

Traffic Flow in Railway Systems

“Gaming is an activity that cannot be taken seriously enough!”

Jacques-Yves Cousteau

Contents

- I. Manual** **4**
- 1. Simulation** **5**
 - 1.1. Line setup 5
 - 1.2. Trains 5
 - 1.3. Round sequence 5
 - 1.4. Example of a simulated train movements 6
- 2. Block section** **6**
 - 2.1. Block section setup 7
 - 2.2. Example of a train running through a block 7
- 3. routes** **7**
 - 3.1. route setup 7
 - 3.2. Example of a train using a route 7

DRAFT

Aim and Materials

The aim of the learning game is to simulate and experience the driving dynamics of trains in the context of block division. This requires:

- two trains with different driving dynamics
- a track consisting of spaces
- train berths
- signals for block division
- if necessary, turnouts

Real continuous dimensions time (t) and distance (s) are assigned to discrete units of laps (t) and spaces (s). Thus, the simulation is round-based in order to imitate the steps of a computer.

Version 0.7.2 from 2019-09-20

 This work is licensed under a Creative Commons License (CC BY 4.0).

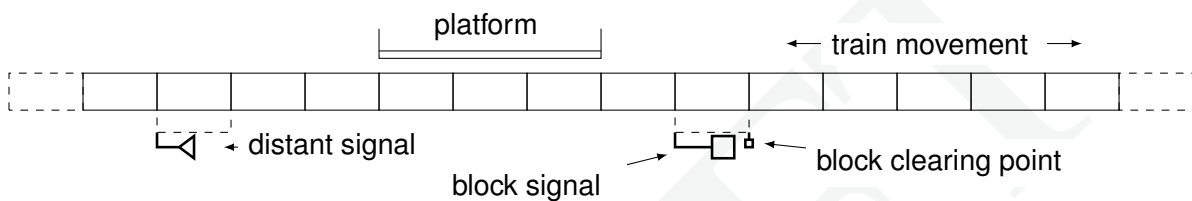
Part I.
Manual

DRAFT

1. Simulation

1.1. Line setup

The line consists of any number of spaces. Signals or platforms can be arranged along the line.



1.2. Trains

(nur Zugfahrten, keine Rangierfahrten)

1.3. Round sequence

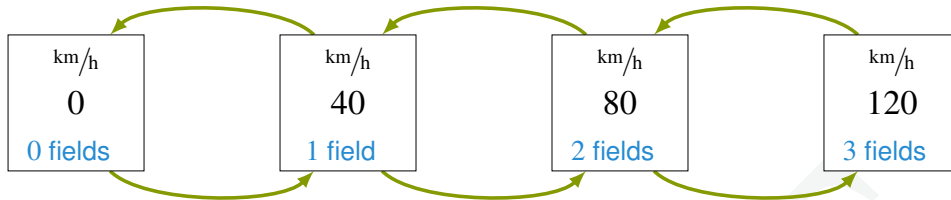
The simulation is based on rounds. Each round consists of at least two consecutive steps:
Sequence per round:

1. calling of routes (optional)
2. Set signals to CLEAR (optional)
3. Select control lever position (optional)
4. *move all trains according to the control lever position!*
5. *Execute stop case for signals!*
6. release of routes (optional)

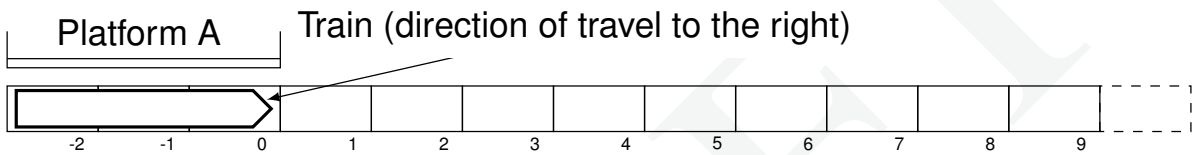
At the start of the game, the train stands still. control-lever positions start at the "0" field. The different train dynamics are depicted by different possible movements of the shift lever.

1.4. Example of a simulated train movements

The control-lever is moved along the green arrows. control-lever positions for a passenger train:



A train is supposed to accelerate on the following track:



For the course of the learning game, we start with the first round and follow the process from the previous section *Simulation*. In the first round, the train from the initial condition stands still. In the example there are no signals that can be set. We can move the control-lever by one position to 40 km/h forward. The round is over.





The second round begins with the execution of the movement one field to the right. The control-lever can be moved on and the round is over. The third round begins with the execution of the movement by *two* fields to the right. The control-lever can be moved on again and the round is over. Continue until the position of 120 km/h is reached and the train moves evenly with three fields per round.

Round	current speed	Move	
0	0 km/h	0 fields	
1	40 km/h	1 field	
2	80 km/h	2 fields	
3	120 km/h	3 fields	
4	120 km/h	3 fields	
etc.			

2. Block section

2.1. Block section setup

The main signal may only show the proceed aspect if there is no train in the following block section (from track vacancy detector to track vacancy detector). The distant signal is located in front of the main signal in braking distance and reflects the signal aspect of the main signal.

	stop	clear
main signal		
distant signal		

2.2. Example of a train running through a block

3. routes

3.1. route setup

3.2. Example of a train using a route

Revision History

Revision	Date	Author(s)	Description
0.1	2018-04-17	MS, FN, LG	First prototype created with driving dynamics
0.2	2018-05-15	MS, LG	Educational game with block logic extended
0.3	2018-09-03	MS	Handbook created
0.3.1	2018-10-17	MS	Handbook with neutral design
0.4	2018-11-16	MS, LE, SZ	Translation into english
0.5	2019-03-29	MS	Minor improvements and craft sheets
0.5.1	2019-03-29	MS	Adaptation of track length and tasks
0.6	2019-05-20	MS	Added routes and route locking
0.6.1	2019-08-26	MS, LP	Extended tasks for routes
0.7	2019-09-09	MS, LP	reworking of game mechanics together with tasks and figures
0.7.1	2019-09-17	MS	Adapted signals for left- and right-hand traffic
0.7.2	2019-09-20	MS	Added tasks in English from version 0.6.1

Felix Nebel (FN), Laura Enders (LE), Lukas Gruber (LG), Leonhard Pelster (LP), Martin Scheidt (MS), Stephan Zieger (SZ)