

The logo consists of the letters 'TS' in a bold, white, sans-serif font, centered within a blue square with a thin white border.A detailed screenshot from a train simulation game. A red OBB locomotive is pulling a long freight train with various colored containers across a large, multi-arched stone viaduct. The landscape is a lush, green mountain valley with dense evergreen forests. In the background, misty mountains are visible under a blue sky with light clouds. The train is moving away from the viewer, following the curve of the viaduct.

Semmeringbahn

dovetail
GAMES



1. ROUTE INFORMATION	3
2. LOCOMOTIVE	5
3. ROLLING STOCK	6
4. DRIVING THE ÖBB 1116	9
5. AFB SPEED CONTROL	11
6. SIFA SYSTEM	12
7. PZB SIGNALING	13
7.1 How to use PZB	14
8. SCENARIOS	15
8.1 1. [1116] The Sound of Mountains	15
8.2 2. [1116] Morning Haul	15
8.3 3. [1116] High up the Hill	15
8.4 4. [1116] The Lonely Driver	15
8.5 5. [1116] Climb Every Mountain	15
8.6 6. [1116] My Favourite Things	15
8.7 7. [1116] I Have Confidence	15
9. RAILFAN MODE SCENARIOS	16
9.1 [RailfanMode] Payerbach-Reichenau	16
9.2 [RailfanMode] Semmering	16
9.3 [RailfanMode] Spital am Semmering	16
10. SIGNALING	17
10.1 MAIN SIGNALS	17
10.2 DISTANT SIGNALS	18
10.3 COMBINED MAIN AND DISTANT	18
10.4 REPEATERS	19
10.5 PROTECTION SIGNALS TYPE 1	19
10.6 PROTECTION SIGNALS TYPE 2	20
10.7 BLOCK SIGNALS	20
10.8 SHUNT SIGNALS	21
10.9 OBSTRUCTION SIGNALS	21
10.10 SIGNS AND SPEED INDICATORS	21
11. ACKNOWLEDGEMENTS	23

1. Route Information

Background

The railway connects the Austrian towns of Mürzzuschlag and Gloggnitz whilst traversing the heavily mountainous terrain of Semmering Pass. It was the first standard gauge mountain railway ever constructed and is considered the first 'true' mountain railway due to the immense change in altitude and the very difficult terrain across the route.

The line itself sees a 457m altitude difference in the space of 41km, 60% of the track is on a 2-2.5% (around 1:40) gradient with as much as 16% featuring very tight radius curves at only 190m. These feats of engineering combined together to make one of the most picturesque rail journeys in Europe, with tourism booming following the completion of the line.

The Semmering Railway features many structures along the line to aid in crossing some of the deep valleys and getting passed the mountains. There are over 100 stone bridges, 11 iron bridges, 14 viaducts of which some are two storeys high and 16 tunnels that add up to just over 6km long. The 14 viaducts add up to a length of almost 1.5km.

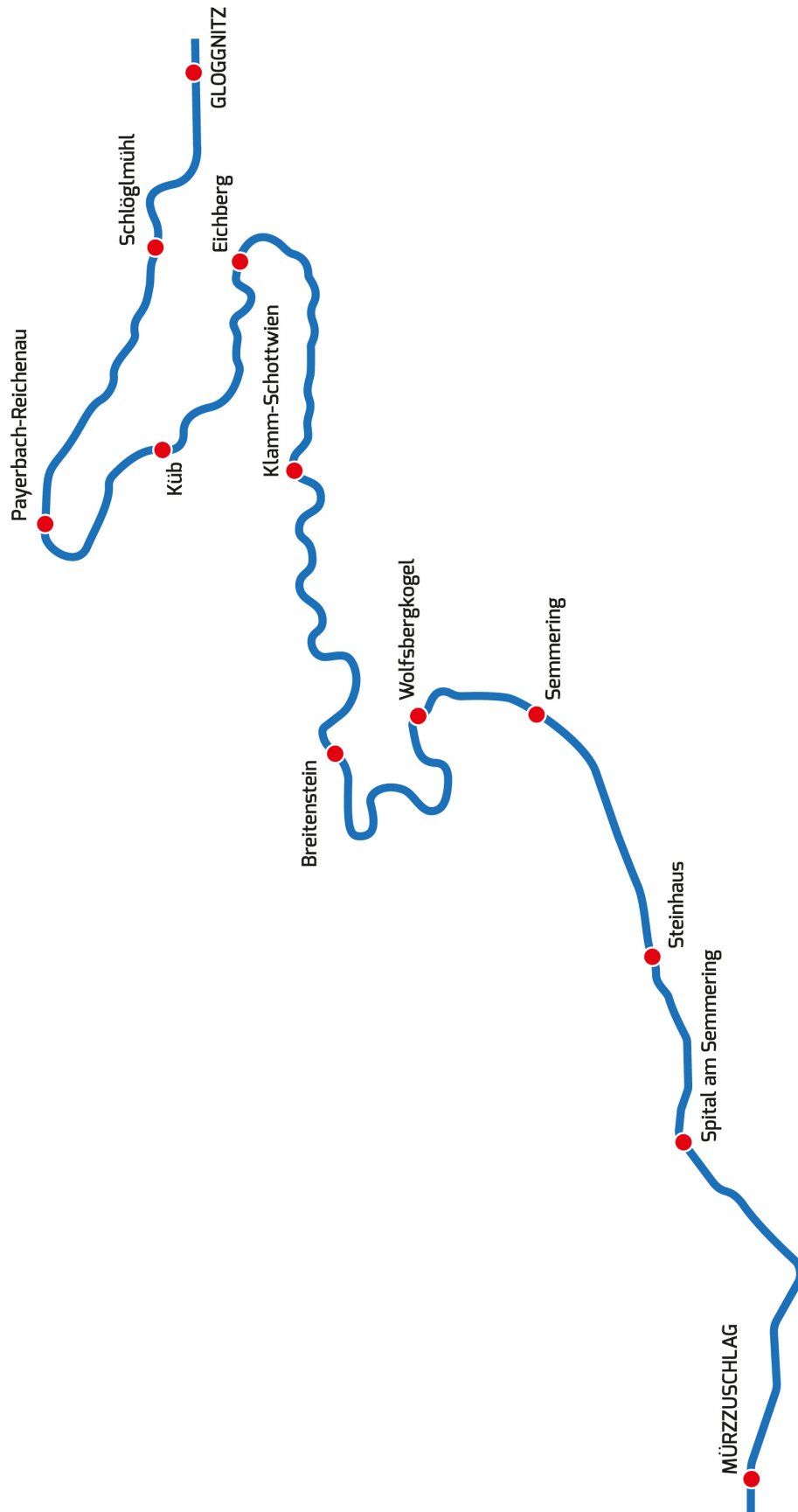
The incredible grades and tight curves along the Semmering Railway resulted in the need for new locomotives that could more easily handle the task. To decide which locomotives these would be, a competition was held. The new locos had to be able to traverse the grades and curves while maintaining a minimum speed of 11.5 km/h. Four companies submitted their locos and even though they were all successful in trial runs, they weren't reliable enough in running.

Eventually, the railway settled for the Engerth locomotive, a unique articulated tender loco that had a top speed of 19 km/h up the steepest gradients thanks to the weight of the fuel and water being spread across all the axels, providing more traction.

The increased accessibility to the mountains set the path for purpose built Alpine resorts, with parts of the railway becoming known for their summer orientated architecture such as hotels and villas. It also lead to the construction of residential areas, which created a new form of landscape not usually seen on mountainous terrain. The line was electrified with the 15 kV overhead catenary system between 1957 and 1959. This vastly changed the appearance of the route, but didn't have much of an effect on the overall view.

Today the line is owned and operated by the Austrian Federal Railways some 160 years after its construction and plays a key role in connecting Vienna and Graz as part of the ÖBB Southern Railway. The Semmering Railway was listed as a UNESCO World Heritage site in 1998. Despite the fantastic scenery, towering bridges and challenging grades, a new 27.3km tunnel is being constructed under the mountains to bypass the Semmering Railway. This will be known as the Semmering Base Tunnel and is expected to open in 2024.

The Route



2. Locomotive

ÖBB 1116 (Europrinter)



Builder	Siemens
Locomotive Weight	86 tonnes
Vehicle Length	19.28m
Engine Power	6,400kW
Max Speed	230km/h
Power System	15kV & 25kV OHE

The EuroSprinter is a family of electric locomotives built by Siemens primarily for the European market. The product name for the EuroSprinters is ES 64, ES meaning EuroSprinter and 64 representing the 6400 kW power output from the locos. Different variants are indicated by a letter following the product name. Some examples are: ES 64 'P' meaning **P**rototype; or ES 64 'F' meaning **F**reight. Additional classification may be required to designate how many power types the locomotive houses, for example one that could operate on both the 15 kV and 25 kV catenary would be an ES 64 U2.

3. Rolling Stock

ÖBB 1116



SGGR55 Wagon



Habbins Wagon



Zags Wagon



TDRRS Wagon



Bmz Eurofima Coach



4. Driving the ÖBB 1116

Cab Controls (ÖBB 1116)



1	Throttle	13	Circuit Breaker
2	Train Brake	14	Pantograph
3	Electric Brake	15	CDM Free
4	Direct Brake	16	CDM Acknowledge
5	Horn	17	Traction Cooling
6	Headlights	18	AFB Speed
7	Instrument Lights	19	Battery
8	Cab Light	20	Pantograph Selector
9	Train Length	21	Air Brake Mode
10	Sander	22	Stationary Brake Apply
11	Wipers	23	Stationary Brake Release
12	Reverser		

Locomotive Keyboard Controls

Key Equivalent

Action

A / D	Increase or Decrease the Throttle.
W / S	Move reverser control Forward or Backward.
; / '	Increase or Decrease the Train Brake.
[/]	Increase or Decrease the Direct Brake.
< >	Increase or Decrease the Electric Brake

General Keyboard Controls

Key Equivalent	Action
T	Load/Unload. Press once to load/unload passengers or freight.
X	Sander. Causes sand to be laid on the rails next to the wheels to assist with adhesion. Press to toggle activation.
H	Headlights. Repeatedly pressing will cycle through headlight states where appropriate.
V	Windscreen Wipers. Press once to switch on and again to switch off.
Ctrl + V	Windscreen Wipers (Intermittent). Switch wipers between constant and intermittent mode.
Z	Circuit Breaker. Stops and restarts the engine.
Ctrl + Z	Battery. Turn the locomotive battery on or off.
Space	Horn (High Tone). Press to sound the high tone horn.
B	Horn (Low Tone). Press to sound the low tone horn
/	Handbrake. Press to toggle the train Handbrake on and off.
L	Cab Lights. Toggle the Cab overhead light on and off.
Ctrl + L	Desk Light. Toggle the Cab desk light on and off.
I	Instrument Lights. Toggle all Instrument Lights
P	Pantograph. Raise and lower the selected pantograph.
Shift + P	Pantograph Select. Cycle to the next pantograph.
Ctrl + Shift + C	Couple manually.

5. AFB Speed Control

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. Release the brakes.
3. 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.

Key Controls

Function	Keyboard
Enable / Increase Speed	Y
Disable / Decrease Speed	C

6. Sifa System

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

The Sifa vigilance alerter is disabled at startup, but can be activated or deactivated by pressing ‘Shift+Enter(Numpad)’. While activated the Sifa light on the cab dashboard is normally switched off. While the train is moving the driver is required to confirm an alarm every 30 seconds.

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

It is possible to release the brake triggered by a Sifa emergency application by acknowledging the alarm. After acknowledging the emergency, the brake will be released but the loco will not be able to apply power until the throttle is first set to the off position.

Key Controls

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

7. PZB Signaling

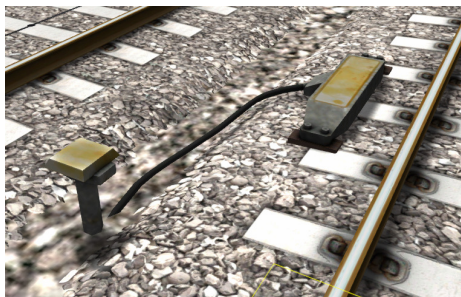
PZB stands for Punktförmige Zugbeeinflussung loosely translated this means “Spotwise Train Control”.

Safe distances between trains are managed conventionally through the use of block-based systems. A given line is broken up in to 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 and to ensure that drivers are fully aware of what is happening around them by requiring them to react in certain ways according to what is happening.

PZB is a complex system and requires that you understand the varying speed limits and the requirement to respond promptly to the signalling system.

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.

Cab Controls

There are also three controls on the cab desk that you will need to use in order to interact with the PZB system. These three controls, to the left of the control desk, are: Override / Free / Acknowledge

Key Controls

Function	Keyboard
Activate/Change Mode	Ctrl+Enter(Numpad)
Deactivate/Change Mode	Ctrl+Shift+Enter(Numpad)
Acknowledge	Page Down
Free	End
Override	Delete

Once activated, PZB will be in **Monitoring Mode**. During this time, do not exceed **45Km/h**. If the line is free of danger, you can release the train from this mode by pressing **PZB Free**.

7.1 How to use PZB

PZB requires interaction for any **Distant** signal (*Vr*) on the approach to a Main signal (*Hp*) displaying any aspect other than **CLEAR**. PZB also requires interaction at any **Lf6** board (*which warn about a speed reduction*).

<u>EVENT</u>	<u>MODE - O (Upper) 85 160Km/h Vmax Trains</u>	<u>MODE - M (Middle) 70 120Km/h Vmax Trains</u>	<u>MODE - U (Lower) 55 100Km/h Vmax Trains</u>
At the Distant or Combined signal, or Lf6 board.	Press PZB Acknowledge.	Press PZB Acknowledge.	Press PZB Acknowledge.
Monitoring Mode is activated and the YELLOW 1000Hz light turns ON .	The 85 light will start to flash. You now have 23secs to reduce below 85Km/h .	The 70 light will start to flash. You now have 26secs to reduce below 70Km/h .	The 55 light will start to flash. You now have 34secs to reduce below 55Km/h .
After travelling 700m the YELLOW 1000Hz light turns OFF .	If Main signal is now CLEAR , or you are at the new permitted line speed, press PZB Free . The 85 light will go out and you can continue at the permitted speed. If Main signal is still at DANGER , reduce to below 65Km/h BEFORE passing the 500Hz magnet.	If Main signal is now CLEAR , or you are at the new permitted line speed, press PZB Free . The 70 light will go out and you can continue at the permitted speed. If Main signal is still at DANGER , reduce to below 50Km/h BEFORE passing the 500Hz magnet.	If Main signal is now CLEAR , or you are at the new permitted line speed, press PZB Free . The 55 light will go out and you can continue at the permitted speed. If Main signal is still at DANGER , reduce to below 40Km/h BEFORE passing the 500Hz magnet.
At the 500Hz Magnet the RED 500Hz light turns ON .	The 85 light stops flashing. Reduce to 45Km/h within 153m and prepare to stop for signal.	The 70 light stops flashing. Reduce to 35Km/h within 153m and prepare to stop for signal.	The 55 light stops flashing. Reduce to 25Km/h within 153m and prepare to stop for signal.
If the Main signal is still at DANGER .	Stop the train before reaching the signal and 2000Hz magnet.	Stop the train before reaching the signal and 2000Hz magnet.	Stop the train before reaching the signal and 2000Hz magnet.
If the Main signal is now CLEAR .	Continue at 45Km/h . The 500Hz light will remain ON.	Continue at 35Km/h . The 500Hz light will remain ON.	Continue at 25Km/h . The 500Hz light will remain ON.
After travelling 300m the RED 500Hz light turns OFF .	The train can now accelerate to the permitted line speed.	The train can now accelerate to the permitted line speed.	The train can now accelerate to the permitted line speed.

8. Scenarios

8.1 1. [1116] The Sound of Mountains

Crossing the Semmering Pass is an incredibly scenic experience. Take control of a frequent regional service that traverses the line on its way south from Vienna.

- Difficulty: Easy
- Duration: 15 Minutes

8.2 2. [1116] Morning Haul

The Semmeringbahn is a vital rail corridor and requires full-time maintenance. Shuttle one of the numerous engineers trains down the valley to be restocked for another nights work.

- Difficulty: Easy
- Duration: 20 Minutes

8.3 3. [1116] High up the Hill

Take control of a northbound freight train taking bottled water to Germany. You'll be in charge for the climb out of Mürzzuschlag as far as Semmering.

- Difficulty: Easy
- Duration: 15 Minutes

8.4 4. [1116] The Lonely Driver

It's now time to pilot some of the heavier trains that traverse this important freight corridor. This run sees you take a train of sand hoppers down to Gloggnitz for the onward transit.

- Difficulty: Medium
- Duration: 35 Minutes

8.5 5. [1116] Climb Every Mountain

Climb aboard a container train of electrical goods bound for Italy. You're in charge, all the way to Müzzuschlag.

- Difficulty: Medium
- Duration: 45 Minutes

8.6 6. [1116] My Favourite Things

Take a break from all the freight action and lend a hand operating a passenger service to Gloggnitz.

- Difficulty: Medium
- Duration: 55 Minutes

8.7 7. [1116] I Have Confidence

A shipment of aviation fuel is heading north to Poland and a delay here could have a big impact on the customer. It's important you get the train safely over Semmering Pass.

- Difficulty: Hard
- Duration: 45 Minutes

9. 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.

9.1 [RailfanMode] Payerbach-Reichenau

- Duration 15 Minutes

9.2 [RailfanMode] Semmering

- Duration 17 Minutes

9.3 [RailfanMode] Spital am Semmering

- Duration 12 Minutes

10. Signaling

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

10.1 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 The line ahead is occupied.		
CLEAR / PROCEED The line ahead is clear.		
PROCEED Do not exceed 40km/h.		
PROCEED Do not exceed 60km/h.	N/A	
PROCEED Do not exceed a speed that prevents the train stopping for any obstruction.	N/A	

10.2 DISTANT SIGNALS

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

DESCRIPTION	ASPECTS
WARNING The MAIN signal is at DANGER.	
PROCEED The MAIN signal is at CLEAR.	
PROCEED The MAIN signal is displaying a 60km/h restriction.	
PROCEED The MAIN signal is displaying a 40km/h restriction.	

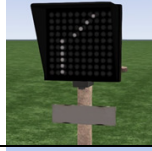
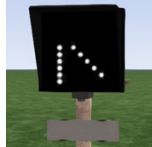
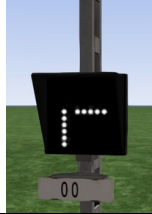
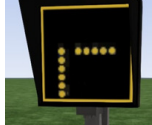
10.3 COMBINED MAIN AND DISTANT

DESCRIPTION	ASPECTS
Main and distant signals can be combined onto one post. The aspects they display are the same. In the example on the left, the MAIN signaling 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.	

10.4 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 The signal ahead is showing CLEAR .	
PROCEED The signal ahead is showing a SPEED RESTRICTION .	
WARNING The signal ahead is showing DANGER .	
Warning as above, with 1000HZ PZB functionality.	

10.5 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 The line ahead is occupied.	
PROCEED The line ahead is empty.	

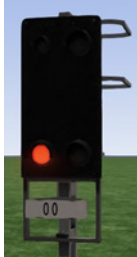
10.6 PROTECTION SIGNALS TYPE 2

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 The line ahead is occupied.	
PROCEED with CAUTION. Do not exceed a speed that prevents the train stopping for any obstruction.	
PROCEED The line ahead is empty.	

10.7 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 The line ahead is occupied.	
CLEAR / PROCEED The line ahead is clear.	

10.8 SHUNT SIGNALS

A shunt signal is only valid for shunting.

DESCRIPTION	ASPECTS
STOP The route ahead is blocked.	
PROCEED The line ahead is clear.	

10.9 OBSTRUCTION SIGNALS

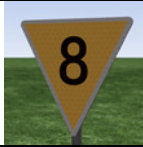
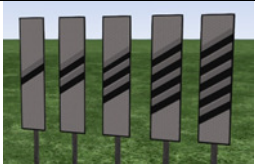
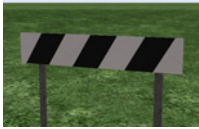
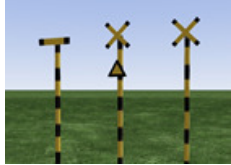
This is a circle sign that sits on a buffer to indicate to the driver that they cannot pass that point.

10.10 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 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 Warning of a change in permitted line speed		Advanced warning of a speed change.
Lf7 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.
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.

11. Acknowledgements

Dovetail Games would like to thank the following people for their contribution to the development of the Semmeringbahn route.

Stuart Galbraith - Route building

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