Randall Train Room - Staff Manual

Updated: 2021-06-05

This manual describes the operation of the Randall Train Room by the Randall Museum Staff.

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1- Glossary

This is a glossary of terms used in the Randall Train Room -- these terms are referenced in this documentation as well as on labels in the train room.

Name / Label	**Pictures / Description**
Train Automation	Computer program that automatically moves the trains on a timer during museum hours, based on detecting visitors motion. It turns off automatically at 4:50 pm.
Train Layout	In Model Railroading terminology, a “layout” denotes the whole thing -- the miniature decor, the tracks, the trains, etc.
Pullman Car	Exhibit with the locked cabinet covering the lights and layout & outlet power switches. 
“Layout & Outlet” Power (main switches)	The main switches at the entrance. The “Layout & Outlet” Power must be the first on and always the last off. 
DCC Power Switch	The DCC Power Switch is located under the layout, next to the Automation Computer. It is located in a gray box protected by a gray cover. 
Auxiliary Power Supply	A power supply located to the right of the Automation Computer. It sometimes trips when powering up the layout. Toggle the black switch up when it trips. 
Automation Computer	The computer under the layout, next to the DCC Power Switch. It runs a custom-made program that orchestrates the whole train automation. 

Name / Label	Pictures / Description
DCC Command Station	An electrical device that provides power to the trains. It is located behind the Automation Computer. 
Valley Panel 1	The large black console with toggles to the right of the Automation Computer. 
Automation On/Off Toggles	The two toggles that enable/disable automation, located on the “Valley Panel”. 
Mainline	The main track where the Passenger and the Freight train runs. They share the track so only one can run at the same time. 
Branchline	The track where the 2-car silver train runs. 
Passenger Train (runs on mainline)	Currently that’s the yellow train. Color may vary as we change cars/engines. Parked next to the station. 
Freight Train (runs on mainline)	The one next to the yellow train. Composition may vary over time. Parked next to the station. 
Branchline Train	The 2-car silver train running on the branchline, by the mountain side. Train may vary with time. 

Name / Label	Pictures / Description
Mountain Side	The right side of the layout with hills and slopes. It depicts California's Sierras. 
Valley Side	The left side of the layout that is mostly flat, and contains the large city with a station and the building on fire. It depicts California's Central Valley. 
Stockton Station	The main large station located on the left side of the layout. The two Mainline trains (Passenger & Freight trains) are normally parked in front of it. 
"Engine" vs "Car"	Different parts composing a train. Typically the "engine" is the first part (with the motive power), and typically "cars" are the ones behind.

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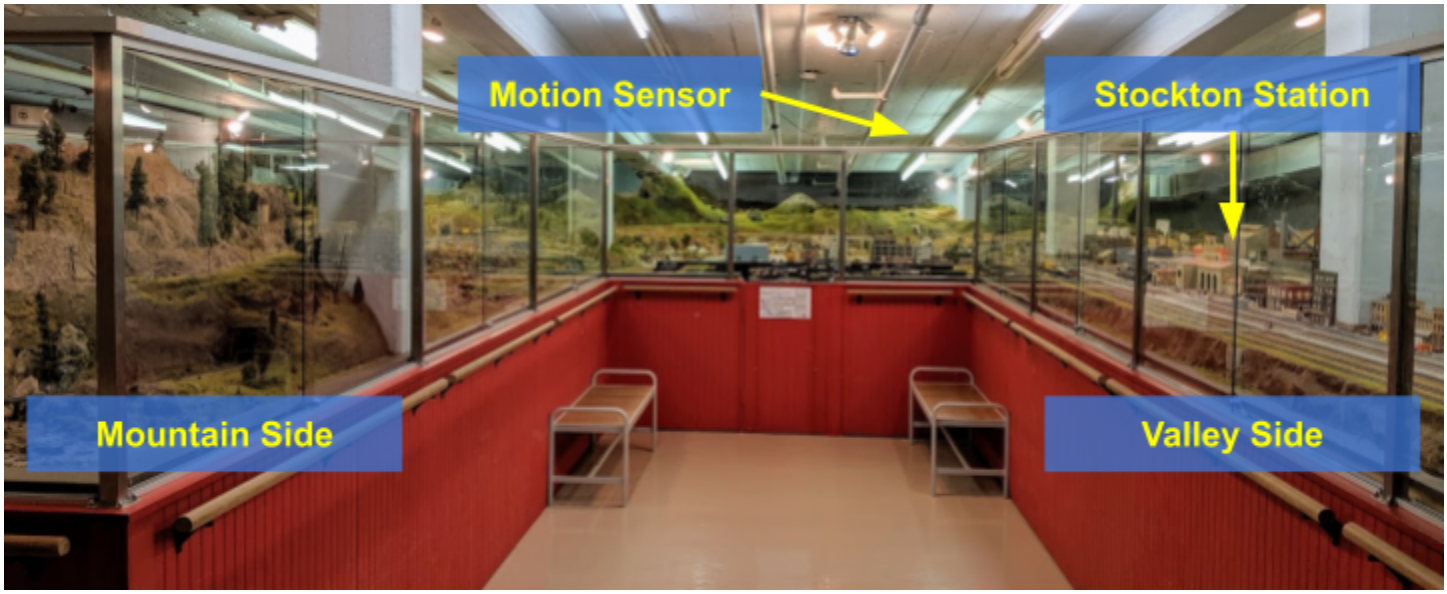
2- Automation Overview

Three trains currently run under automation in the train room.
They are divided in two groups.

2.1- Train Room

The train model is loosely based on California. One side of the room has a flat scenery -- this is called “the Valley”. The other side of the room has a range of mountains, evoking the California Sierras.

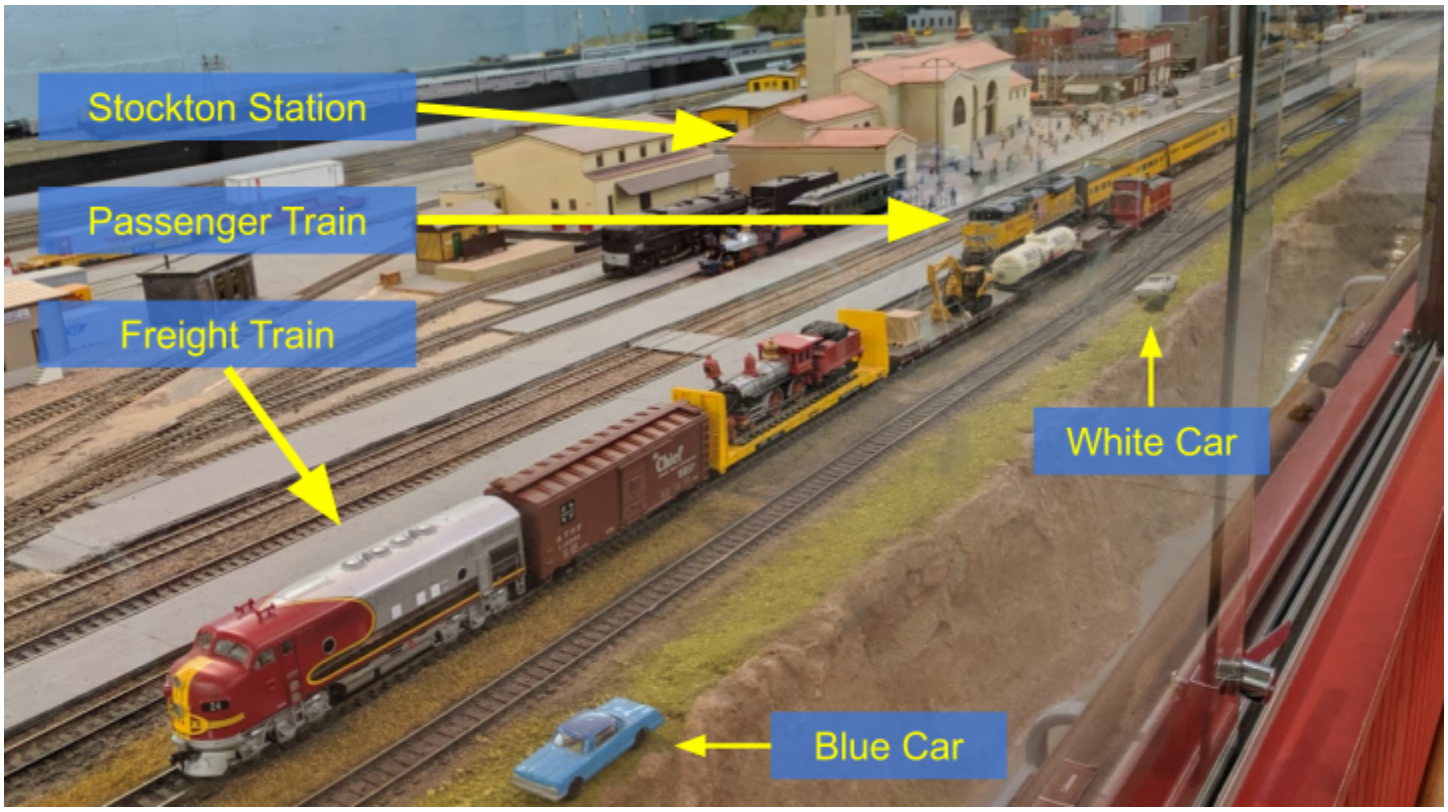
The train layout forms a U shape, with the space of the visitors in the middle. There’s also a small passage on the left side of the room to view the other side of the mountain. The right part is private access to train operators and Museum Staff, and features various control panels. Visitors should not be able to go there.



On the Valley side, the main station is the Stockton Station. This is where two of the automated train start and stop. It is the main feature of the layout and visitors are naturally drawn to it when they enter the room.

On the end wall at the top is a motion sensor. This is what detects visitors and triggers the automation. It is calibrated in order to detect children when they are near the Stockton Station. Adults are detected a bit farther.

2.1- Mainline: Passenger and Freight Train



Two trains are parked by the large **Stockton Station**, on the left side of the layout:

We have placed **two small automobiles** on the layout roughly where the trains stop. On the picture above, these are the blue car and the white car that can be seen on the side by the window. These act as “markers” and they should not be moved by the staff.

The picture above shows their parked position:

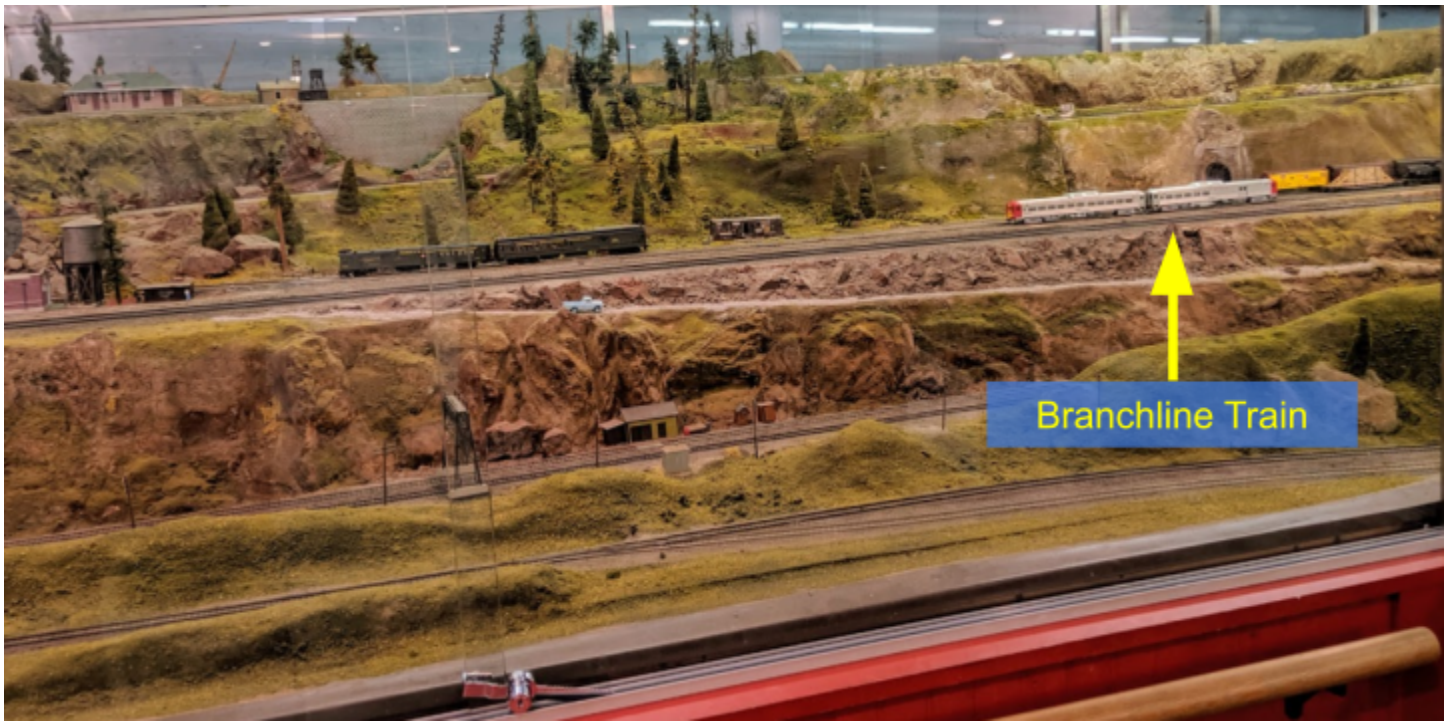
- The **Freight Train** is the one on the right. It is located on the 2nd track and stops roughly where the blue car is located.
- The **Passenger Train** is the one on the left. It is located on the 3rd track and stops roughly where the white car is located, in front of the station’s passengers.

The train composition will change over time as we swap engines or cars. The picture above is a reference of where the trains stop, but not necessarily how they look like.

The track where these trains run is called the “main line” since it is essentially the main long track line that loops around the whole room. They share the same track and take turns running on that track.

During automation, these two trains circle from the left to the right side of the layout. Both trains are programmed to stop and eventually come back in reverse direction where they started from. However they differ in speed and they differ in where they stop & reverse.

2.2- Branchline



On the right side of the layout is the “mountain”, which features the track & trains moving at different elevations. The 3rd automated train runs on a secondary track line called the “branchline” which is parallel to the mainline.

Currently the Branchline Train is a small train composed of two silver cars.

The picture above shows where the train is parked when not running under automation.

This train circles around the mountain via a few tunnels and ends in a little town composed of a few buildings on the other side.

2.3- Train Automation

For train automation to work, obviously power needs to be turned on in the train room. This manual details this in the following section.

Sometimes it is desirable to turn off the automation. There are toggles on the main Valley Panel that enable or disable the automation. Each line (mainline or branchline) can be turned on or off separately. This way, if there's a problem with one of the trains, the other line can keep running.

A motion detector is installed in the room, next to the Stockton Station. It detects people as they walk in and approach the station, and then the computer proceeds in automatically starting the trains, one per line.

Each train runs in "shuttle" mode, meaning they run along the track, reach a point where they stop, then reverse and go back to the original starting point. After each run, the trains have a pause before they can be triggered and running again. The pause varies -- it is currently 1 minute for the mainline and 3 minutes for the branchline. That delay can vary as we adjust the computer program over time.

A tablet is located at the entrance of the room. It displays whether the automation is running or stopped, and which train would run next. To keep the display simple, the tablet only displays the status of the mainline trains as this is what seems more relevant to the visitors.

> **Note**: The tablet connects using WiFi. In rare occasions, the tablet can get out of sync with the computer and the display does not end up reflecting the current automation status. If that's the case, simply let Raphaël know so that he can reset the tablet.

3- Powering the Layout

This chapter will guide you through the steps to turn power on for the layout and place the trains under automation. The steps to power off the layout are exactly the same, just in reverse order, and are covered here too. A one-page laminated “cheat sheet” summary of this is kept at the reception desk.

3.1- First Step, by the Pullman Car

The “**Pullman Car**” is an exhibit next to the entrance wall in the train room. This wooden structure depicts a Pullman passenger car with various questions printed on windows that move up and down, revealing answers.

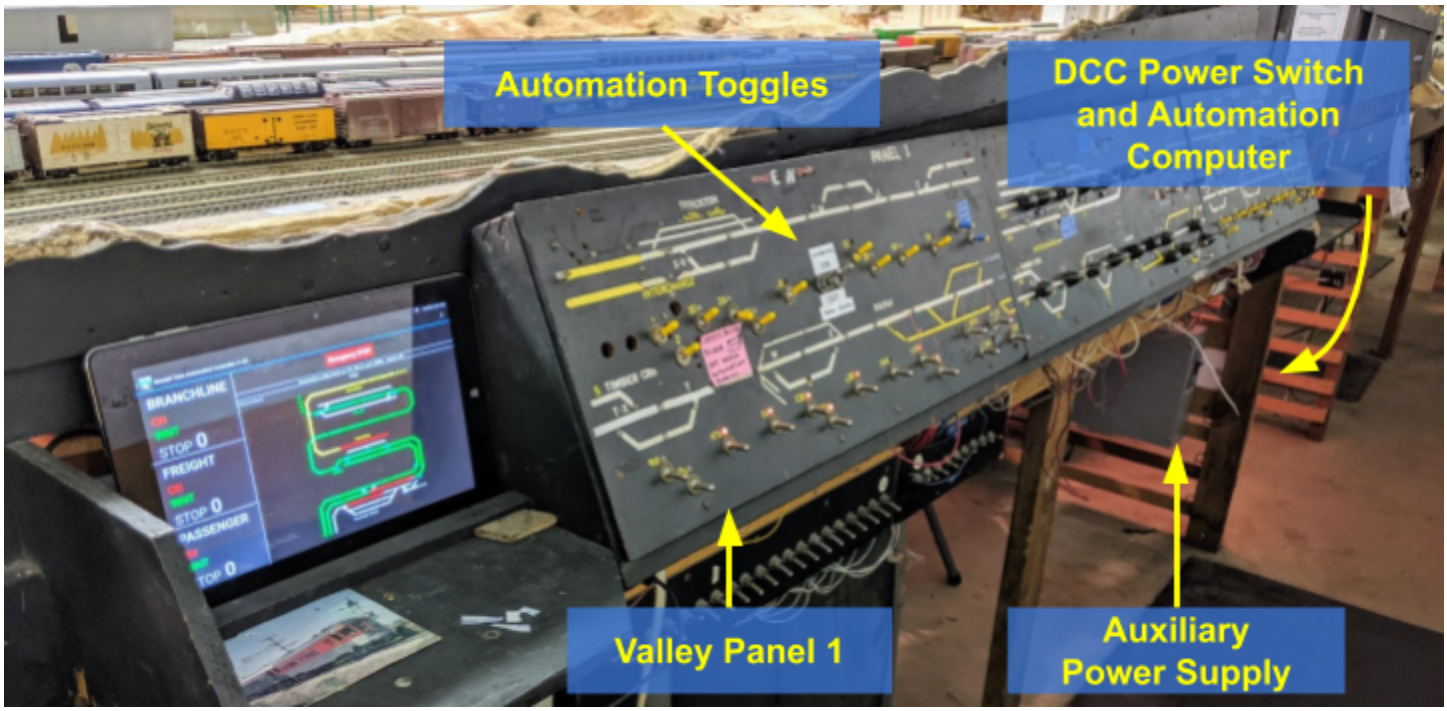
The rightmost window does not move up and down. It is actually a disguised locked door to an electric panel that provides power to the lights in the room, as well as contain switches that power the whole layout. These are named the **“Layout & Outlet” Power** and look like this:

To turn on power, both switches must be flipped up. It is important that they both be in the same position.
When turning on power, please also turn on all the lights, including the switch to the left of the “Layout & Outlet” Power.

The “Layout & Outlet” Power must always be the first one to be turned on, and the last one to be turned off.

3.2- Second Step, by the Valley Panel

The “Valley Panel” is a large black console with many switches and toggles. It is accessed by going through the locked side door on the right side of the room.

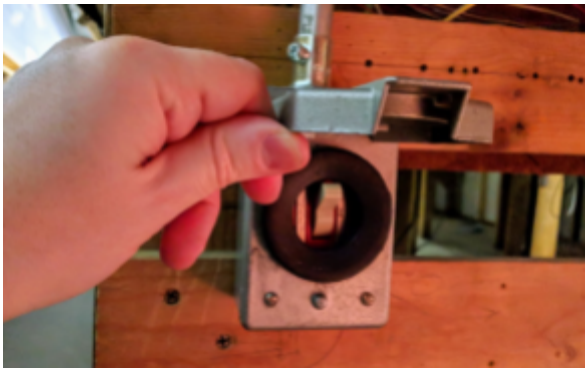


We encourage the Museum Staff to not touch the silver and yellow switches on the panel as doing so may prevent the automation from working properly.
It is important to notice that this was designed without safeguards and we, the train operators, are well aware that it is unfortunately too easy to flip a switch just by leaning or brushing against the panel. I have certainly done so myself. If you think that happened, it’s no big deal, just let us know so that we can rectify the situation if needed.

This section will describe the parts that are designed for the Museum Staff to interact with safely.

3.2.1- DCC Power Switch

Once the “Layout & Outlet” Power has been turned on in the Pullman car, the second step is to turn on the **DCC Power Switch**. It is located under the layout, next to the Automation Computer. It is located in a gray box protected by a gray cover.



Important:
When powering ON the layout, always turn on the “Layout & Outlet” Power *before* the DCC Power Switch.

When powering OFF the layout, always turn off the DCC Power Switch *before* the “Layout & Outlet” Power.

⇒ The “Layout & Outlet” Power must always be the first one to be turned on, and the last one to be turned off.

3.2.2- Automation Computer

This is a step where the Museum Staff has no action to take. All you have to do is make sure the computer has started as expected.

Once the DCC Power Switch is turned on, the **Automation Computer** next to it will start automatically.
Similarly, when powering off the train room, the Automation Computer will automatically shutdown by itself when the DCC Power Switch is turned off.

> Staff members *should not interact* with the computer, both when powering on and when powering off.
> Doing so may interfere with the automated start up/shut down sequence.

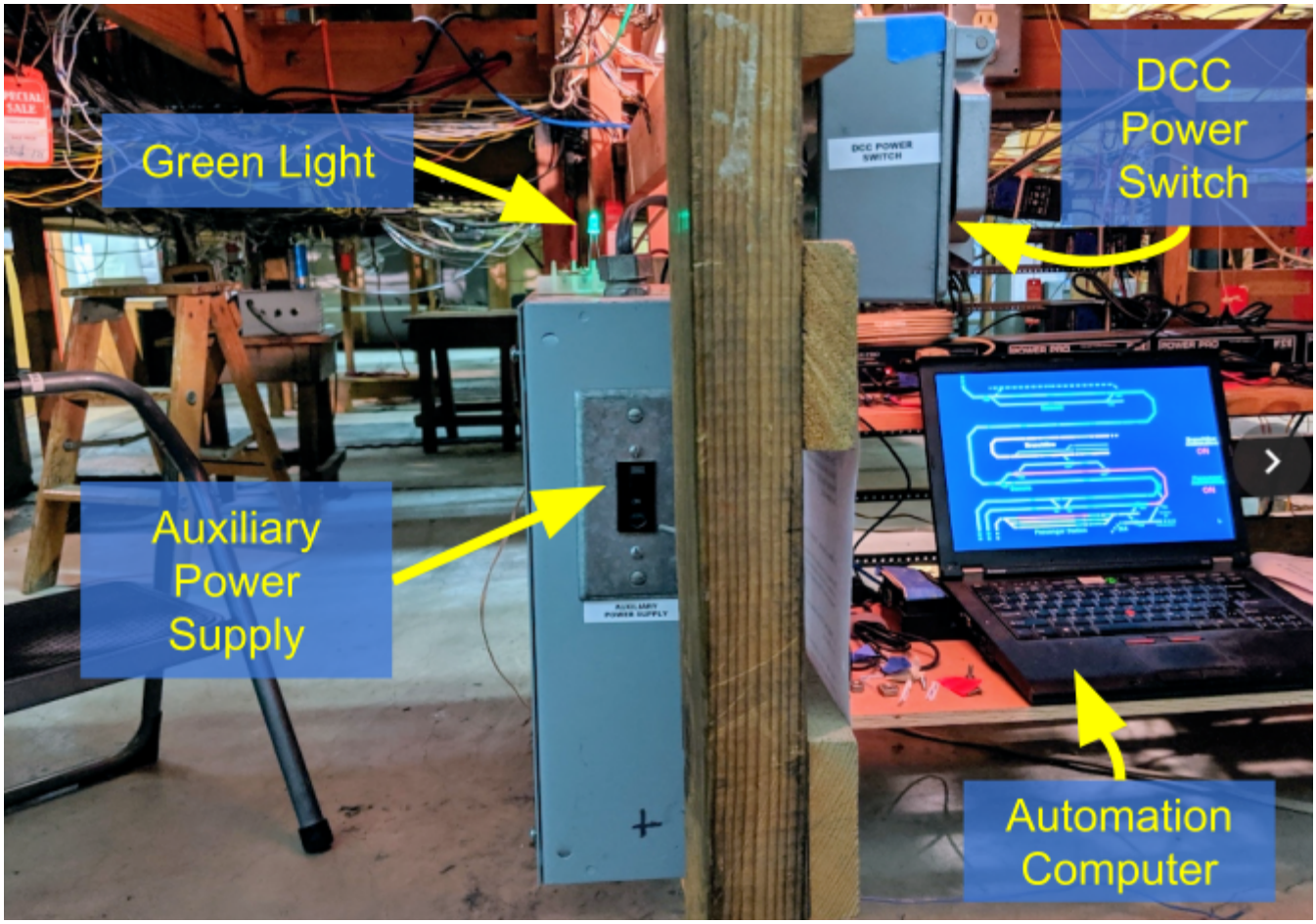
It takes exactly one minute for the computer to start, and exactly one minute to shutdown.

As part of the “powering on” routine, please **WAIT for the computer to finish booting**. That takes a full minute and the display changes, displaying some text then some boxes that come and go. It has finished once it displays a schematic map, as per the picture above. The display also clearly indicates whether the automation is enabled or disabled.

> **Important**: **Do not power off the layout while the computer is starting up**. You must WAIT for it to finish booting and display the map. If you toggle the main power on/off/on while the computer is starting, it will then proceed to automatically shutdown, and you may end up with a situation where the computer is turned off while the power is on. In that case, please see section 4 for troubleshooting.

3.2.3- Auxiliary Power Supply

This is a step where the Museum Staff has no action to take. All you have to do is make sure the power supply is turned on as expected.



The “Auxiliary Power Supply” is a gray box mounted vertically on the other side of the support where the DCC Power Switch is located. On top of the Auxiliary Power Supply is a green light.

When the DCC Power Switch is ON, the green light should be ON.

> **If the green light is not on**: Check the Auxiliary Power Supply. In the front is a black switch. It should be up.
>
> Sometimes the power supply trips and the switch moves down. In that case, just flip it up again..

3.2.4- Automation ON / OFF Toggles

In the middle of the “Valley Panel 1” are located two switches which are purposely made for the staff and the train operators. There are two toggles clearly marked as “Automation ON / OFF”.

The left-side toggle enables the mainline automation.
The right-side toggle enables the branchline automation.

As part of the routine to turn on the automation, we ask the staff to simply visually validate that both switches are in the up position, to enable the automation of both train lines. If the switches are down, the staff must flip them up to enable the automation. Timing is not important here -- this can be done at any time, whether the power has been turned on or not.

Sometimes we may want to prevent one of the lines from running under automation if there’s a known defect. When that is the case, we will place a post-it on the panel to clearly indicate that one of the lines should stay disabled.

It is important to know that the switches do not stop trains in they are already running. All they do is prevent trains from starting at the next automation cycle.

4- Troubleshooting Guide

4.1- What to Do When Automation Does Not Start

If the trains do not run after powering on the layout:

- First, don't panic!
- Use the **one-page laminated "cheat sheet"** and make sure you did not miss a step.
- If that did not help, please go through the next **section which has troubleshooting steps** for most common issues. Try to see if you can easily rectify the situation.
- ⇒ However, please **only do an action if you are comfortable with it**. If not, please don't do it.

⇒ If you got the situation rectified, congratulations! It is suggested that you notify Jim or Raphaël of what went wrong and how it was rectified. If something causes issues repeatedly, we'll want to address it. Our contact information is written down at the front desk.

⇒ **If you did NOT get the situation rectified** and the trains still do not run:

- **Take pictures** of anything that you can think is relevant (for example a train stopped at an unusual place, an odd message on the computer or tablet).
- **Send us the pictures and a description** of what you experienced via cell phone or email. Our contact information is written down at the front desk.
- **Turn everything off** by following the proper instructions (e.g. turn off at the DCC Power Switch first, wait for the computer to turn off, and turn off at the "Layout & Outlet" Power at the Pullman Car last).

4.2- What to Do When Automation Stops During the Day

If the trains were working in the morning and then **later stop working during the day**, then it is important to **turn off power to the layout**.

It is possible for a train to derail, and this could create an electrical short that would damage the equipment if left ongoing for a while.

In this case, please take pictures of where the trains are stopped, and send us **the pictures and a description** of what you experienced via cell phone or email. Our contact information is written down at the front desk.

4.3- Common Troubleshooting Issues

This section lists common troubleshooting issues. For each issue, it gives a summary description of what to look for, and how you can rectify it. However we want to stress that you should only take action if you are comfortable with it.

The order of these steps matters a lot. Please check them in the provided order.

1	Check the **"Layout & Outlet" Power** switches in the Pullman Car. ⇒ Both switches must be UP. A common mistake is to flip up only one of the two switches.	
2	Check the "**DCC Power Switch**" by the computer. ⇒ The switch must be UP.	
3	Check the "**Auxiliary Power Supply**", to the left of the DCC Power Switch. ⇒ The green light on top of the Auxiliary Power Supply must be lit. ⇒ There's a black switch in front. It must be UP. A common issue is that this power supply trips and the front black switch moves down. In that case, just flip it up again.	
4	Check the **Automation Computer** is ON. Just above the keyboard there's a little white label "POWER >". Next to it, there's a round button. ⇒ It must be lit green. If it is off, press the power button once to start the computer.	
5	Check the "**Automation On/Off Toggles**" on the Valley Panel 1. ⇒ They must be both UP. If they are not, flip them up to enable automation.	

5- Special Cases

5.1- Automation After 4:50 PM

To make it easier for the staff to turn off automation during the week, the automation automatically stops at 4:50 PM. In a normal situation, that means when the staff goes in the room to turn the automation off, trains are already back at their station, and the motion detectors will not start the trains.

In rare cases, the museum may host an event that requires the trains to continue running past 4:50 PM. There is no way to prevent the automation from stopping the trains at 4:50 PM; however it is very easy to re-activate the automation just after, as this section will explain.

Step 1: Wait until 4:50 PM that the automation disables itself.
The tablet display by the entrance should report “Automation Stopped”.

Step 2: Wait at least a couple minutes, e.g. at least 4:52 PM.
The timing does *not* have to be very precise.
Technicality: The only thing that matters is that it be *past* 4:50 PM from the computer’s clock point of view. Waiting at least a couple minutes ensures that the next action will work even if the clock is not perfectly synchronized.

Step 3: Once it is at least 4:52 PM, **flip down** both Automation ON/OFF toggles on Valley Panel 1.
Step 4: Wait a couple seconds and **flip up** both Automation ON/OFF toggles on Valley Panel 1:

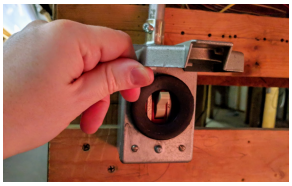
That’s all there is to do.
The automation is now re-enabled.
To verify, please move next to the Stockton Station. This should start a train.
You can check the tablet by the entrance, and it should indicate a train is either waiting or running.

5.2- Powering Off Automation With Visitors in the Room

To make it easier for the staff to turn off automation during the week, the automation automatically stops at 4:50 PM. You may have to power off the automation at other times, and this section explains how.

A very important requirement when powering off the automation is that both mainline trains *must* be idle at the Stockton Station. However, since the trains' automation cycle is triggered by the motion sensor in the room, anyone in the room, including you, may trigger the trains to start while you are trying to power the automation off.

Luckily, the procedure to turn the automation and power off in this case is very simple.

Step 1: Go to the "Valley Panel 1" and turn OFF both "Automation" toggles.	
Step 2: If any of the trains are running, they will not stop instantly. Instead you must **WAIT for the trains to come back** to the main Stockton Station. For the branchline, you wait for it to park on the right side of the mountain. **Once no train is running anymore**, you can proceed to the next step.	
Step 3: **Turn off the DCC Power Switch** next to the computer. **Wait one minute** for the computer to fully shut down.	
Step 4: Go to the "Valley Panel 1" and turn ON both "Automation" toggles. It sets up the automation to start normally the next day.	
Step 5: **Turn off the "Layout & Outlet" Power** in the Pullman Car. Flip both down. Remember to also turn off all the lights, including the one "hidden" to the left of that switch box.	

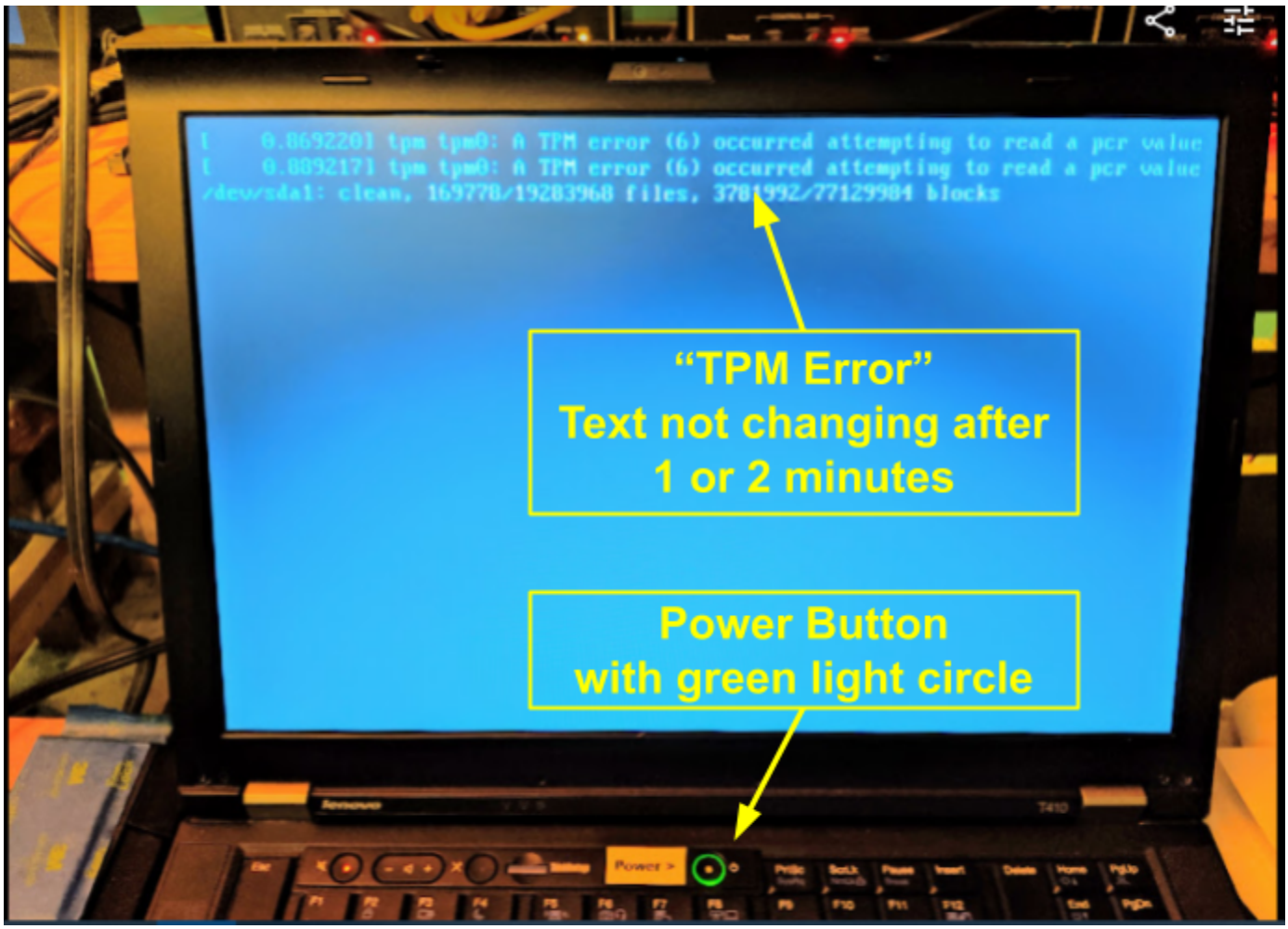
5.3- Computer “Stuck” when Starting

This scenario has been known to happen a few times:

- Power on the layout by turning on the “Layout & Outlet” Power followed by turning on the DCC Power Switch as usual.
- Computer starts, except it gets stuck on this black screen with a couple lines of text.

This case is identified by:

- 3 lines of text on a black screen on the computer indicating something about a “TPM error”.
    - Normally, these lines should disappear after a few seconds.
    - ⇒ Problem happens when the 3 lines are present for at least 1 minute or more.
- Power button is illuminated with a green light circle.



See next page on how to solve this problem.

How to solve this problem:

Step 1: a- **Do NOT turn off power** at the DCC Power Switch. b- **Press and hold the power button** (typically 10 seconds) till the screen goes off. c- Then **release** the power button. **Expected**: There should not be a green light circle around the power button any more.
Step 2: a- **Briefly press the power button** (typically 1 second). b- Release it. **Expected**: The green light around the power button should illuminate, and the screen should turn on. Computer should start as usual and display the train map within one minute.

~~ end ~~