

Arosa Line – Chur to Arosa



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I Route Information

I.1 History

The 25 km long Arosa Line winds its way from Chur, the oldest town in Switzerland, up to the Summer and Winter tourist resort of Arosa. The line was opened in December 1914 to both passengers and freight. Surprisingly, the distance between the two towns is less than 14 km and the route gains its length from a multitude of hairpin turns which help it climb over the 1,100 m that separates the two communities.



The Arosa Line also features a large number of tunnels and viaducts, including the Langwieser Viaduct, a pioneering reinforced concrete structure that spans the Plessur River with the single track. The site today is of national significance, and in the winter months, Christmas lights are hung from the viaduct so it can be seen for miles after dusk. Given all the twists, turns and structures, it takes about an hour to traverse this breath-taking line.

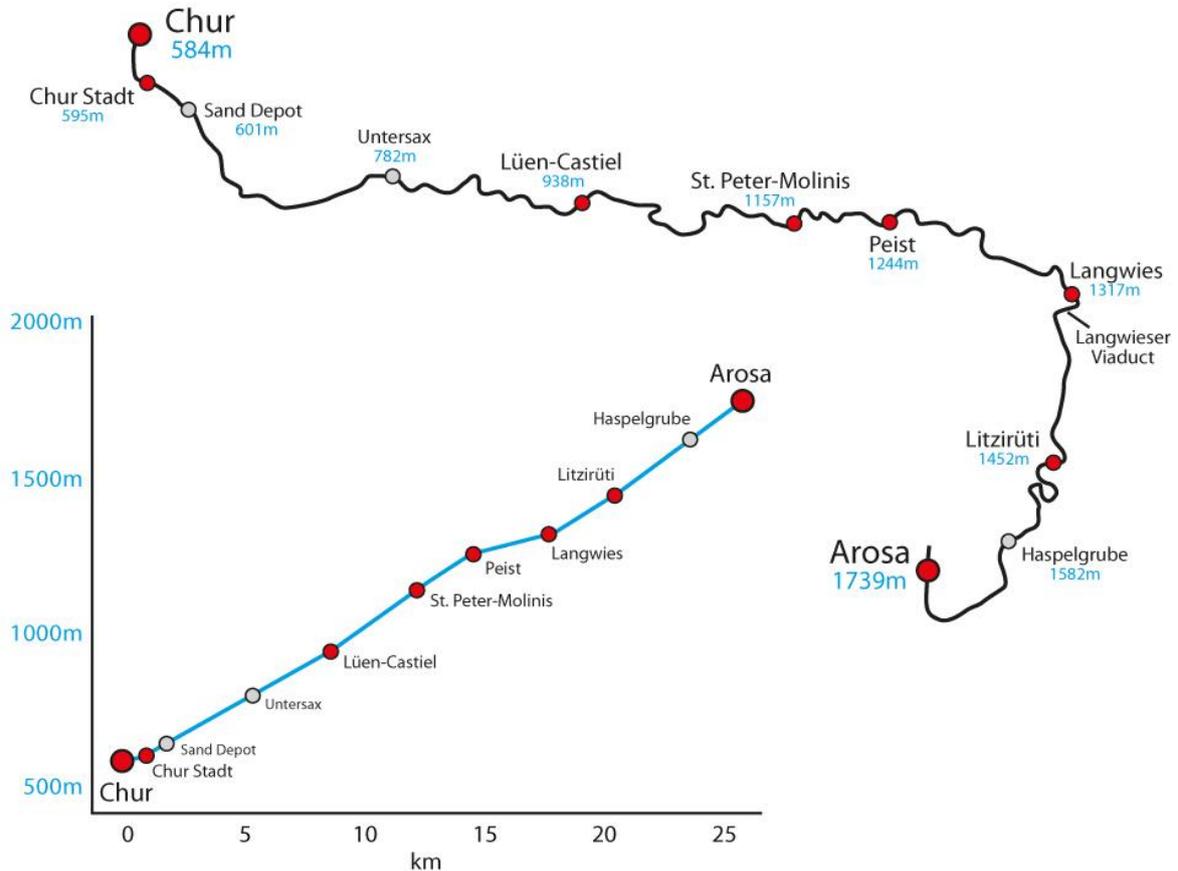
While a standard route nonetheless, the approach to and from Chur is most unique. Over 2 km of the track outside Chur's main station runs through the streets of the town itself, this is known as the Chur stadtbahn (town railway), and requires extra vigilance as you share track with road traffic and pedestrians. This entire stretch has been carefully modelled and detailed to provide a unique driving experience in Train Simulator.

With Arosa being a tourist resort all year round, the line sees a lot of passenger traffic, but a significant amount of freight is also transported between the two towns. Mixed trains are a common occurrence on the RhB railway network, so having to haul a little extra load is to be expected. Uniquely, it is not just locomotives that do the hauling, the local electric multiple units will also carry extra passenger coaches, as well as freight, along this incredible railway.

The latest EMU to be put to work along the Arosa Line is the RhB ABe 8/12 Allegra, this 3-car unit was introduced in 2009 and is designed to handle the steepest grades of the RhB railway network, such as those found between Chur and Arosa. The Allegra offers unmatched views for first class passengers, where windows can provide a driver's eye view of the mountains, and is easily accessible with a low floored centre coach. Not only does the Allegra perform as expected, it exceeded all measures in December 2009 when a not-in-service unit set a new metre gauge speed record, clocking in at 139 km/h. A total of 15 Allegra ABe 8/12s operate in Switzerland, and all of them are named after famed Swiss men, including Friedrich Hennings, chairman of construction for the Albula Line, and Willem Jan Holsboer, a founder of the Rhaetian Railway (RhB).

We have designed the new Allegra to be compatible with our dynamic pantograph height feature developed for our Albula Line and also adopted for the Arosa Line.

1.2 Route Map



1.3 Route Features

- Metre gauge track system with 3D sleepers, animated junction levers and illuminated indicators covering the 25 km line.
- RhB signalling system with custom designed signal models and features including:
 - Arosa group signals unique to this line
 - Animated Brake Test and “Abfahrbefehl” (departure indicators)
 - Operating “Besetztes Gleis” indicators for entering occupied platforms
 - Three state ground signals that function correctly between main signals
 - ZSI-90 Safety System track magnets and in-cabin equipment
- All new request stop features designed especially for the Arosa Line.
- Over 100 overhead line equipment and catenary models.
- Dynamically operating pantographs for the Abe 8/12 Allegra. Player locomotives have pantographs that dynamically follow the height of the overhead wires and lower through tunnels.

- Over 50 custom bridge and tunnel portal models designed to accurately represent the stunning engineering of the route.
- Highly detailed station models designed from our survey of the route in early 2017 along with many other feature models along the line.
- Animated ski lift models in Arosa.
- Detailed rock face models to capture the breath-taking scenery of the route.



- All new ABe 8/12 Allegra Electric Multiple Unit in branded RhB livery with correct body side nameplates for all fifteen set numbers (3501 – 3515). Dynamic and selectable pantographs with sparking feature. Animated wing mirrors and exterior driver character that automatically moves to the driving end of the train. Player selectable destination system. Automatic speed control system and a host of other in cabin features.
- Passenger view for the EWA coach of the Allegra where you can take in the breath-taking scenery and observe the driver's cabin through the glass partition.
- Lb-v container wagons, Sp-w timber wagons and all-new Fac hopper wagons are included.
- Route fully configured for Quick Drive scenarios and Allegra trainset compatible with our existing Albula route Quick Drive (Albula Line available separately).
- 3 x Railfan mode scenarios.
- 7 x Career scenarios including a guided tutorial for the ABe 8/12 Allegra train.



2 The ABe 8/12 Allegra

2.1 Train History

The Rhaetian Railway ABe 8/12 is also known as an Allegra. It is a dual voltage, metre gauge, 3-car multiple unit. The Swiss locomotive and railcar classification system dictates the train name with ABe 8/12 denoting an electric railcar train with first and second class compartments, and a total of 12 axles, eight of which have powered traction motors.

The ABe 8/12 trains were delivered between 2009 and 2011. They have been built for routes with steep inclines such as the Arosa line, the Bernina Railway, and the line from Landquart to Davos. They are dual voltage trains, to enable them to run on both the Rhaetian Railway's core network, which is electrified at 11 kV AC, and on the Bernina Railway, which is electrified at 1,000 V DC.

The first class compartment at the front and rear of each set offers a view of the driver's cabin and line ahead.

On the 5th of December 2009, during regular testing in the Vereina Tunnel, an Allegra set a new metre gauge railway speed record of 139 km/h.

2.2 Design & Specification

Number Range	3501 - 3515
Coach Wheel Arrangement	Bo-Bo
Weight	106 tonnes
Set Length	49.5 m
Width	2.65 m
Power Output	AC: 2,800 kW DC: 2,400 kW
Max Speed	100 km/h

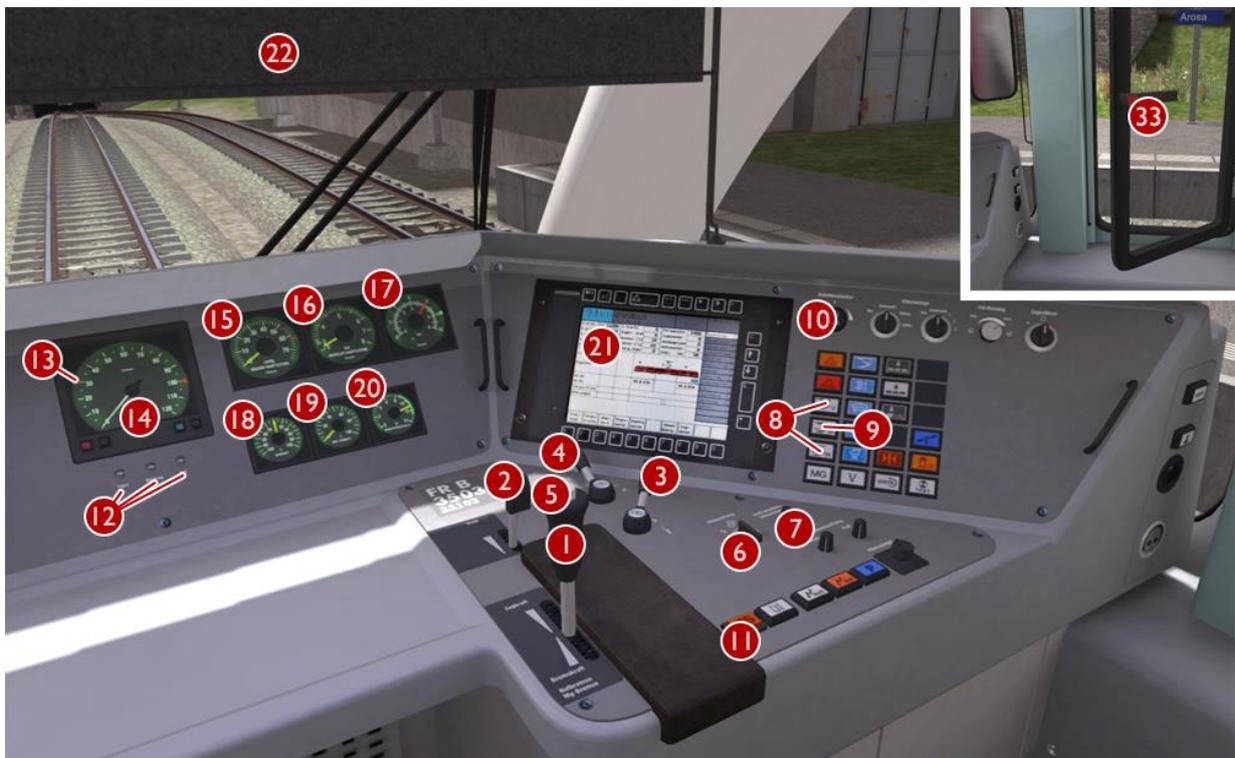
2.3 Additional Keyboard Controls

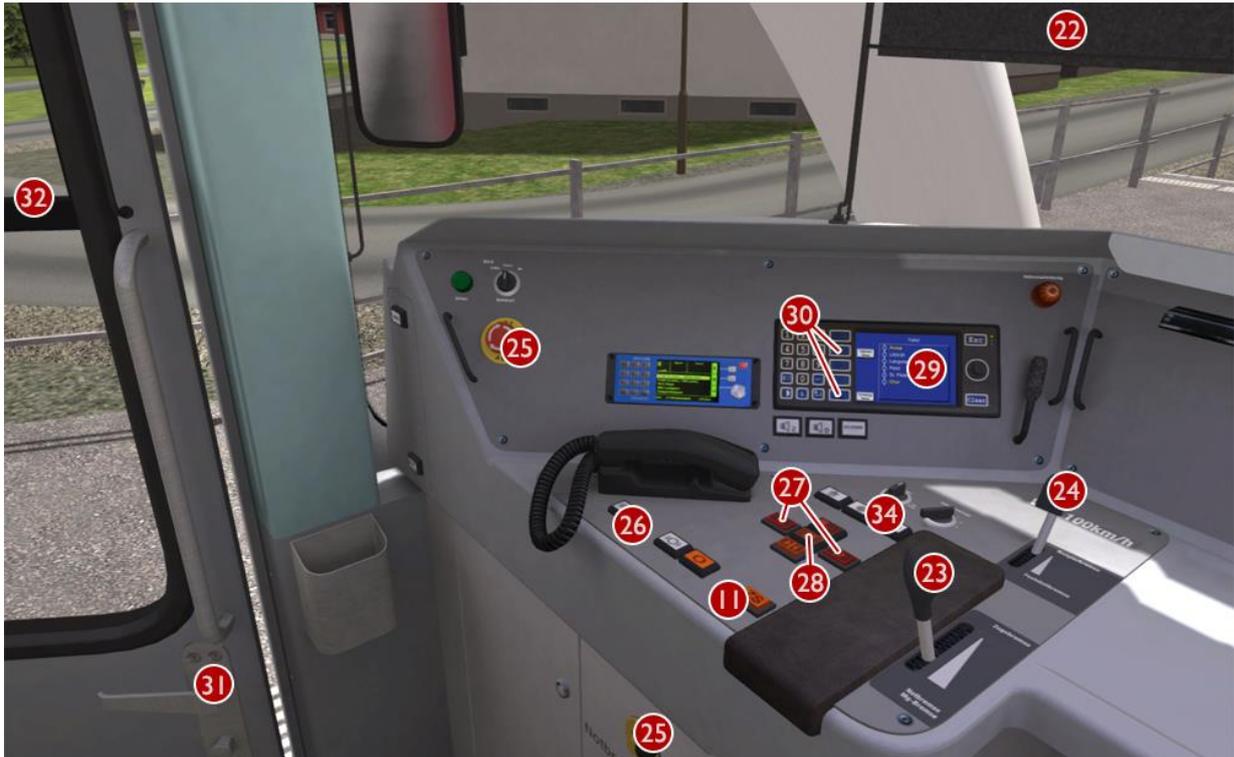
L – Toggle Cab Light On / Off	V – Toggle Wipers On / Off
I – Increase Instrument Lights	SHIFT + P – Select Centre Pantograph
SHIFT + I – Decrease Instrument Lights	CTRL + P – Select Outer Pantographs
Q – ZSI Acknowledge	P – Toggle Main Switch (Drop/Raise Pantos)
Y – Increase V _{soll} Lever Position	X – Toggle Sander
C – Decrease V _{soll} Lever Position	

2.4 Cabin Controls

1	Combined Throttle and Dynamic Brake	18	Train Braking Force Indicator
2	Vsoll Lever (Speed Control Select)	19	Differential Traction Force Indicator
3	Reverser	20	Catenary Voltage Indicator
4	Main Switch (Drop/Raise Pantographs)	21	Train Status and Clock Display
5	Warning Whistle	22	Sun Visor
6	Headlights Selector Switch	23	Train Vacuum Brake Lever
7	Instrument Lights Dimmer	24	Unit Air Brake and Parking Brake Lever
8	Outer Pantographs Selector	25	Emergency Brake
9	Inner Pantograph Selector	26	Cabin Lights Button
10	Wiper Switch	27	Doors Open Indicator Lamps
11	ZSI Acknowledge Button	28	Request Stop Halt Indicator Lamp
12	ZSI System Lamps	29	Current Destination / Route Display
13	Vsoll Speed Selected Indicator	30	Destination Select Buttons
14	Speedometer KPH	31	Opening Cabin Door
15	Train Vacuum Braking Pressure Indicator	32	Opening Cabin Door Window
16	Brake Pipe Pressure Indicator	33	Opening Cabin Window
17	Brake Cylinder / Main Reservoir Indicator	34	Sander Button

Refer to the illustrations on this page and on page 8.





Note: Controls that are not identified above have no function even if they are animated.

2.5 Vsoll Lever and Speedometer Indicator (Speed Control System)

The Allegra is equipped with automatic speed control. The desired maximum speed for the line ahead should be selected using the Vsoll Lever and this will be indicated by the moving Vsoll Speed Indicator on the Speedometer. Speed selection can be made in 5 km/h increments from 5 to 100 km/h. There is also an additional selection of 33 km/h provided specially for the Arosa Line.

This system makes use of the power provided by the driver's throttle selection and cannot exceed this level. The driver must gradually increase the throttle when starting to move the train. If the Allegra is hauling coaches and wagons then the level of the throttle will need to be higher than normal.

When hauling coaches and wagons the driver must also supplement and balance the system by manually applying the Train Vacuum Brake and/or the unit Air Brake. This is especially important when braking at lower speeds as the speed control system only uses the dynamic brake and this is much less effective at lower speeds.

2.6 ZSI-90 Safety System

You are alerted by the ZSI safety system when you pass a distant signal (Vorsignal) that is displaying a warning. The ZSI Acknowledge Button and ZSI Warnung Lamp will start to flash accompanied by an audio beep. You must press the ZSI Acknowledge Button immediately otherwise the emergency brakes will be applied automatically. Once pressed there will be five further lamp and audio alerts to remind you that you are driving under a distant signal caution. **A ZSI alert will also be activated when you pass a main signal displaying Aspect 6 (Short Journey – Expect Obstruction).**

2.7 Air Brake and Parking Brake

The Allegra Air Brake and Parking Brake are combined on a single lever. The unit's Air Brakes are applied gradually as the lever is moved back towards the driver. The Parking Brakes (Handbrakes) are applied once the lever is moved back to the maximum position. This should be done if stopped at a station or while you are changing cabins.

2.8 Running Numbers

If you wish to make use of the Allegra in your own scenarios, it is possible to customise the initial Pantograph selection and Destination Displays for the player and AI trains during the creation of a scenario. There are fifteen valid sets of running numbers as follows:

Set	EWA				MWC	EWB	
	Panto	Vehicle	Name	Route		Vehicle	Name
3501	A or D	35001	a ... o	A ... N	35601	35101	a ... o
3502	A or D	35002	a ... o	A ... N	35602	35102	a ... o
3503	A or D	35003	a ... o	A ... N	35603	35103	a ... o
3504	A or D	35004	a ... o	A ... N	35604	35104	a ... o
3505	A or D	35005	a ... o	A ... N	35605	35105	a ... o
3506	A or D	35006	a ... o	A ... N	35606	35106	a ... o
3507	A or D	35007	a ... o	A ... N	35607	35107	a ... o
3508	A or D	35008	a ... o	A ... N	35608	35108	a ... o
3509	A or D	35009	a ... o	A ... N	35609	35109	a ... o
3510	A or D	35010	a ... o	A ... N	35610	35110	a ... o
3511	A or D	35011	a ... o	A ... N	35611	35111	a ... o
3512	A or D	35012	a ... o	A ... N	35612	35112	a ... o
3513	A or D	35013	a ... o	A ... N	35613	35113	a ... o
3514	A or D	35014	a ... o	A ... N	35614	35114	a ... o
3515	A or D	35015	a ... o	A ... N	35615	35115	a ... o

There are fourteen RhB routes provided for destination and internal train displays:

Route Letter	
A	Blank Display
B	Chur - Tirano (Bernina Express)
C	Tirano - Chur (Bernina Express)
D	Chur - St. Moritz (Regio Express)
E	St. Moritz - Chur (Regio Express)
F	St. Moritz - Tirano (Regio)
G	Tirano - St. Moritz (Regio)
H	Filisur - Davos Platz (Regio)
I	Davos Platz - Filisur (Regio)
J	Chur - Arosa (Regio)
K	Arosa - Chur (Regio)
L	Chur - Davos Platz (Regio Express)
M	Davos Platz - Chur (Regio Express)
N	Allegra: Please Do Not Board

We will use the following example of an Allegra three coach consist to explain the configuration:

Set	EWA				MWC	EWB	
	Panto	Vehicle	Name	Route		Vehicle	Name
3504	A	35004	d	J	35604	35104	d

This gives us the following running numbers for the three vehicles:

EWA = A35004dJ

MWC = 35604

EWB=35104d

This train initialises as set 3504 with AC (centre coach pantograph) and “Chur to Arosa” as the displayed destination. For six coach Allegra consists it is essential that the same **Panto** and **Route** selections are entered for both EWA vehicles to avoid errors.

The system also allows players to select destinations while driving Quick Drive scenarios.

3 Signals

3.1 Signal Heads and Permissible Speeds

Swiss railways use two main families of signalling - the “L” system and the “N” system. The RhB (Rhaetian Railway) network is signalled with the “L” system with alterations to the speeds that relate to the signal aspects compared to those that apply to standard gauge signal aspects on SBB routes for example. In Switzerland signals are normally positioned on the left hand side of the track unlike Germany and Austria. Where there is reduced visibility or multiple tracks they can be also positioned on the right hand side of the track.

RhB signals use separate main and distant heads as shown below and these can be mounted either individually to form a main signal (Hauptsignal) or a distant signal (Vorsignal) or both heads mounted on the same signal post (Combined Signal).

Distant signals provide advanced warning of a speed reduction commencing from the next main signal and usually provide ZSI Safety System protection as described on page 8. Main signal aspects indicate either that the line is blocked or the line is clear at the current line speed or display a reduced speed that must be achieved by the driver before passing the main signal.

There are also some additional signal indicators and the following examples illustrate the most common combinations along with an explanation of their use.



This is a main signal (Hauptsignal) that is currently showing Aspect 3 to alert the driver that 45 km/h is the maximum permissible speed allowed beyond this point.

Head 1 is the Main Signal Head

Head 3 is a co-acting Ground Shunt Signal
(These are explained on page 15)

Head 4 is a Brake Test / Departure Indicator

If vehicles are uncoupled or coupled to a train then it is essential that the driver carries out a brake test before departure. During the brake test the ground staff communicate with the driver using this indicator as follows:



Apply Brakes



Release Brakes



Brake Test Successful



Ready for Departure (Abfahrbefehl)

These indicators are animated in this simulation for effect but do not need to be obeyed while driving a scenario.



This is a combined signal that is currently showing Aspect 3 on the Main Signal Head to alert the driver that 45 km/h is the maximum permissible speed allowed beyond this point. The Distant Signal Head is showing that the next signal ahead is displaying Aspect 0 (Stop).

Head 1 is the Main Signal Head

Head 2 is the Distant Signal Head

Distant signals usually provide ZSI protection as described on page 9.



This is a Distant Signal that is currently showing that the next signal ahead is displaying Aspect 0 (Stop).

Head 2 is the Distant Signal Head

Distant signals usually provide ZSI protection as described on page 9.



This is a Distant Repeater Signal that is currently showing that the next signal ahead is displaying Aspect 0 (Stop).

A Repeater Signal can be identified by having a smaller Distant Head. These signals are located between a Main Signal and its preceding Distant Signal at locations where visibility is restricted such as on tight curves or where bridges obstruct the view.

Head 5 is the Distant Repeater Signal Head

*Repeater signals **DO NOT** provide ZSI protection.*



This combined signal on approach to a station has an additional Occupied Track Indicator.

If you need to proceed past a signal showing a Stop aspect in to an occupied track then you will need to press TAB during the scenario to ask the signaller for permission. If permission is granted then the signaller will set the Main Signal Head to the aspect shown here. The Main Signal Head will display Aspect 2 to limit your speed to 30 km/h and the Occupied Track Indicator (Besetztes Gleis) will illuminate with four horizontal lights. The Distant Signal Head will go dark.

Head 6 is the Occupied Track Head (Besetztes Gleis)

If the Main Signal Head does not have the lights necessary to display Aspect 2 then Aspect 0 (Stop) will continue to be displayed and the Occupied Track Indicator will illuminate with four diagonal lights instead meaning you have consent to overrun the signal.

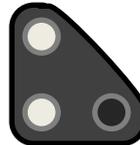
This table illustrates the signal aspects and associated permissible speeds that are used on the RhB network.

Note: All shunting operations should take place at a maximum of 30 km/h in station areas.

Aspect	Meaning	Distant Signal (Vorsignal)	Main Signal (Hauptsignal)
Aspect 0	Stop		
Aspect 1	Clear – Maximum speed is as shown on relevant speed signs		
Aspect 2	30 km/h Maximum Speed		
Aspect 3	45 km/h Maximum Speed		
Aspect 6	30 km/h Maximum Shunting Speed (Short Journey – Expect Obstruction) You are alerted by the ZSI safety system when you pass the distant signal and the main signal that is displaying Aspect 6.		

3.2 Ground Shunt Signals

These signals are normally mounted on short ground posts, however at stations they are sometimes mounted below the platform canopy. When they are located alongside a Main Signal they co-act and display the appropriate aspect according to the aspect the Main Signal is set to.

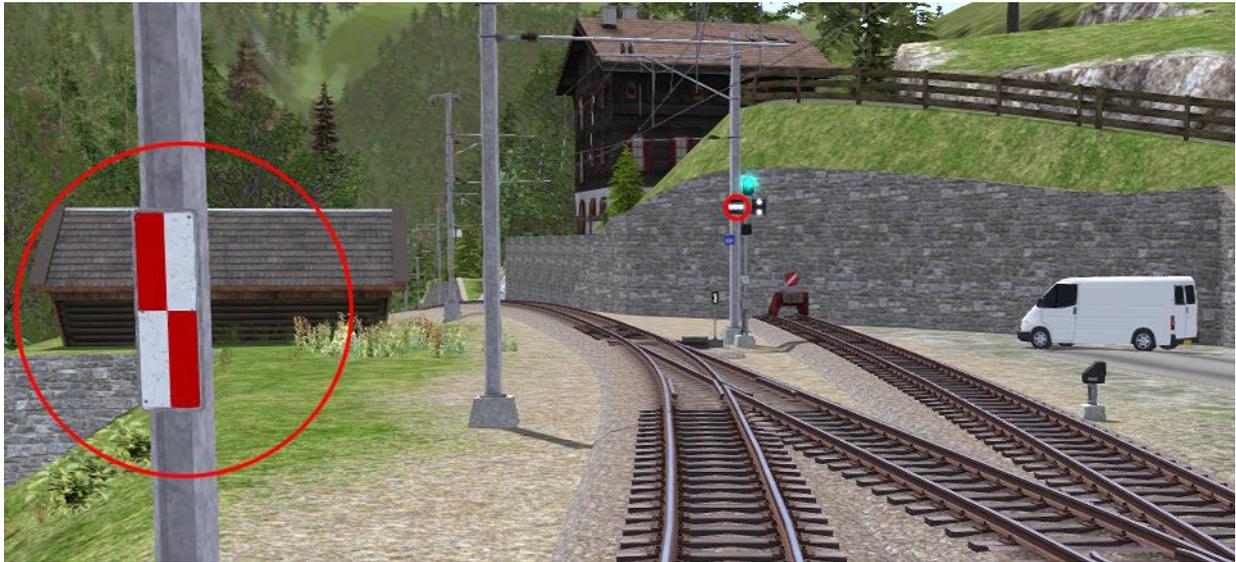
Aspect	Meaning	Ground Shunt Signal
Stop	Stop at this signal	
Warning	The next Main Signal or Shunt Signal is at Stop or you are entering a siding / end of line	
Clear	The next signal is displaying a proceed aspect	

3.3 Arosa Line Signals



These types of RhB signals are unique to the Arosa Line. Each shared departure signal has two additional indicators. The left indicator relates to the left track and the right indicator relates to the right track. Three horizontal white lights indicate stop and two vertical white lights indicate clear when associated with the main signal aspect. Preceding distant signals and repeater signals also have a slightly different layout than normal with the two green lights arranged horizontally.

When waiting at a shared departure signal you must not pass the red and white stop marker board as shown below. This ensures adequate clearance between your train and the converging line.



3.4 Level Crossings Without Barriers

The signal shown below indicates whether the level crossing road signals are activated to protect the level crossing ahead. If the crossing road signals are flashing red then this indicator flashes a single yellow light to advise the train driver. If this signal is dark then the train must not proceed over the level crossing.



3.5 Shunt Indicators



At Chur Sand there are signals with Shunt Indicators. These are normally not illuminated and indicate that shunting from the secondary track is not allowed. However, when illuminated with vertical white lights they show the driver that shunting is allowed and they can proceed out of the line normally used for operations in the opposite direction.

3.6 Request Stops



The signal shown above is provided at the approach to request only stations. It is activated by passengers at the station by pressing a button at the information point. When activated the two white lights on the signal board flash together to indicate to the driver that passengers wish to board their train.

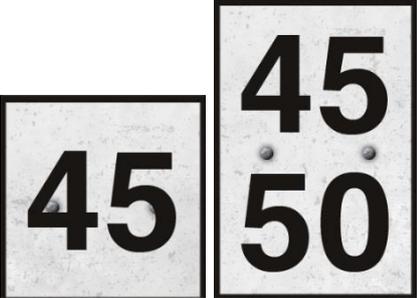
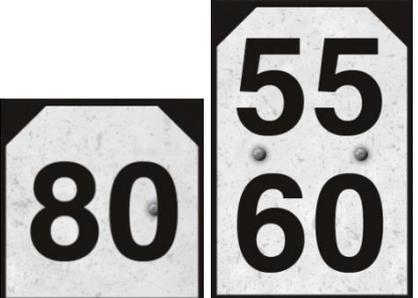
The driver must also check the Request Stop Halt Indicator Lamp on the cabin desk on approach to a request stop. If this is illuminated then a passenger wishes to leave the train and has already pressed one of the onboard request stop buttons.

Make sure that at least one passenger door opens on the Allegra when making a request stop.

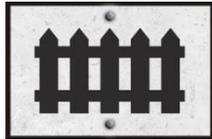
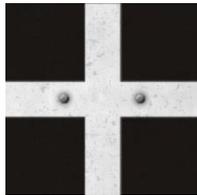
4 Trackside Signs

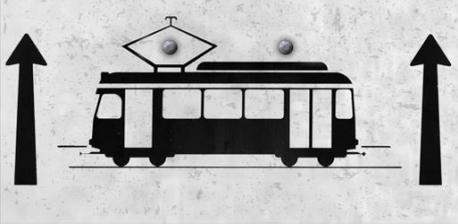
4.1 Speed Signs

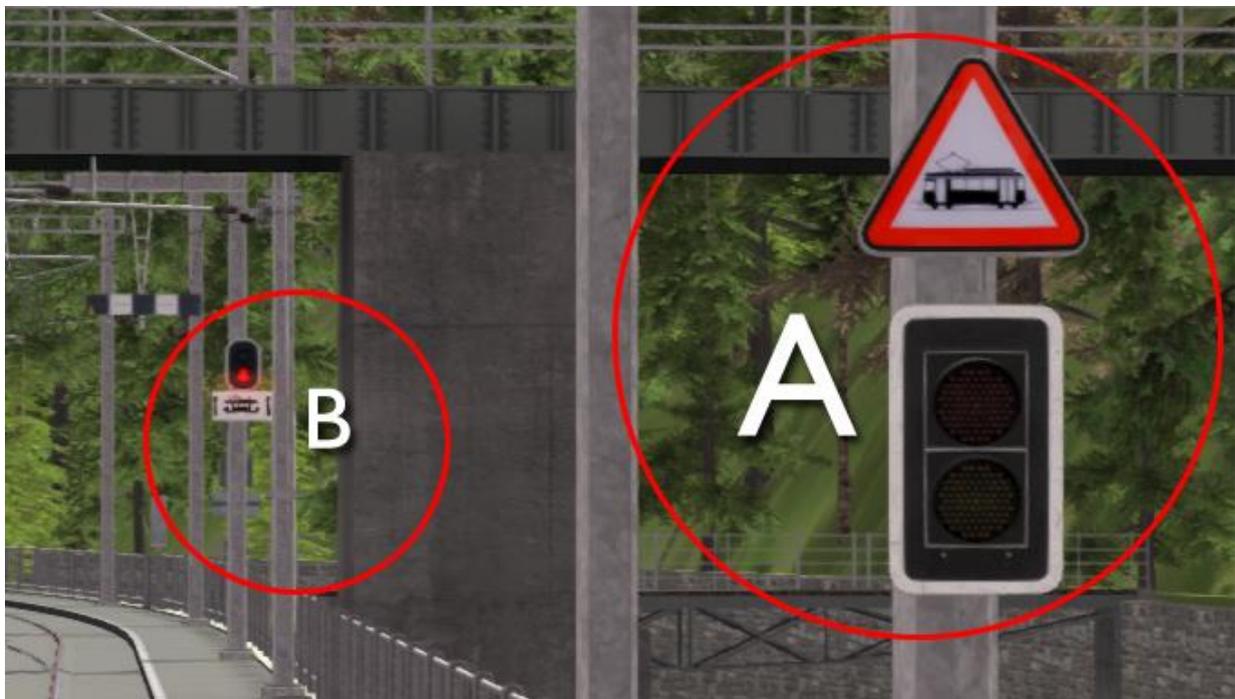
The line speed on RhB routes is advised using track speed signs. For a reduction in speed the driver first sees a reduce speed sign that indicates the target speed. The driver must then reduce his speed before passing a commencement sign situated ahead of the first sign. Main Signals always override any speed indicated by a trackside sign.

	Meaning	Signs
Reduce Speed	<p>Reduce your speed to that shown on this sign before you reach the next speed restriction commencement sign.</p> <p><i>If the sign shows two speeds the higher speed applies to passenger trains and the lower speed to freight trains.</i></p>	
Speed Restriction Commencement Sign	Your train must have reduced speed to that advised at the previous Reduce Speed Sign before passing this sign.	
End of Speed Restriction Sign	If the speed restriction is on a short section of the line then this sign indicates that the driver can return to the speed prior to the speed restriction once the rear wagon or coach has passed this sign.	
Increase Speed	<p>This sign indicates that the driver can increase the train speed once the rear wagon or coach has passed this sign to the speed shown.</p> <p><i>If the sign shows two speeds the higher speed applies to passenger trains and the lower speed to freight trains.</i></p>	

4.2 Other Signs and Signals

	Meaning	Signs
Whistle Sign	The driver should sound his whistle or warning horn at this sign.	
Level Crossing Sign	This sign is mounted on signal posts prior to a level crossing.	
Limit of Shunting Sign	Outside station areas these signs indicate the limit of shunting operations. During scenarios you do not need to obey these signs as they are only positioned for visual completeness.	
End of Electrification Sign	<p>Where the overhead catenary wires end, these signs are used to alert the drivers of electric trains to proceed no further than the sign.</p> <p>They are suspended from the catenary wires or mounted on the junction indicators where only one route ahead is not electrified as shown below.</p>	
Tramway Area	This sign provides advance notice of the commencement of tramway running.	
Tramway Running Commencement Sign	This marks the location where tramway running starts and the associated rules apply.	
End of Tramway Running Sign	This sign indicates that the driver can return to normal railway operations and rules once the rear wagon or coach has passed this sign.	

<p>Signal applies to trains</p>	<p>To avoid confusion for road traffic this sign indicates that the associated signal applies to trains only.</p>	
<p>Tramway signal</p>	<p>When tramway running this signal indicates to the train driver whether the traffic stop lights are functioning to protect the route ahead.</p> <p>A horizontal line of three white lights indicates that the traffic lights are not functioning.</p> <p>A horizontal line of three white lights with one additional white light above indicates that the traffic lights are in the process of being activated.</p> <p>A vertical line of three white lights indicates that the traffic lights are functioning and the street ahead is protected and the train can proceed.</p>	



Street Traffic Lights (A - above) should not be confused with **Train Signals (B - above)**.

5 Procedural Flora



This route has been designed making full use of the simulator's procedural flora functionality. We have designed all new ground textures that feature shrubs and grasses. To make these visible and get the best visual experience of the route we advise that you turn this feature on in the main settings menu as shown below. If you are running a less powerful computer you may get an increase in performance if you turn this setting off.



6 Content Creators - Terms and Conditions

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- Route Enhancement Patches
- Audio Enhancement Packs

If you are interested in working with us please contact us through our web site.

6.3 Workshop and Freeware Scenarios

We encourage the non-commercial creation of scenarios for our routes. We prefer these to be distributed through the Steam Workshop so that they are easily available to all players. However non-commercial (Freeware) scenarios may be distributed via other channels as long as there is no commercial charge or gain for the author.

7 Acknowledgements

We would like to thank the Rhaetian Railway for their assistance in developing this route and for permission to use their branding on models included with this product.

We also wish to thank the Dovetail Games third party partner team and beta testers for their help and support.

A very special thanks also goes to Louise Baxter for providing her original artwork for inclusion with this route.

- end -