Using the JMRI/PanelPro Layout Editor

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Introduction

Layout Editor allows JMRI users to create animated schematics of a model railroad layout. It is an alternative to JMRI's traditional **Panel Editor**. Layout Editor differs from Panel Editor in several ways, including:

- Layout Editor uses a drawn track schematic, instead of the icon based schematic used by Panel Editor,

- Layout Editor captures the full connectivity automatically as the layout schematic is constructed,

- Layout Editor supports new animation features and tools.

Layout Editor is similar to Panel Editor in many ways, including:

- Both build on the same JMRI configuration items, such as, turnouts, sensors, and signal heads.

- Both use the same icons for panel items other than the track schematic.

Outline

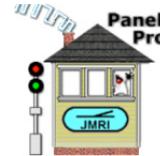This clinic demonstrates many of the features of the JMRI/

PanelPro Layout Editor. It requires JMRI 2.1.7 or later. In this clinic we go through the operations needed to:

- Create a Layout Editor Panel for a simple oval layout,

- Add animation to our simple oval panel,

- Add signals to the animated simple oval panel,

- Modify the panel background for use with a CTC panel.

Configuration/Panel Files

Associated with this postscript file are two layout configuration/panel files. If you open these files in PanelPro, you can see the panels that are built in this clinic. You can also simulate a train running on the simple oval layout. You can use these panels as starting points if you want to follow along with the clinic. To use these associated files:

1. Start **PanelPro** (or another JMRI application).

2. In the preferences dialog, select **Loconet Simulator.** If you've set up any **Advanced Preferences** items make sure they are all turned off, so that the clinic files will load correctly.

3. Save preferences and restart the program.

4. After the program is restarted, select **Load panels...** in the **Panels** menu.

5. In the file selection dialog, navigate to the folder containing this postscript file and select either: *LayoutEditorClinic.xml* - to view the simple oval panel, the animation panel, and the animated signals panel, or *LayoutEditorClinicCTC.xml* - to view the panel with a CTC background. **Do not load both without restarting PanelPro in between.**

6. You can simulate a train traversing the layout by clicking the **Run** button on the animation panel, the animated signals panel, or the CTC panel. To rerun the simulation, click **Pause**, then click **Run** again.

Creating a Simple Oval Schematic

In this section we will create a track schematic of a simple oval layout with a passing siding and an industrial spur.
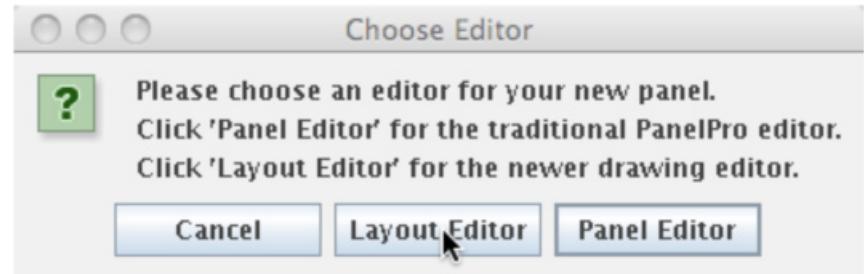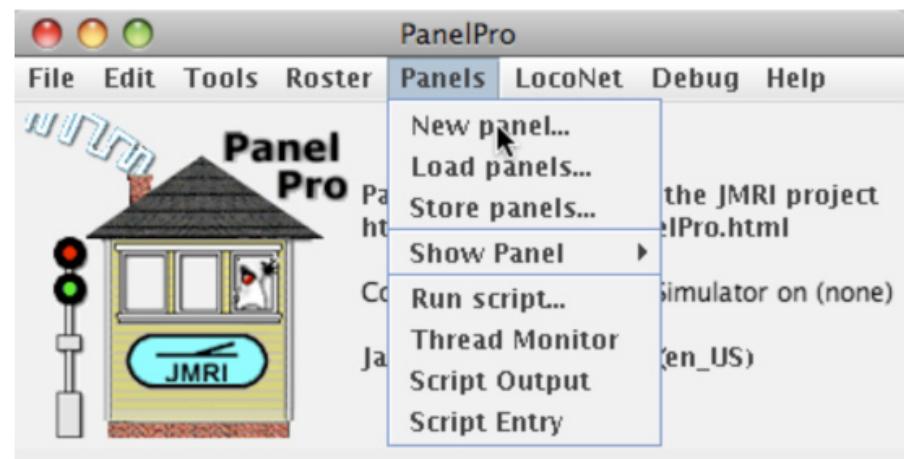
Start **PanelPro** (or another JMRI application if you prefer), and set the preferences to Loconet Simulator. Save preferences and restart the application.
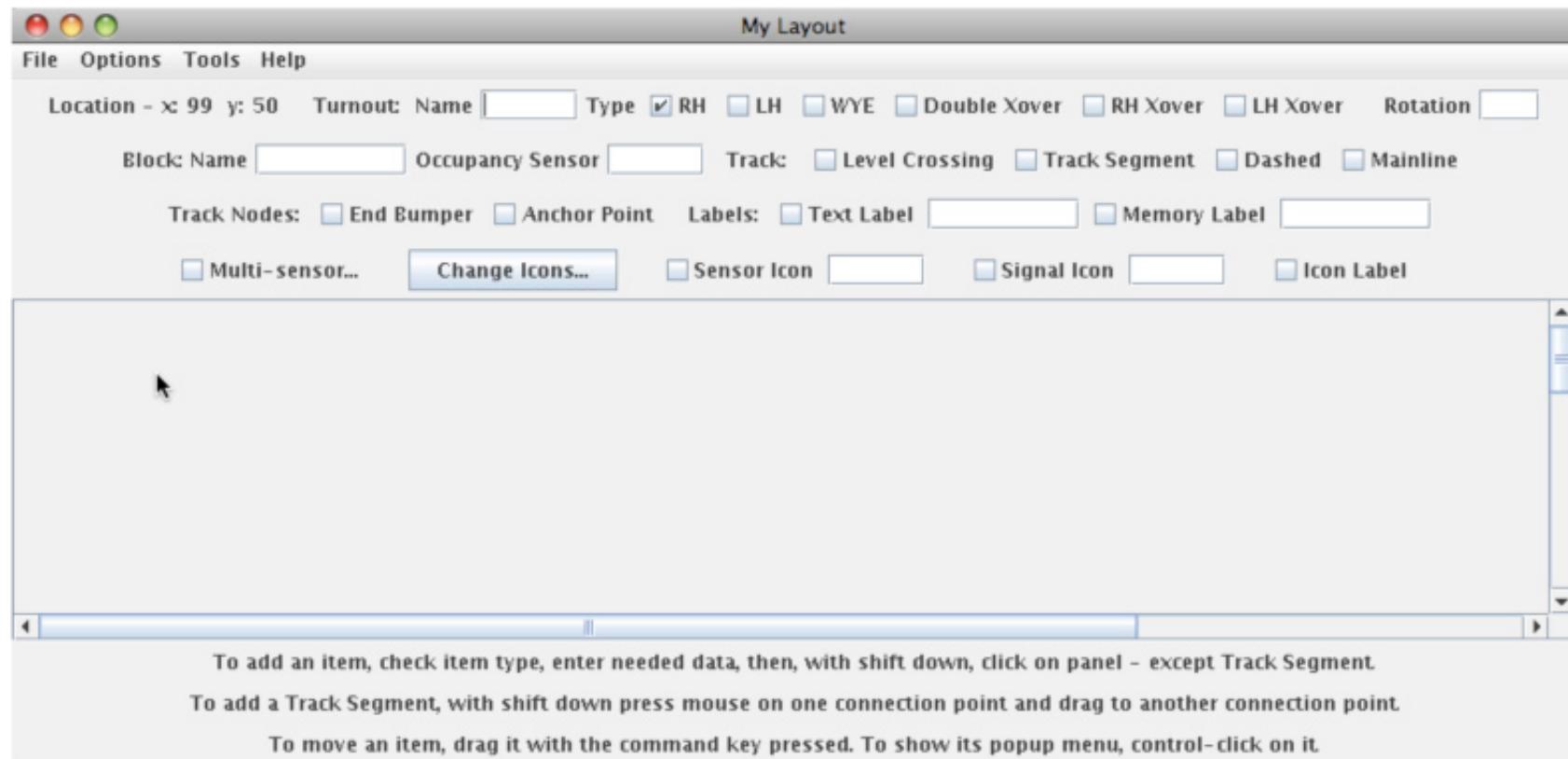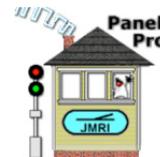
To save having to enter turnouts, signal heads, etc, into tables, load *LayoutEditorClinic.xml* as described in steps 4 and 5 in the above section. Ignore the panels that are displayed for now.

Select **New Panel** in the **Panels** menu, as shown in the figure below.

The "Choose Editor" window (see lower figure) opens. Click **Layout Editor** to open a new Layout Editor panel. Adjust the size of the new panel if necessary.
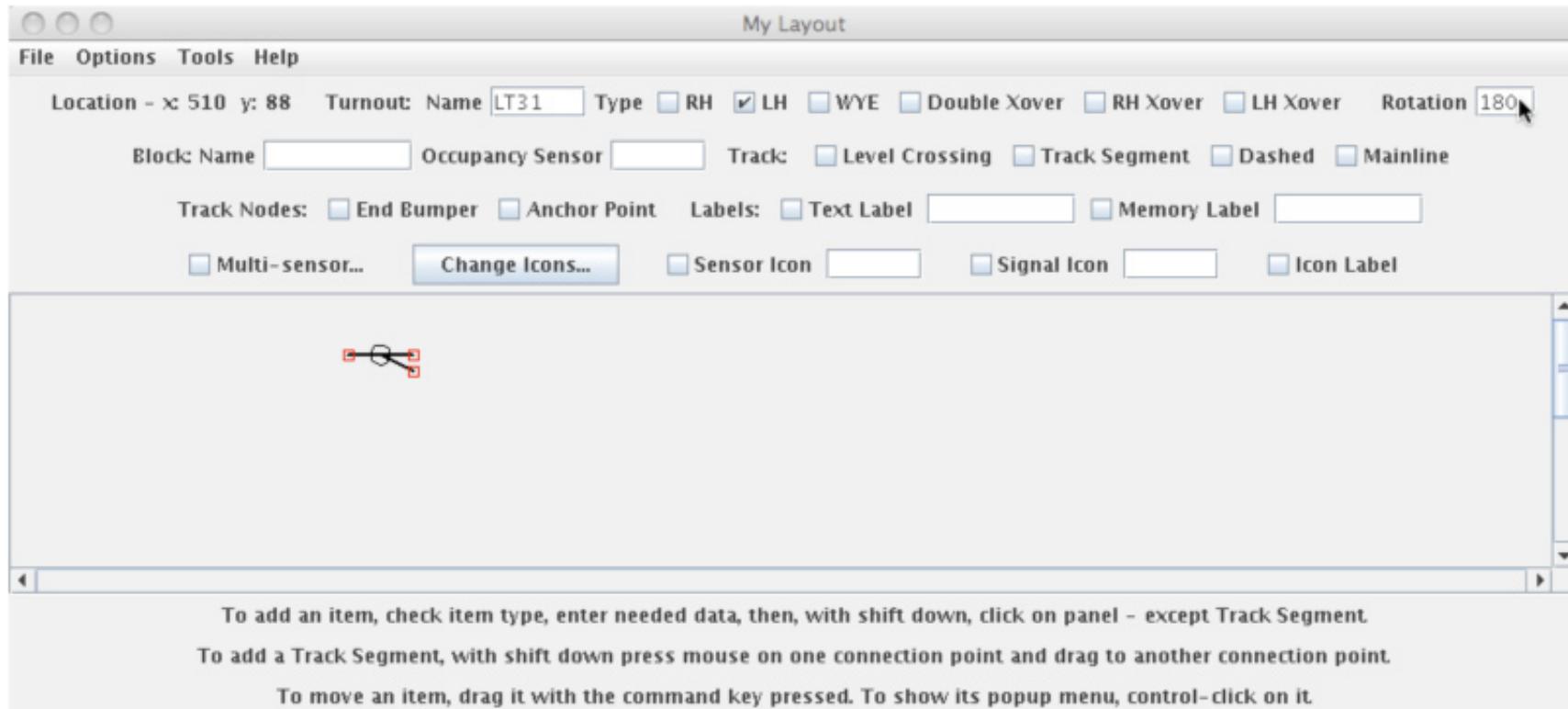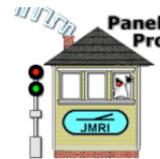
The top part of the panel contains the tool bar used to build the panel. At the bottom of the panel is a help bar to explain the user interface. Note the menus at the top:

- File - provides for saving and deleting a panel,

- Options - provides items used fairly infrequently,

- Tools - provides access to a variety of tools helpful in creating panels.

- Help - provides access to detailed documentation describing Layout Editor.

We start our simple oval panel by adding a right-handed turnout (RH). To do this, we check RH on the top of the tool bar, and click where we want the turnout to be located while holding shift down (shift-click).
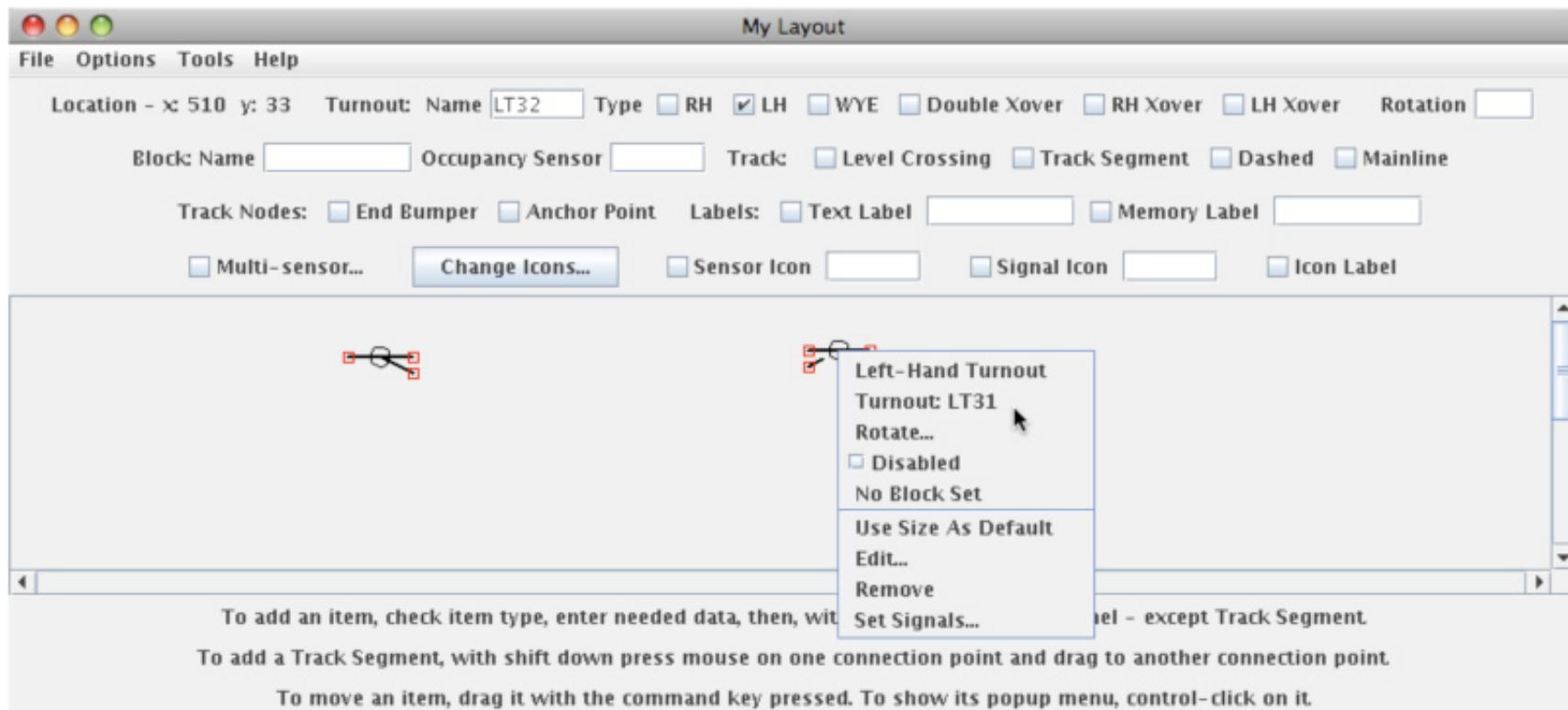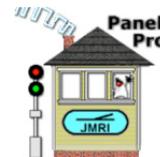
Note the right-handed turnout. The red squares are connection points. The circle at the center is the place to click to get its popup menu. This turnout will be the left side of our siding.

We now need to add a left-handed turnout (LH). We check **LH** on the top row. We enter "180" in the **Rotation** entry box to make the turnout face in the opposite direction to its normal default. We also enter "LT31" in the **Turnout:Name** entry box. This links the turnout schematic to be created with a physical turnout ("LT31") in the Turnout Table.

Note that we did not link our RH turnout to a physical turnout when we created it. We'll do that later.

With these items entered, shift-click to the right of our existing RH turnout to create the second turnout of our passing siding.

To add an item, check item type, enter needed data, then, wit[h] ... [pan]el – except Track Segment.

To add a Track Segment, with shift down press mouse on one connection point and drag to another connection point.

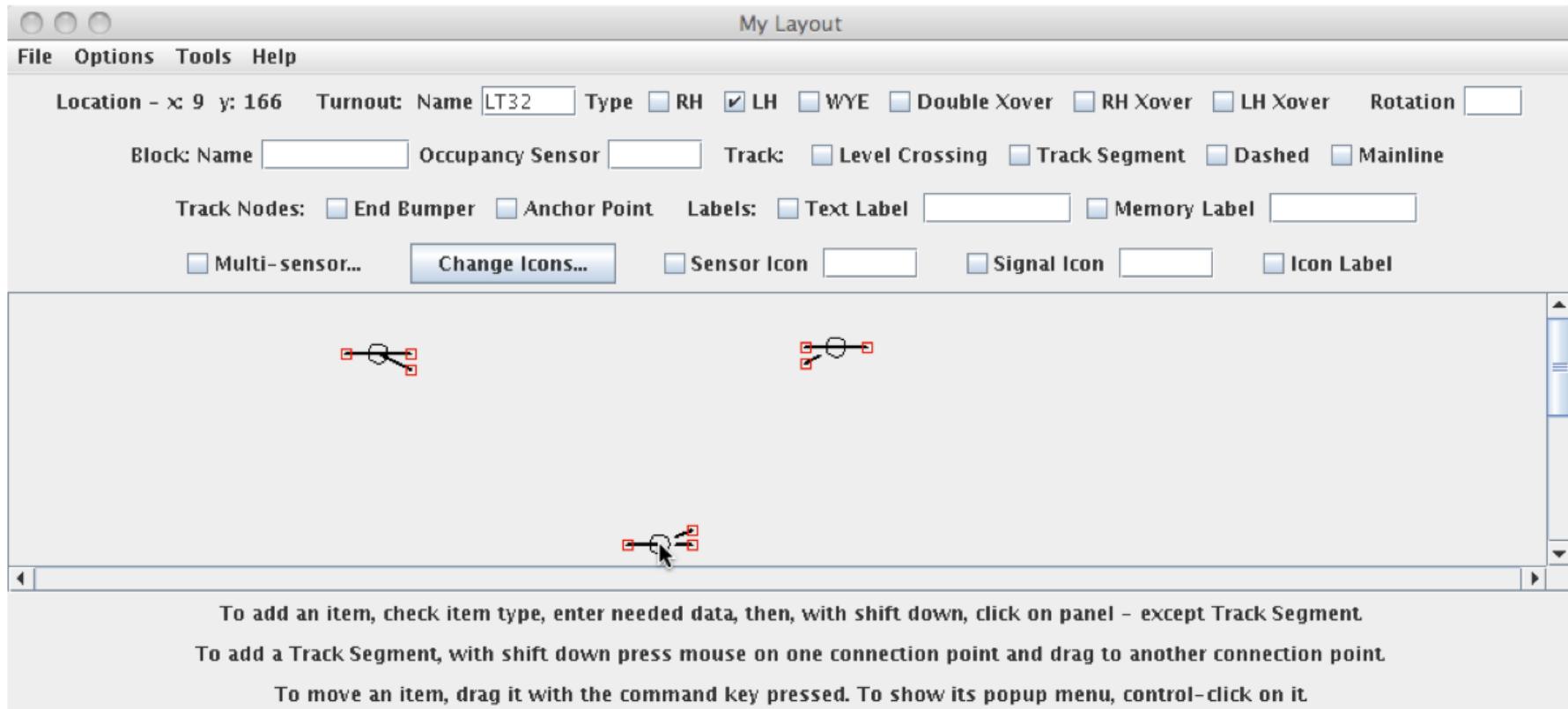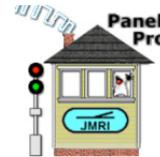To move an item, drag it with the command key pressed. To show its popup menu, control–click on it.

We get the popup menu for our new LH turnout by control-clicking on the circle at its center. Note that it is linked to LT31. Also note that it has been rotated to face the RH turnout.

The last line of the help bar explains how to drag an item and how to summon its popup menu. The line shown is for a Macintosh. Different lines will be shown for Windows and Linux operating systems.

This is a good time to point out **Location** at the upper left of tool bar. The **x** and **y** entries follow the location of the cursor on the panel. This is useful in placing track components in approximate alignment when adding them to the panel.

Next we will add another LH turnout for our industry spur by shift-clicking at the bottom of our simple oval schematic. Note it will be assigned to LT32 and will not be rotated from its default orientation.

Panel Pro

JMRI

```
 ● ● ●                                My Layout
 File  Options  Tools  Help
   Location – x: 9  y: 166    Turnout: Name LT32    Type ☐ RH  ☑ LH  ☐ WYE  ☐ Double Xover  ☐ RH Xover  ☐ LH Xover    Rotation [    ]

      Block: Name [          ]   Occupancy Sensor [        ]   Track:  ☐ Level Crossing  ☐ Track Segment  ☐ Dashed  ☐ Mainline

        Track Nodes:  ☐ End Bumper   ☐ Anchor Point    Labels:  ☐ Text Label [          ]   ☐ Memory Label [          ]

          ☐ Multi-sensor...    [ Change Icons... ]    ☐ Sensor Icon [        ]    ☐ Signal Icon [        ]    ☐ Icon Label
```

To add an item, check item type, enter needed data, then, with shift down, click on panel – except Track Segment.

To add a Track Segment, with shift down press mouse on one connection point and drag to another connection point.

To move an item, drag it with the command key pressed. To show its popup menu, control-click on it.

Note: Physical turnouts, like LT32, must be entered into the JMRI turnout table before a turnout diagram on the panel can be assigned to that physical turnout.
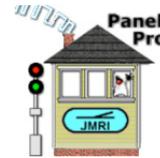
The three turnouts are drawn differently on the layout diagram. The upper left drawing indicates that the turnout is not assigned to a physical turnout from the turnout table.

The upper right turnout drawing indicates that turnout is assigned to a physical turnout that is set to the CLOSED state (a gap in the diverging track).

The lower turnout drawing indicates that turnout is assigned to a physical turnout that is in the UNKNOWN state (gaps in both tracks).

A turnout's state may be toggled, CLOSED/THROWN/ CLOSED/, etc., by clicking in its center circle.

Lets review JMRI tables that were set up before starting this clinic. Items were previously entered into the following tables:
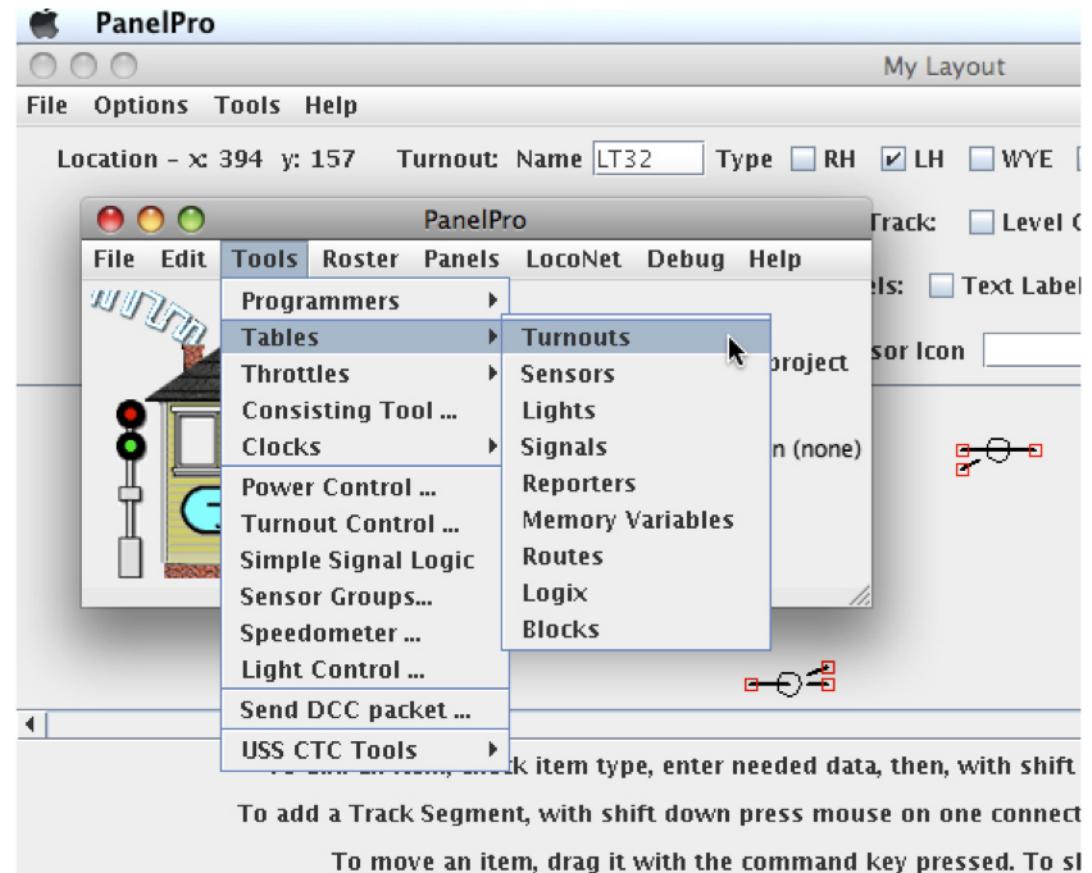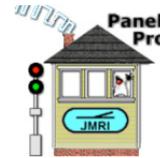
Turnouts

Sensors

Signals and

Memory Variables.

Tables may be displayed by selecting them in the **Tables** submenu of the main JMRI **Tools** menu, as illustrated in the figure at the right.

Here we'll select the **Turnouts** table and take a look at what was previously entered there. We'll review some of the other tables later.

At the right is the top portion of the turnout table requested above.

In JMRI "turnouts" correspond to outputs, which can control track switches, but can also be used for other output functions. In the table, LT1 through LT12 are used for the green, yellow and red outputs of signal heads defined in the Signals table. User names are used to easily identify which output of which signal head is referred to. There are more signal head outputs below LT40. These can be displayed by scrolling the table.

Of interest here are LT30, LT31, and LT32 which correspond to physical track switches. These turnouts (track switches) must be entered in the Turnout table prior to being used in Layout Editor.

LT30, LT31, and LT32 were manually entered into the table using the **Add** button. The other entries were entered automatically as Signal Heads were added to the Signals table. All User Names were added manually when turnout items were created.

Syste...	User Name	Cmd		Invertec
LT1	Green IH1 (left throat 1)	Closed	Delete	☐
LT2	Yellow IH1 (left throat 1)	Closed	Delete	☐
LT3	Red IH1 (left throat 1)	Thrown	Delete	☐
LT4	Green IH3 (left diverging)	Closed	Delete	☐
LT5	Red IH3 (left diverging)	Thrown	Delete	☐
LT6	Green IH5 (left throat 2)	Closed	Delete	☐
LT7	Red IH5 (left throat 2)	Thrown	Delete	☐
LT10	Green IH2 (left continuing)	Closed	Delete	☐
LT11	Yellow IH2 (left continuing)	Closed	Delete	☐
LT12	Red IH2 (left continuing)	Thrown	Delete	☐
LT30	left end	Unknown	Delete	☐
LT31	right end	Closed	Delete	☐
LT32	industry	Unknown	Delete	☐
LT40	Green IH14 (left east)	Closed	Delete	☐

Turnout Table — File Help Automation

Add ... ☐ Show feedback information ☐ Show lock information

Note: New users may wonder why JMRI Lights are not used for Signal Head outputs, instead of turnouts. The answer is simple. Lights were introduced to JMRI long *after* Signal Heads were introduced. When Signal Heads were introduced, turnouts were the only type of output in JMRI, so they were used. To date adding new features to JMRI has taken precedence over re-engineering existing ones.
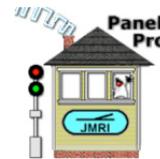
Our next step is to connect the top two turnouts with **Track Segments**. We check the **Track Segment** check box in the tool bar to indicate we're going to add a track segment. With the shift key held down, we press the mouse on the top right connection point (red box) of the left turnout, and drag the mouse to the corresponding connection point on the right turnout. As we drag, a line is drawn from the starting connection point to the cursor. When the cursor is within range of the target connection point, it will change shape. When this happens, release the mouse to complete addition of the track segment. Connection point boxes will turn green, indicating those connection points are "full", i.e., have their maximum number of connections.

Note the second line of the help bar reminds us how to add a track segment.

Add a track segment to complete the siding track.
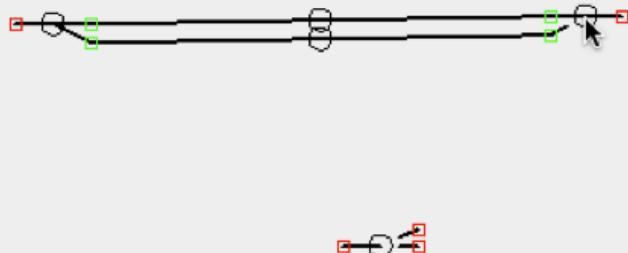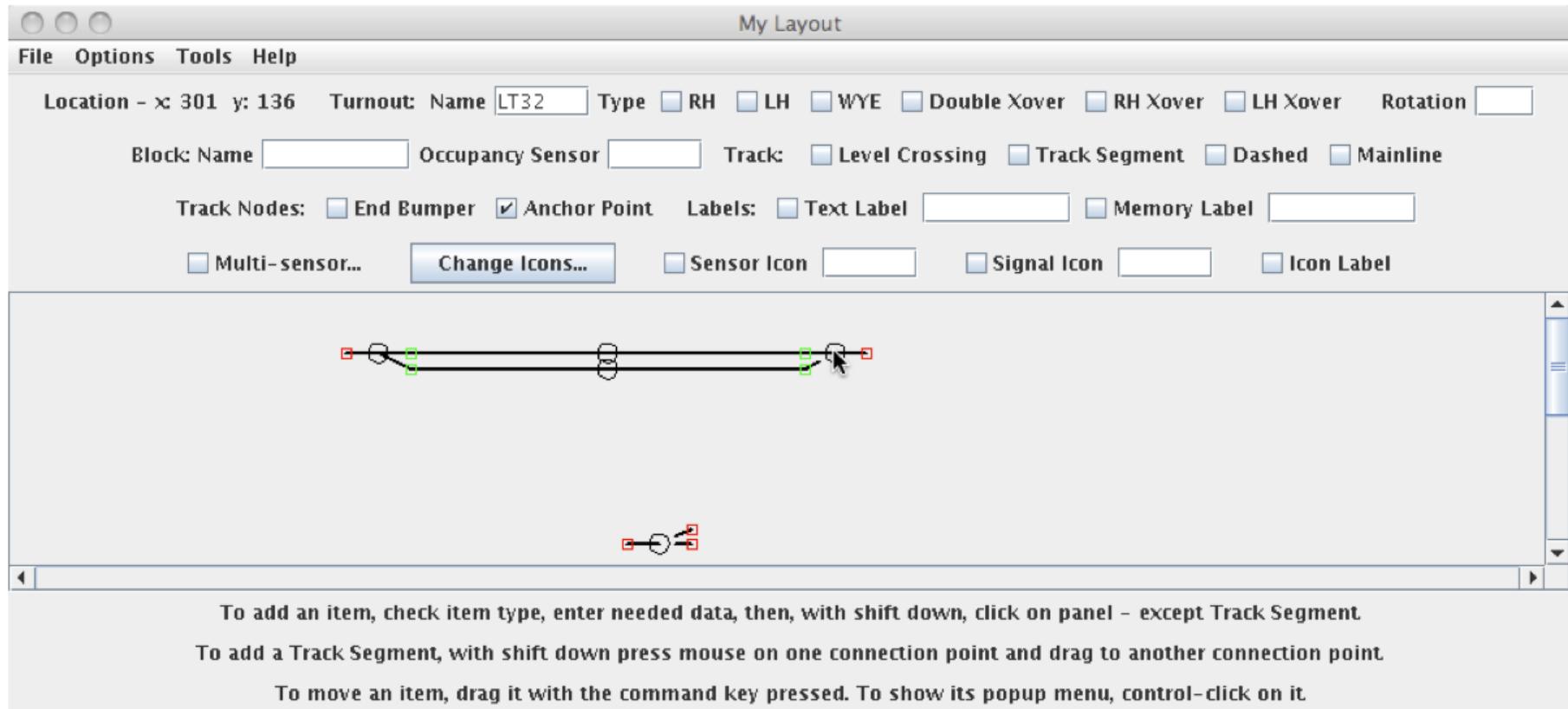
The turnouts are connected with Track Segments, but the two turnouts are not aligned correctly. The four connection points are green, indicating they are full.

It's worth noting that a Track Segment does not contain any coordinate information (x,y location information). Track diagram coordinate information is maintained in turnout diagrams, in **Track Nodes** (**Anchor Points** and **End Bumpers**) and in **Level Crossings**.

The bottom line of the help bar tells us how to move an item. This item changes according to computer operating system (MacOS X, Windows, or Linux).

We'll move the right turnout down a little. For our MacOS X system, we'll hold down the command key, while dragging the right turnout. The place to drag the turnout is at its center circle, as shown above.
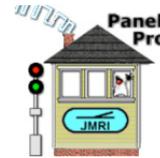
File Options Tools Help

Location – x: 301 y: 136   Turnout: Name [LT32]   Type ☐RH ☐LH ☐WYE ☐Double Xover ☐RH Xover ☐LH Xover   Rotation [ ]

Block: Name [   ]   Occupancy Sensor [   ]   Track: ☐Level Crossing ☐Track Segment ☐Dashed ☐Mainline

Track Nodes: ☐End Bumper ☑Anchor Point   Labels: ☐Text Label [   ] ☐Memory Label [   ]

☐Multi-sensor...   [Change Icons...]   ☐Sensor Icon [   ]   ☐Signal Icon [   ]   ☐Icon Label
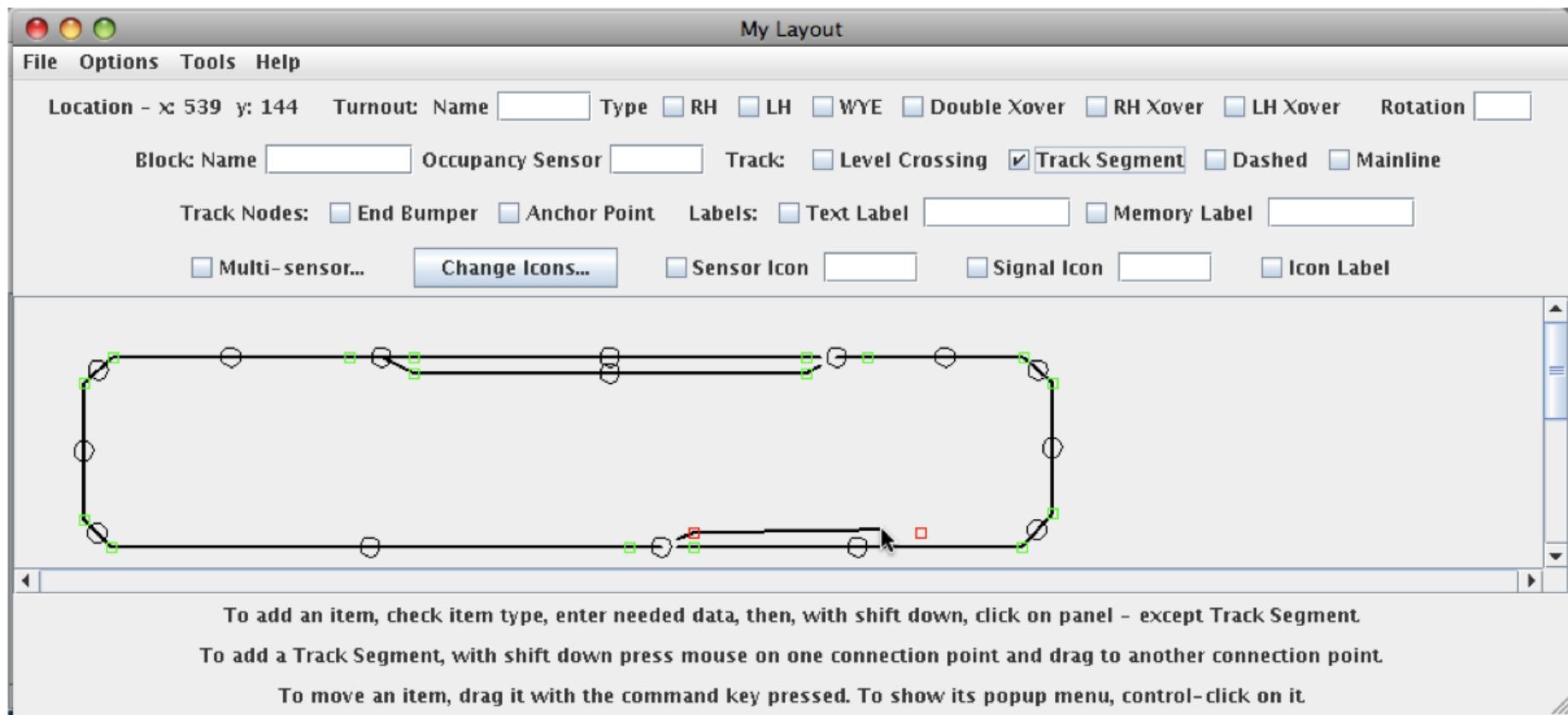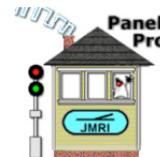
To add an item, check item type, enter needed data, then, with shift down, click on panel – except Track Segment.

To add a Track Segment, with shift down press mouse on one connection point and drag to another connection point.

To move an item, drag it with the command key pressed. To show its popup menu, control-click on it.

Move the turnout down, until the jagged lines become smooth as shown above.

Next we need to create **Anchor Points** to complete our oval schematic. Anchor Points are independent connection points that accept two connecting track segments.

To create Anchor Points, first check **Anchor Point** in the tool bar. Then with the shift key pressed, click at places on the panel where you want anchor points.

Remember that Layout Editor produces a *schematic* diagram of the layout. There are no curved track segments. We can simulate corners with multiple anchor points connected by track segments. You can use the cursor location in the tool bar to help place anchor points.
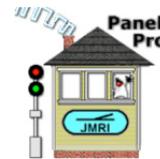
The new anchor points are shown as red connection points. To complete the oval diagram, they must be connected using track segments.

Check **Track Segment** in the tool bar, click on one connection point of the track segment, and drag to the other (as shown above for a track segment connecting the first anchor point to the throat connection point of the left upper

turnout). Remember not to release the mouse until the cursor changes shape when the second connection point is reached.

Repeat this procedure to create all track segments needed to complete the oval.

All the anchor points are connected to form a schematic oval. Note that as two track segments were connected to an anchor point, its connection square changed from red to green indicating a full connection at that anchor point.

If your diagram needs alignment, move the anchor points to align things. Follow the instruction in the help bar as we did when we moved the right top turnout.

There is still one red connection point. We need to add an industrial siding track at that connection point on the industry turnout. For the other connection point of the siding track, we create an **End Bumper**. An End Bumper is similar to an anchor point, but only accepts one connection.

Check **End Bumper** in the tool bar, and click where the industrial siding should end.
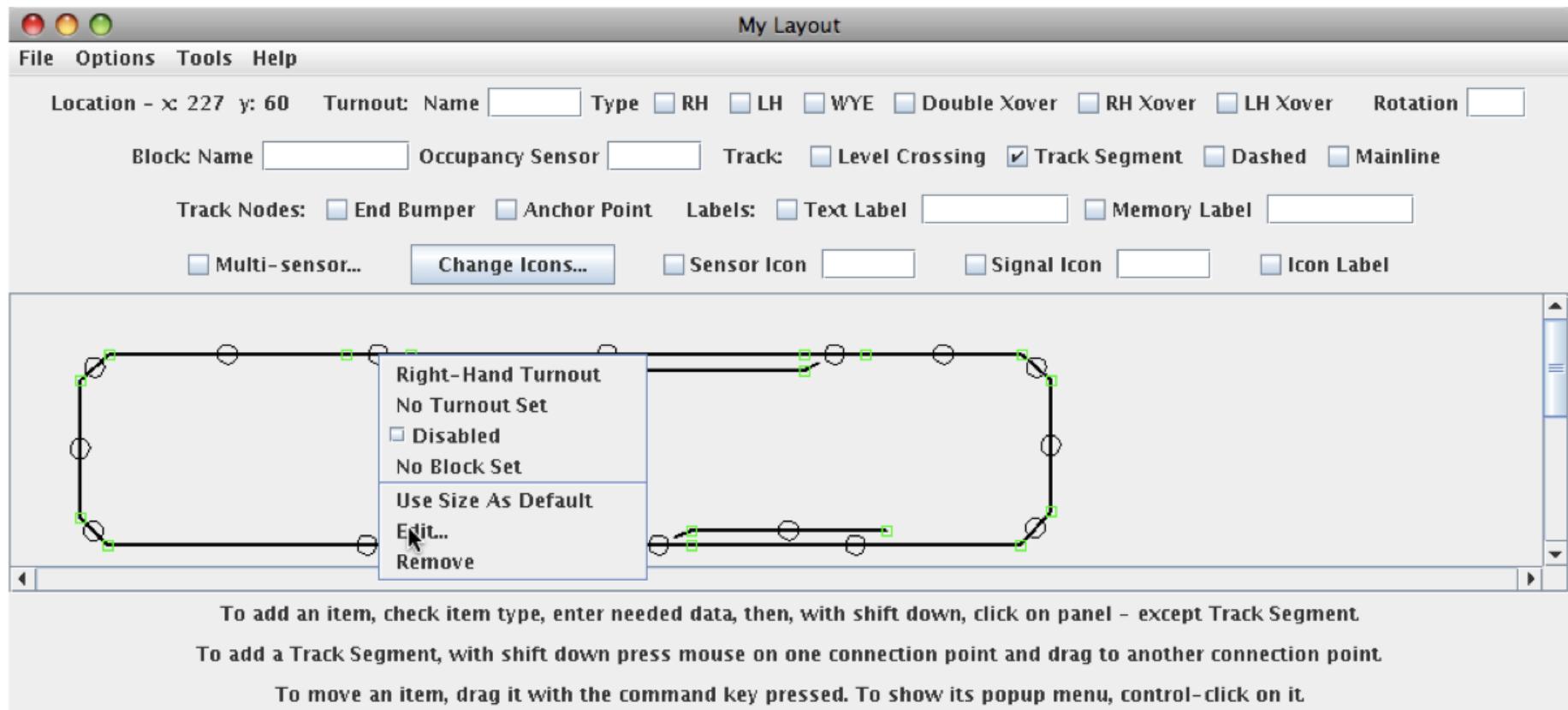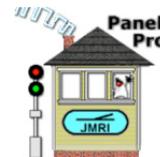
To complete the industrial siding track, add a track segment connecting the diverging connection point of the industry turnout to the new end bumper. (See above.)

Note how both the right upper turnout and the industry turnout are drawn. The drawings indicate both turnouts are in an unknown state. Click to toggle the turnout states of each to CLOSED. The place to click to toggle a turnout is in the circle at the center of the turnout.

If you like, you can verify the state of these turnouts by looking in the turnout table. You can also change their state by clicking in the turnout table

Schematic drawings of the upper right and industry turnouts now indicate they are in the CLOSED state.

We cannot set the upper left turnout to the closed state until we first assign a physical turnout from the turnout table to this turnout diagram.

The bottom line of the help bar tells us how to show popup menus of items. For MacOS X, we control-click (click while holding the control key down) on the turnout's center circle to show its popup menu.

Note that the popup menu tells us "No Turnout Set". This is replaced with the name of a turnout if a physical turnout is assigned to the turnout diagram.

Click **Edit...** in the popup menu as shown above.

The **Edit Turnout** window appears, as shown at the right.

We enter "LT30" in the Turnout Name field.
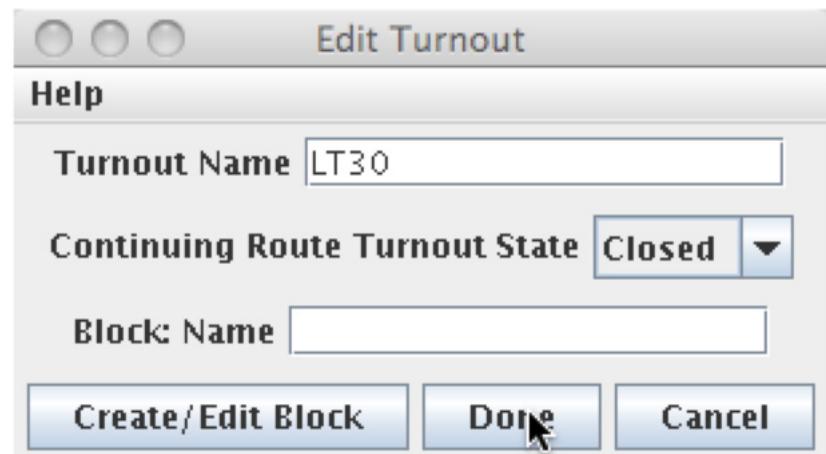
A physical turnout may be specified using either its "System Name" or its "User Name", as they appear in the turnout table. The System Name may not be changed once a turnout is created. The User Name may be changed. The User Name should not be used here unless it is *final*, that is, will not be changed at a later time. If a User Name is used here, and if the User Name is later changed, the assignment will be lost. By entering the System Name, we avoid that possibility.
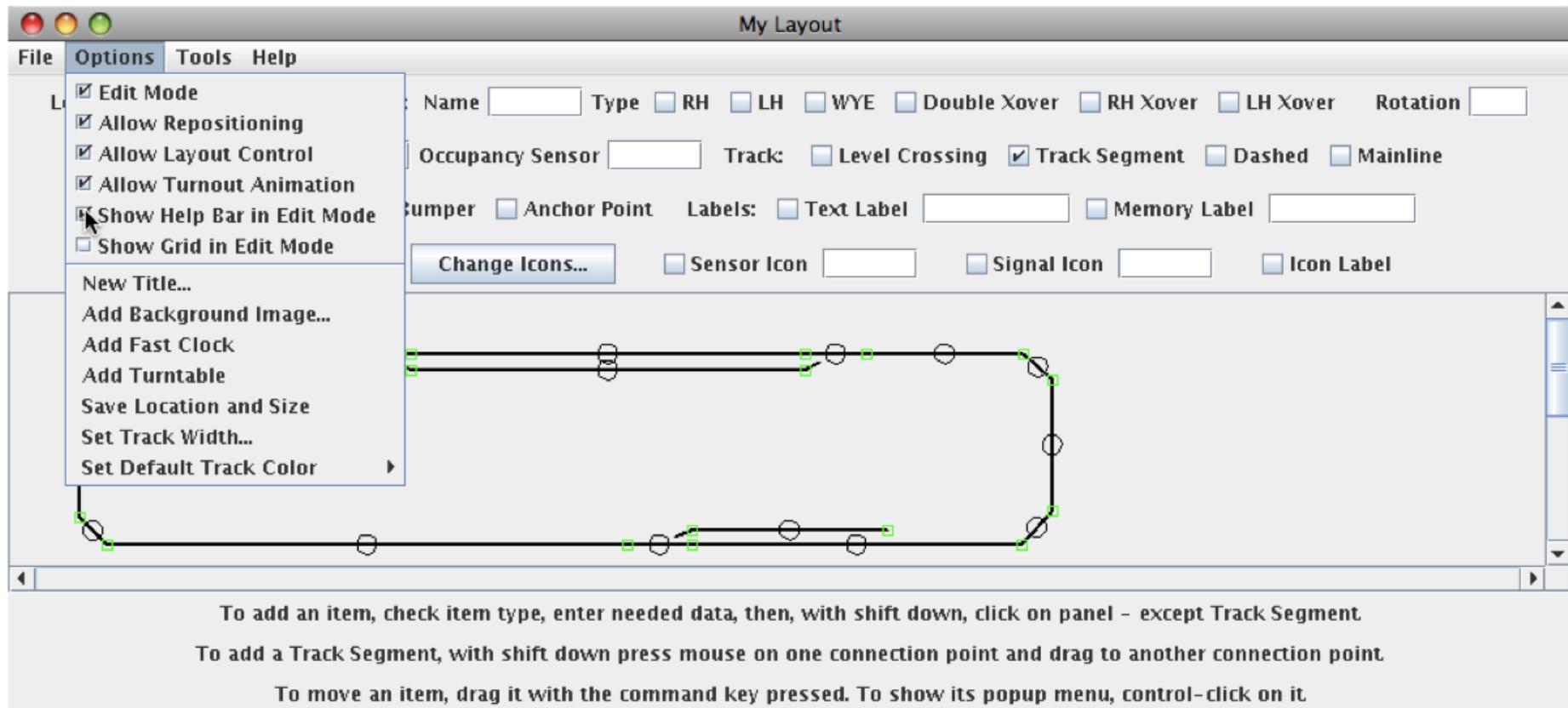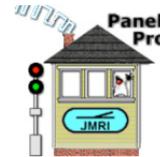
This window also allows us to specify a Block. We'll discuss Blocks later.

Click the **Done** button to complete the edit.

Click on the upper left turnout to toggle it to the CLOSED state.

This clinic is being run using Loconet Simulator, without a connection to a real layout. If a layout was connected, and if the entered turnouts correspond to track switches on the real layout, the track switch positions would change on the layout when the corresponding turnout on the panel is clicked.

By now, you should be familiar with the user interface used by Layout Editor, so we don't need the help bar at the bottom any more. We select the **Options** menu, and uncheck **Show Help Bar in Edit Mode**.
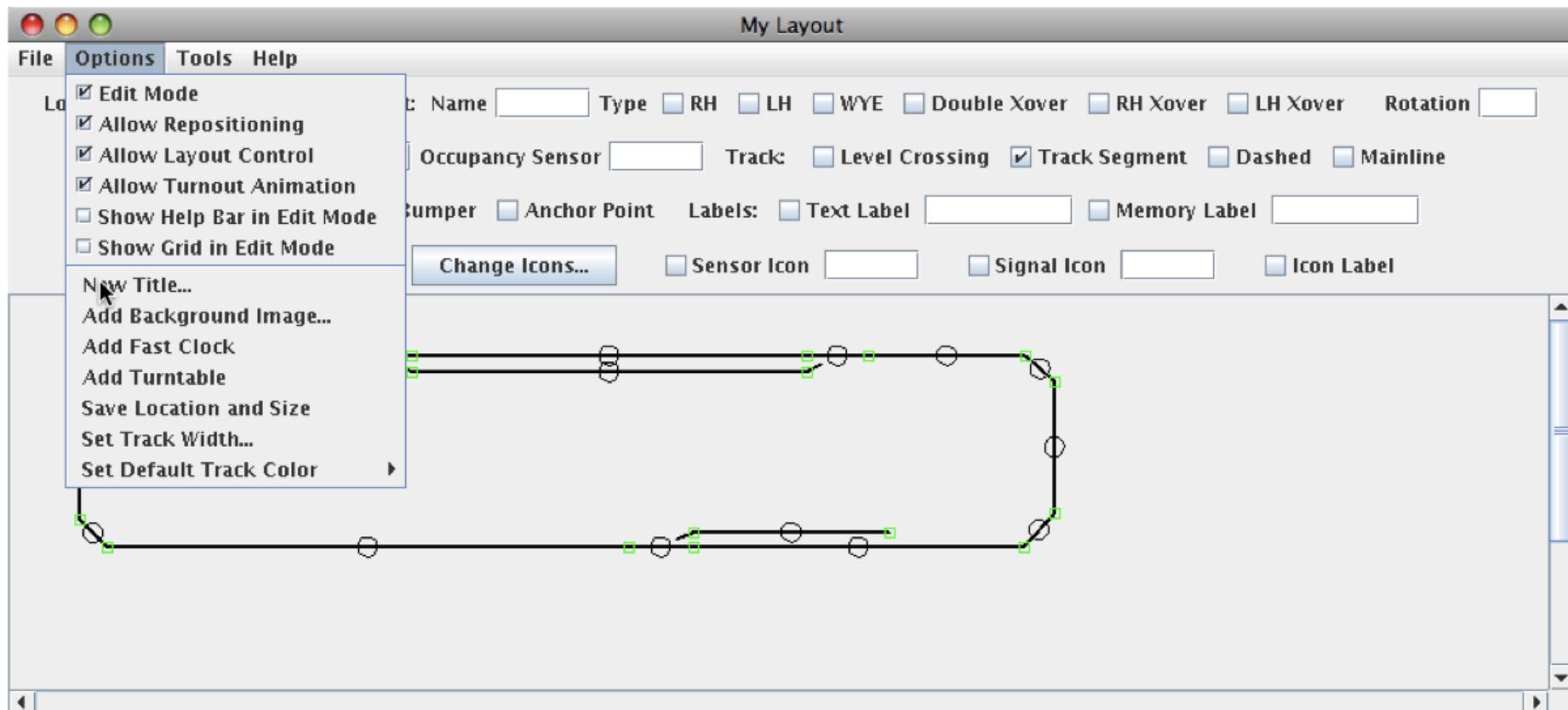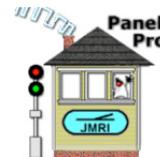
The Options menu provides for items not used very often. The upper part consists of various check boxes, and the lower part provides defaults and for adding and/or changing infrequently used items. Most of these items could have been put in the tool bar, but it's fairly full as it is.

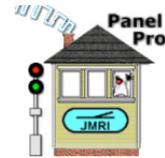Each item in the Options menu is described in the Help menu documentation for Layout Editor.
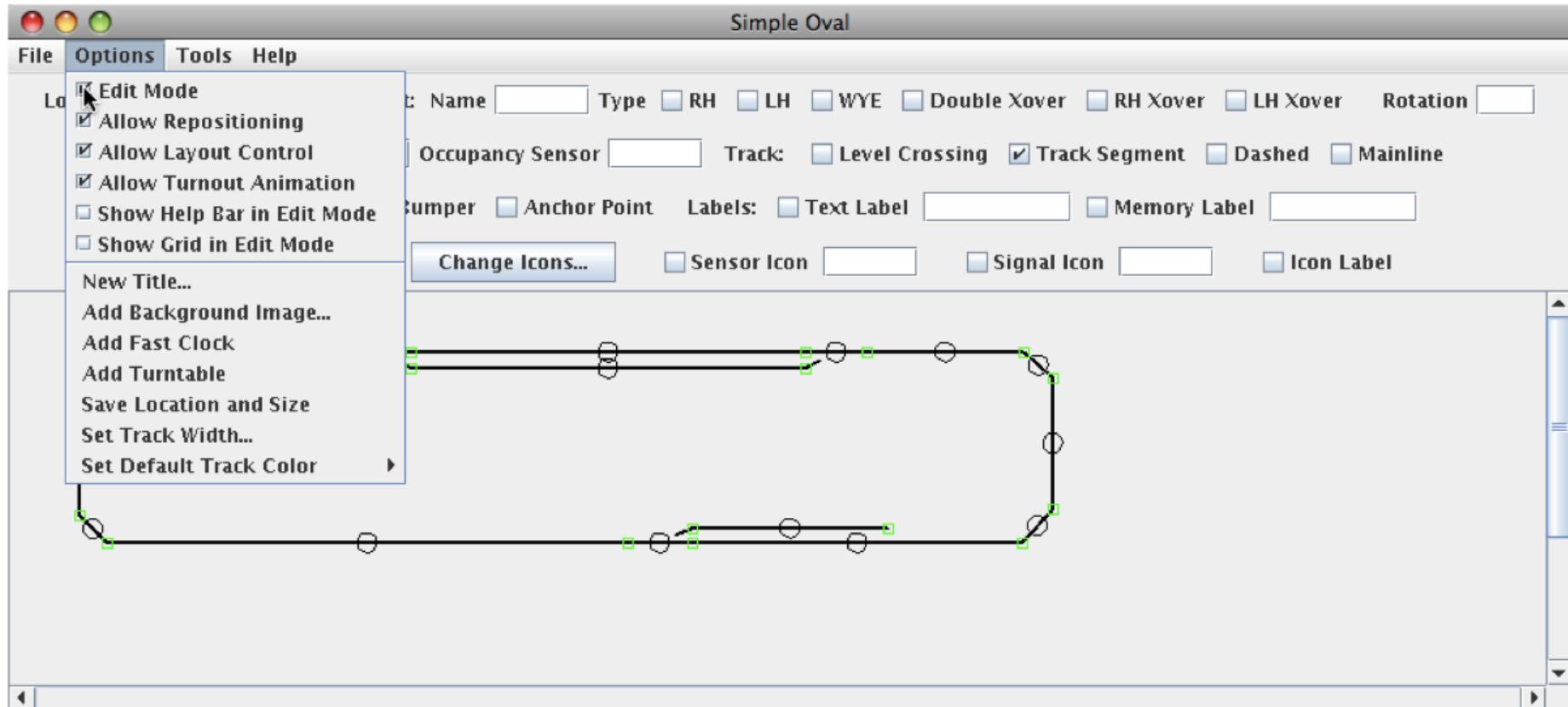
The help bar is no longer displayed.

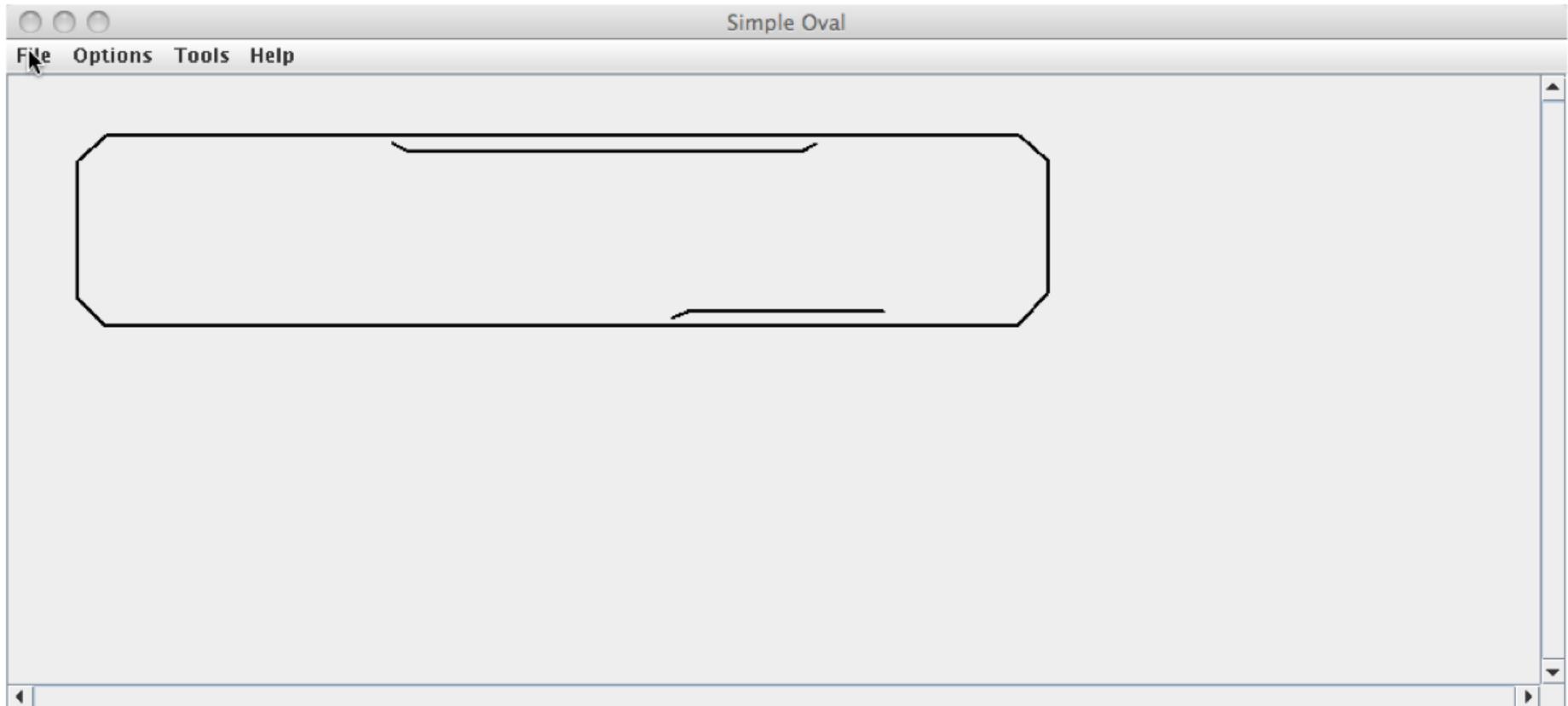Next we'll use the **Options** menu again to change the title

My Layout

File Options Tools Help

☑ Edit Mode
☑ Allow Repositioning
☑ Allow Layout Control
☑ Allow Turnout Animation
☐ Show Help Bar in Edit Mode
☐ Show Grid in Edit Mode

New Title...
Add Background Image...
Add Fast Clock
Add Turntable
Save Location and Size
Set Track Width...
Set Default Track Color   ▶

Lo   t: Name [   ]   Type ☐ RH ☐ LH ☐ WYE ☐ Double Xover ☐ RH Xover ☐ LH Xover   Rotation [   ]

| Occupancy Sensor [   ]   Track: ☐ Level Crossing ☑ Track Segment ☐ Dashed ☐ Mainline

Bumper ☐ Anchor Point   Labels: ☐ Text Label [   ]   ☐ Memory Label [   ]

[Change Icons...]   ☐ Sensor Icon [   ]   ☐ Signal Icon [   ]   ☐ Icon Label

of the panel to "Simple Oval".

Selecting **New Title...** brings up a small window that allows us to type in the new title. Click **OK** after entering the new title.

The panel now has a new name.

Finally we'll turn off **Edit Mode** by unchecking it in the
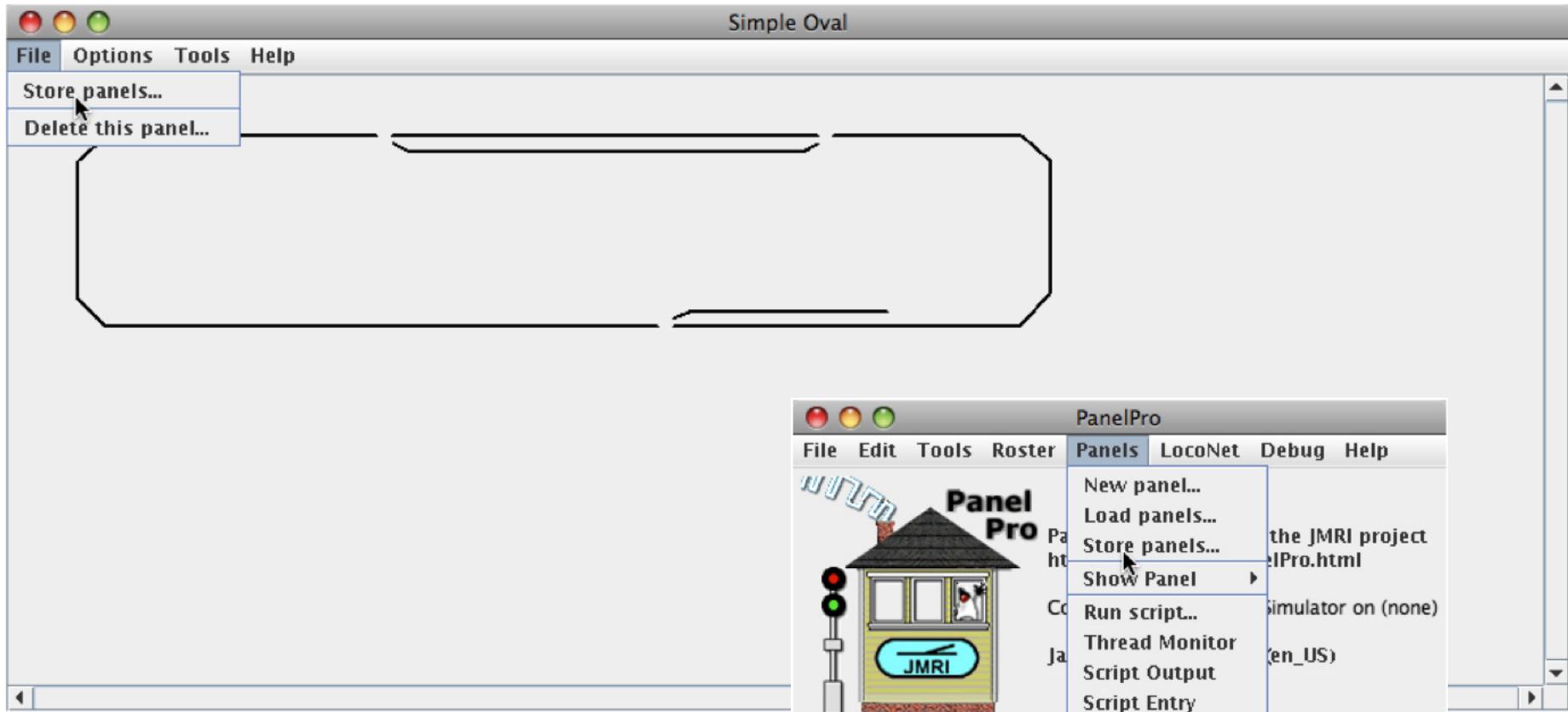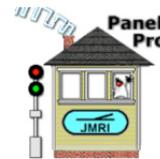**Options** menu to see what our simple oval layout looks like.

Our schematic of the simple oval layout is shown, as it would be displayed when in use.

The tool bar and the various connection point squares and selection circles are not shown.

Note that it has taken far longer to describe how to draw this track diagram, than it would take to redraw it now that you know how!

If this were a layout diagram we wanted to preserve, we would save it to disk at appropriate times to make sure we don't lose our work to computer or power gremlins.

The **File** menu provides for storing panel and configuration information and for deleting unwanted panels.
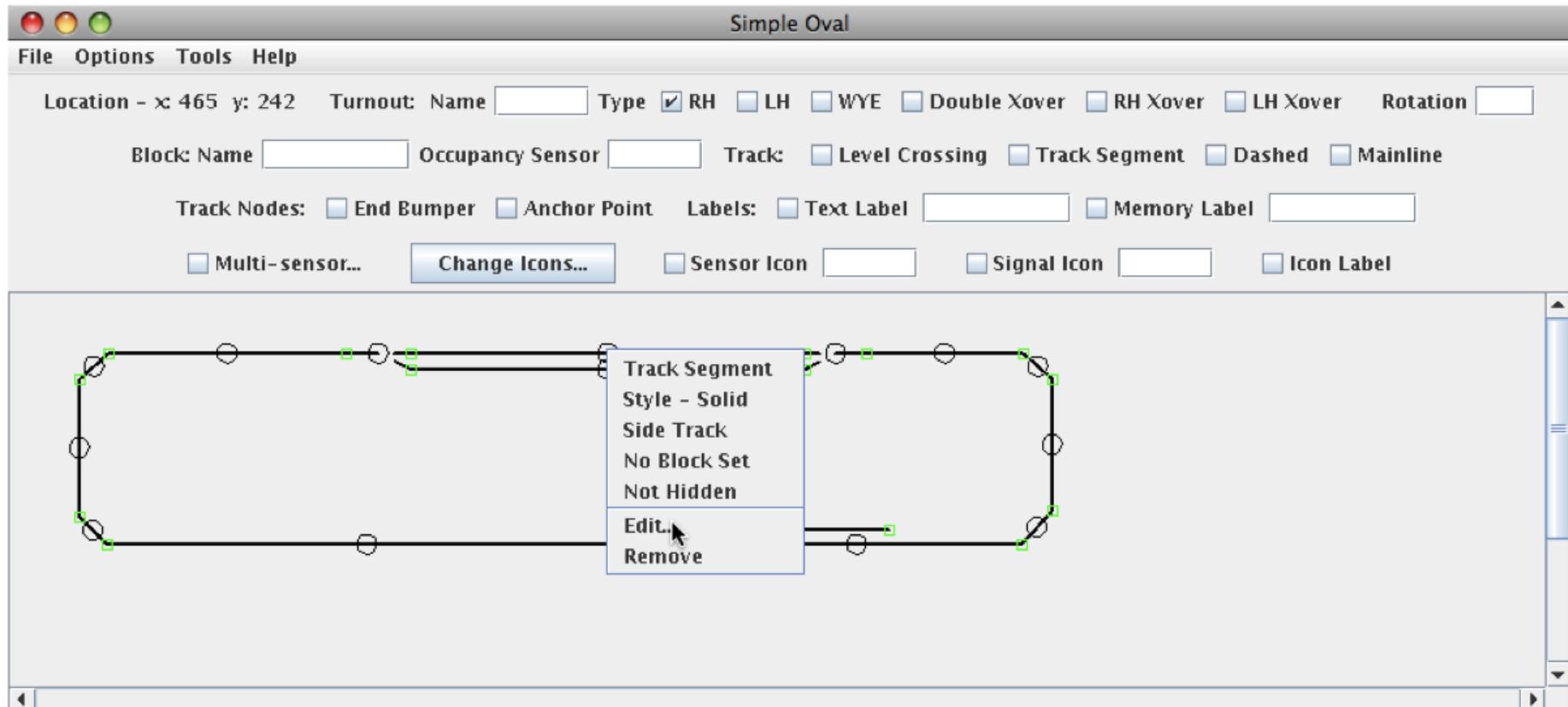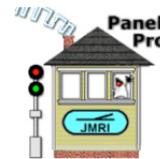
The **Panels** menu in the main PanelPro window also provides for storing panel and configuration information.

Selecting **Store panels...** in either menu will bring up a standard store file dialog window that will allow you to store all your panels and your configuration information (turnouts, sensors, signal heads, etc.) in a single file.

The saved "panel file" may be loaded after restarting the program using **Load panels...** in the **Panels** menu or automatically using Advanced Preferences.

Important: **Don't load a panel file without restarting the program first!** Errors usually result if you do.

Adding Animation to our Panel

In this section, we'll add animation to the simple oval panel we constructed in the previous section. We'll start by adding **Blocks** to our panel and defining which track is **Mainline** track and which is **Side** track (the default).

We could have added **Blocks** and defined **Mainline** track as we created the panel (see **Block** and **Mainline** entries in the tool bar above), but we didn't. So now we'll add them by editing track segments and turnouts. We'll start by editing the "passing" track segment between the two track switches at the top of our panel.

Select **Edit...** from the popup menu of the track segment. Control-click (MacOS X) on a track segment's selection circle to get its popup menu.
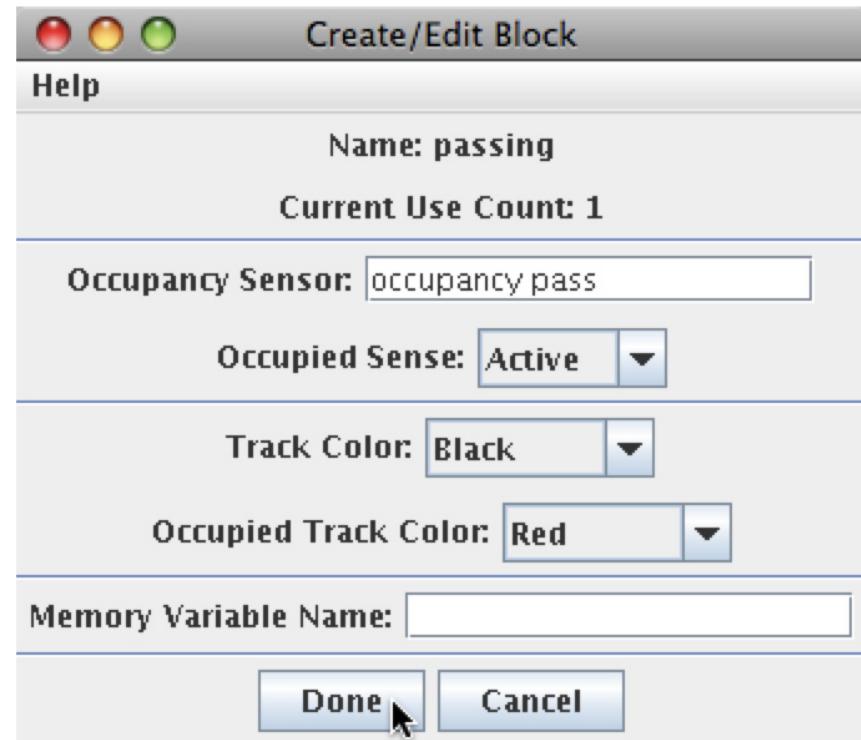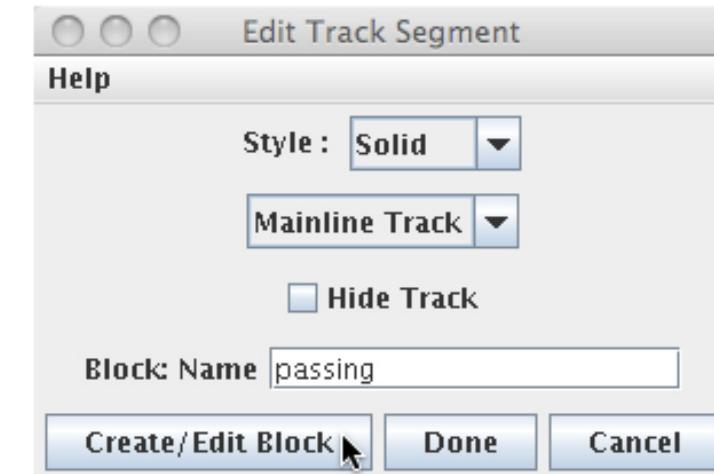
The **Edit Track Segment** window (upper right) appears. We select "Mainline Track" for this track segment, and keep the default **Style** of "Solid". (The other **Style** is "Dashed", for simulating tunnels and other hidden track.) We enter "passing" for a **Block:Name**, and click **Create/Edit Block**.

Blocks are automatically created when you enter a **Block: Name** for the first time. There is a Blocks table in JMRI. Blocks are automatically added to the Block table when a new Block is created. The entered name becomes the new Block's User Name.

Clicking **Create/Edit Block** brings up the **Create/Edit Block** window shown at the lower right. A Block is a section of track that is monitored by hardware for occupancy by a train or rolling stock. Block occupancy is indicated by an occupancy sensor, which is usually "Active" for occupied and "Inactive" for unoccupied. Here we enter "occupancy pass" as the **Occupancy Sensor** for this Block. **The named occupancy sensor must be in the Sensor table**.

We select "Red" for **Occupied Track Color,** and leave the default, "Black", for **Track Color** (unoccupied track). Track in this block will be drawn "red" if it is occupied, and "black" if it is unoccupied, following its occupancy sensor.

We'll skip **Memory Variable Name:** and come back to it later. Complete the edit by clicking **Done** in both windows.

At the right is the **Sensor Table** with previously entered block occupancy sensors. We will use 8 Blocks, with names:

north west

south west

passing

siding

south

north east

south east

industry

Syste... ⌃	User Name	State		Inverted
ISCLOC...		Inactive	Delete	☐
LS10	occupancy nw	Unknown	Delete	☐
LS11	occupancy sw	Unknown	Delete	☐
LS12	occupancy pass	Unknown	Delete	☐
LS13	occupancy side	Unknown	Delete	☐
LS14	occupancy s	Unknown	Delete	☐
LS15	occupancy ne	Unknown	Delete	☐
LS16	occupancy se	Unknown	Delete	☐
LS17	occupancy i	Unknown	Delete	☐

Add ...
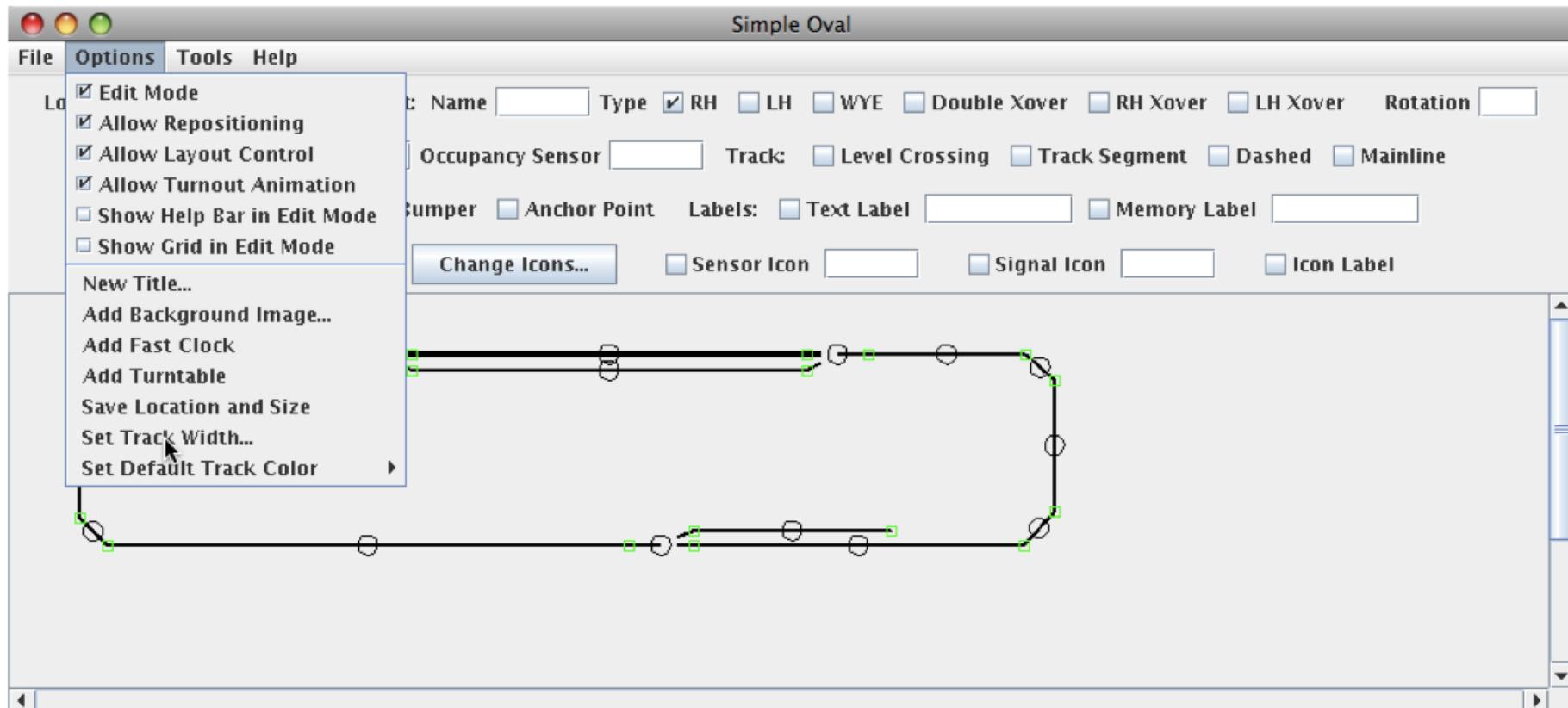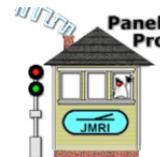
It's obvious from the User Name, which occupancy sensor goes with which block. Since these user names will not change, we'll use them to enter the occupancy sensors in **Create/Edit Block** windows.

Each Block may contain multiple track segments and possibly a turnout. Each Block needs to be set up only once. The **Create/Edit Block** window may be requested from any

track segment or turnout that is assigned to the Block.

For our simple oval panel, each track segment or turnout must be assigned to a Block in our simple oval. In actual layouts, there may be unblocked areas, such as yards.
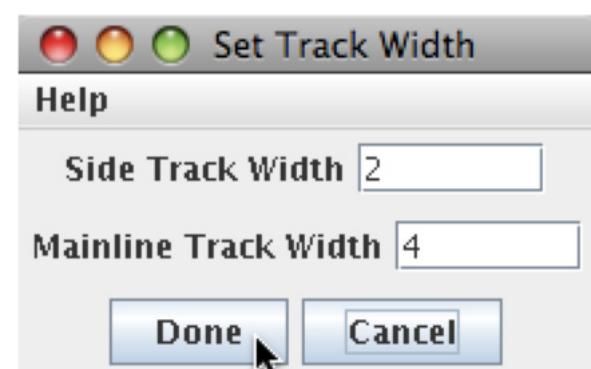
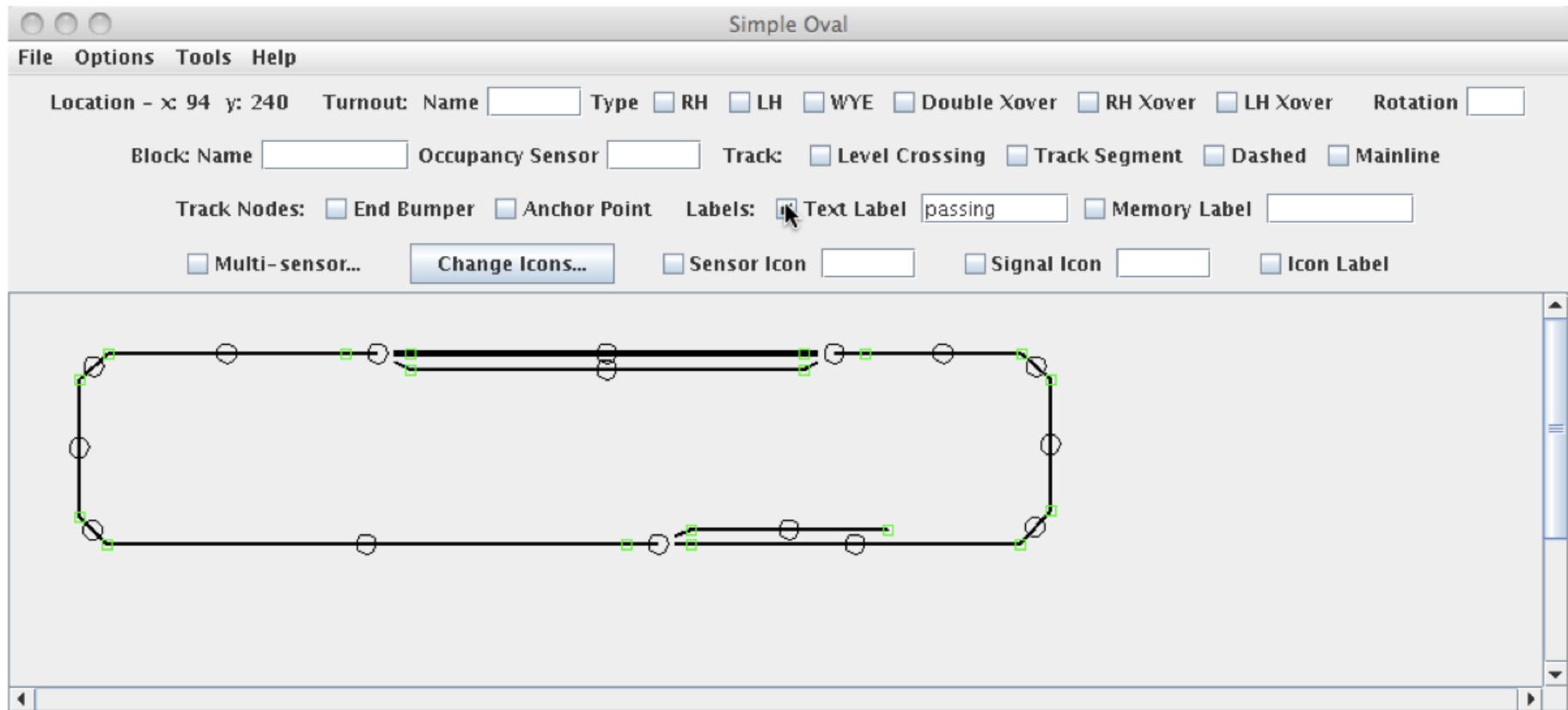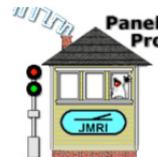Blocks are very useful for animation, and are essential for setting up signal logic.

Simple Oval

File   Options   Tools   Help

☑ Edit Mode
☑ Allow Repositioning
☑ Allow Layout Control
☑ Allow Turnout Animation
☐ Show Help Bar in Edit Mode
☐ Show Grid in Edit Mode

New Title...
Add Background Image...
Add Fast Clock
Add Turntable
Save Location and Size
Set Track Width...
Set Default Track Color ▶

Name _____ Type ☑ RH ☐ LH ☐ WYE ☐ Double Xover ☐ RH Xover ☐ LH Xover   Rotation _____
Occupancy Sensor _____ Track: ☐ Level Crossing ☐ Track Segment ☐ Dashed ☐ Mainline
Bumper ☐ Anchor Point   Labels: ☐ Text Label _____ ☐ Memory Label _____
Change Icons...   ☐ Sensor Icon _____ ☐ Signal Icon _____ ☐ Icon Label

Note that the mainline track is wider. Mainline track and side track can be drawn with different widths.

Select **SetTrackWidth...** in the **Options** menu to bring up the **Set Track Width** window shown at the right.

Click **Done** or **Cancel** to use the defaults shown.

Set Track Width

Help

Side Track Width 2

Mainline Track Width 4

Done   Cancel
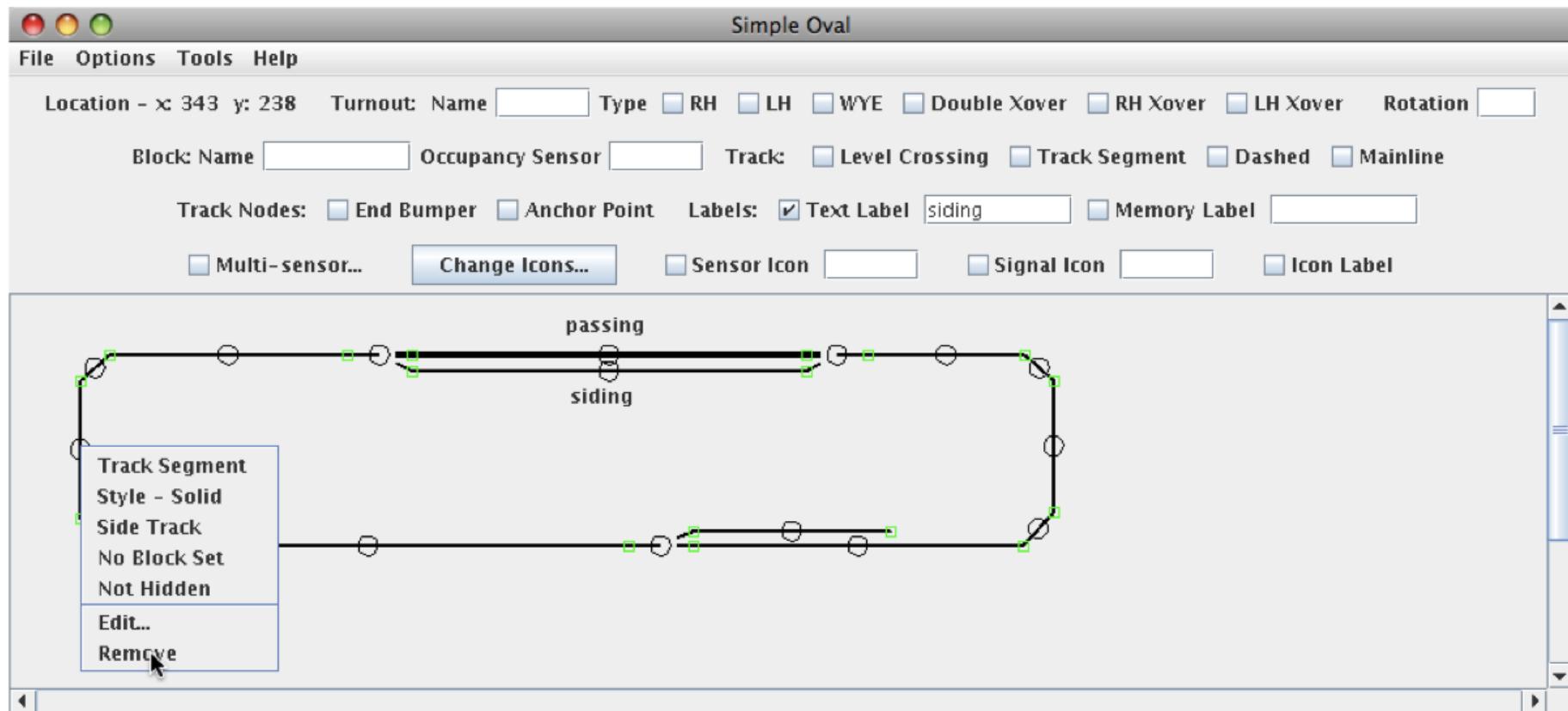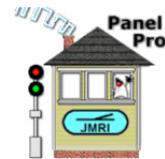
For our simple oval schematic, we'll add text labels for each block. This is not normally done on panels. Labeling our Blocks will afford an opportunity to demonstrate Text Labels, and will allow you to see what Block is located in what area of our schematic panel.

To add a Text Label, we check **Text Label** in the tool bar, and enter the text to be shown. In the example above, we've entered "passing" as our text.

Now, create the Text Label. While holding shift down, click at the desired the upper left corner of the label.
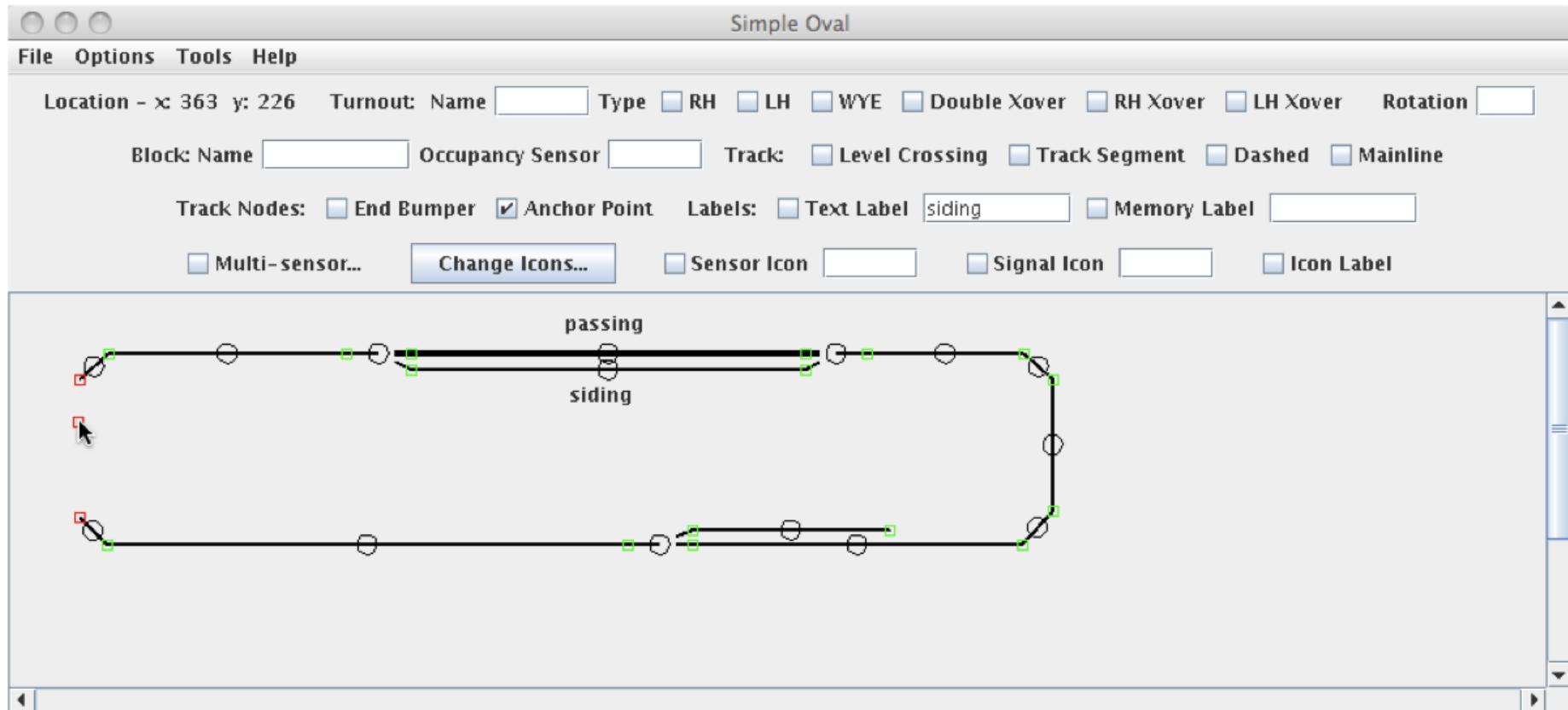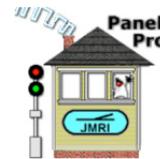
Each Text Label is an icon, and has a popup menu. From its popup menu you can inspect and change its Font, its Font Size, its Font Color and various other items.

Next assign the "siding" Block to the siding track, edit that Block, and add a Text Label for it.

Two Blocks are assigned and labeled. Now we need to provide a new Anchor Point on the left side to serve as the block boundary between the "north west" and the "south west" blocks.
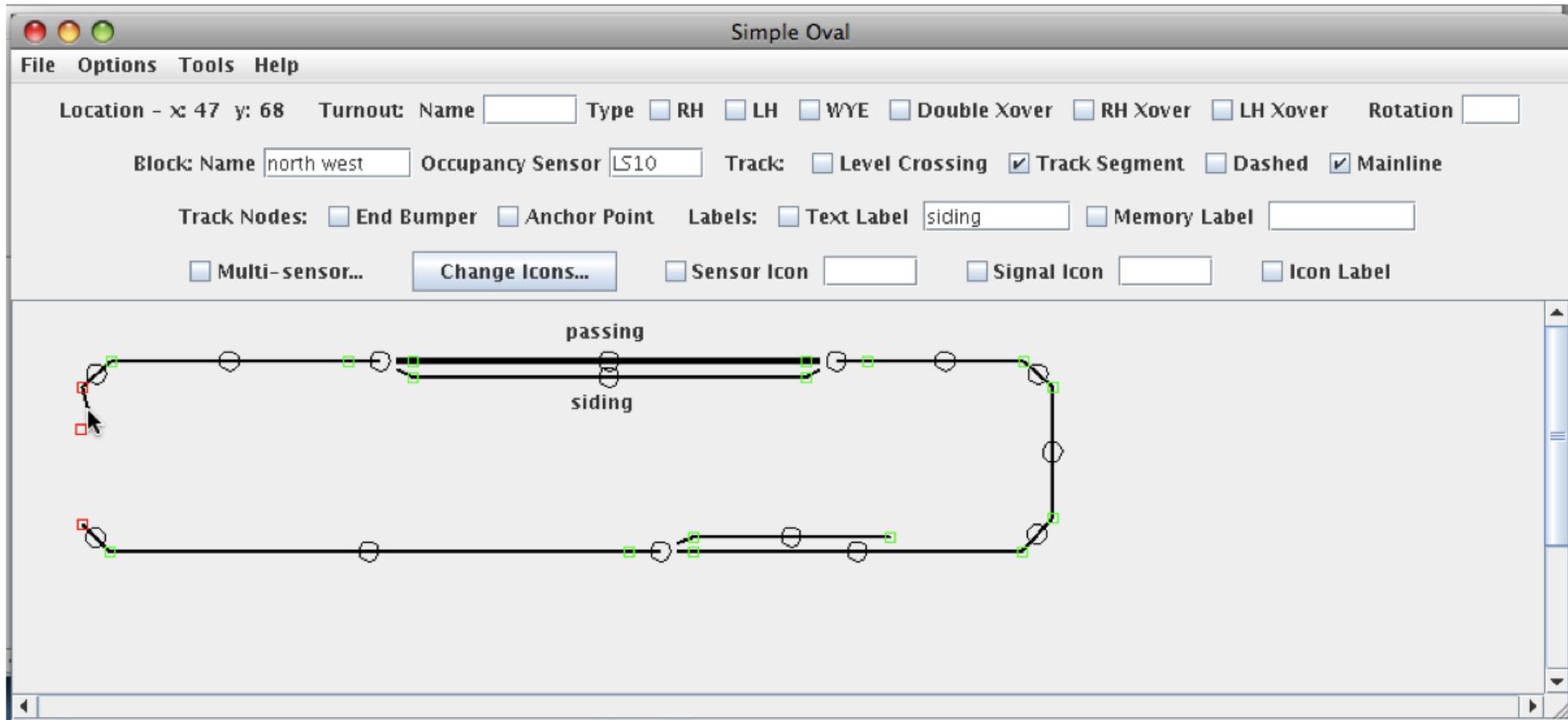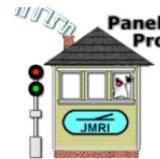
Start by deleting the track segment on the left side by selecting **Remove** in its popup menu.

The connection point squares are now drawn red.

Add the new Anchor Point that will serve as our block boundary. Select **Anchor Point** in the tool bar. With the shift key held down, click at the point the Anchor Point should be, as shown above.

Now we need to add track segments to rebuild the left side of our oval.
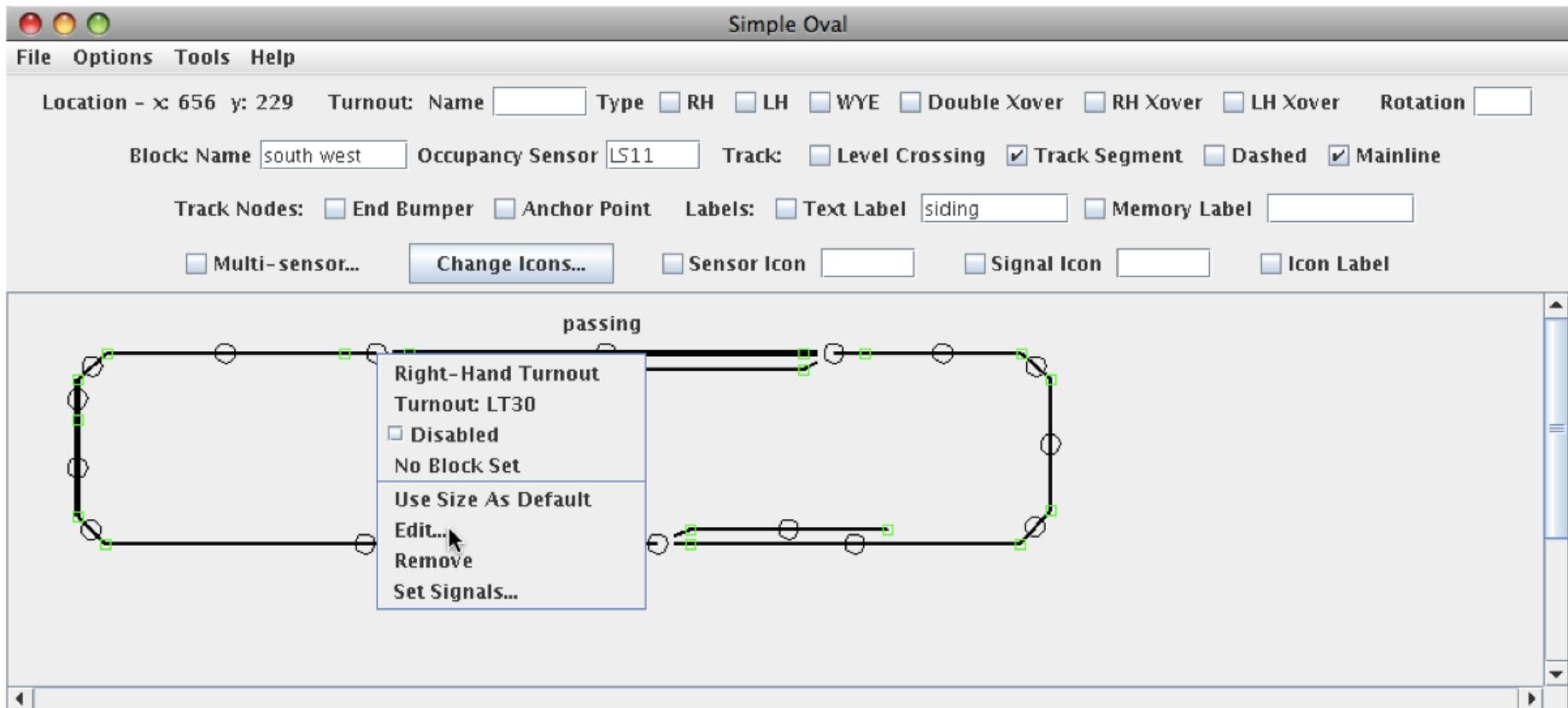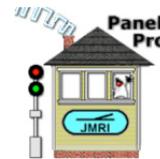
We first add the upper track segment. Check **Track Segment** in the tool bar. To automatically create its Block with its Occupancy Sensor as we add the track segment, we enter "north west" in the **Block: Name** field, and "LS10" in the **Occupancy Sensor** field. Also, note we have checked **Mainline** in the Tool Bar. Making these entries *before* the track segment is created will save time by not having to edit the new track segment.

Note we could have used the sensor user name, "occupancy nw" instead of "LT10".

Create the track segment as shown above.

Change the Block information to "south west", change the occupancy sensor to "LS11" or "occupancy sw", and create the lower track segment.
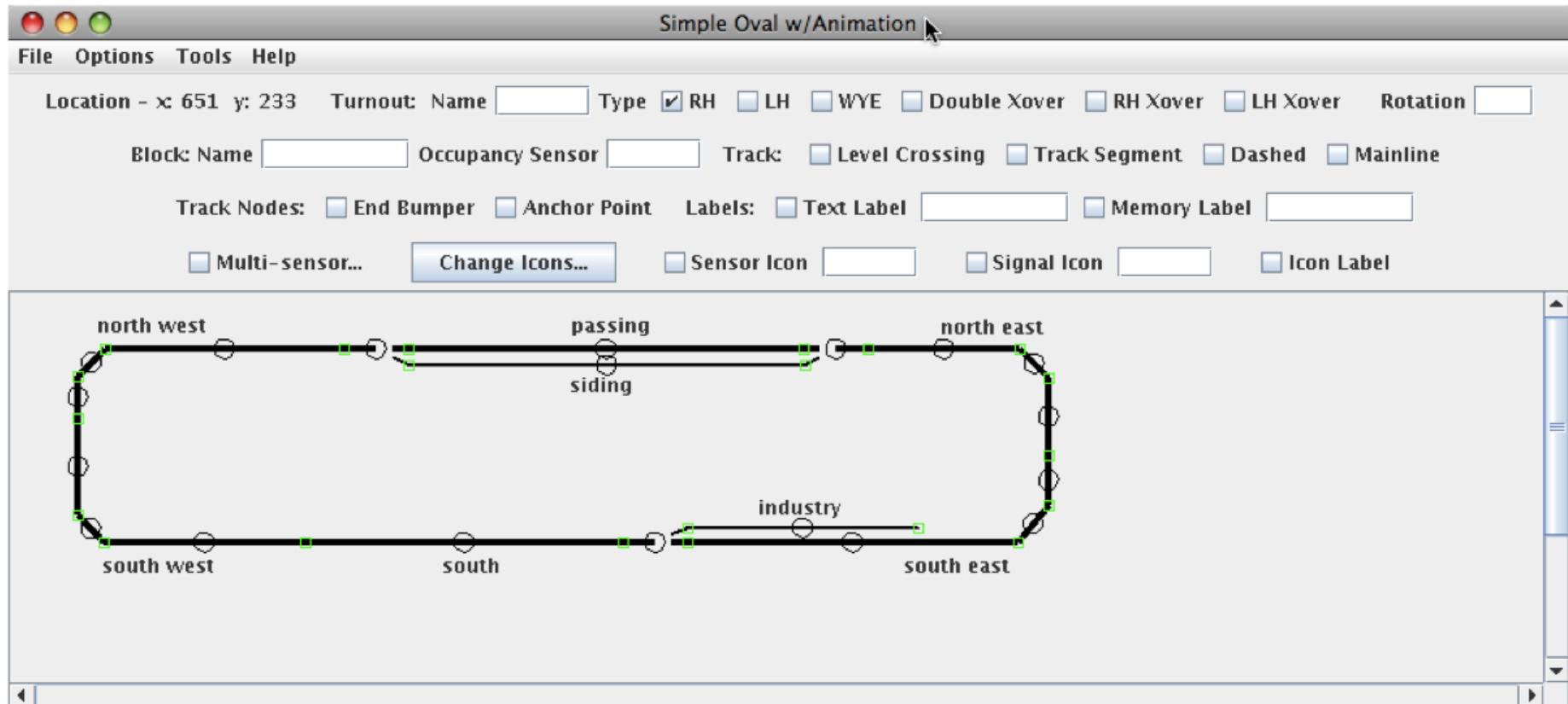
If you display the popup menu of our new anchor point, it will indicate that this anchor point is a block boundary between the "north west" and "south west" blocks.

Next we complete the "north west" block by assigning the right upper turnout and the two right upper track segments to this block. Also, when editing the two track segments, select **Mainline**. While editing the turnout or either track segment, click **Create/Edit Block**, and select "Red" for its occupied

track color. Then add a Text Label for the "north west" block at the upper left.

Using the methods just described, create two new block boundaries--one at the bottom and one on the right. Then assign all turnouts and track segments to the remaining 5 blocks, and create Text Labels for those blocks, as shown on the next page.
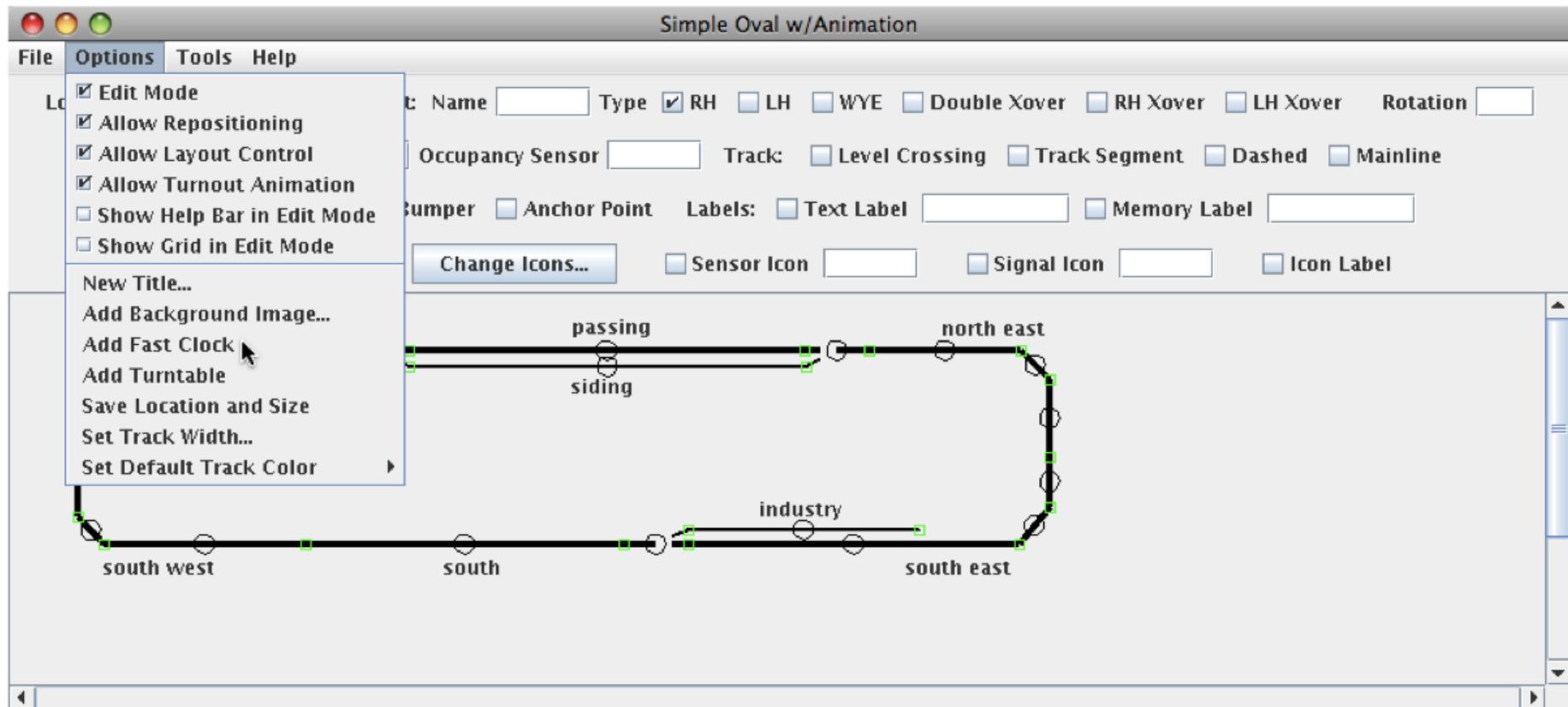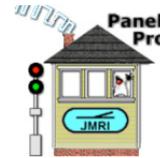
Your simple oval with Blocks should be similar to that shown above.

This clinic is using Loconet Simulator, without a connection to a real layout. However, we can simulate a train traversing our simple oval layout using a Logix. Our Logix simulates the train by changing occupancy sensors and turnout states according to the time shown on the JMRI Fast Clock.

Explaining how Logix works is beyond the scope of this clinic. You can view our Logix by displaying the Logix table using the PanelPro **Tools** menu, then clicking the **Edit** button next to the Logix.

Here, we need to add a Fast Clock display to our panel.
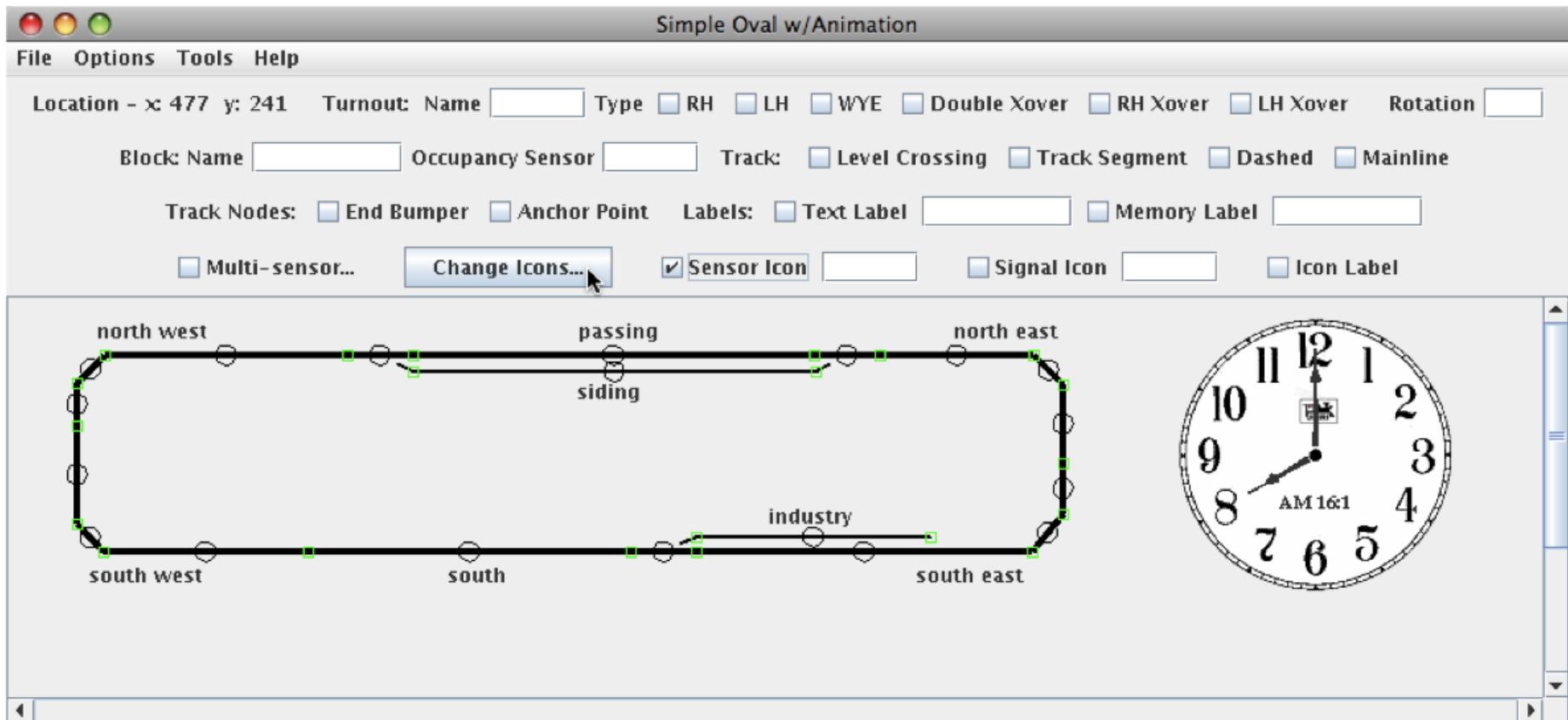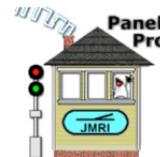
To add a Fast Clock display to our panel, select **Add Fast Clock** in the Options menu.

An analog fast clock display appears at the upper left of the panel. Move it (drag it) to the right side of the panel.

The JMRI Fast Clock was previously defined to start at 8:00 AM, and to load stopped (paused) at 8:00. The Fast Clock rate was set to 16:1. This information was saved in the *LayoutEditorClinic.xml* file, along with panels, sensors, turnouts, signal heads, etc., and was loaded when that panel file was loaded. Fast Clock information may be viewed and changed by selecting **Clocks>Setup Fast Clock...** in the PanelPro **Tools** menu.
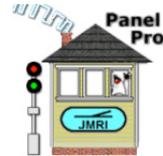
Our analog fast clock display is at the right.

We need to add a button to our panel that we can use to start the fast clock and run our simulation. We'll use a Sensor Icon linked to the Fast Clock's ISCLOCKRUNNING internal sensor. When this sensor is toggled, the fast clock switches from run to pause, etc.

First we'll change the sensor icons to button images.

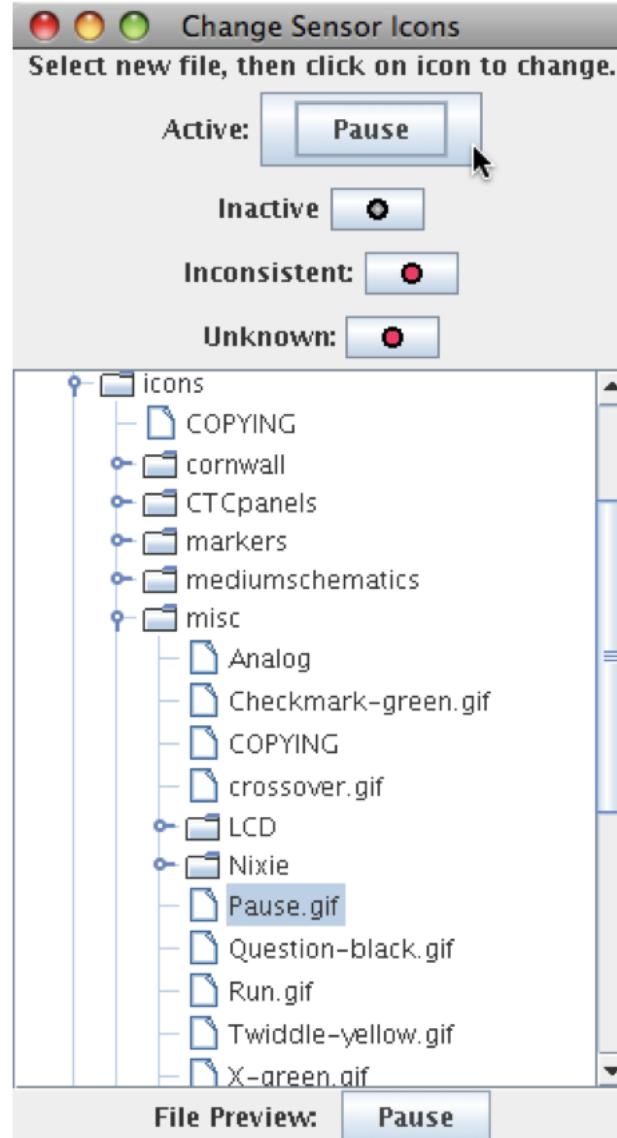Check **Sensor Icon** in the tool bar, and click **Change Icons...** as shown above.

The **Change Sensor Icons** window is shown. When the window is first opened, only the "resources" directory is shown. Click the toggle at the left to open the "resources" directory. Then click the toggle next to the "icons" directory to open it. Then click the toggle next to the "misc" directory to open it. The lower part of your window should be similar to the window at the right. (Scroll as needed.)
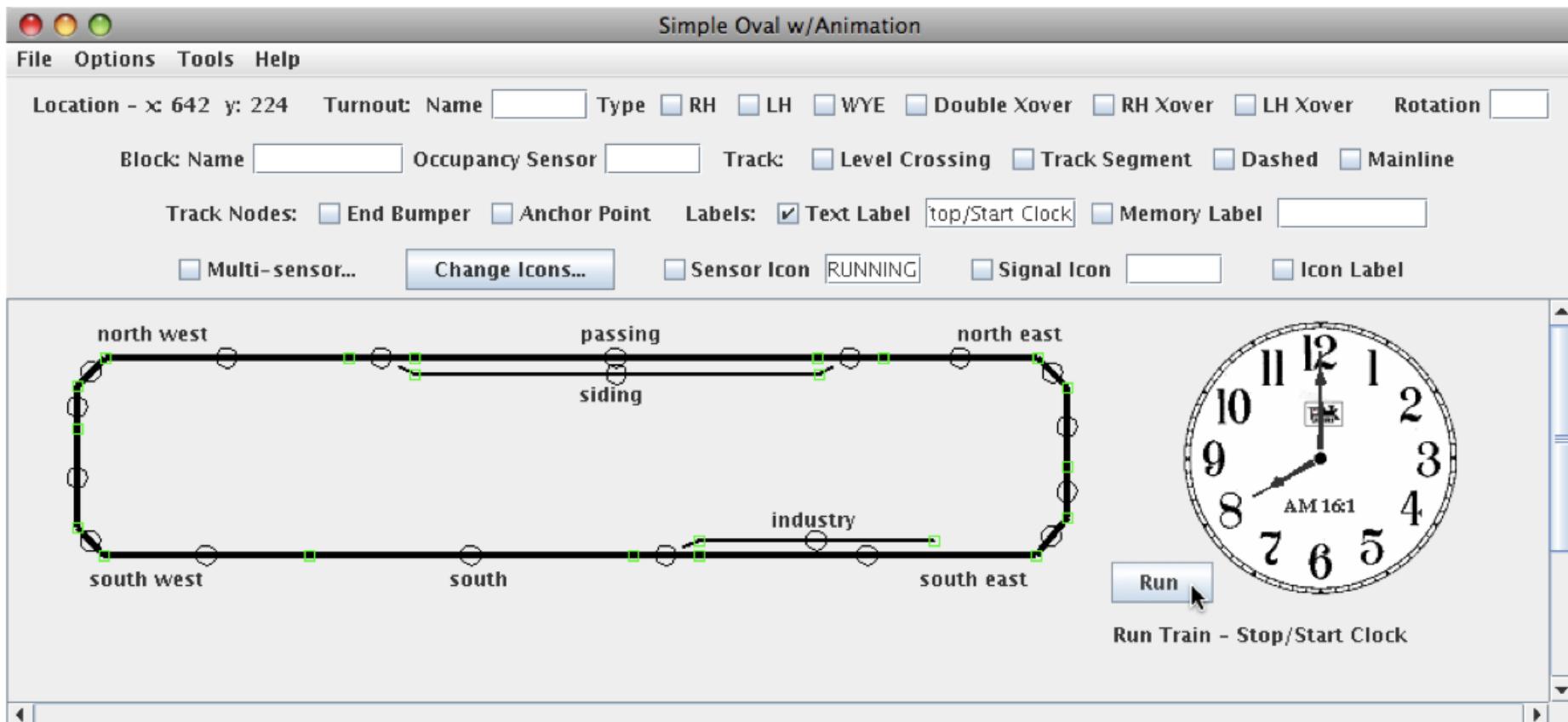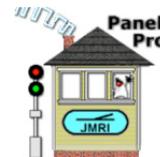
Assign the "Pause.gif" icon to **Active**. Click "Pause.gif" to select it--its image appears at the bottom of the window. Click the icon next to **Active:** to assign the selected icon, "Pause.gif" to the active sensor state.

Assign "Run.gif" to **Inactive** by first selecting it, then clicking the icon next to **Inactive**.

After a Sensor Icon is created using these assignments, the "Pause.gif" icon will be displayed when the assigned sensor is Active, and the "Run.gif" icon will be displayed when the assigned sensor is inactive. We will be using an internal sensor, so we need not assign icons to **Inconsistent** or **Unknown** states.

Close the window by clicking appropriately in the upper window bar.

Change Sensor Icons

Select new file, then click on icon to change.

- Active: **Pause**
- Inactive: ○
- Inconsistent: ●
- Unknown: ●

- icons
  - COPYING
  - cornwall
  - CTCpanels
  - markers
  - mediumschematics
  - misc
    - Analog
    - Checkmark-green.gif
    - COPYING
    - crossover.gif
    - LCD
    - Nixie
    - Pause.gif
    - Question-black.gif
    - Run.gif
    - Twiddle-yellow.gif
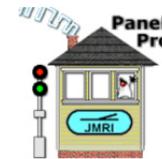   - X-green.gif

File Preview: **Pause**

To create the sensor icon, enter ISCLOCKRUNNING in the box next to **Sensor Icon**, and check **Sensor Icon**. With the shift key held down, click where the upper left corner of the sensor icon is to be placed. (See above).

Under the new sensor icon, add a Text Label as shown above.

The ISCLOCKRUNNING sensor is linked to the fast clock automatically by JMRI. When the fast clock is running, the ISCLOCKRUNNING sensor is active, and the "Pause.gif" icon is displayed. When it's not running (as it is now), the sensor is inactive and the "Run.gif" icon is shown. Clicking the sensor icon changes the state of the ISCLOCKRUNNING sensor, starting or stopping the JMRI fast clock.

We could stop at this point and run the train simulation, but instead we'll add **Train Tracking** animation.

Train Tracking allows us to display dynamically which train is in an occupied Block. So for one train, or for several trains transiting a layout at the same time, we can show where each train is at any given time.

Train Tracking is based on the Block software developed by Bob Jacobsen prior to the development of Layout Editor, and primarily used with scripts. Basically, each occupied Block has a *value*. This *value* is automatically passed from Block to Block as a train moves from Block to Block, and is cleared when a Block is no longer occupied. So the *value* follows the train around the layout. Setting *value* to a train name, passes the train name around from Block to Block.

Layout Editor has expanded Bob's original Block software by adding a tool to automatically initialize each Block, creating needed Path and Bean Settings objects. This initialization (previously done in scripts only) is needed to make the Block system work. Since Layout Editor captures the full connectivity of its panel, it has the information needed to perform this initialization automatically. The initialization is performed when Blocks are changed or when a panel file is loaded. (Since it's automatic, Layout Editor users don't need to be concerned about Path and Bean Settings objects.)
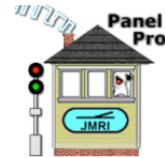
Layout Editor also provides software to allow a Memory Variable to be assigned to each Block. When the *value* of a Block changes, Layout Editor automatically copies the new *value* of the Block into its assigned Memory Variable (if there is one).

So, by using a Memory Label near each Block, we can display the name of the train in that Block.

This might sound complicated, but it's very easy to set up because the JMRI Block and Layout Editor software does almost everything automatically. There is even software to automatically save and restore Block *values* between runs of the program.

Since our panel is already blocked, all we need to do to implement **Train Tracking** on our simple oval panel is:

1. Create the Memory Variables (they are already in the Memory Variables Table),

2. Assign one of the Memory Variables to each Block,

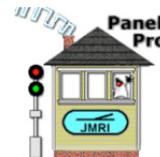3. Place a Memory Label near each Block in our panel.

Syste... △	User Name	Value	
IM1	siding		Delete
IM2	north east		Delete
IM3	north west		Delete
IM4	passing		Delete
IM5	industry		Delete
IM6	south		Delete
IM7	south west		Delete
IM8	south east		Delete

Memory Table

File   Help

Add ...

   Above is the **Memory Table** showing the 8 memory variables that were previously defined. To make things easy to keep track of, we used our Block names for the user names of the corresponding Memory Variables.
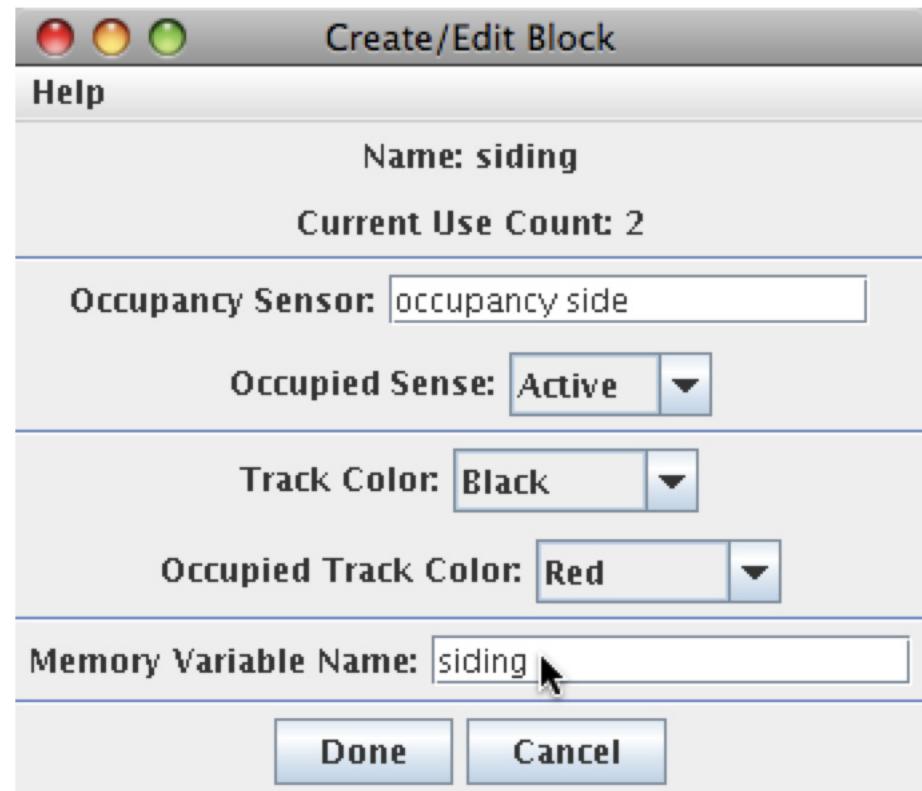
   The Memory Table may be displayed at any time by selecting **Memory Variables** in the submenu of the **Tables** item in the **Tools** menu of the main PanelPro window.
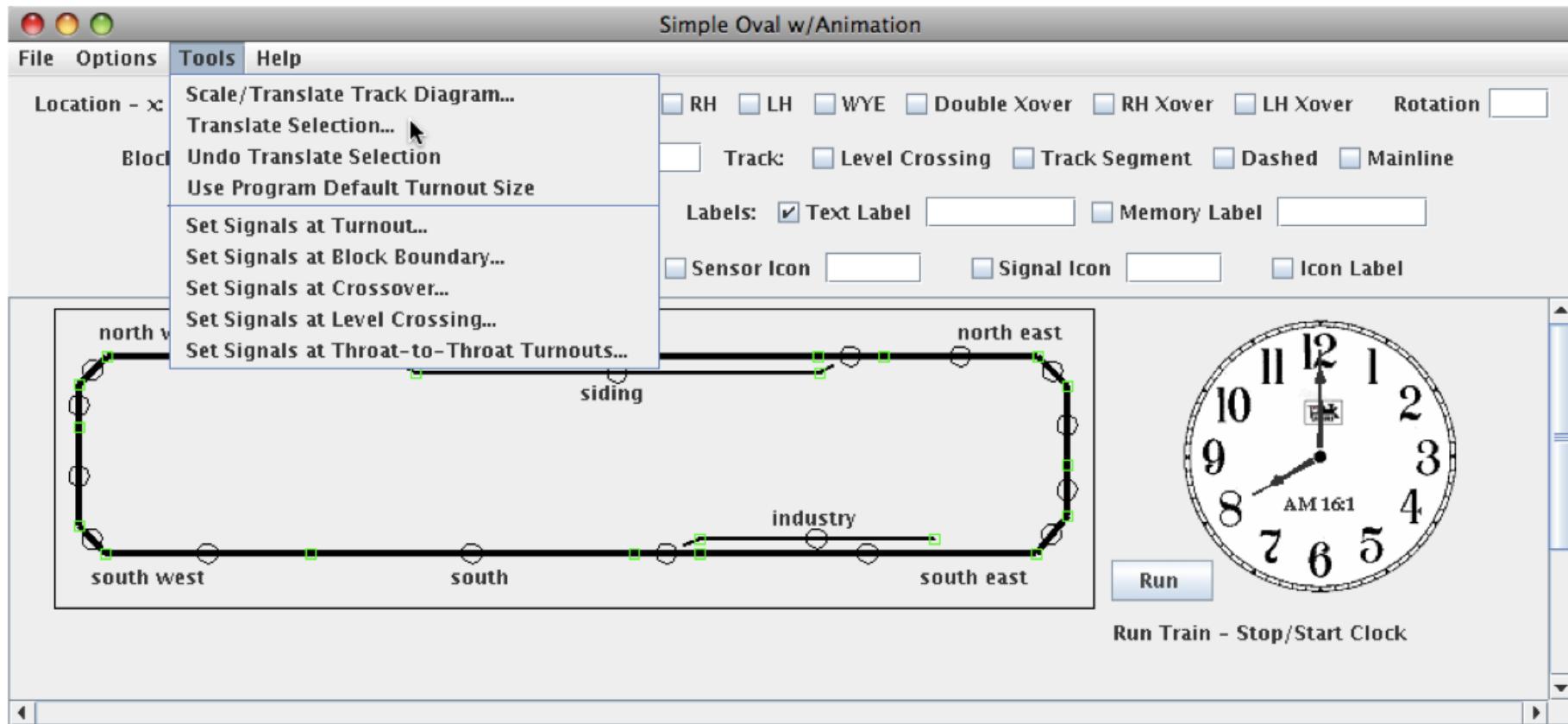
Next we need to edit each Block, adding the name of its Memory Variable in its **Create/Edit Block** window.
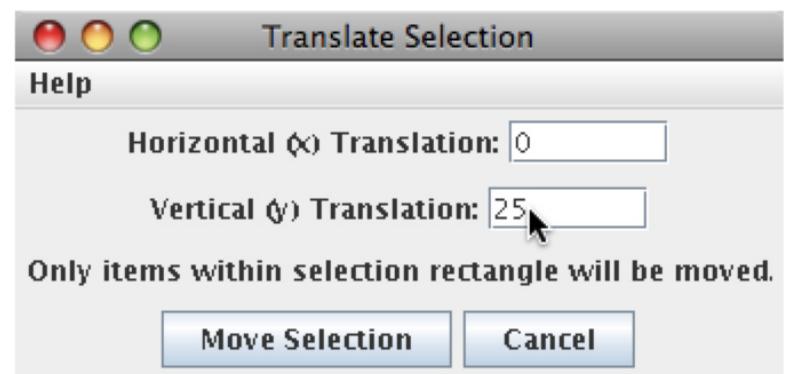
This is illustrated at the right for the "siding" block. To Edit a Block, select **Edit...** in the popup menu of any track segment or turnout in that block. In this example, we used the popup menu of the "siding" track segment. When the **Create/Edit Block** window appears, add a name from the Memory table in **Memory Variable Name:,** then click **Done**. Then click **Done** in the Edit window that was used to summon the **Create/Edit Block** window.
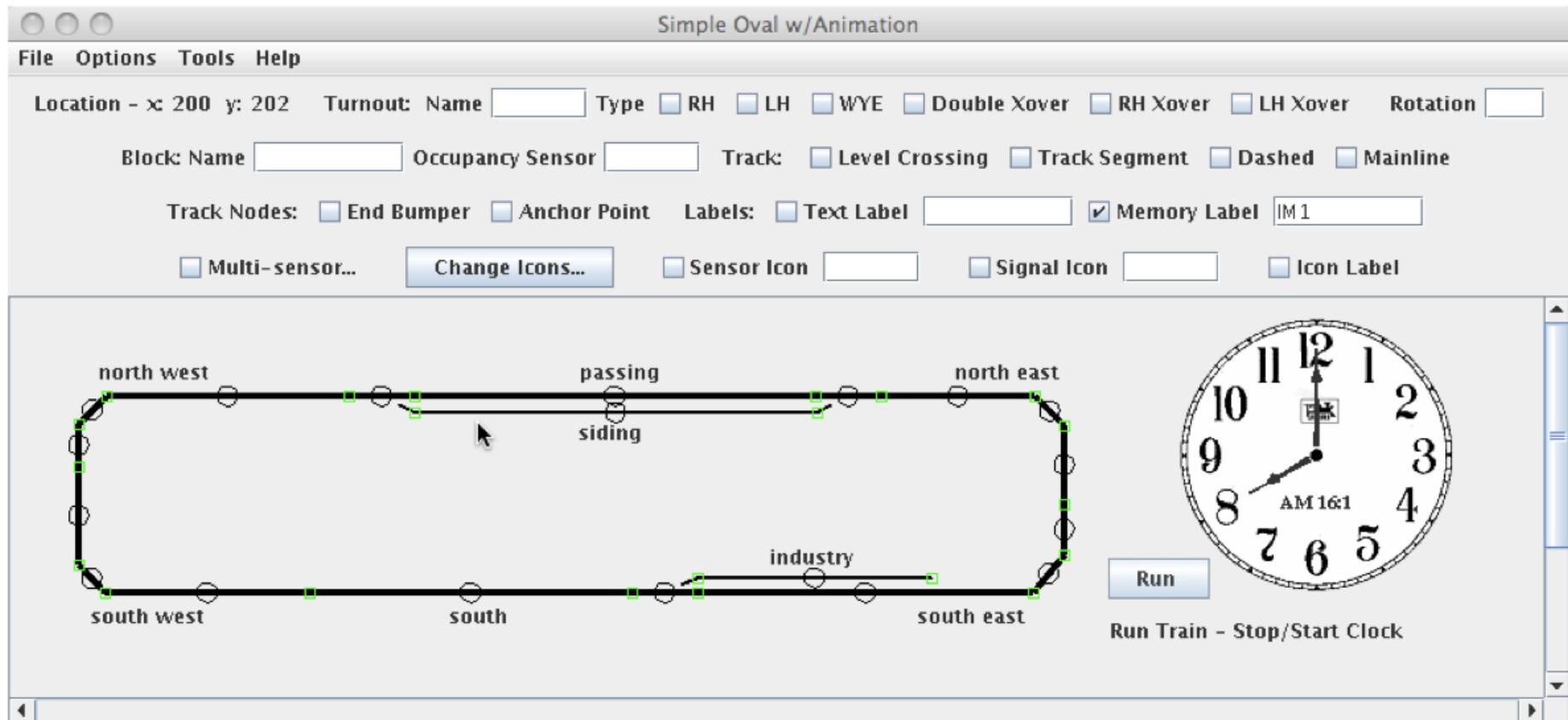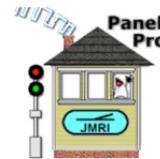
Our next step is to add Memory Labels for each of the Memory Variables.

Before we can add our Memory Labels, we must move our track diagram down to make more room at the top. We'll use the Translate Selection tool to do this. After *selecting* our entire track diagram by clicking and dragging (see the rectangular box above), select **Translate Selection...** in the **Tools** menu, to bring up the window at the right. After entering an appropriate number in **Vertical (y) Translation:**, click **Move Selection** to do the translation
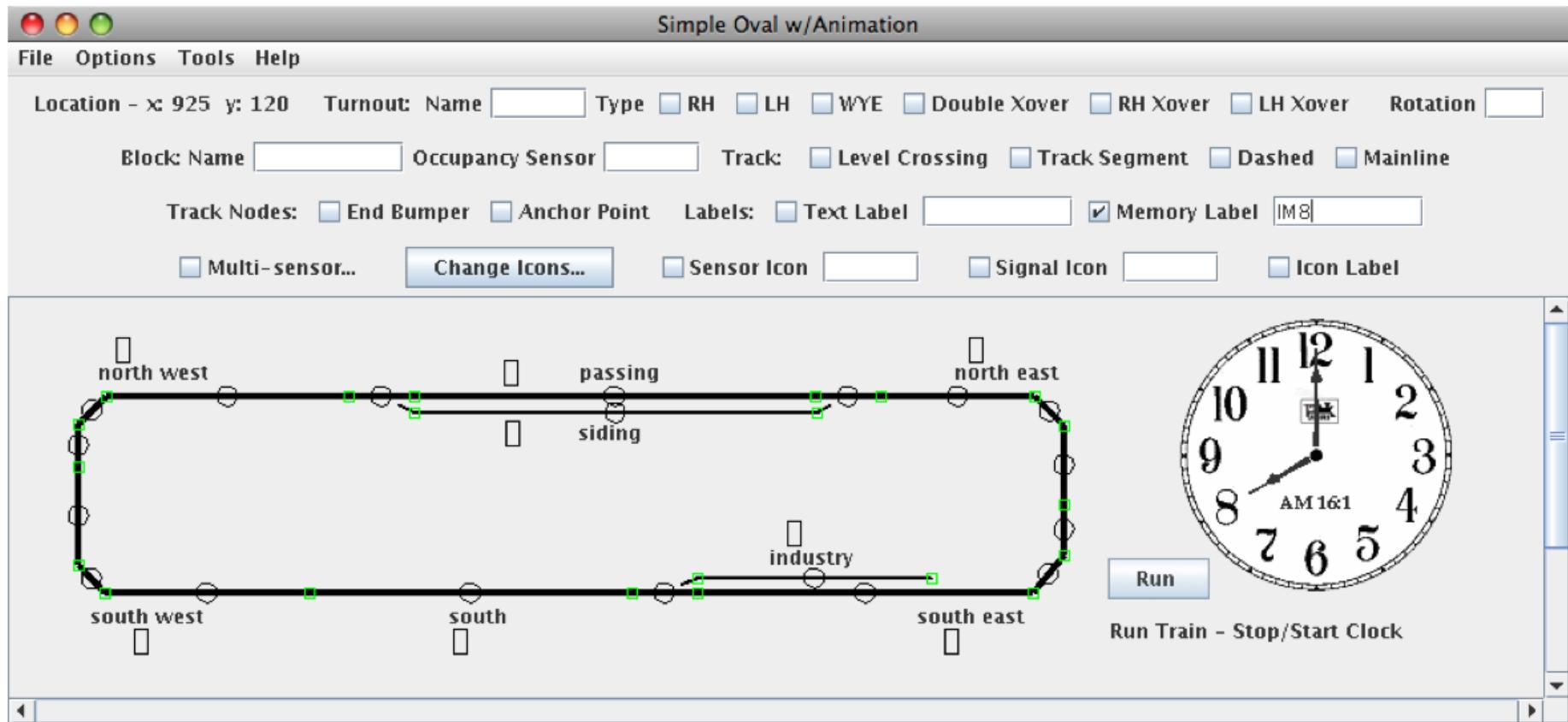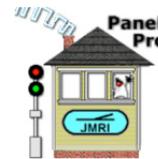
The track diagram is now 25 pixels lower. Note: if the translation was not satisfactory, you can reverse it by selecting **Undo Translate Selection** in the **Tools** menu immediately after translating a selection.

Next we need to add Memory Labels near each of the Block names in our track schematic.

To do this, check **Memory Label** in the tool bar. Then for each Memory Label, enter the name of one of the Memory Variables, either System Name or User Name, in the text field following **Memory Label**. While holding shift down, click the location of the upper left corner of the new memory label, placing it near its corresponding Block text label.

Repeat for each of the 7 other memory labels.

A small rectangle shows the location of each memory label. These rectangles are only shown in Edit Mode. Each memory label automatically expands to the right when text is displayed.

Hovering the cursor over each rectangle shows the name of the Memory Variable assigned to that memory label.

Each memory label also has a popup menu, similar to the popup menu we've already mentioned for text labels. This popup menu provides for changing text font style, font size, and/or font color. Use popup menus to change the color of each memory label to "Red", and the style to "Bold".

Memory labels can also be moved (repositioned) like other items in the track schematic.

Syste... ▲	User Name	Value		Direction
IB1	siding	Train	**Delete**	None
IB2	north east		**Delete**	None
IB3	north west		**Delete**	None
IB4	passing		**Delete**	None
IB5	industry		**Delete**	None
IB6	south		**Delete**	None
IB7	south west		**Delete**	None
IB8	south east		**Delete**	None

Add ...

On to the demo of a train running around our oval.
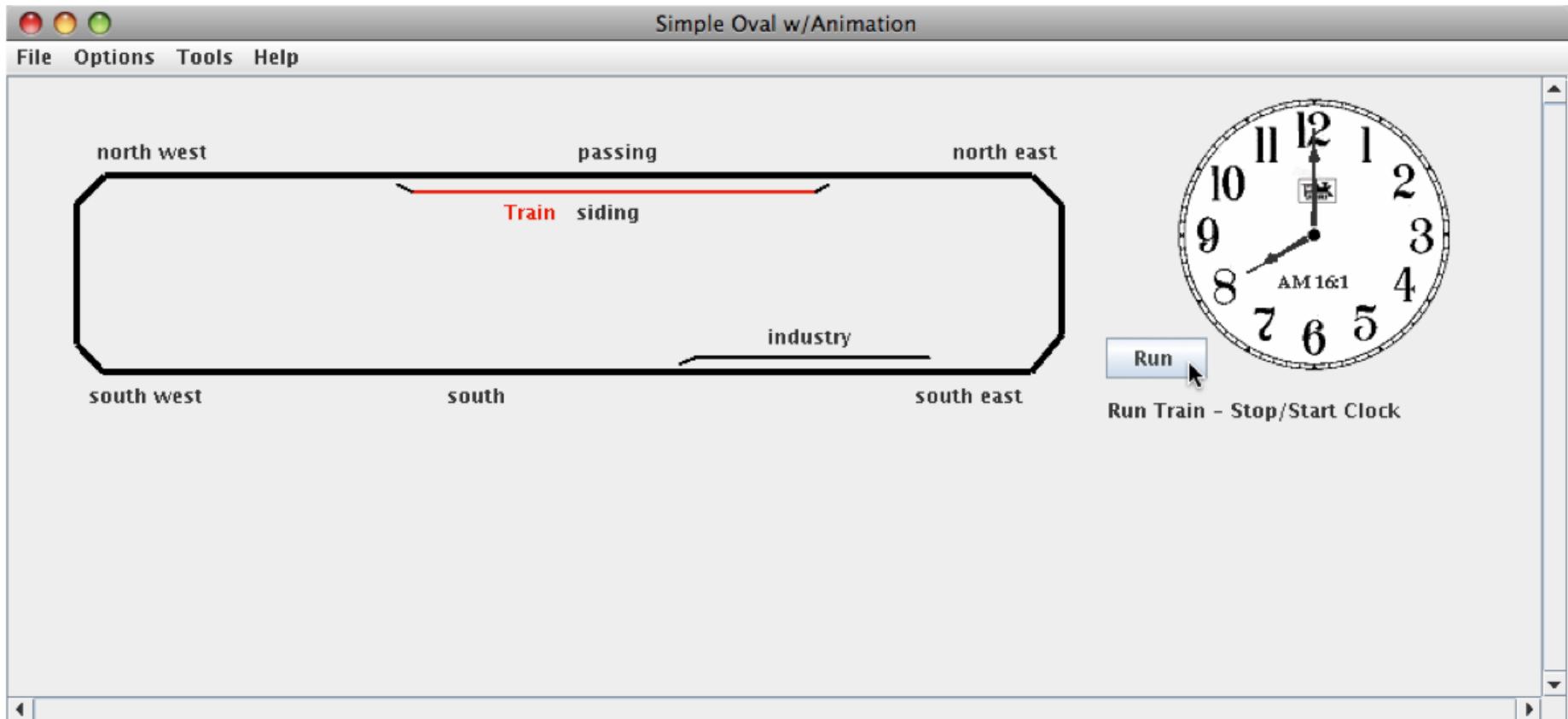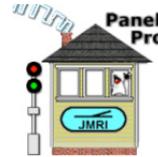
To initialize things, place a train in the "siding" block. To do this:

1. Enter a train name in the Block Table, and

2. Set the block's occupancy sensor to Active. (This need not be done with a real layout connection. The occupancy sensor will reflect the presence of a train automatically.)

We enter the train name, here we'll just use "Train", in the

Value column of the "siding" Block of the **Block Table** as shown above. **Remember to click somewhere outside the value entry after typing in the train name to make Java read what you entered.** (The **Block Table** is opened using the **Tables** item in the **Tools** menu of the main PanelPro window.) Close the Block Table.

Next we open the Sensor Table (see page 24) and set the state of the "occupancy side" sensor to Active. This tells JMRI that the "siding" block is occupied. Close the Sensor Table.
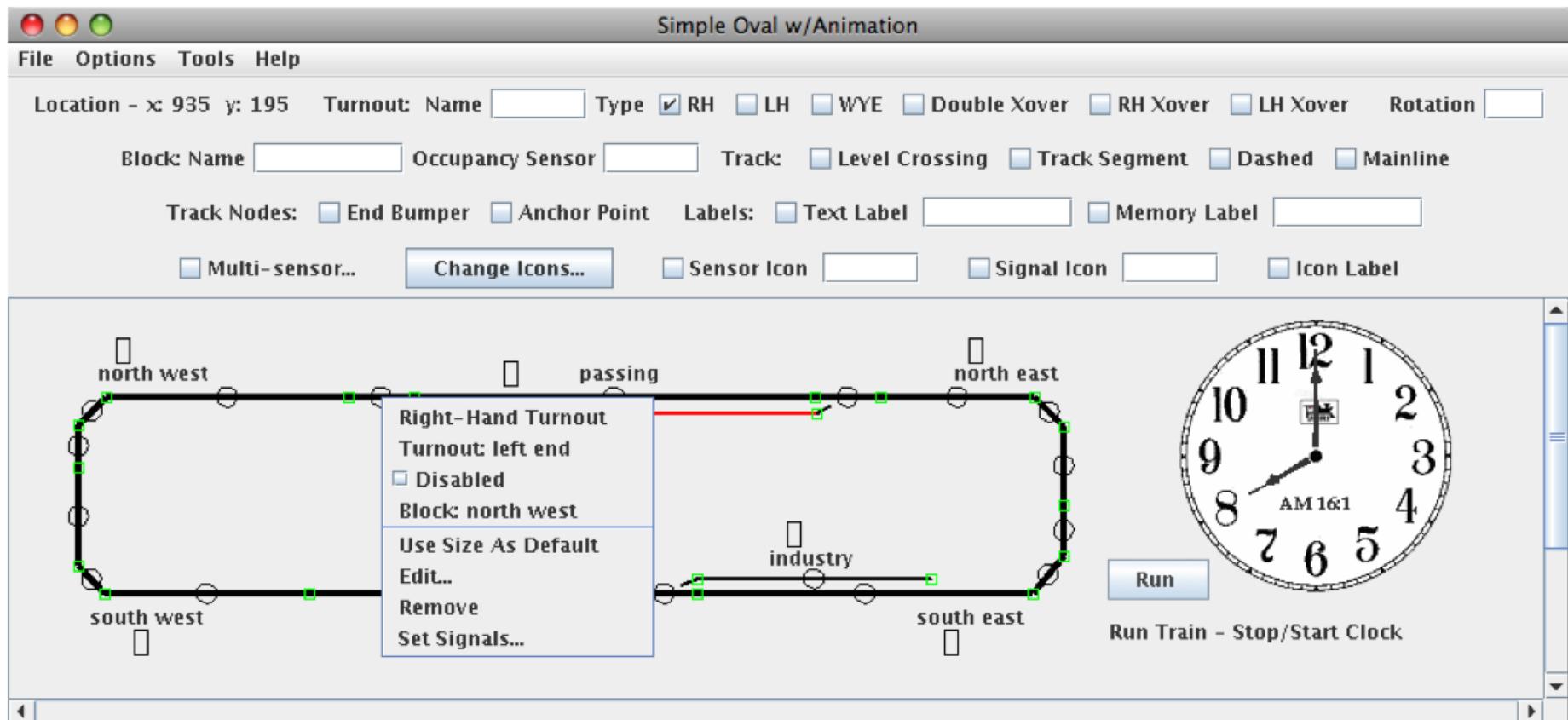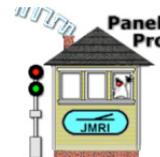
After turning off Edit Mode using the **Options** menu, the above panel is displayed. Track in the "siding" block is displayed Red, indicating that this block is occupied. Also, the train name is displayed next to the "siding" Block.

We're now ready to run the train simulation. Switch to the PanelPro program from the application reading this pdf file. If the panel shown above is not displayed, go to the **Show**

Panel > item in the **Panels** menu of the main PanelPro window, and select **Simple Oval w/Animation**.

Click **Run** to start the simulation. Our Logix will simulate the train making two transits of the oval, and returning to the "siding" Block. Track color changes as the train enters and exits each Block. After the simulation is complete, click **Pause**. Click **Run** to run the simulation again.
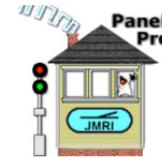
Adding Signals and Signal Logic

We'll use Layout Editor's **Set Signals at XXX...** tools to place signals and setup signal logic for these signals. Layout Editor's five **Set Signals at XXX...** tools may be accessed using Layout Editor's Tools menu, however, except for the **Set Signals at Throat-to-Throat Turnouts...** tool, it's best to access them using the popup menus of turnouts and anchor point block boundaries.

We'll start by selecting **Set Signals...** in the popup menu of our left upper turnout. This brings up the window shown on the next page.
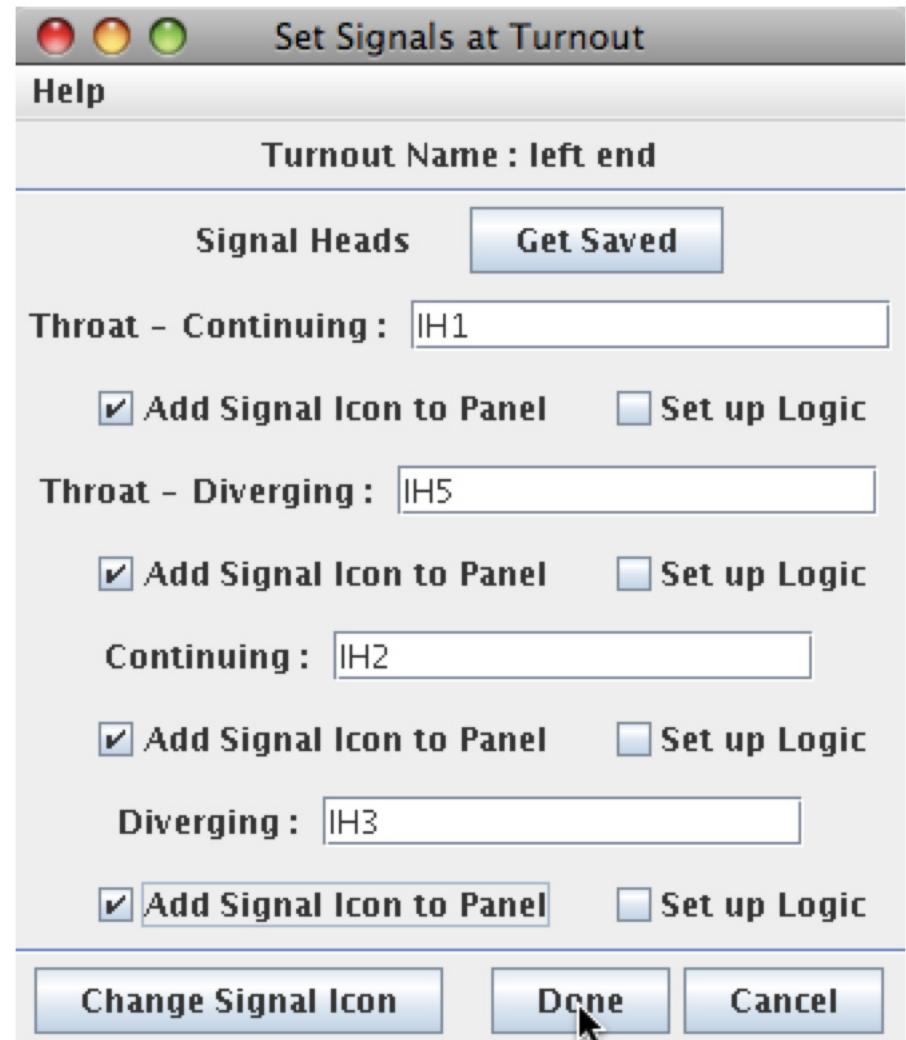
The main purpose of this window (and all Set Signals windows) is informing Layout Editor which signal head is assigned to which function. Two automated options are also available to help in setting up signaling.

1. **Add Signal Icon to Panel** - Will place an icon for an entered Signal Head on the panel at a reasonable position near the turnout. Icon positions may be adjusted by manually moving them. Signal icon images may be changed before they are added to the panel by 1) checking **Signal Icon** in the Tool Bar, 2) clicking **Change Icons...**, and 3) following a procedure similar to that used to change the Pause/Run icons previously.
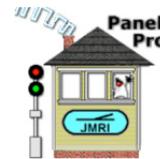
2. **Set up Logic** - Will set up Simple Signal Logic, SSL, for the Signal Head. SSL supports ABS signalling. SSLs set up by Layout Editor usually need no adjustment, however, in special situations manual editing may be needed. The SSL for a Signal Head may be viewed/edited by selecting **Edit Logic...** in the popup menu of its signal head icon.

Layout Editor doesn't have enough information to set up signal logic until Signal Heads are set in adjacent Blocks. So we'll first go through setting and placing Signal Heads at every block boundary, then return later to set up the logic for these signals.

Prior to entering them in a Set Signals window, Signal

Heads must be in the Signal Table. The Signal Heads entered above were previously entered into the Signal Table. Click **Done** to add icons for these Signal Heads to the panel.

Our pre-entered Signal Table is shown at the right.
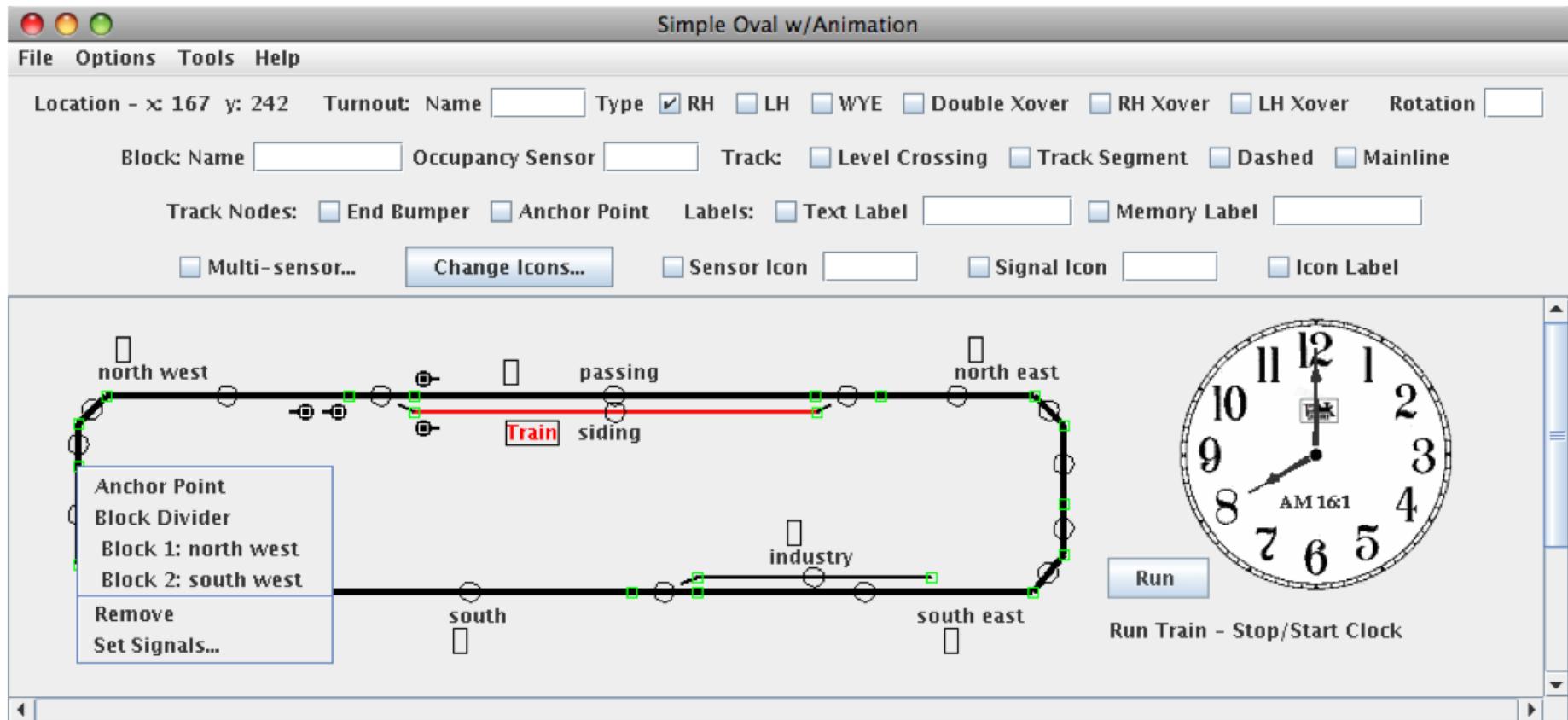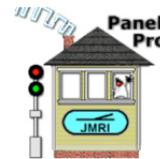
Each Signal Head was assigned a User Name that indicates where the Signal Head is placed. This makes it easy to keep track of the function and location of each Signal Head.

All Signal Heads are "Triple Output" type. The three outputs for each Signal Head are shown in the Turnout Table.

Signal Table

File   Help

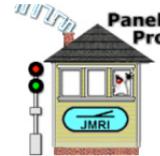| Syste...	User Name	State		Lit	Held
IH1	left throat 1	Green	Delete	✔	☐
IH2	left continuing	Green	Delete	✔	☐
IH3	left diverging	Red	Delete	✔	☐
IH5	left throat 2	Red	Delete	✔	☐
IH10	right throat 1	Green	Delete	✔	☐
IH11	right throat 2	Red	Delete	✔	☐
IH12	right continuing	Green	Delete	✔	☐
IH13	right diverging	Red	Delete	✔	☐
IH14	left east	Green	Delete	✔	☐
IH15	left west	Green	Delete	✔	☐
IH16	bottom east	Green	Delete	✔	☐
IH17	bottom west	Green	Delete	✔	☐
IH18	industry facing	Green	Delete	✔	☐
IH19	industry continuing	Green	Delete	✔	☐
IH20	industry diverging	Red	Delete	✔	☐
IH21	right east	Green	Delete	✔	☐
IH22	right west	Green	Delete	✔	☐

Add ...

Four Signal Heads are placed around our left upper turnout. The positions of these Signal Heads may be adjusted manually. The icons are shown "Dark" because the signal logic is not set up and working yet. (Note: if you are following along in PanelPro after loading *LayoutEditorClinic.xml*, you'll see colors instead of "Dark", because the signal logic was included in that file, and you'll see Signal Head names automatically displayed in **Set**

Signals at XXX windows because that information was also in the panel file.)

Next we'll set the signals at the block boundary on the left by selecting **Set Signals...** in the popup menu of the anchor point that divides the "north west" and "south west" blocks.

The **Set Signals at Block Boundary** window is displayed. After entering the two required Signal Head names and checking **Add Signal Icon to Panel** below each Signal Head name, click **Done** to tell Layout Editor those Signal Heads serve the designated function and to place signal head icons on the panel.

Repeat this procedure to set Signal Heads and place signal head icons at the other four block boundaries:

anchor point - "south west" to "south",
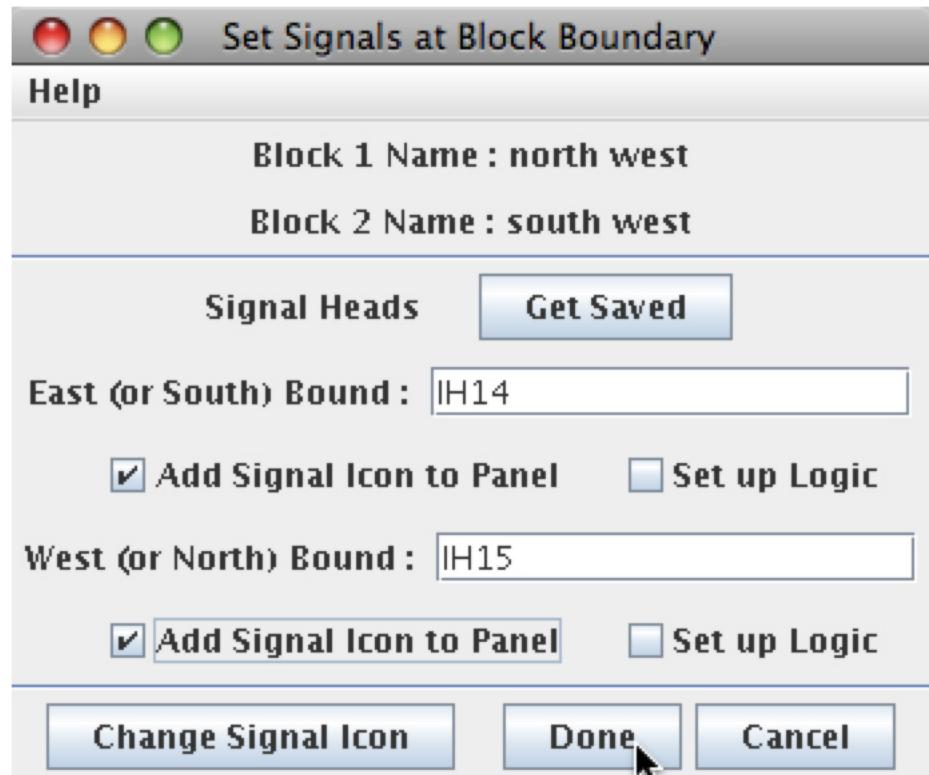
industry turnout - "south" to "south east" and "south" to "industry",
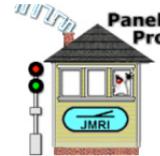
anchor point - "south east" to "north east",

upper right turnout - "south east" to "passing" and "south east" to "siding".

With signal head icons placed, and Layout Editor knowing which Signal Heads serve which function, there is enough information to set up signal logic. To do this, we revisit each of the turnouts and anchor point block boundaries.

Our revisit of the upper left turnout is shown on the next page.

The window is shown with the Signal Head names already in place.

Uncheck **Add Signal Icon to Panel** under each Signal Head name, because the icons for the named Signal Heads are already on the panel.

Check **Set up Logic** under each Signal Head name.

Click **Done** to set up the signal logic.

Repeat this at the other turnout and anchor point block boundaries. As signal logic is set up, signal head icons will show as colored icons.

Layout Editor sets up **Simple Signal Logic** (**SSL**) for each Signal Head. **SSL supports ABS signalling**.
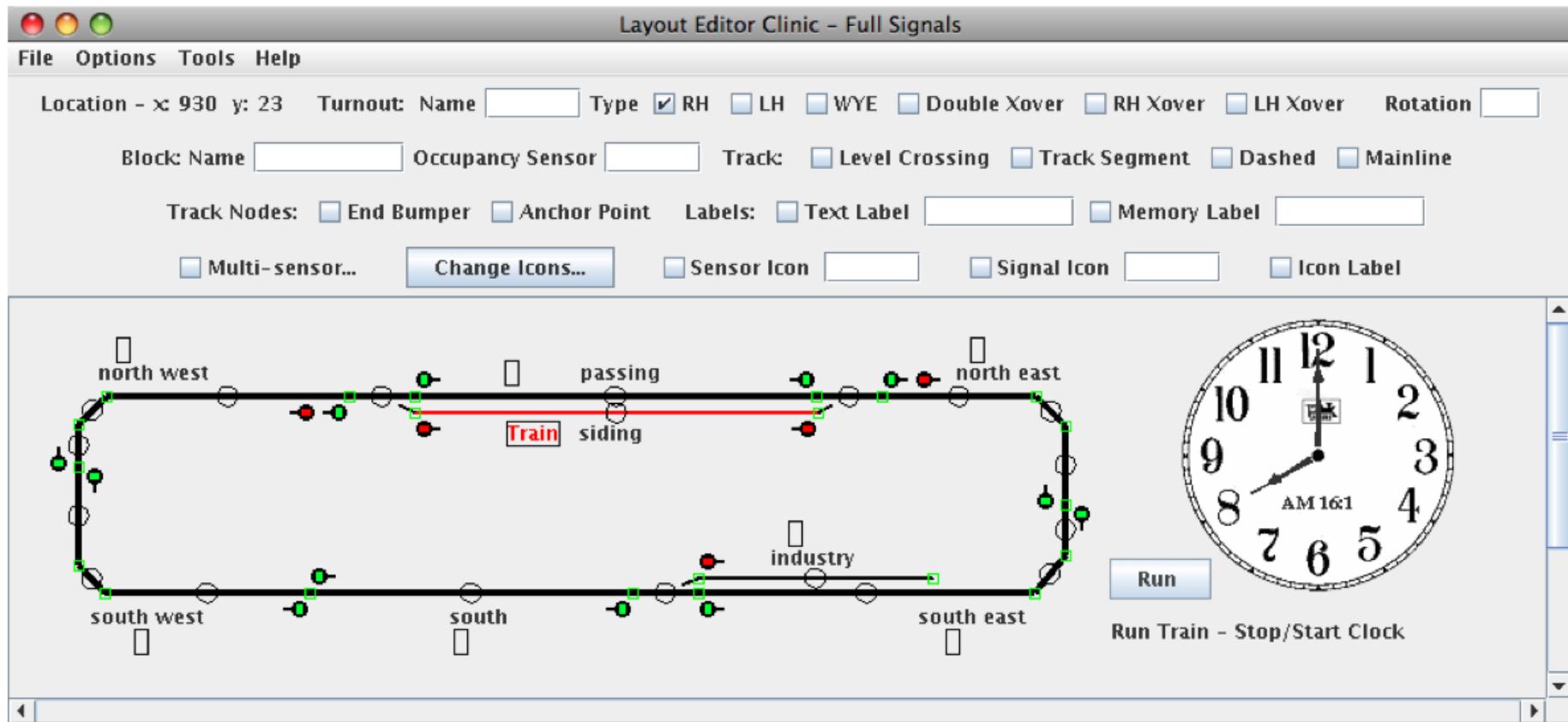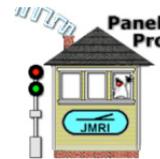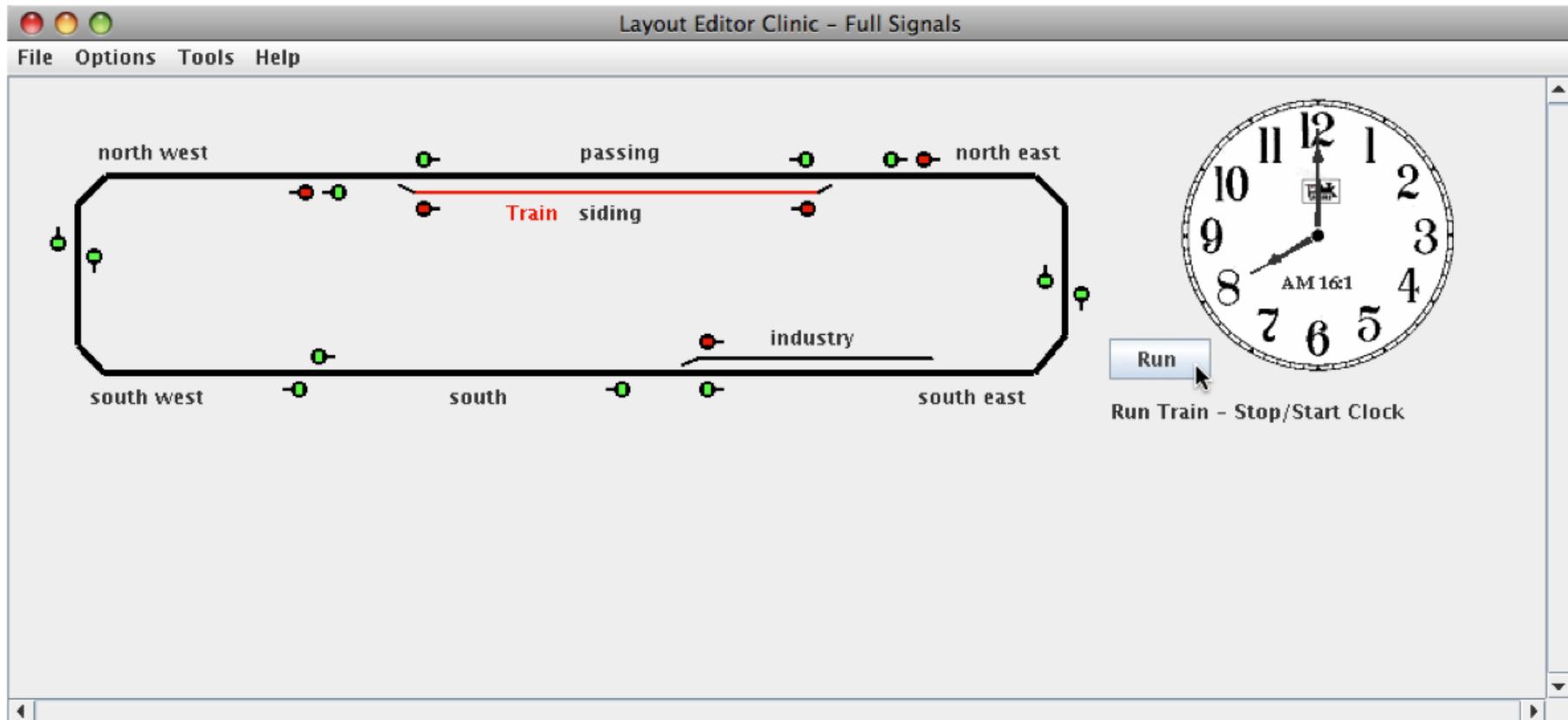
All signals are placed, and ABS signal logic is functioning!   Uncheck **Edit Mode** in the **Options** menu.

Note we have also changed the title of this panel.

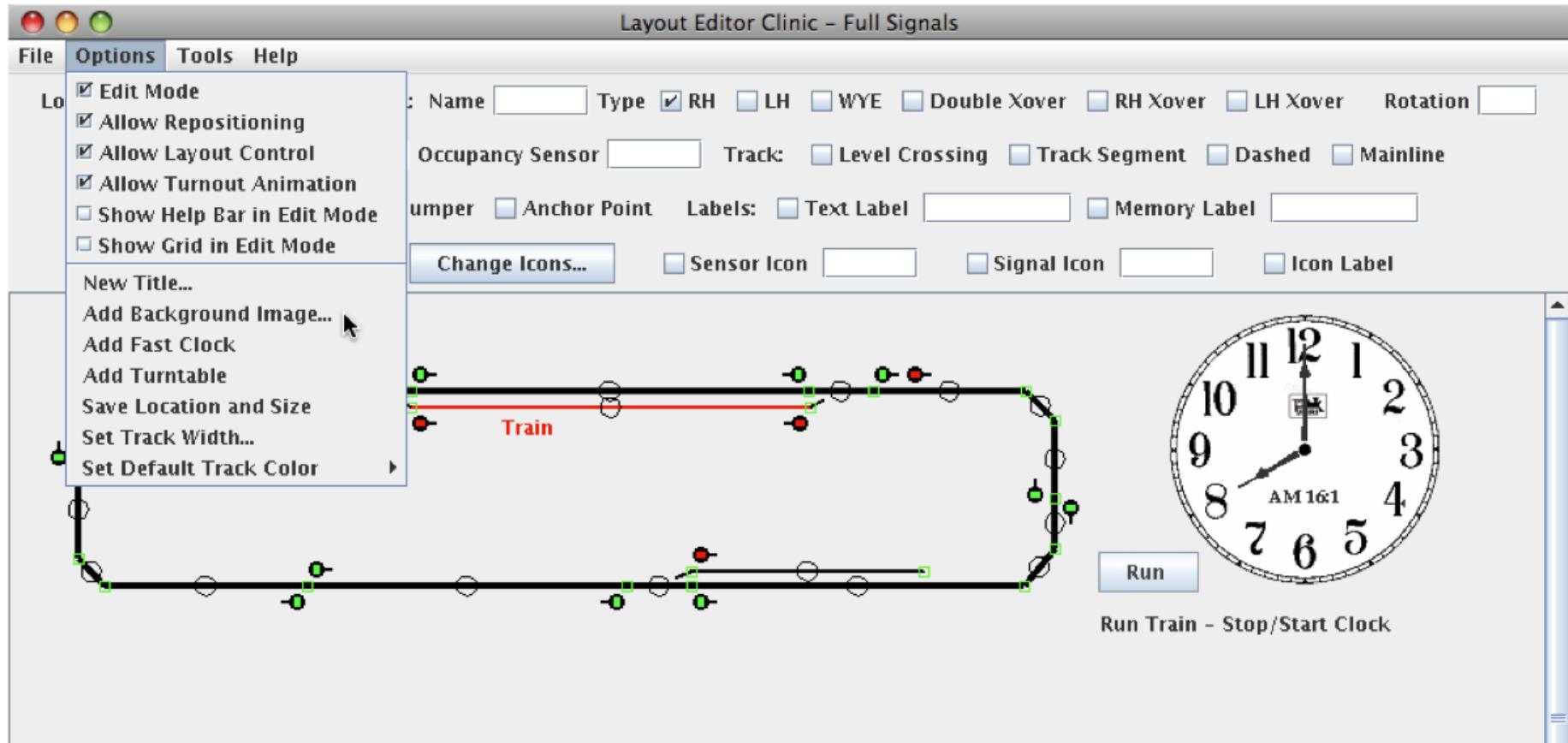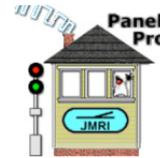Using Layout Editor's tools, adding signals to our animated simple oval panel was quick and pain free.

Now we're ready to re-run our train simulation.

We're now ready to re-run our train simulation.

Switch to the PanelPro program from the application displaying this pdf file. If the panel displayed above is not shown, go to the **Show Panel >** item in the **Panels** menu of the main PanelPro window, and select **Layout Editor Clinic - Full Signals**.

As before, click the **Run** button to run the simulation. Since the siding track shows occupied and "**Train**" is displayed in its memory label, we do not need to re-initialize the simulation.

Adding a CTC Panel Background

We'll now add a background suitable for a CTC panel using Dick Bronson's "multi-slice" method. Note: we removed Block names and Memory Labels, and extended the panel in the vertical direction. (We'll put the Memory Labels back in later.) The panel shown above and on the next few pages is clipped at the bottom, to provide room for this text. Adding backgrounds is the only CTC support currently offered by Layout Editor, but the manual methods to continue on in Dick's clinics apply here also.

To begin, select **Add Background Image...** in the **Options** menu.
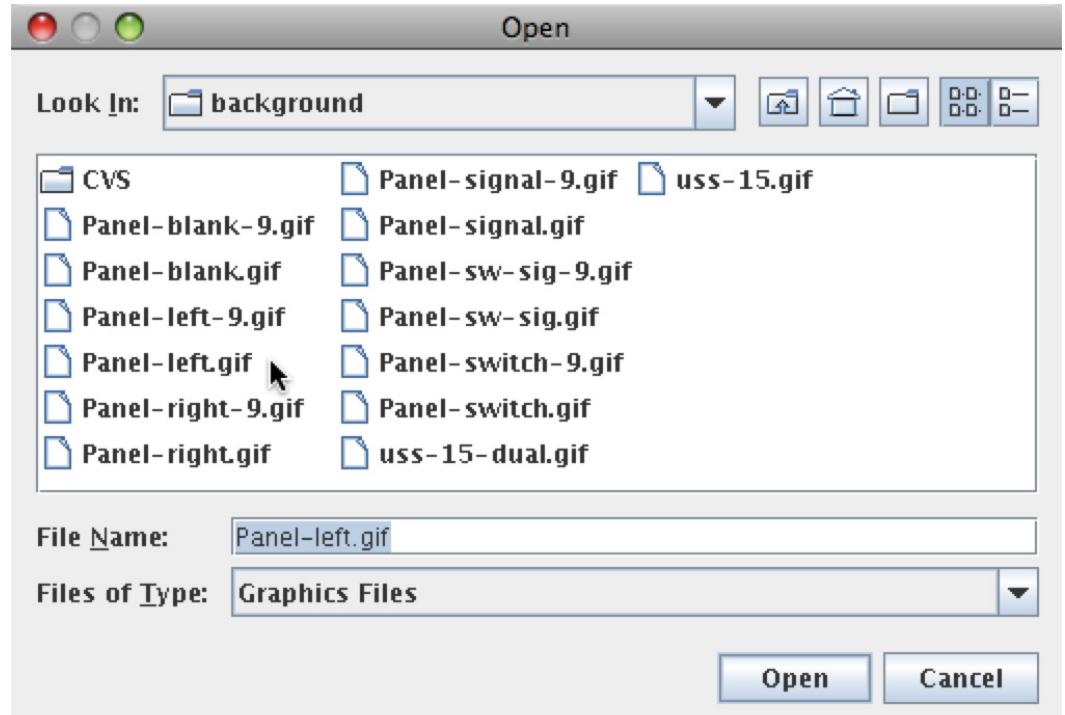
A standard file selection window opens up to allow us to select a background file. This window varies with operating system.
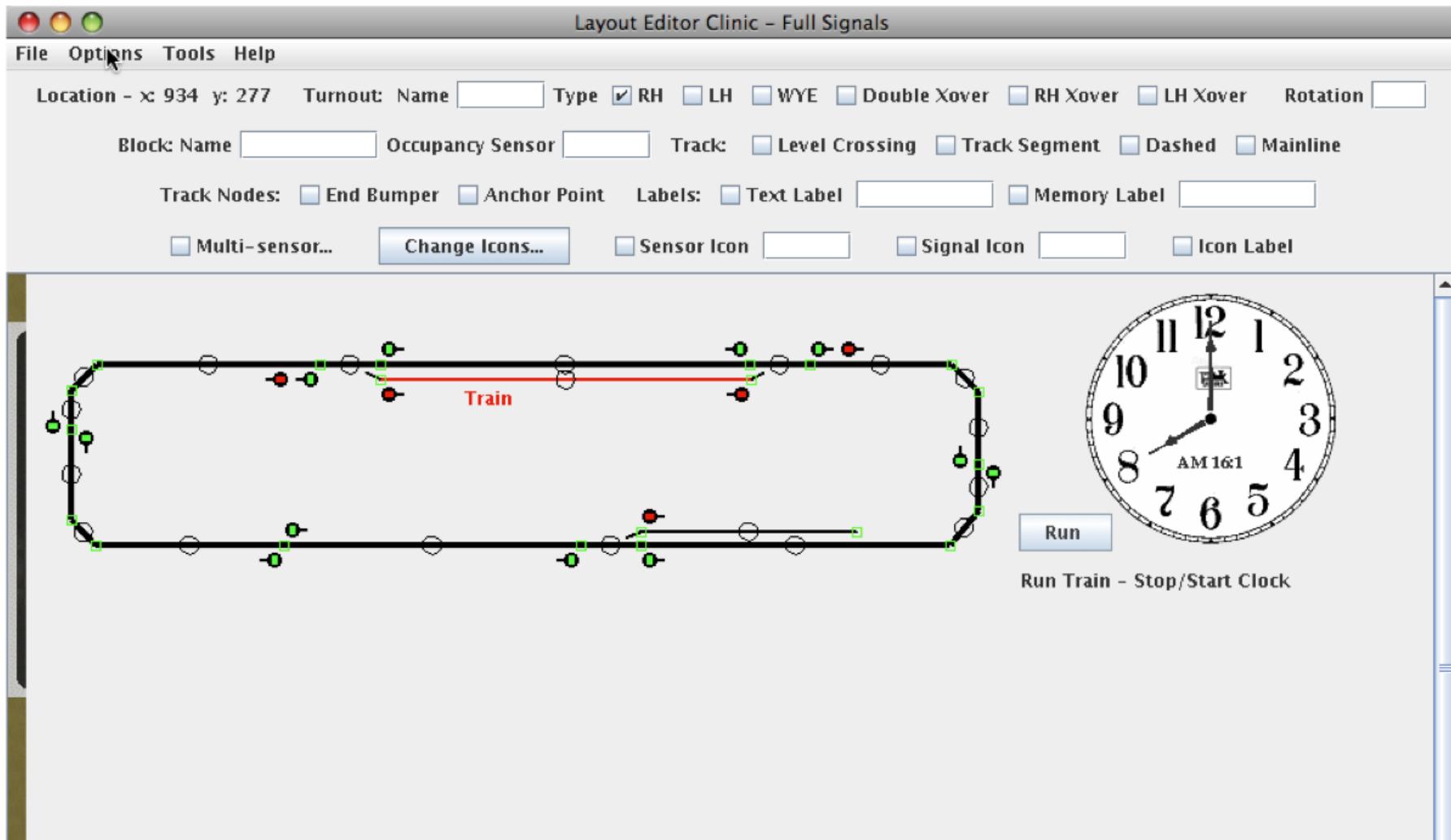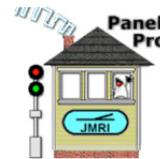
The window will begin with the "resources" or with the "icons" directory. Navigate to the "background" directory, which is found in the "USS" directory of the "icons" directory. The "icons" directory is found in the "resources" directory of the JMRI directory.

Each of the "Panel-" files corresponds to a vertical slice of the CTC background. To complete a background, we start with the left-most slice, and keep adding slices across the panel, until we finish with the right most slice. When a slice is added, Layout Editor automatically places it to the immediate right of the previously entered slice. The first slice is placed at the upper left of the panel.

Note that there are two sets of slices in the "background" directory, those with a "-9" in the name, and those without the "-9". You can use either set, but should not mix slices across sets. Here we'll use the set without the "-9" in the names.

Begin by selecting "Panel-left.gif", as shown to the right. click **Open** to add this slice to the panel.
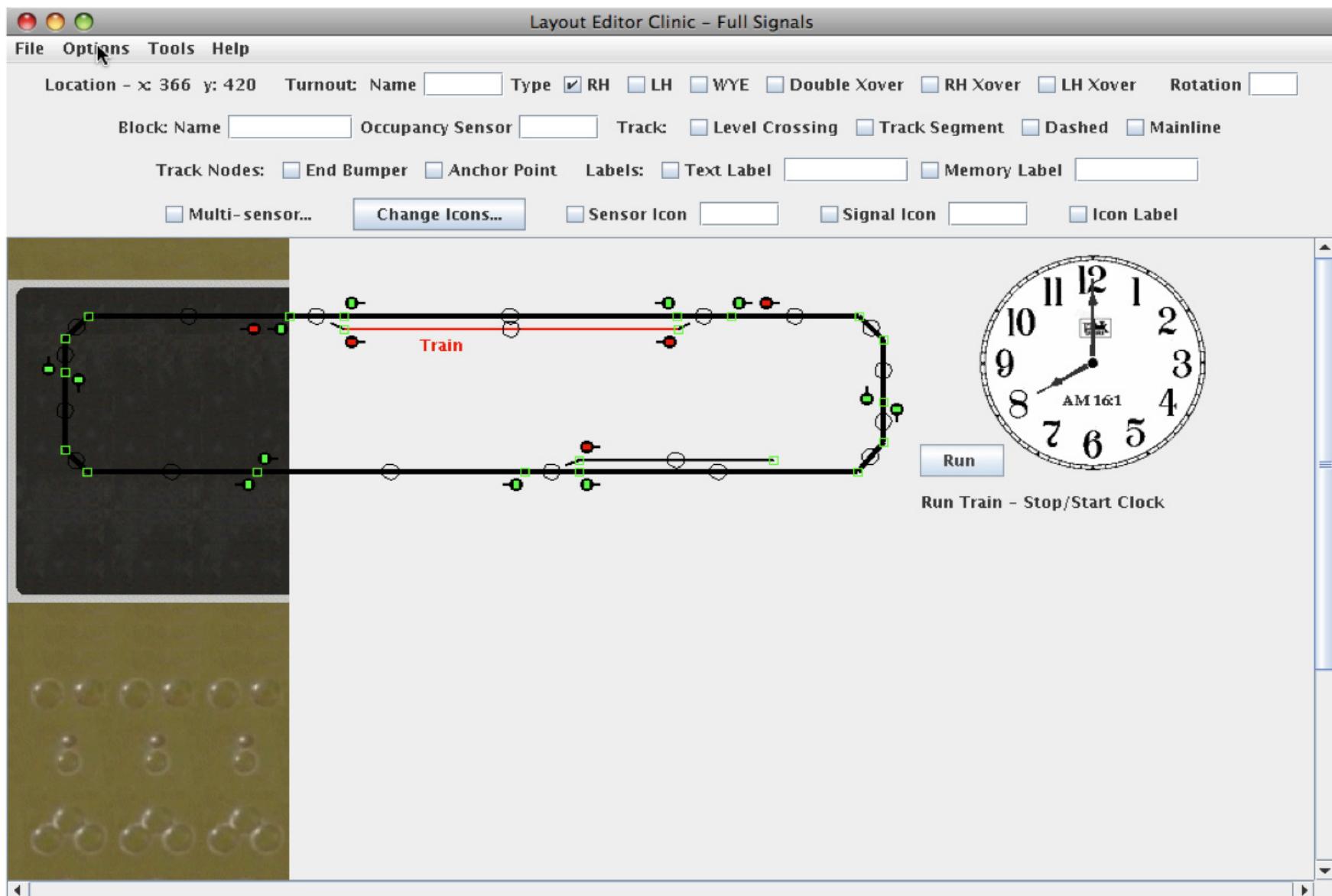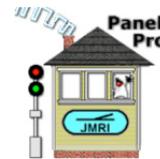
Note the left border slice of the CTC background. Next we need to add blank slices, slices without plate images. Again, select **Add Background Image...** in the **Options** menu. Select "Panel-blank.gif", and click **Open** to add a blank slice.
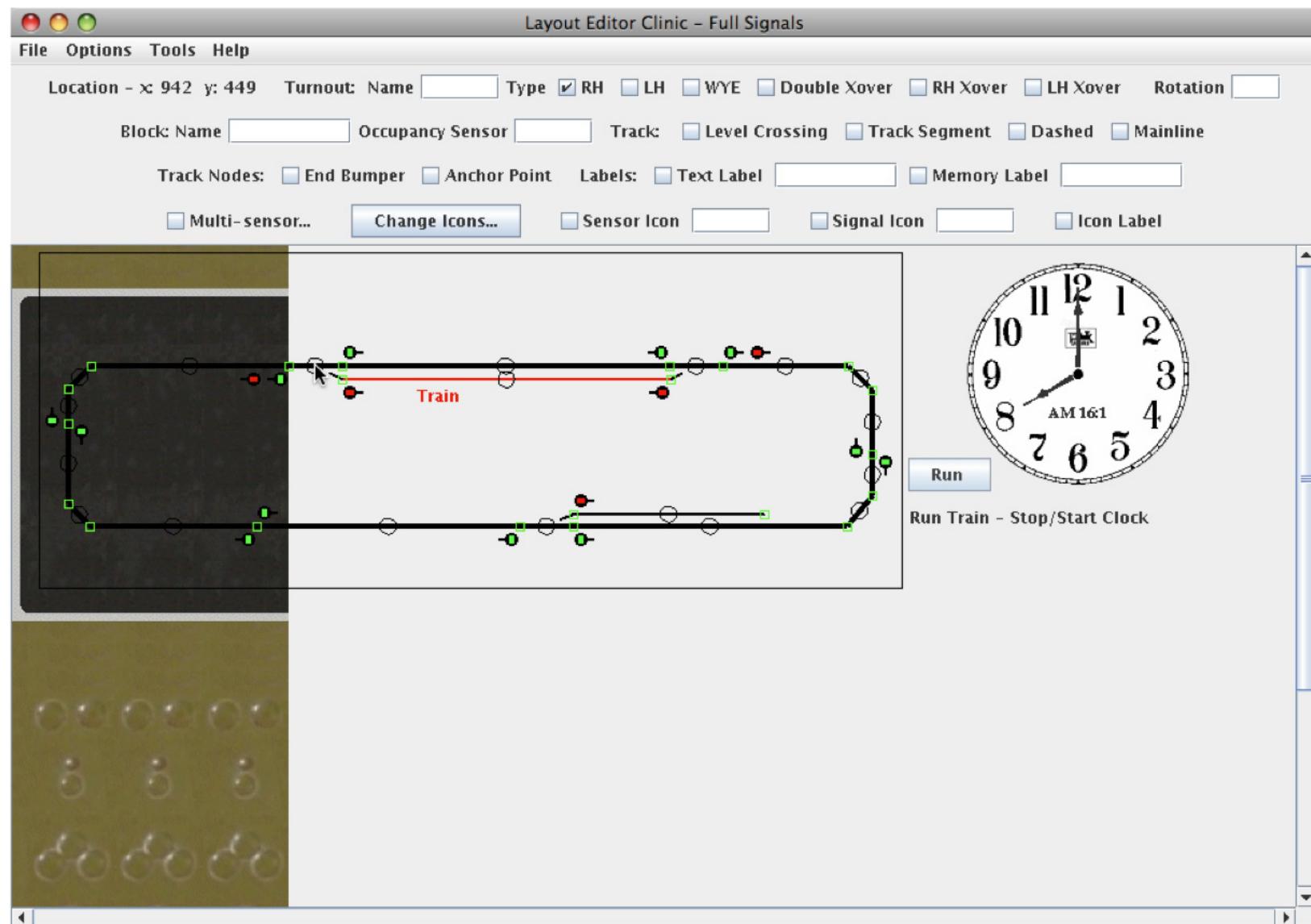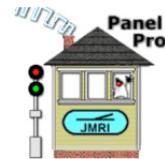
Repeat this two more times to add two more blank slices of CTC background.
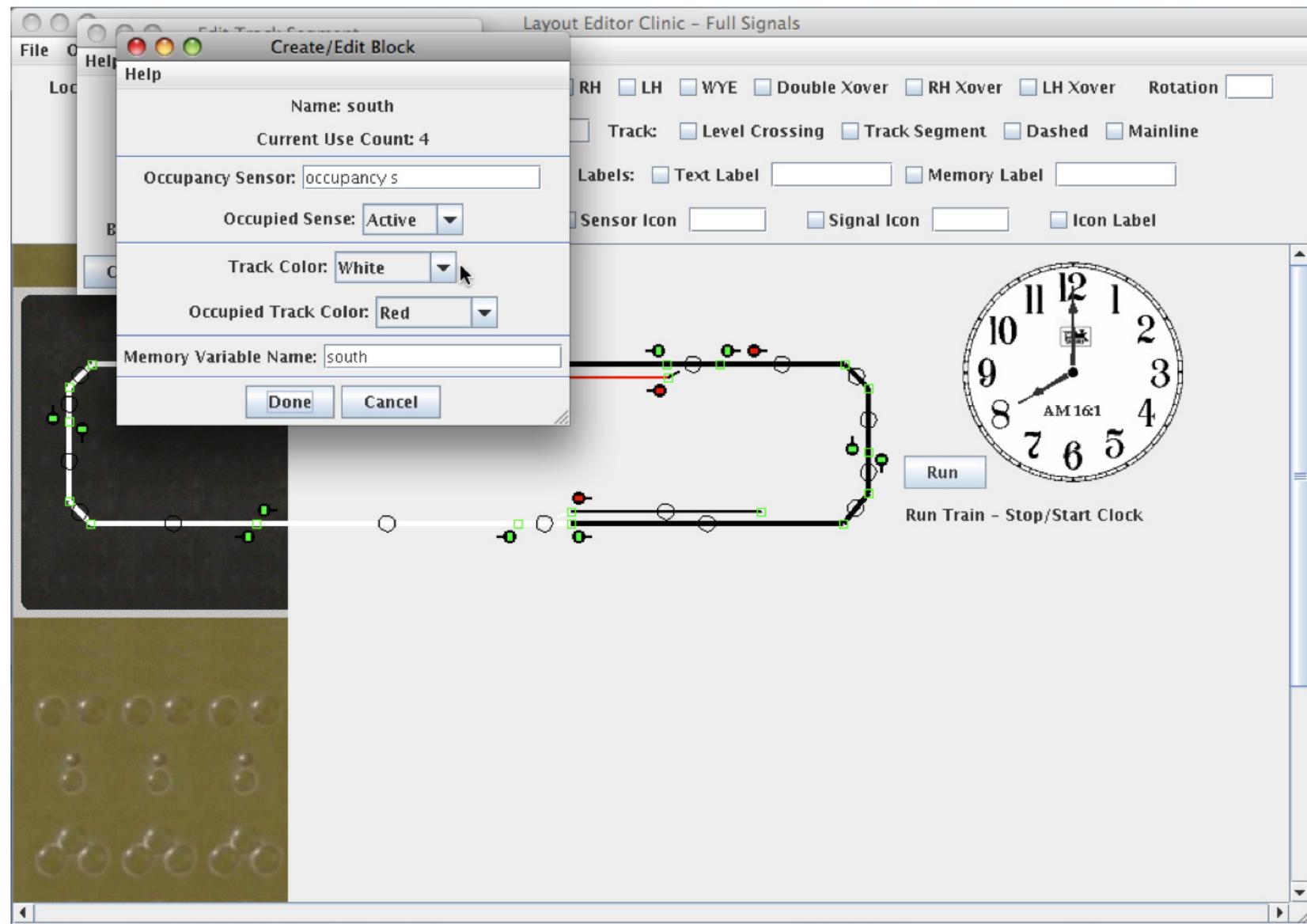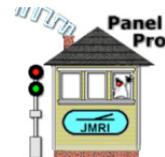
Note problems with centering and color. The track schematic is too high in the background image, and the tracks and signals are black on black.
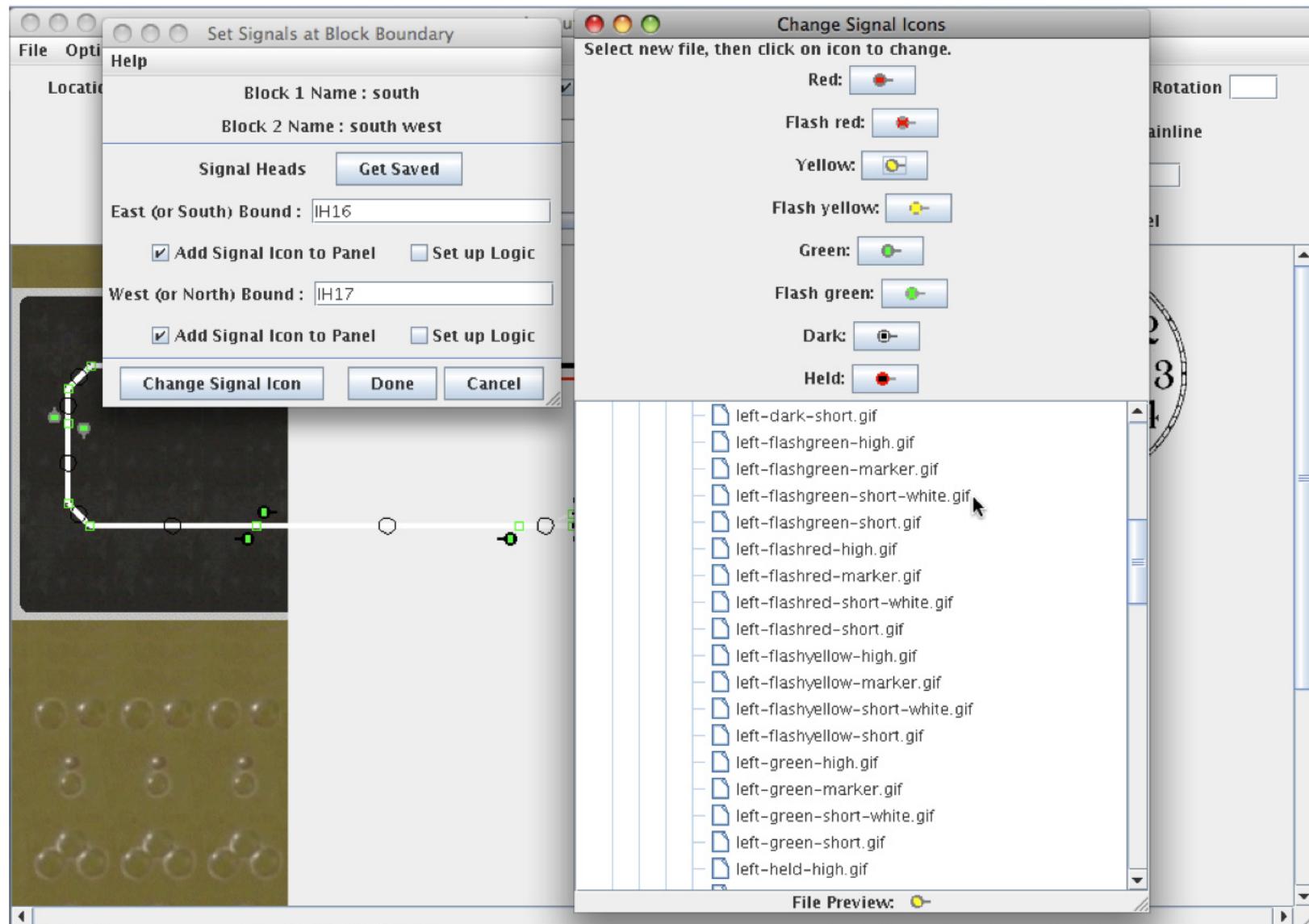
We use the **Translate Selection...** tool in the **Tools** menu to lower the track diagram (see page 39).

Next, set **Default Track Color >** in the **Options** menu to "White", so edit circles will show up on the background.
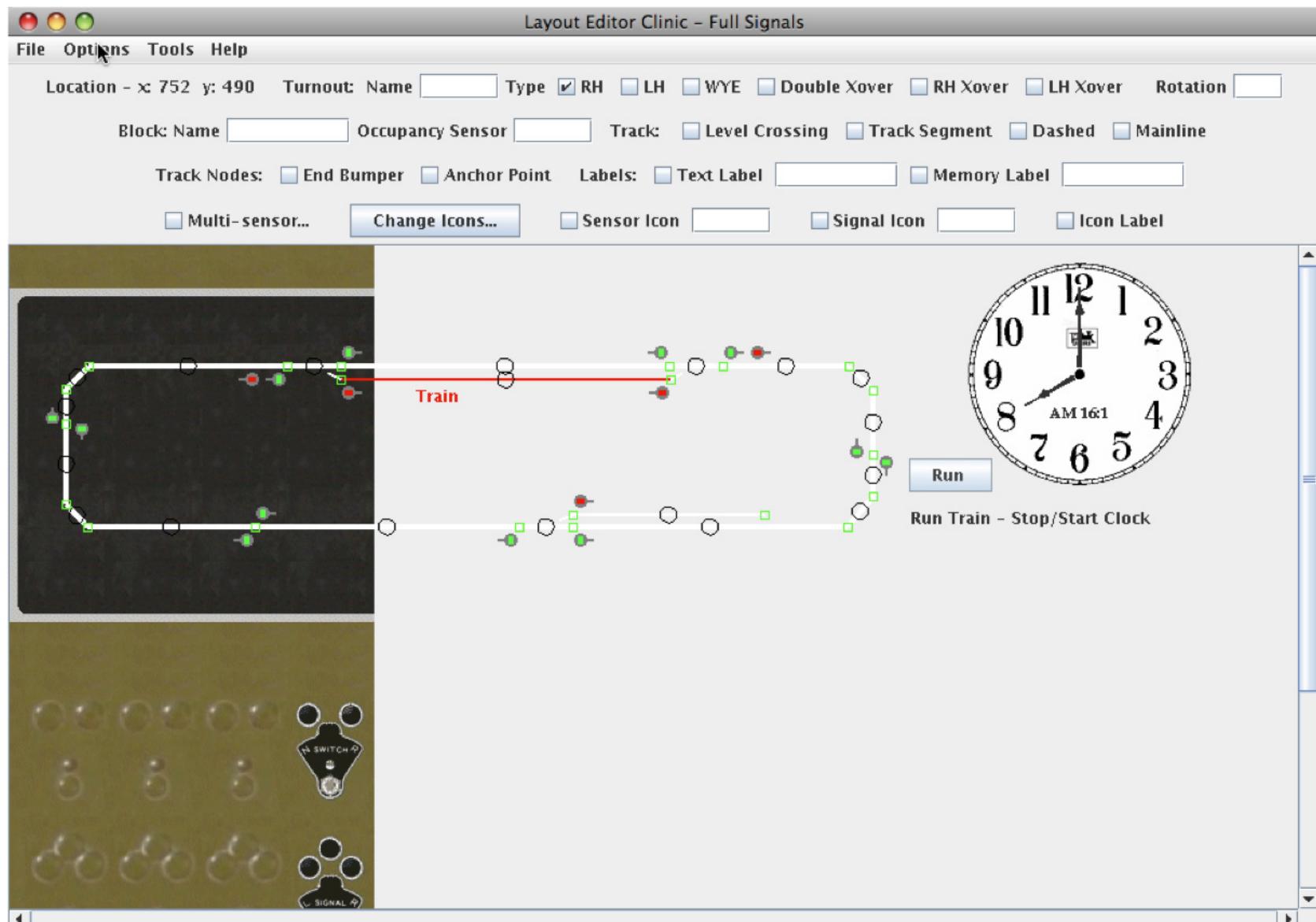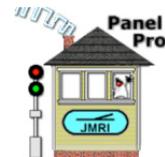
Next, open **Create/Edit Block** for each of our eight blocks and change **Track Color:** to "White" (see page 38 to remember how to bring up these windows. This will make all unoccupied track visible. Now for Signal Heads.
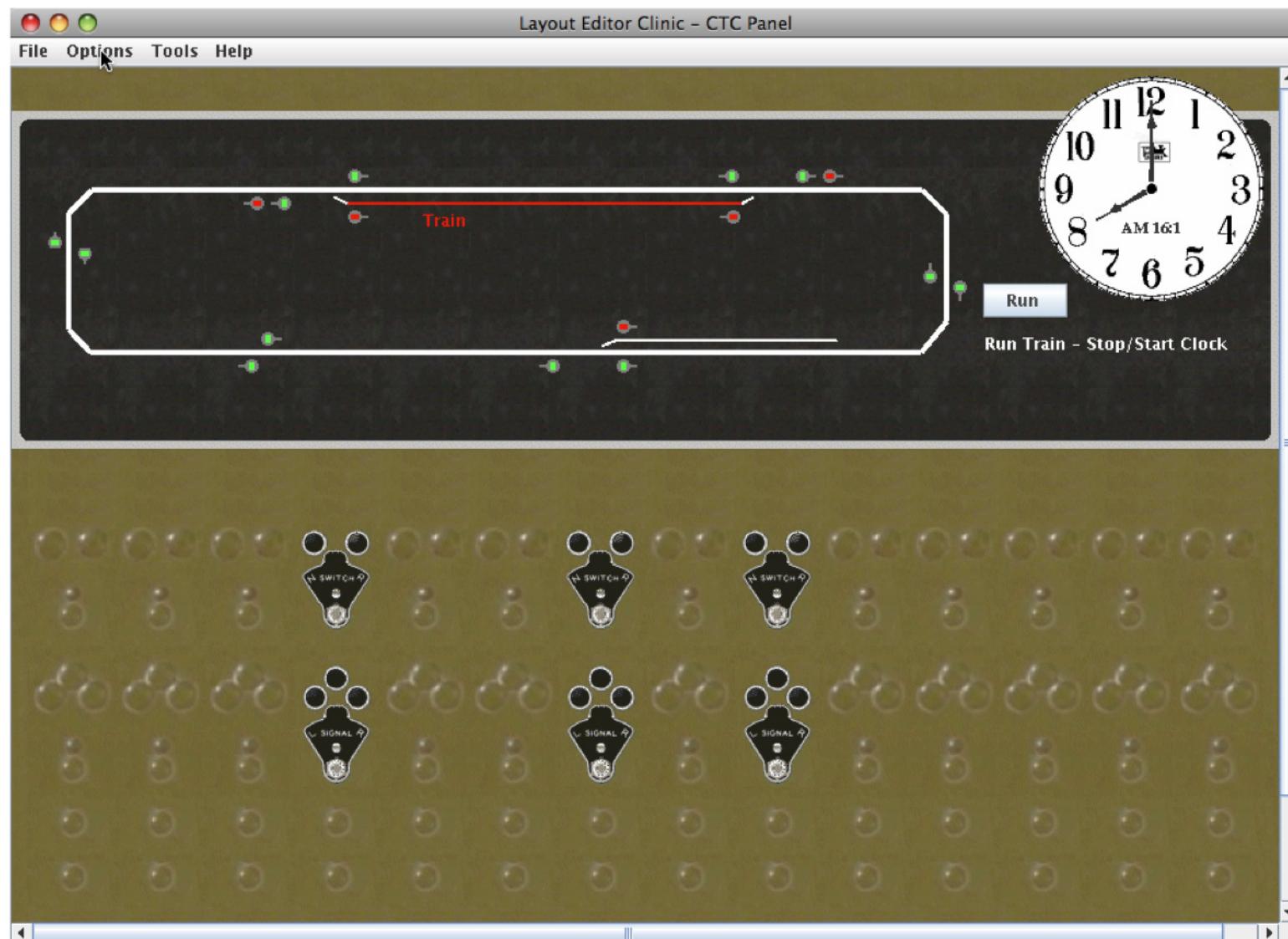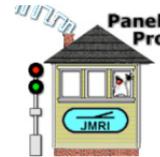
Change to "short-white" icon images. In the Tool bar check **Signal Icon** and click **Change Icons...** in the Tool bar. The **Change Signal Icons** window (above right) is displayed. After changing icons, use **Set Signals...** at each anchor point block boundary and turnout (above left) to replace the signal icons with the "short white" ones
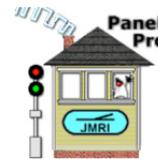
Add a background slice with switch and signal plates for the upper-left turnout.

Next add more blank slices and two switch and signal plate slices for the other two turnouts, then add a right end slice.

Above is our finished CTC background. Before exiting Edit Mode, we changed the panel title, and used Translate Selection... to stretch the track diagram to the right to align turnouts over their plates. The text label color under the fast clock was also changed. This panel is found by loading *LayoutEditorClinicCTC.xml* into PanelPro.

Our CTC panel needs to be completed manually.

Procedures for adding "levers" and "jewels" to the plates shown above for Panel Editor type CTC panels are given in clinics by Dick Bronson. These procedures are very similar for Layout Editor type CTC panels. Layout Editor tools to automate these procedure are possible future additions to Layout Editor.

Future Layout Editor Development

We'll conclude our clinic with a brief discussion of the future. **Layout Editor development is continuing.** Possible directions include:

1. Automated setup for automatically running trains around the layout. Using Layout Editor's connectivity information should facilitate a reasonably easy user interface for setting up transit paths for automated running of trains.

2. Linked to the above, is automated addition of APB signal logic to the ABS signal logic demonstrated in this clinic.

3. Development of a tool for automated placement of levers and jewels on a Layout Editor CTC panel with backgrounds made using the multi-slice method.

4. Development of a tool for automated setup of the logic for operating the CTC switch and signal plates.

5. ??? User suggestions. JMRI developers continue to be very interested in user suggestions. These often come in via the Yahoo *jmriusers* list. User suggestions have led to addition of many JMRI features, including some in Layout Editor.

In this clinic, we've only been able to cover a part of Layout Editor. You will probably need some of what was not covered when you use Layout Editor to build a panel for a real layout. To build on what you've learned here, please make use of documentation provided via the Help menu of the main Layout Editor window. And be sure to look at the detailed documentation available in the Help menus of Layout Editor's other windows, especially windows shown when tools are selected or components are edited. For example, there is detailed information on how to handle crossover turnouts and double slip turnouts in Help menu documentation, as well as answers to many other Layout Editor questions.

Thanks for your interest in Layout Editor and in this clinic.