahrensfelde

S75	T - Theodor	1 – 9	Wartenberg – Spandau (- Falkensee)
S75	T I - Tapir	51 – 59	Wartenberg – Spandau (- Falkensee)
S75	Keine o. Reserve	10 – 50, 60 – 99	Wartenberg – Spandau (- Falkensee)
S8	N - Nordpol	1 – 9	Wildau – Birkenwerder
S8	N I - Neiße	51 – 59	Wildau – Birkenwerder
S8	N II - Natter	31 – 39	Wildau – Birkenwerder
S8	Keine o. Reserve	10 – 30, 40 – 50, 60 – 99	Wildau – Birkenwerder
S85	N I - Neiße	1 – 9	Grünau - Waidmannslust
S85	Keine o. Reserve	10 – 99	Grünau - Waidmannslust
S86	N II - Natter	1 – 9	Grünau – Buch
S86	Keine o. Reserve	10 – 99	Grünau – Buch
S9	C - Cäsar	1 – 9	BER - Warschauer Str. - Spandau (- Falkensee)
S9	C I - Celsius	51 – 59	Flughafen BER – Pankow - Blankenburg
S9	C - Cäsar	31 – 39	BER - Warschauer Str. - Spandau (- Falkensee)
S9	Keine o. Reserve	10 – 30, 40 – 50, 60 – 99	BER - Warschauer Str. - Spandau (- Falkensee)

Italic = contains future or (half)fictional routes

The following train groups are available to be added for additional tours. The codes on the left side must be used when creating your own tour lists. Those codes are not for the regular simulation. These are only interesting for those who wish to create or alter tour lists.

g01	=	A	Anton	g35	=	F I	Fee
g02	=	A I	Adler	g36	=	F	Friedrich
g03	=	B	Berta	g37	=	G I	Greif
g04	=	B I	Bussard	g38	=	G	Gustav
g05	=	B II	Benno	g39	=	H	Heinrich
g06	=	C	Cäsar	g40	=	H I	Hummel
g07	=	D	Dora	g41	=	J I	Jaguar
g08	=	E	Emil	g42	=	J	Jutta
g09	=	E I	Elster	g43	=	K I	Kondor
g10	=	E II	Eiche	g44	=	L I	Lerche
g11	=	E III	Erna	g45	=	L	Ludwig
g12	=	N	Nordpol	g46	=	M	Möve
g13	=	N I	Neiße	g47	=	N II	Natter
g14	=	K	Konrad	g48	=	O II	Olive
g15	=	O	Otto	g49	=	P III	Pelikan
g16	=	O I	Olaf	g50	=	R III	Regine
g17	=	P	Paula	g51	=	R II	Rudolf
g18	=	P I	Panther	g52	=	S III	Sonne
g19	=	P II	Pastor	g53	=	U I	Uhu
g20	=	R	Richard	g54	=	W III	Weichsel
g21	=	R I	Reiher	g55	=	W II	Wilhelm
g22	=	S II	Sirius	g56	=	[leer]	(Dummy)
g23	=	T	Theodor	g57	=	Res	Res Waidmannslust
g24	=	T I	Tapir	g58	=	Res	Res Lichtenberg
g25	=	U	Ulrich	g59	=	Res	Res Ostbahnhof
g26	=	V	Viktor	g60	=	Res	Res Westkreuz
g27	=	V I	Vampir	g61	=	Res	Res Wannsee
g28	=	W	Wulf	g62	=	Res	Res Erkner
g29	=	W I	Wespe	g63	=	Res	Res Schöneweide
g30	=	A III	Amsel	g64	=	Res	Res Ostkreuz
g31	=	A II	August	g65	=	Res	Res Südkreuz
g32	=	C I	Celsius	g66	=	Res	Res Westend
g33	=	D I	Delphin	g67	=	Res	Res Nordbahnhof
g34	=	D II	Dietrich	g68	=	Res	Res Oranienburg
				g69	=	Res	Res Anhalter Bf