

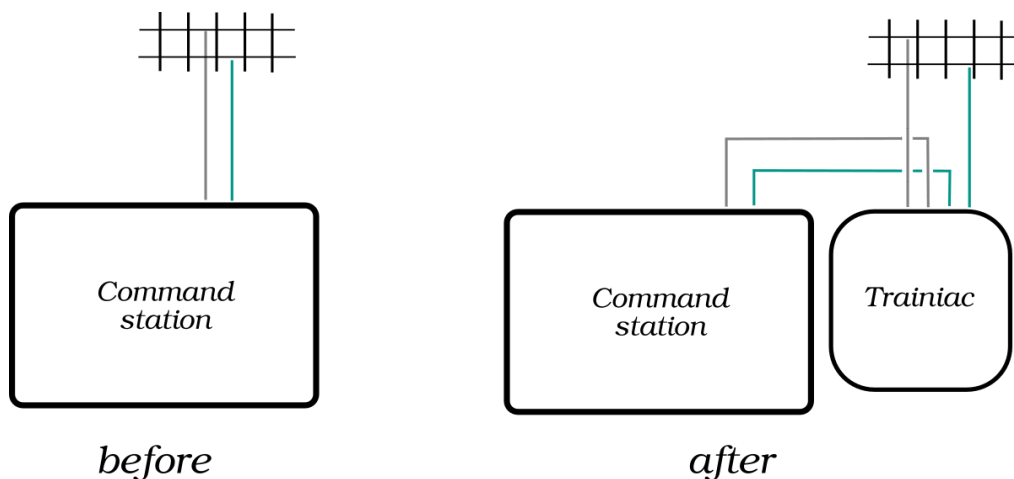
Getting started guide

HANDLE THE MAGNETS WITH CARE. THEY BREAK AS EASY AS COOKIES. DO NOT SMASH THEM TOGETHER BUT KEEP THEM IN THE PLASTIC BAG AND PULL THEM APART IN A SLIDING MANNER. KEEP AWAY FROM PEOPLE USING PACEMAKERS ESPECIALLY IF MULTIPLE MAGNETS ARE STACKED TOGETHER. WHEN NEEDED REMOVE THE MAGNETS FROM THE RIBBON IN PAIRS.

On the other hand, don't be scared to death either. A single magnet has a magnetic field equivalent to the Earth's magnetic field at a distance of 10 cm.

Installation of the Trainiac

Your command station has an output with two wires connected to the tracks either directly or through some current protection and occupancy detection equipment. The Trainiac must be inserted directly after the command station. Cut the two wires or use some spare wires such that you end up with the connections as shown in the figure, i.e. the wires from the command station are inserted in the centre positions and the track is connected to the outermost positions. Remove 8 mm of the insulation and put the wires into the connector while pressing the white button inward with a small screwdriver. To remove the wire, use a small screwdriver and press the white button inward while pulling the wire outward.



The system is continuously improved, currently, the following limitations apply:

- Boosters are not supported.
- DCC only, i.e. for Märklin CS2/3 enable multi-protocol and make sure that turnouts and signals are controlled by DCC commands. Locomotives controlled by this system must also be controlled by DCC commands.
- Track voltage must be in the range of 14 - 20 volt.
- Maximum current 3 amperes (might be 5 amperes later).
- The command station must handle long addresses (1 – 9999). This system will use the address 8191 for special operations and this address must therefore not be used by any locomotive.
- Double heading trains are not supported.
- When using the XpressNet connection you must change all other devices to use odd-numbered addresses only. This is because some command stations do not utilise the bus bandwidth wisely and therefore the Trainiac uses all the

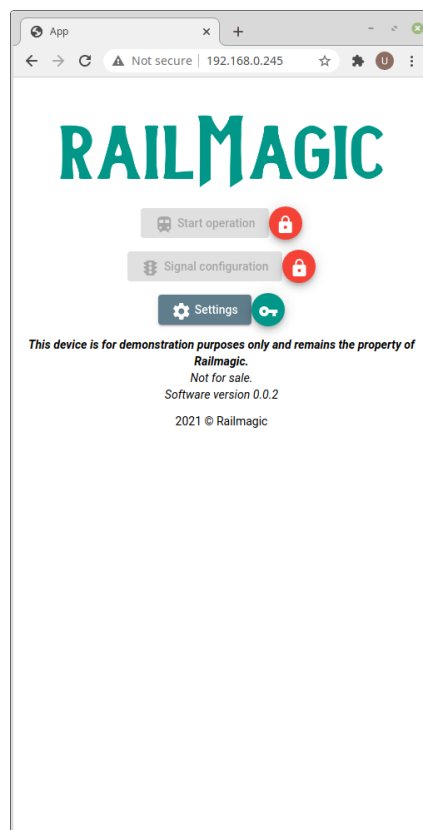
even-numbered addresses to ensure enough bandwidth. We will later add an option to select one address only, which can be used for command stations that utilise the full bandwidth of the XpressNet bus.

The Trainiac will be powered by the command station. If you often have short circuits on the layout it is preferable to have some kind of current protection equipment after the Trainiac to prevent a power-down of the system. A restart of the system takes only a few seconds and in most cases will the locomotives be able to continue to run without user interaction. In other cases, some of the locomotives will not be able to continue automatically, e.g. if they were near a signal at danger while the short circuit occurred. We are still working on an intelligent method to solve this.

Make sure the Trainiac is not placed on a surface where the battery slot underneath can get in contact with electrically conducting materials.

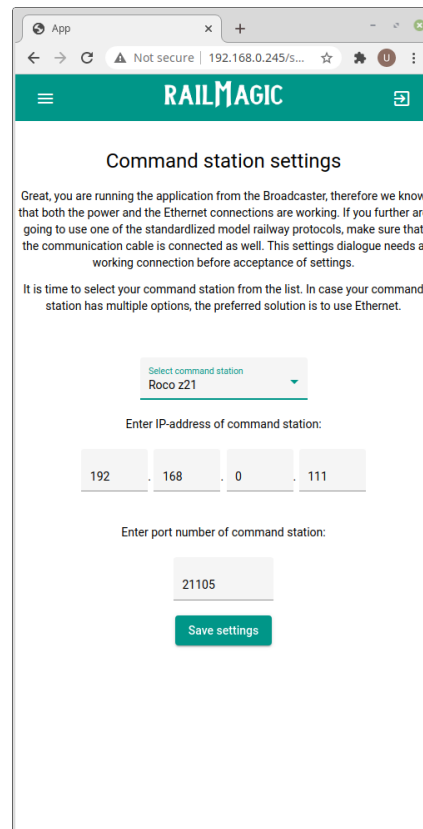
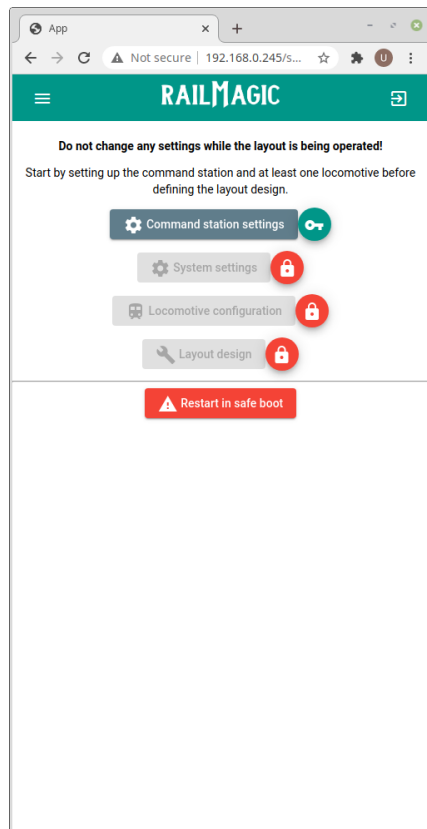
Access to the application

You don't have to install software to use this system. Just power up your command station and the Trainiac will be accessible from all computer devices connected to the same network. Simply enter "magic/" in a web browser. A boot menu will be displayed and there is a button to start the application. Click the button and hereafter the application will appear within a few seconds (see image below). Note that the images in this manual may vary slightly from what you see on your mobile phone, tablet or computer.



Because the system hasn't been configured, the two first buttons are greyed out as indicated by the red keylock. Simply follow the green keys to complete the configuration. First click on "settings". The new screen shows the settings main menu. In the application,

you will in the upper right corner see the "go back" button (an arrow pointing into a square). The three vertical lines symbol in the upper left corner has yet no functionality, see the image below. Then click on "command station". We will now check if your command station and Trainiac are able to communicate together. Select the protocol or computer network to use. Some additional settings might appear. If the settings are successfully applied, the confirm button will change to green colour, see the image below showing the Roco Z21 settings.



If you get the green coloured button and pressed it, you have started the setup process. At this point insert the coin cell battery underneath the Trainiac while it is powered. The positive pole of the battery carrying the logo should point toward you when the battery is pushed into the slot. Do not insert the battery while the Trainiac is unpowered.

The easiest way to remove the battery in the future is by gently pressing a small flat screwdriver into the battery and pulling it out. Take care not to press the screwdriver so much that you damage the battery nor so little that the screwdriver slips into the Trainiac circuit board.

Notice: When the Broadcaster sense that the command station delivers a DCC signal less than approximately 12 volts, it runs a process for two seconds to store a backup. It must not be powered up again before the two seconds has passed. If you do this, it will be kept powered off and the tracks will remain disconnected. Cycle the power to fix this. It is due to a feature that ensures, that when the tracks are shorted and the Broadcaster loses its power, it will keep the track output on, such that the current protection in your command station will trigger and shut down.

Installation of the Trackers

Start by installing only one Tracker into one locomotive. The rest of the Trackers can be installed after the system has become operational. The Trackers provided with the demonstration kit are using fixed identification numbers from 1 to 4. You will later see that the software allows you only to set up four Trackers. This is a limitation for the demonstration kit only.

The Tracker needs four connections in total. When you hold the Tracker such that the logo is readable, the solder points below the logo must be connected to the power inlet and the solder points above the logo must connect to the motor. You can remember this because in a locomotive "the track is below and the motor is above". The polarity does not matter as this is automatically adjusted during the setup process. You might find more suitable locations to solder on the printed circuit board in your locomotive than trying to solder directly to the actual pickups and motor terminals.

We advise that you secure the Tracker in the locomotive before soldering it. This way you can better determine the length of the wires. Secure the Tracker with adhesive such that it is perfectly aligned with the body of the locomotive, i.e. parallel to the body and vertical in level. It must not be able to move. If possible keep it away from the motor and other magnetic parts. Also, make sure that the Tracker is taking up an empty space such that the body part will still fit when the locomotive is assembled again. It is preferable to have the Tracker located mid-height and mid-width but in the longitudinal direction, it is unimportant where it is located.

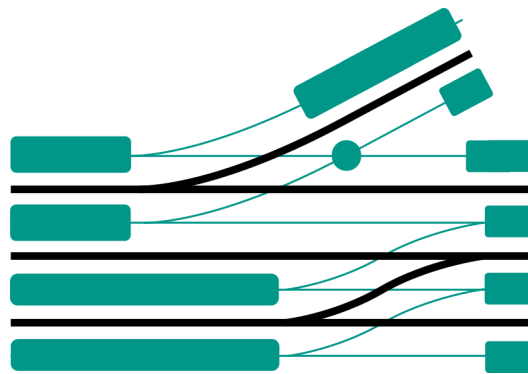
After you have soldered the connections and before powering up the locomotive, make a visual inspection to make sure that the five small solder points are not shorted/connected or touching anything. This will permanently damage the Tracker!

Placement of magnets

The magnets must be placed on one side or the other side of the track – not directly underneath. The size of the magnets has been chosen such that the perfect distance to the side of the track equals half the distance between two adjacent tracks. Therefore, one magnet will be sensed on both adjacent tracks. Hence on main lines with multiple tracks and station areas, you can save quite a few magnets by placing them between the tracks. However, it is also wise to place magnets that only will be sensed by one track, because this will increase the randomness of the patterns. Another advantage of the magnet dimension is that it ensures that non-adjacent tracks will not sense the magnet. This is because the distance is three times larger than the preferred distance (half the distance between two adjacent tracks). Just in case someone thinks about using other magnets than the ones provided by Railmagic; the diameter to height ratio is critical and the magnetic grade further defines the magnetic field strength, so please reconsider that idea.

Resumé: If the centre-to-centre distance between the tracks is 6 cm, the magnets should be 3 cm to the side of the centre of each track. No other tracks should be within 9 cm. See the figure below for reference. The magnets can be placed anywhere in the green coloured area. Note that there are areas around turnouts where magnets cannot be placed. Note also the sweet spot (shown by the green circle) just where the tracks leaving the turnout has a centre-to-centre distance of 6 cm between them. Further, the magnets must be separated between 20 - 100 cm along the tracks. If you have e.g. a bridge where you cannot place a magnet, a distance up to 200 cm is allowed but will yield a larger

misalignment. Still in doubt; take a picture of your track layout from above and send it to us for guidance.



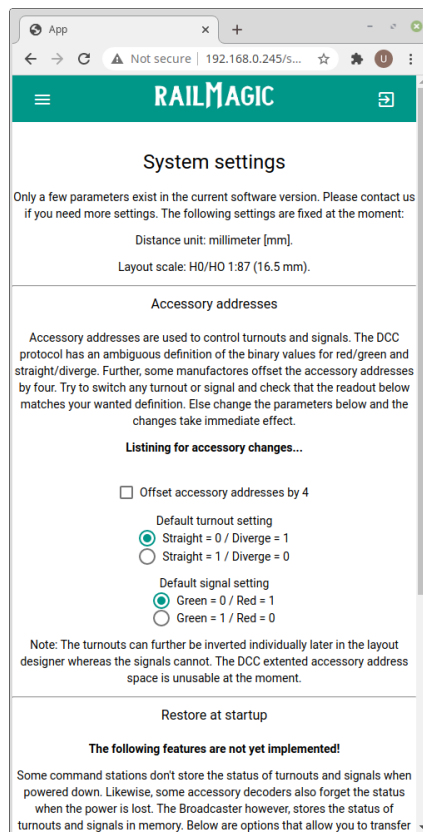
The precision of the placement is not critical, anything between 2 - 4 cm to the track centre is fine. The easiest way to achieve this precision is by creating a tool. Take a few magnets and place them on top of each other, this will create a stronger magnet that you can place on top of the layout where you want to place a magnet underneath. With one of your hands hold the tool in the wanted position in the middle between two adjacent tracks or 3 cm to the side of a single track. Make sure that the magnet you want to place underneath the baseboard attracts the tool with the adhesive side upward, so maybe you will have to flip the tool. With your other hand hold the magnet to place underneath the baseboard with three fingers, just as you would hold a pencil. When you touch the baseboard with all three fingers, the magnet should be a few millimetres from the baseboard. You can then feel when the magnet is attracted to the tool above and you let the magnet go. Give it a firm press. Reuse the tool for all the magnets.

The baseboard can have any thickness between 6 – 16 mm. We have on our test layout a helix with only 7 cm spacing between layers. It seems to work because the upper layer magnets are sensed consistently on both layers. This might depend on the layer spacing and is still to be determined.

Setting up the software

We will now hit back to the software setup. Power up your command station and enter "magic/" into your browser window when the track power is applied. The battery should ensure that you go straight to the application and not the boot menu.

This time there should be two buttons marked by a green key in the main settings menu. Start by clicking on "system settings". Read the guidance on the screen (see below). Switch one accessory address from your command station when asked. If you are using Märklin CS2/CS3 you should make sure that the address is configured to use DCC and not MM. The second part of the system settings are not implemented and can be left as is.

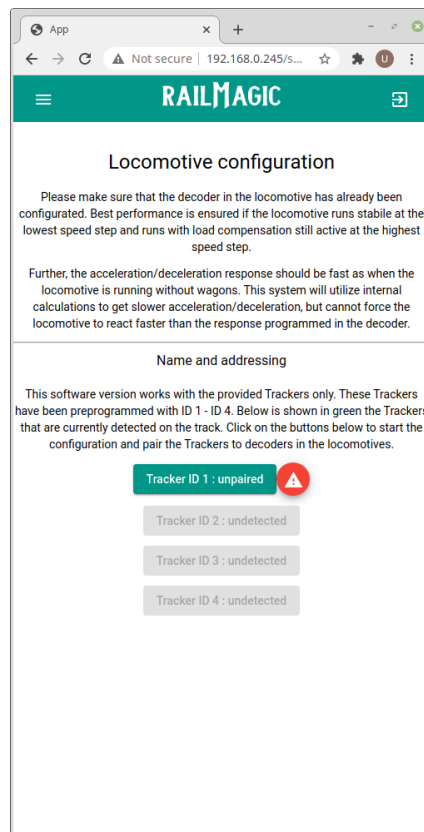


Configuration of locomotives

This process is demonstrated in the guided video programme.

To configure the locomotives click on "locomotive configuration". As stated on the screen, you should optimise the decoder in the locomotive to get the best result. Pay special attention to the deacceleration as it must not be too slow. Currently, we have programmed a quite slow deacceleration profile into the system (will be customizable later). However, if the locomotive has an even slower deacceleration profile programmed into the decoder, the system cannot stop the locomotive in time! Also, try to set the lowest speed step such that the locomotive will actually move.

At this time you will have only one locomotive fitted with a Tracker. Place it on the track and one of the four buttons will turn green and say "Tracker ID x : unpaired", see the figure below. Click on the button.



The next page lets you choose the protocol and address of the locomotive (see image below). The Railmagic system further has an option to store a name. When you are going to use the system, you will sometimes want to control a locomotive either by yourself or let the system control it. This virtual engine driver functionality has simply been called "magic". We therefore refer to states as "magic on" and "magic off". You can toggle between these two states in this application, but you can also choose a function key to provide easier access directly from your command station. At this point, you choose the function key number individually for each locomotive, but it might get hard to remember, so consider using the same number for all locomotives. Click "apply" to store the values. This will make the locomotive drive a few centimetres, such that the system can sense whether the entered address was true.

The screenshot shows a mobile browser window with the RAILMAGIC app. The page title is "Locomotive configuration". Below the title, there is a paragraph of instructions: "Please make sure that the decoder in the locomotive has already been configured. Best performance is ensured if the locomotive runs stable at the lowest speed step and runs with load compensation still active at the highest speed step. Further, the acceleration/deceleration response should be fast as when the locomotive is running without wagons. This system will utilize internal calculations to get slower acceleration/deceleration, but cannot force the locomotive to react faster than the response programmed in the decoder." Below this is a section titled "Name and addressing" with the instruction "Choose parameters for the locomotive". It contains three radio buttons for protocol selection: "DCC, 28 speed steps", "DCC, 126 speed steps", and "MFX (not implemented)". There are two text input fields: "Enter the address of the locomotive" and "Enter the name of locomotive". Below the name field is a character count "0 / 15" and a note "Use only [A-Z, a-z, 0-9] and spaces". A dropdown menu is labeled "Function key for magic" with a downward arrow. At the bottom, there is a button labeled "Invalid protocol type".

Notice: When magic is on, you cannot stop the locomotive just by turning the knob to zero. You have to turn magic off first. When you do this, the locomotive will continue with the current speed. You are then able to take over the control. However, if you accidentally turn it off, the locomotive will run unmanaged.

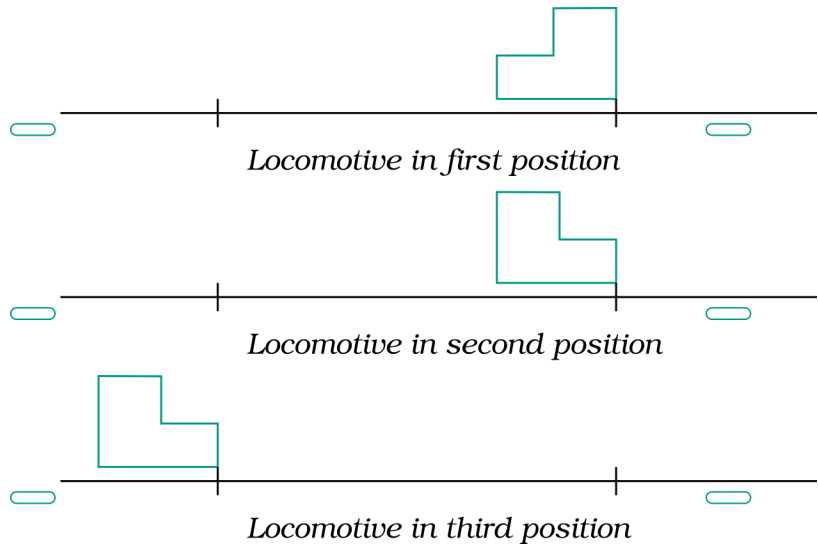
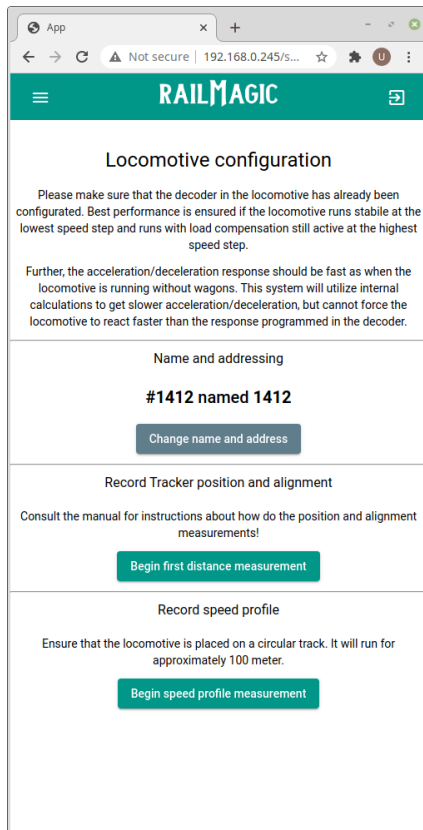
Calibration of locomotives

This process is demonstrated in the guided video programme.

The next step is to record the Tracker position and alignment. Choose a straight piece of track where the spacing between two magnets is close to one meter. You are going to take three measurements where the locomotive will run from a standing position until it passes a magnet (see the figure below where the locomotive is running toward the right, the second magnet is on the left side). The first and second positions should be 10 to 20 cm from the magnet. The distance between the second and third positions should be above 50 cm. In the third position the locomotive should not be near any magnets and there cannot be any magnets before the locomotive reaches the same magnet as in the first two measurements.

When you have placed the locomotive in the first position simply click on "begin first distance measurement". The locomotive will run automatically until it passes the magnet. Between measurements one and two you must physically lift the locomotive and rotate it by hand. Between measurements two and three, you can use your command station to drive the locomotive near the third position and adjust by hand.

For multi-wagon passenger trains, only the wagon containing the motor should be used for this measurement. The length of the other wagons can be added later.



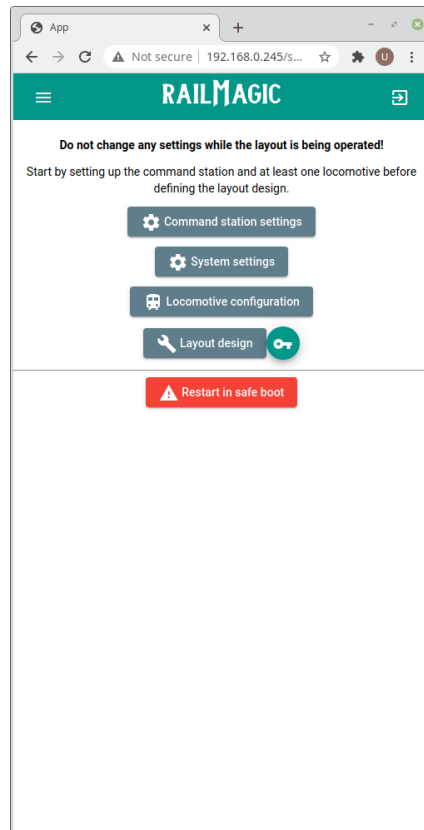
The last step is to record the speed profile. The locomotive is going to run between 25 and 50 meters, so you must probably create a loop through stations etc. Switch the turnouts now! Choose a piece of track where the locomotive can reach the highest speed without derailment. The track does not need to have magnets installed underneath. If you got a roller test stand that will work as well. As the 14 measurement points are recorded they will be displayed in the application just above the button "begin speed profile measurement". You should expect the first number to be around 100 and the following ones increasing for each step. Here is an actual example: 100 , 204 , 332 , 482 , 643 , 877 , 1126 , 1405 , 1725 , 2059 , 2584 , 3172 , 3973 , 4788. Cancel and redo the measurement if any of the values are far off or not larger than the previous value.

When all three steps have been completed the locomotive is configured. Use the "go back" button in the top right corner. You will now see that the green key has moved to the "layout design" button.

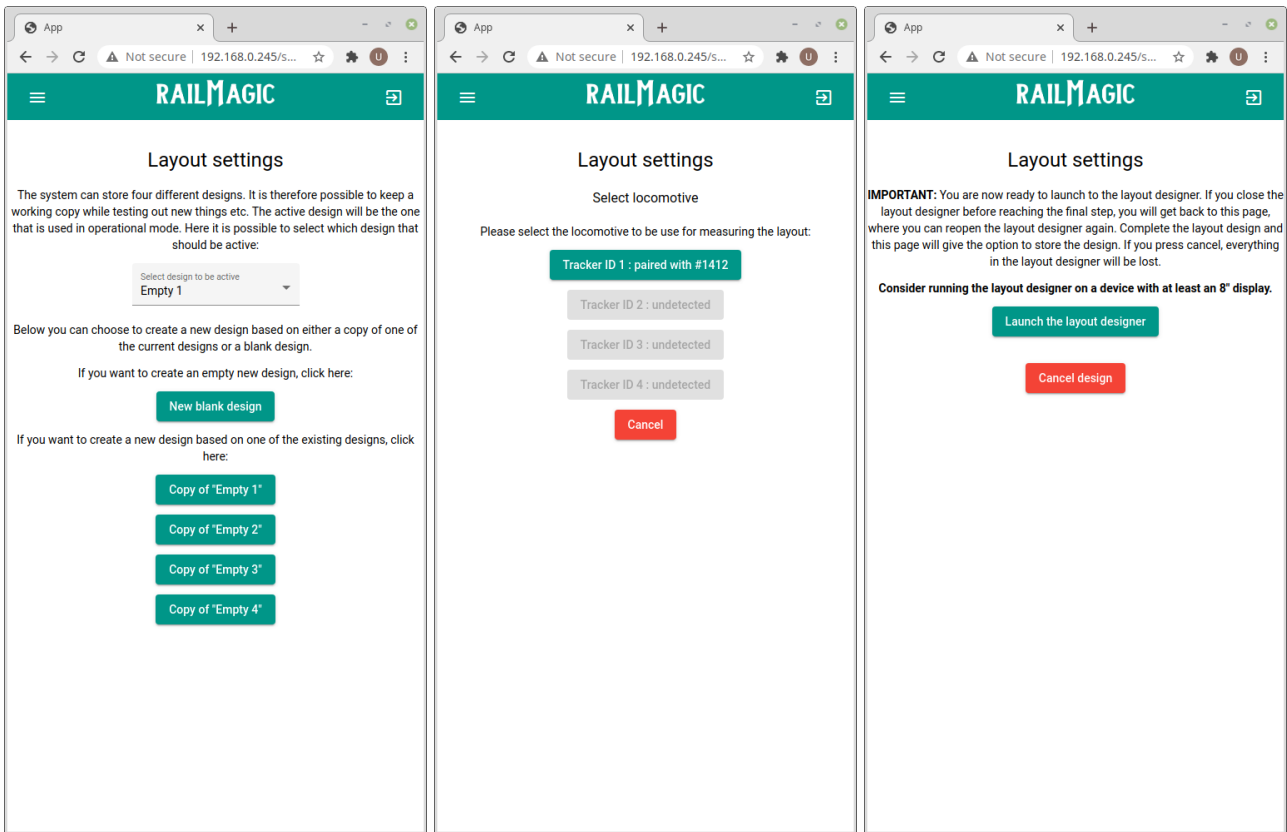
Layout design

The layout designer is demonstrated in the guided video programme.

You have reached the final step in setting up the software. Click on the "layout design" button in the settings menu, see the image below. This will bring up the layout settings menu. For the demonstration version, the system has been designed with storage space for four designs. This can be used for different layouts or if you want to test a new design but keep a backup.



In the layout settings menu, you can select which storage space to be active for operations (see image below). We will leave this setting as-is for now. The first button makes you start a new black design while the other four buttons let you start a new design based on a previous one. This time click on "new blank design". The next screen lets you select the locomotive to use for measuring the tracks, see the image below. Right now you only have one locomotive which you select. The locomotive will start running for two seconds. On the next screen click on "launch the layout designer" (also called the Mimaniac panel). Consider doing this on a tablet or computer. If you do it on a mobile phone, you might need to turn the display into vertical orientation in order to see the display. The help menu might take up the entire display. The menu can be toggled on and off by clicking the "help" button.



Please consult the guided video programme for more information on how to use the layout designer (Mimaniac panel). This is easiest to demonstrate and explain in the video format.

