SBB Ce 6/8 II & Be 6/8 II

Model for OpenRails and MSTS – Version 1.02 – 2014/02/02

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2 Class “Ce 6/8 II” of the Swiss railways

2.1 Electrification of the Swiss railways after WW I

2.1.1 The context

In the aftermath of WW I, the increase in the price of coal pushes the new administration of the Swiss federal railways to electrify its network. This evolution is driven in a hurried way. In 1917, the electrification of 1724 kilometers of tracks is envisaged.

2.1.2 The choice of current

Single-phase 15 kV $16^{2/3}$ Hz is selected. This current is the same as the one already used by the BLS. This choice results from the technical possibilities of this time:

- Industrial current supplied by hydroelectric plants is 50 Hz AC. Transforming AC into DC is feasible only through cumbersome and complicated plants. It will however be the choice made by other companies, primarily in the United States, but also in France by the company of the Midi.
- The lowering of the frequency is imposed by the problems of insulation of electrical circuits and traction motors. The frequency is divided by 3 (from 50 Hz to $16^{2/3}$ Hz) thanks to huge rotating machinery taking place in power plants.

These choices will have consequences on the traction units.

2.1.3 Traction units

Namely, one must also define and build the corresponding locomotives, which must replace the steam machines used so far. A pool of 116 locomotives will be ordered until 1921. Time is running out, and studies must be carried out in a short time. Thus, solutions will not be the most innovative, robust or simplest ones.

2.2 The Gotthard and the “crocodiles”

2.2.1 The specifications

The Gotthard line imposes severe specifications:

- Machines must be able to achieve a round-trip between Arth-Goldau and Chiasso within 28 hours, hauling a train of 860 tons. A 15 minutes pause is scheduled in the two extreme stations.
    - On the gradients exceeding 1:100, a second unit is however planned.
    - One machine must be able to haul a train of 650 tons between Chiasso and Bellinzona.
- Machines must be able to haul:
    - A train from 430 tons to 35 miles per hour over a 1:38 gradient.
    - A train of 300 tons to 50 kilometers per hour on a 1:38 gradient.
    - A train of 300 tons to 65 kilometers per hour on a 1:100 gradient.
- In addition, on a 1:62 gradient, machines must be able to exceed the power limits above by 20%. This can be achieved by increasing either the speed or the tractive effort, or both, during a time period of 15 minutes!

2.2.2 The prototypes

To test the alternate solutions to meet these constraints, four prototypes are ordered. *Brown Boveri* and *Oerlikon* build the electrical part, while SLM provides the mechanical part.

Paradoxically, and while many companies have already abandoned this solution for their electric locomotives, a rod-based transmission is retained. It is to be noticed that, despite its aggressiveness for the track and its relative fragility, this solution is the only one that can easily accommodate the impressive volume of single-phase motors of the time. Same choice will be made for different reasons on future *Ae 3/6 II*-speed machines. *Büchli* and *Westinghouse* transmissions will then be used massively, especially on the *Ae 3/6 I*, *Be 4/7* and *Be 3/5*.

Anyway, two of the prototypes meeting the specifications are used as bases for the definition of the first two series of machines to be used on the Gotthard:

- The first one, with axle configuration *1BB1*[1], is used to define the elegant class *Be 4/6* machines for passenger trains.
- The second, with axle configuration *1CC1*[2] is used to define the 33 machines class *Ce 6/8 II*, which are devoted to heavy goods trains. These machines will be quickly nicknamed "crocodile" because of their very specific forms.

2.2.3 The design of the "crocodiles" class "Ce 6/8 II"

2.2.3.1 Mechanical part

– Body

The articulated body consists of two oversized bogies, which support a central box-shaped body. The two bogies are identical, and can therefore be interchanged. They are coupled by a spring and a central buffer, allowing horizontal and vertical relative movements. Therefore, the central body does not contribute to the transmission of the tractive effort between the two bogies. This general design was already used before on several classes, including American. On the other hand, the forms designed by SLM are here pretty elegant. They probably explain the popular reputation of these machines.

– Transmission

The motion of the two electric motors of each bogie is first transmitted to a false axle through a set of gears. The false axle then transmits the motion one end of a triangular rod. The movement of the latter is controlled at the other end by a return crank mounted on an auxiliary shaft, placed between the lead truck and the extreme driving axle. Furthermore, the lower part of this triangular rod transmits the motion to the connecting rods of the three driving axles.

2.2.3.2 Electrical part

– Overview

The *Ce 6/8 II* are all similar from the mechanical point of view. On the opposite, their electrical equipment is based on at least three different variants. Two pantographs are placed on the roof of

[1] The Swiss administration denotes this type as "4/6", since having 4 driving axles among 4.
[2] Similarly, this type is known as "6/8" because of the 6 driving axles among 8.

the central body. The latter hosts the pneumatic reverser, the motor combination lever, and a large transformer. The motors as well as the compressors take place inside the covers located on the bogies.

- Dimmer

There are four types of motor control device, allowing either 20 or 23 notches. Units 14251 to 14255 and 14258 to 14260 make use of a 23 notches dimmer based on "dancing contacts"[3]. This device proved to be complex and relatively fragile. It was replaced on next units by simpler equipment. In all cases, it is possible to insulate one or more engines. In addition, a spare hand wheel can be used to control the motors manually in case of failure.

- Electric brake

The machines are designed to haul heavy trains on mountain routes. They are thus equipped with an electric brake, which delivers a constant braking effort until train stop. It completes air brake, providing a maximum total brake effort of 76 tons. However, this value remains small compared to the 128 tons of the machine!

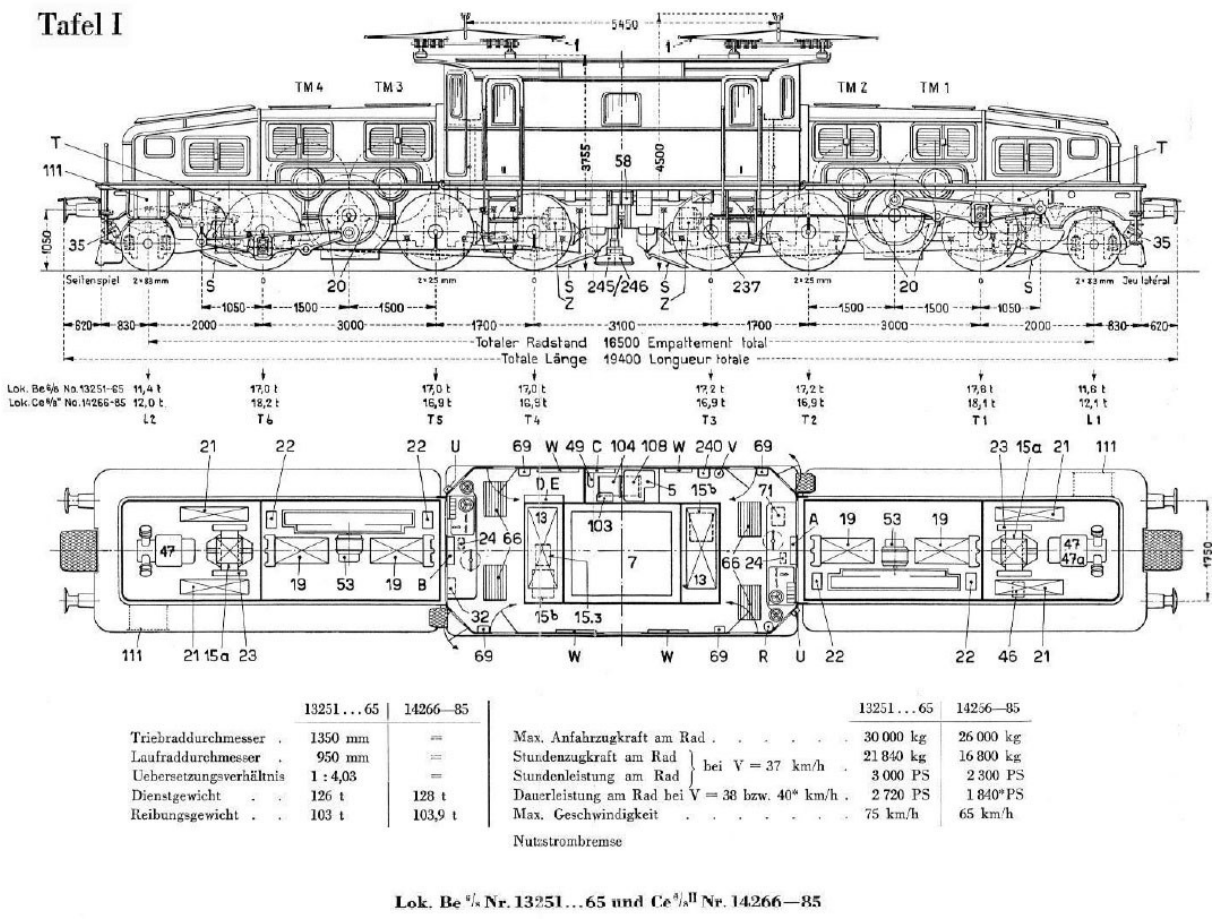
- Cooling and ventilation

Two ventilation devices are mounted under the central body. They aim at cooling the oil of the transformer. The motors are cooled through dedicated fans. Starting and stopping fans can be done from the driver's cab. As a general rule, the ventilation is stopped during the stops in the stations, or during switching operations.

- Security

The machines are equipped with the Swiss *Integra-Signum* safety device. It stops the machine when crossing a closed signal. Another *Oerlikon* device stops the machine in case of over speed.

[3] The exact term in German is "Walzerschalter".



	13251...65	14266—85
Triebraddurchmesser	1350 mm	=
Laufraddurchmesser	950 mm	=
Uebersetzungsverhältnis	1 : 4,03	=
Dienstgewicht	126 t	128 t
Reibungsgewicht	103 t	103,9 t

	13251...65	14266—85
Max. Anfahrzugkraft am Rad	30 000 kg	26 000 kg
Stundenzugkraft am Rad bei V = 37 km/h	21 840 kg	16 800 kg
Stundenleistung am Rad bei V = 37 km/h	3 000 PS	2 300 PS
Dauerleistung am Rad bei V = 38 bzw. 40* km/h	2 720 PS	1 840* PS
Max. Geschwindigkeit	75 km/h	65 km/h

Nutzstrombremse

Lok. Be 6/8 Nr. 13251...65 und Ce 6/8 II Nr. 14266—85

Figure 1: The blueprint of the Ce 6/8 II

2.3 Career

These machines hauled heavy trains on the “Gotthard” after the electrification of the route in 1920. But they have in fact been in duty on the entire Swiss network. During their career, they were thus assigned to the depots of Basel, Biasca, Biel, Erstfeld, Lausanne and Zurich.

2.3.1 Upgrade of class “Ce 6/8 II” as class “Be 6/8 II”

Between 1942 and 1947, part of class *Ce 6/8 II* was transformed into class *Be 6/8 II*:

- Speed was increased from 65 to 75 km/h.
- Continuous power was increased from 1000 kW at 40 km/h to 1810 kW at 46.5 km/h.

This transformation concerned units 14251 to 14259, 14261 and 14263 to 14265. The machines were renumbered accordingly in the range "13000", usually with the same last three digits.

2.3.2 Reconstruction as shunting units

At the end of the 1960s, 12 units were modified in order to ensure shunting service on the large yards of the country. Several modifications were achieved, such as:

- The removal of one of the two pantographs to ease the installation of a radio antenna.
- The replacement of brake valves, as well as the installation of a more accurate speedometer to ensure slow and accurate displacements.
- New front light and front aspect.

The machines involved were 14267, 14270 and 14274 to 14283.

2.3.3 Withdrawal

Most machines were withdrawn between 1965 and 1980. The shunting units were withdrawn between 1968 and 1986. The last units still in service hauled heavy ballast trains, for which their traction capacities were particularly well suited.

When withdrawn in 1973, the *Be 6/8 II* 13259 (formerly 14259) delivered in 1920 had traveled a little more than 5 million kilometers. The machines proved to be robust and relatively reliable, with an availability of 77 to 88%, excluding scheduled maintenance period.

2.3.4 Preserved units and the machines "14253" and "13254"

Several machines have been rescued from the torch, some of which are still in working conditions:

- *Be 6/8 II* 14253 was rebuild into *Ce 6/8 II* in 1976. It was repainted in the nice Brown livery of his debut. It is preserved in working order at the Erstfeld depot by the SBB-Historic Foundation. This machine is the first of the two reproduced by the current models.
- *Be 6/8 II* 13254 machine is preserved since 1982 at the Museum of transport in Lucerne. This machine is the second of the two reproduced by the current models.
- *Be 6/8 II* 13257 machine is preserved at the Museum of Mürzzuschlag in Austria.
- *Ce 6/8 II* 14267 is preserved at the Museum of the techniques of Speyer in Germany.
- The machine *Ce 6/8 II 14270* is preserved since 1982 as a static monument near the train station in Erstfeld.
- *Ce 6/8 II* 14276 machine is owned by *Club del San Gottardo Mendrisio*, Ticino.
- The machine *Ce 6/8 II* 14282 is preserved at the Museum of technology of Sinsheim in Germany.

It should be noted that *Be 6/8 III* 13302 and *Ce 6/8 III* 14305, which belong to the second class of Swiss "crocodiles", are also preserved in operating condition.

2.4 Bibliography

Reglement über elektrischen Lokomotiven Serie Be 6/8 13251-13265 und Serie Ce 6/8II 14266-14285. (August 1950). *Instruktion für die Bedienung und Beschreibung*. Schweiz: SBB.

Baillieux, J. (1981, Juillet-Aout). 17 Crocodiles du IIIM au Z. *Voies Ferrées n° 6*, pp. 66-70.

Lachenal, W., & Chambet, C.-P. (1981, Mai-Juin). Crocodiles: les dents du rail. *Voies Ferrées n°5*, pp. 39-50.

Wikipedia. (2013, Mars). *SBB Ce 6/8 II*. Retrieved from Wikipedia: http://de.wikipedia.org/wiki/SBB_Ce_6/8_II

Zellweger, C. (2007). *Krokodil, Königin der Elektrolokomotiven.* (S. Historic, Hrsg.) Schweiz: AS Verlag.

3 The model

3.1 States reproduced

The model reproduces the two machines below:

- *Ce 6/8 II* 14253 as it can be seen since its transformation into historic locomotive, which occurred in year 1976. It is therefore likely to travel on most of the contemporary virtual Swiss lines.
- *Be 6/8 II* 13254 which is now preserved in the Museum of transport in Lucerne since 1982.

3.2 General design and usable Simulator

The machine can be used either with *OpenRails* or with the original version of *MSTS*, or with *MSTS* augmented with *Bin-Patch*. However, the model is intended primarily as a model for *OpenRails*. This simulator has more advanced capabilities as *MSTS*. Thus, a simplified version of the model is to be used with the "historic" *MSTS* simulator.

Furthermore, special attention has been made to reflect the very specific design and features of the real locomotive. The model thus consists of three different elements corresponding to three different *ENG* files. This results in a few constraints and peculiarities!

It is very important to read the next sections of this document to understand how the model works and to be able to use it properly!

The physics (tractive effort especially) of the Ce 6/8 II 14253 corresponds to the characteristics of the real Ce 6/8 II before their transformation into Be 6/8 II. This choice is made on purpose, although it does not correspond to the most recent characteristics of the real machine.

The physics of the Be 6/8 II 13254 corresponds to the final characteristics of the real Be 6/8 II.

4 Installation

4.1 The locomotive

The installation is performed thanks to an automatic installer (*SBB_Krokodil_VL_XXX.exe*, where *XXX* stands for the current version number). This manual is displayed when the installation completes. When properly installed:

- The machine is stored in the *SBB_Krokodil_VL* folder of your *TRAINSET*.
- Consist files are placed in the *CONSISTS* folder of your *TRAINSET*.

No other directory of MSTS or element of your PC is changed.

4.2 Sounds

A set of specific sounds is included in the pack. It is partly based on sound files designed by *Hyglo* (mainly sounds for *ÖBB 1189*, *1245* and *1042*), who allowed me to modify and distribute them. Some files come from the sound pack designed by *Hibu* for *DB* class *E44*. Finally, coupling and uncoupling are original MSTS sounds. Some of these sounds have been slightly modified, either to convert them to mono, or to adapt them to the new scope of Swiss "*crocodiles*".

The table below describes the match between the *Hyglo* and *Hibu* files initial names on the one hand, and new names used in this pack on the other hand.

"Crocodile" sound	Author	Initial pack	Initial name
M_Kroko_Fahrt.wav	Hibu†	DB E44	E44Fahrt.wav
M_Kroko_Hupe.wav	Hibu†	DB E44	E44Horn.wav
M_Kroko_Hupe_lang1.wav	Hibu†	DB E44	E44Horn1.wav
M_Kroko_Hupe_lang2.wav	Hibu†	DB E44	E44Horn2.wav
M_Kroko_PantoAb.wav	Hyglo	ÖBB 1245	x_Panto_ab.wav
M_Kroko_PantoAuf.wav	Hyglo	ÖBB 1245	x_Panto_auf.wav + x_Hauptschalter_ein.wav
M_Kroko_Rollgerausche.wav	Hyglo	ÖBB 1245	1245_Knarren.wav
M_Kroko_Halt.wav	Hyglo	ÖBB 1042	1042_Halt.wav
M_Kroko_Kupplung1-3.wav	MSTS	-	couple_chain1-3.wav
M_Kroko_UKupplung1-3.wav	MSTS	-	uncouple_chain1-3.wav
M_Kroko_LuftBremseLang.wav	BB25187	-	-
M_Kroko_LuftBremseKurz.wav	BB25187	-	-
M_Kroko_Schalter.wav	BB25187	-	-
Any other sound file	Hyglo	ÖBB 1189	-

Table 1: Match of sound files

4.3 The "Cabview"

The cab built by Wilhelm Hacker is included in this pack.

If you use neither *OpenRails* nor the *Bin-Patch*, it is still possible to switch day / night sight. Two script files are provided for this purpose. They must be run before the activity is launched or restored. They are located in the same directory as the machines (*SBB_Krokodil_VL*):

- To select the day view: *_CAB_DAY.bat*
- To select the night view: *_CAB_NIGHT.bat*

The reversed cabs (with "*_rv*" suffix) are also included. They will be used with *OpenRails* and *Bin-Patch* only.

Note: The correctness of the “cabview” perspective is highly dependent on the field of view ("FOV") of the camera. This latter is defined either in the OpenRails options or in the file “CamCfg.dat” of MSTS. A large value is recommended (50-60).

Figure 2 : The three views of the cabin by Wilhelm Hacker

4.4 Installation for OpenRails, MSTS with Bin-Patch, or MSTS "vintage"

4.4.1 The variants

The pack includes several variants of the model, which are differentiated by the *ENG* files, the setup of the "*cabviews*", and some aspects of the 3D. At installation time, you can choose between two options:

- The version for *MSTS "vintage"*, i.e. without the *Bin-Patch*.
- The version for *OpenRails* or for *MSTS* extended with *Bin-Patch*. Those versions make use of slightly different 3D, since the 3D designed for *OpenRails* causes a *MSTS* crash!

All in all, three variants of the model are thus proposed:

- The version for *OpenRails*.
- The version for *MSTS* with *Bin-Patch*.
- The variant for *MSTS "vintage"*.

The following table describes the specificities of each of these variants. The full procedure to use these machines is described in section 5.

	OpenRails	MSTS Bin-Patch	MSTS "vintage"
3D details	High	Limited	Limited
Cabview	Located in central body. Front bogie is visible upfront with dynamic behavior.	Located in central body. Front bogie is visible upfront with dynamic behavior.	Located in front bogie. Front bogie is statically represented on front view texture..
Consist	SBB_Krokodil_14253_VL_OR SBB_Krokodil_13254_VL_OR	SBB_Krokodil_14253_VL_MSBP SBB_Krokodil_13254_VL_MSBP	SBB_Krokodil_14253_VL_MSTS SBB_Krokodil_13254_VL_MSTS
Front bogie file	SBB_Ce68_14253_Vorne_VL SBB_Ce68_13254_Vorne_VL	SBB_Ce68_14253_Vorne_VL_MSBP SBB_Ce68_13254_Vorne_VL_MSBP	SBB_Ce68_14253_Vorne_VL_MSTS SBB_Ce68_13254_Vorne_VL_MSTS
Central body file	SBB_Ce68_14253_Mittel_VL SBB_Ce68_13254_Mittel_VL	SBB_Ce68_14253_Mittel_VL_MSBP SBB_Ce68_13254_Mittel_VL_MSBP	SBB_Ce68_14253_Mittel_VL_MSTS SBB_Ce68_13254_Mittel_VL_MSTS
Rear bogie file	SBB_Ce68_14253_Hinten_VL SBB_Ce68_13254_Hinten_VL	SBB_Ce68_14253_Hinten_VL_MSBP SBB_Ce68_13254_Hinten_VL_MSBP	SBB_Ce68_14253_Hinten_VL_MSTS SBB_Ce68_13254_Hinten_VL_MSTS
Procedure	OR / BP section 5.1.2	OR / BP section 5.1.2	MSTS section 5.1.1
Bin-patch "Lights"	No	Yes	No

Table 2: Description of the three variants available

4.4.2 Enabling the version for "Bin-Patch"

When the installation completes, you can use the version for *OpenRails* or the version for *MSTS "vintage"*. Namely, the "*Lights*" sections of the version designed for the *Bin-Patch* induces compatibility when used with *MSTS "vintage"*. To prevent errors in this case, it is only installed if you run the script named "*_ENG_BinPatch.bat*" manually after the initial installation!

4.4.3 Traffic and AI trains

ENG and CON files whose name includes the "*_AI*" suffix should be used for traffic trains. They include "*Lights*" sections suitable for this purpose, and make use of a lighter "*freightanim*".

Important note on the 3D: the use of the 3D designed for OpenRails under MSTS causes a simulator to crash.

5 Driving the locomotive

5.1 Actions to perform when starting an activity

The articulated design of the machine requires a particular procedure when an activity is started. Indeed, the model consists of three disjoint motor vehicles, each associated with a different *ENG* file. The procedure to be applied depends on the simulator in use.

5.1.1 MSTS "vintage"

No special procedure is required with *MSTS* when *Bin-Patch* is not used. The "*Cabview*" is activated at activity start. The cabin is placed in the front bogie. The front bogie is statically represented by the texture of the front view.

Figure 3: Front view with MSTS "vintage" (no Bin-Patch)

5.1.2 OpenRails and MSTS with Bin-Patch

Under *OpenRails* and *MSTS* with *Bin-Patch*, the "*Cabview*" used for driving is placed in the central part of the machine. Thus, the 3D of the front bogie is visible upfront.

However, and because of the way simulators do work, the "*Cabview*" associated with the front bogie of the machine is activated when activity starts. To avoid confusion, this dummy cabin does not look like a usual "*Cabview*". A panel prompts the user to perform the suitable procedure to enable the actual "*Cabview*". This procedure depends on the simulator.

Figure 4: The "Cabview" which is visible at activity start with OpenRail

5.1.2.1 OpenRails

Just press *Ctrl-E* key combination to switch to the actual "Cabview" illustrated in Figure 2.

5.1.2.2 MSTS with Bin-Patch

With MSTS and Bin-Patch, the procedure is the following one:

- First press *F9*.
- Then select the central part of the machine.
- Finally, press key *1* to switch view to "*Cabview*".

5.1.2.3 "Headout" with OpenRails and Bin-Patch

Switching the "*Cabview*" (thanks to *Ctrl-E* with *OpenRails*, or through *F9* with *Bin-Patch*) does not impact the "*Headout*" view. The initial "Headout" is thus associated with the front bogie. This can be changed by pressing keys *Alt-3* and *Alt-9*.

5.2 Driving procedures

The table below summarizes the main driving steps and procedures.

Step	Key	Comment
Rear pantograph up	P	-
Front pantograph up	Shift-P	Only with OpenRails and MSTS with Bin-Patch
Release engine brakes	^	Engine brakes applied at activity start
Release engine brakes	M	Please refer to section 5.3!
Reverser forward	Z	-
Accelerate	D	23 notches
Sand	X	No speed restriction
Start / stop wipers	V	Only front wiper is animated
Long horn	Space	Two different sounds selected randomly
Short horn	B	Only one short sound
Decelerate	Q	-
Apply dynamic / electric brake	:	9 notches – No speed restriction
Release dynamic / electric brake	;	9 notches – No speed restriction
Apply train brake	ù	Please refer to section 5.3!
Apply engine brake	$	-
Rear pantograph down	P	-
Front pantograph down	Shift-P	Only with OpenRails and MSTS with Bin-Patch

Table 3 : Driving procedures

5.3 Remarks on braking systems

5.3.1 Engine brake

The engine brake has only three positions to apply, maintain or release brakes.

Position	Comment
Released	Braking effort decreases slowly
Maintained	Braking effort is maintained
Continuous service	Braking effort increases slowly

Table 4 : Engine brake positions

Recommendations:

- At activity start, the engine brakes are applied. It therefore necessary to release engine brakes before operating the locomotive.
- Pressure should be checked on the manometer.
- Engine brakes should be released when driving.

5.3.2 Train brake

Train brake setup allows a realistic behavior. On the other hand it requires some habit and know-how! This setup is more naturally described by braking positions than by the commands or keys. The table below summarizes these positions.

Position	Comment
Quick release	Braking effort decreases rapidly
Release	Braking effort decreases slowly
Neutral / maintain / lap	Braking effort is maintained
Continuous service	Braking effort increases slowly
Emergency	Braking effort increases rapidly

Table 5 : Train brake positions

Recommendations:

- Engine brakes should be released when driving.
- Furthermore:
    - Applying and releasing brakes should be done through brief actions.
    - The pressure on the manometers must be monitored during the operation.
    - The brakes should be moved back to the neutral position as soon as the braking effort and deceleration reaches the expected values.

5.3.3 Dynamic / electric brakes

Like real machines, the model is equipped with an electric brake. It is recommended to use it as soon as it is possible, either in combination with the train brakes to benefit from a higher braking effort, or alone if it is sufficient to adjust the speed.

5.4 Remarks on tractive effort[4]

Traction parameters have been established so as to meet the specifications of the real machines. Notches must be applied in a gradual manner, ensuring that the intensity displayed on the gauges remains in the expected range, and limiting the need for sanding and risk for wheel slip.

[4] Note: Since the version Alpha-03 distributed in 2013, the physics has been reworked, especially regarding the settings of the tractive effort. A set of ENG files based on the physics used in version Alpha-03 is provided in the archive ENG_BP/MM_Former_Eng.zip. Those files must be installed manually.

6 Summary of the known limitations

The main known limitations related to the use of this model are listed below. The simulator under consideration is mentioned at the beginning of each section.

6.1 Wrong « Cabview » perspective

Simulators: OpenRails, MSTS "vintage", MSTS Bin-Patch

"*Cabviews*" are in two dimensions. The perspective of the images used for this view and the perspective of the 3D scene can therefore not be totally consistent. This is especially true with this model, when the 3D of the bogies is directly visible from the cabin. The match depends on the field of vision of the camera. This parameter can be adjusted in the *Camcfg.dat* file of *MSTS*, or through *OpenRails* options. A value in the range 50 to 60 is recommended for the "*Cabview*" *FOV* parameter.

6.2 Relative movements of bogies and central body

Simulators: OpenRails (under certain circumstances), MSTS "vintage", MSTS Bin-Patch

In tight curves, the 3D of the bogies may interfere with the parts of the body in which they fit. This problem is due to the three parts design which cannot be handled accurately by MSTS.

With *OpenRails*, the position of the bogies and body are defined more accurately. Nevertheless, the defect above mentioned can be observed when superelevation and/or oscillations are enabled.

6.3 Vibrations and jumps of the central body

Simulators: MSTS "vintage", MSTS Bin-Patch

In tight curves, sometimes in alignment, and when crossing rails joints, the central part of the machine may be affected by vibrations or sudden jumps.

This problem is due to the small length of the central body, as it is declared in the *ENG* file. It is not possible to increase this value without poorly impacting the coupling with other vehicles.

6.4 MSTS crash when using the 3D designed for OpenRails

Simulators: MSTS "vintage", MSTS Bin-Patch

Two versions of the "*freightanim*" are provided, to accommodate the different capabilities of the simulators. The version designed for *OpenRails* contains features which cannot be displayed by *MSTS*, and will thus result in a crash of this simulator.

6.5 Animation of rods in traffic mode

Simulators: MSTS "vintage", MSTS Bin-Patch

When the machine is used in traffic mode, the animation of the connecting rods and wheels is too fast and does not correspond to the speed of the locomotive.

6.6 No power supply if pantograph is raised before switching to central part

Simulator: OpenRails

If the pantograph is raised at activity start before pressing *Ctrl-E*, then the locomotive is not properly fed, and it cannot be operated. This situation can be recovered thanks to the following procedure:

- Switch to "*Cabview*" with key *1* if needed.
- Move pantograph down with key *P*.
- Press *Ctrl-E* until you reach the expected view.
- Move pantograph up with key *P*. Check the line voltage on the central voltmeter.

6.7 The "Convoi" tool and the comments in ENG files

Simulators: None – Only exposed by the "Convoi" tool.

The *Convoi* tool is sometimes used to handle various files (especially consist, engine and wagon files). It wrongly reports errors in the engine files of the machines. Those errors are caused by the comments placed at the top of the files. Those comments are syntactically correct, and properly parsed and interpreted by *MSTS* and *OpenRails*. Thus, this is clearly a bug of the *Convoi* tool. The engine files are thus provided on purpose with those comments, even if *Convoi* is buggy and wrongly reports errors in those files.

7 Copyrights

Small reminders, never superfluous, relating (among other things) to the emotional attachment of an author for his creations:

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- Please do not modify, reuse totally or partially the textures, 3D forms, cabin, sounds, documents and elements of installation outside the present pack without my explicit agreement.
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The authors of the model disclaim all liability for any damage caused by the installation or the use of this content on hardware, operating system, software or any component of the computer of the users. I reassure you this is very unlikely in a reasonable use!

8 Credits and contributions

The table below summarizes the contributions of the authors.

Task	Authors
3D	BB25187, Jimidi
Textures	BB25187, Jimidi
Tuning of .ENG files	Marc Müller, Vapeur71, BB25187
Sounds	Hyglo, Hibu, BB25187
Cabview	Wilhelm Hacker, BB25187
Documentation	BB25187
Installer	BB25187

Table 6: Contributions

9 Acknowledgements

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- The team of the *Activity Simulator World (ASW)* website, as well as the members of this forum, for their support.
- Generally, the authors of the used documentary elements, which constitute a real mine!

10 Tooling

The main tools used are listed in the table below.

Task	Tool
Initial 3D	TSM (Abacus)
3D post-processing and LODs	PolyMaster (Thopil) – Shape File Manager
Initial textures	Photoshop Elements (Adobe)
Texture conversion	TgaTools – MakeAceWin
Texture post-processing	Savetex – RemipIt
Text edition (.ENG, .SMS, .BAT, …)	Notepad++ (Don Ho / Notepad)
Text edition / differences	CompareIt (GrigSoft)
Documentation	MS Office (Microsoft)
Installer	Install Creator Pro (ClickTeam)

Table 7: Tooling

11 Contact

Technical questions on the model can be asked on the forum of the Activity Simulator World (ASW) website. I will also reply on the following forums:

- TSSF.eu (German).
- Elvas Tower (English).

Non-technical questions must be asked through Personal Message (MP) on the forum of the Activity Simulator World (ASW) website.

12 History

Version	Date	Comment
Alpha-00 (Test)	2013/03/16	Preliminary version for developers
Alpha-01 (Test)	2013/04/01	First alpha for developers
Alpha-02 (Test)	2013/04/11	Various features improved: • Tuning of the physics. • New “Lights” sections for the Bin-Patch. • Documentation in French and English. • New details in the 3D and LODs. • Improved texturing effects. • Enrichment of the sounds (notches of dynamic brake especially). First public distribution.
Alpha-03	2013/04/12	Fixes: • Shorter filenames for Bin-Patch to prevent MSTS crash. • Increased speed of the wheels and torques animation. First public distribution.
1.00 (Test)	2014/01/05	Added Be 6/8 II 13254 and updated documentation accordingly Fixed the width of the front part of the Ce 6/8 II Weathering effect added to some textures
1.01 (Test)	2014/01/19	3D : • Oil tap represented in opened position • Shadows added to the “freightanim” Textures: • Fixed transparency issue on one texture of the MSTS versions • Improved buffer texture • Added a black rectangle on the front part of the 13154 Physics and ENG files : • Speed limit modified in over speed monitor (Be 6/8) • Brake force modified (BP only) • Max current for traction modified • Max current for dynamic brake modified • Max force and power modified • Sphere of light modified • Added passenger view in the middle part of MSTS versions Cabview : • Speedometer adapted (Be 6/8) • Ammeter range modified Sounds : • Speedometer sound added Documentation : • Various updates
1.02	2014/02/02	Fixed « Alpha Bug » of the freightanim shapes Slight adjustments of the ENG files (MSTS and BP versions) Archive with ENG files based on the physics formerly used in the Alpha-03 version distributed in 2013