

# Mittenwaldbahn

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Whilst we do our utmost to reproduce sounds that are accurate and true-to-life, sometimes these sounds may not completely tally with the user's expectation. Due to the nature of the simulation, it is often not possible to reproduce a completely accurate soundscape for a variety of reasons such as limitations with our current technology and occasional inability to gain meaningful access to the locomotives being created. You should therefore regard the audio reproduction for our locomotives as authentic interpretations rather than perfect recreations.

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# 1 ROUTE INFORMATION

## 1.1 History

A proposal for a railway between Innsbruck and Seefeld was first seen in the late 1880s, submitted by Josef Riehl, this new line would traverse the vast Alpine landscape of western Austria, providing a local railway link for the mountain's residents, connecting them to Tyrol's capital. Tough disputes lingered on with the Austrian ministry of trade and economics, with financing being a major concern for what would be tunnel and viaduct-heavy railway. In the end, not only did he gain approval for the new line, he was also given clearance to extend the line to Mittenwald, a relatively small yet beautiful town that sits on the cusp of the German border.

Looking for aid in construction, Riehl formed a consortium between himself and another engineer, Wilhelm Carl von Doderer. Together, they would oversee everything from the land acquisition to the rolling stock, while the actual construction was deferred to Karl Innerebneron, August Mayer on behalf of Riehl and Doderer respectively.

Many railways built around the turn of the 20th Century wouldn't have been electrified from the start, but the plans for the Mittenwaldbahn called for wires to be erected immediately. This, plus all the tunnels and viaducts required to traverse the harsh Karwendel landscape, pushed the price tag of the line up significantly, the benefit of electrifying in foresight however prevented any major work in the future.

The last call for what would become today's Mittenwaldbahn came when the local council requested the line be extended to Garmisch-Partenkirchen, allowing services to cross between Innsbruck and Munich with ease. The extension was built, and the line opened in July of 1912, but the power stations, nor the electric locomotives were ready for use, so steam-powered operations broke in the line. Electric traction arrived on the Austrian side of the line in October 1912, and extended into Germany in April the following year.

The Mittenwaldbahn played little strategic significance in the Second World War, although the allies saw differently, and so it was pointlessly air-raided throughout the conflict. In contrast, the line to Innsbruck proved vital for the 1976 Winter Olympic Games, and the 1985 Nordic World Ski Championships. The former event was expected to bring much traffic onto the line, so colour light signals were installed and Seefeld station was completely rebuilt. The last development seen on the line was in the 1980s, when road widening in Innsbruck required the rails to be lifted higher, and subsequently new bridges were installed.

Passenger traffic is the Mittenwaldbahn's main purpose, the Tyrol S-Bahn makes good use of the Innsbruck-Scharnitz section, also known as the S5 line. ÖBB in recent years have used Class 4024 'Talent' EMUs on the S5 line, but would have utilised the classic ÖBB 4020 in years past. DB operate Regional services between Munich and Mittenwald, with every other extending to Innsbruck; these usually fall to the 'Talent 2' fleet. The other main service, introduced in winter 2010, is the famed Intercity-Express that runs from Munich to Innsbruck. These ICE services are organised by DB and ÖBB in unison, as the ICE-T EMUs used are owned by the latter, and are classified as the ÖBB 4011; DB-owned ICE units are also used, typically the older ICE1 and ICE 2 generations. Since these services have begun, Seefeld has become the highest ICE calling point in Europe.

The gorgeous Austrian scenery, mixed with the relatively sedate single-line running, makes the Mittenwaldbahn an icon of historic and modern railways – a truly fantastic path through the Alpine peaks.

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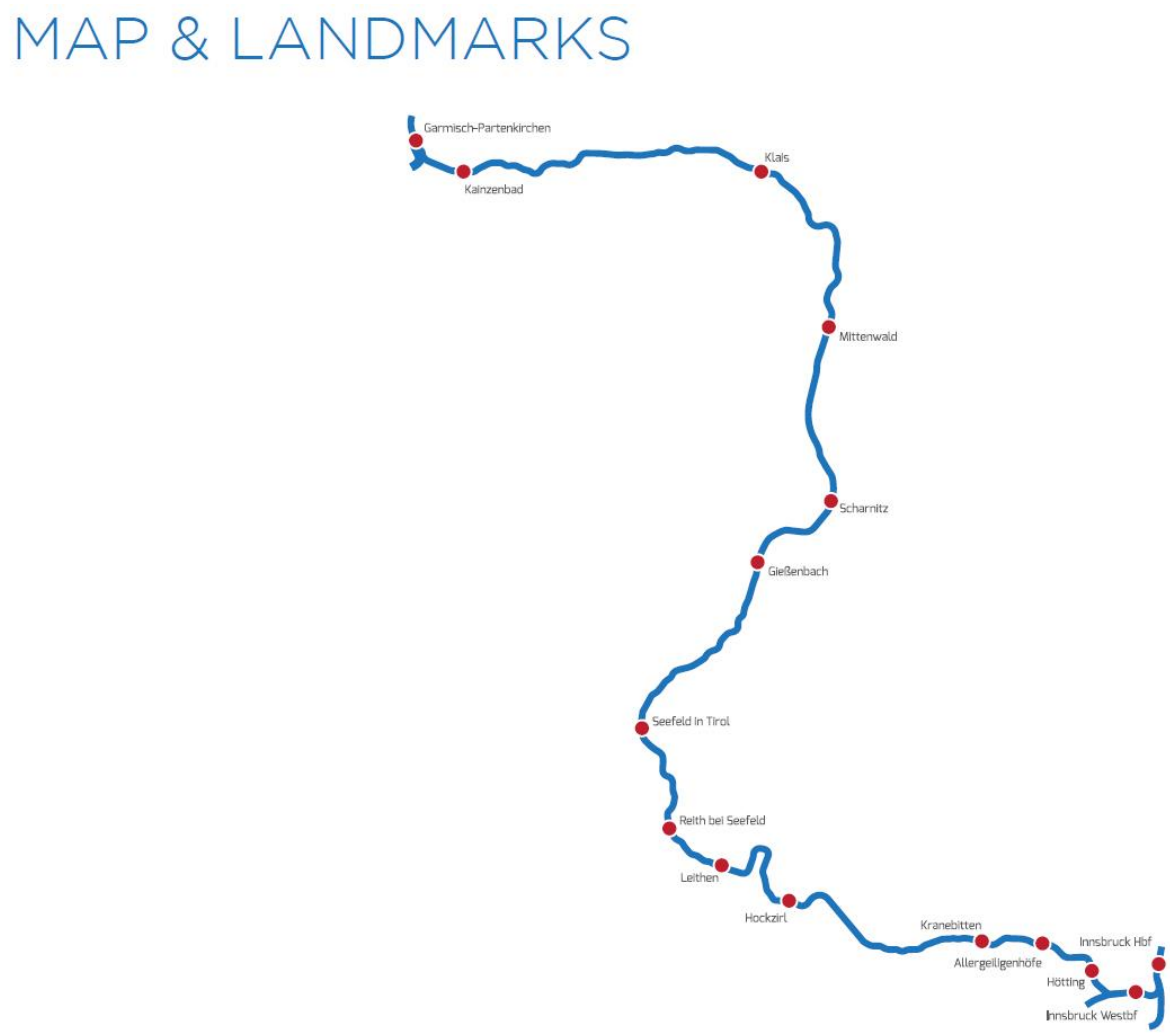


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## 1.2 The Route

The DLC product recreates the 35 mile Mittenwaldbahn as it operates today. The route features 15 stations including Garmisch-Partenkirchen, Mittenwald and Innsbruck.

There are 15 stations located along the length of the Mittenwaldbahn line.




## 1.3 Focus Time Period

The time period for this Route DLC is based around the present day (2016).

## 1.4 Rolling Stock

Included with the route will be the DB BR 442 ‘Talent 2’ DB Traffic Red Livery and the ÖBB 2016 Eurorunner in Red Livery.

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# 2 GETTING STARTED

## 2.1 Recommended Minimum Hardware Specification

The Mittenwaldbahn route is highly detailed, feature rich and incorporates detailed night lighting. Therefore, it will benefit from a higher PC specification.

- Windows 7 / Windows 8.1
- Processor: 2.8 GHz Core 2 Duo (3.2 GHz Core 2 Duo recommended), AMD Athlon MP
- RAM - 4.0GB
- GFX - 512 MB - 1GB with Pixel Shader 3.0 (AGP PCIe only)
- SFX - Direct X 9.0c compatible

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# 3 ÖBB 2016 EURORUNNER

## 3.1 ÖBB 2016 Euro Runner



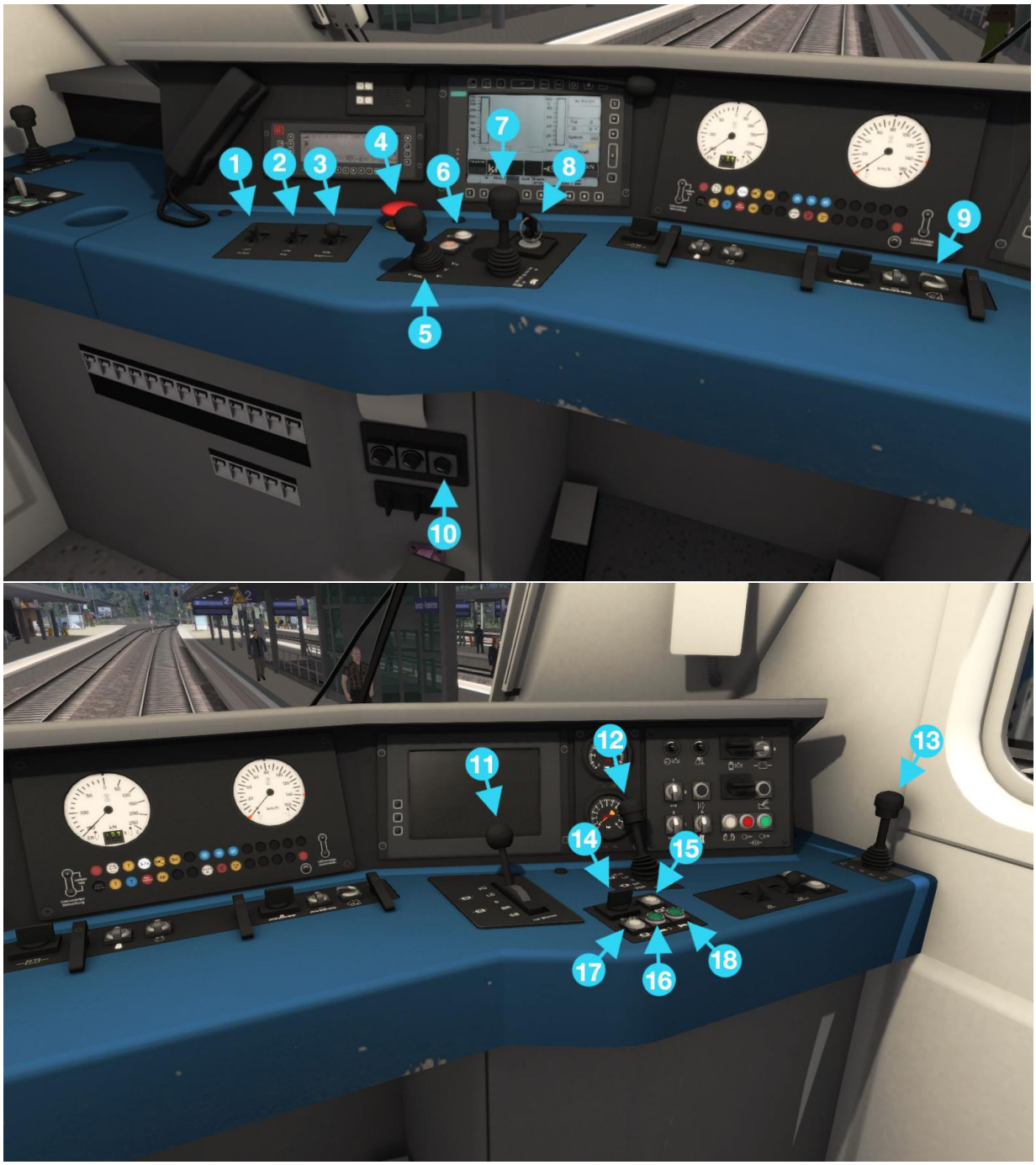

Construction of the Eurorunner locomotive began in 1998, manufactured by Siemens for introduction in 2002. The locomotives shares design characteristics with the Euro Sprinter range, also made by Siemens and was designed to be manufactured using few, modular parts, which meant that failed components could be replaced quickly. Austrian Federal Railways (ÖBB) was looking for a medium specification locomotive and Eurorunner ER20 best fit their requirements. An initial order of 70 locomotives was placed with an additional 30 added to the order later, smaller orders were also fulfilled by smaller railway companies. Production of the Euro Runner ceased in 2012.

## 3.2 Design & Specification

| | |
|---|---|
| **Builder** | Siemens |
| **Locomotive Weight** | 80 tonnes (78.74tons) |
| **Vehicle Length** | 19.28m (63.23ft) |
| **Vehicle Width** | 2.87m (9.12ft) |
| **Type** | Diesel Electric |
| **Traction Power** | 1750 kW |
| **Top Speed** | 140km/h (87mph) |
| **Brake Types** | Indirectly (pneumatic) + dynamic brake |
| **Fuel tank capacity** | 2800 l |

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## 3.3 Cab Controls




| | | | |
|---|---|---|---|
| 1 | Override | 10 | Wipers |
| 2 | Free | 11 | Train Brake |
| 3 | Acknowledge | 12 | Loco Brake |
| 4 | Emergency Brake | 13 | Dynamic Brake |
| 5 | AFB Control | 14 | Headlight |
| 6 | Reverser | 15 | Sander |
| 7 | Power Controller | 16 | Horn |
| 8 | Engine Start/Stop | 17 | Brake Release |
| 9 | Cabin Light | 18 | High Horn |

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### 3.4 Shimmns

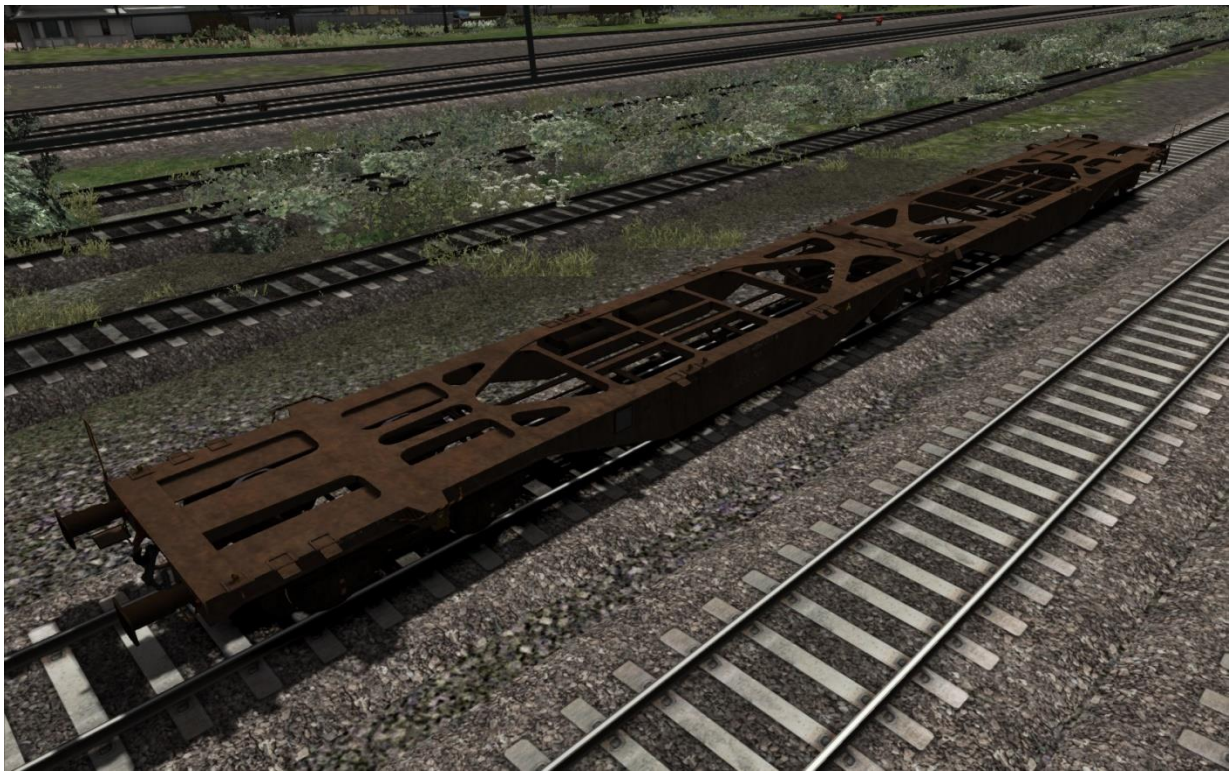


### 3.5 Zacns 95




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## 3.6 SSGGRSS



The SSGGRSS is available as an empty flat bed or with containers. There are five different containers for you to select.

| | |
|---|---|
| 1 | Eco Move |
| 2 | Energy Line |
| 3 | QD World Wide |
| 4 | RS Transco |
| 5 | Wave |

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# 4 DB REGIO BR442 ‘TALENT 2’

## 4.1 DB Regio BR 442




## 4.2 Design and Specification

| | |
|---|---|
| **Builder** | Bombardier Transportation |
| **Vehicle Length** | 40.1m (131.5ft) - two car unit |
| **Vehicle Width** | 2.92m (9.6ft) |
| **Drive** | Electric |
| **Acceleration** | 1.1m/s² |
| **Top Speed** | 160km/h (100mph) |
| **Brake Types** | Dynamic and air |
| **Current** | 15 kV |

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## 4.3 Cab Controls




| | |
|---|---|
| 1 | Combined Throttle and Brake |
| 2 | Reverser |
| 3 | Train Brake |
| 4 | Horns |
| 5 | Wipers |
| 6 | Headlights |
| 7 | Sanders |
| 8 | Cabin Lights |
| 9 | Pantograph |
| 10 | Speed Control Activate/Deactivate |
| 11 | Speed Control Speed Set |
| 12 | PZB Override |
| 13 | PZB Release |
| 14 | PZB Acknowledge |
| 15 | Instrument Lights |
| 16 | Apply Handbrake |
| 17 | Release Handbrake |

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# 5 GENERAL KEYBOARD CONTROLS

## 5.1 Locomotive Keyboard Controls

| Key Equivalent | Action |
|---|---|
| D / A | Decrease or Increase Throttle. |
| S / W | Move Reverser Control Forward or Backward. |
| ; / ‘ | Decrease or Increase Train Brake. |
| [ / ] | Decrease or Increase Locomotive Brake. |
| Y | Increase AFB |
| C | Decrease AFB |
| Shift+Enter(Numpad) | Activate/Deactivate SiFa |
| Ctrl+Enter(Numpad) | Activate/Deactivate PZB |
| Page Down | Acknowledge |
| End | Release |
| Delete | Override |

## 5.2 General Keyboard Controls

| Key Equivalent | Action |
|---|---|
| T | **Load/Unload.** Press to load/unload passengers or freight. |
| H | **Headlights.** Repeatedly pressing will cycle through headlight states as appropriate. |
| I | **Instrument Lights.** Press to toggle instrument lighting on and off. |
| L | **Cab Lighting.** Press to toggle the cab lighting on and off. |
| V | **Windscreen Wipers**. Press once to switch on and again to switch off. |
| Z | **(Expert) Engine Stop/Start**. By default engines will already be running at the start of a scenario. Press this button to stop and then again to restart the engine. |
| X | **(Expert) Sander**. Causes sand to be laid on the rails next to the wheels to assist with adhesion. Press once to apply sand and again to stop. |
| Space | **Horn.** Press to sound the horn. |
| / | **Handbrake On/Off.** This icon is displayed in the Coupling view. |
| Shift + Ctrl + C | Couple Manually**.** |
| Tab / Ctrl + Tab | Request authority to pass a signal at danger. |

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# 6 SIGNALLING

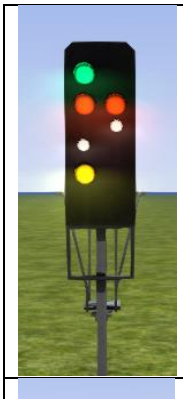
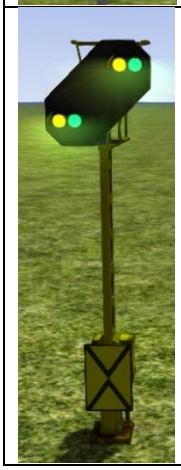
The signalling for the Mittenwaldbahn route consists of German and Austrian signal types. Below you can find information on both the German and Austrian signal systems.

## 6.1 German Signalling

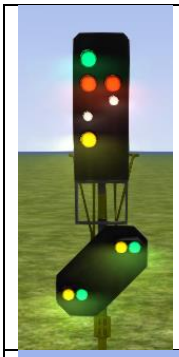
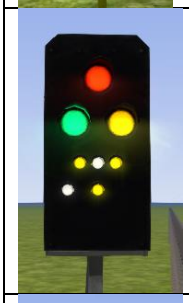
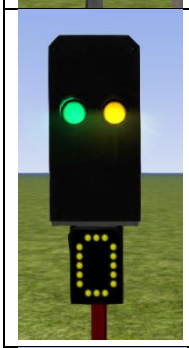
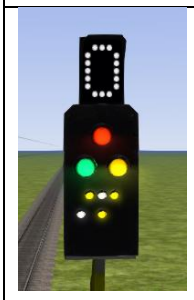
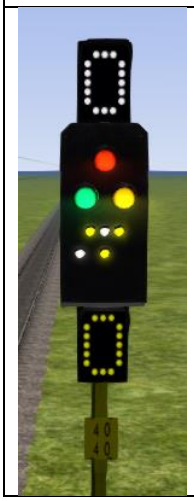
The signalling system employed on German Railways is extremely complex to understand at first; however in reality each signal you encounter will be composed of one or more straight forward signal types to give the final post.

This manual doesn't attempt to cover all the possible signal types and variations, but it should provide sufficient background as to let you work out what each signal post you come across is telling you by explaining the component parts. Note that any signal of a given type that you see should be interpreted the same whether it is on a post, on the ground, on a gantry or in any other position.

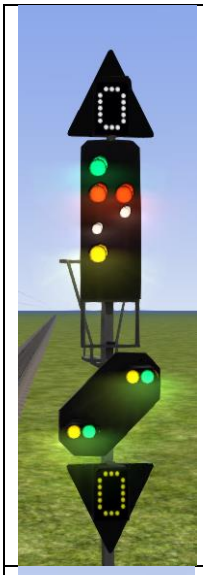
Note that in the examples below, the image shows the signal with all lights on so that you can clearly see where they are. The description of the signal describes the various combinations of lights and what they mean when lit. The small code before the description is the technical name by which that combination of lights is known.

| | |
|---|---|
|  | **Signal Type: Hp**<br><br>This is signal protects entry to a block.<br><br>Hp0 – Red, Stop - do not proceed<br>Hp1 - Green: Clear to proceed<br>Hp2 – Yellow and Green: Caution, Proceed at 40km/h<br>Sh 1 – Red and Double White: Shunting permitted |
|  | **Signal Type: Vr**<br><br>Vr signals are distant signal types and indicate to you what you should expect the *next* active signal to be showing.<br><br>Vr0 – Two Yellow – Caution, expect stop<br>Vr1 – Two Green – Expect Clear<br>Vr2 – Green/Yellow – Expect Caution with 40km/h restriction<br><br>Note the "X" post board at the bottom, any signal which has this board is indicating that the signal is to be interpreted as a Distant signal. |

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| | |
|---|---|
|  | **Combined Signal Type: Hp Vr**<br>This is an example of a combined signal, in this case the example shown is an “Hp Vr” combination. The functions of the individual signal heads are identical to those explained above but they are placed on the same post. |
|  | **Signal Type: Ks**<br><br>A newer signal type than the Hp signal but the function of it is the same.<br><br>Hp0 – Single Red – Stop, do not proceed.<br>Ks2 – Single Yellow – Caution, expect next signal at Danger<br>Ks1 – Single Green – Proceed at line speed<br>Ks1 Flashing – Proceed and expect speed reduction at next signal<br>Hp0 + Sh1 – Single Red + Two small white – Shunting permitted |
|  | **Combined Signal Type: Ks Zs3v**<br><br>The Ks distant signal in this combination functions as normal.<br>Zs3v signals are distant speed indicators. That is, you can expect the speed to change as indicated at the *next* signal. The indicator should be multiplied by 10 to get the speed restriction in km/h, for example, if the Zs3v indicator shows a “3” this means that the speed restriction will be 30km/h at the next signal.<br><br>The Zs3v signals are clearly identified by being *yellow* and placed *under* the signal. Note that fixed speed limits are often indicated with a yellow-backed triangle board rather than an LED signal as shown here. See the example Zs3v speed board below. |
|  | **Combined Signal Type: Ks Zs3**<br><br>Similar to the Zs3v signals, a Zs3 signal differs in that it is indicating the speed limit imposed by *this* signal. While travelling down the line you could reasonably expect to see a Ks Zs3v indicating 30km/h at the next signal, and then the next signal would be a Ks Zs3 indicating 30km/h starts at this signal.<br><br>The Zs3 signals are clearly identified by being *white* and placed *above* the signal. Note that fixed speed limits are often indicated with a white-backed triangle board rather than an LED signal as shown here. See the example Zs3 speed board below. |
|  | **Combined Signal Type: Ks Zs3 Zs3v**<br><br>Combining the signals shown previously, this will show you the speed limit imposed as of the section you are about to enter as well as the speed limit of the next section, allowing you adjust your speed through the section accordingly. |

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**Combined Signal Type: Hp Vr Zs3 Zs3v**

An example of how the signalling can begin to look very complex, however this is simply four signal types combined on to one post. Here you can see:

- permission to enter the next block on the Hp signal,
- indication of the signal state for the next signal on the Vr signal
- speed restriction starting from this signal via the Zs3 at the top
- speed restriction in place from the next signal via the Zs3v at the bottom



**Combined Signal Type: Vr Zs3v**

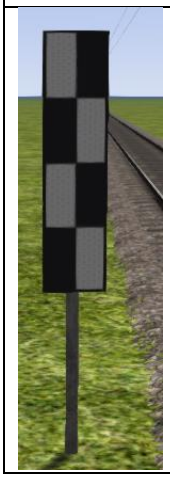
This signal combination naturally combines the distant Vr signal with the distant speed indication in the Zs3v signal.



**Signal Type: Hp Shunt**

This very simple signal will often be found as a ground frame or on a small post and is frequently used in yards and sidings. It has two indications:

Two Red lights – Stop, do not proceed
Two White Lights - Proceed

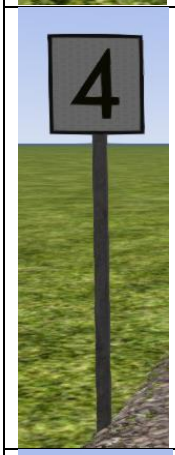
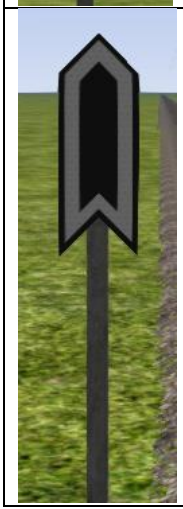


**Post Type: Ne4 Chessboard**

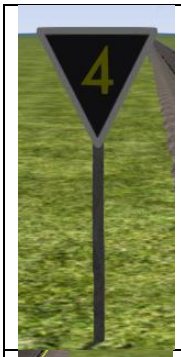
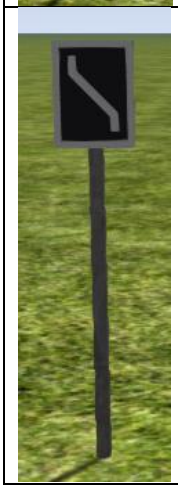
The Ne4 Chessboard is used to tell you that a signal that would normally be at this position has been placed in an alternative location, this could be further away from the track or on the other side of the track.

The Ne4 board is always located where the signal would normally expected to be positioned.

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| | |
|---|---|
|  | **Post Type: Lf6 Advance Warning Speed Post**<br><br>This speed post provides advance warning that a speed limit change is going to take place. In the example shown, the speed will soon be changing to 40km/h. Following an Lf6 you can expect an Lf7 to mark the start of the new speed limit. |
|  | **Post Type: Lf7 Speed Post**<br><br>This speed post marks the beginning of a change in speed limit. The example indicated marks the beginning of a 40km/h speed limit and you should not be exceeding this speed as you pass the post. |
|  | **Post Type: Arrow Indicator**<br><br>Where there might be confusion about which track a sign is associated with, a small arrow is placed to indicate which line the information applies to. In this example the Lf7 speed restriction applies to the track on the left of the post. |
|  | **Post Type: Zs10 End of Speed Restriction**<br><br>This post indicates the end of a speed restriction started by a Zs3. |

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| | |
|---|---|
|  | **Post Type: Zs3 Speed Post**<br><br>New speed limit takes effect immediately from this point. Shows one white number indicating the tenth the speed allowed from this point. This is normally used in conjunction with main signals. Permanent speed restrictions are instead indicated using Lf type signs. |
|  | **Post Type: Zs3v Distant Speed Post**<br><br>Shows one yellow number indicating the tenth of the speed allowed from the point where the following Zs3 signal is found. This plate is normally used in conjunction with distant (e.g. Vr) signals. |
|  | **Post Type: Zs6 Wrong Line Post**<br><br>This track change display plate is used to indicate that wrong line running (left hand) is to be used from this signal. It is only used in combination with main signals and only on lines where wrong line working is frequent. |

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## 6.2 Austrian Signalling

The other signalling used in this route is a form of the Austrian signalling system. Details regarding the types of signals used, the aspects of signals and various signs used in the route can be found below.

## 6.3 Main Signals

Main signals show whether the adjacent section of track may be used (travelled on). There are two styles of head – the older style head used before 1980 and the newer style head incorporated after 1980. The newer style head has more lamps integrated into it.

| DESCRIPTION | HISTORIC | MODERN |
|---|---|---|
| **DANGER / STOP**<br>The line ahead is occupied. |  |  |
| **CLEAR / PROCEED**<br>The line ahead is clear. |  |  |
| **PROCEED**<br>Do not exceed **40km/h**. |  |  |
| **PROCEED**<br>Do not exceed **60km/h**. | *N/A* |  |
| **PROCEED**<br>Do not exceed a speed that prevents the train stopping for any obstruction. | *N/A* |  |

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## 6.4 Distant Signals

A distant signal is used to show what the next main signal ahead is showing.

| DESCRIPTION | ASPECTS |
|---|---|
| **WARNING**<br>The MAIN signal is at **DANGER**. |  |
| **PROCEED**<br>The MAIN signal is at **CLEAR**. |  |
| **PROCEED**<br>The MAIN signal is displaying a **60km/h** restriction. |  |
| **PROCEED**<br>The MAIN signal is displaying a **40km/h** restriction. |  |

## 6.5 Combined Main and Distant

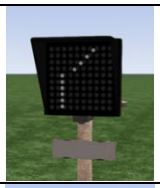
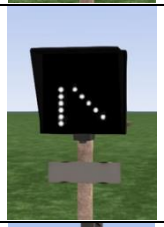
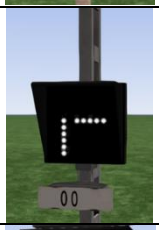
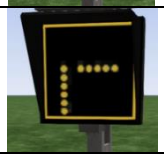
| DESCRIPTION | ASPECTS |
|---|---|
| Main and distant signals can be combined onto one post. The aspects they display are the same.<br><br>In the example on the left, the **MAIN** signalling is displaying **CLEAR** with a **40km/h** speed restriction, and the **DISTANT** is displaying **PROCEED** with a warning of a **60Km/h** speed restriction at the next signal. |  |

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## 6.6 Repeaters

A repeater is used when the visibility of the next main signal is insufficient – for example, there is a curve or tunnel in the way. More than one repeater may be used if necessary. A signal head with a yellow border and the caution aspect lit up in yellow rather than white has a 1000Hz magnet attached to it.

There are two variants of the repeater – an old style head and a new style head.

| DESCRIPTION | ASPECTS |
|---|---|
| **PROCEED**<br>The signal ahead is showing **CLEAR**. |  |
| **PROCEED**<br>The signal ahead is showing a **SPEED RESTRICTION**. |  |
| **WARNING**<br>The signal ahead is showing **DANGER**. |  |
| Warning as above, with **1000HZ PZB** functionality. |  |

## 6.7 Protection Signals Type 1

Protection signals are used to control train movements within stations and can be used for shunting movements as well. A protection signal will have a white border around the signal head to indicate that it is a protection signal.

| DESCRIPTION | ASPECT |
|---|---|
| **DANGER / STOP**<br>The line ahead is occupied. |  |
| **PROCEED**<br>The line ahead is empty. |  |

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## 6.8 Protection Signals Type 2

A Schutzsignale is a protection signal with a white stripe down the middle of the head. There is also a difference in that the CLEAR aspect will have two white lights diagonally lit up rather than the two white lights above each other on a typical protection signal.

| DESCRIPTION | ASPECTS |
|---|---|
| **DANGER / STOP**<br>The line ahead is occupied. |  |
| **PROCEED with CAUTION**.<br>Do not exceed a speed that prevents the train stopping for any obstruction. |  |
| **PROCEED**<br>The line ahead is empty. |  |

## 6.9 Block Signals

Block signals are used to break sections of track into blocks to manage the traffic flow of trains. In Austria, block signals can also be used to signal junctions and crossovers.

| DESCRIPTION | ASPECTS |
|---|---|
| **DANGER / STOP**<br>The line ahead is occupied. |  |
| **CLEAR / PROCEED**<br>The line ahead is clear. |  |

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## 6.10 Shunt Signals

A shunt signal is only valid for shunting.

| DESCRIPTION | ASPECTS |
|---|---|
| **STOP**<br>The route ahead is blocked. |  |
| **PROCEED**<br>The line ahead is clear. |  |

## 6.11 Obstruction Signals

This is a circle sign that sits on a buffer to indicate to the driver that they cannot pass that point.

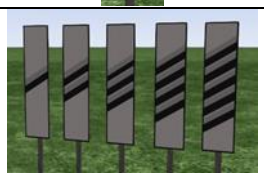
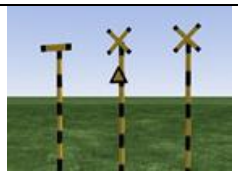
## 6.12 Signs and Speed Indicators

There are various signs placed above or below signals in this route. Listed below are the signs used and what they indicate.

| SIGN TYPE | MEANING |
|---|---|
| **AS** | These control any exiting movements from stations. |
| **ES** | These control any movements entering stations. |
| **ZS** | Indicates the signal is an intermediate signal. |

| SIGN TYPE | EXAMPLE | MEANING |
|---|---|---|
| **Zs3**<br>Dynamic Line Speed Indicator |  | This sits above a signal and it will light up with a number one tenth of the speed, which indicates to the driver that they must be travelling at no greater than that speed when they pass the signal. |
| **Lf6**<br>Warning of a change in permitted line speed |  | Advanced warning of a speed change. |
| **Lf7**<br>Permitted Line Speed |  | This sign is placed at the point of the speed change, when it is a change of at least 20%. |
| Temporary Speed Restriction Sign |  | This sign is used to indicate a temporary speed restriction. |

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| | | |
|---|---|---|
| Mast Boards |  | They are placed on stopping signals as a backup, so that if the red light ever fails on the signal, the board will indicate to the driver that they need to stop at the signal. |
| Countdown Marker Boards |  | A countdown marker board is used to announce a distant signal. There can be between three and five boards used to announce the distant signal depending on visibility. |
| Shunting Limit Sign |  | These signs indicate that a train performing a shunt movement cannot go past the sign (no part of the entire consist may pass this sign). |
| Announcement of a passenger stop sign |  | This sign is indicates simple passenger stops on free track. |
| Snow Plough Signs |  | These signs indicate the state that a snow plough should be in. |

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# 7 AFB

AFB stands for Automatische Fahr- und Bremssteuerung – or loosely translated in to English it means "Automatic Driving and Braking Control"

AFB allows the driver of the locomotive to set the target speed and then the computer in the locomotive will apply the throttle to obtain that speed and then keep applying throttle or brake in order to maintain it. You can almost think of it as a kind of Cruise Control for trains.

To operate AFB, simply follow these steps:

1. Set the AFB control to the desired speed. Note on the speedometer a small red triangle “bug” will slide around to the configured speed.

2. Move the throttle control to the desired level of acceleration, at this point the train will begin moving and accelerate to the configured speed.

All speed changes should be managed with the AFB control, simply change the target speed as required and the AFB Computer will apply throttle and brakes appropriately.

If you wish to come out of AFB control and return to manual control, simply set the target speed to 0km/h and then the throttle and brake controllers will return to normal manual functionality.

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# 8 SIFA

SIFA is short for Sicherheitsfahrschaltung or “Safety Driving Switch”.

The SIFA vigilance alarm is disabled when starting a scenario, but can be activated (or deactivated) by pressing ‘Shift+Enter (Numpad)’. While activated, the SIFA light on the cab dashboard is switched off. The driver is required to acknowledge the alarm every 30 seconds if the train is moving.

When the 30 second alarm is triggered, the SIFA light on the cab dashboard will illuminate. After an additional 4 seconds, an audible alert will sound. Following a further 2.5 seconds, the emergency brake will be applied. This can be avoided by acknowledging the alarm at any stage. This can be done by pressing the ‘Enter (Numpad)’ key.

## 8.1 Key Controls

| Function | Keyboard |
|---|---|
| Activate/Deactivate | Shift+Enter (Numpad) |
| Alarm Acknowledge | Enter (Numpad) |

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# 9 PZB SIGNALLING SYSTEM

PZB stands for Punktförmige Zugbeeinflussung. Loosely translated to English, this means “intermittent train protection”.

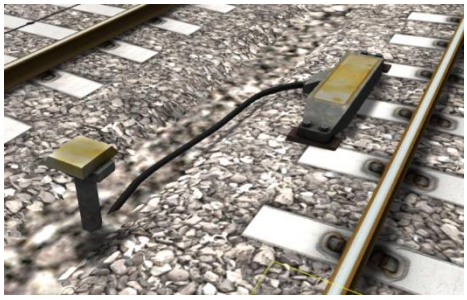
Safe distances between trains are managed conventionally through the use of block-based systems.

A given line is broken up into a series of blocks and trains are permitted (via green or yellow signals) to enter a block. While a train is present in a block the signal permitting entry is set to red, preventing any more trains to enter.

As railways have developed, more complex control systems and in-cab signalling have been implemented to improve the safety of the railways. To ensure that drivers are fully aware of what is happening around them, they are required to react to various alert systems depending on the situation.

PZB is a complex system that demands a very good understanding of the varying speed limits and the requirements to respond promptly to the signalling system.

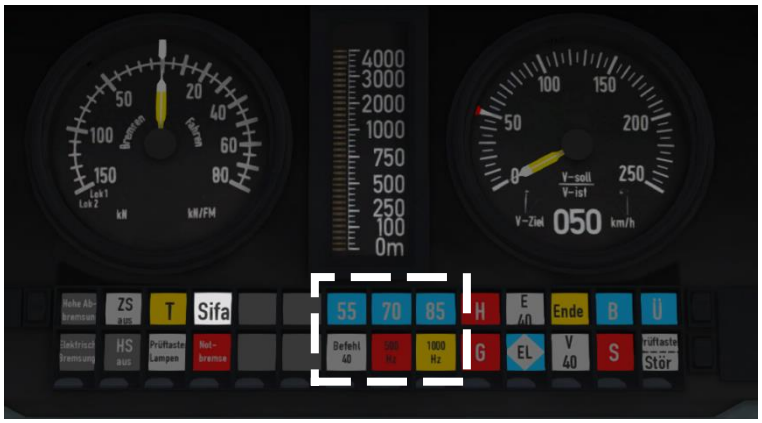
## 9.1 PZB Track Interface



The PZB system incorporates in-cab signalling. This is where the control desk has indicators, alarms and buttons that will react according to the signalling status on the railway. The mechanism by which this works is a series of “balise” magnets placed on the side of the track. An example of one of these magnets is shown in the image on the left.

## 9.2 In-Cab Indicators

Inside the cab, there are lights indicating the current state of the PZB system (as shown in the diagram below):




Take a look at the picture above. The section inside of the white dashed box shows the lights related to the PZB. It would be worth noting that the controls in the DB BR474 are similar but not identical.

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## 9.3 Cab Controls

There are also three controls on the cab desk that you can use to interact with the PZB system.




PZB controls on the Cab Desk of a BR474 (other locomotive controls would be similar but not identical)

These three controls, to the left of the control desk on the BR474, are named as follows:

1 – German: Befehl40 / English: PZB Override
2 – German: PZB Frei / English: PZB Release/Free
3 – German: PZB Wachsam / English: PZB Acknowledge

## 9.4 Train Types

The type of train you are driving is important in understanding how the PZB system works. It's also important to have a good understanding of the impact the PZB system has on the various speed limits.

There are three types of train that PZB deals with:

Type O (Obere) - Passenger trains
Type M (Mittlere) – Faster Freight Trains
Type U (Untere) – Slow / Heavy Freight Trains

The implementation of the PZB system within locomotives on the Hamburg S1 route automatically identifies the correct type of train. This is based on the train type configurations in the scenario. Once PZB is active you can see this in the PZB lamps as follows:

Type O – Lights up the 85 lamp
Type M – Lights up the 70 lamp
Type U – Lights up the 55 lamp

## 9.5 Key Controls

| Function | Keyboard |
|---|---|
| Activate/Deactivate | Ctrl+Enter(Numpad) |
| Acknowledge | Page Down |
| Release | End |
| Override | Delete |

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## 9.6 Example

For this example, we are driving a passenger train. The speed limits indicated in this example are therefore specific to a Type O service and will be different to the two other services.




There are three primary points noted in the diagram above:

A – The Distant Signal is usually around 1.2km from the hazard (such as a converging junction).
B – A point usually about 250m before the Guarding Signal.
C – The Guarding Signal is normally placed around 200m before the hazard.

Let's take a look at what happens in this simple example. We begin on the left hand side of the image above and progress along the track until you get to the Guarding Signal on the right. We'll assume that in this case there is a converging junction set against us and therefore the Guarding Signal is indicating that you should stop.



As you approach point A, the Distant Signal will show a yellow light to let you know that the signal at C is a red light, indicating danger.

You will also notice that there is a magnet next to this signal. This is called a 1000hz magnet.

As the signal is at anything other than a green light, the magnet will energise and the PZB system on-board the train will sense its presence. As the train passes over the 1000hz magnet, the driver has up to 4 seconds in which to press the PZB Wachsam/ Acknowledge key (Page Down). If the driver fails to do this, the PZB system will apply the emergency brakes in order to stop the train.




Note that there is no alert in the cab when we pass over the 1000hz magnet. This is because the driver is expected to be aware that they have passed a Distant Signal and react accordingly. Once the PZB Wachsam/ Acknowledge control is pressed, the display will update to indicate that the locomotive is now in a monitored state. As we are a Type O train, the 85 light and the 1000hz light will be activated.

We must not be exceeding 165km/h (103m/h) as we pass the 1000hz magnet, regardless of the line speed. If we are, there is a good chance we will not be able to fully stop before the signal at point C. Therefore, the PZB system will apply the emergency brakes.

We now have 23 seconds in which to decrease our speed to 85km/h (53m/h). If after 23 seconds we are exceeding this speed then the PZB system will apply emergency brakes.

We now continue on towards the guarded signal at no greater than 85km/h (53m/h).

After 700 meters, the 1000 Hz lamp will go out and we will no longer be monitored. Now the driver can make a decision based on what they can see. Can you see the Guarded Signal and is it still red, indicating danger?

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If it is, then we continue slowing down to stop. If the signal is now showing a clear aspect because the hazard has cleared, the driver has the option to release the locomotive from monitoring and they will then be permitted to return directly to line speed.
Press the PZB Frei / Release button to do this *before* the train reaches point B or further restrictions are put in place.

Caution: Be careful to ensure that you only release when the signal is clear. If you release and the signal is not clear when you reach Point B the system will assume that you are incapable of safely driving the locomotive and will apply the emergency brakes.

Assuming the signal is still at danger and we haven't released from monitoring, we will then reach Point B. At Point B there is another track magnet; the 500 Hz magnet.




As we pass the 500hz magnet, we must have slowed down to 65km/h (40m/h) or else we might not be able to stop in time for the signal. If that's the case, the PZB system will apply the emergency brakes. There is no need to acknowledge the 500hz magnet. At this point, the 500hz light on the control desk will activate, indicating the current restriction.

After passing the 500hz magnet, we must now decelerate to 45km/h (28m/h) within 153 meters.

Having slowed down to 45km/h (28m/h), we can draw up safely to the red signal and stop.

If the signal changes to a clear aspect while we are approaching, then we must continue with the 45km/h (28m/h) speed limit as we are still being monitored. It is not possible to release (PZB Frei) from monitoring while under a 500hz restriction. This restriction will continue for 250 meters, taking you past the Guard Signal, after which you will be able to return to line speed. This is the primary reason for releasing from monitoring before Point B (if and only if the signal is seen to be clear), otherwise you would be tied to running past the clear signal at the much reduced speed limit for an extra 250 meters instead of being able to return to normal line speed earlier.

If you pull up to the signal and stop because it is still red you may seek to obtain permission from the controller to pass it at danger. If you need to pass a signal that is still showing a red aspect then you will need to use the Befehl40 (Override) key to do so as you approach the red signal.

At Point C the Guard Signal has the third and final type of magnet, a 2000hz magnet. This magnet will *always* stop the train if passed and is used to stop trains that pass the signal while it is at danger. Pressing and holding Befehl40 (Override) key *stops* the PZB system from reacting to the 2000hz magnet. Once the 2000hz magnet is detected, the Befehl40 lamp comes on and you will then be restricted to a speed limit of 40km/h (25m/h). You should remain at this speed until either you have travelled for 2km, or you have passed a signal showing a clear aspect. Once either of these conditions pass you can press PZB Frei to release from monitoring and return to line speed.

## 9.7 Alternately Flashing PZB Indicators

There is an additional state called Restricted Monitoring, which may engage while you are travelling under the control of either the 1000hz or 500hz magnets. If you travel below 10km/h for more than 15 seconds or you stop completely at any point, the PZB display will start alternating between two of the speed lamps such as the 70 and 85 lamps, to indicate that restricted monitoring is now in place. Under these circumstances the speed limits to be imposed are reduced further. Full details about speed limits for all types of trains in both normal and restrictive monitoring are below.

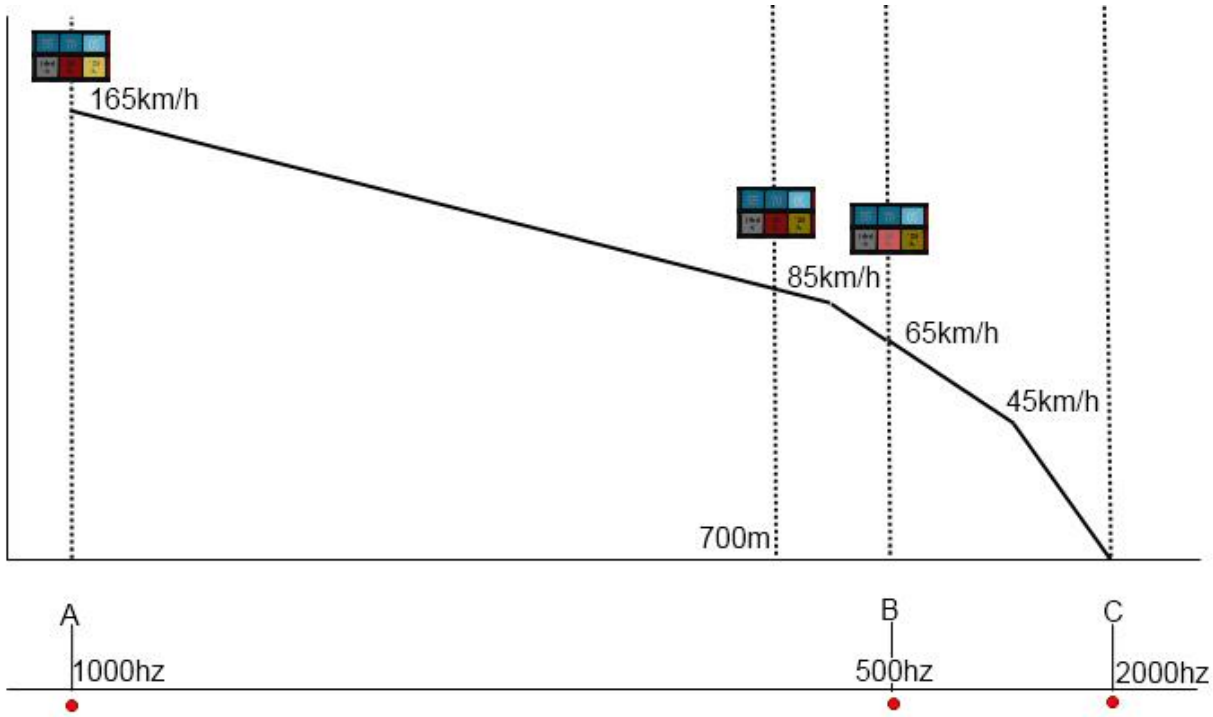
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## 9.8 PZB Speed Restrictions by Train Type

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

## 9.9 Example Run Graph

Here's a graphical layout of what happened in our example run, indicating the magnets, speed limits and what you would expect to see in the PZB indicator lamps.




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# 10 SCENARIOS

***For driving tutorials, please visit the Academy from the main TS2017 menu screen****

## 10.1 [BR442] 1. Going South

This morning, starting at Garmisch-Partenkirchen, you will be driving this southbound service to Innsbruck. Take in the views and enjoy the ride in this straight-forward run.

**Duration:** 80 Minutes
**Difficulty:** Easy

## 10.2 [BR442] 2. Mittenwald Shuttle

Tunnels are closed between Hochzirl and Innsbruck for repairs due to recent bad weather. Shuttle services are running between München (Munich) and Hochzirl. You will be in charge of one such service, starting at and returning to Mittenwald.

**Duration:** 45 Minutes
**Difficulty:** Hard

## 10.3 [BR442] 3. Innsbruck Shuttle

Tunnels are closed between Hochzirl and Innsbruck for repairs due to recent bad weather. Shuttle services are running between München (Munich) and Hochzirl. You will be in charge of the next shuttle service, this time you will be starting at and returning to Innsbruck.

**Duration:** 30 Minutes
**Difficulty:** Hard

## 10.4 [BR442] 4. Urgent Replacement

The unit booked for the 18:45 service to München (Munich) is suffering with door problems and you need to save the day. Starting at the sidings at Innsbruck drive the delayed service as far as Hochzirl.

**Duration:** 30 Minutes
**Difficulty:** Hard

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## 10.5 [ÖBB 2016] 5. Containers to Innsbruck

Due to ongoing maintenance works on the München (Munich) – Rosenheim route, your container train is re-routed over the Mittenwaldbahn. You are taking over this train at Seefeld and you will drive it to Innsbruck. The weather on this summer's day is absolutely brilliant, so enjoy a nice run through the Austrian Alps.

**Duration:** 40 Minutes
**Difficulty:** Medium

## 10.6 [ÖBB 2016] 6. Tourist Delays

Your duties this morning are to drive an ÖBB2016-hauled freight train over the alps into Germany. Be aware that you will be running behind a tourist special as far as Mittenwald, where another driver will take over, and you should expect to encounter some delays as a result.

**Duration:** 60 Minutes
**Difficulty:** Medium

## 10.7 [ÖBB 2016] 7. Unusual Freight

Freight trains from Germany to Austria normally don't run over the Mittenwaldbahn, but this night, due to a heavy snow storm, this route is the only remaining open route from München (Munich) to Austria, so your freight train was rerouted over this lovely, but not be underestimated route. You are driving a fuel train originating in Rotterdam and going to Wien (Vienna). It's a stormy night and your train is long and heavy. Unfortunately, the two DB BR101 that were tasked for this service broke down under the harsh conditions, so two ÖBB 2016 engines were brought as a replacement. It is your job to take this train down to Innsbruck, as far as Hochzirl.

**Duration:** 60 Minutes
**Difficulty:** Hard

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# 11 RAILFAN MODE SCENARIOS

Railfan Mode provides a unique chance to observe and enjoy the operations of trains without the pressure and involvement of driving them. Railfan Mode scenarios are positioned at various key points along the route and provide camera functionality to sit back and watch the action unfold.

These scenarios are located on the **Drive** screen under the **Career** tab.

## 11.1 [RailfanMode] Garmisch

**Duration:** 10 Minutes

## 11.2 [RailfanMode] Innsbruck

**Duration:** 10 Minutes

## 11.3 [RailfanMode] Mittenwald

**Duration:** 5 Minutes

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# 12 CREDITS

Dovetail Games would like to thank the following people for their contribution to the development of Mittenwaldbahn:

Beta Testing Team
Skyhook Games
Andreas Czudai




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