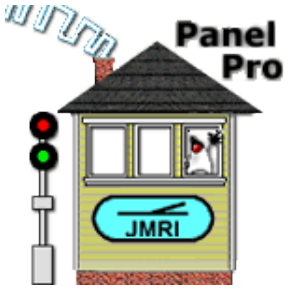
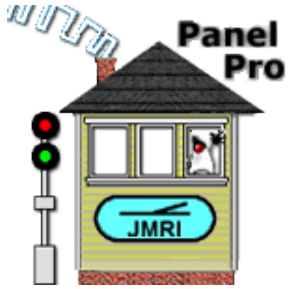


Running Trains with JMRI's Dispatcher

Dave Duchamp



What is Dispatcher?

Dispatcher provides functionality and organizes information for dispatching trains on a model railroad layout.

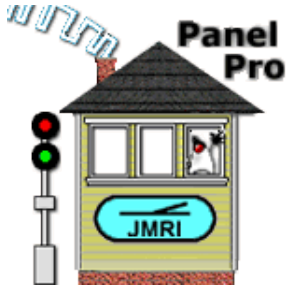
Dispatcher is **not** designed to be prototypical, and **not** designed to replace a human dispatcher.

Dispatcher is designed to make dispatching easier and more fun.

It's main functions are:

- Support running multiple trains manually (*human engineer*) and/or automatically (*virtual engineer*).
- Creating Active Trains by linking a Transit and a Train.
- Allocating Sections to Active Trains, and releasing when not needed.

Optionally, can automatically set Turnouts as Sections are allocated.



What is a Section?

A Section is a group of one or more connected Blocks that may be allocated together to a train running in a given direction.

A Section has three states:

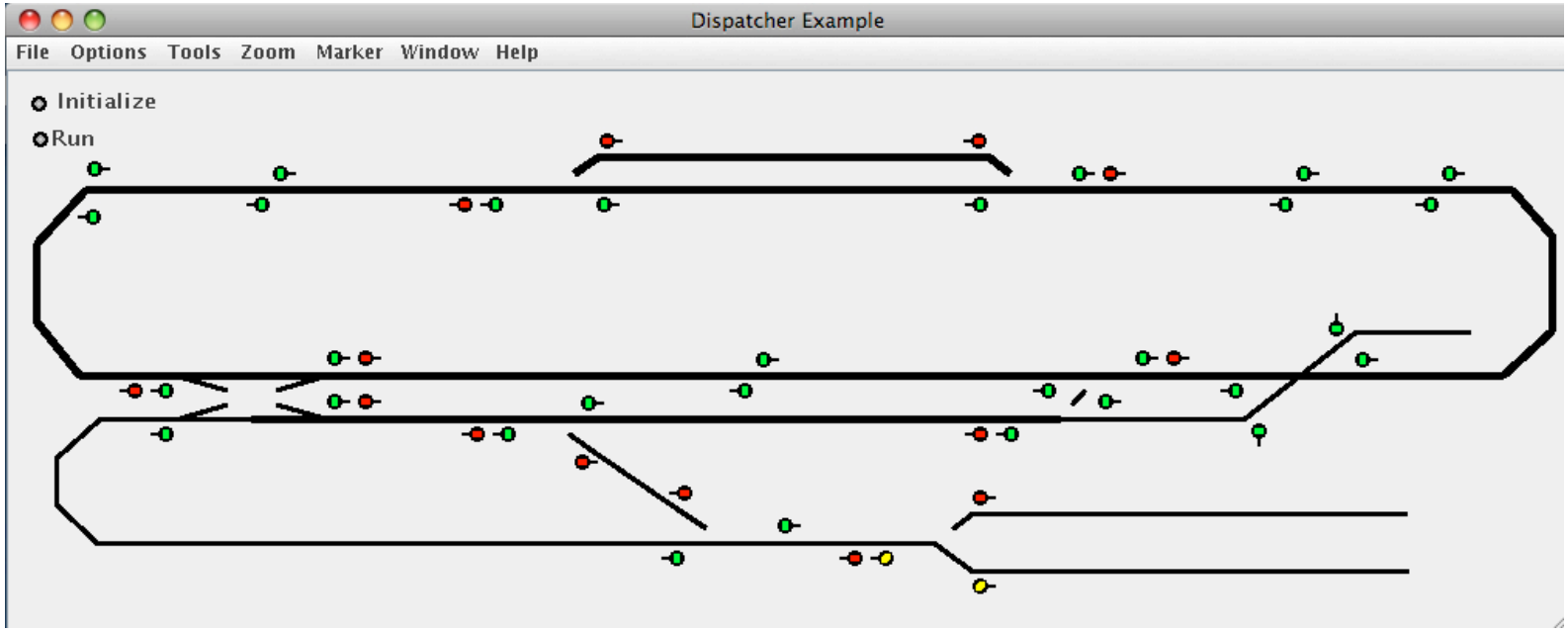
- FREE – not allocated.
- FORWARD – allocated for travel in the “forward” direction.
- REVERSE – allocated for travel in the “reverse” direction.

Dispatcher requires that Sections (and Transits) be set up before running trains that use them.

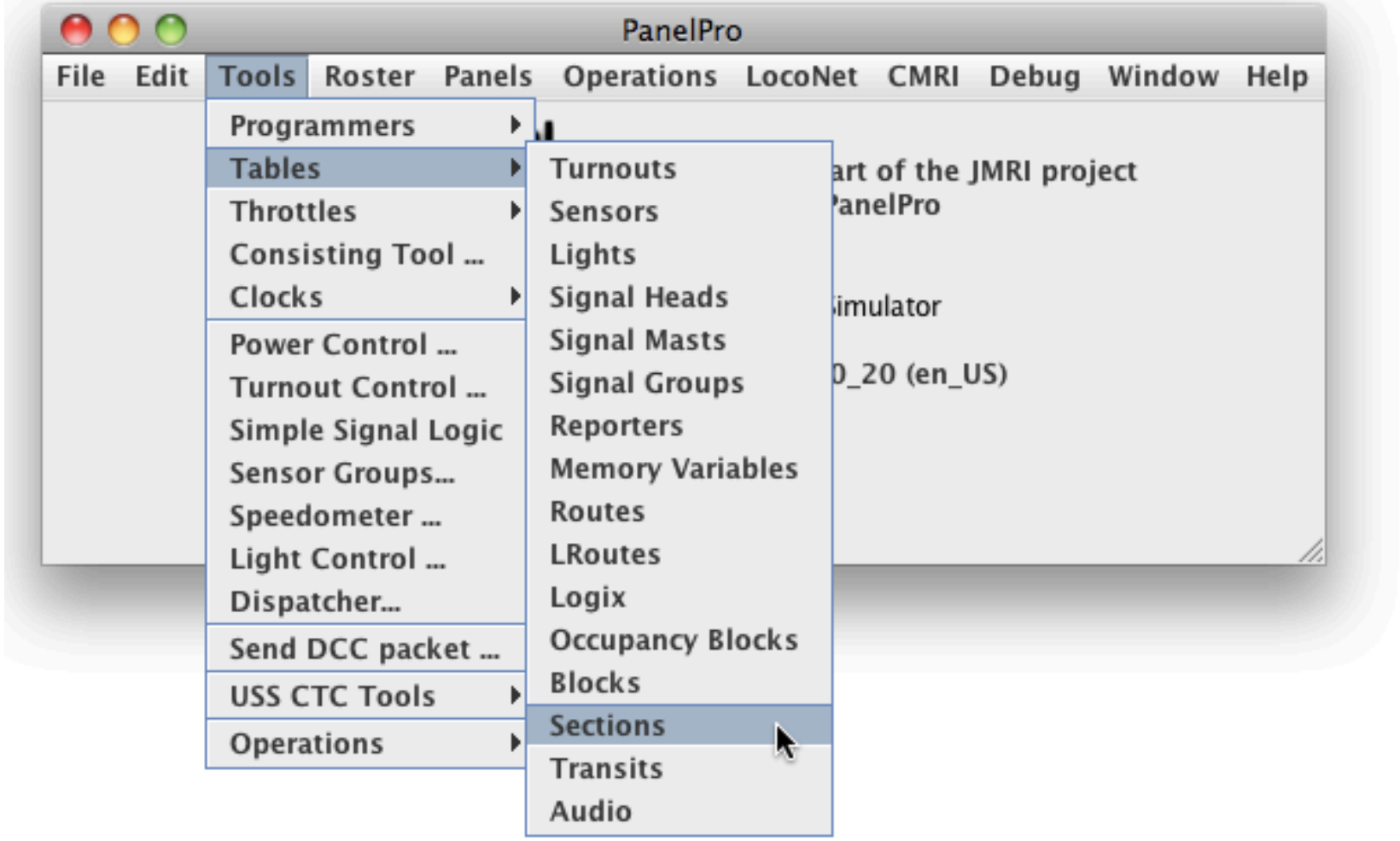
Layout must have Blocks set up and functional before Sections can be defined.

Demo Layout

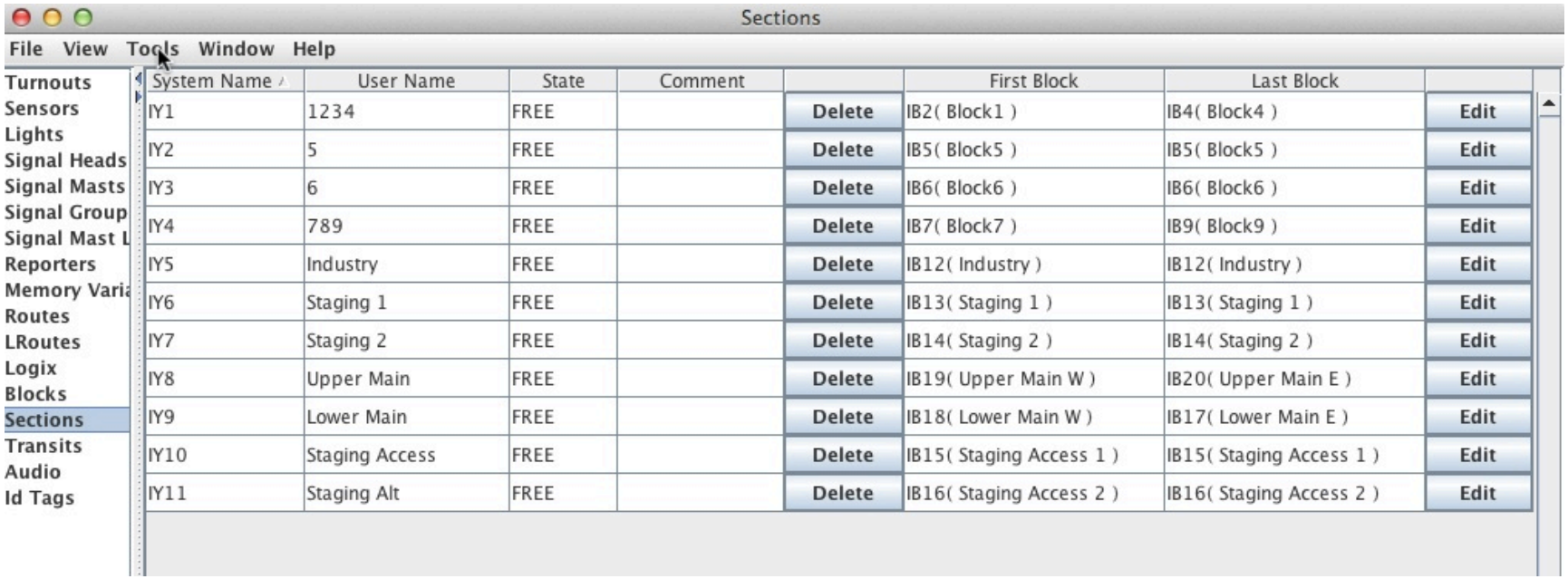
(Made with Layout Editor)



Set up Sections using the Section Table



Selecting the Section Table for our Demo Layout shows that its 18 Blocks are grouped into 11 Sections.



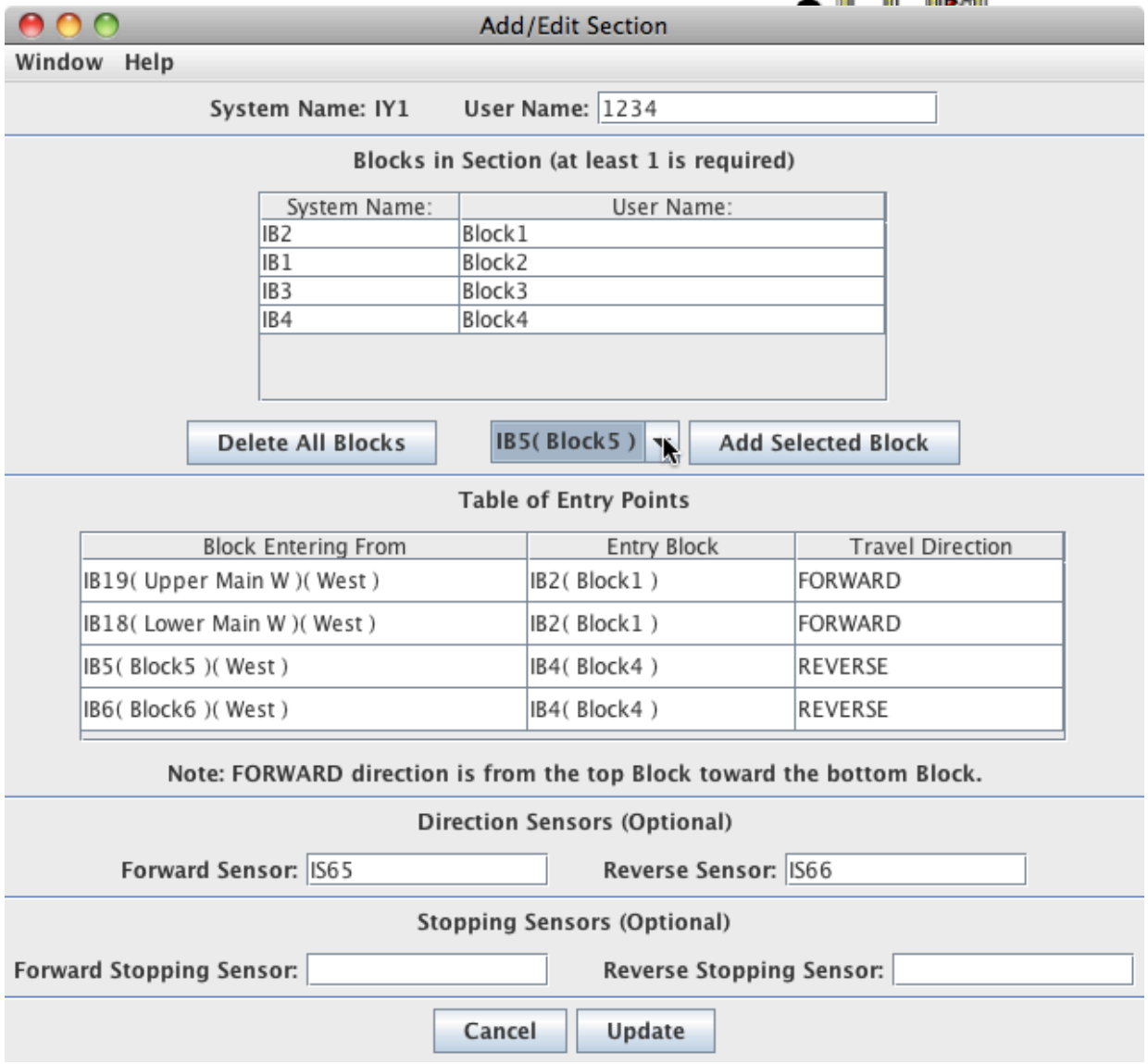
System Name	User Name	State	Comment		First Block	Last Block	
IY1	1234	FREE		Delete	IB2(Block1)	IB4(Block4)	Edit
IY2	5	FREE		Delete	IB5(Block5)	IB5(Block5)	Edit
IY3	6	FREE		Delete	IB6(Block6)	IB6(Block6)	Edit
IY4	789	FREE		Delete	IB7(Block7)	IB9(Block9)	Edit
IY5	Industry	FREE		Delete	IB12(Industry)	IB12(Industry)	Edit
IY6	Staging 1	FREE		Delete	IB13(Staging 1)	IB13(Staging 1)	Edit
IY7	Staging 2	FREE		Delete	IB14(Staging 2)	IB14(Staging 2)	Edit
IY8	Upper Main	FREE		Delete	IB19(Upper Main W)	IB20(Upper Main E)	Edit
IY9	Lower Main	FREE		Delete	IB18(Lower Main W)	IB17(Lower Main E)	Edit
IY10	Staging Access	FREE		Delete	IB15(Staging Access 1)	IB15(Staging Access 1)	Edit
IY11	Staging Alt	FREE		Delete	IB16(Staging Access 2)	IB16(Staging Access 2)	Edit

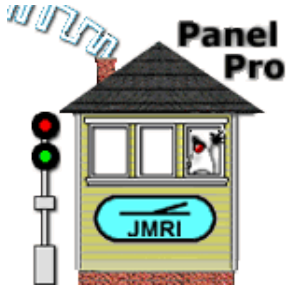
Blocks must be fully defined, including Paths.

"FORWARD" direction is from top Block to bottom Block.

User selects the Travel Direction for each Entry Point to the Section.

Trains can traverse Section in either direction.





What are Direction Sensors?

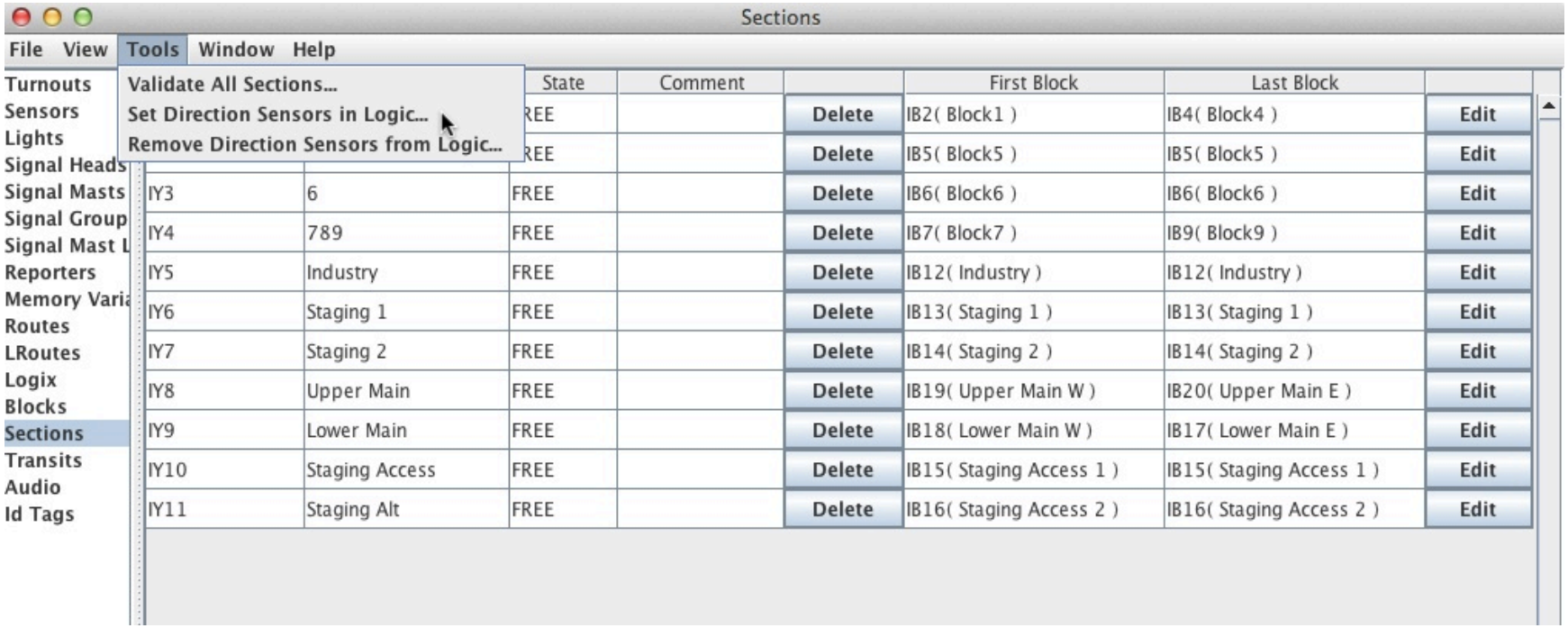
Direction Sensors are internal sensors whose state reflects the allocation status of their Section.

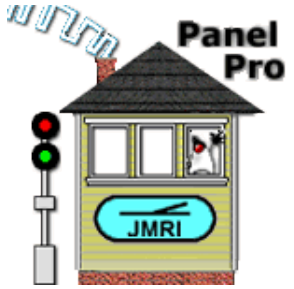
- FREE – Both Direction Sensors ACTIVE
- FORWARD – Forward Sensor INACTIVE, Reverse Sensor ACTIVE
- REVERSE – Reverse Sensor INACTIVE, Forward Sensor ACTIVE

Correctly inserting Direction Sensors into Signal Logic, will cause signals to block travel in unallocated directions, resulting in simple APB Signaling.

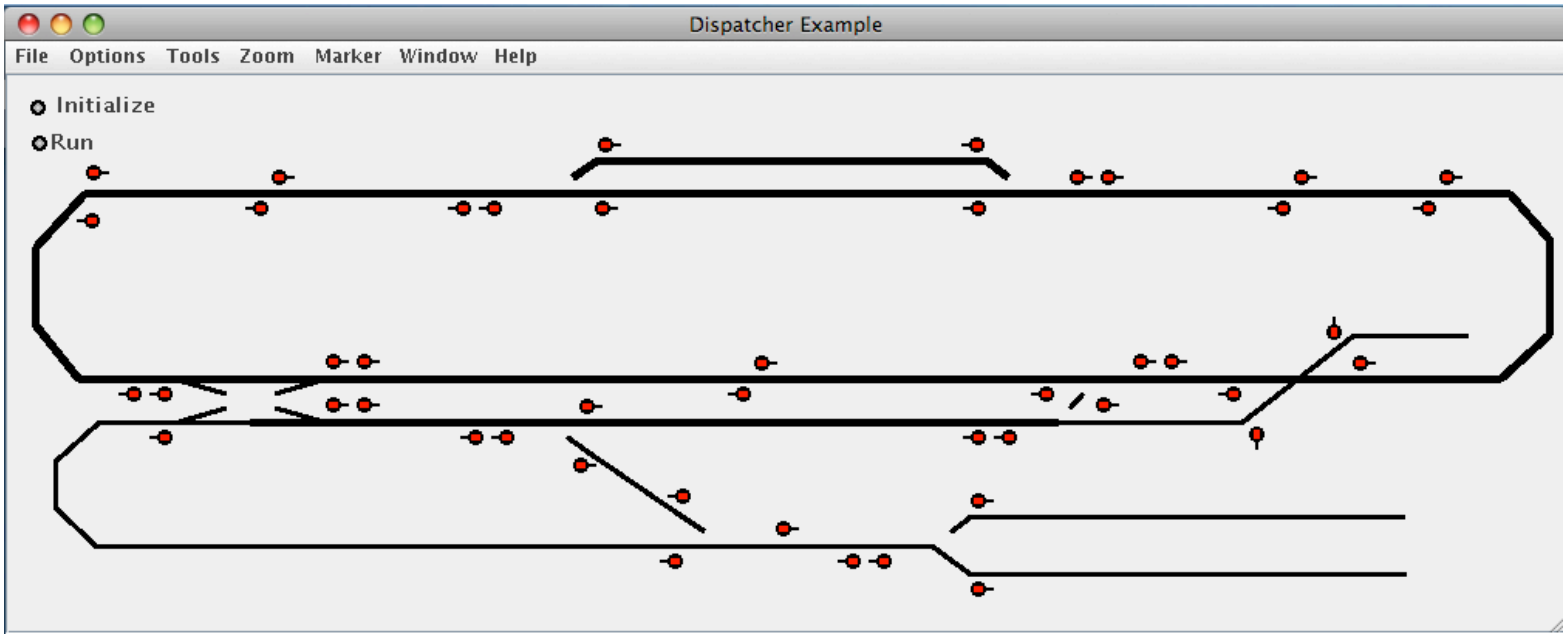
Tools are available for inserting and removing Direction Sensors into/from Signal Logic.

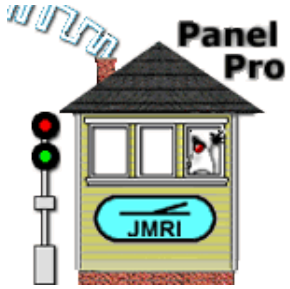
Select tool to put Direction Sensors into Signal Logic.





No Sections are allocated, so all Signal Heads are Red!





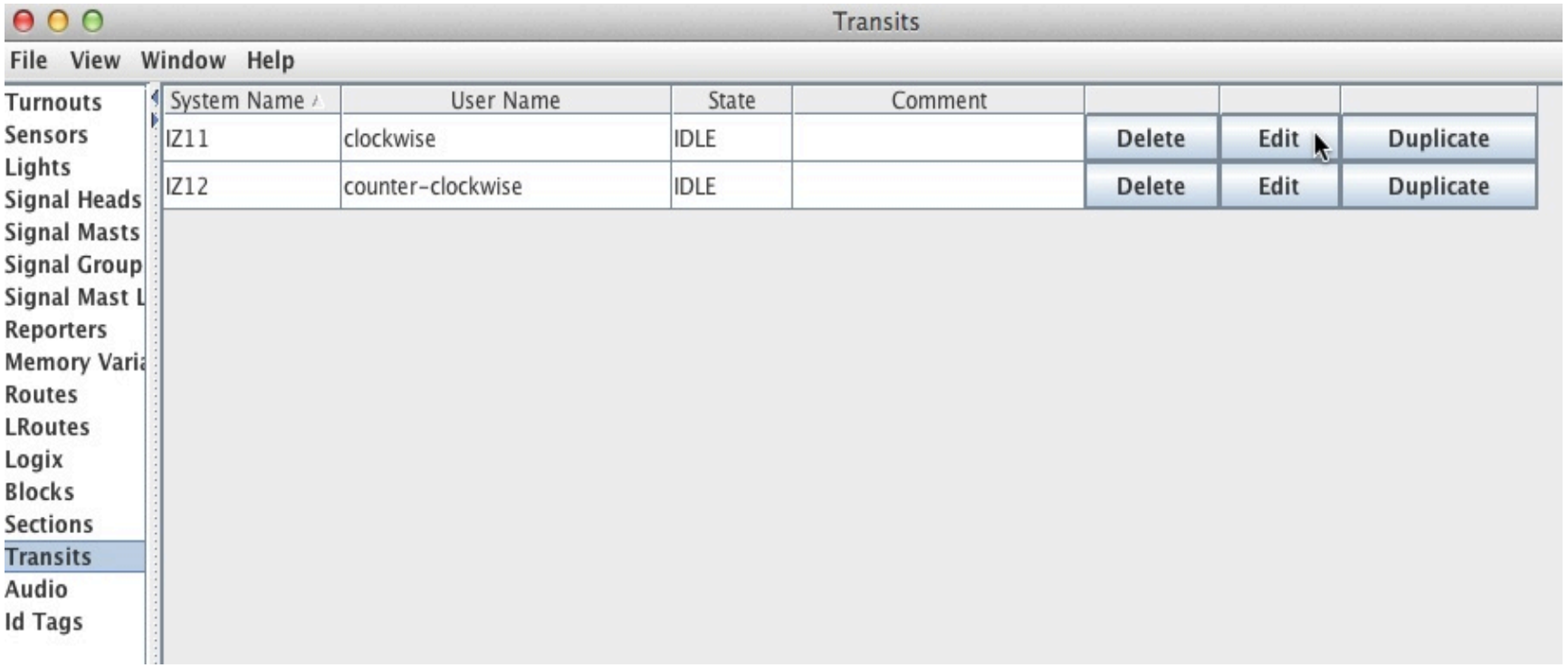
What is a Transit?

A Transit is a group of two or more connected Sections that describes a route around the layout for a train traveling in a given direction.

Transits are *activated* in the Dispatcher window, where a Transit is paired with a Train to create an Active Train.

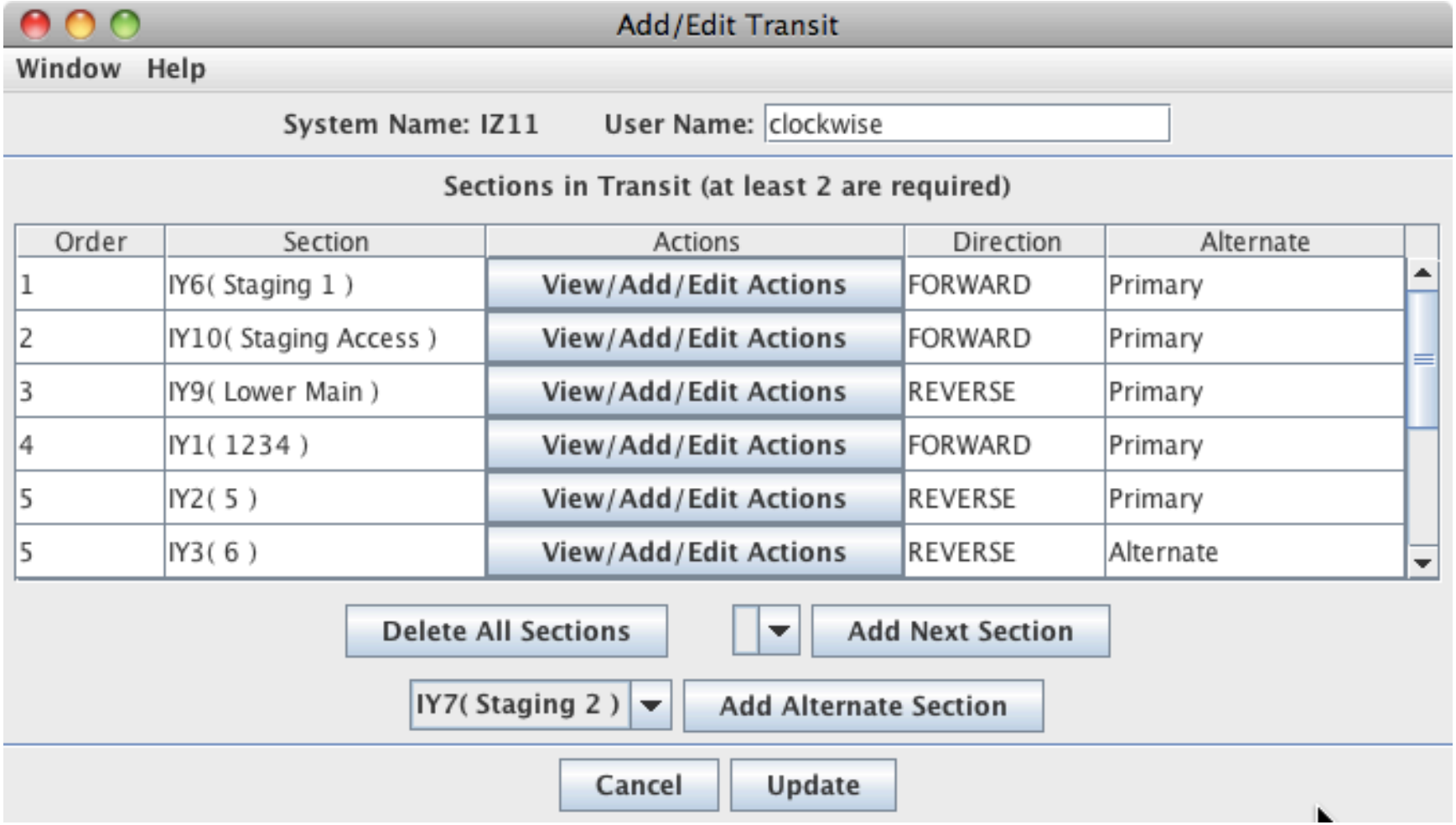
Transits are set up in the Transit Table.

Two Transits have been defined for our demo layout.



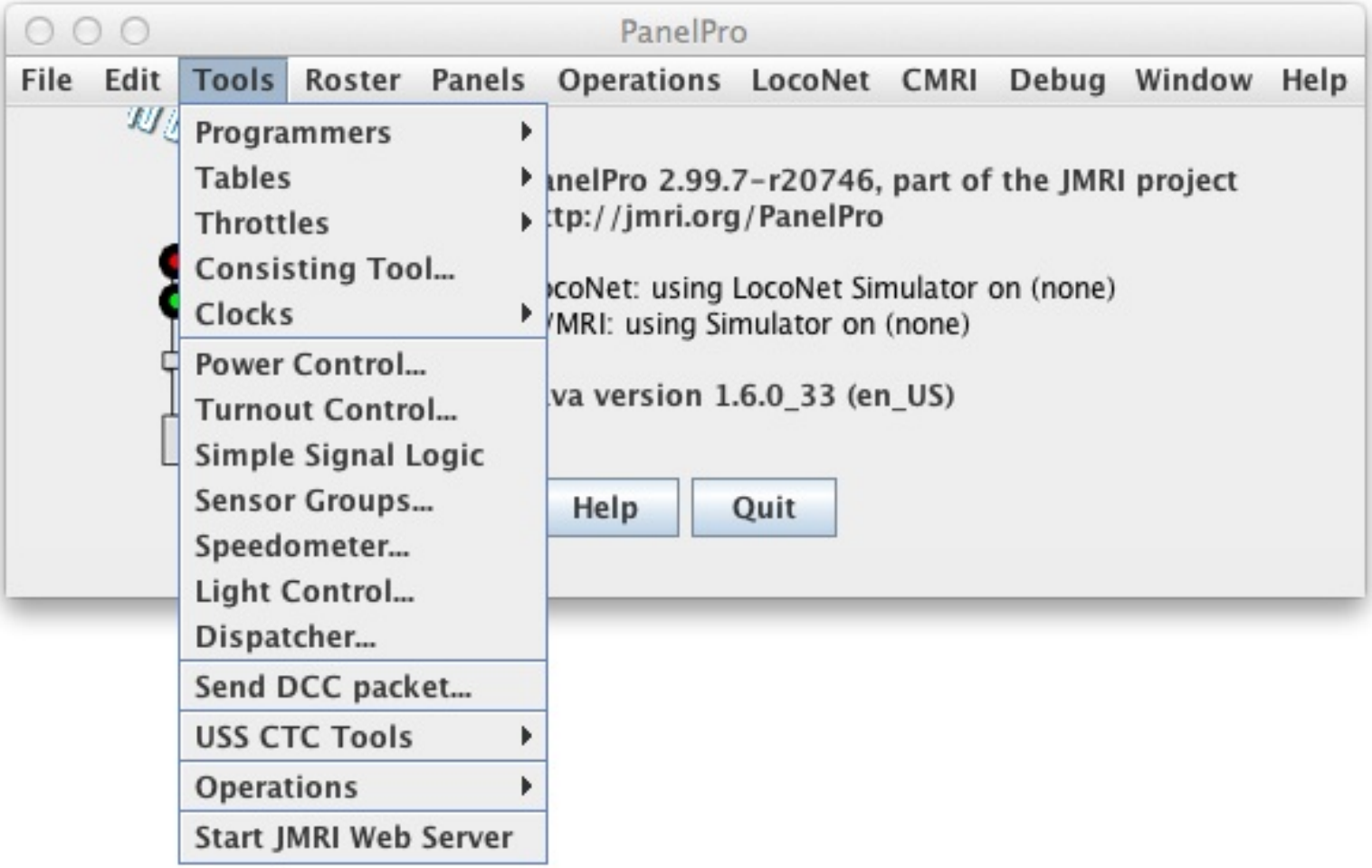
“Clockwise” Transit

Note alternate Sections at siding.



After all mainline Sections and at least one Transit have been defined—

Select **“Dispatcher…”** in the main PanelPro window.



The dispatcher controls the layout via the

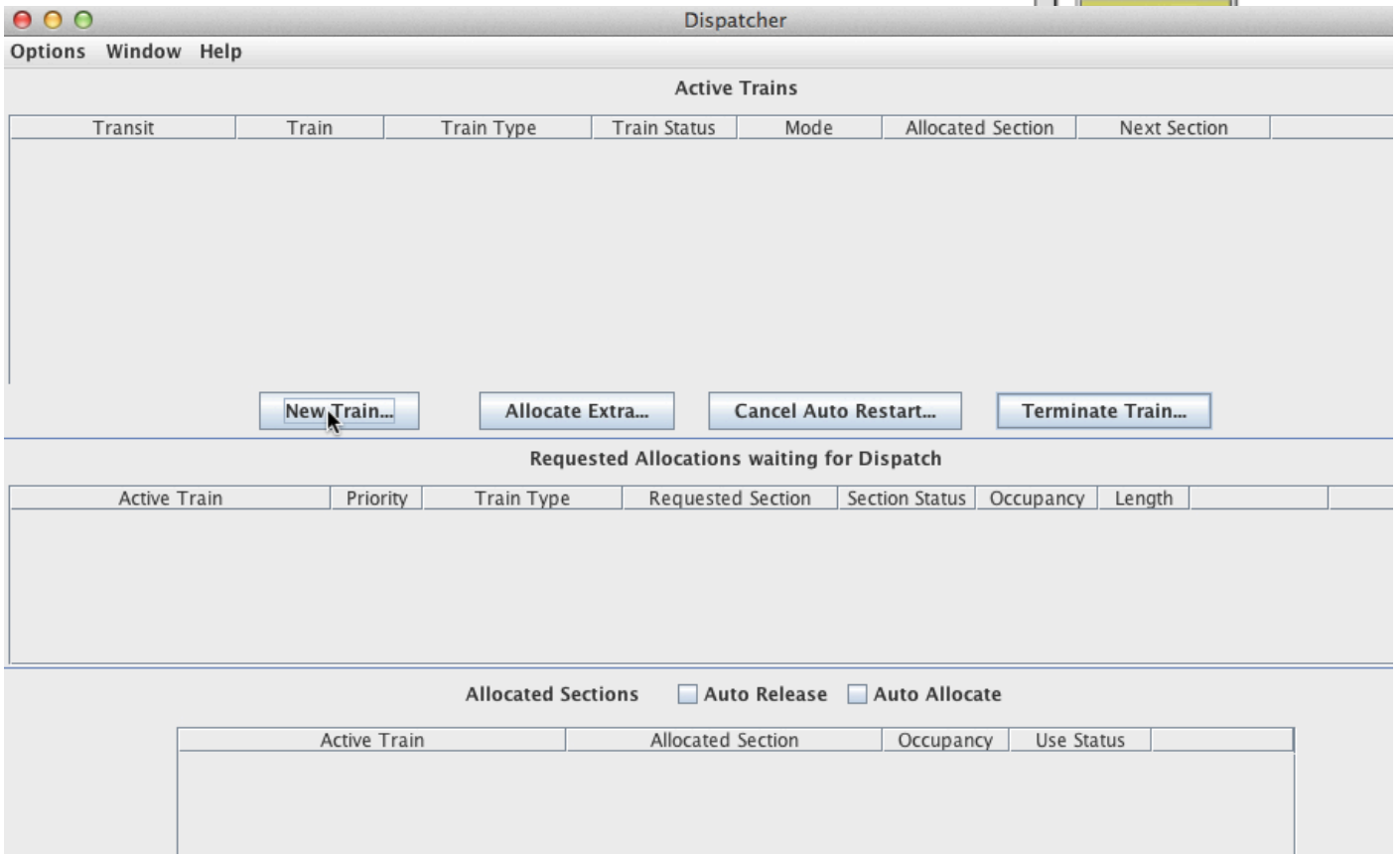
Dispatcher Window.

Three Tables:

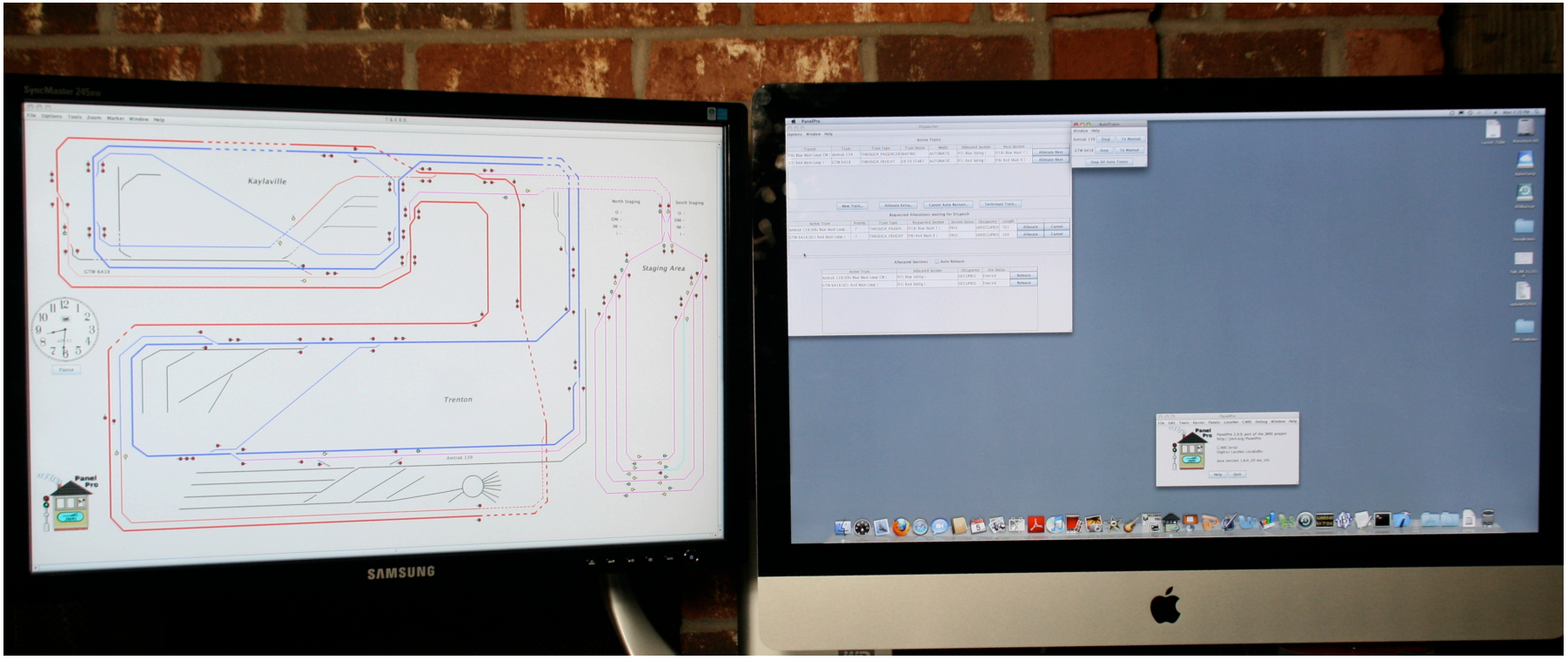
Active Trains

Requested Allocations

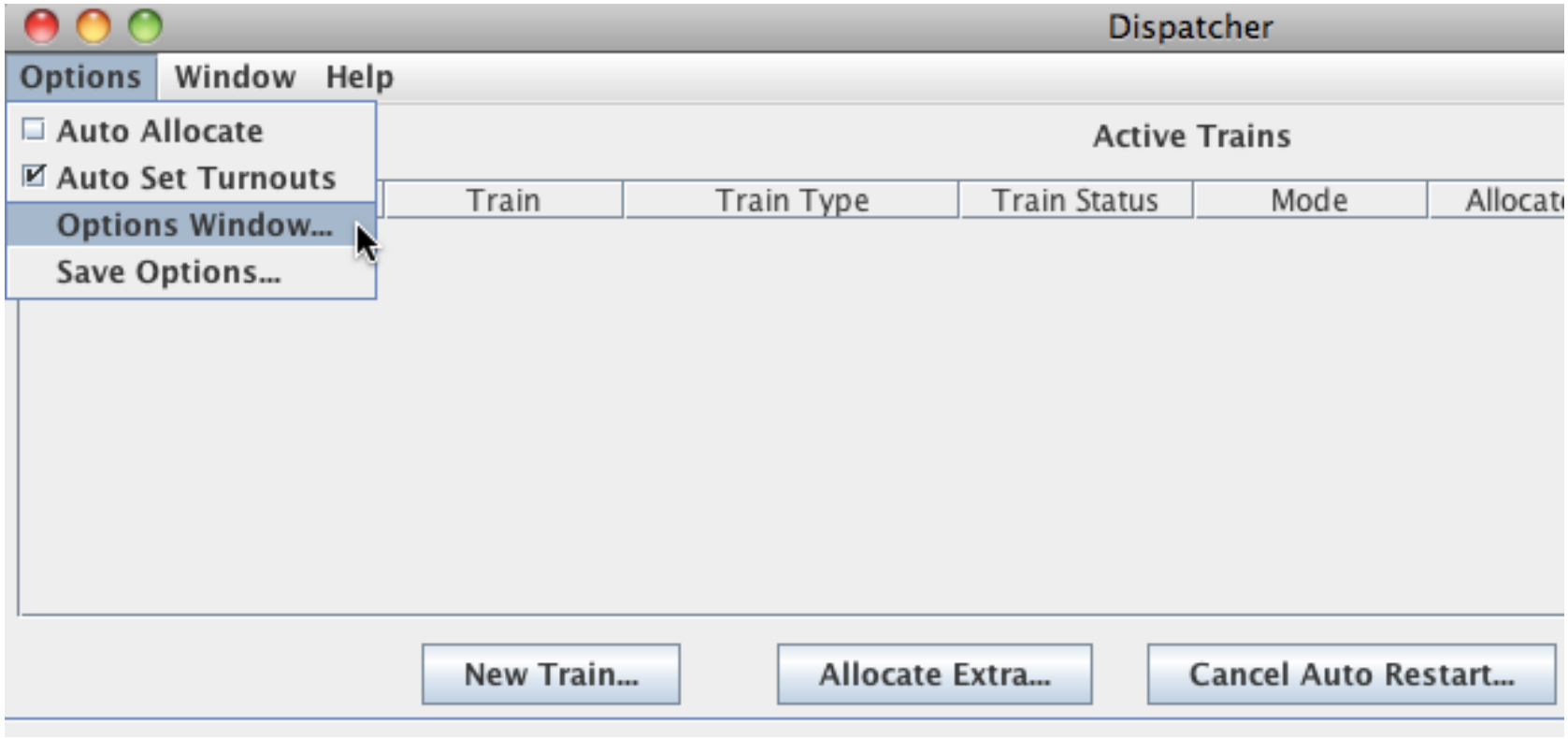
Allocated Sections



Dispatcher Window is large. Works best with multiple monitors, but multiple monitors are not required.

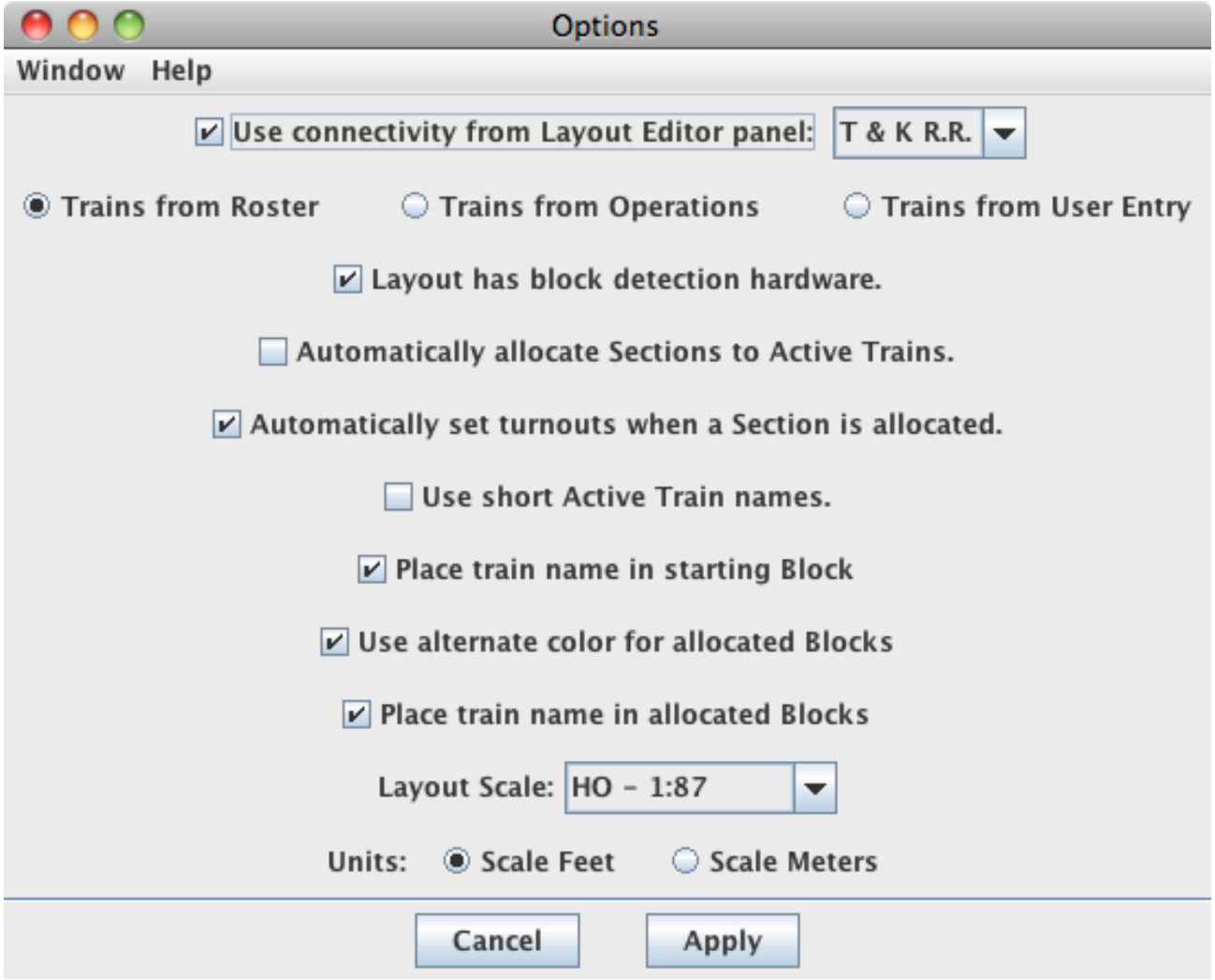


Click **“Options Window…”** in the Dispatcher **“Options”** menu.



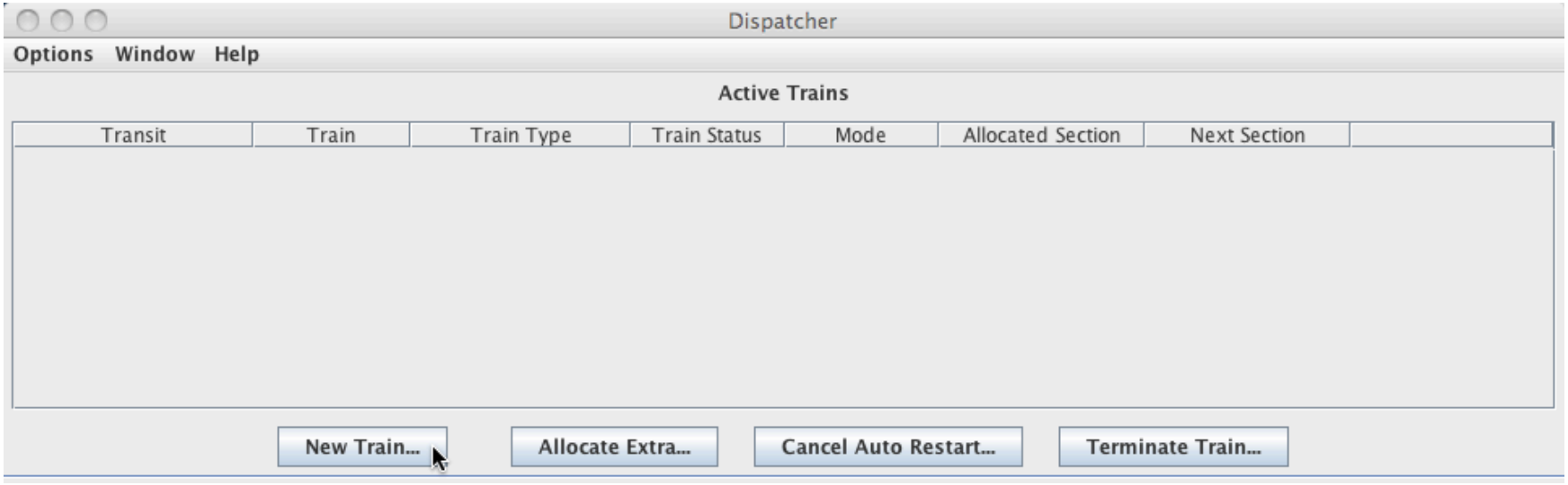
Dispatcher Options Window

Set options, then click “Apply”.



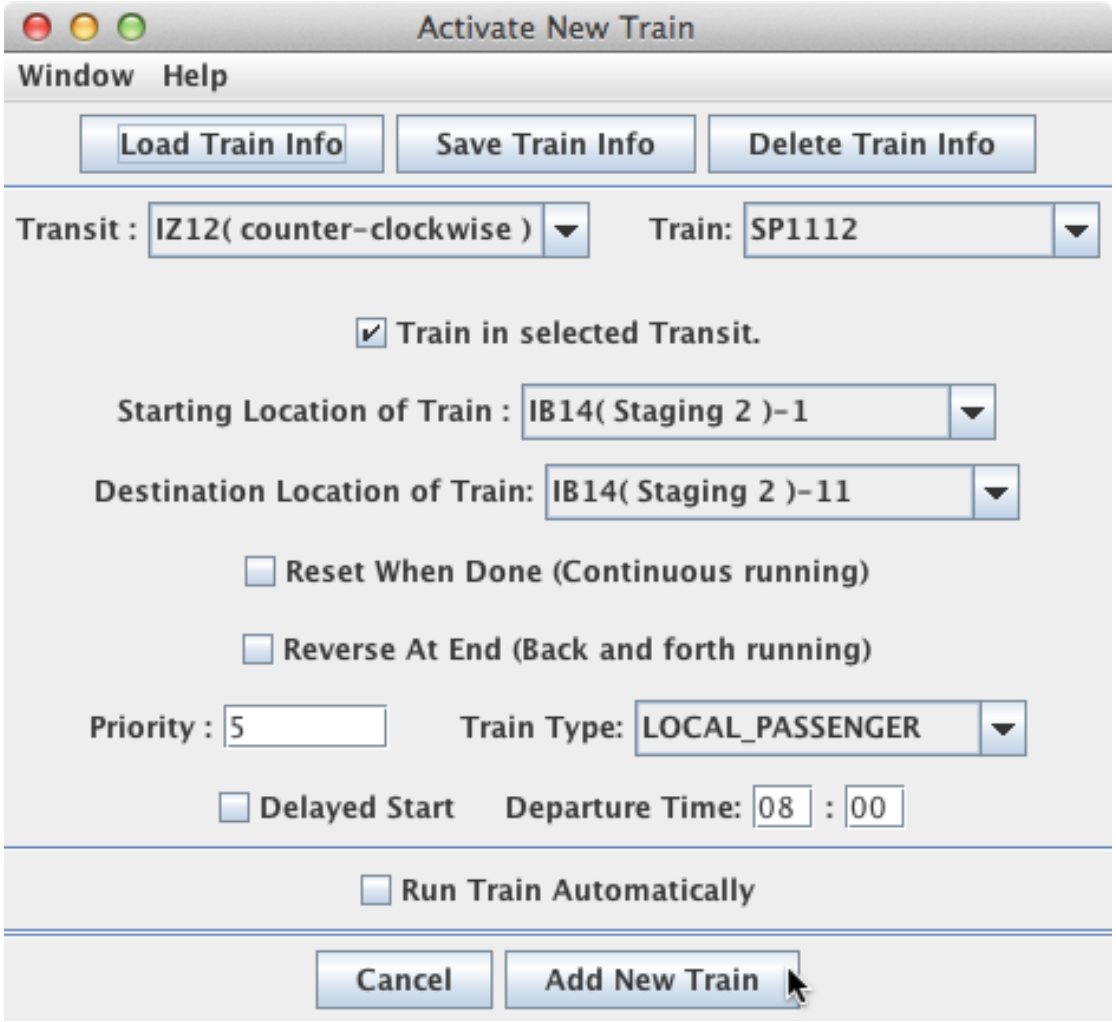
Note:
To save these Options and have then automatically set when restarting, select Save Options… in Dispatcher’s Option menu.

To create an **Active Train**, ready to be dispatched, click **"New Train…"** below the Active Trains table.



Activate New Train Window

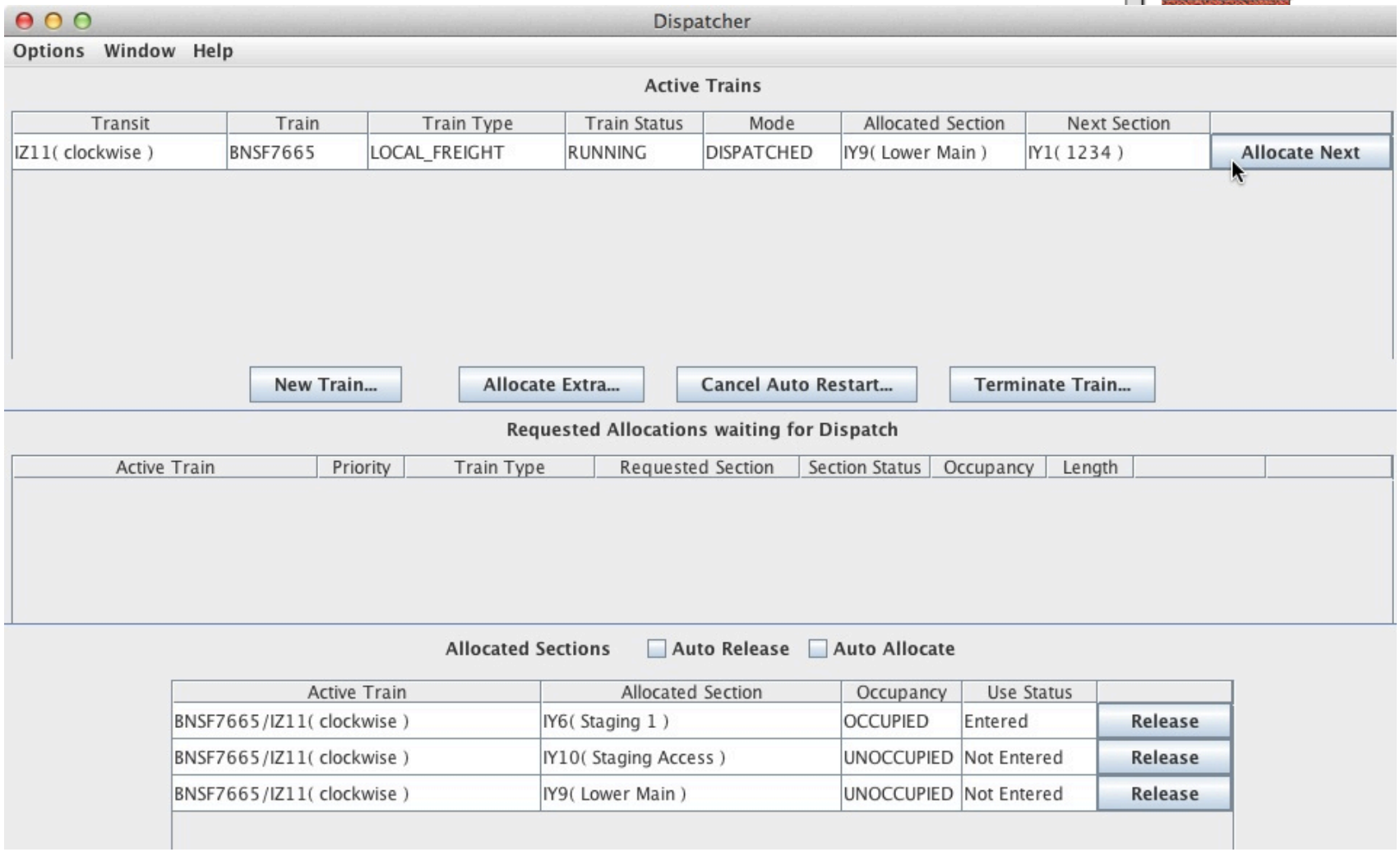
Select a Transit and a Train. Enter other information and click "**Add New Train**".



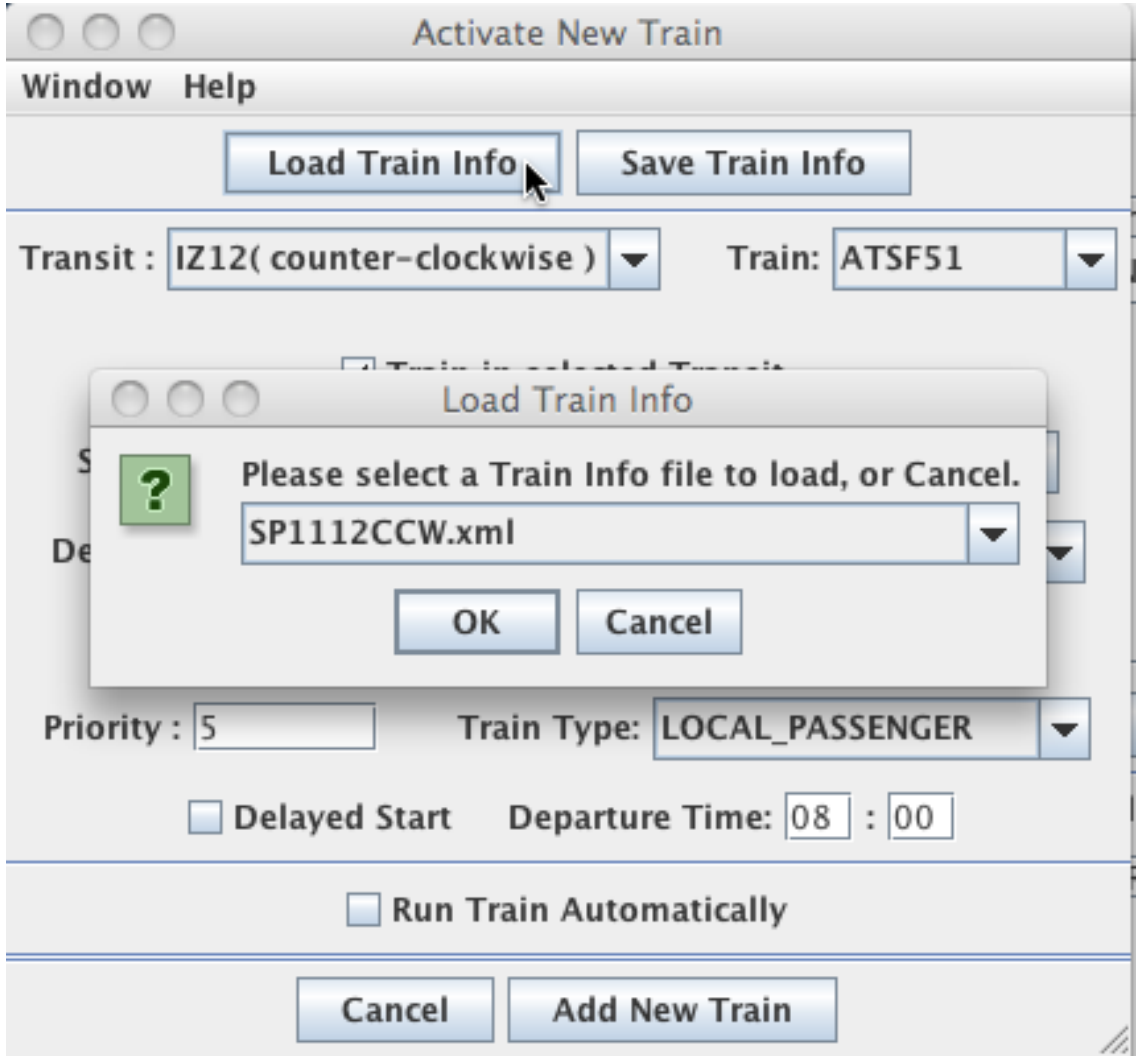
To reuse this train at a later date, click **Save Train Info** after all information is set.

Train information is retrieved by clicking **Load Train Info** when this window is first displayed.

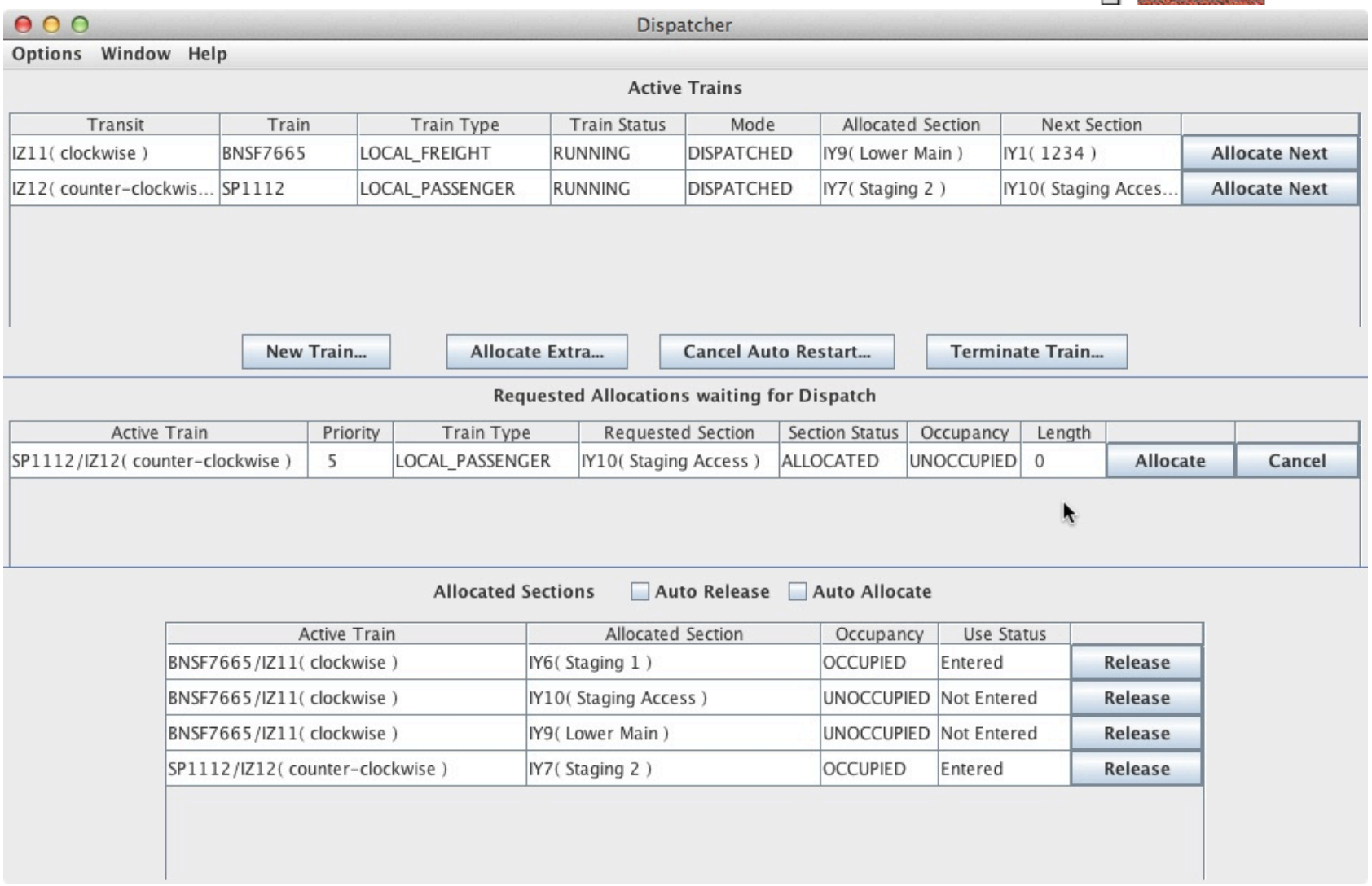
The first Section was automatically allocated. The next two were allocated using the **"Allocate Next"** button.



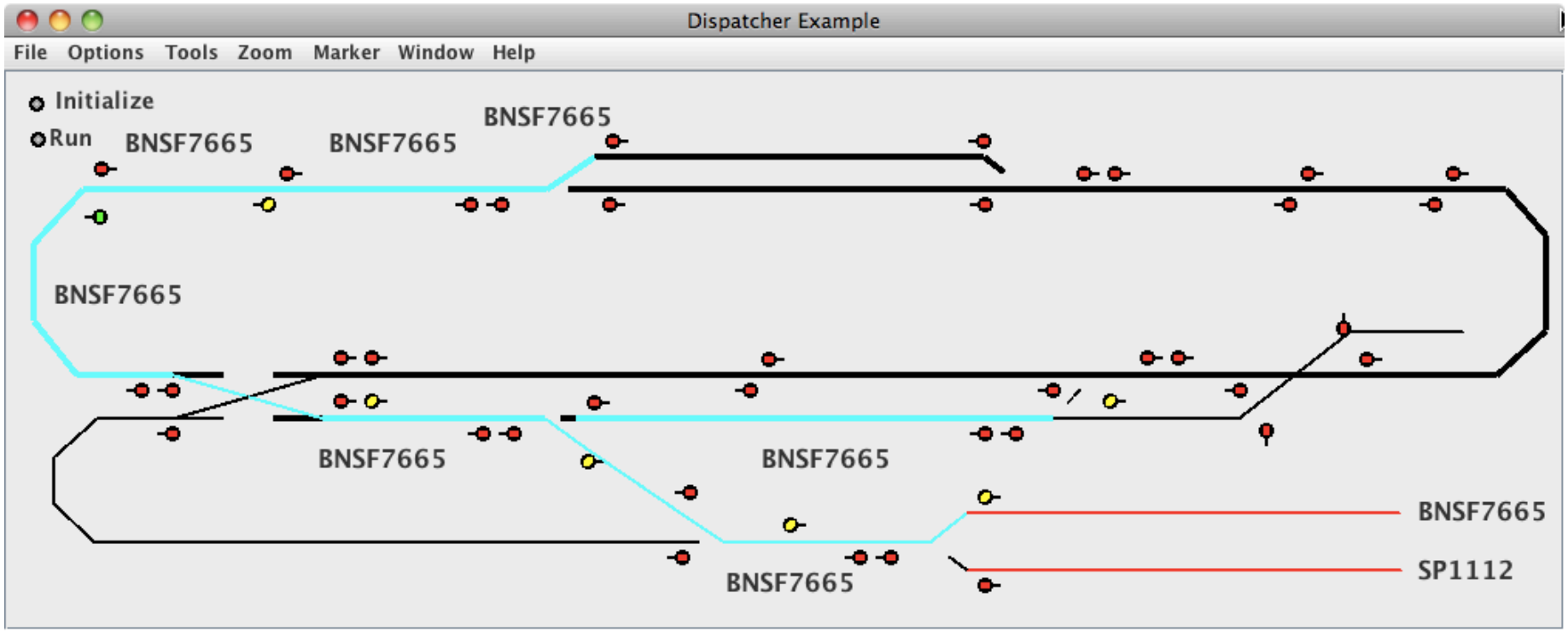
Second train – use **"Load Train Info"** then click **"Add New Train"**.



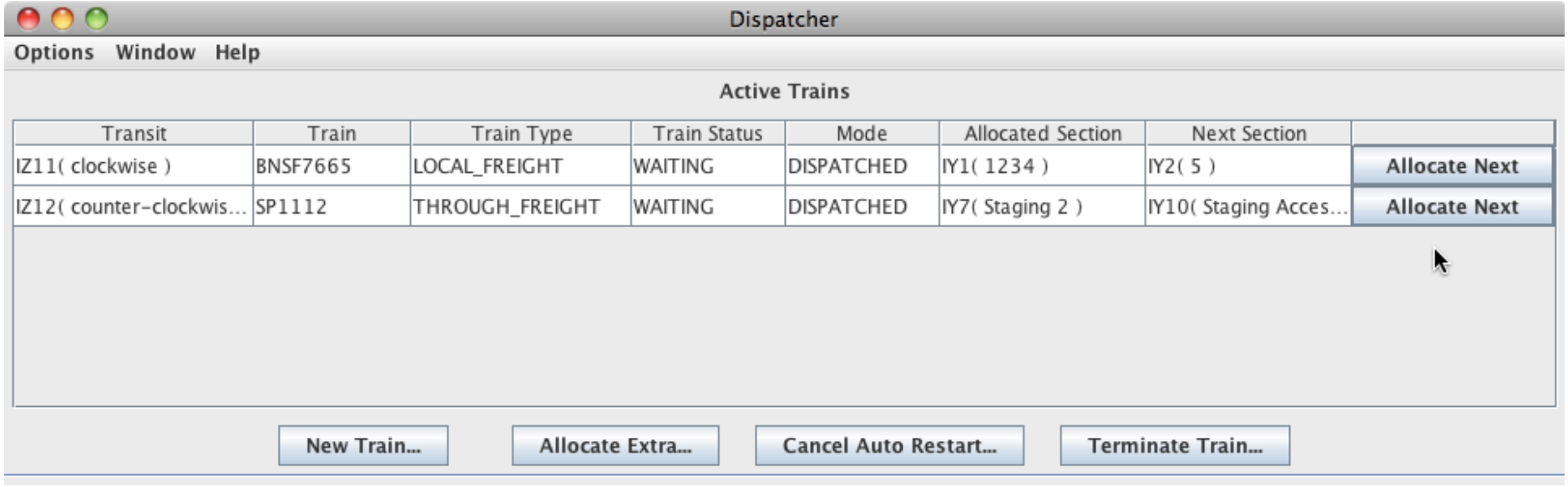
The first Section was automatically allocated. Attempted to allocate another using the **"Allocate Next"** button.



Demo Layout


Dispatcher Example
File Options Tools Zoom Marker Window Help
Initialize
Run
BNSF7665
BNSF7665
BNSF7665
BNSF7665
BNSF7665
BNSF7665
BNSF7665
BNSF7665
SP1112

Active Trains Table



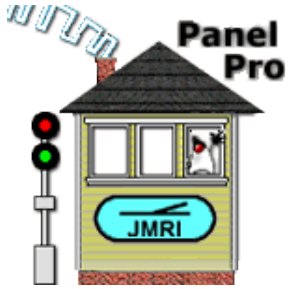
New Train… - Click to create a new Active Train.

Allocate Extra… - Click to allocate a Section to an Active Train that is not the next Section in the Transit.

Cancel Auto Restart… - Click to cancel Auto Restart of an Active Train.

Terminate Train… - Click to terminate an Active Train and release its Transit and Train for future use.

Requested Allocations Table

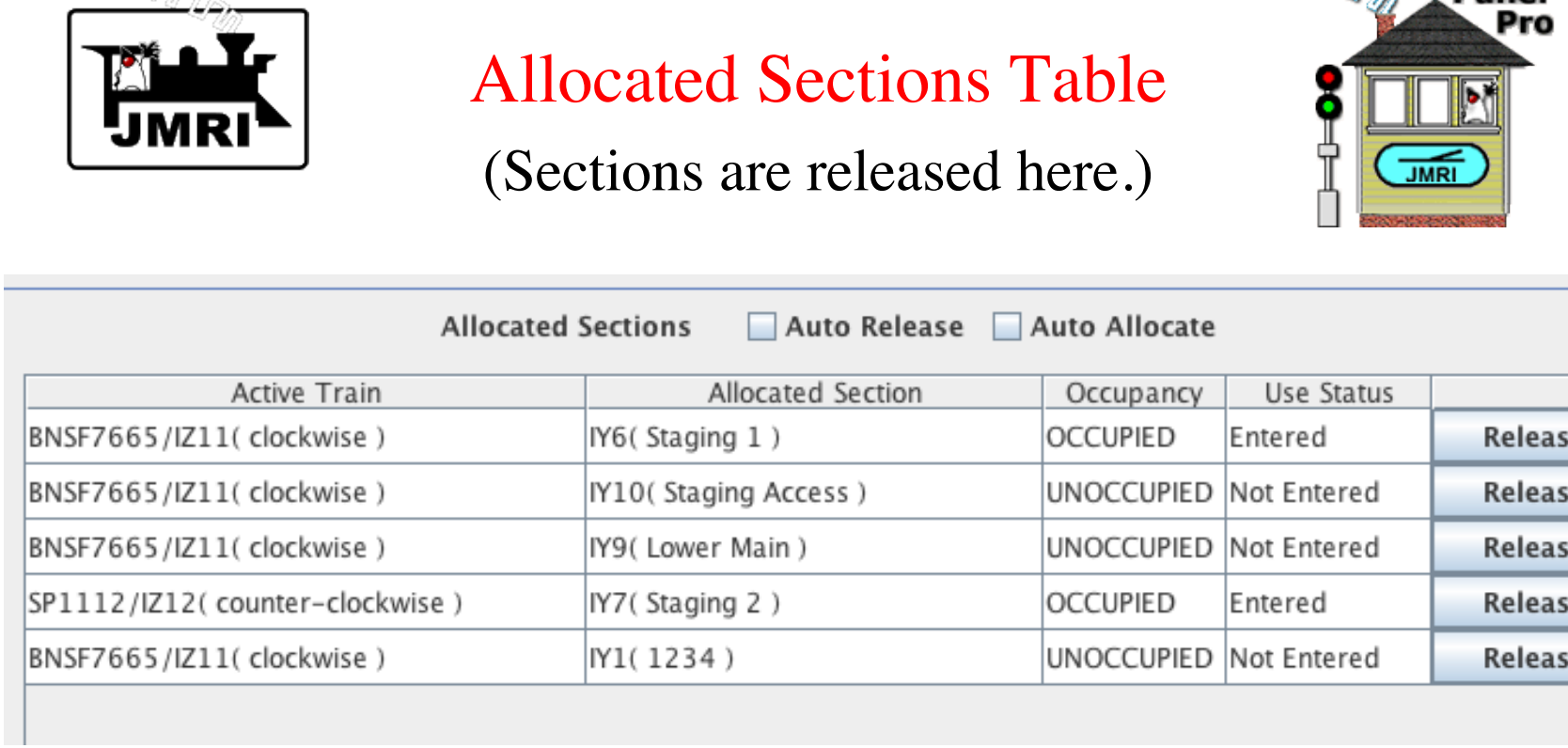


Requested Allocations waiting for Dispatch

Active Train	Priority	Train Type	Requested Section	Section Status	Occupancy	Length		
SP1112/IZ12(counter-clockwise)	5	THROUGH_FREIGHT	IY10(Staging Access)	ALLOCATED	UNOCCUPIED	0	Allocate	Cancel

Allocated Sections Table

(Sections are released here.)



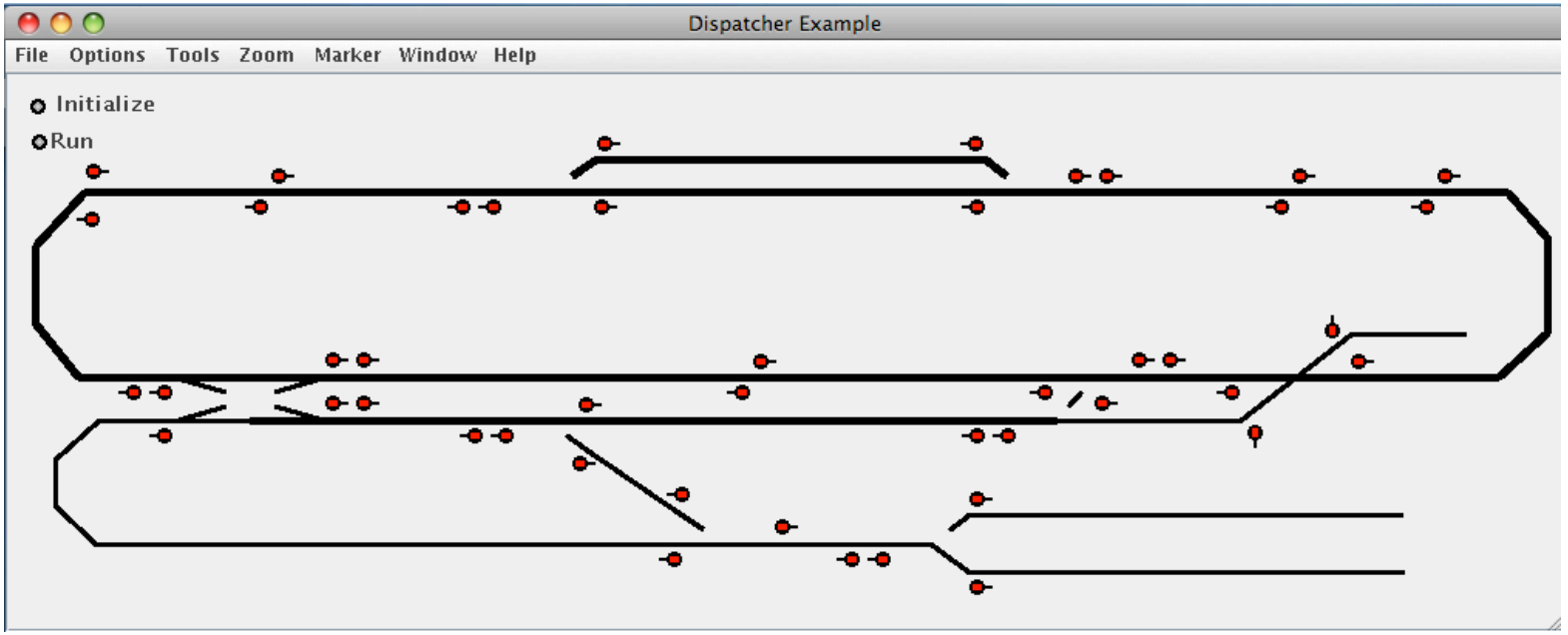
Checking "Auto Release" will automatically release Allocated Sections when Occupancy shows UNOCCUPIED and Use Status shows Exited (Allocated Section has been Entered and Exited.)

Checking "Auto Allocate" will attempt to automatically allocate Sections to Active Trains provided Sections are FREE. Dispatcher will allocate according to train priority and will set up meets.

Run Dispatcher Example Simulation.

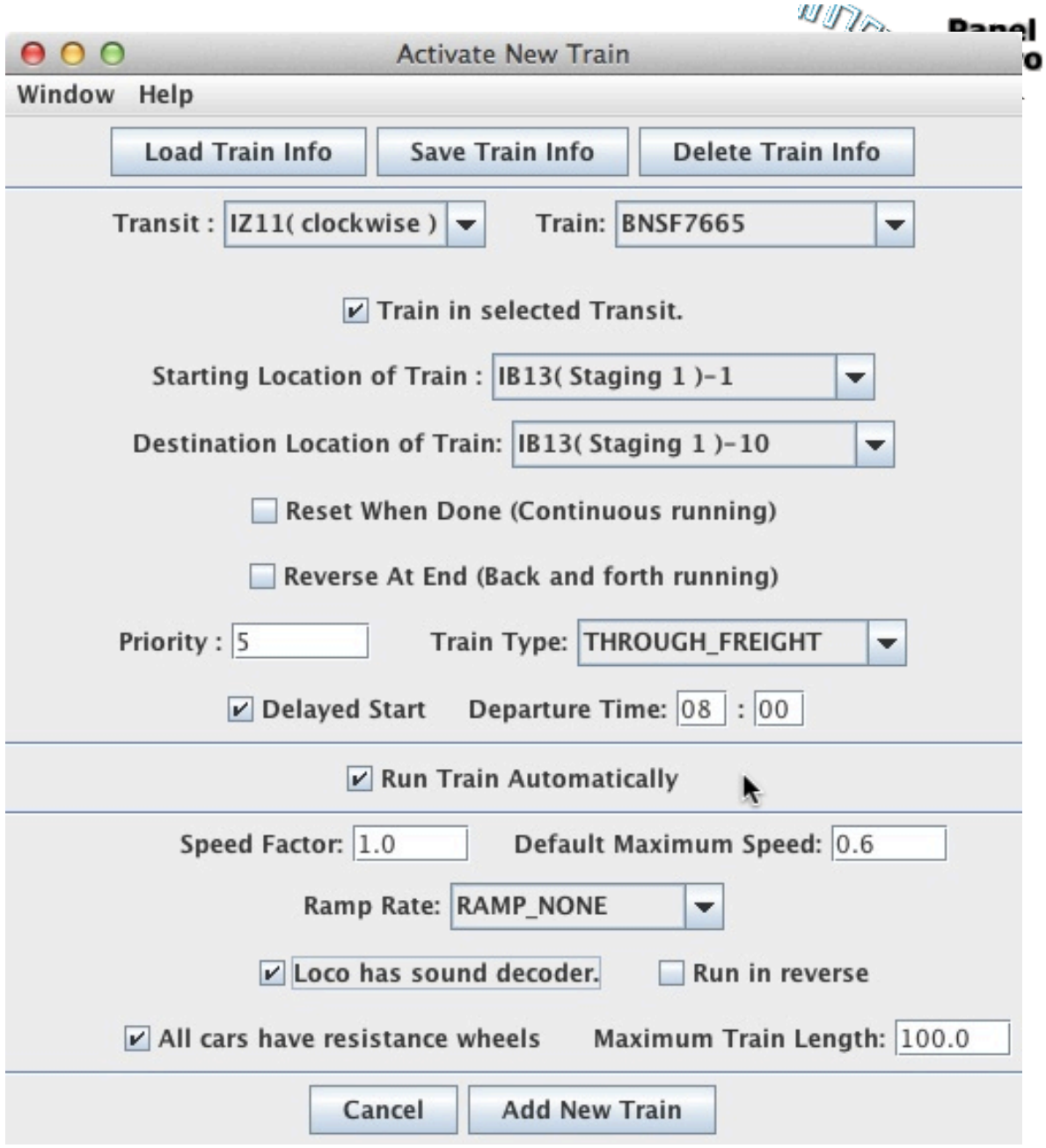
Two trains crossing at the passing siding.

Logix for each train--follows signals to advance.



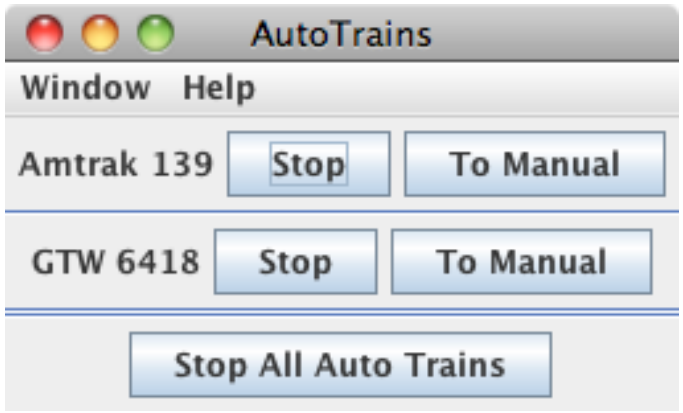
Automatic Running

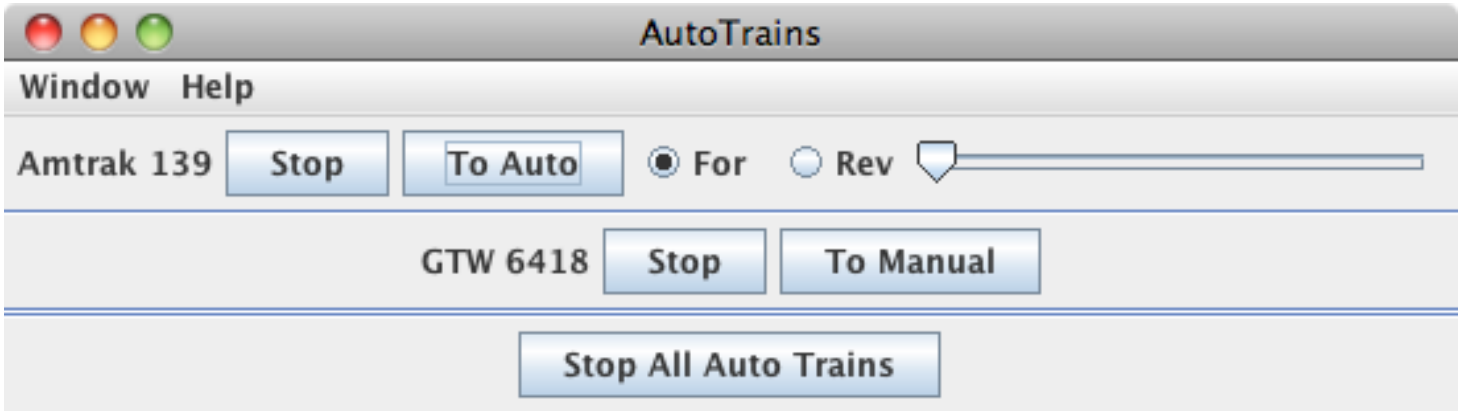
Selecting "Run Train Automatically" brings up items specific to automatically running trains.



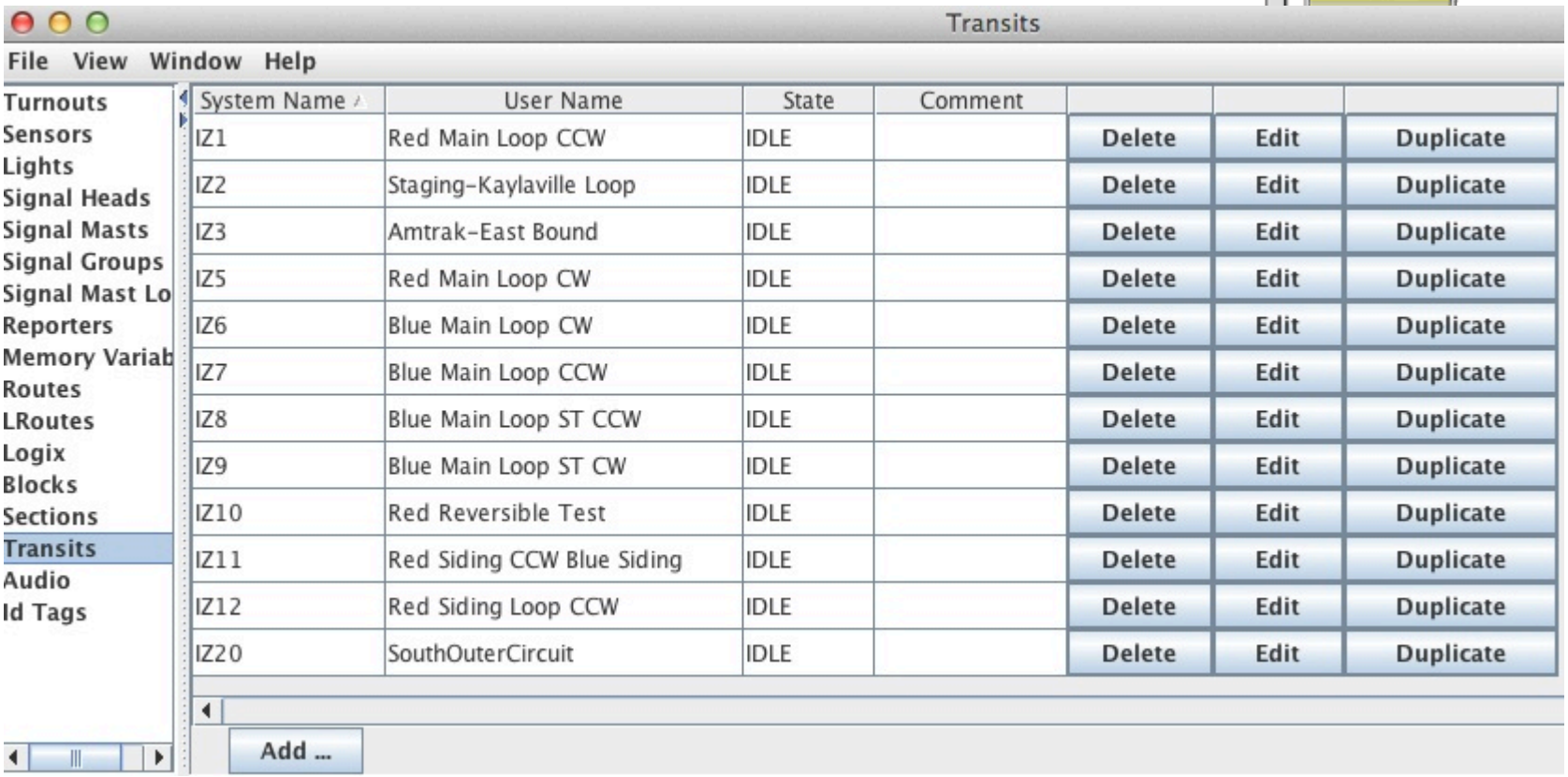
Auto Trains Window

Click “To Manual” for Amtrak 139





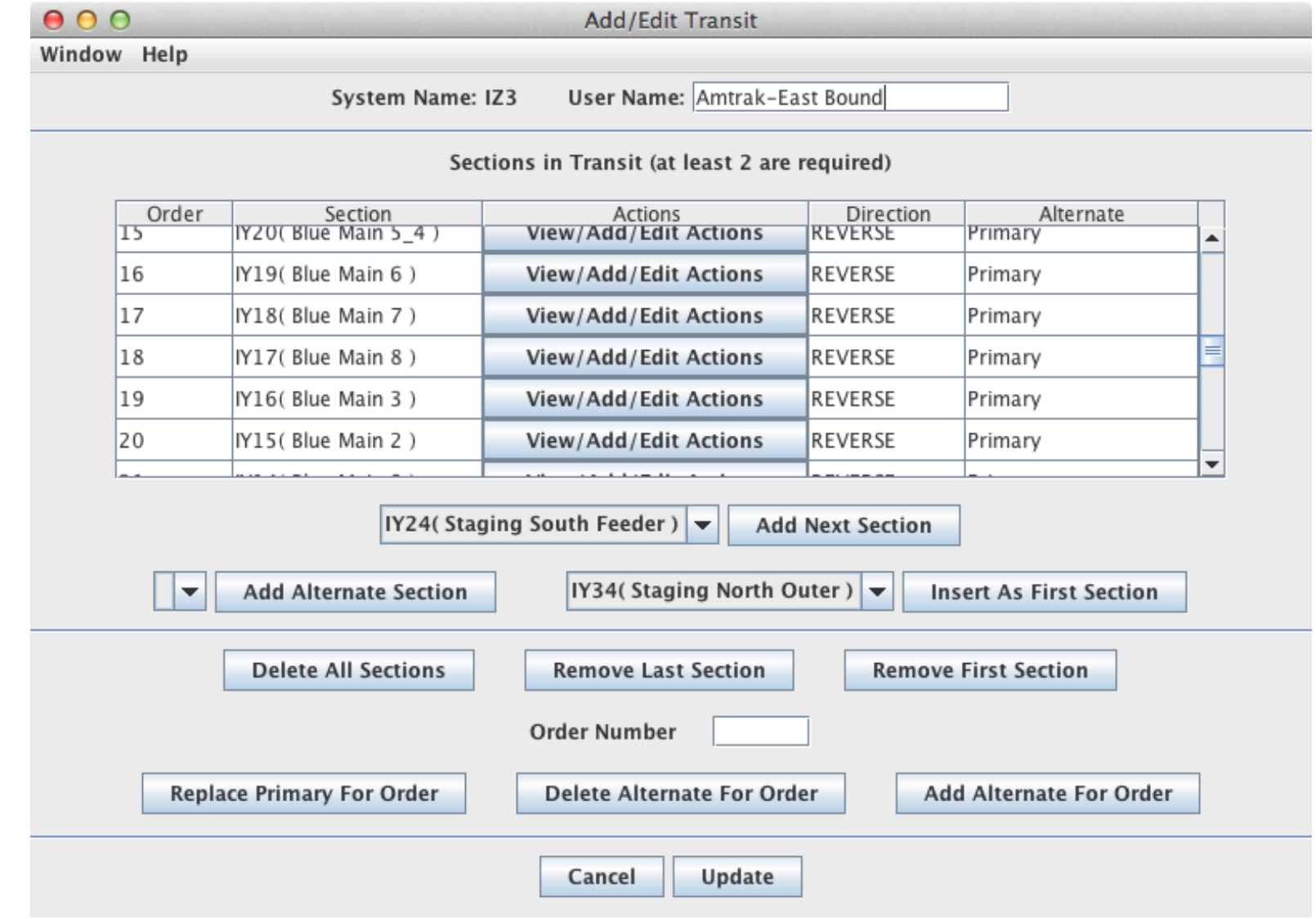
Example: Setting up Automatic Actions for a Station Stop



Click “Edit” for the “Amtrack-East Bound” Transit (from the T&K Railroad).

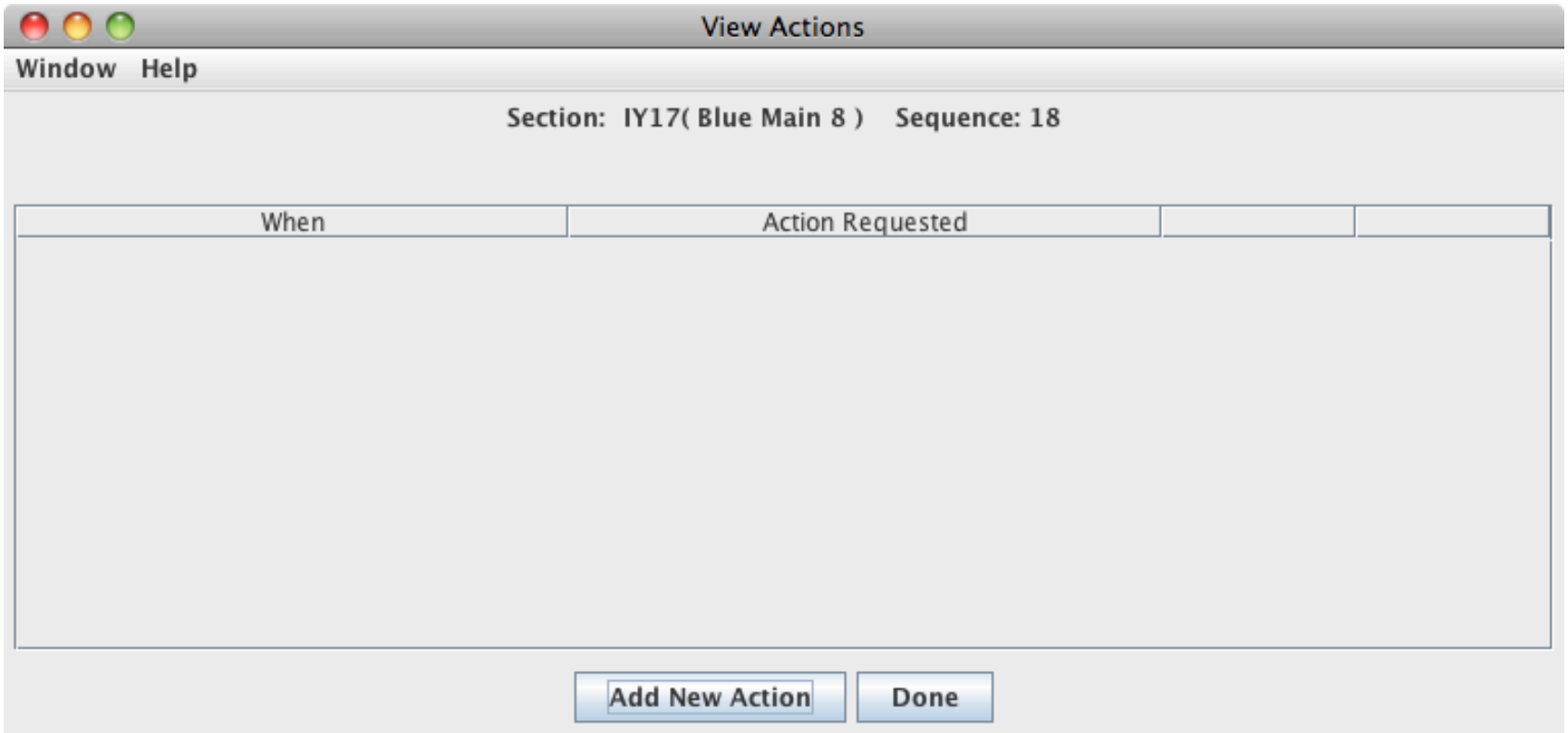
Example: Setting up Automatic Actions for a Station Stop (continued)

Click "View/Add/Edit Actions" for 18 – Blue Main 8.



Example: Setting up Automatic Actions for a Station Stop (continued)

Click “Add New Action”.



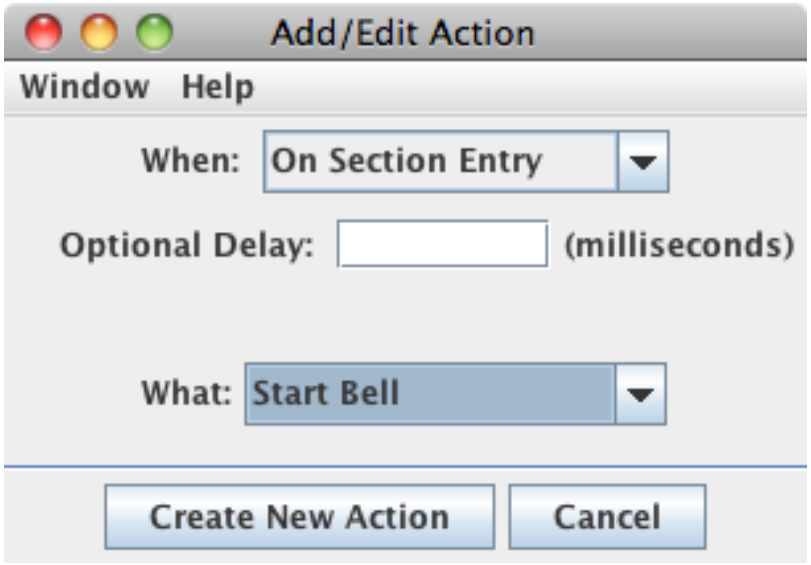
View Actions Window

Example: Setting up Automatic Actions for a Station Stop (continued)

Add/Edit Action Window

When →

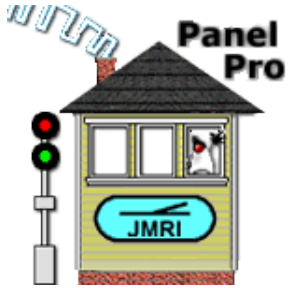
What →



When

On Section Entry
On Section Exit
On Block Entry
On Block Exit
On Train Stop
On Train Start
On Sensor ACTIVE
On Sensor INACTIVE

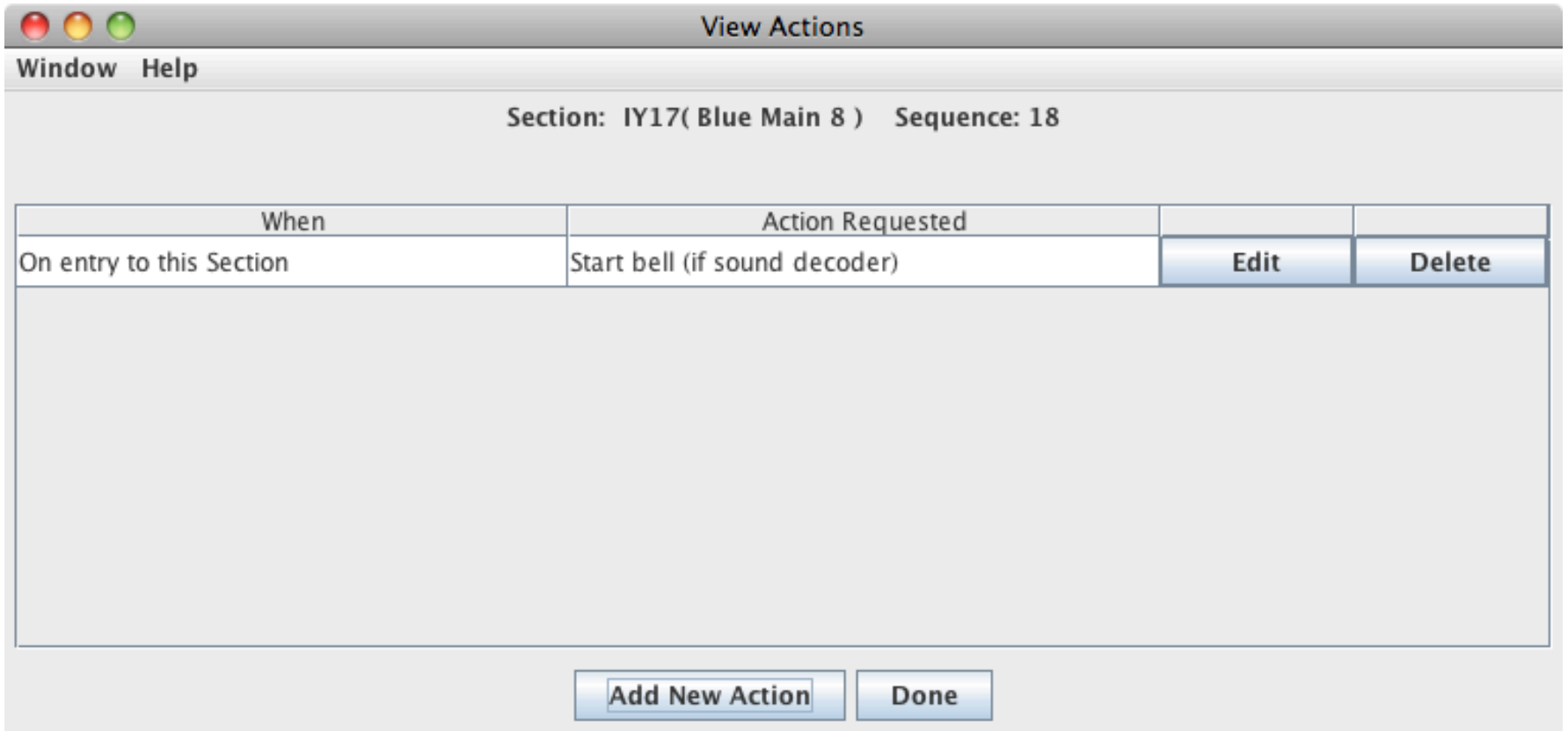
Note: An Action may be delayed for a user-specified time after the When.



What

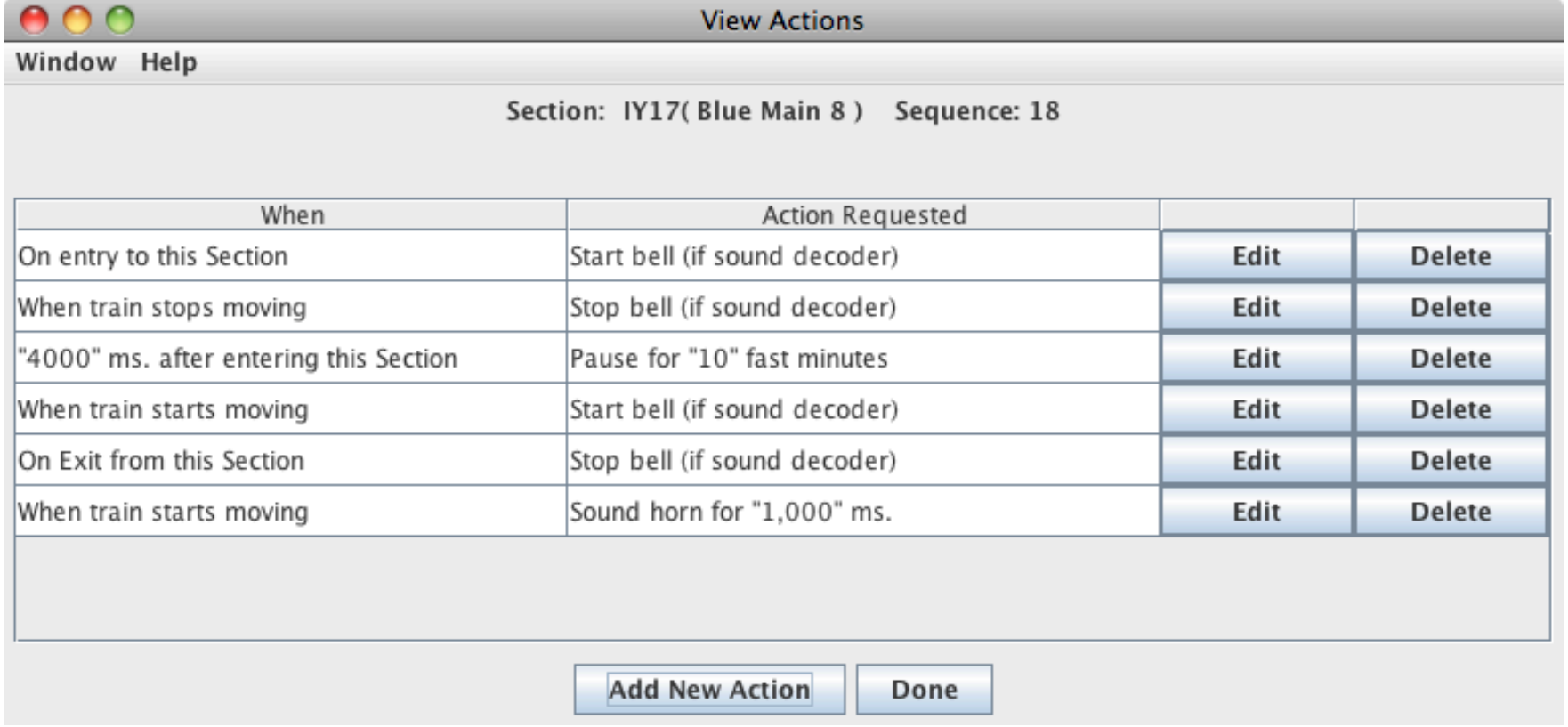
Pause Train
Set Maximum Speed
Set Train Speed
Ramp Train Speed
Go to Manual Mode
Set Locomotive Light
Start Bell
Stop Bell
Sound Horn
Pattern Sound Horn
Set Decoder Function
Set Sensor ACTIVE
Set Sensor INACTIVE

Example: Setting up Automatic Actions for a Station Stop (continued)

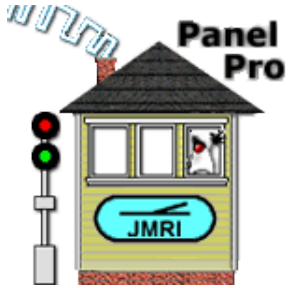


Continue to use “Add New Action” to add more automatic Actions.

Example: Setting up Automatic Actions for a Station Stop (continued)



Movie showing automatic running with a station stop. Contact the author for a copy.

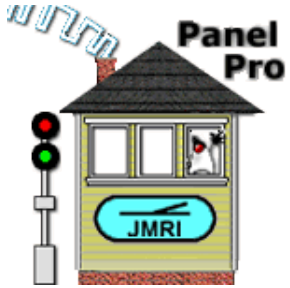


Switching Example:

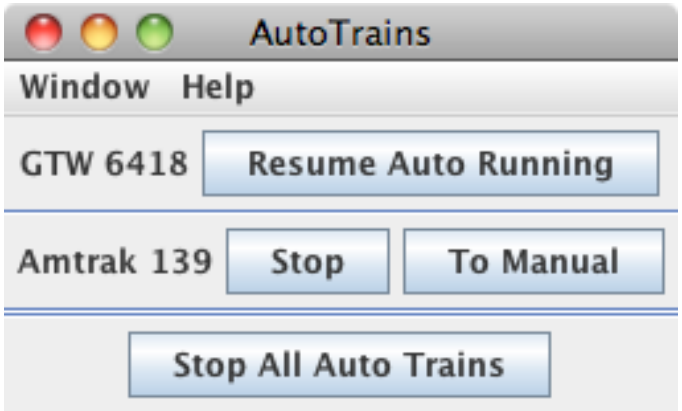
- Automatically drive an Active Train to a switching location.
- Turn over the train to a human engineer for switching.
- Resume automatic operation when switching is complete.

Set the **"Go to Manual Mode"** Action in the Section where the switching is to occur.

Switching Example: (continued)



- When the "Go to Manual Mode" Action takes place, the computer releases its throttle.
- The entry for the Auto Active Train (GTW 6418) changes to:



- The dispatcher notifies the human engineer that he/she may acquire the engine and switch train cars.
- When the dispatcher is notified that switching is complete, the dispatcher clicks "Resume Auto Running".

Requirements for Manual Running (Human Engineer)

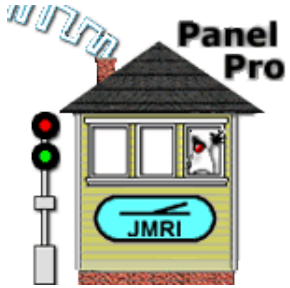
Required:

- Layout must be divided into **Blocks**.
- Blocks (including Paths) must be set up.
- **Sections** and **Transits** must be set up.

Recommended:

- Hardware **Block Occupancy Detection**. Required for Auto Release.
- Fully detectable trains – usually means **Resistance Wheels** on all train cars, to facilitate stopping trains. Required for Auto Release.
- **Computer-controlled Turnouts** (track switches). Required for automatic setting of Turnouts when Sections are allocated.
- Fully configured **Layout Editor Panel**. Required for automatic setting of Turnouts when Sections are allocated. Greatly facilitates the setting up Sections and Transits.
- **Well functioning layout** – most important for successful manual running.

Requirements for Automatic Running (Virtual Engineer)



Required:

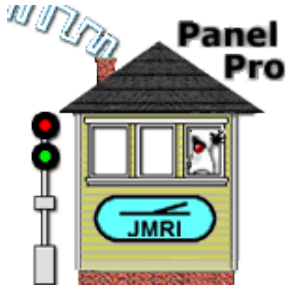
- DCC Command Station that supports JMRI **Computer Throttles**.
- Layout Mainline must be divided into **Blocks** with **Occupancy Detection** hardware.
- **Turnouts** (track switches) along mainline must be capable of computer control.
- **Layout Editor Panel**, with Blocks, Turnouts, and Signals fully configured. All Block boundaries must be signaled on the Layout Editor panel.

  Note: Signals must be configured on the Layout Editor panel, but physical signals need not be present.
- **Sections** and **Transits** must be set up.
- All Sections must have **Direction Sensors**.

Recommended:

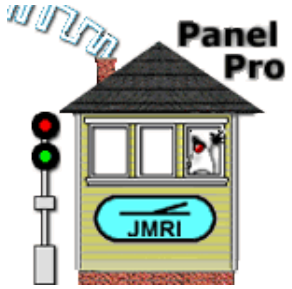
- **Stop Sensors** in areas where accurate stopping is desired.
- **Block Lengths** entered into Block table, to facilitate stopping.
- Fully detectable trains – usually means **Resistance Wheels** on all train cars, to facilitate stopping trains. Required for Auto Release.
- **Well functioning layout** – most important for successful automatic running.

What's Next?



Dispatcher Development is continuing.

- Better validation of Sections and Transits.
- Improved protection/recovery from human dispatcher error.
- Improved recovery from hardware problems (e.g. derailing) when automatically running.
- Enhanced Auto Allocation planning when multiple trains are running to better avoid gridlock.
- Ability to temporarily release an allocated Section, and reallocate it when it is again FREE.
- And more - suggestions welcome!!



This clinic is available as a PDF file:

DispatcherClinic2012.pdf

To run the demo, view the tables and the Logixs that simulates train running, you also need:

Dispatcher2010.xml

Email me at: djduchamp@mac.com