Add Signals to your Layout with JMRI/PanelPro

Dick Bronson - RR-CirKits, Inc.

Other Clinics in this series:

- Introduction to Layout Control with JMRI/PanelPro

  8:30 PM, Sunday, July 13th

- Create a Detailed CTC Machine Model with JMRI/PanelPro

  10:00 PM, Monday, July 14th

- Introduction to Layout Control with JMRI/PanelPro

  Repeated 4:00 PM, Friday, July 18th

SSL (Simple Signal Logic)

- SSL is the PanelPro name for ABS signaling.
  - According to Wikipedia **Automatic Block Signal**, or ABS, systems consist of a series of signals that govern blocks of track between the signals. The signals are automatically activated by the conditions of the block beyond the signal. Signals in ABS territory do not denote occupancy. Signals in ABS territory are set up to denote the most restricted indication. ... Train crews that operate in ABS, often operate with track warrants or traffic control.
  - Only CTC systems are considered sufficient authority to run trains based strictly on signal indications. This is because CTC signals default to 'Stop' and require a dispatcher to 'Clear' them.

SSL (Simple Signal Logic)

- SSL basics
  - ABS defaults to 'Clear' signals, and drops to 'Stop' if the block immediately beyond the signal is occupied, or if the switch (turnout) beyond the signal is set against the direction of traffic.

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  - Therefore ABS requires input information for track occupancy and for switch position.
  - ABS also shows a limited speed indication called 'Approach' if the next signal beyond this signal is showing 'Stop'. This is a warning to the train crew to *approach* the next signal prepared to 'Stop' before they reach it.

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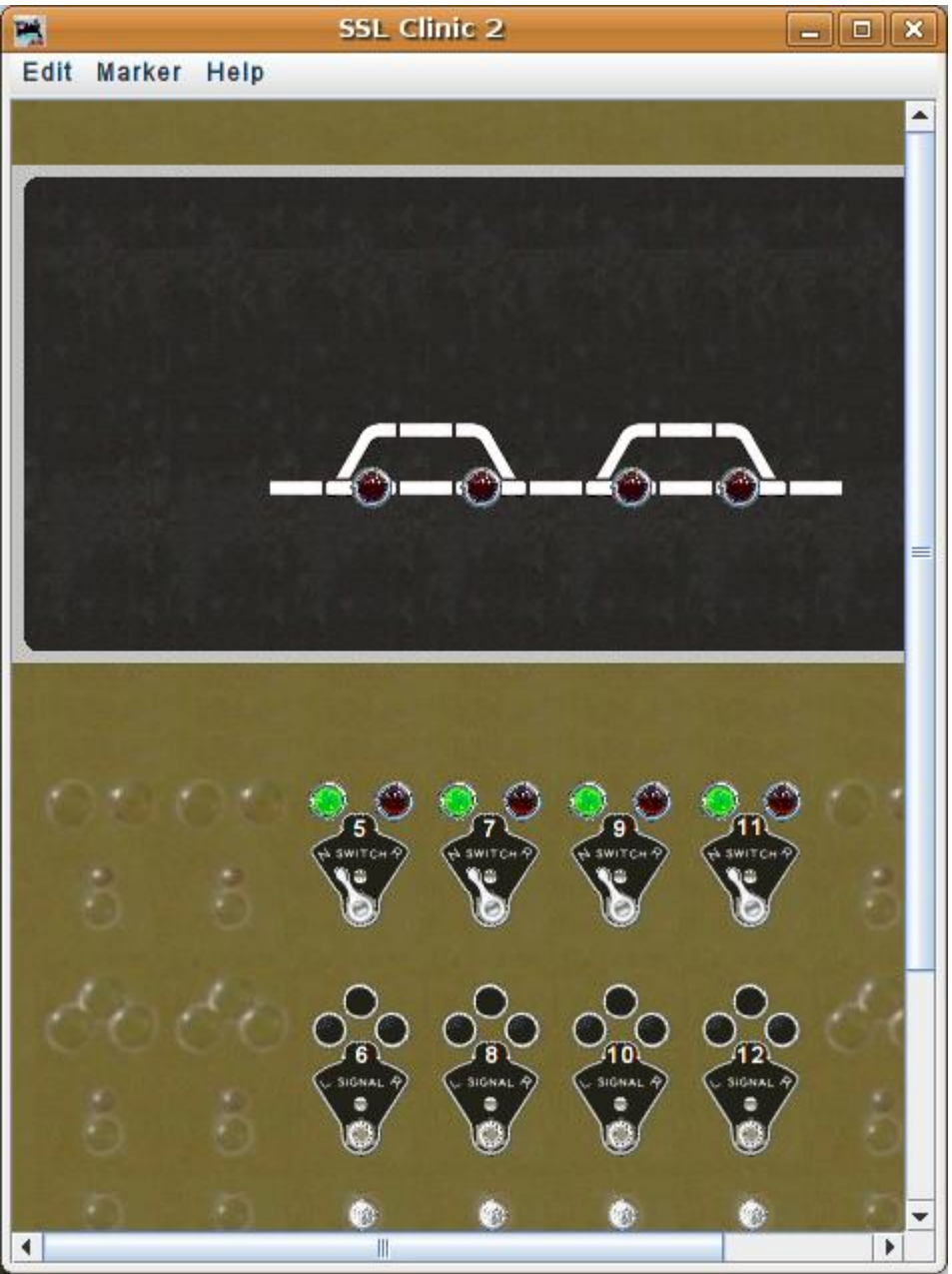
  - ABS defaults to 'Clear' signals, and drops to 'Stop' if the block immediately beyond the signal is occupied, or if the switch (turnout) beyond the signal is set against the direction of traffic.
  - Therefore ABS requires input information for track occupancy and for switch position.
  - ABS also shows a limited speed indication called 'Approach' if the next signal beyond this signal is showing 'Stop'. This is a warning to the train crew to *approach* the next signal prepared to 'Stop' before they reach it.
  - If the signals are close, or trains long, some systems would give a double warning using a flashing signal.

SSL (Simple Signal Logic)

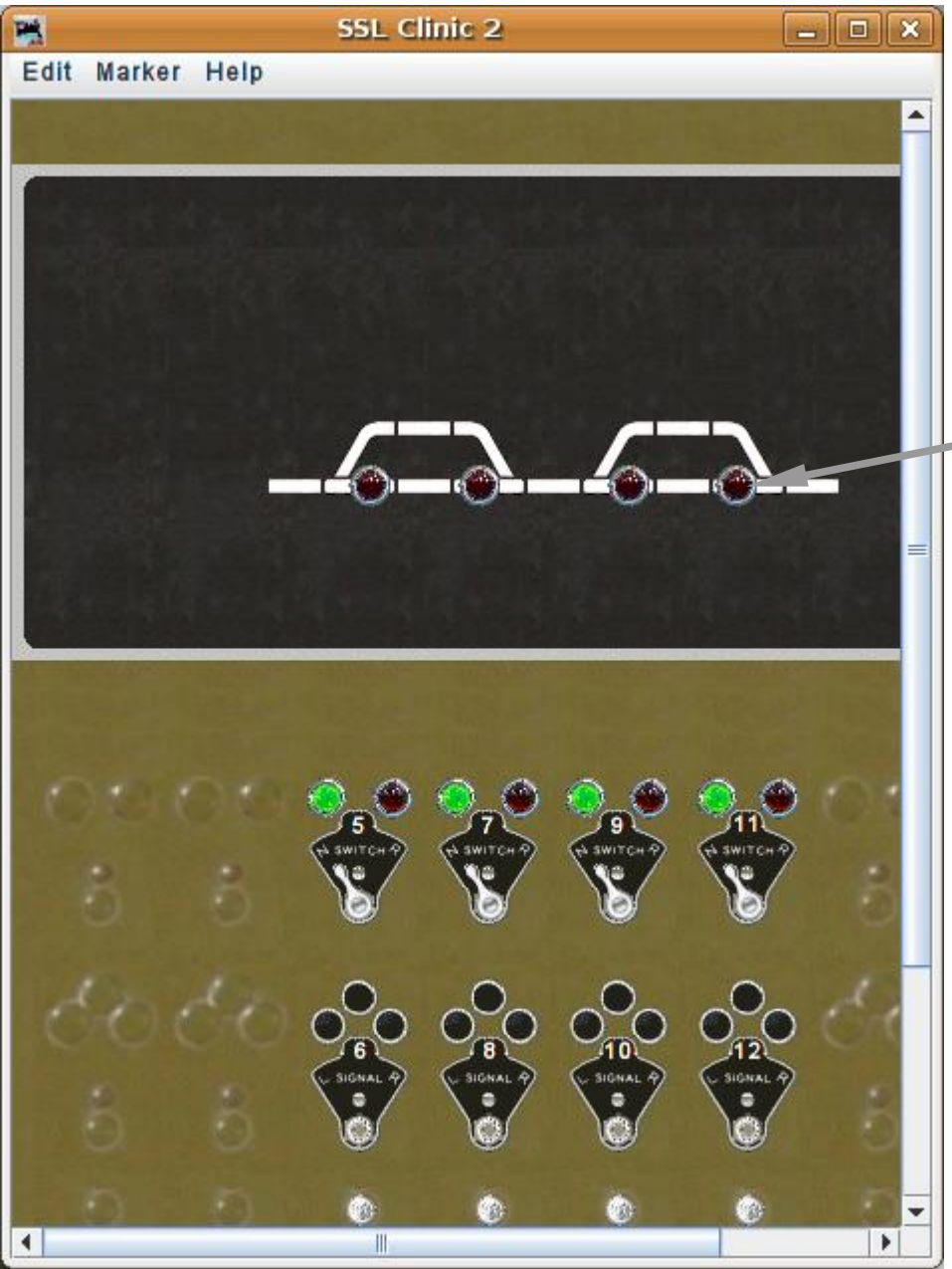
- SSL basics
  - In some cases a signal at the block boundry may not be visible due to terrain, tunnels, buildings, etc. In that case a slave or 'Distant' signal could be used as a 'heads up'. In SSL checking the 'Is Distant Signal' will tie a signal to the next (Protected) signal and show the most restrictive setting of either signal.
  - Approach Lighting. In the earlier days of signaling it was common to have signals turn out their lamps if there were no trains approaching them in order to save lamp life and battery power. Now that most signals are utility powered this is less common. Most modelers ignore this feature because a series of dark signals is not very interesting to onlookers.

SSL (Simple Signal Logic)



- SSL basics
  - Re-open our new SSL-Clinic-2 panel.

SSL (Simple Signal Logic)



- SSL basics
  - Re-open our new SSL-Clinic-2 panel.
  - We already have occupancy sensors for our OS sections.

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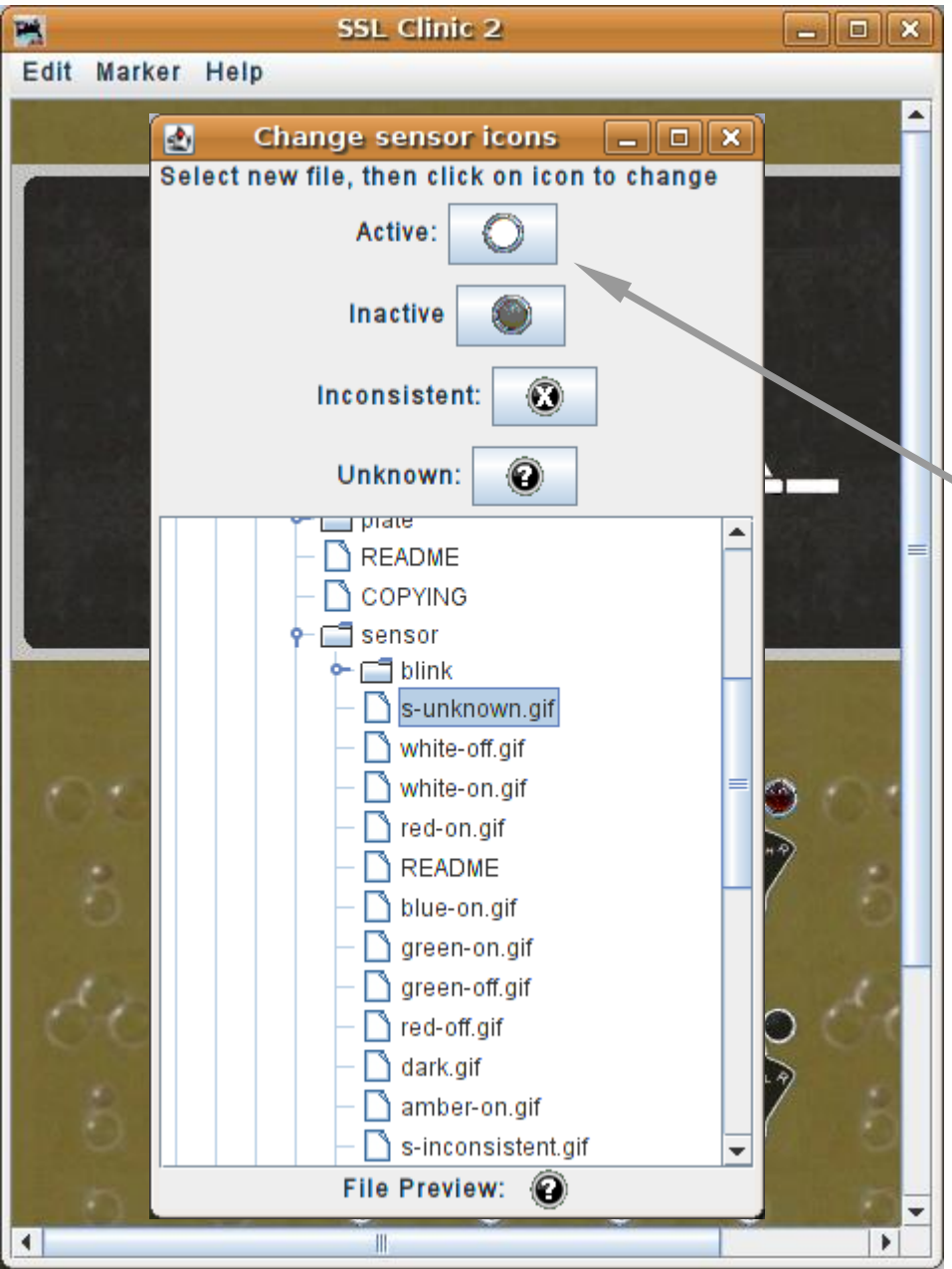

- SSL basics
  - Re-open our new SSL-Clinic-2 panel.
  - We already have occupancy sensors for our OS sections.
  - The US&S default was white jewels for track other than the OS. We will do the same. If your RR used some other color, do so by choosing different colors for your images.

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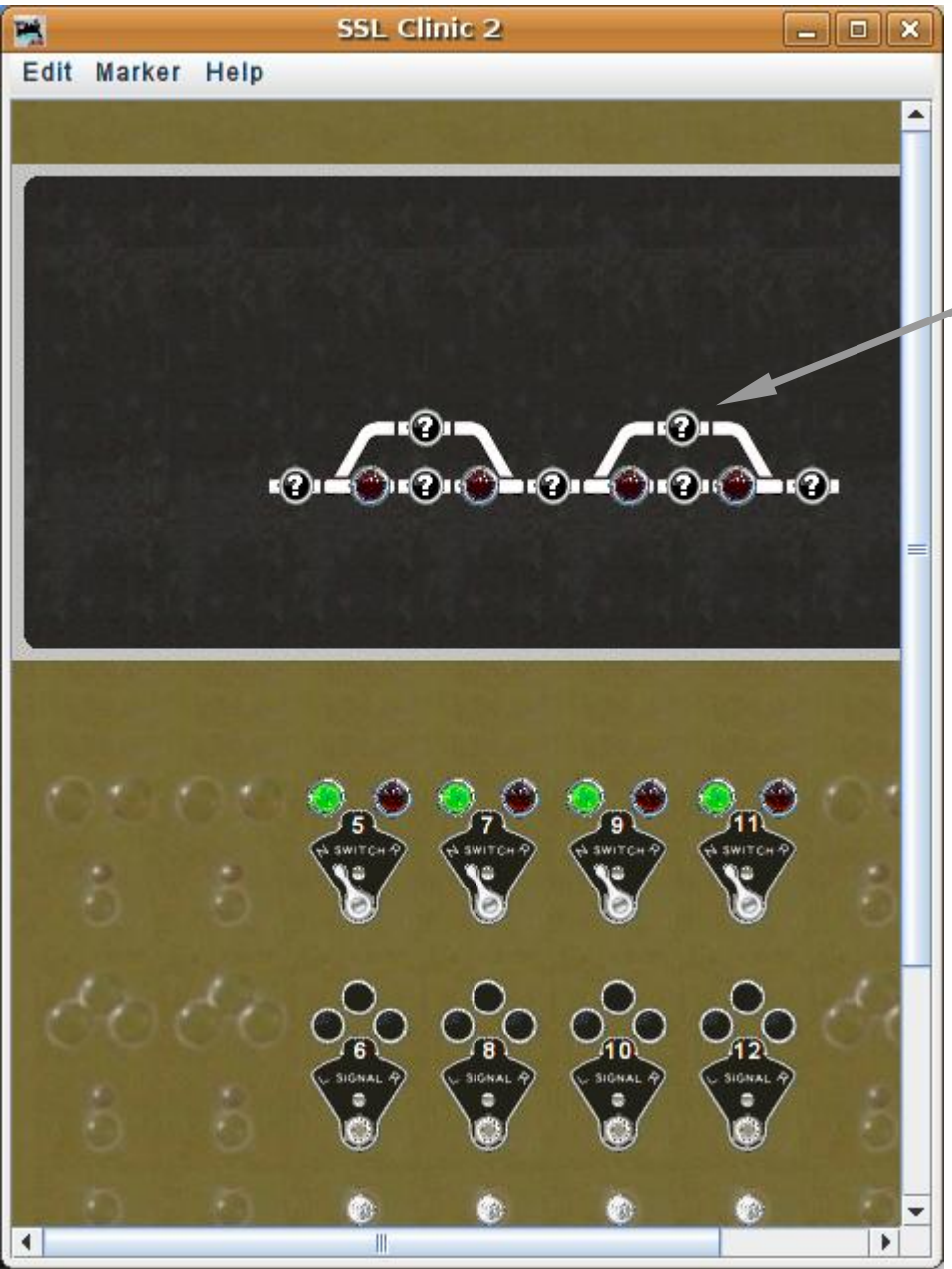

- SSL basics
  - Position each new sensor image where appropriate.

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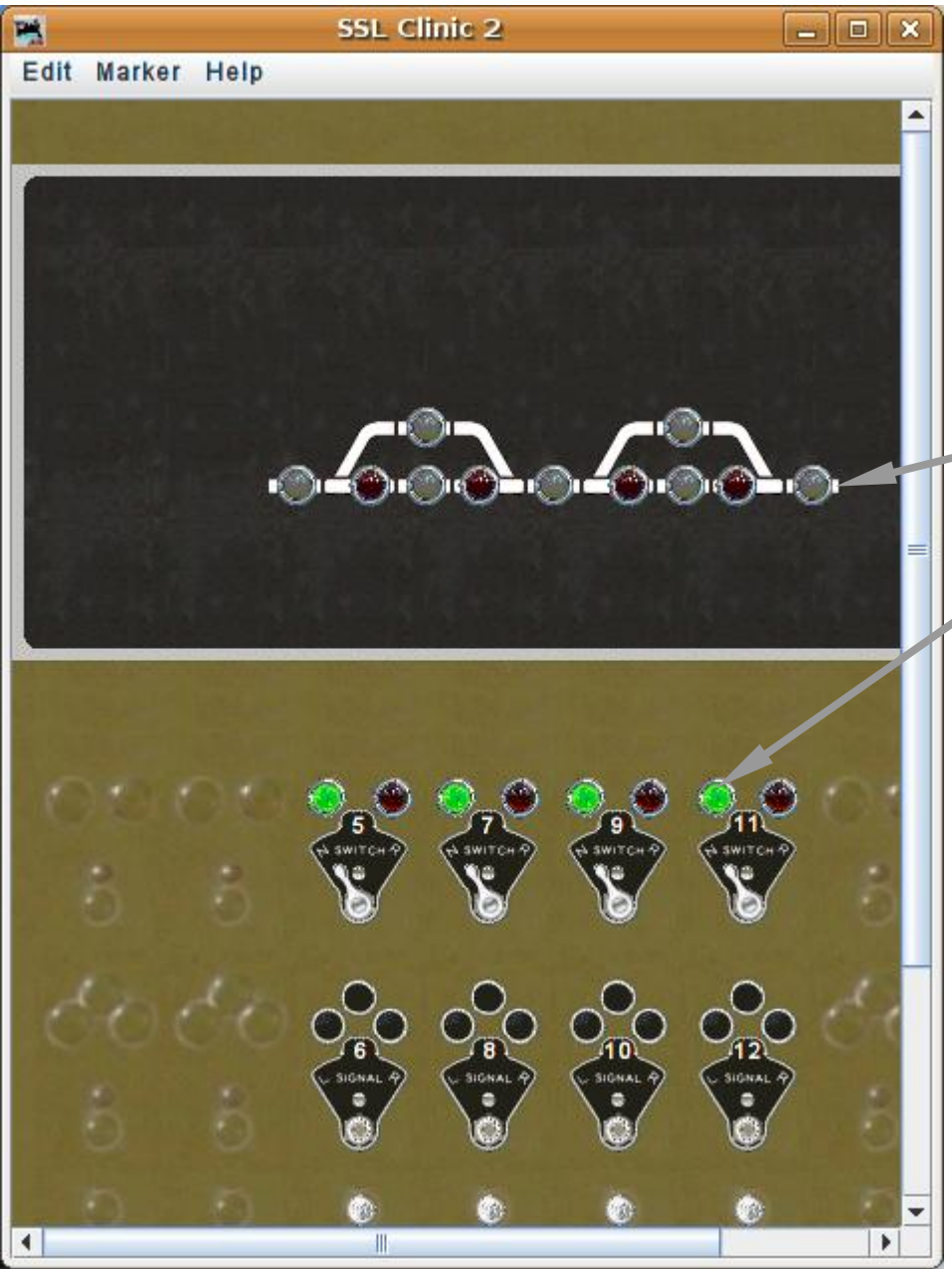

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  - Position each new sensor image where appropriate.
  - We now have sufficient information from the layout to add our signals. (occupancy plus switches)

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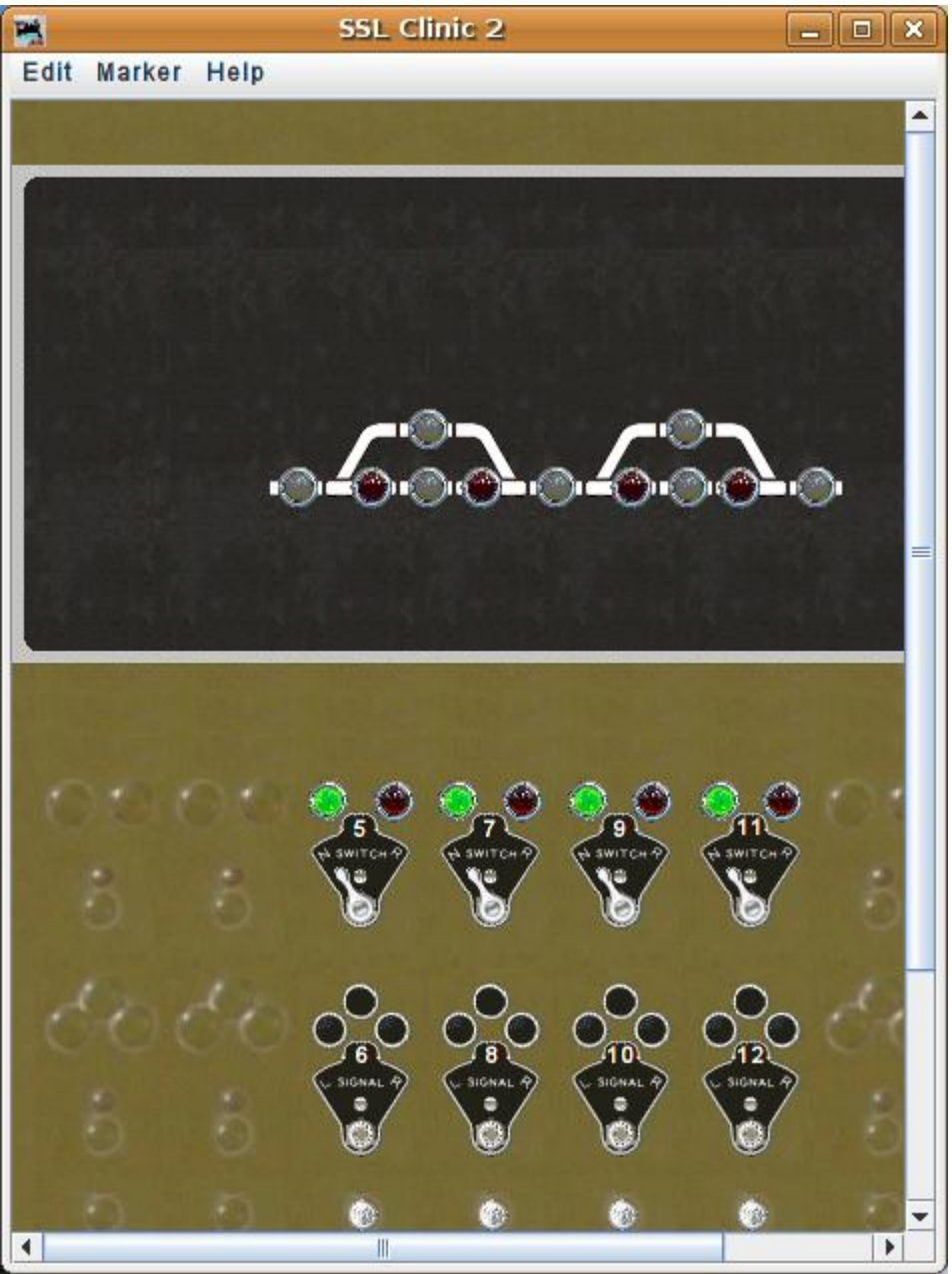

- SSL basics
  - Position each new sensor image where appropriate.
  - We now have sufficient information from the layout to add our signals. (occupancy plus switches)
  - Actually an ABS system would not have a central panel like we are creating here. We are only making the panel to more easily understand the way the JMRI system operates.

SSL (Simple Signal Logic)

- Signal head basics
  - Go to the PanelPro window and select 'tools'.

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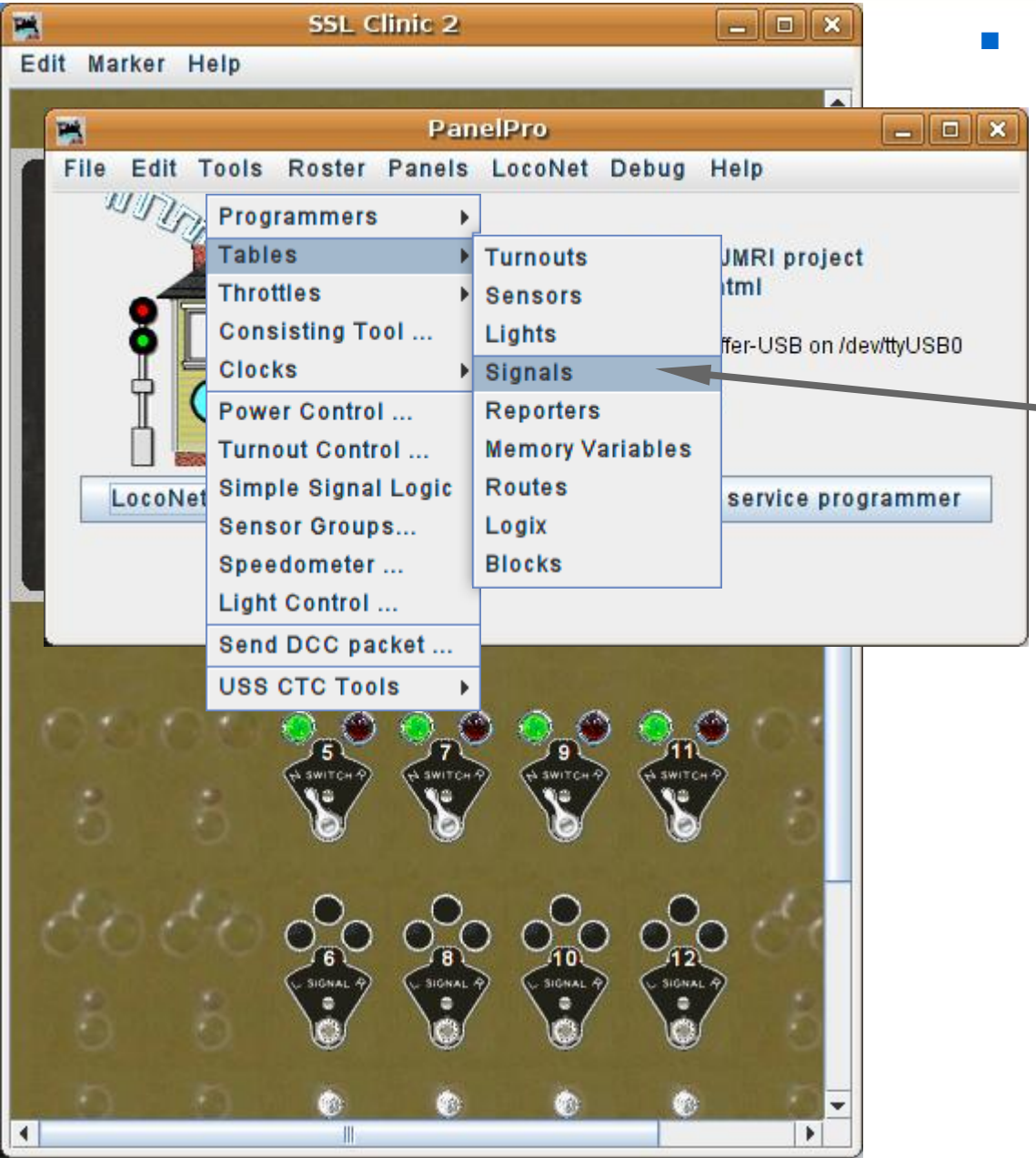

- Signal head basics
  - Go to the PanelPro window and select 'tools'.
  - Navigate to 'Tables' – 'Signals' and click to open the 'Signal Table'.

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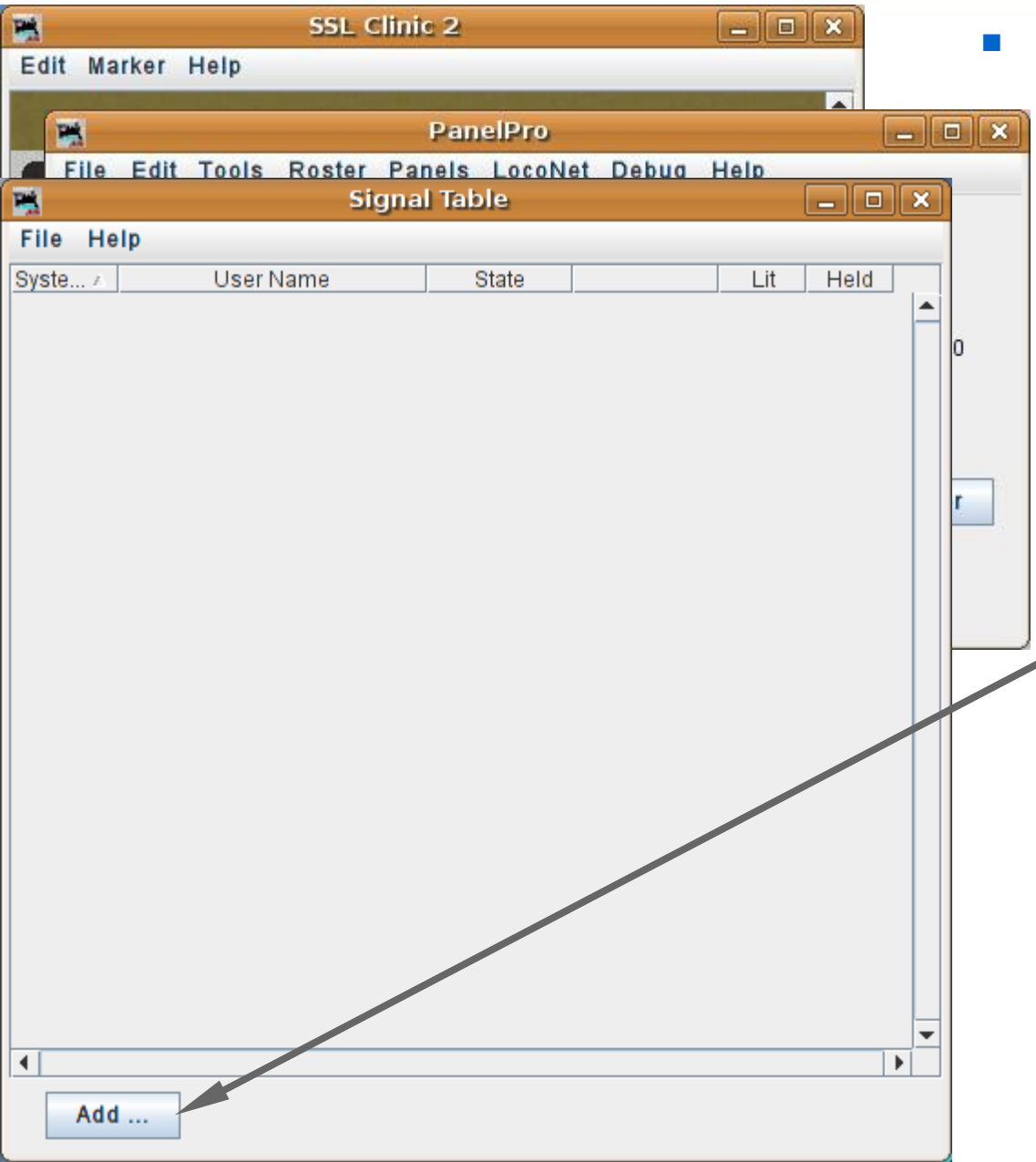

- Signal head basics
  - Go to the PanelPro window and select 'tools'.
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  - Click 'Add ...' to add new signal heads.

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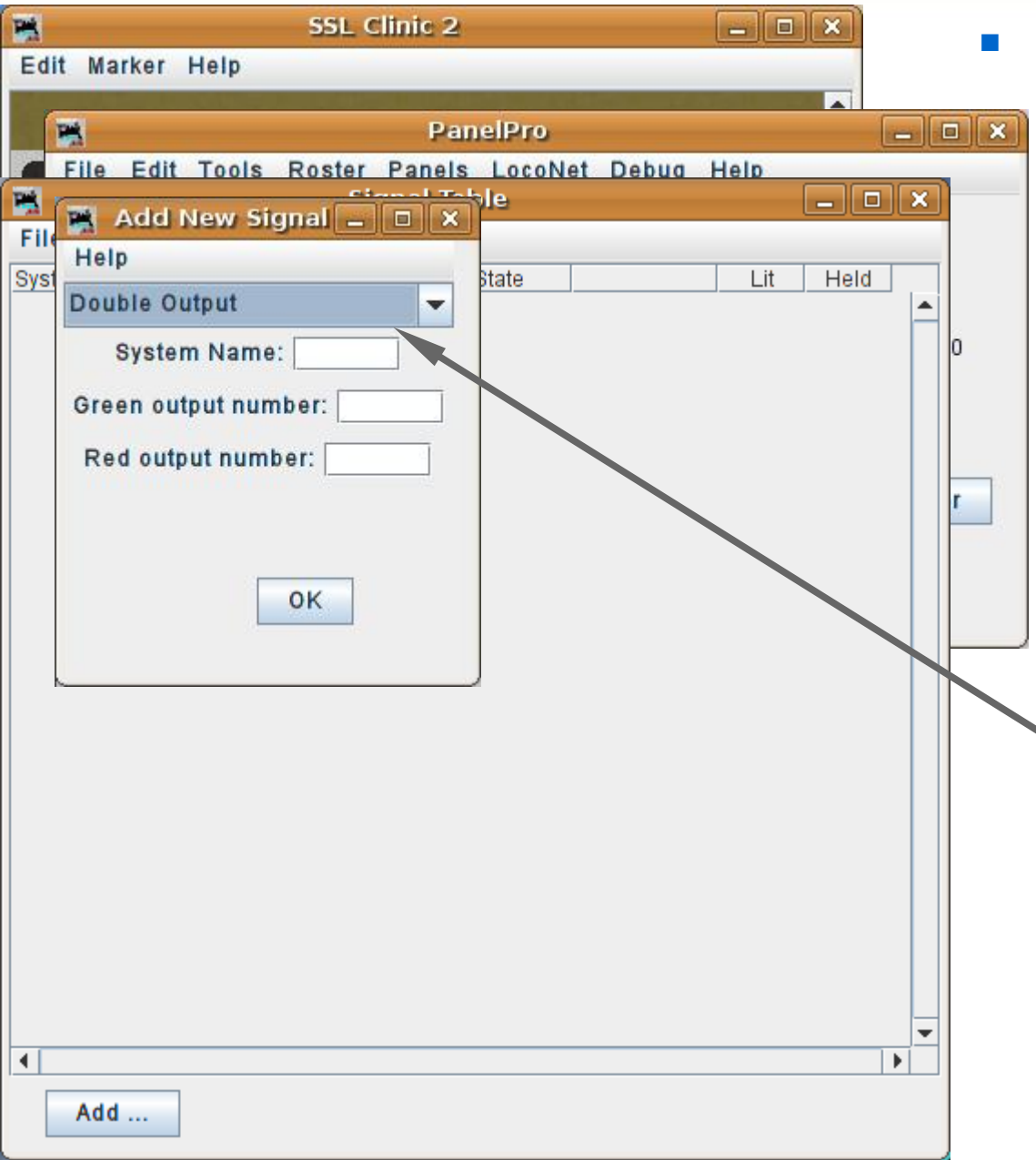

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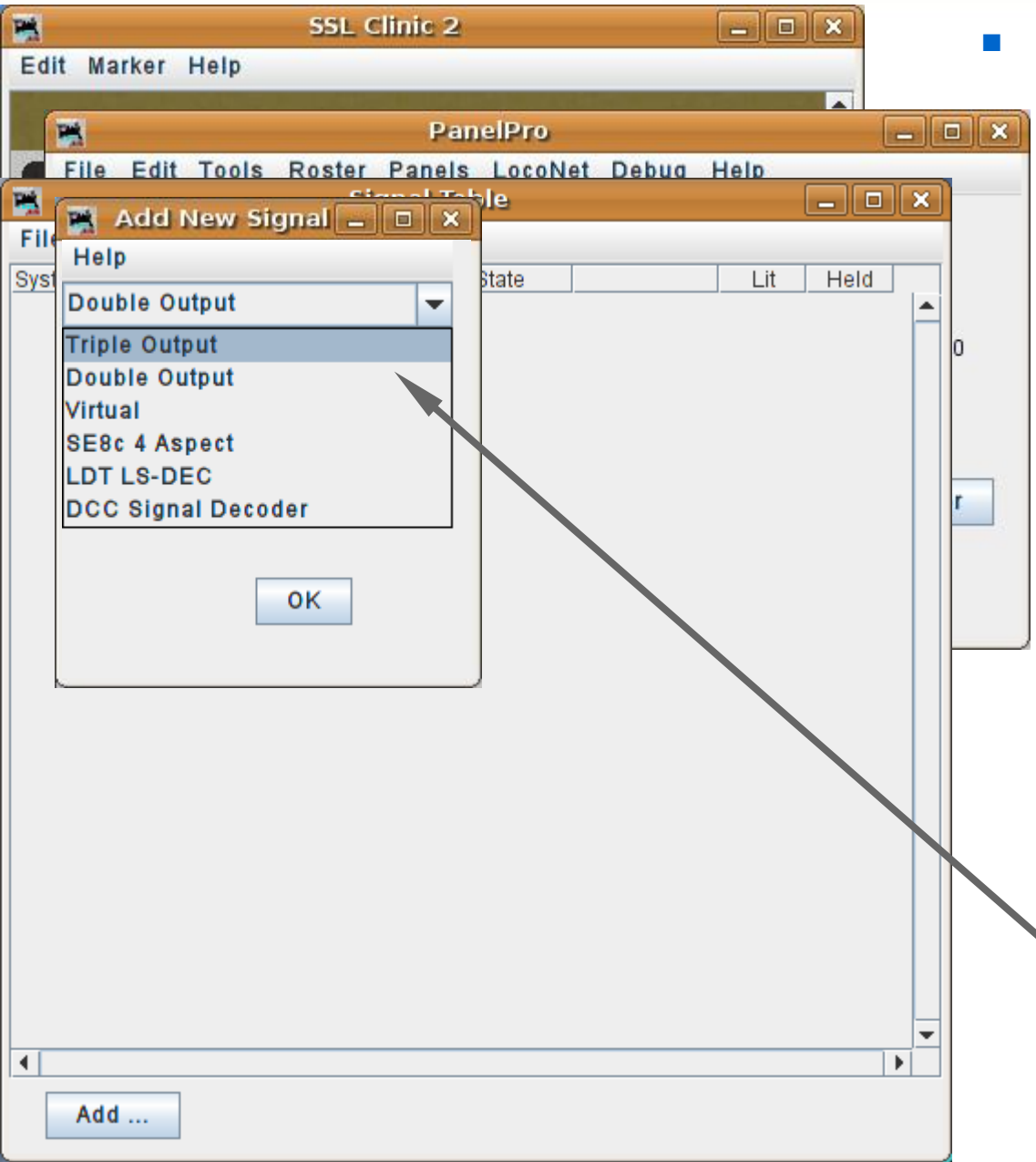

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  - Go to the PanelPro window and select 'tools'.
  - Navigate to 'Tables' – 'Signals' and click to open the 'Signal Table'.
  - Click 'Add ...' to add new signal heads.
  - This brings up a new window requesting specifics on the hardware.
  - There are different basic hardware choices, each with its own details.

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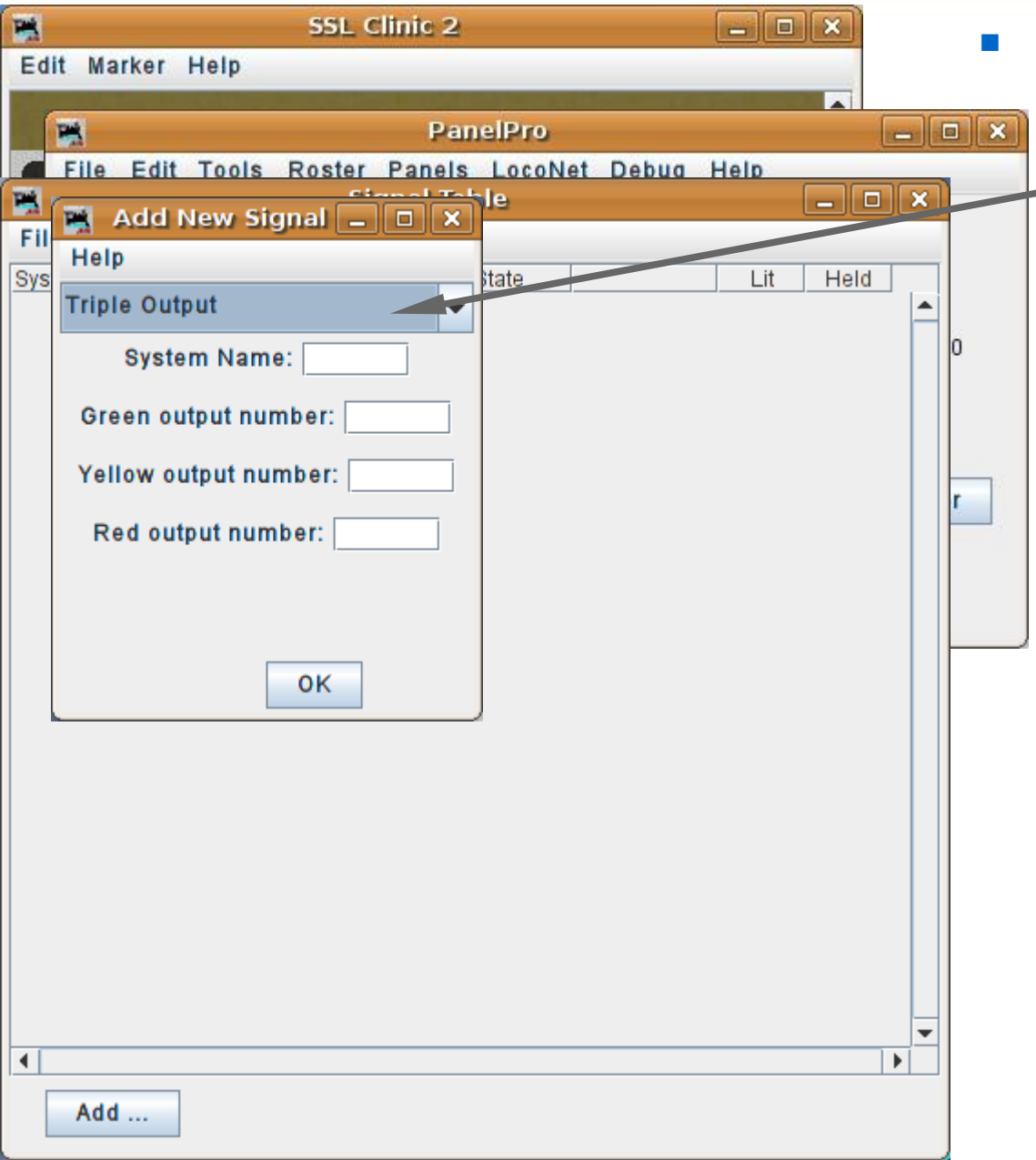

- Signal head basics
  - **Triple Output**. This refers to a signal that has individual drivers for each output. Originally this was called 'Triple Turnout' because many systems use 'turnouts' as general purpose output devices.

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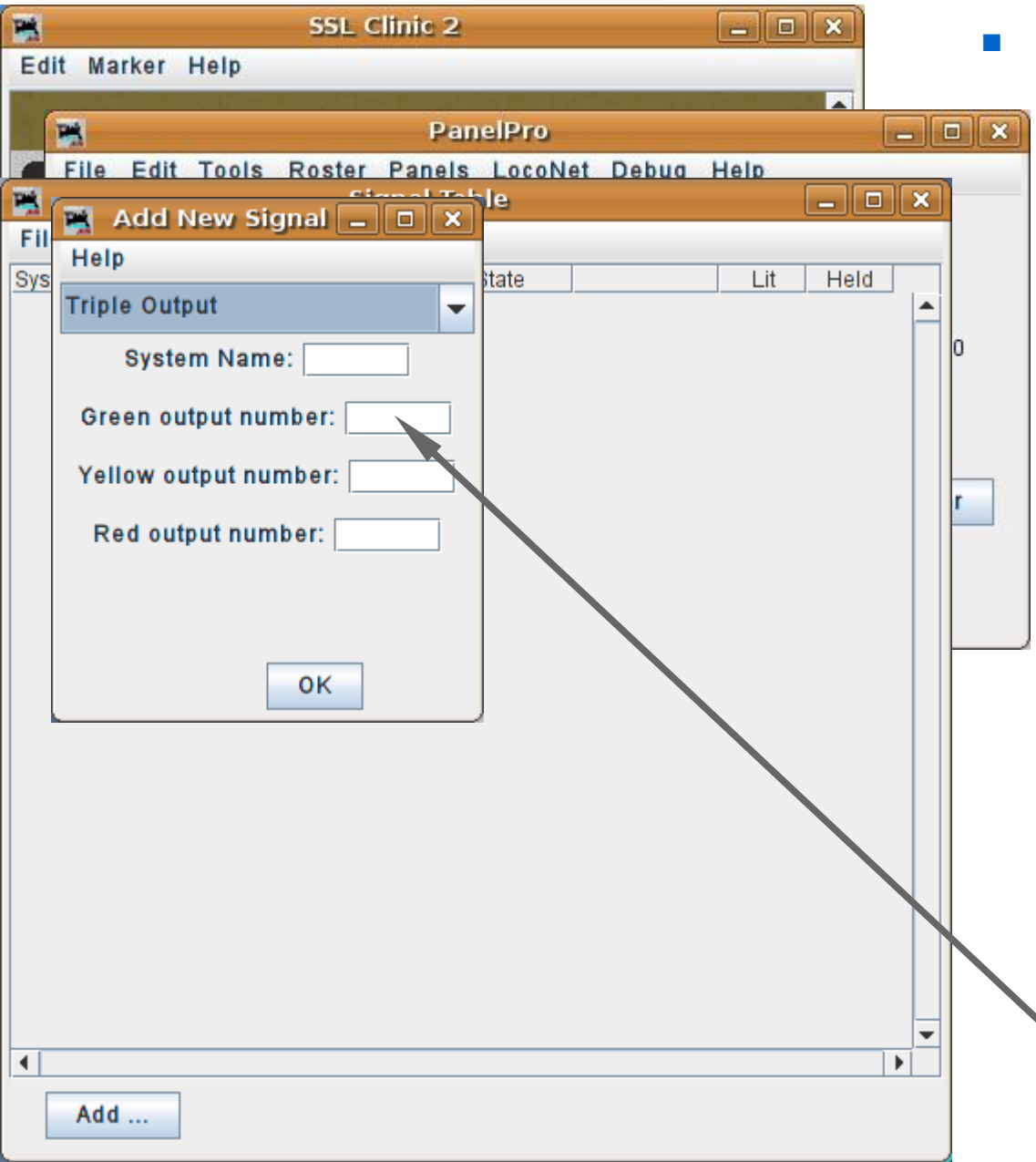
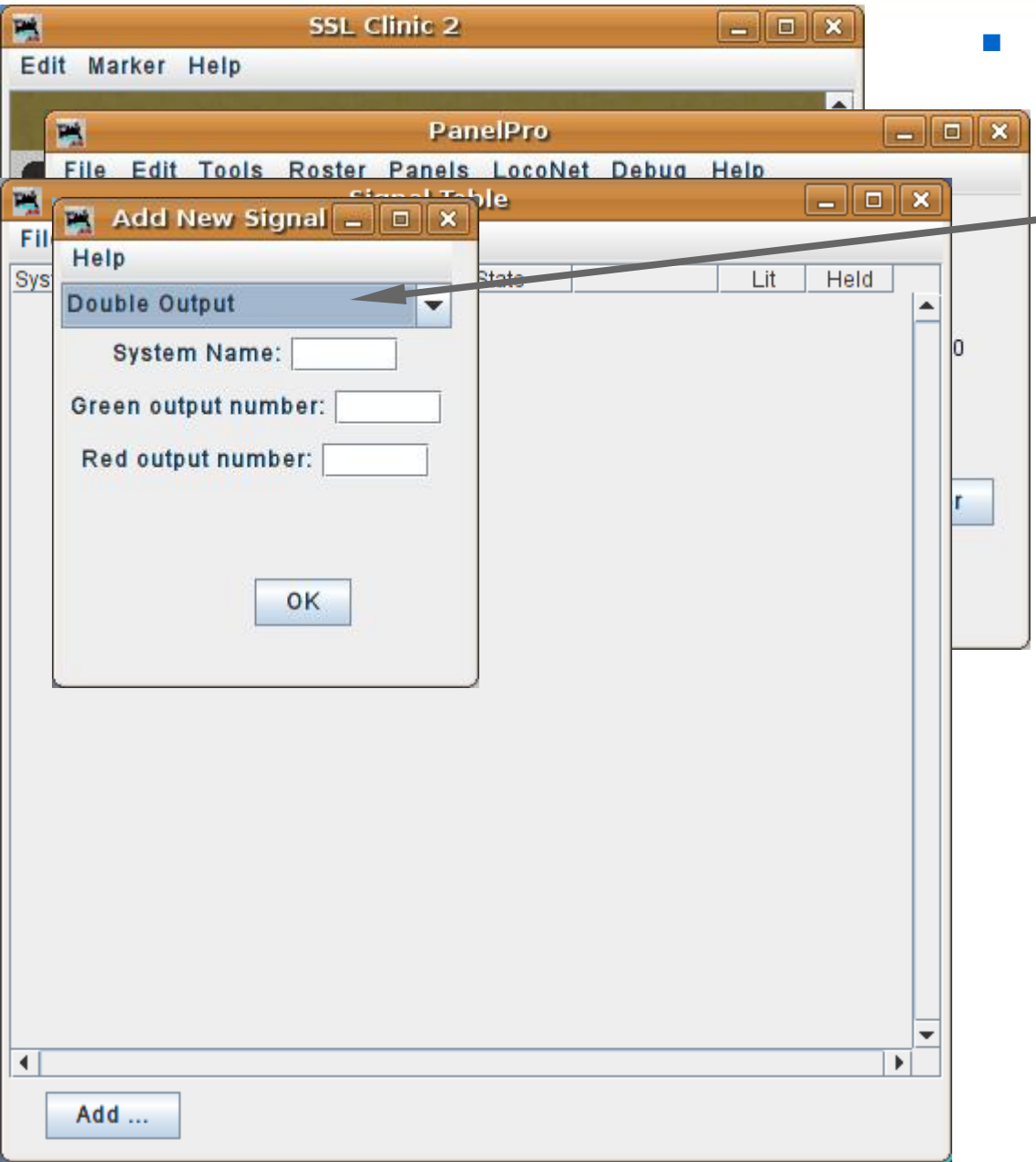


- Signal head basics
  - **Triple Output**. This refers to a signal that has individual drivers for each output. Originally this was called 'Triple Turnout' because many systems use 'turnouts' as general purpose output devices.
  - This ID is the system type plus ”H” for 'signal **H**ead'. For example 'LH' for Digitrax **L**ocoNet devices.
  - Individual output lines get entered here. (e.g. LT25)

SSL (Simple Signal Logic)



- Signal head basics
  - **Double Output**. This refers to a signal that has two drivers. This implies some sort of decoding in the hardware or visually. (for example driving a red plus a green searchlight LED at the same time will produce a yellow signal)

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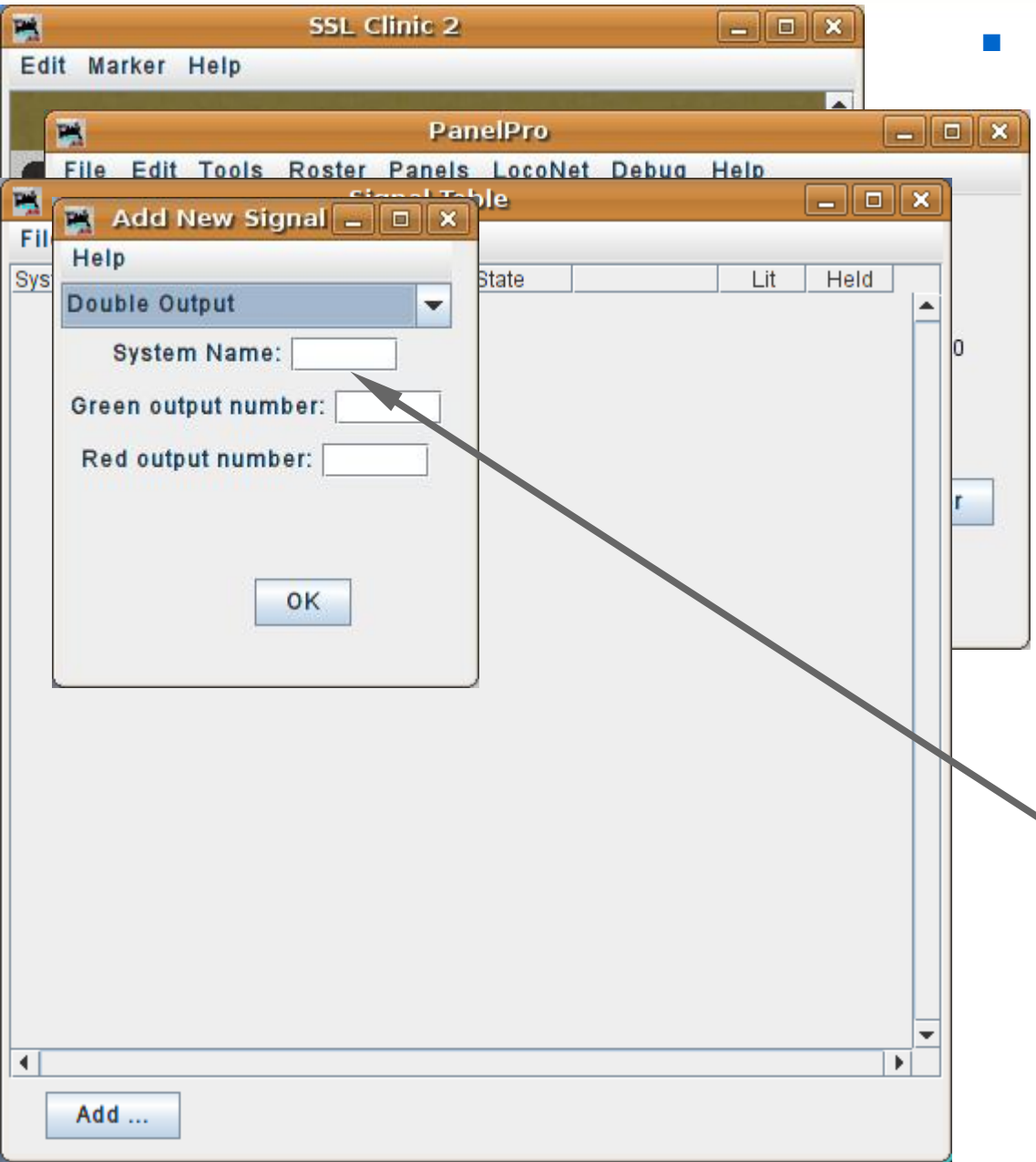

- Signal head basics
  - **Double Output**. This refers to a signal that has two drivers. This implies some sort of decoding in the hardware or visually. (for example driving a red plus a green searchlight LED at the same time will produce a yellow signal)
  - The system name and hardware ID are similar to the triple output head.

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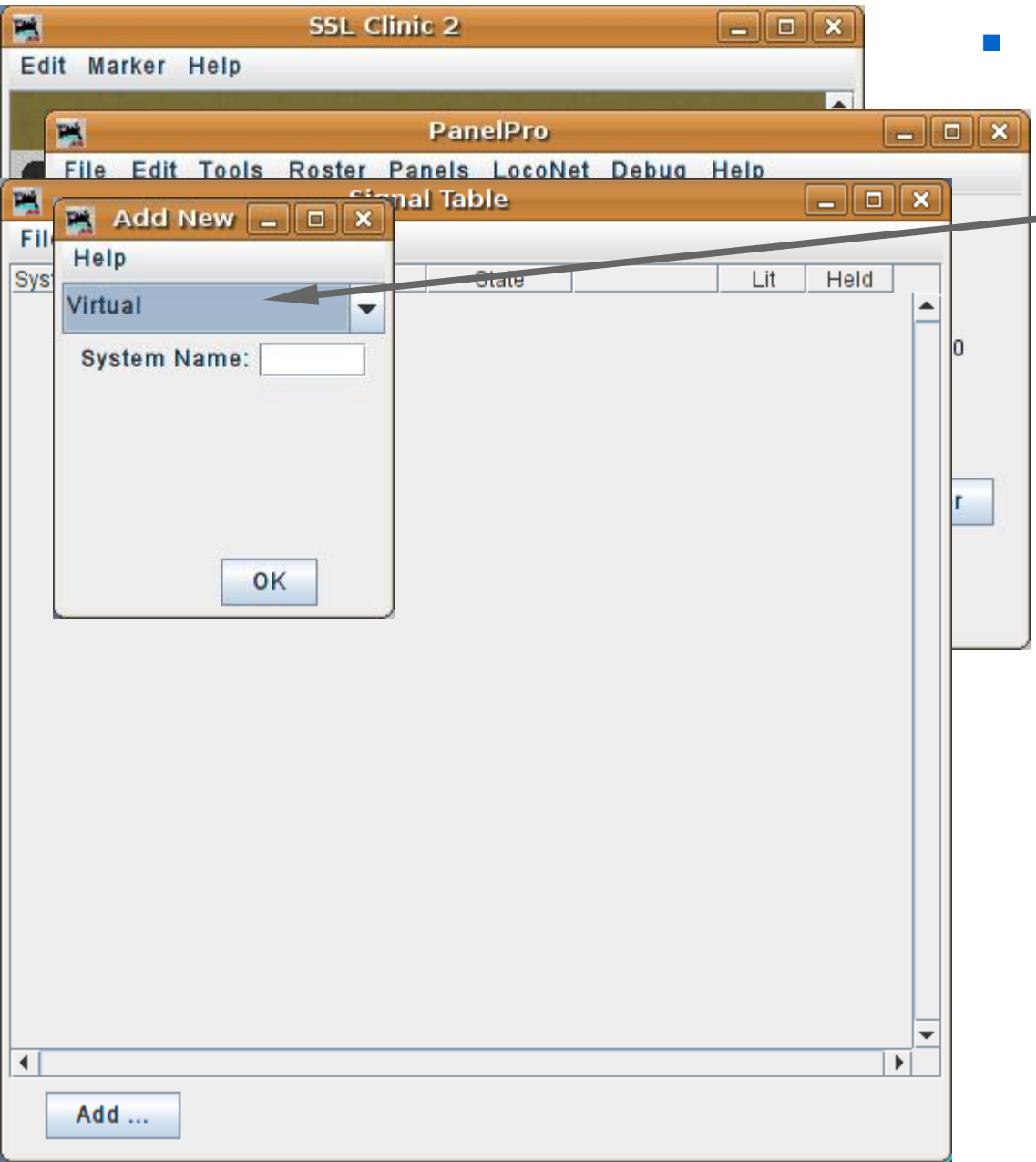

- Signal head basics
  - **Virtual**. This refers to a signal that has no actual hardware on the layout. Sometimes it is convienient to use a virtual signal to fill in the 'details', so to speak, and then use the 'Distant' option to include the 'details' into another actual signal's indication. It is not even necessary to include the virtual signal on the panel.

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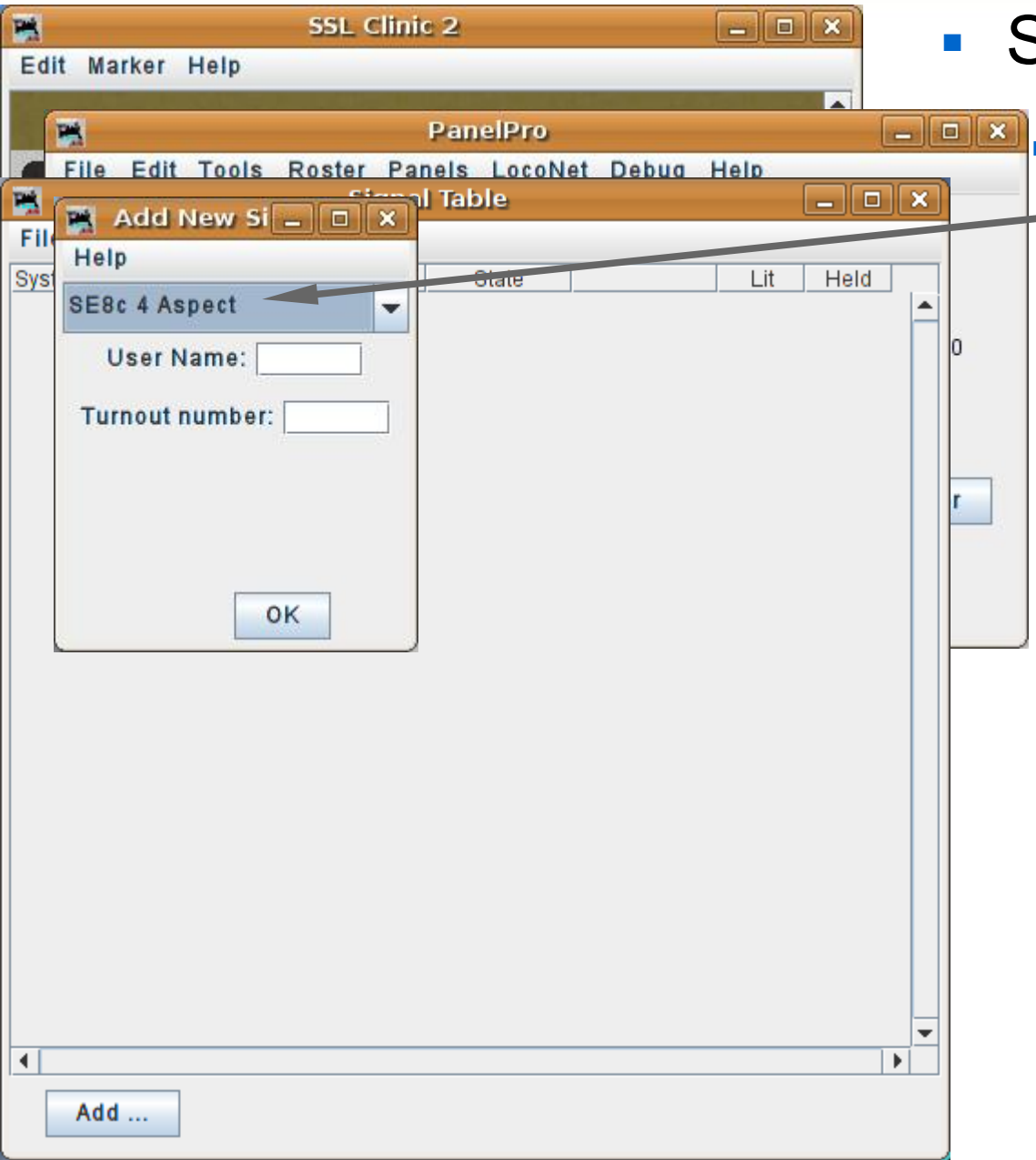

- Signal head basics
- **SE8c 4 Aspect**. The SE8c is Digitrax's signal driver board. Our TC-64 board will also operate in SE8c (signal) mode. The SE8c mode just sends out single commands for each aspect change, which saves some bandwidth on the network. (a relatively minor amount)

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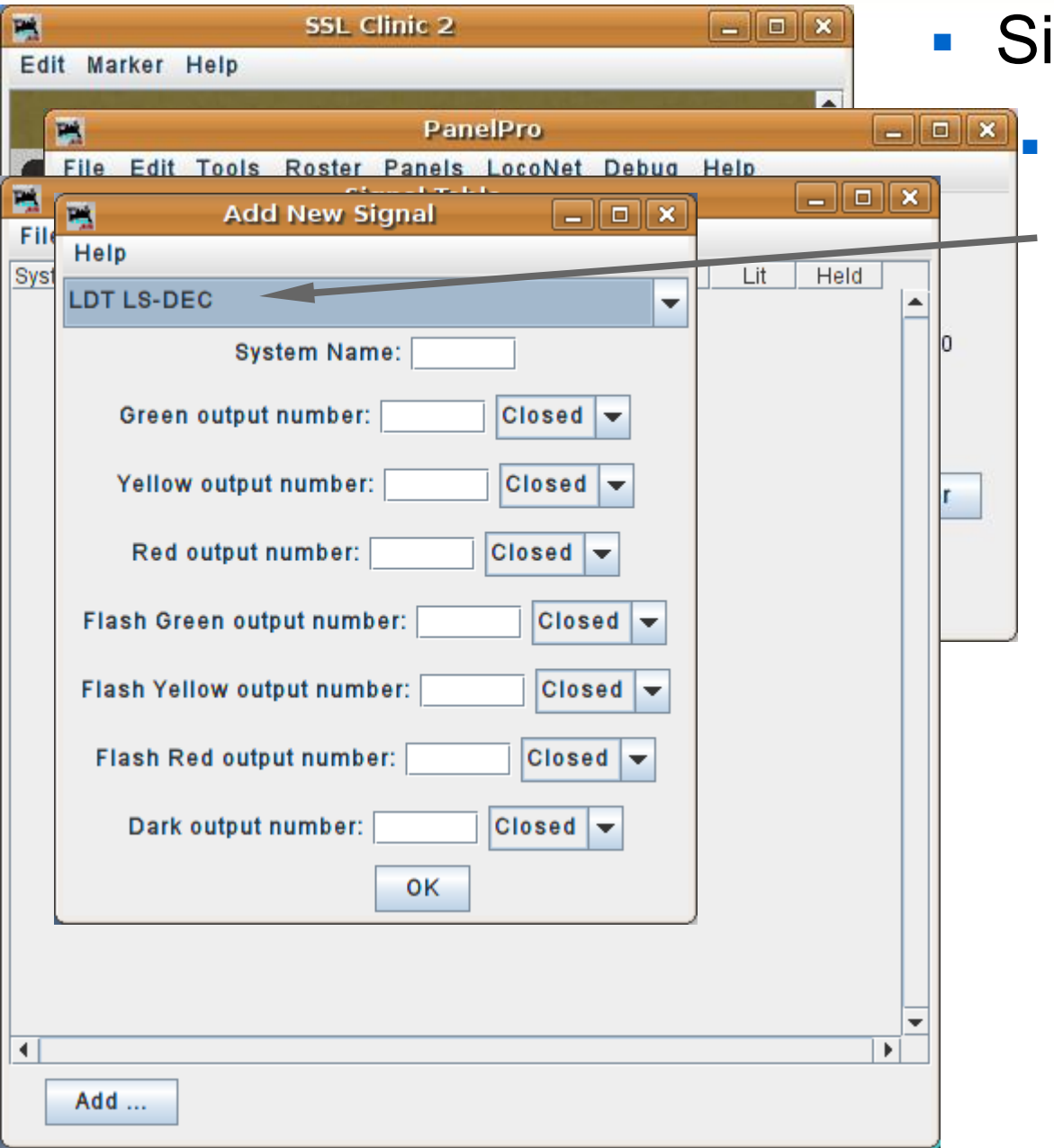
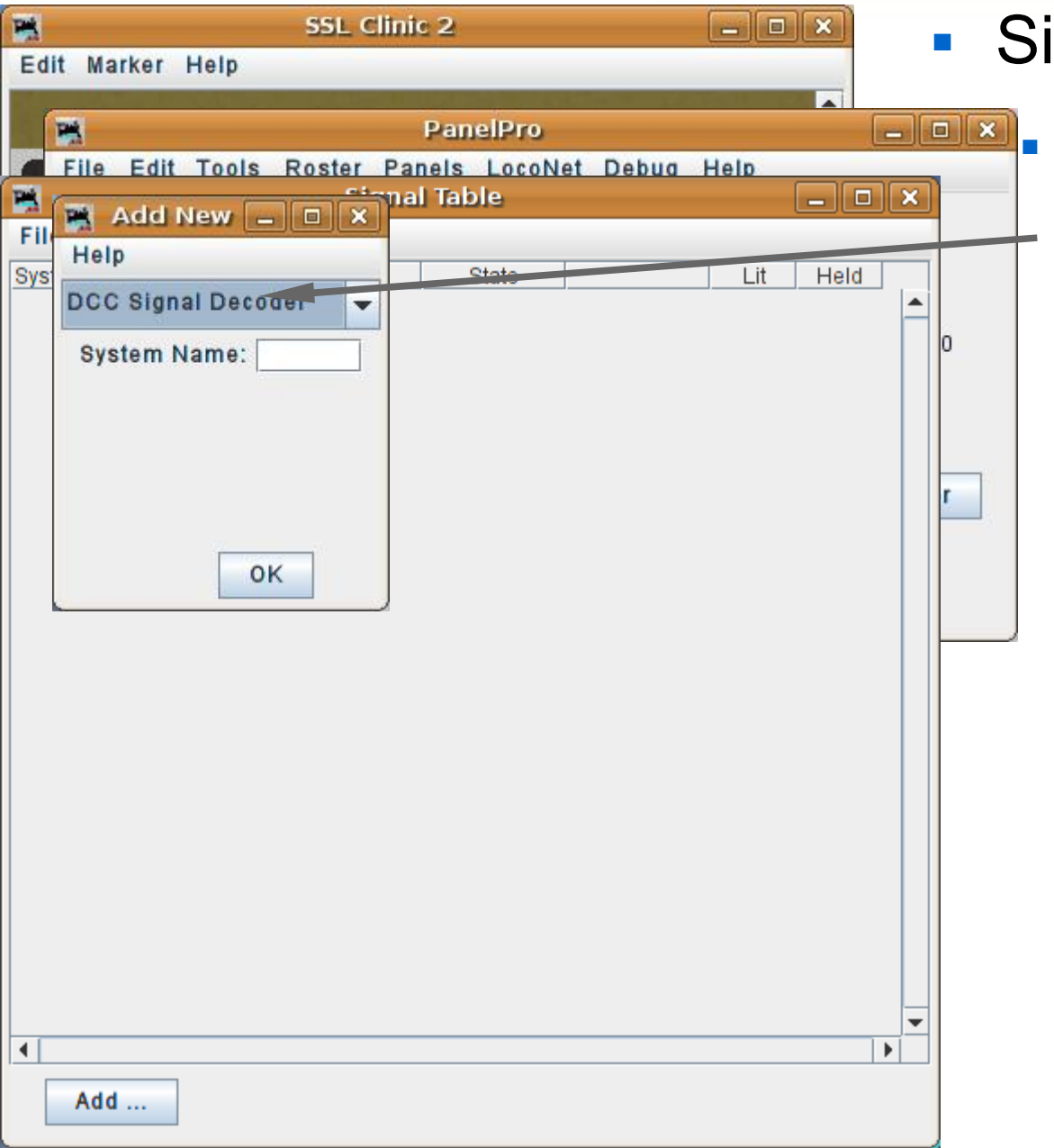


- Signal head basics
- **LDT LS-DEC**. **L**ittfinski **D**aten **T**echnik **L**ight **S**ignal **Dec**oder. This signal decoder has different versions that directly support many of the complex european multi-head signal systems.

SSL (Simple Signal Logic)



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- **DCC Signal Decoder**. This signal type controls signal heads attached to any decoder that uses the DCC signal packets as defined by the NMRA DCC Working Group.

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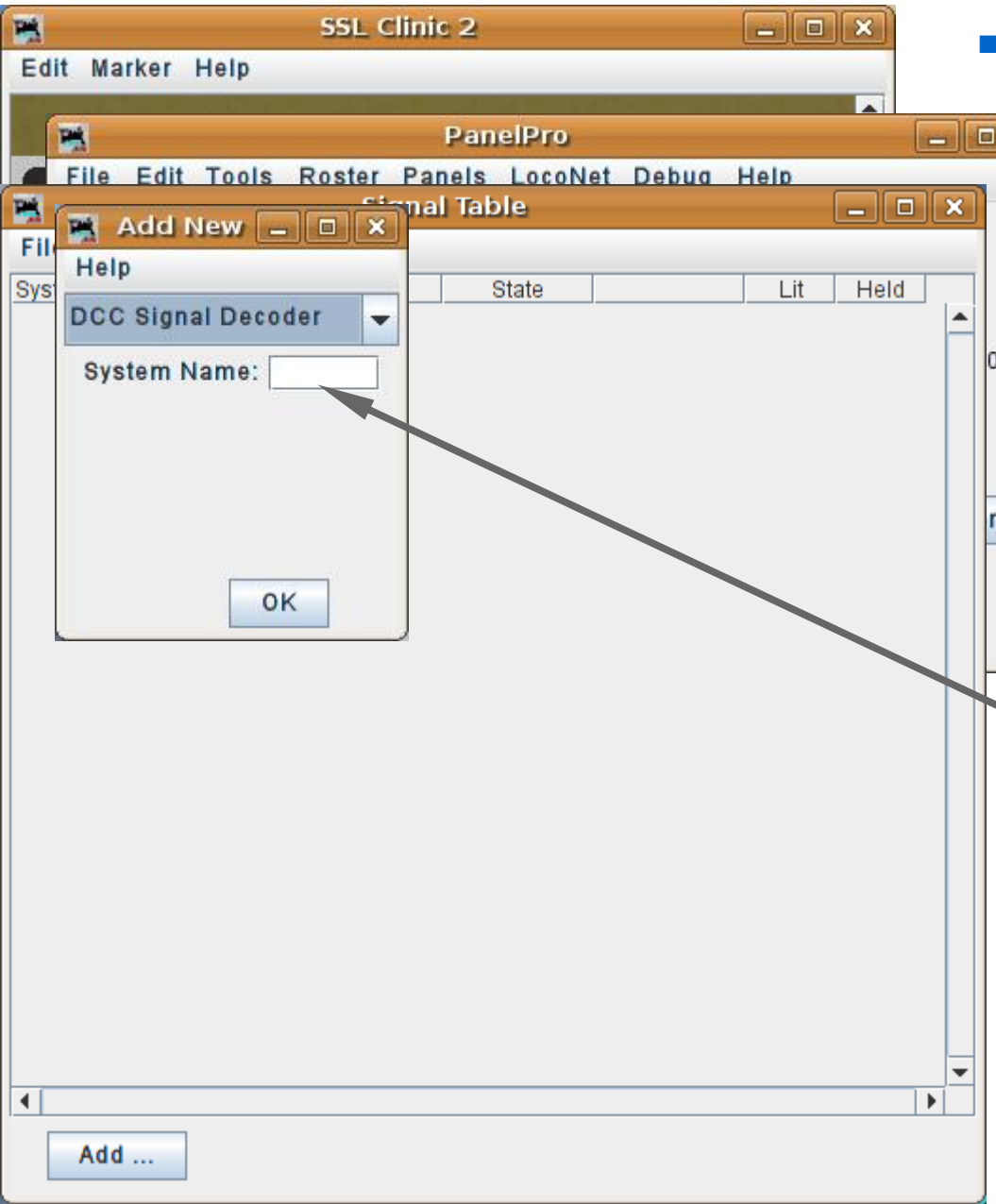

- Signal head basics
- **DCC Signal Decoder**. This signal type controls signal heads attached to any decoder that uses the DCC signal packets as defined by the NMRA DCC Working Group.
- Enter its DCC address as the system number.

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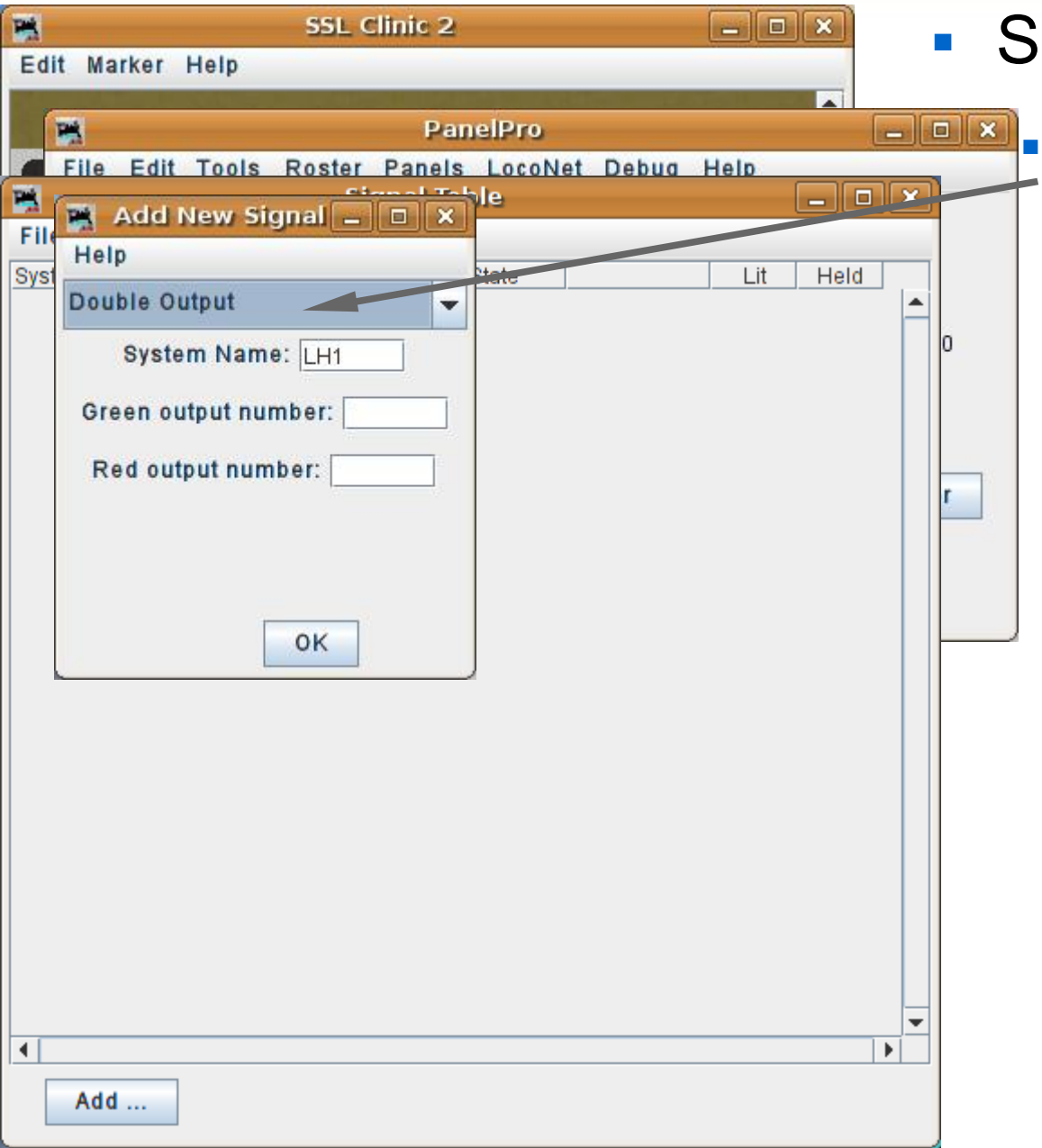

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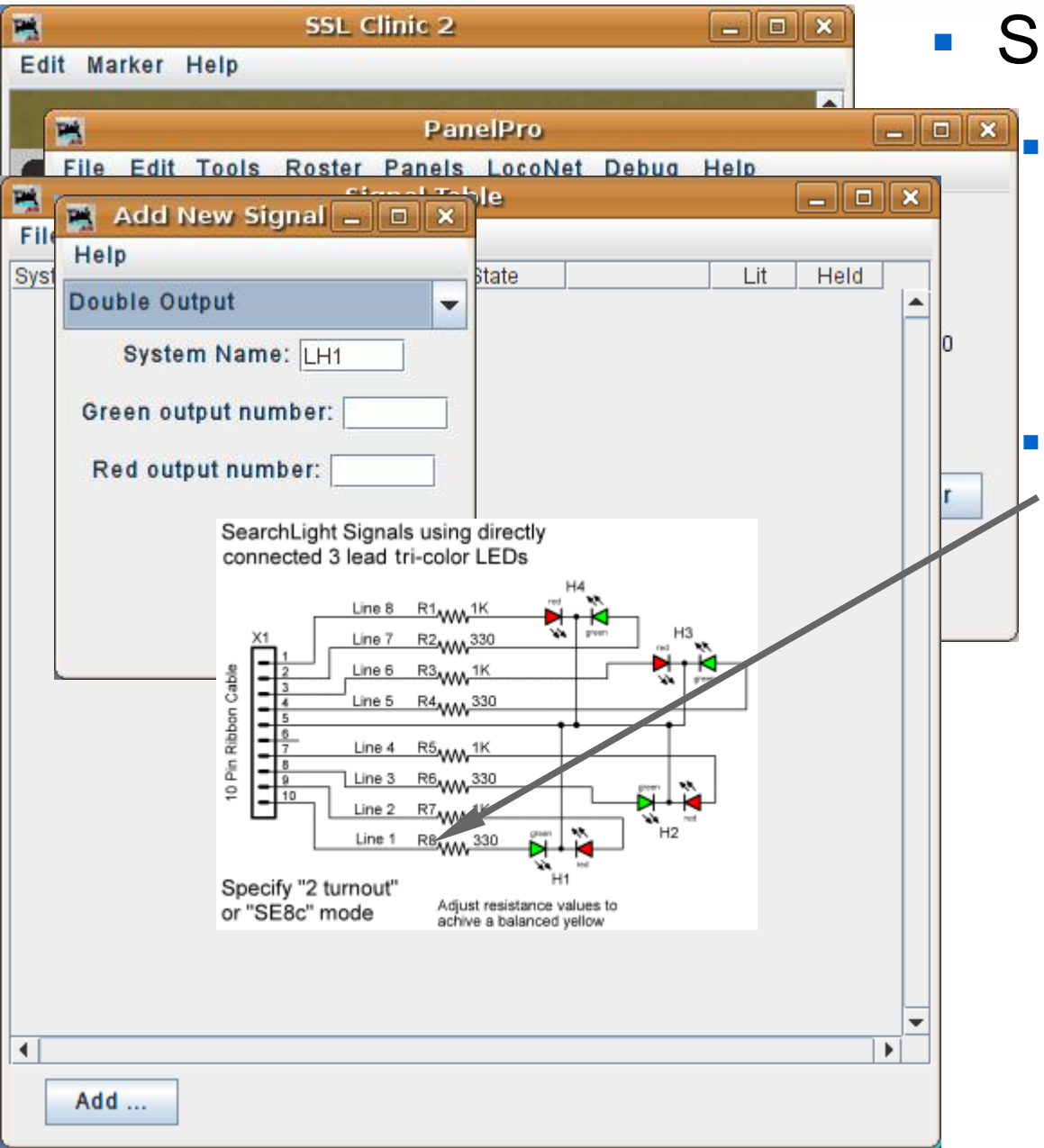

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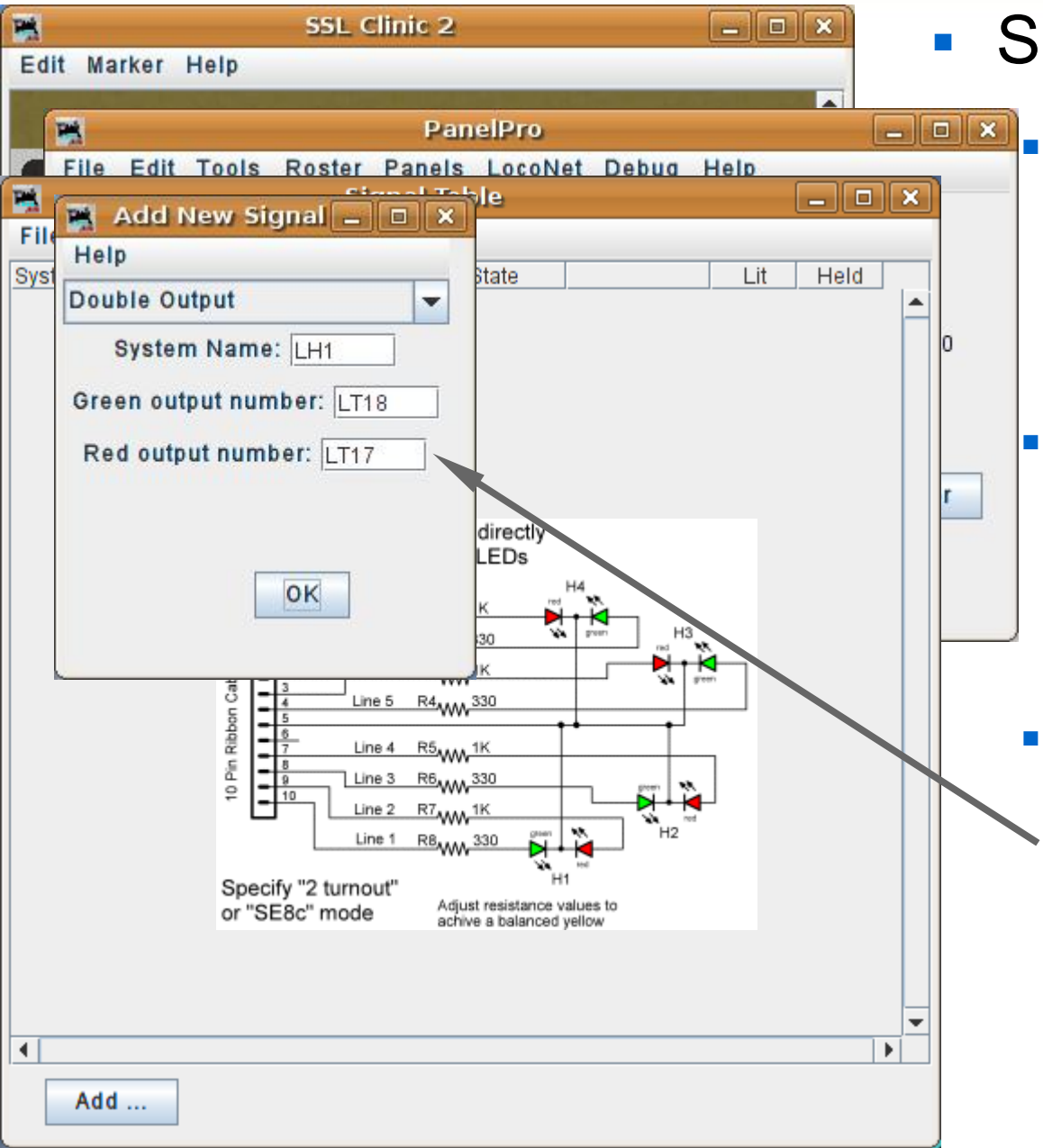

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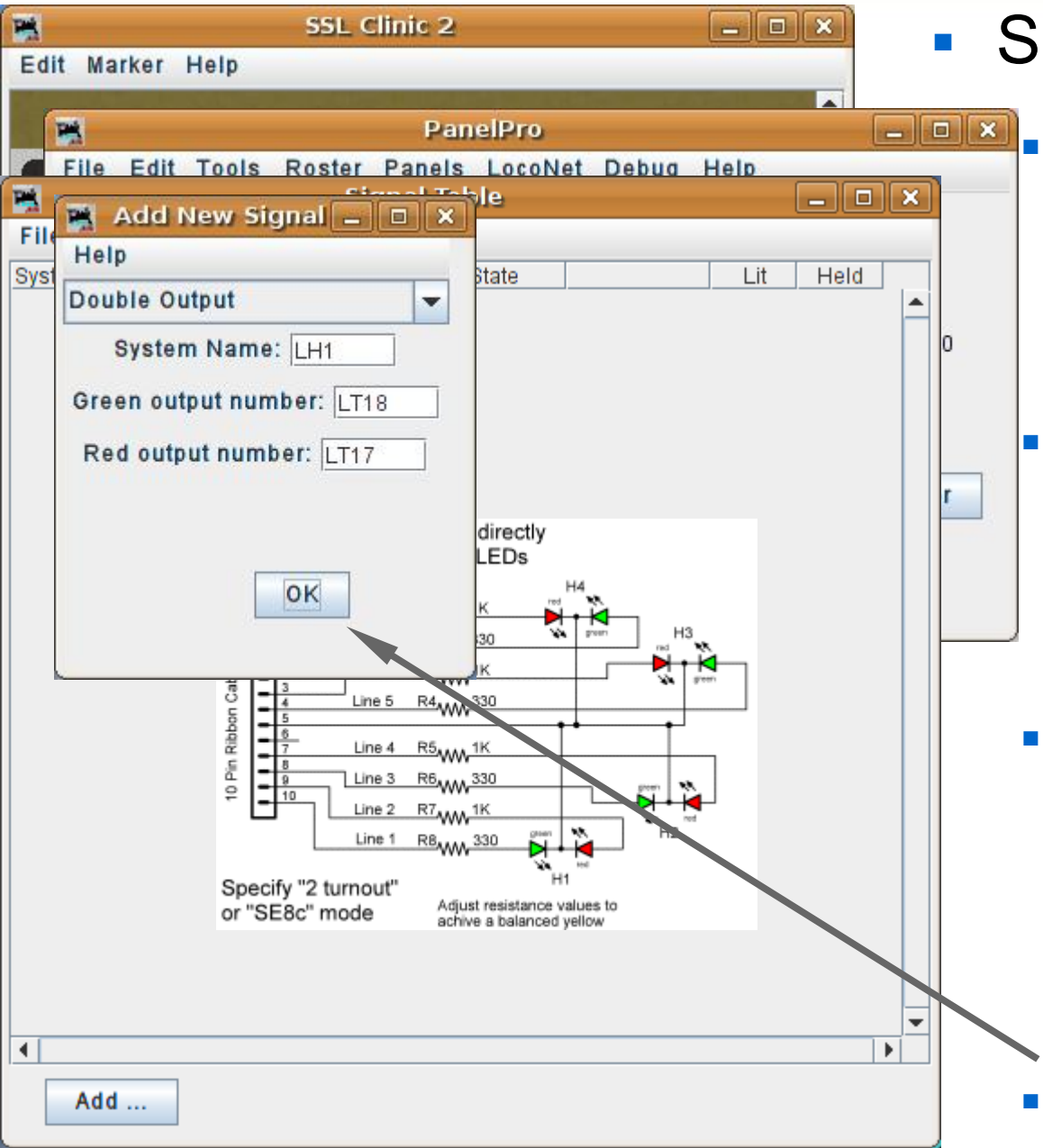

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  - Click 'OK' to add a signal.

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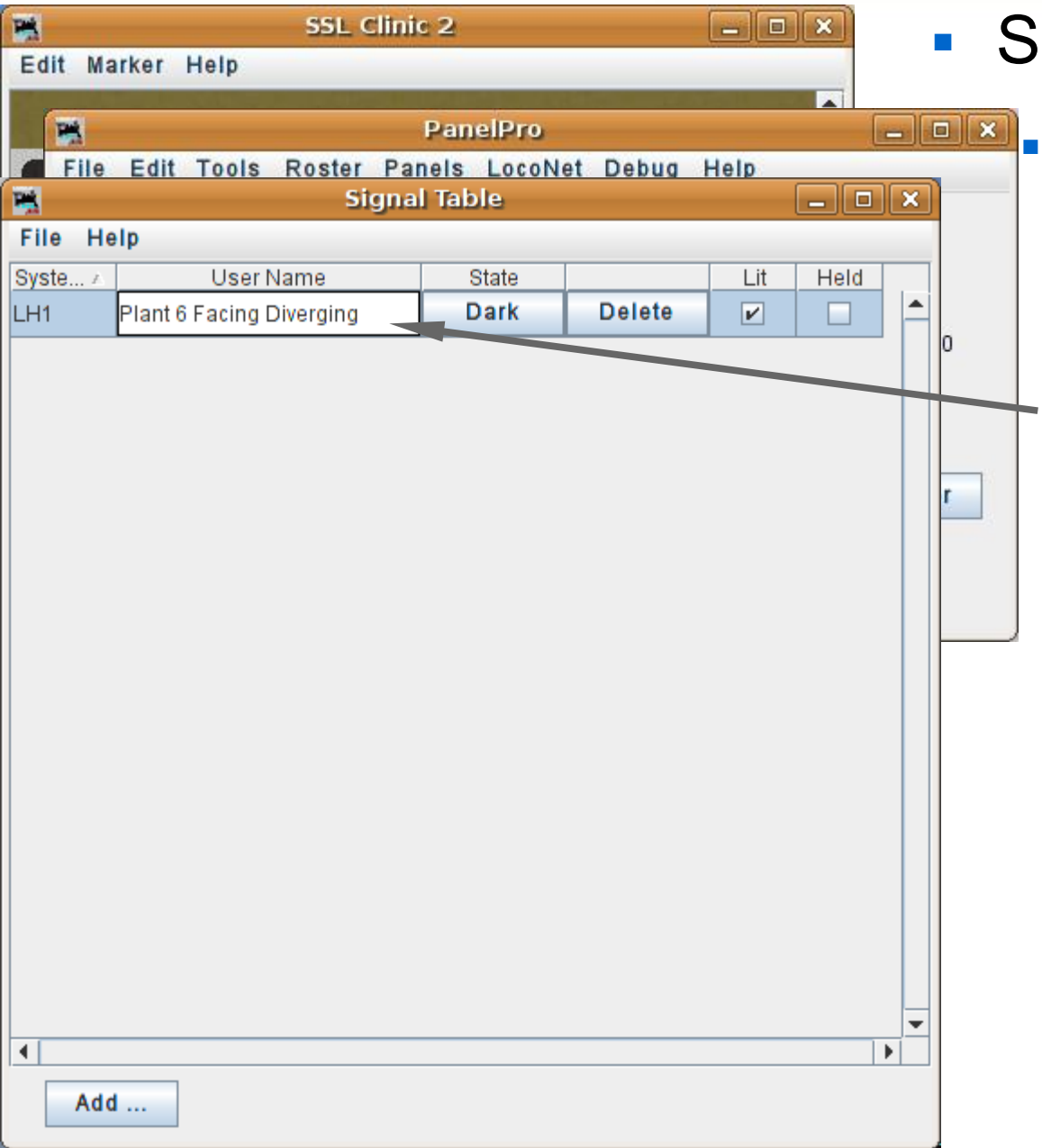

- Signal head basics
  - Once the signal head is in the Signal Table, add a description to match it. I called it 'Plant 6 Facing Diverging', but you could name it any way that seems good for your RR.

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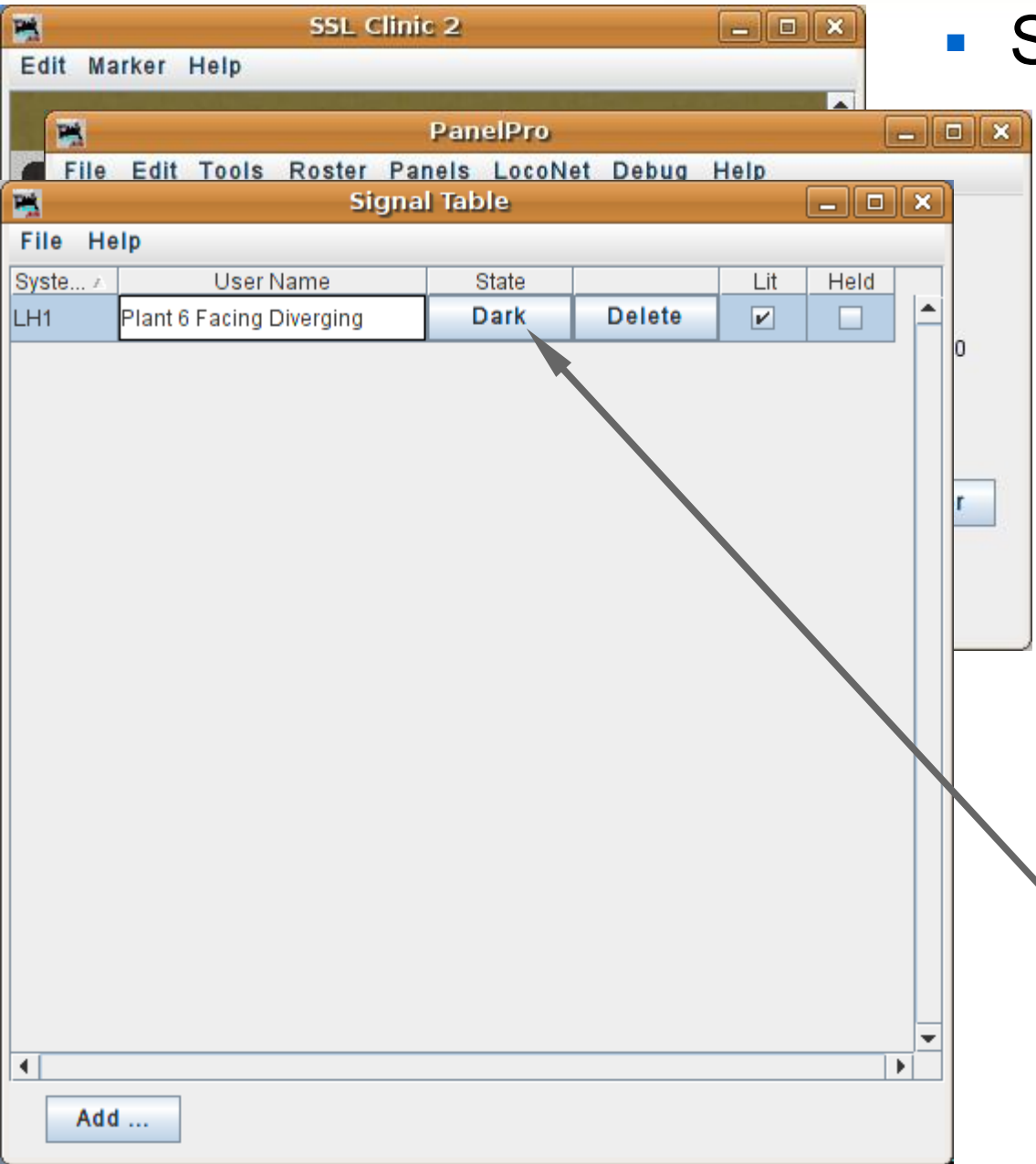

- Signal head basics
  - Once the signal head is in the Signal Table, add a description to match it. I called it 'Plant 6 Facing Diverging', but you could name it any way that seems good for your RR.
  - A good thing to do at this point is to see if your hardware responds as expected. Clicking on the 'State' button should cycle the actual signal through its various aspects.

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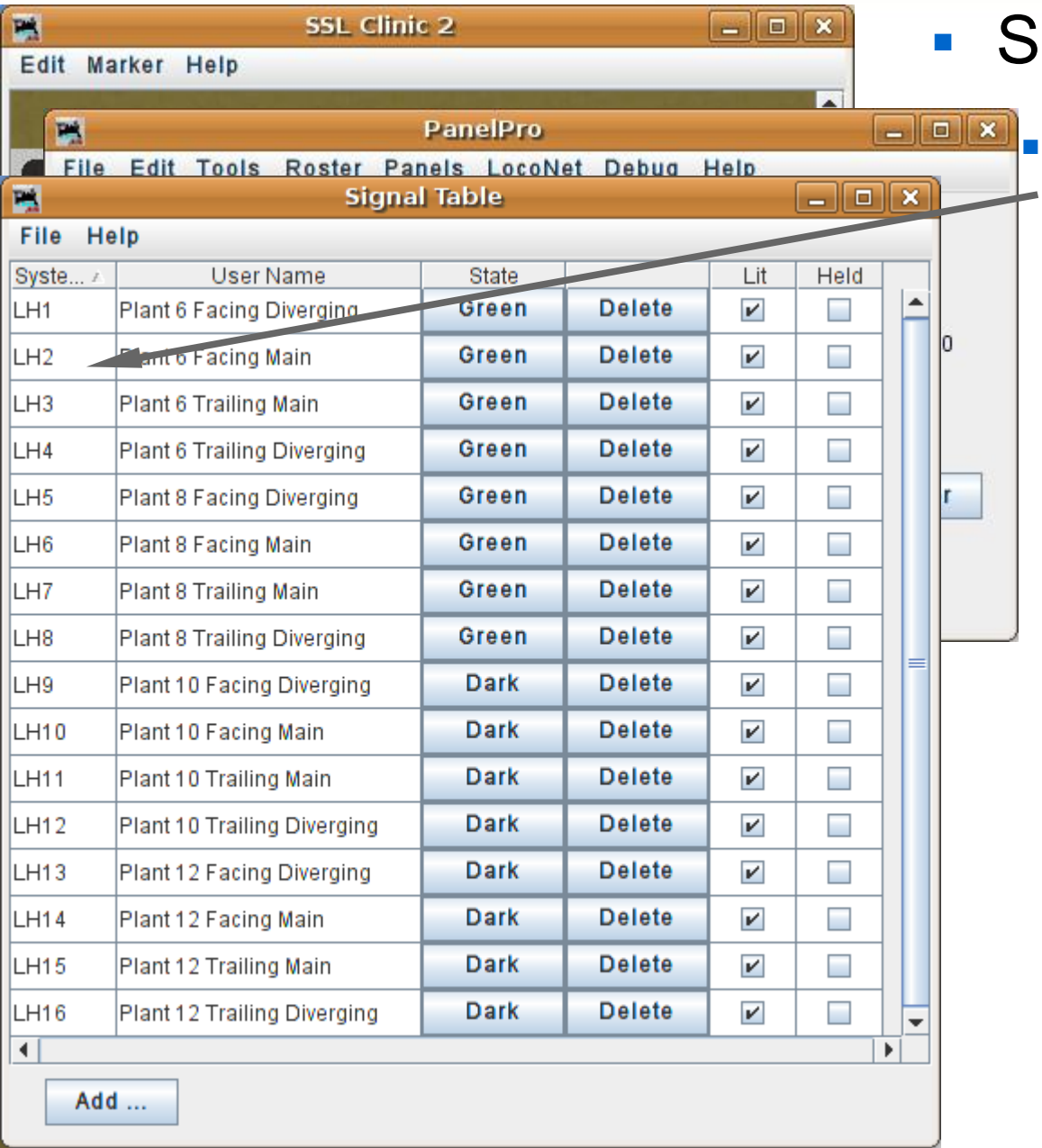

- Signal head basics
- Once the first signal head is working correctly, add in the rest of them.

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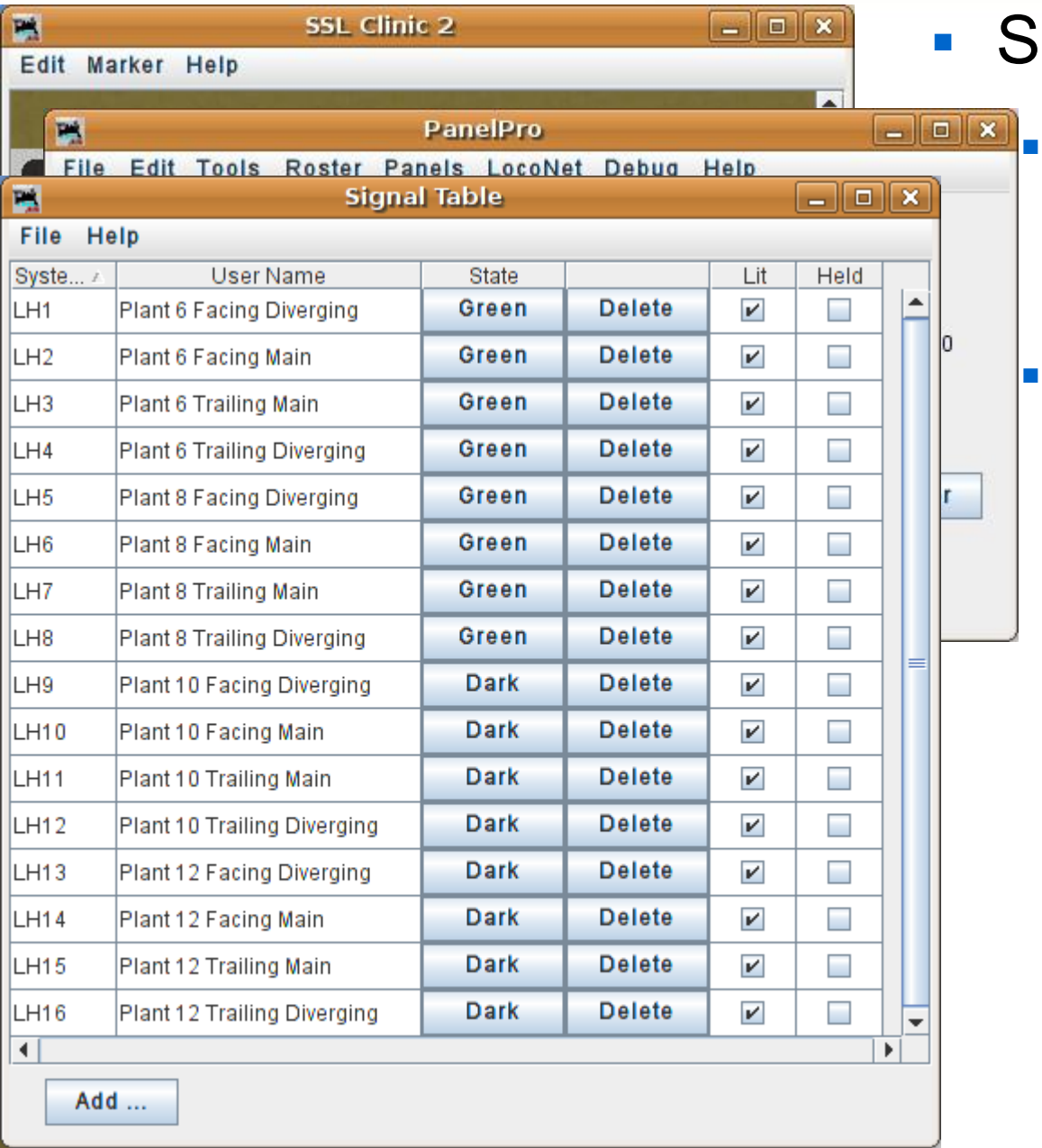

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  - Once the first signal head is working correctly, add in the rest of them.
  - This would be a good time to save your work again.

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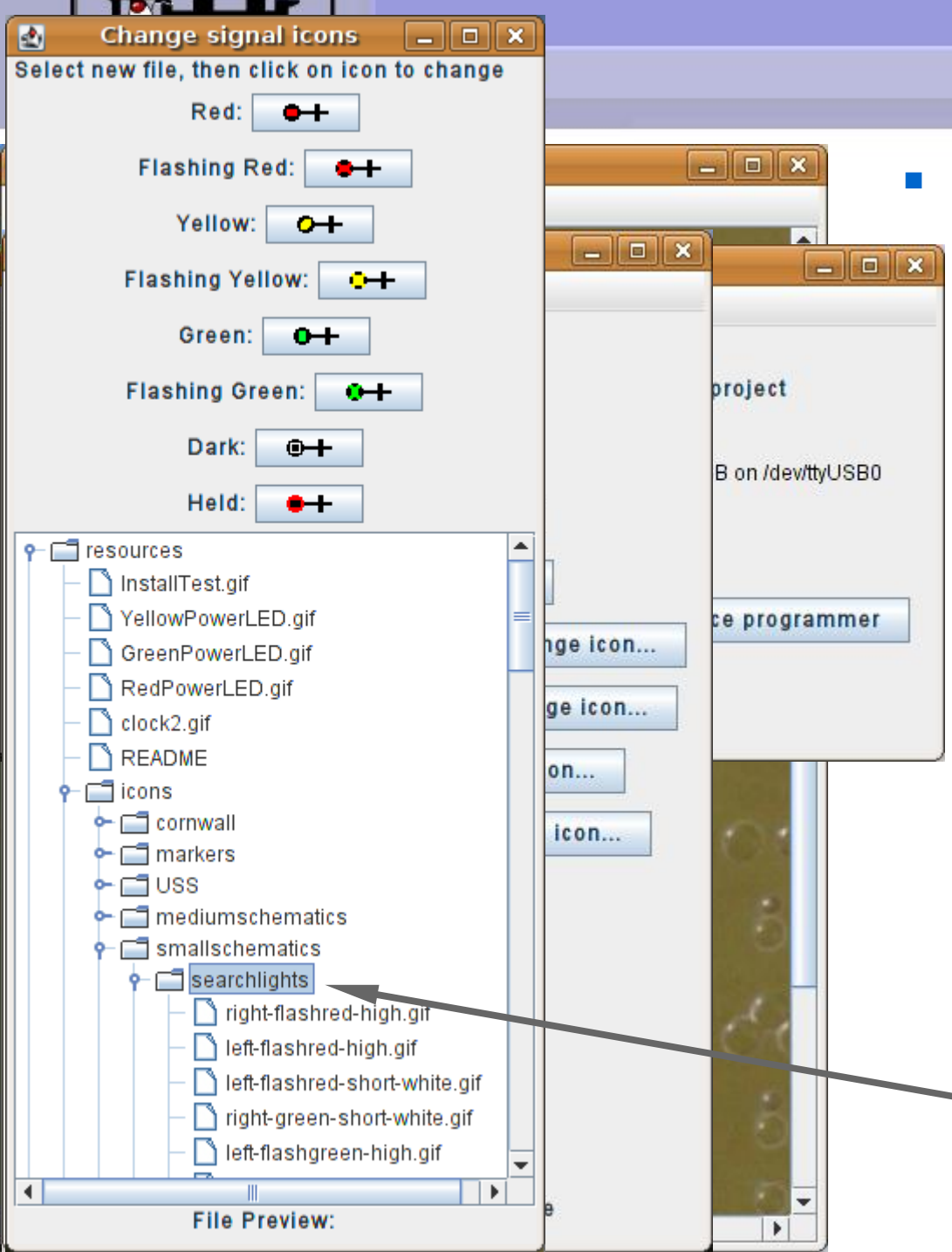

- Signal head basics
  - Once the first signal head is working correctly, add in the rest of them.
  - This would be a good time to save your work again.
  - For this session of the clinic we will add signal images to the panel to help us visualize what is happening. For a prototypical panel we would skip this step.
  - Drill down to searchlights.

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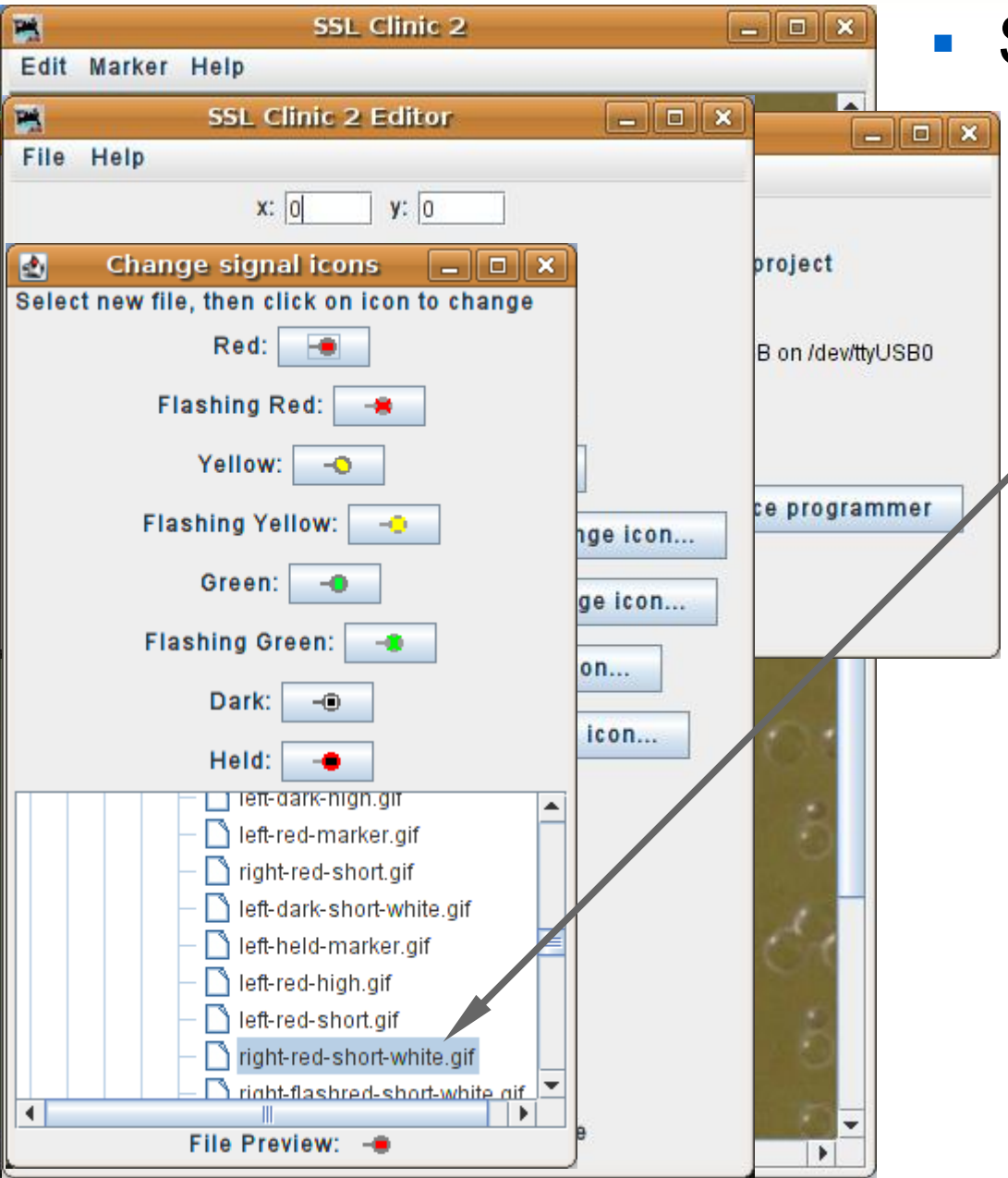

- Signal head basics
  - Dig through the various images to get a set of short signals with white backgrounds. (that show up OK on our black panel)

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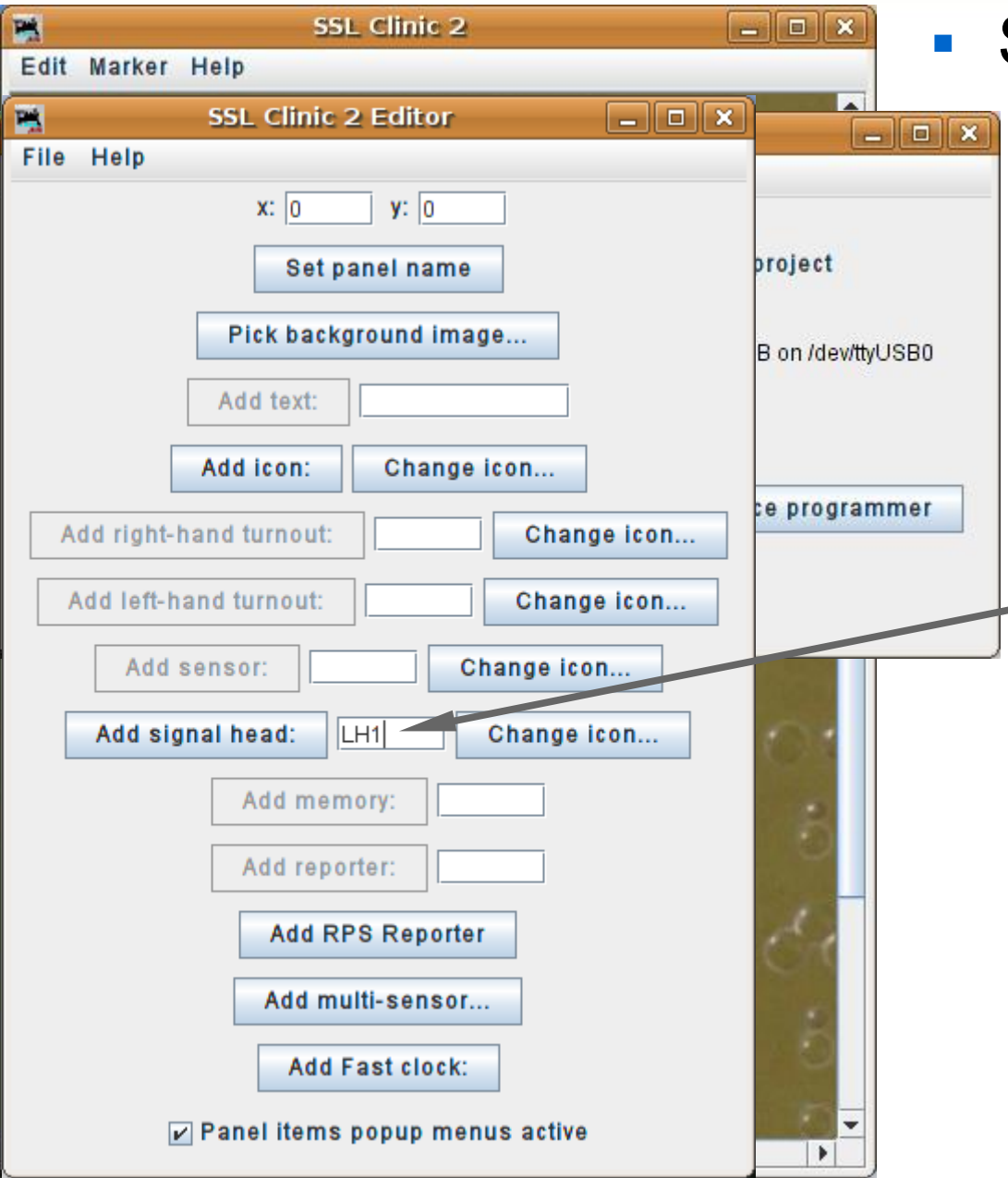

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  - Enter the first head. (LH1) 'Facing Diverging' will be the lower signal of 2 heads.

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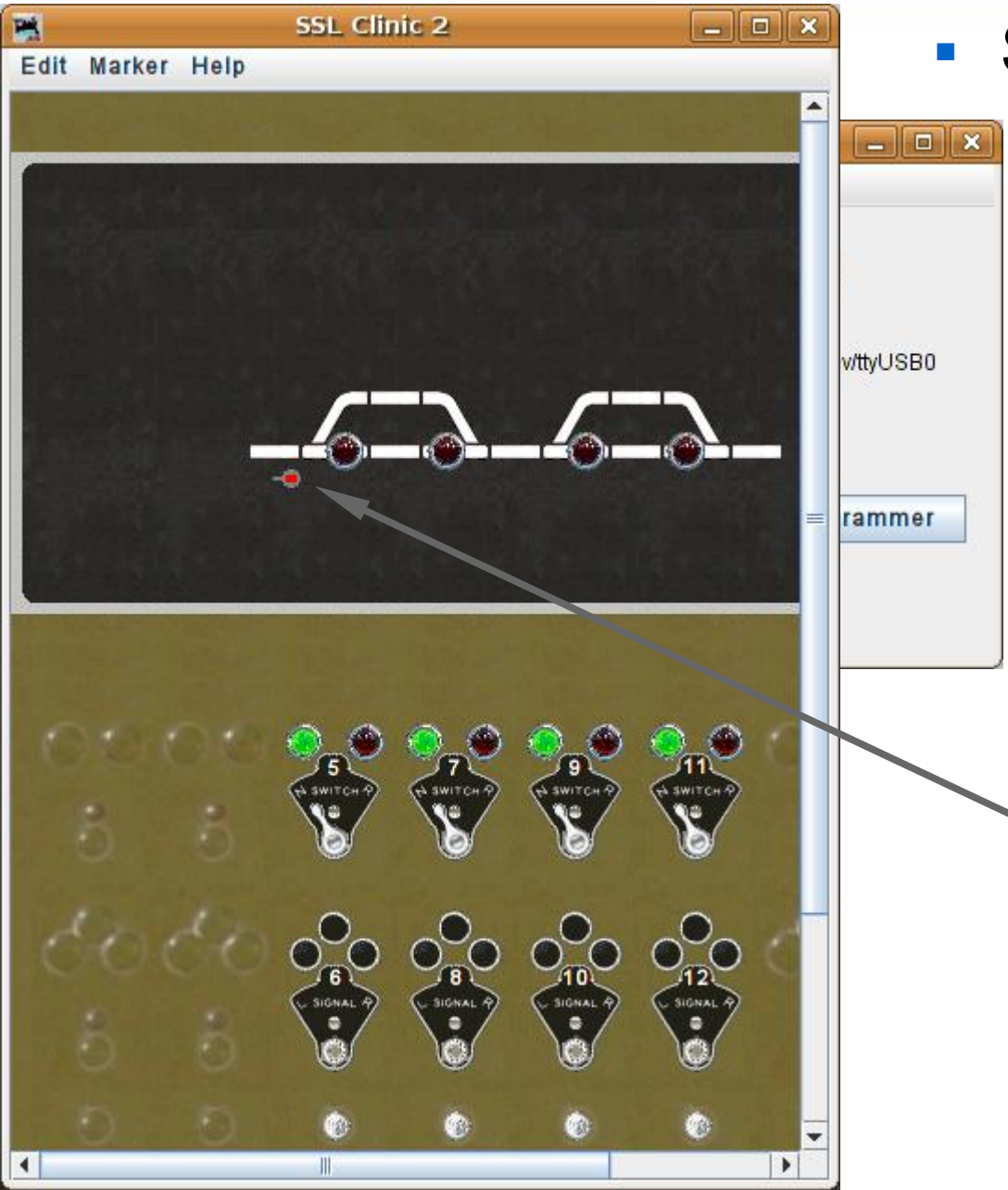

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  - Enter the first head. (LH1) 'Facing Diverging' will be the lower signal of 2 heads.
  - Move the signal into position.

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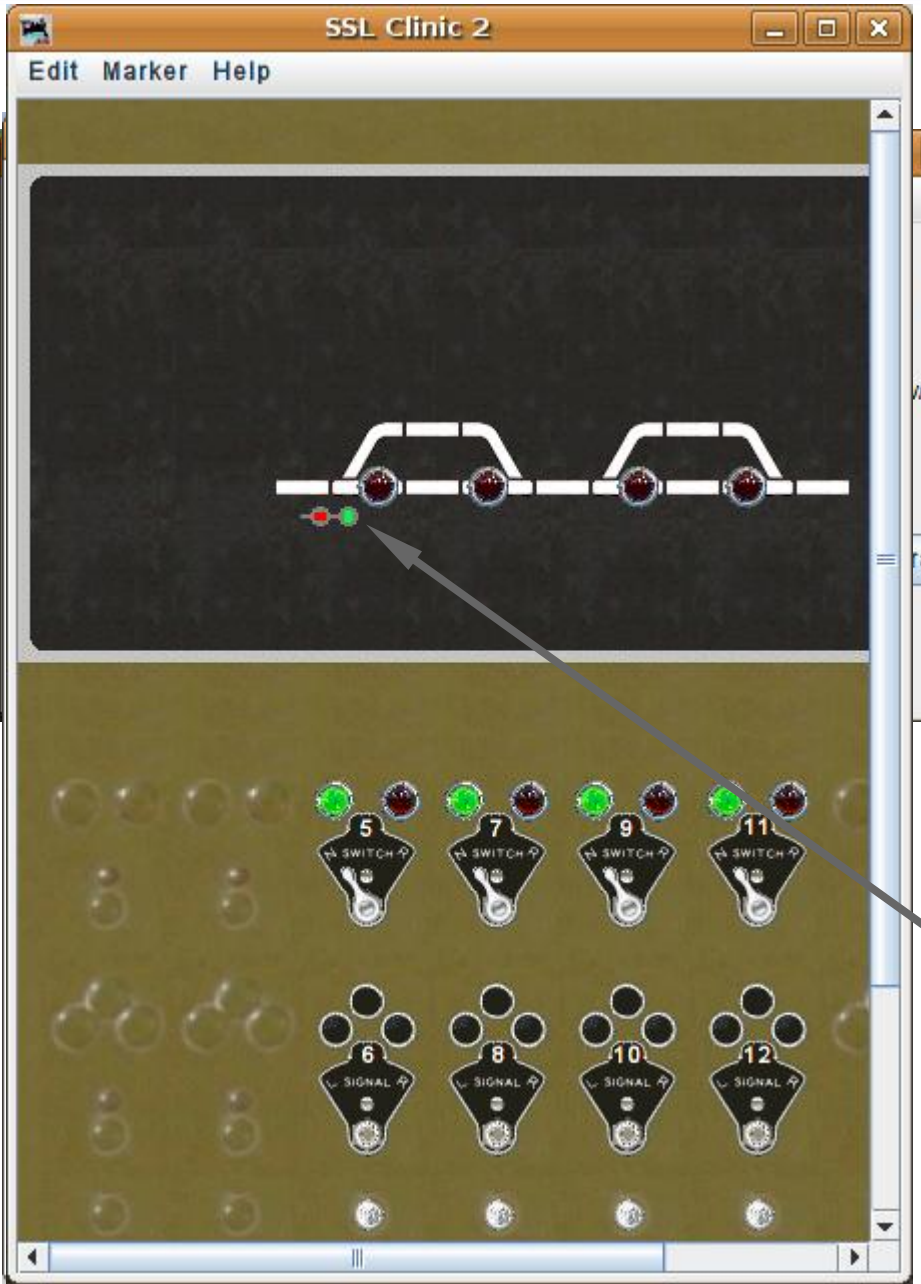

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  - Add the second head and place it above the first one.

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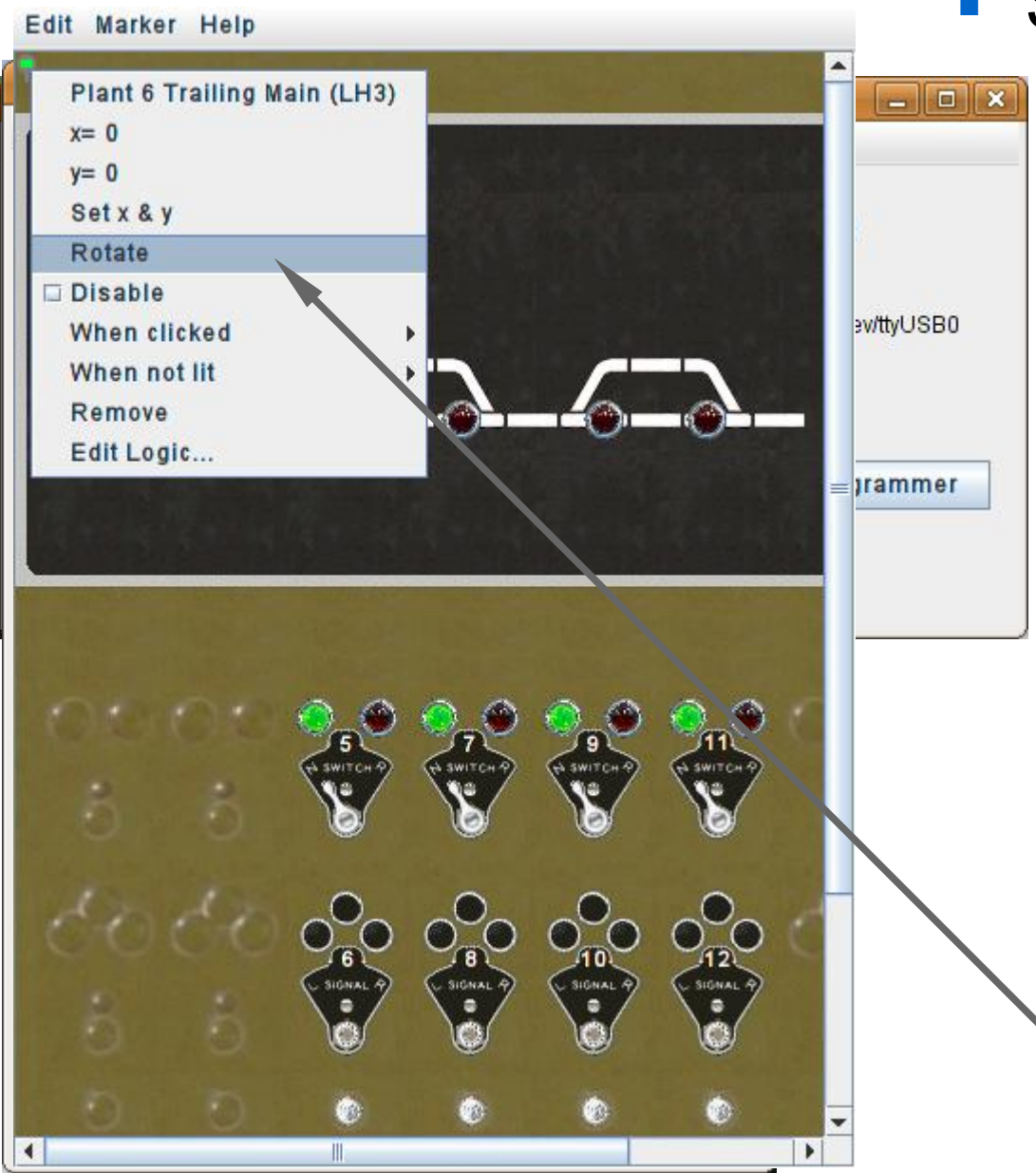

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  - Enter the first head. (LH1) 'Facing Diverging' will be the lower signal of 2 heads.
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  - #3 and #4 need rotating.

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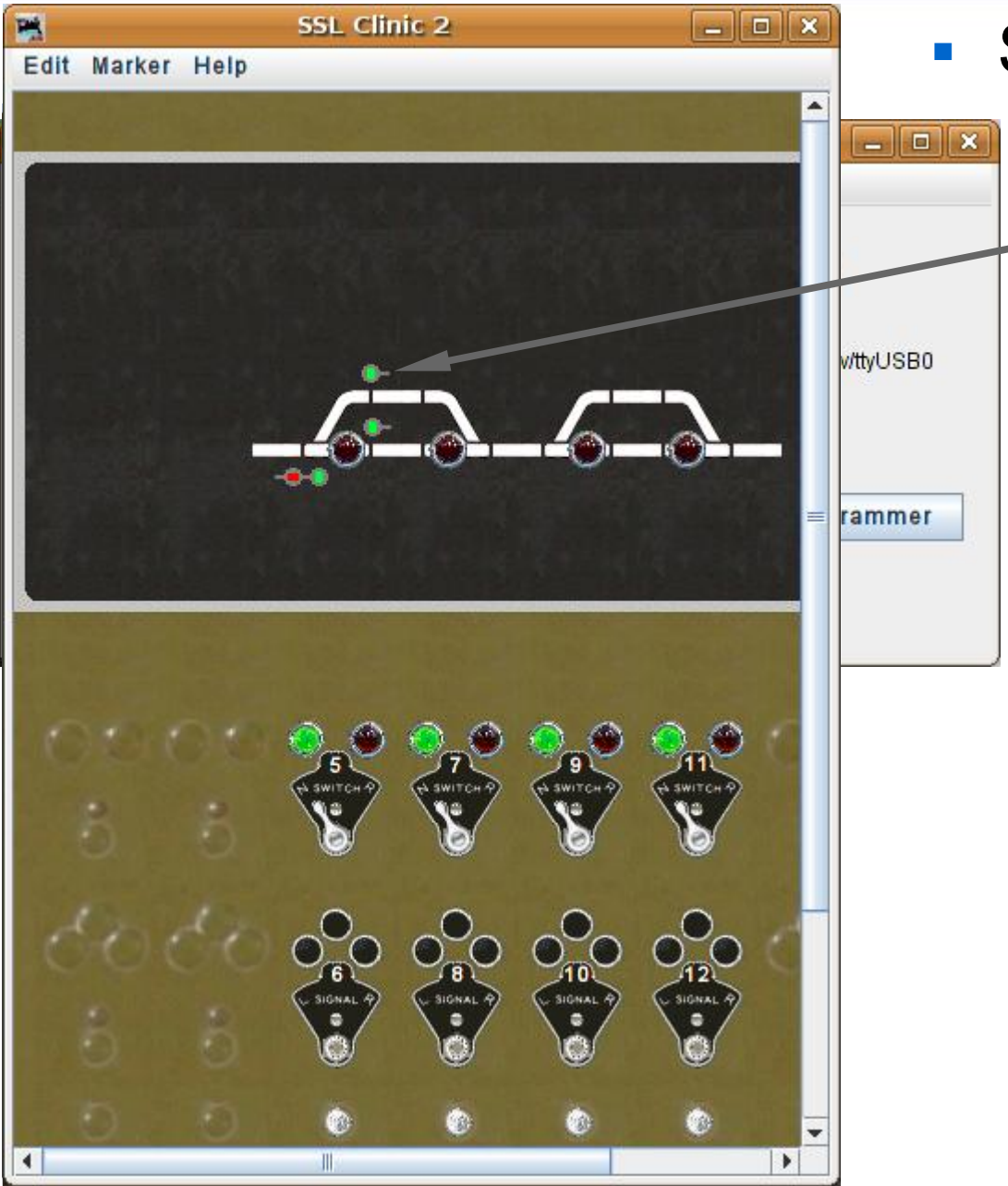

- Signal head basics
  - Continue to place your signals, rotating them as required.

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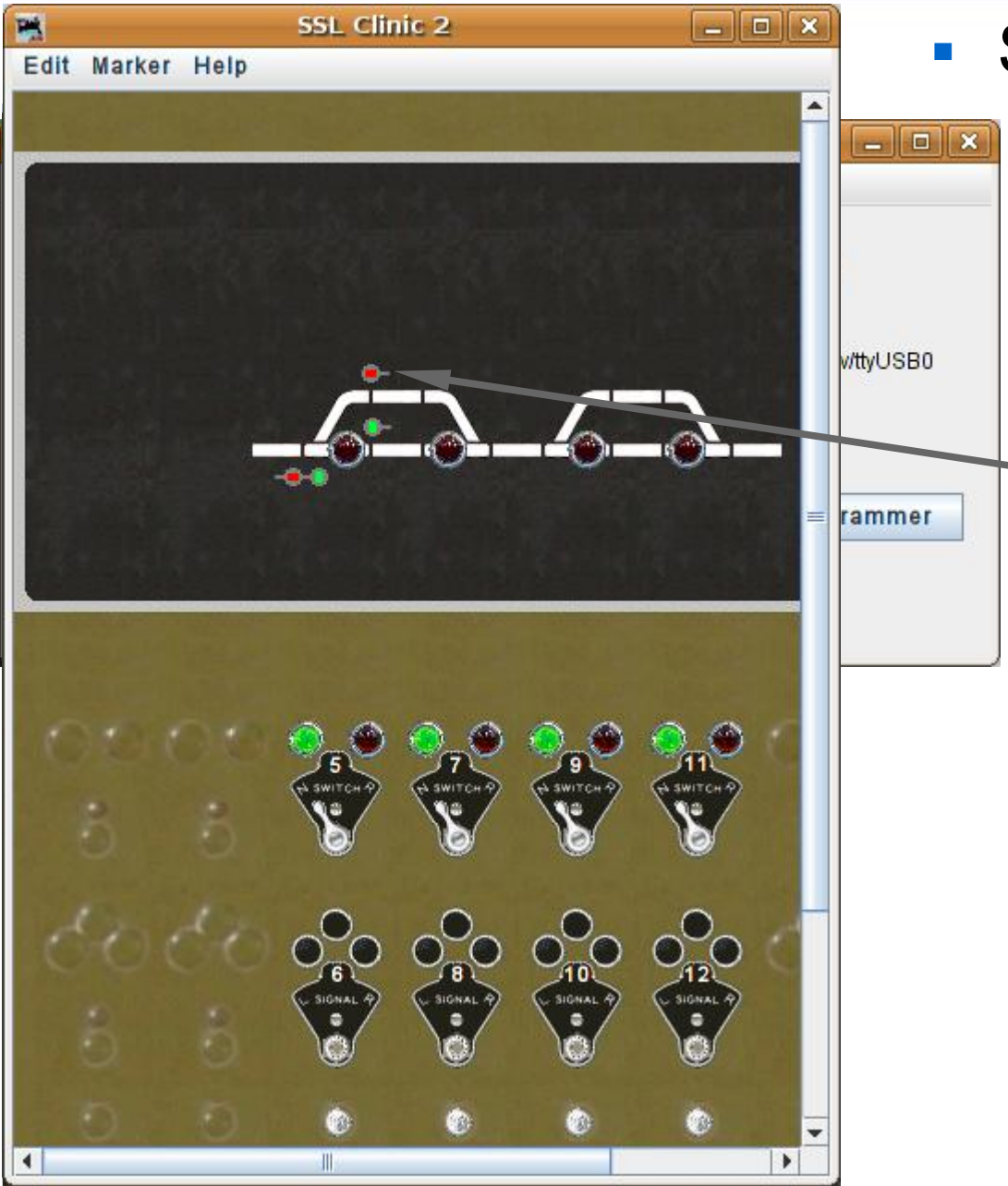

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  - Clicking on the images will change the signals on your layout. This allows you to easily check your locations.

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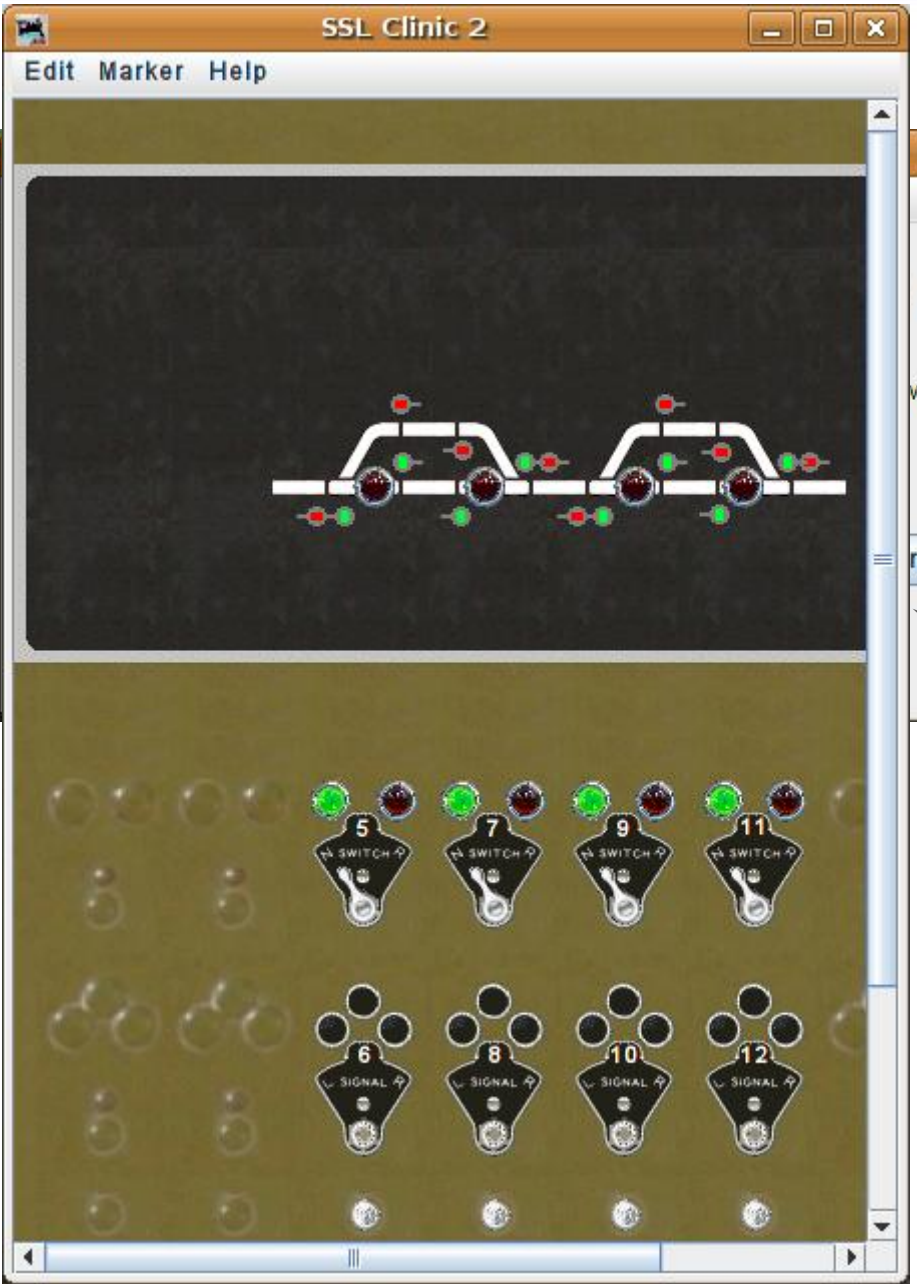

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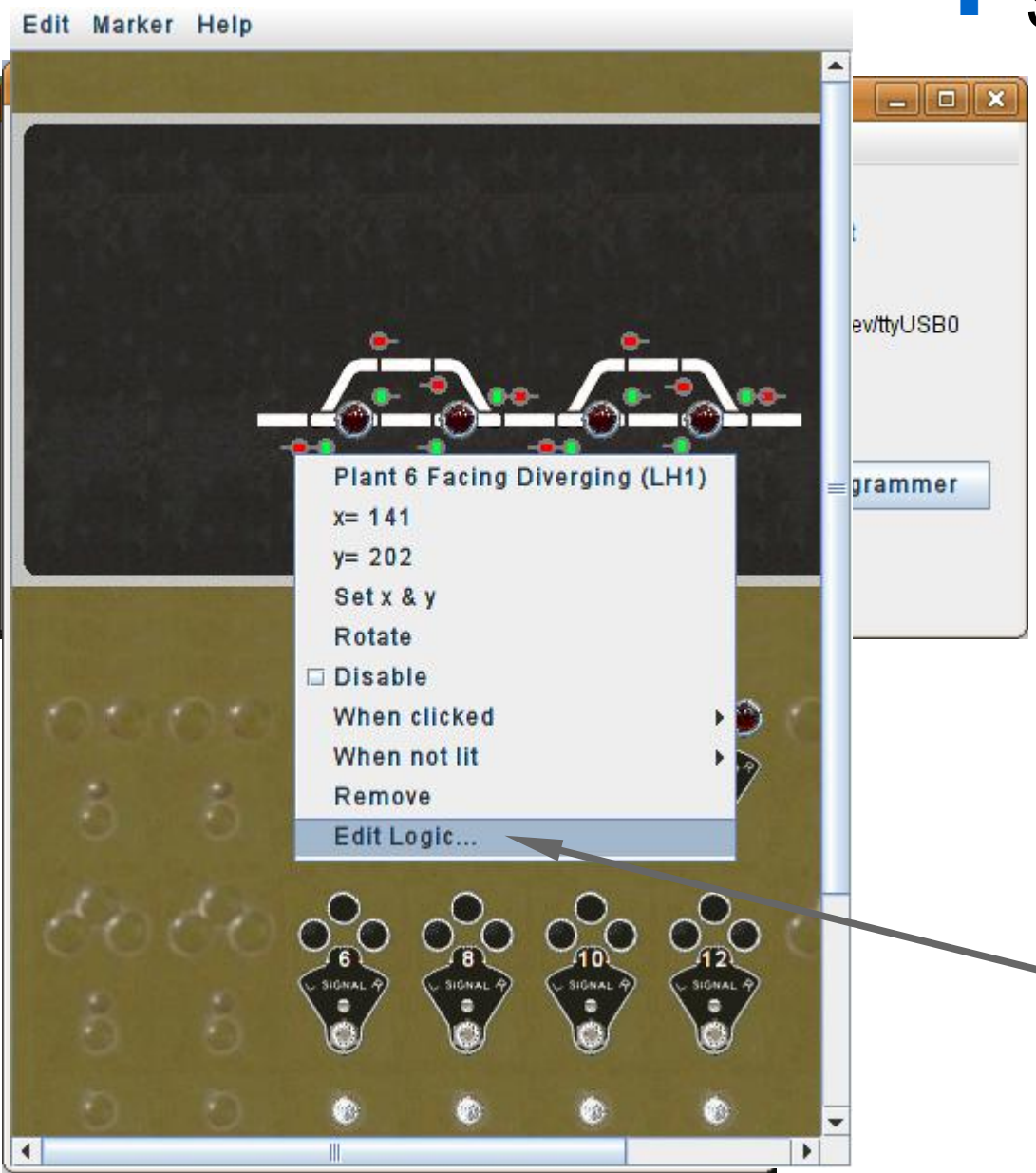
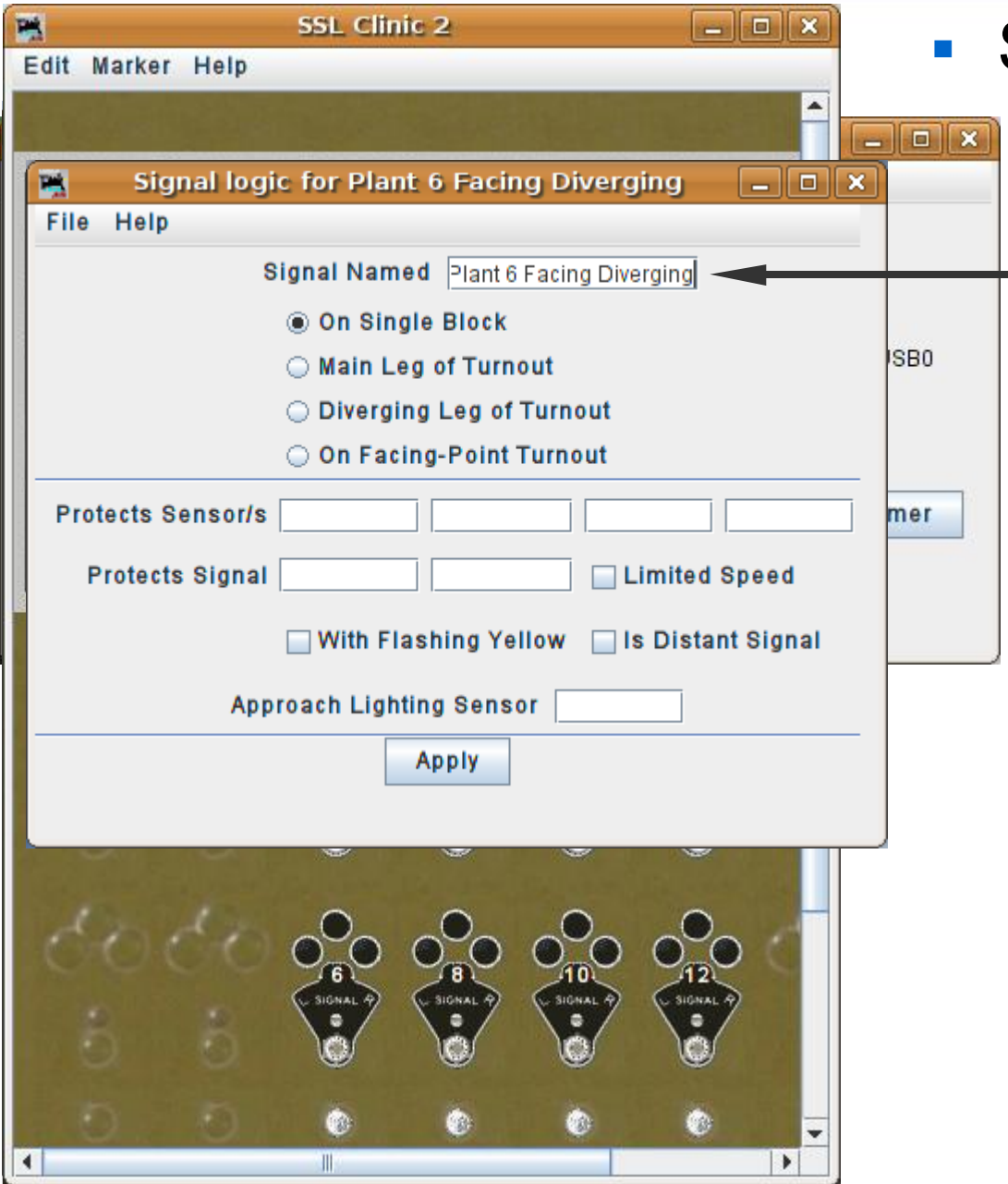
  - This is another good point to save your work.

SSL (Simple Signal Logic)



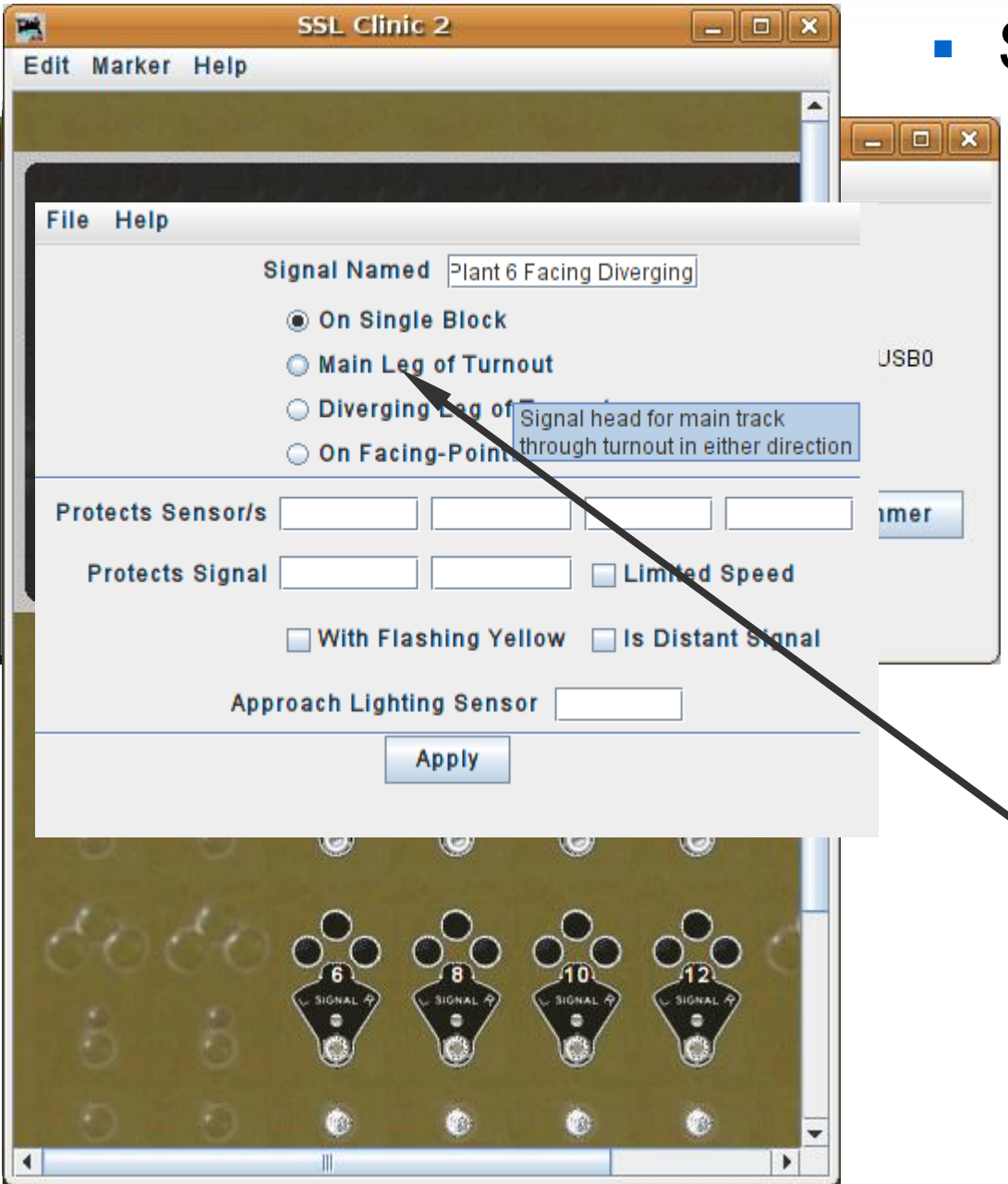
- Signal Logic
  - Continue to place your signals, rotating them as required.
  - Clicking on the images will change the signals on your layout. This allows you to easily check your locations.
  - This is another good point to save your work.
  - The easiest way to open up the SSL for each signal head is to simply right click on the image and select 'Edit Logic',

SSL (Simple Signal Logic)



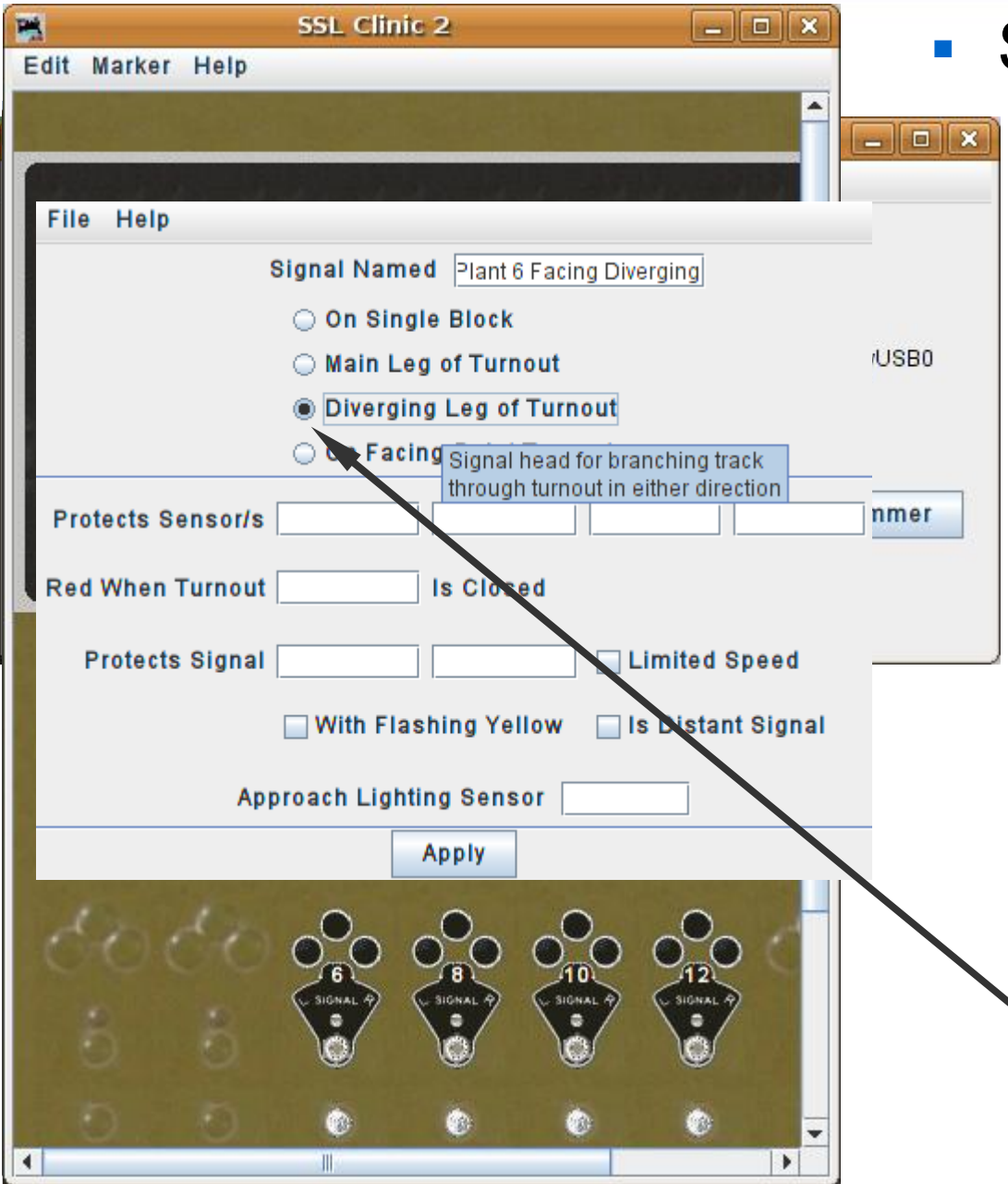
- Signal Logic
  - This automatically brings up the SSL edit window for the selected signal head.
  - First select the proper mode for this signal head.

SSL (Simple Signal Logic)



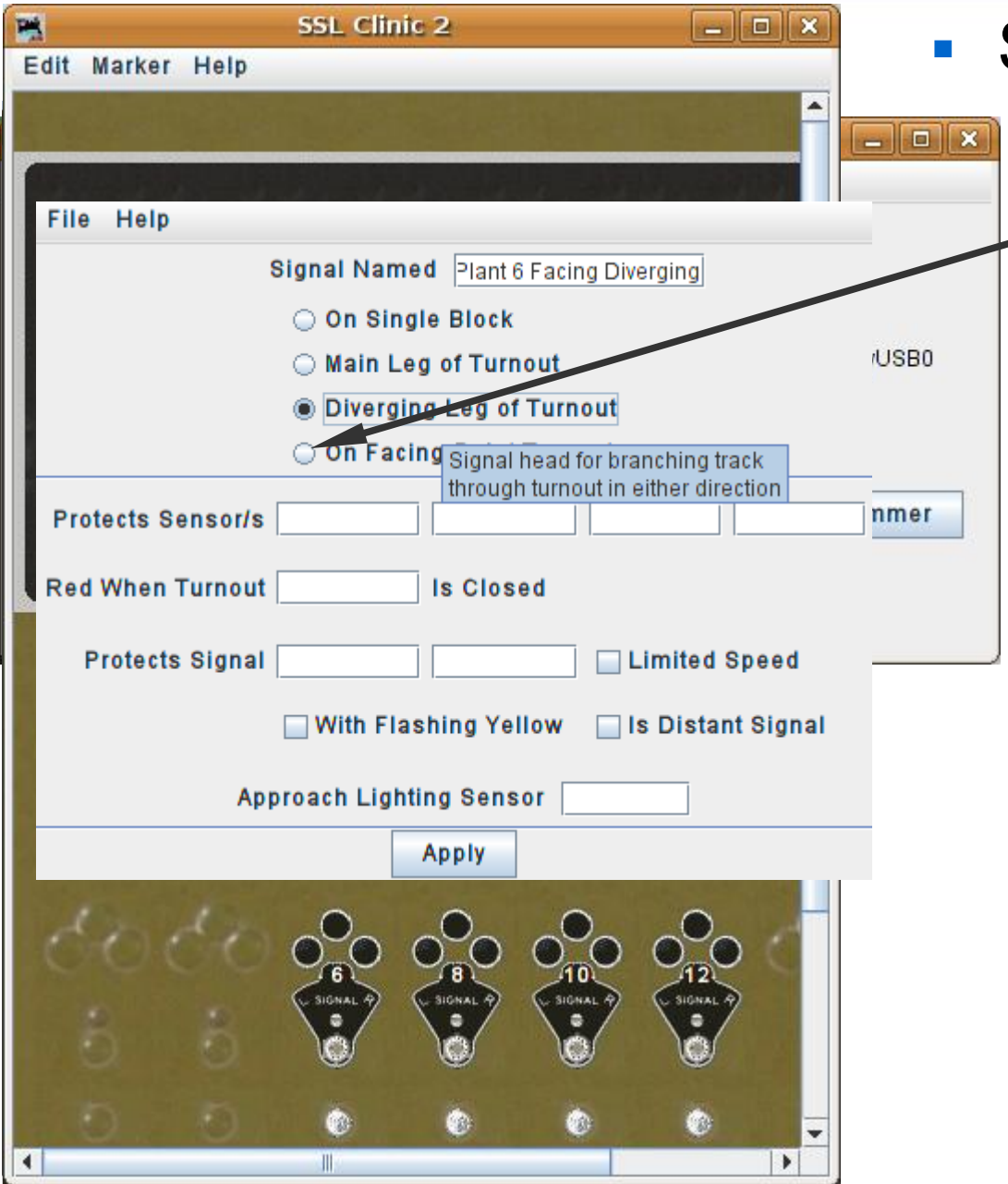
- Signal Logic
  - This automatically brings up the SSL edit window for the selected signal head.
  - First select the proper mode for this signal head.
  - There is pop up help for virtually every item in the SSL editor to help you understand the function of each item. Simply pause your mouse over the item in question.

SSL (Simple Signal Logic)



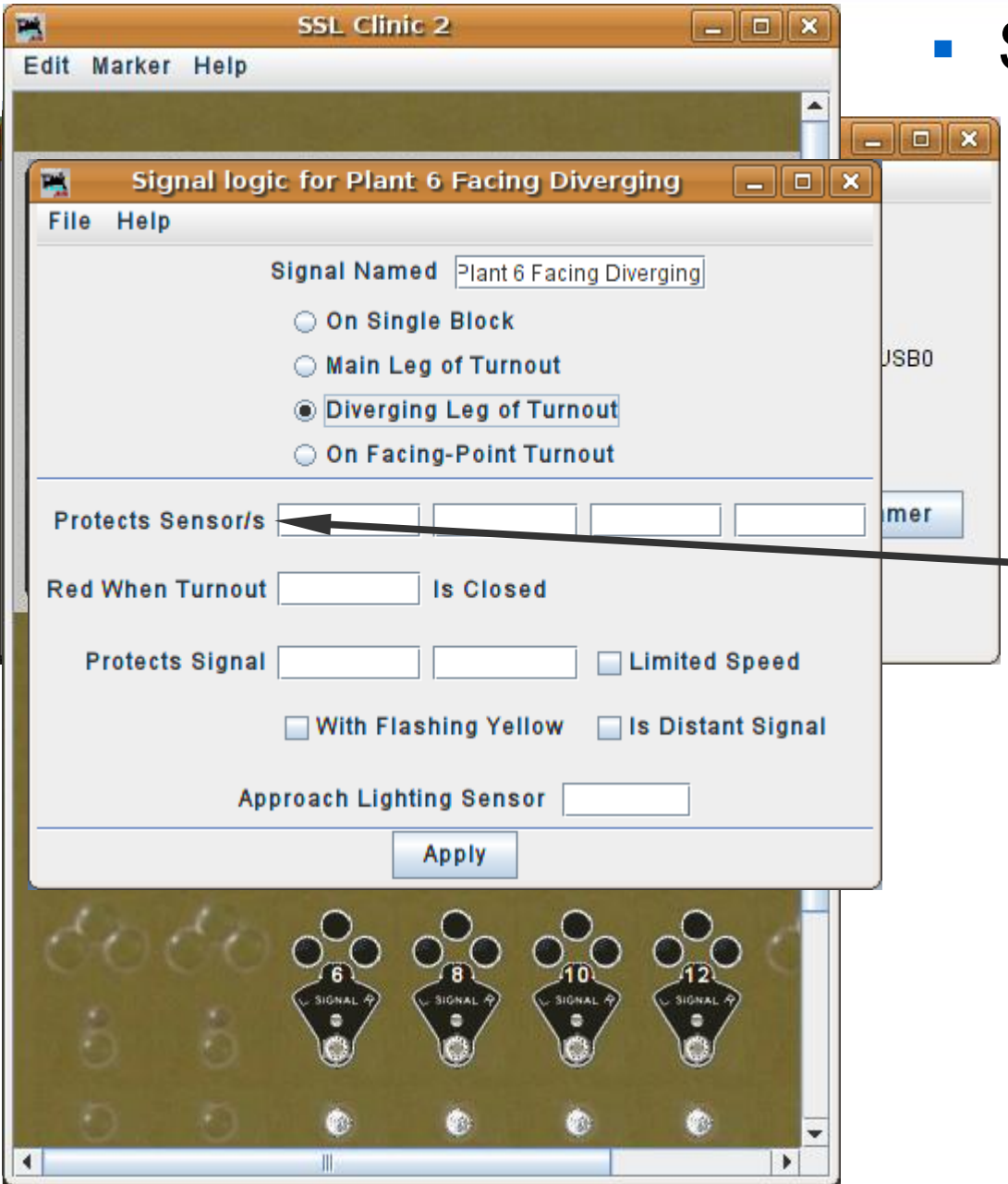
- Signal Logic
  - This automatically brings up the SSL edit window for the selected signal head.
  - First select the proper mode for this signal head.
  - There is pop up help for virtually every item in the SSL editor to help you understand the function of each item. Simply pause your mouse over the item in question.
  - This is the diverging leg.

SSL (Simple Signal Logic)



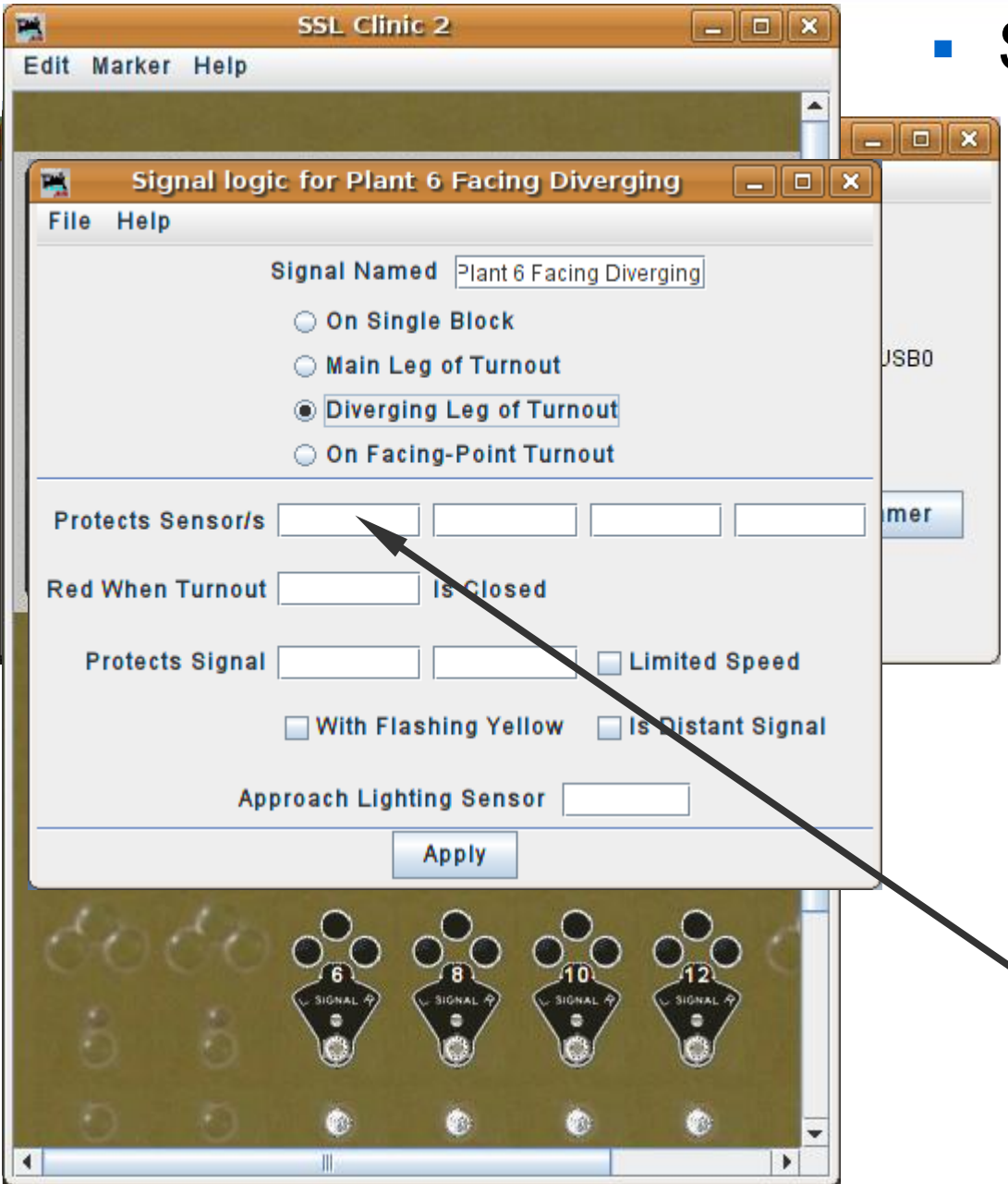
- Signal Logic
  - Do NOT choose 'On Facing-Point Turnout' unless you just have a single head controlling both routes.

SSL (Simple Signal Logic)



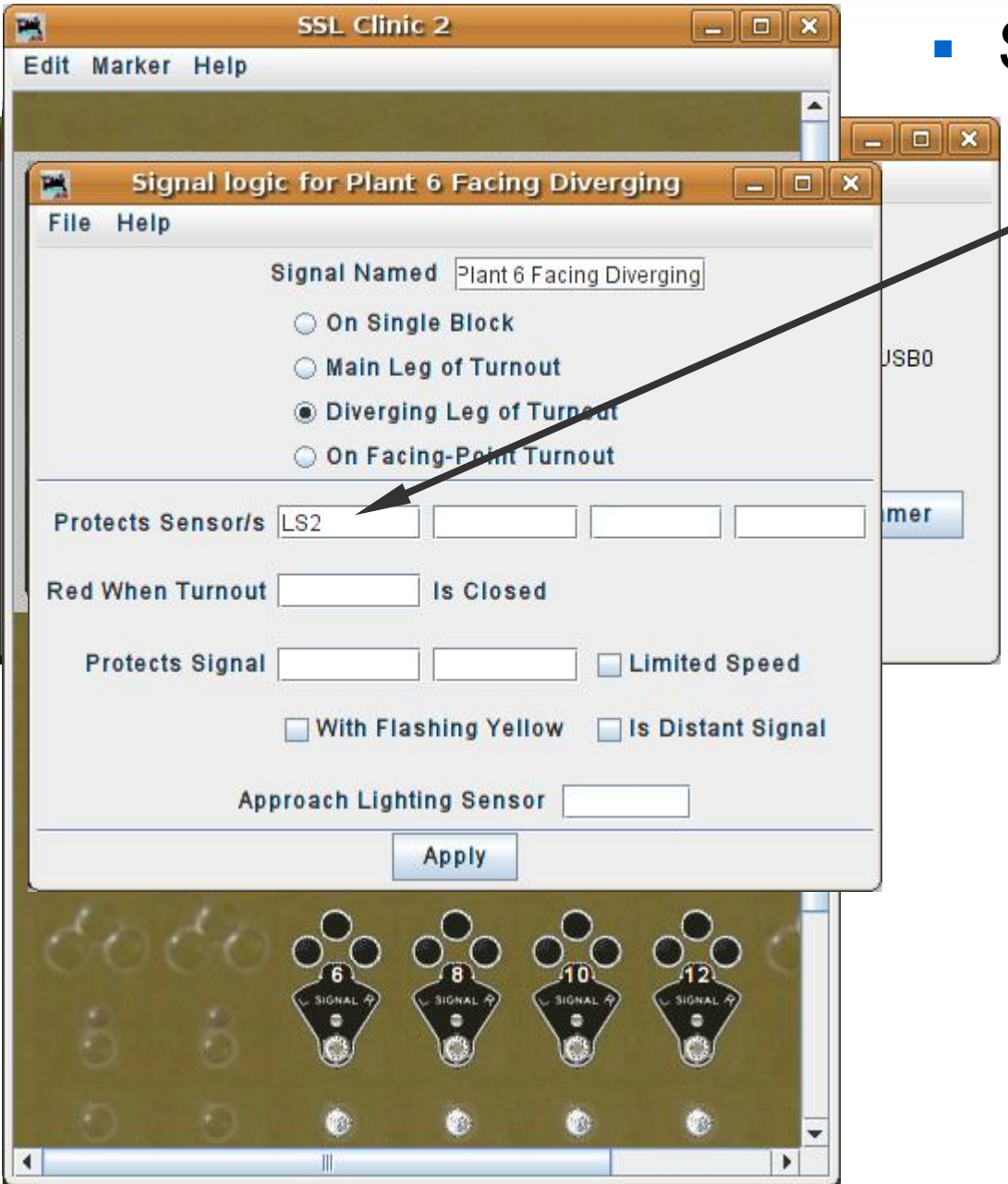
- Signal Logic
  - Do NOT choose 'On Facing-Point Turnout' unless you just have a single head controlling both routes.
  - 'Protects' means that a signal goes to 'stop' in front of these sensors when they are active. I.e. It is the track that is being protected from any train that might be entering it.

SSL (Simple Signal Logic)



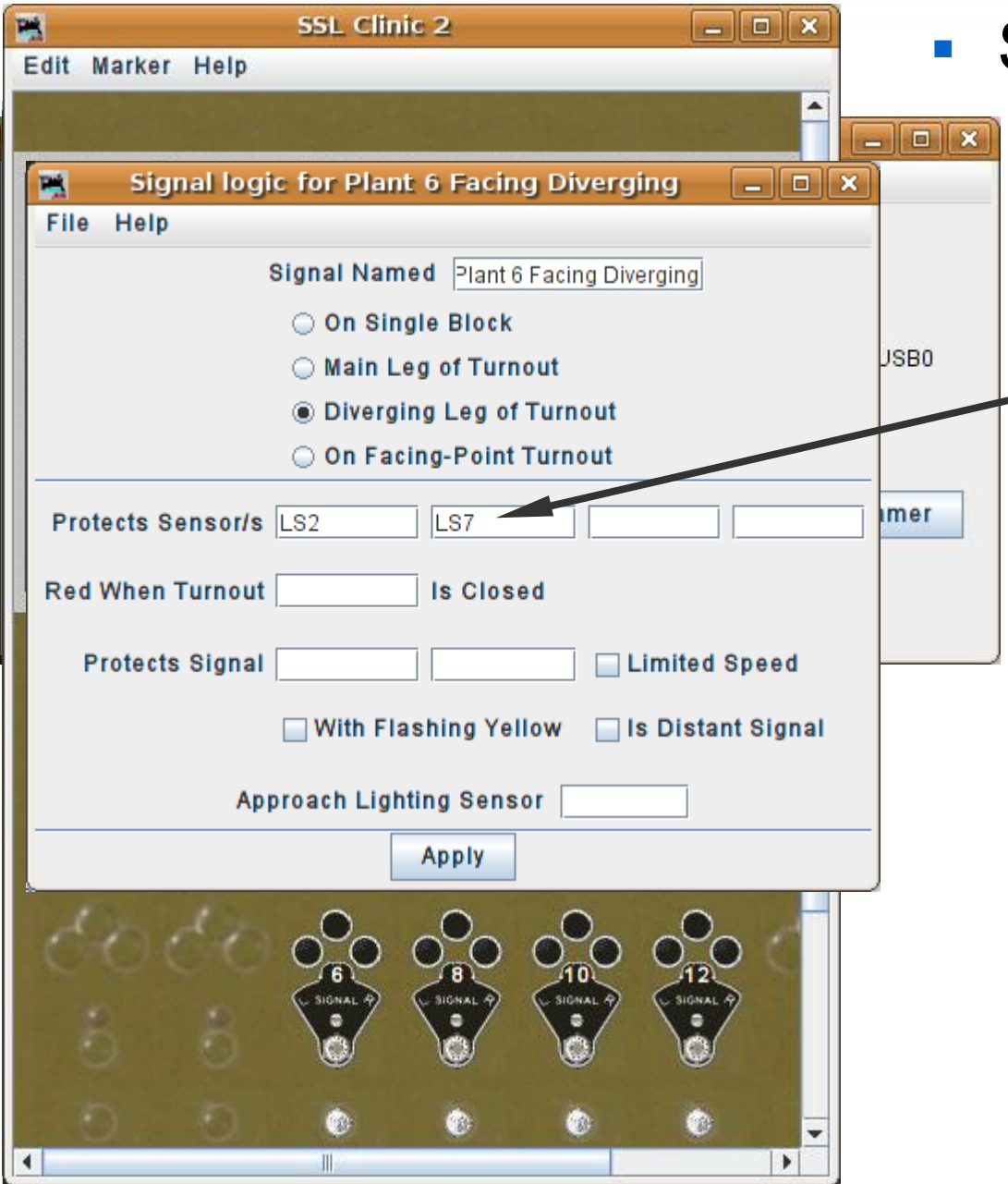
- Signal Logic
  - Do NOT choose 'On Facing-Point Turnout' unless you just have a single head controlling both routes.
  - 'Protects' means that a signal goes to 'stop' in front of these sensors when they are active. I.e. It is the track that is being protected from any train that might be entering it.
  - One reason, if the OS is already occupied.

SSL (Simple Signal Logic)



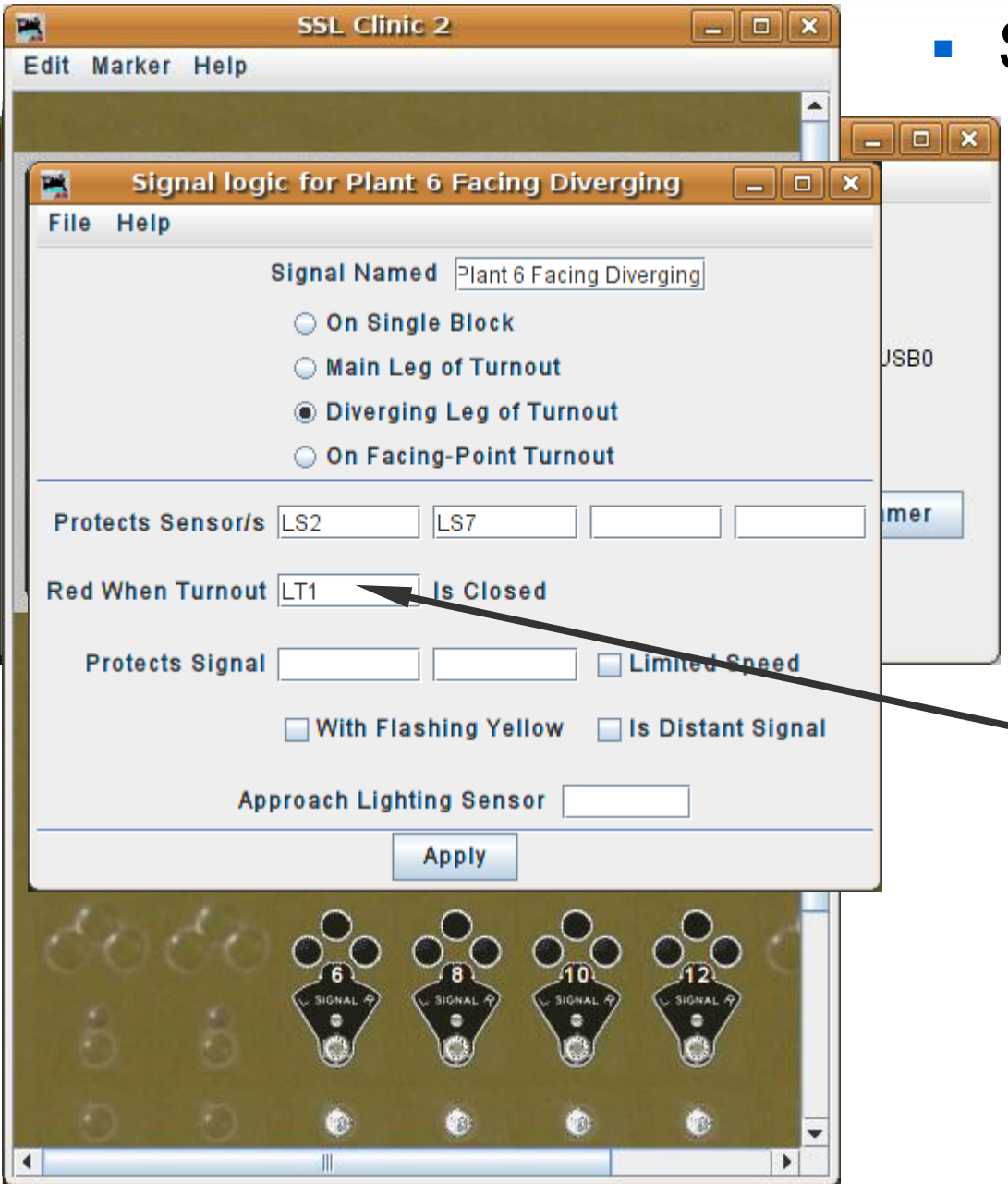
- Signal Logic
  - Enter the sensor for the OS which is LS2.

SSL (Simple Signal Logic)



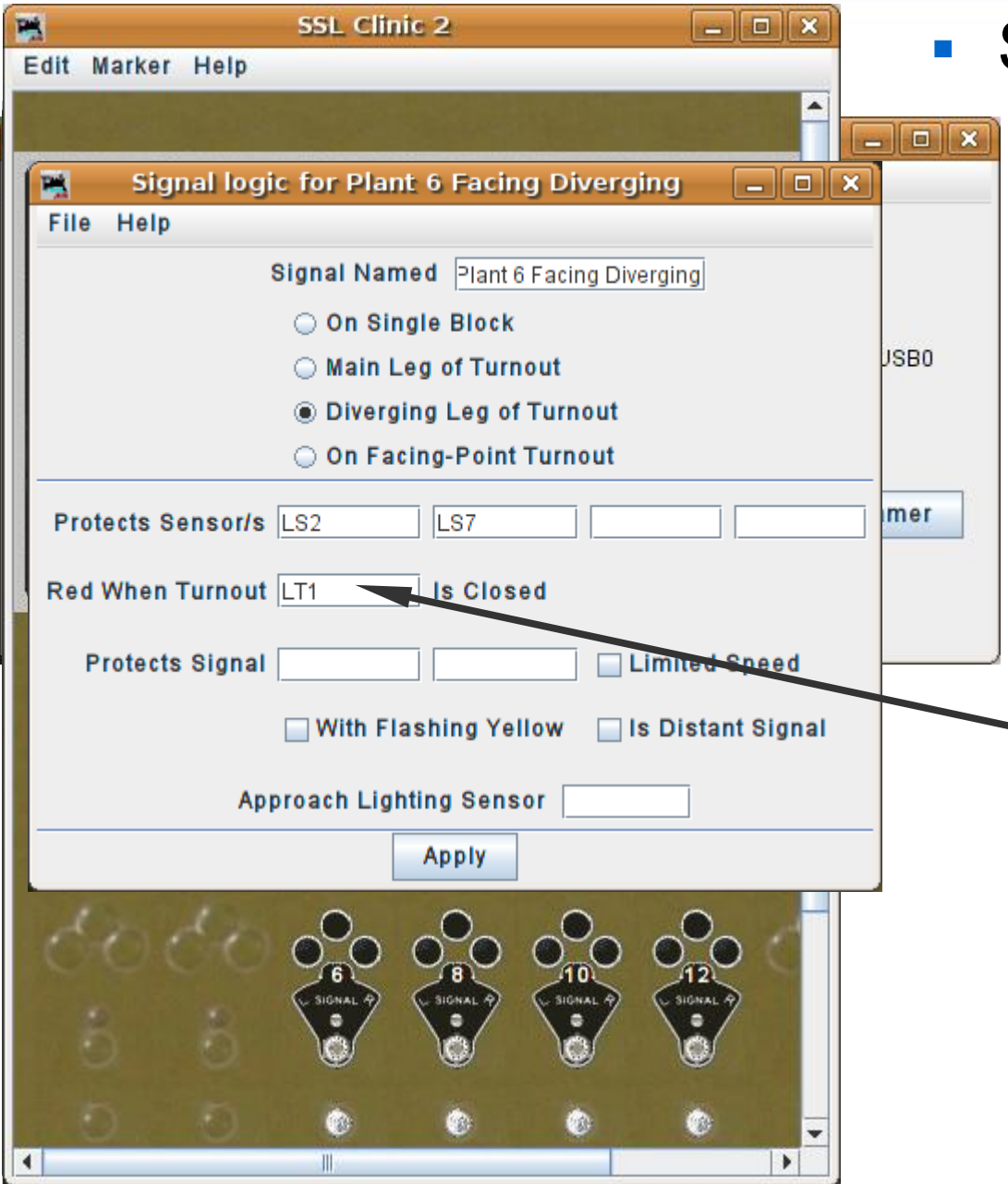
- Signal Logic
  - Enter the sensor for the OS which is LS2.
  - This signal head is for the diverging route, so it also needs to protect the siding, i.e. LS7.

SSL (Simple Signal Logic)



- Signal Logic
  - Enter the sensor for the OS which is LS2.
  - This signal head is for the diverging route, so it also needs to protect the siding, i.e. LS7.
  - Of course we need to know what turnout is involved, so we enter LT1.

SSL (Simple Signal Logic)



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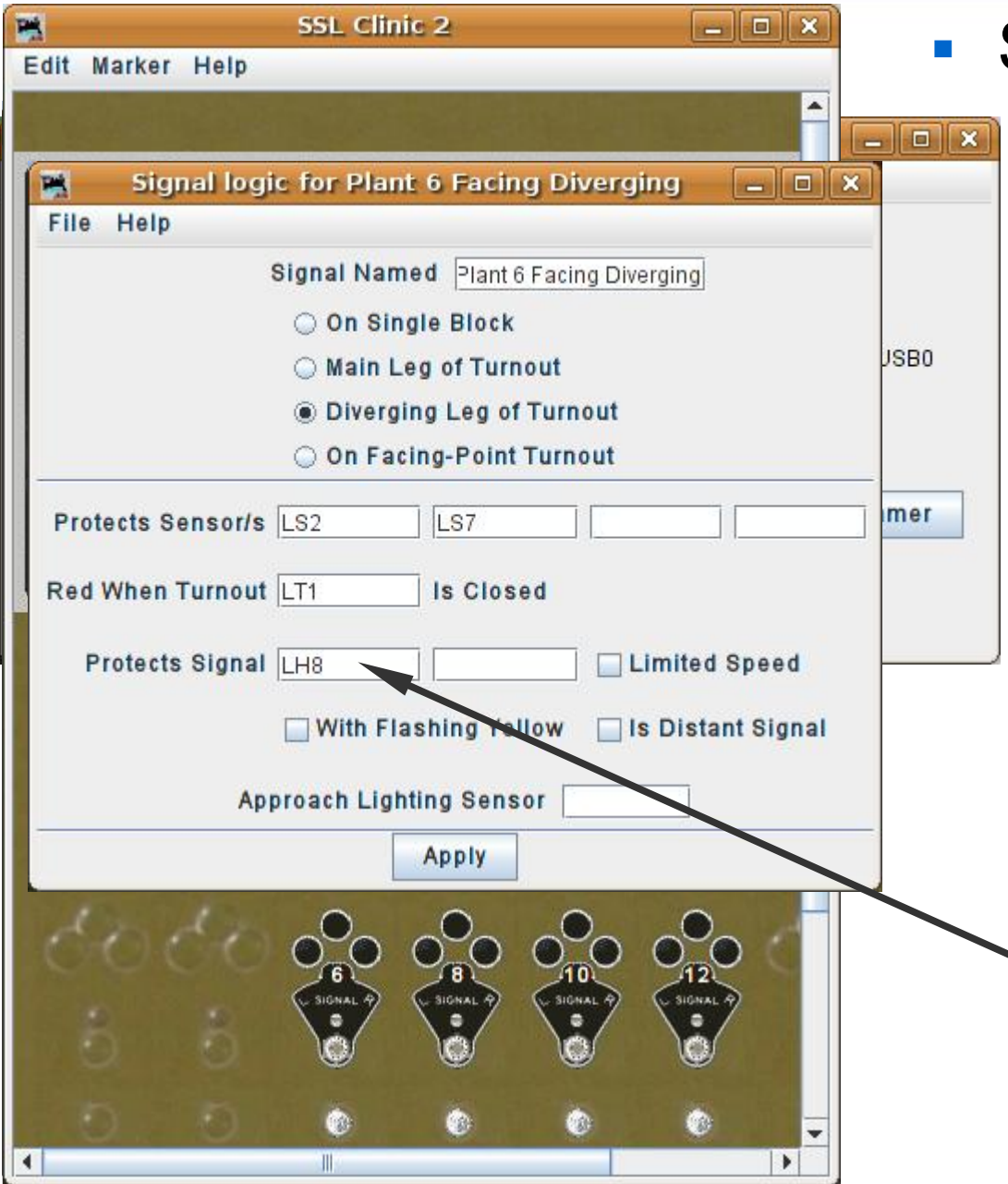
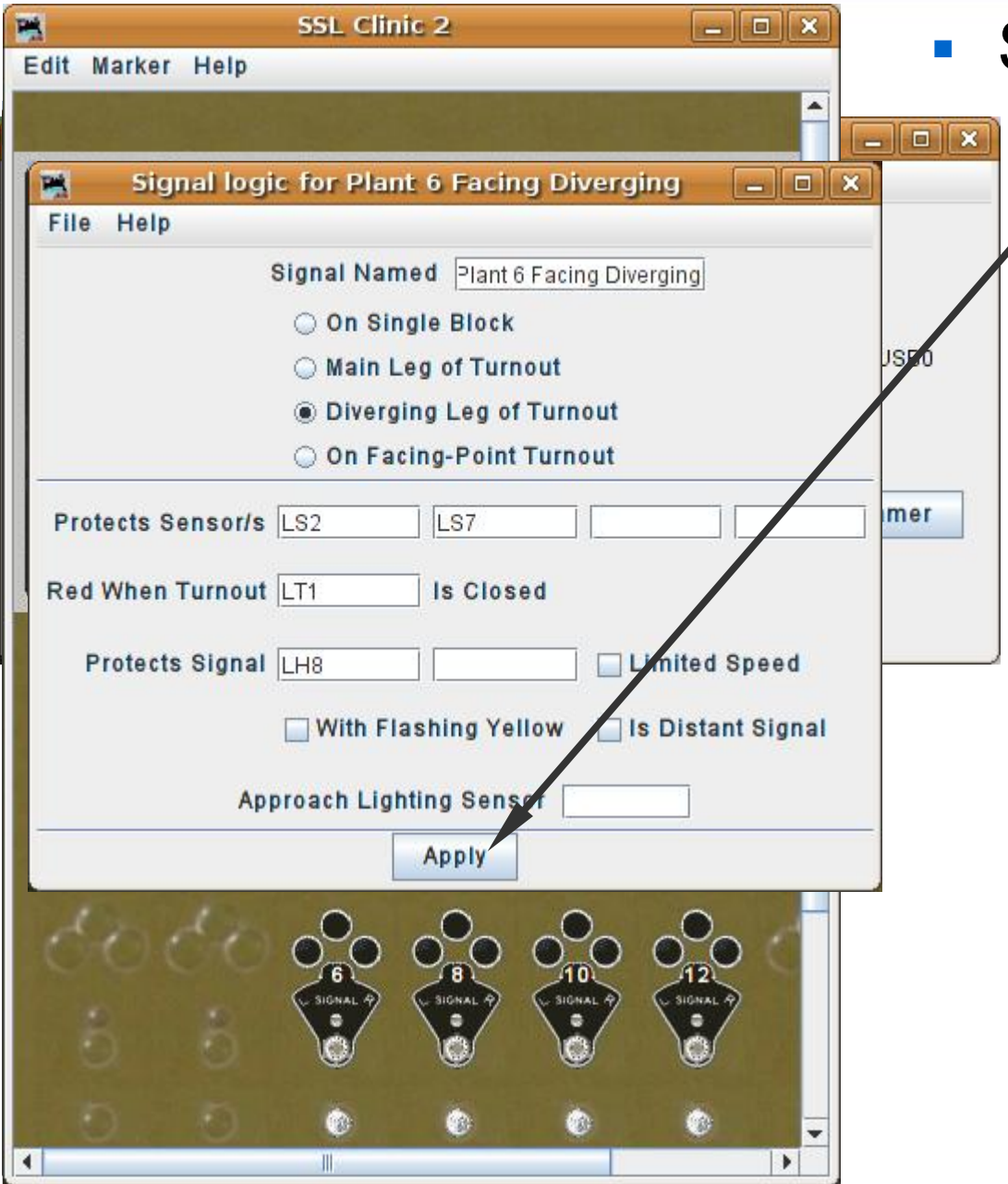
SSL (Simple Signal Logic)



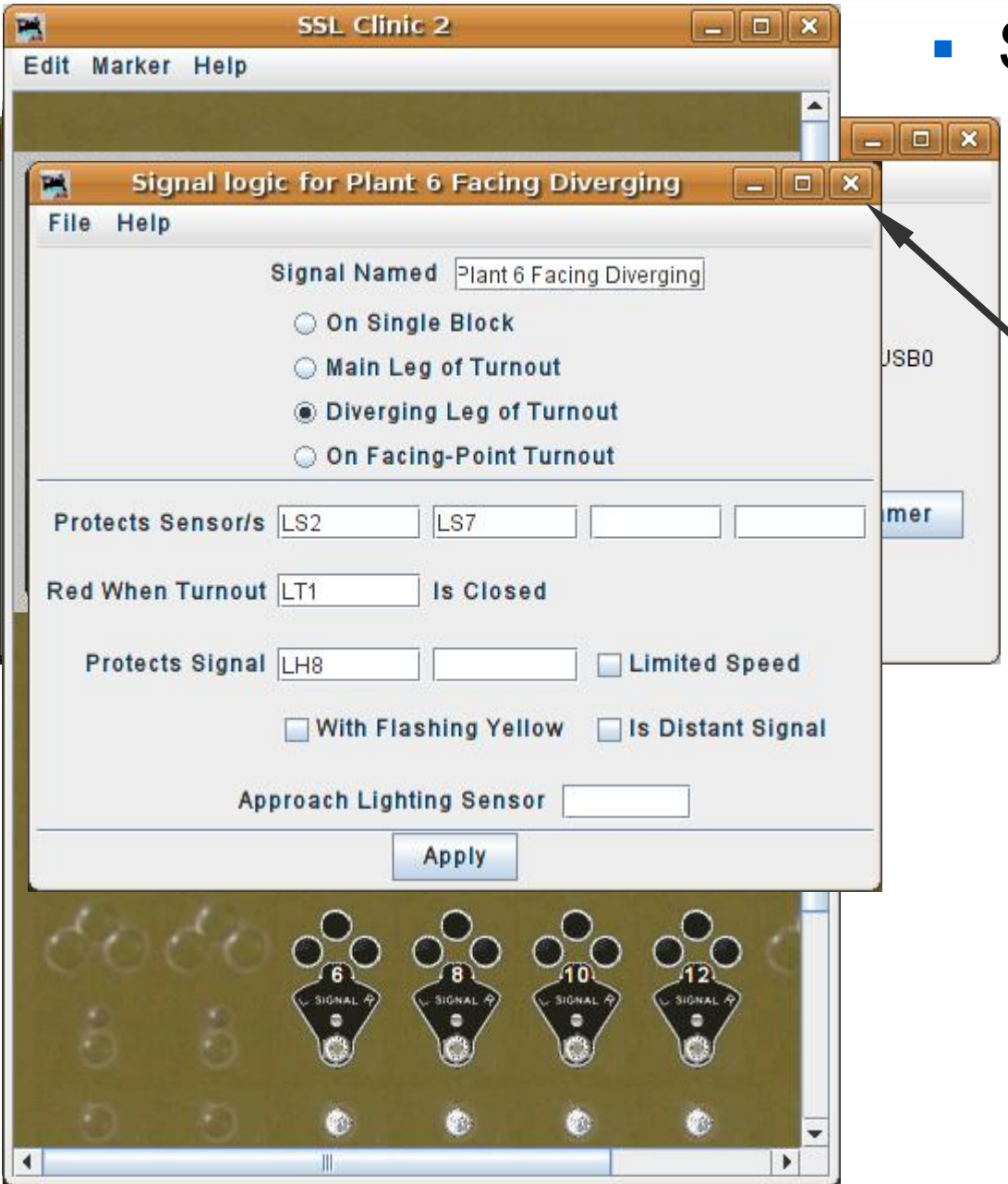
- Signal Logic
  - Enter the sensor for the OS which is LS2.
  - This signal head is for the diverging route, so it also needs to protect the siding, i.e. LS7.
  - Of course we need to know what turnout is involved, so we enter LT1.
  - Finally we need to know the next signal along *this* route. It is LH8 at the end of the diverging track.

SSL (Simple Signal Logic)



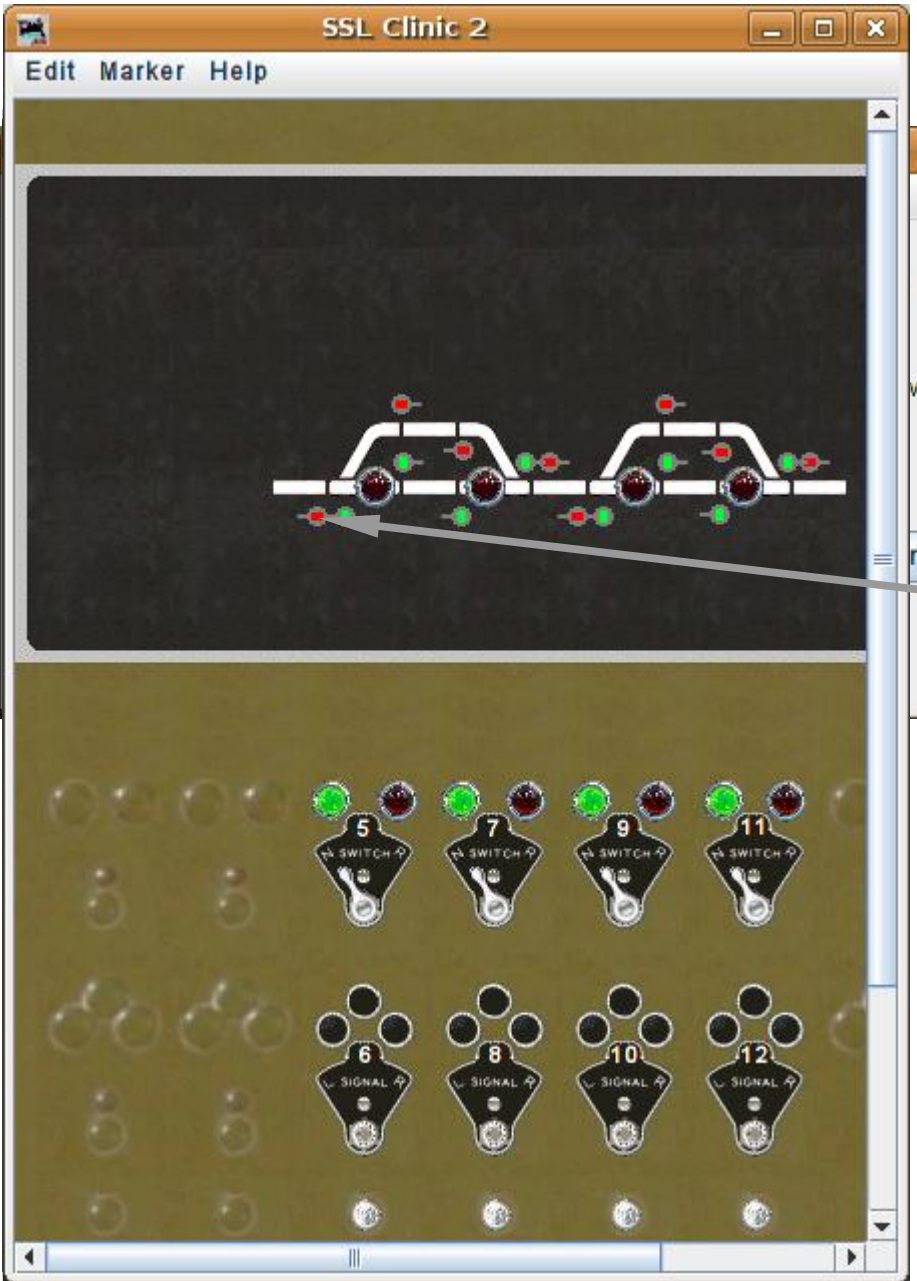
- Signal Logic
  - Click 'Apply' to update the logic for this head.

SSL (Simple Signal Logic)



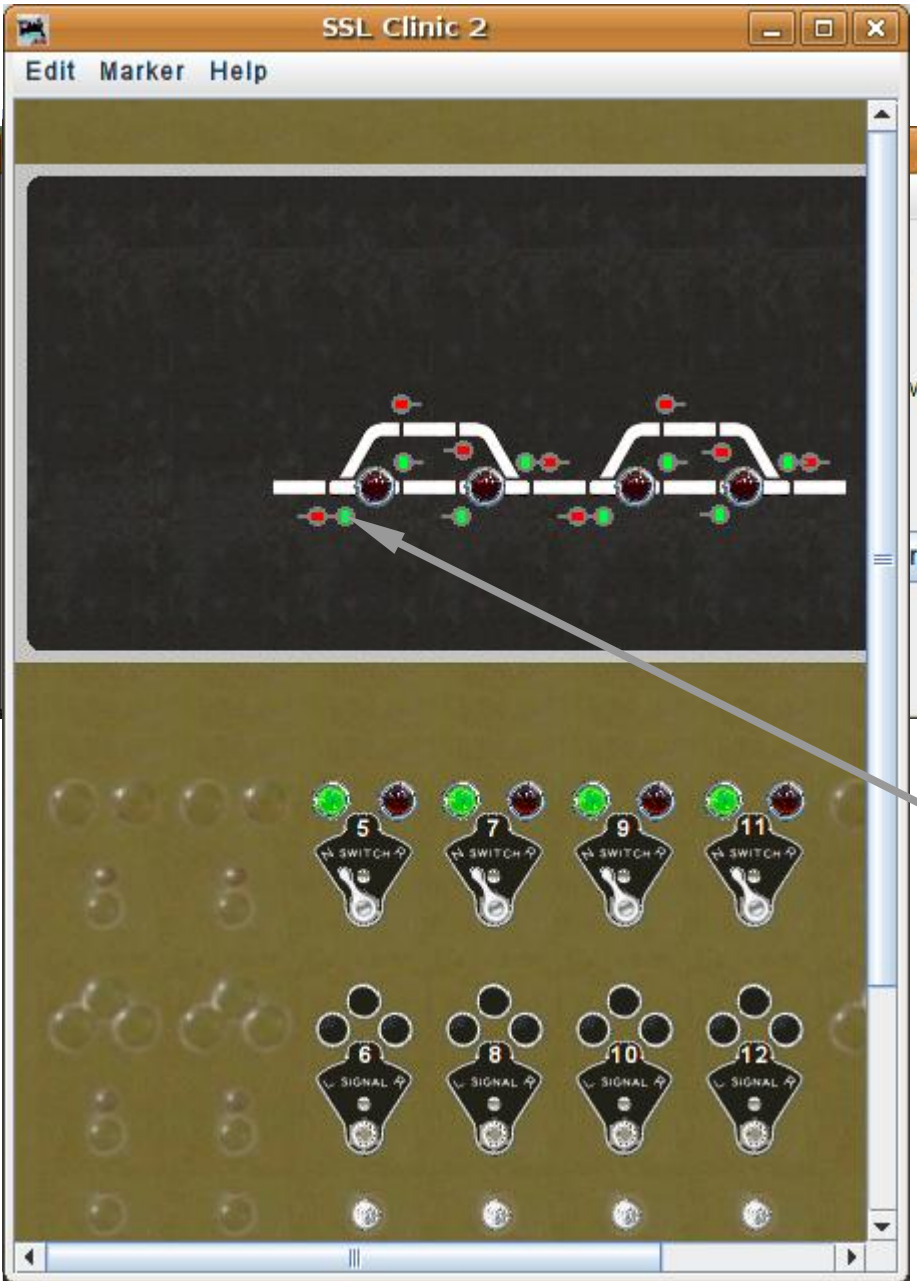
- Signal Logic
  - Click 'Apply' to update the logic for this head.
  - Close the edit window when done.

SSL (Simple Signal Logic)



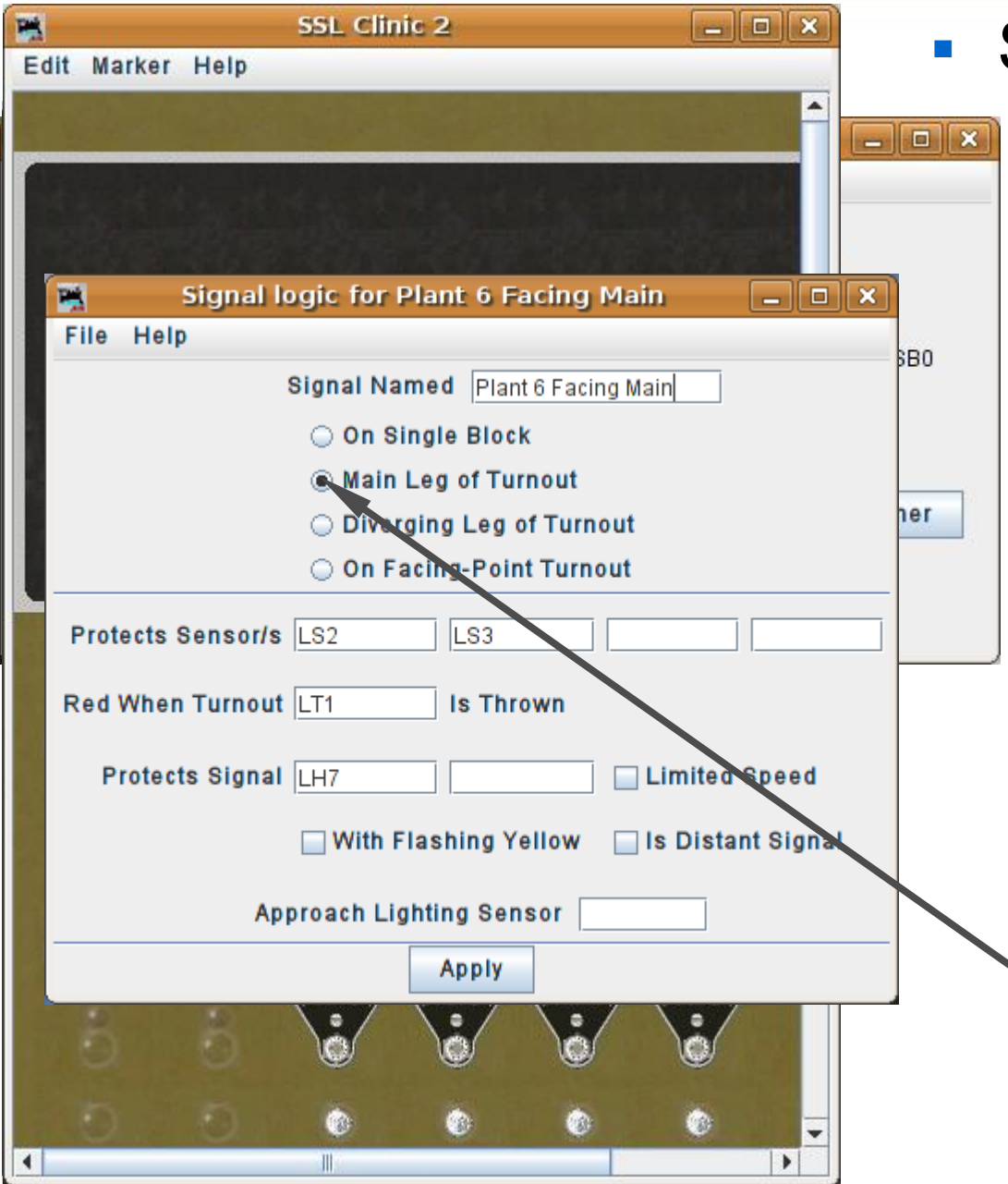
- Signal Logic
  - Click 'Apply' to update the logic for this head.
  - Close the edit window when done.
  - The signal is now red because the turnout is against traffic on the diverging route.

SSL (Simple Signal Logic)



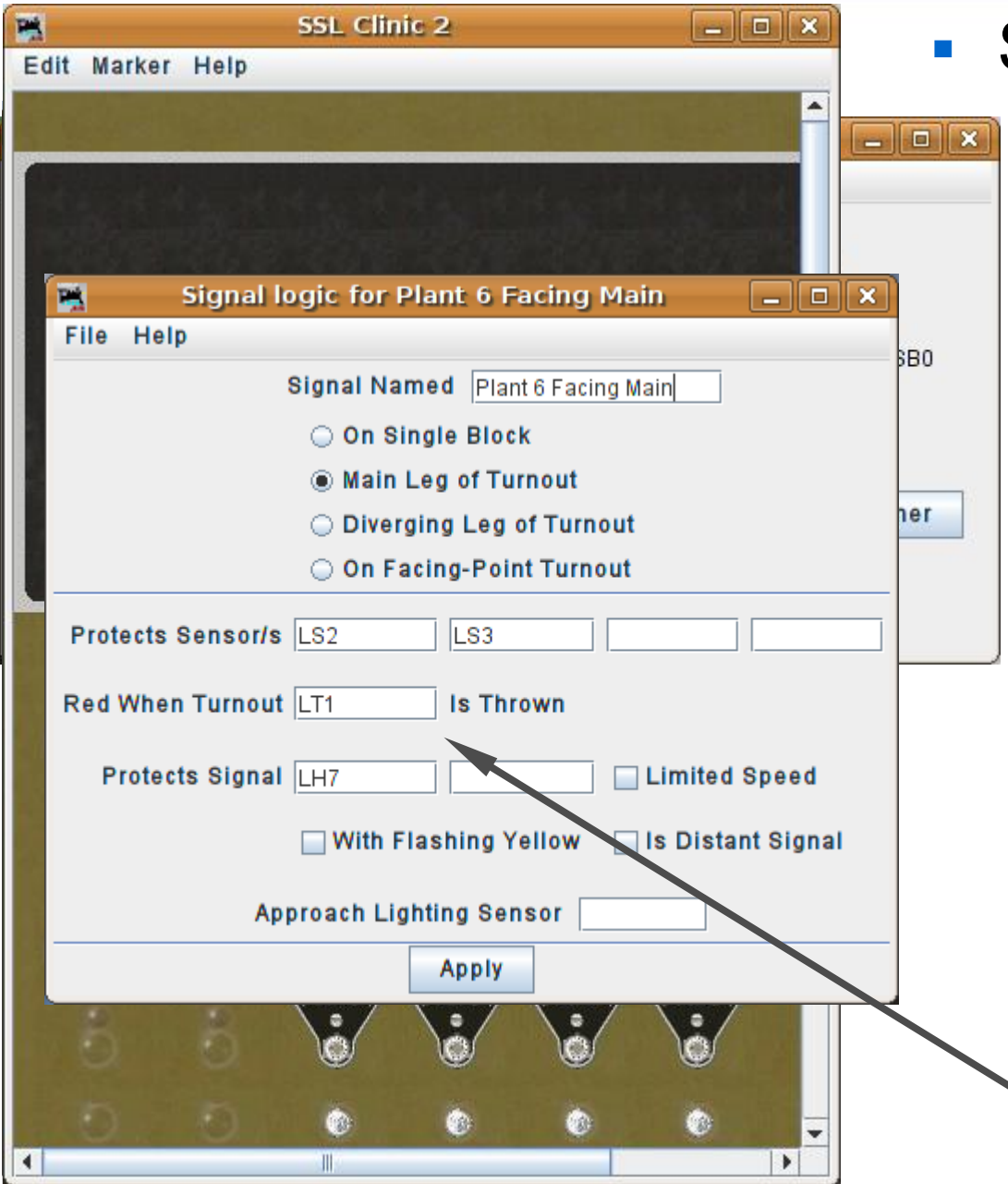
- Signal Logic
  - Click 'Apply' to update the logic for this head.
  - Close the edit window when done.
  - The signal is now red because the turnout is against traffic on the diverging route.
  - Right click the next head to bring up its edit window.

SSL (Simple Signal Logic)



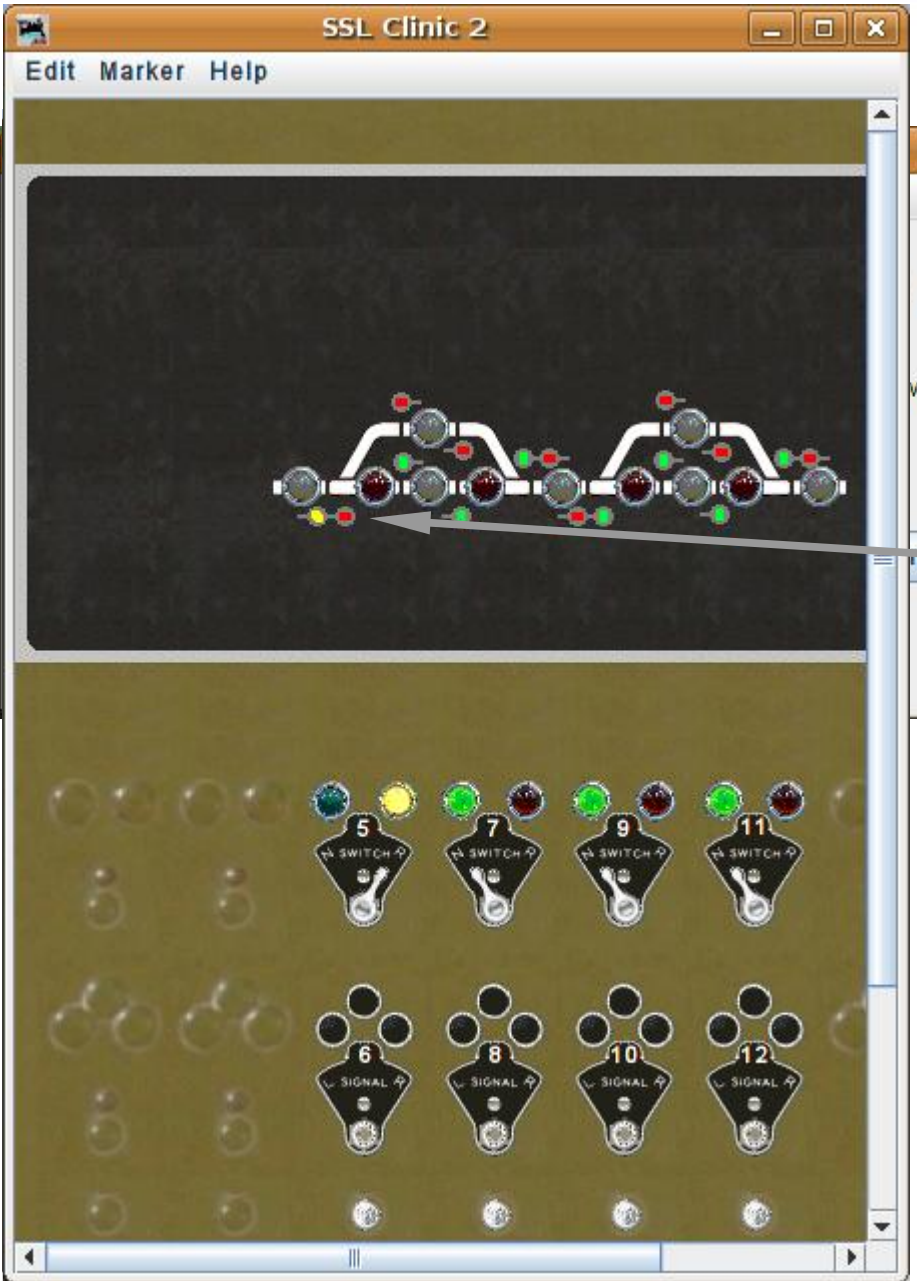
- Signal Logic
  - Click 'Apply' to update the logic for this head.
  - Close the edit window when done.
  - The signal is now red because the turnout is against traffic on the diverging route.
  - Right click the next head to bring up its edit window.
  - This is the 'main' leg of the route.

SSL (Simple Signal Logic)



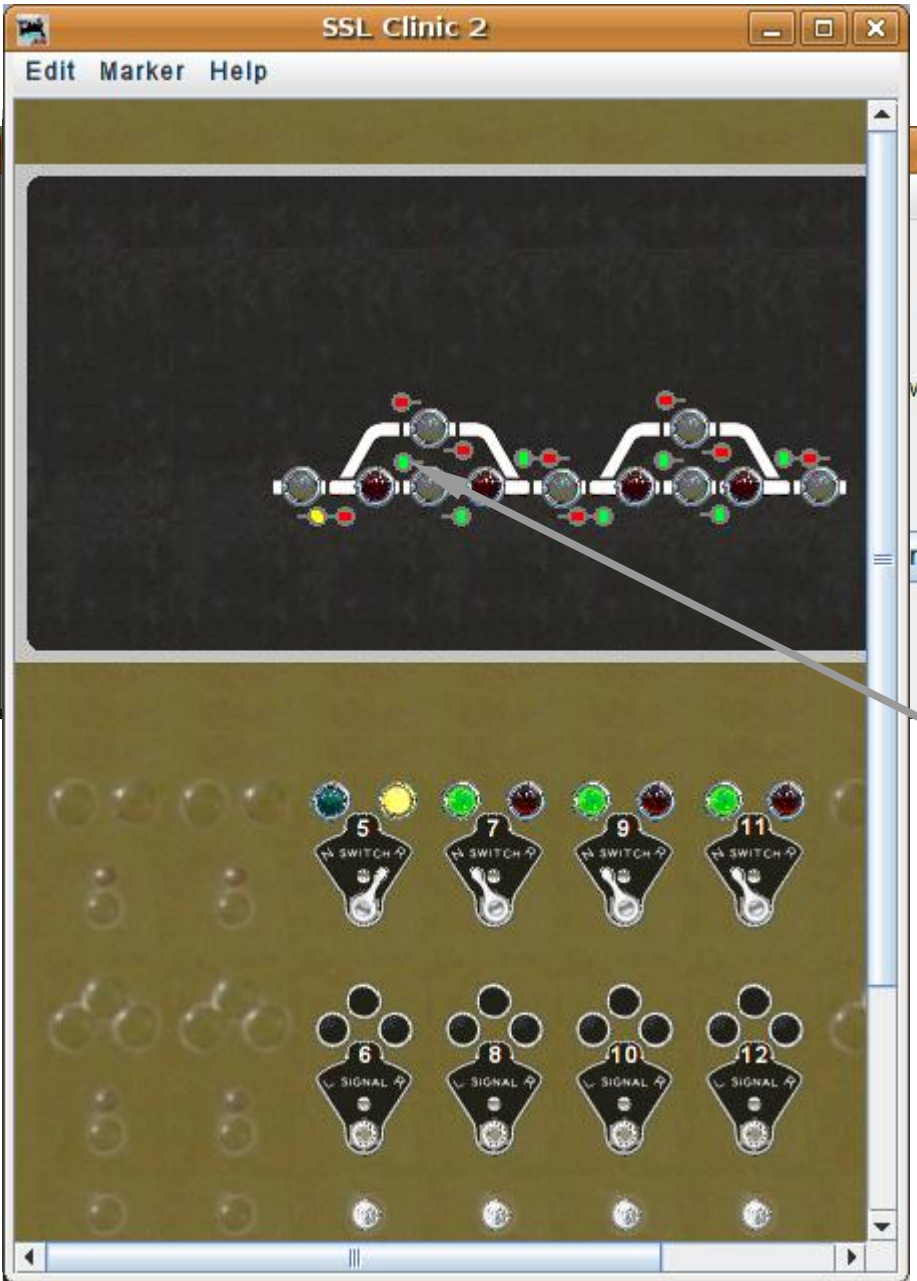
- Signal Logic
  - Click 'Apply' to update the logic for this head.
  - Close the edit window when done.
  - The signal is now red because the turnout is against traffic on the diverging route.
  - Right click the next head to bring up its edit window.
  - This is the 'main' leg of the route.
  - Add all the other info.

SSL (Simple Signal Logic)



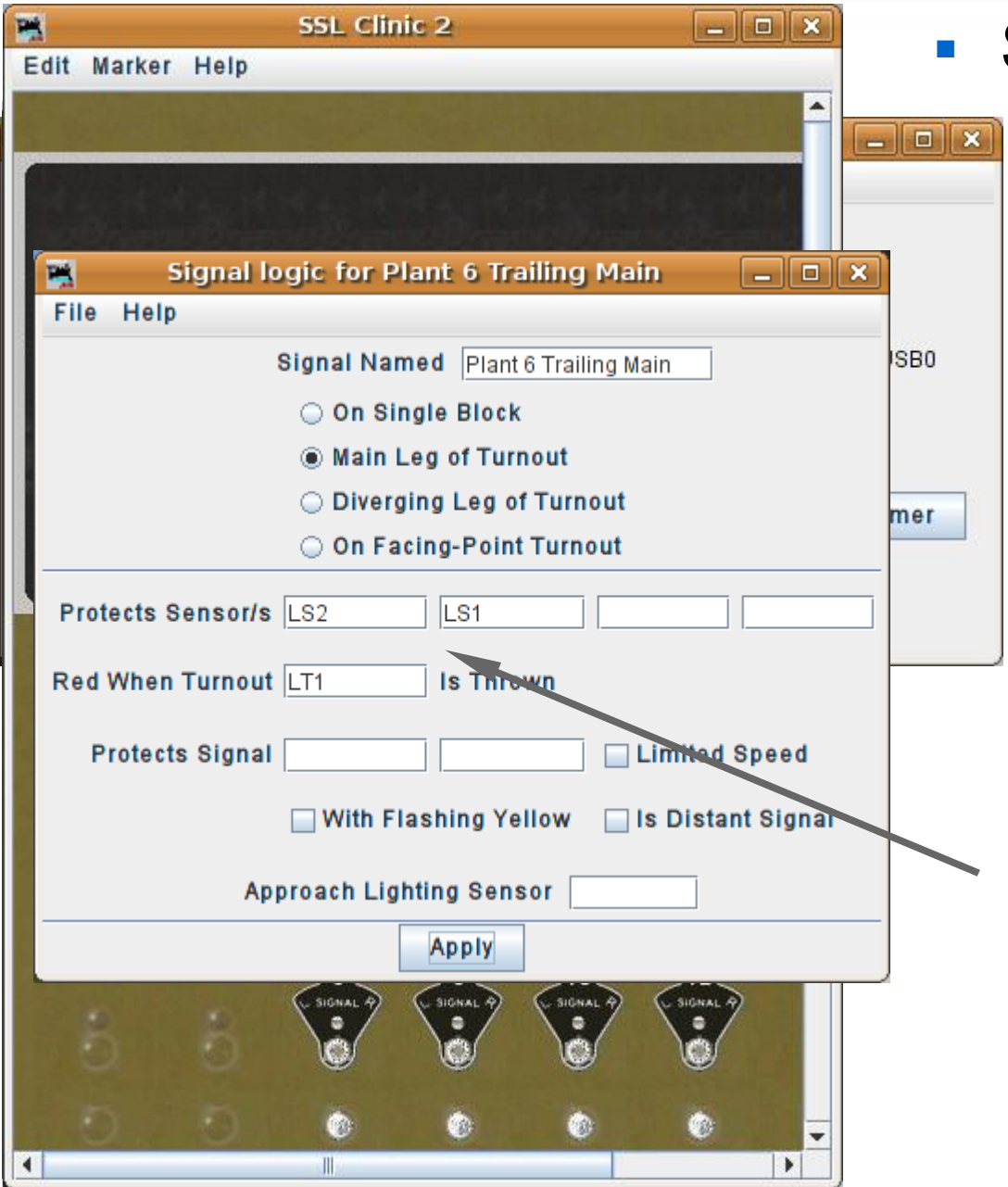
- Signal Logic
  - After changing the switch to the diverging leg these signals change to red over yellow which indicates enter the diverging route prepared to stop at the next signal.

SSL (Simple Signal Logic)



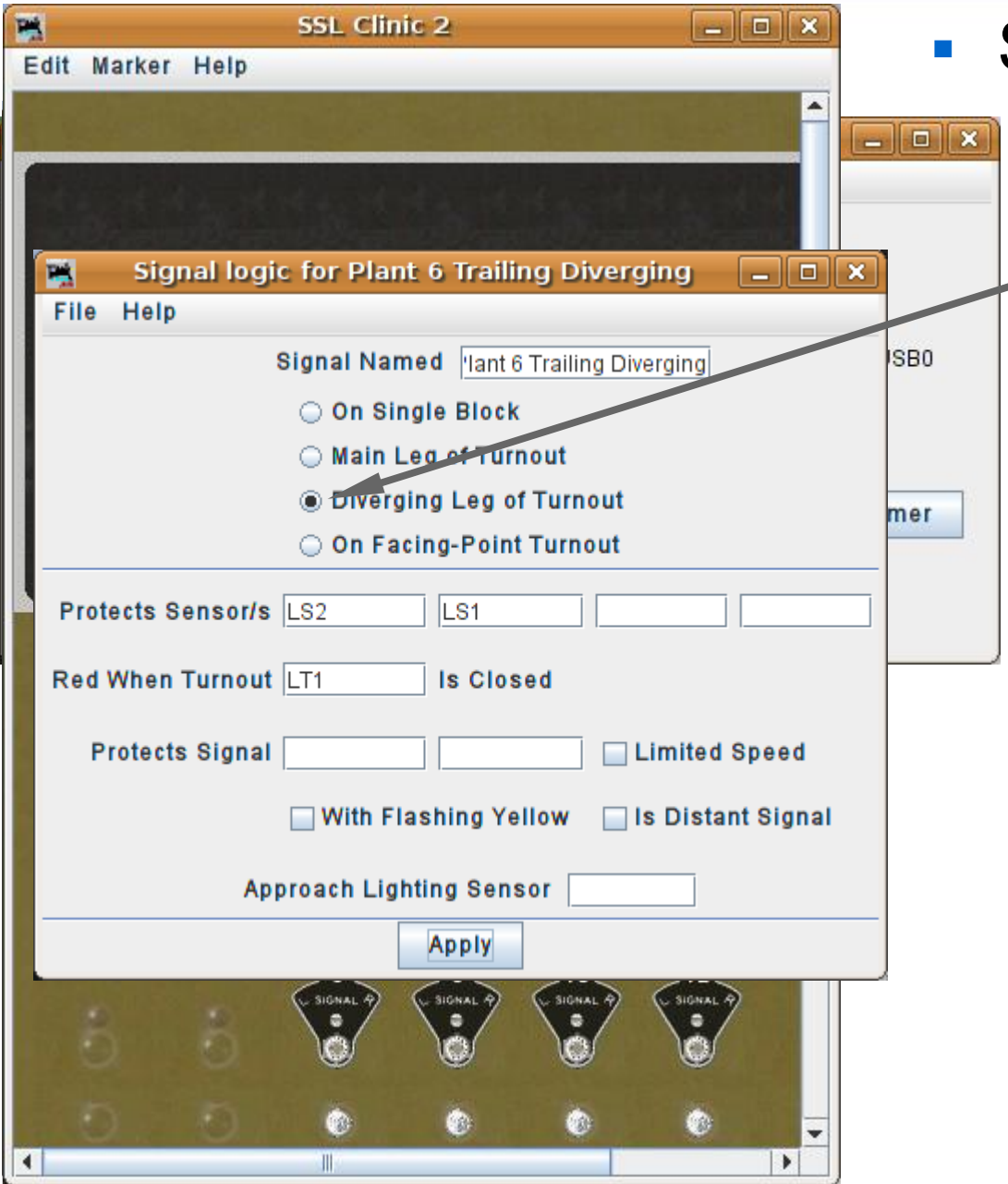
- Signal Logic
  - After changing the switch to the diverging leg these signals change to red over yellow which indicates enter the diverging route prepared to stop at the next signal.
  - Next enter the info for the two remaining signals at this turnout.

SSL (Simple Signal Logic)



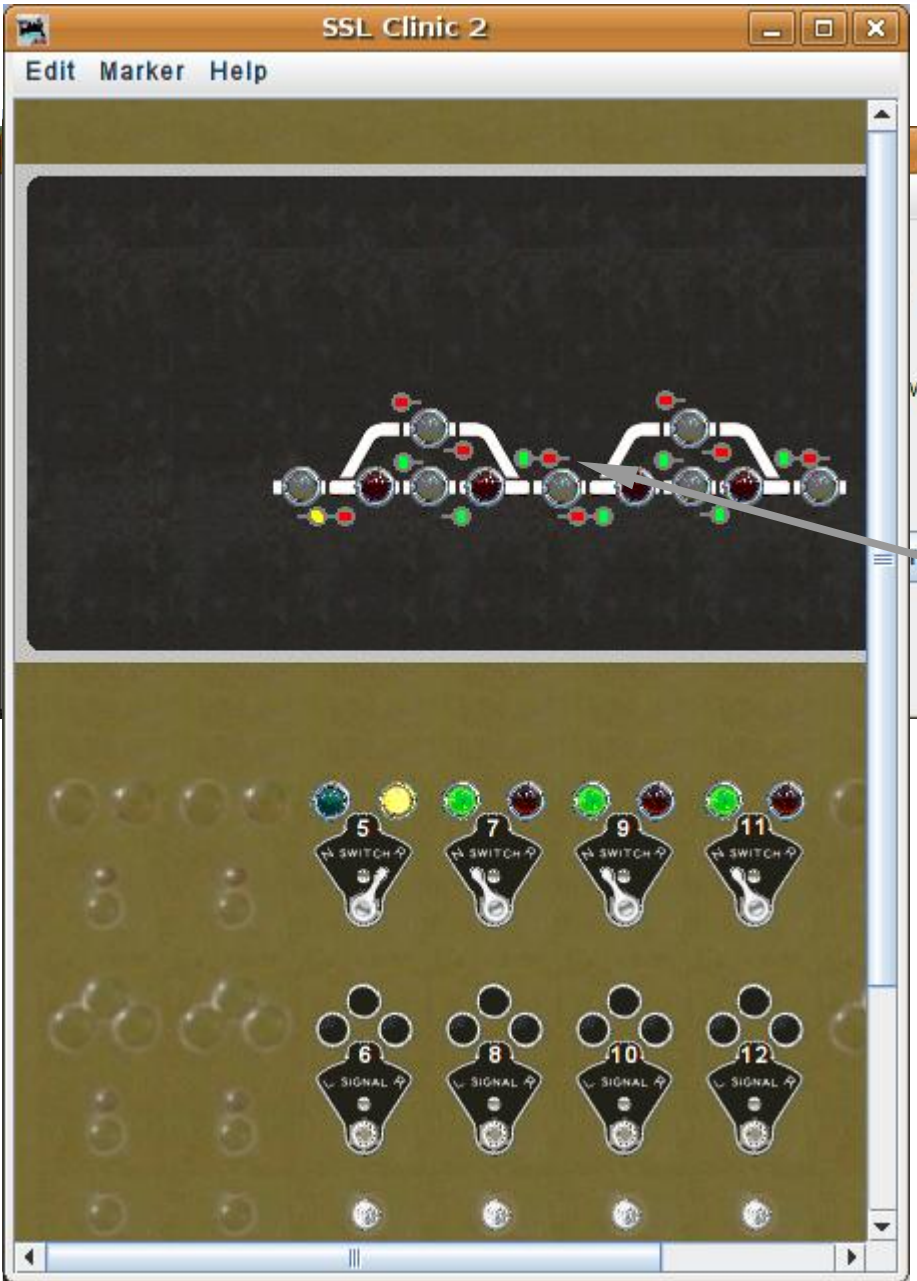
- Signal Logic
  - After changing the switch to the diverging leg these signals change to red over yellow which indicates enter the diverging route prepared to stop at the next signal.
  - Next enter the info for the two remaining signals at this turnout.
  - The info for the main leg. Note, we don't have any known signal to protect in this direction.

SSL (Simple Signal Logic)



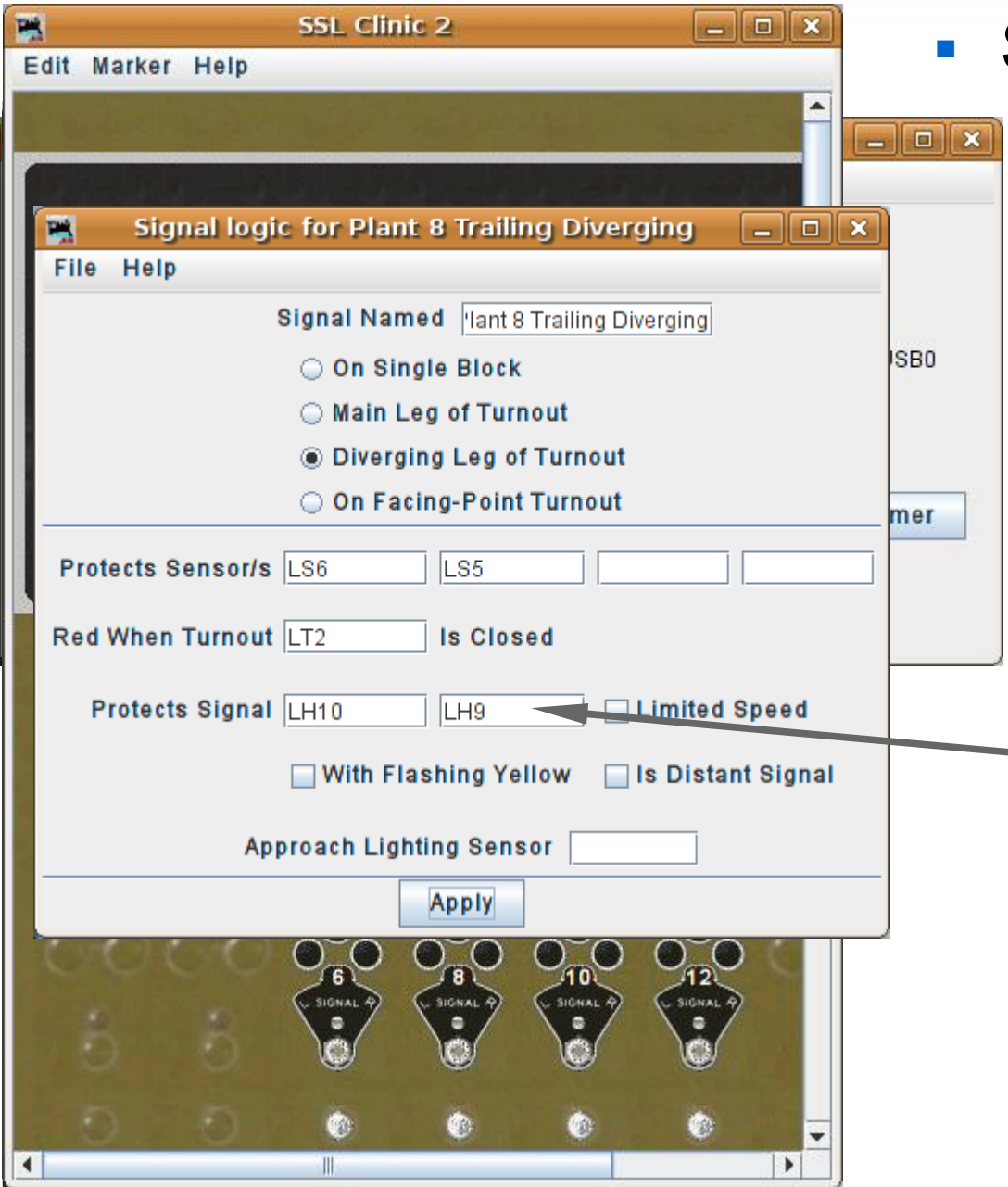
- Signal Logic
  - The information for the diverging leg is identical to the main leg in this direction.

SSL (Simple Signal Logic)



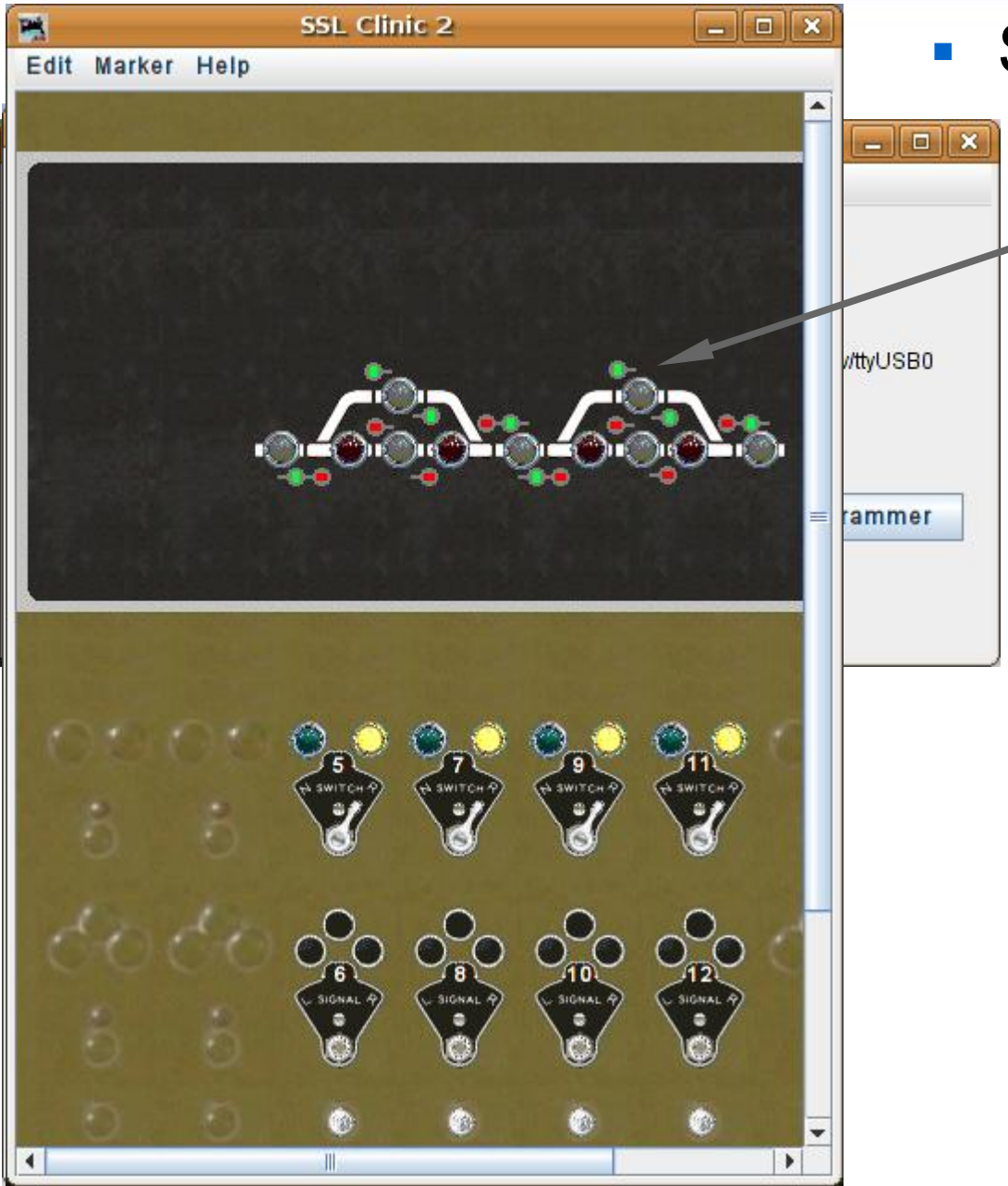
- Signal Logic
  - The information for the diverging leg is identical to the main leg in this direction.
  - Continue to add the logic for each signal until they are all complete.

SSL (Simple Signal Logic)



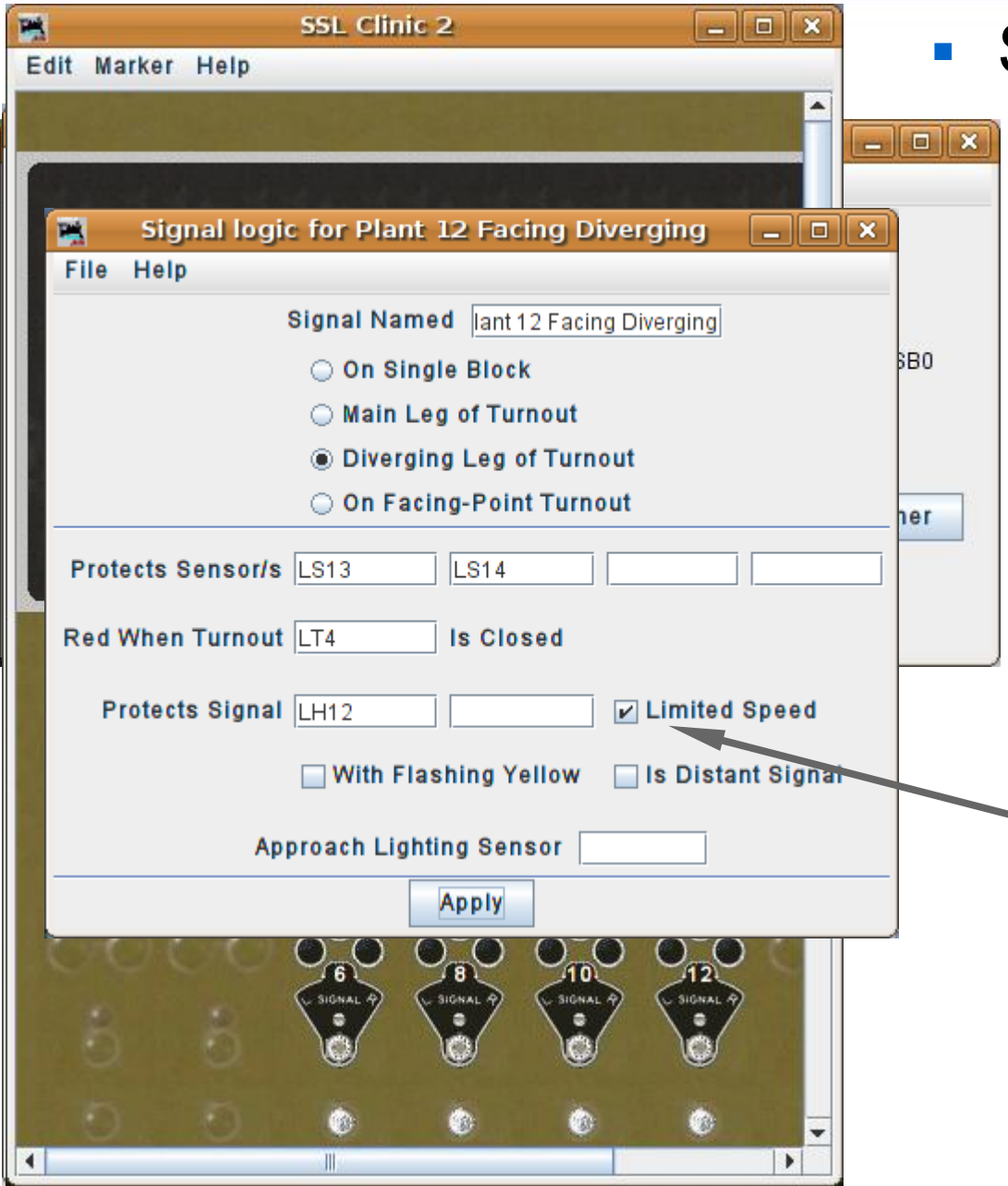
- Signal Logic
  - The information for the diverging leg is identical to the main leg in this direction.
  - Continue to add the logic for each signal until they are all complete.
  - Note, this protected signal is a two head mast, so list both signals here. If either signal is clear, (G or Y) then this signal will show green. (if the protected blocks are clear as well.)

SSL (Simple Signal Logic)



- Signal Logic
  - Notice that setting all the turnouts to reverse (diverging) gives us green signals through the passing sidings. Many rail roads would limit the speed in this situation by using the 'approach' signal.

SSL (Simple Signal Logic)



- Signal Logic
  - Notice that setting all the turnouts to reverse (diverging) gives us green signals through the passing sidings. Many rail roads would limit the speed in this situation by using the 'approach' signal.
  - SSL supports this practice simply by checking the 'Limited Speed' box.

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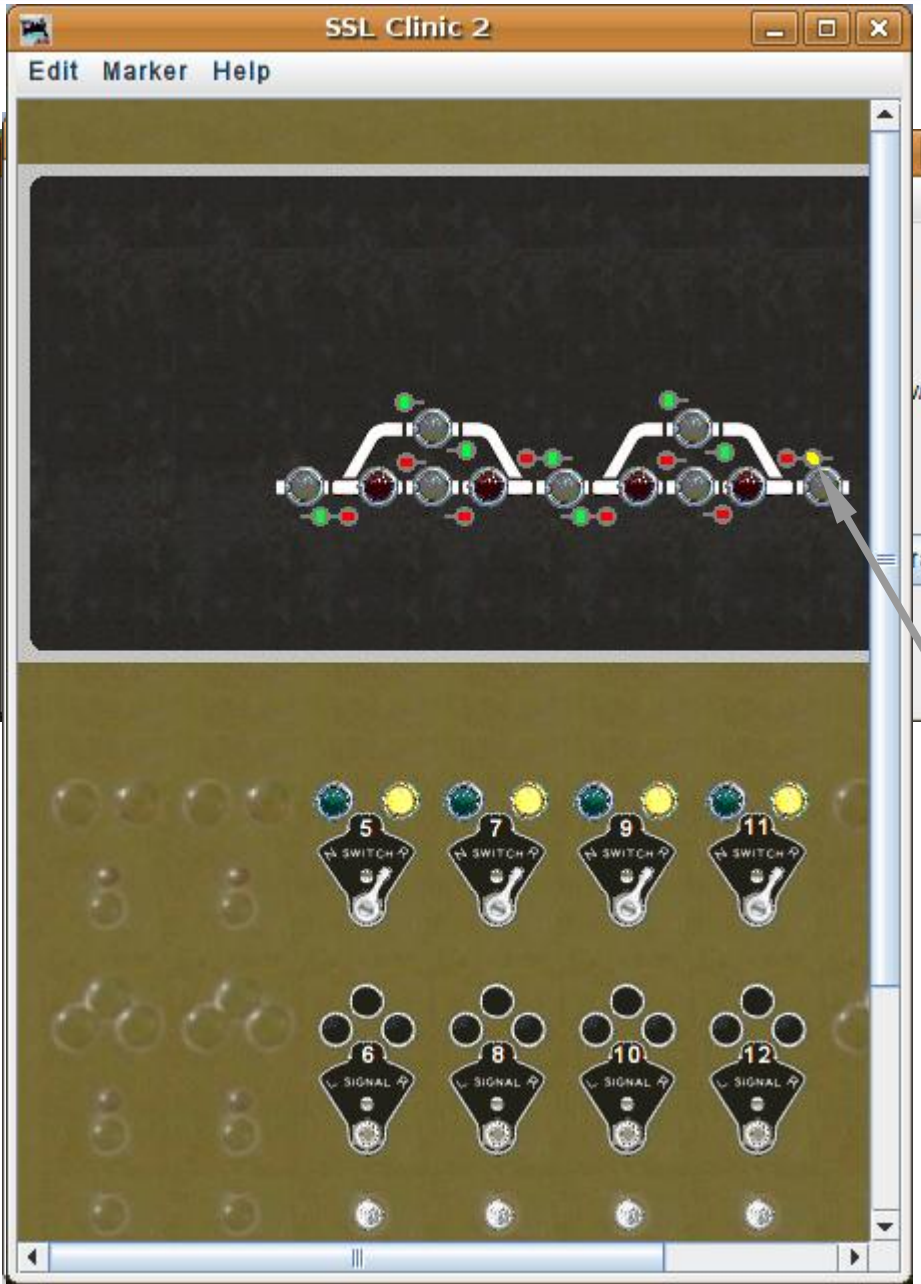
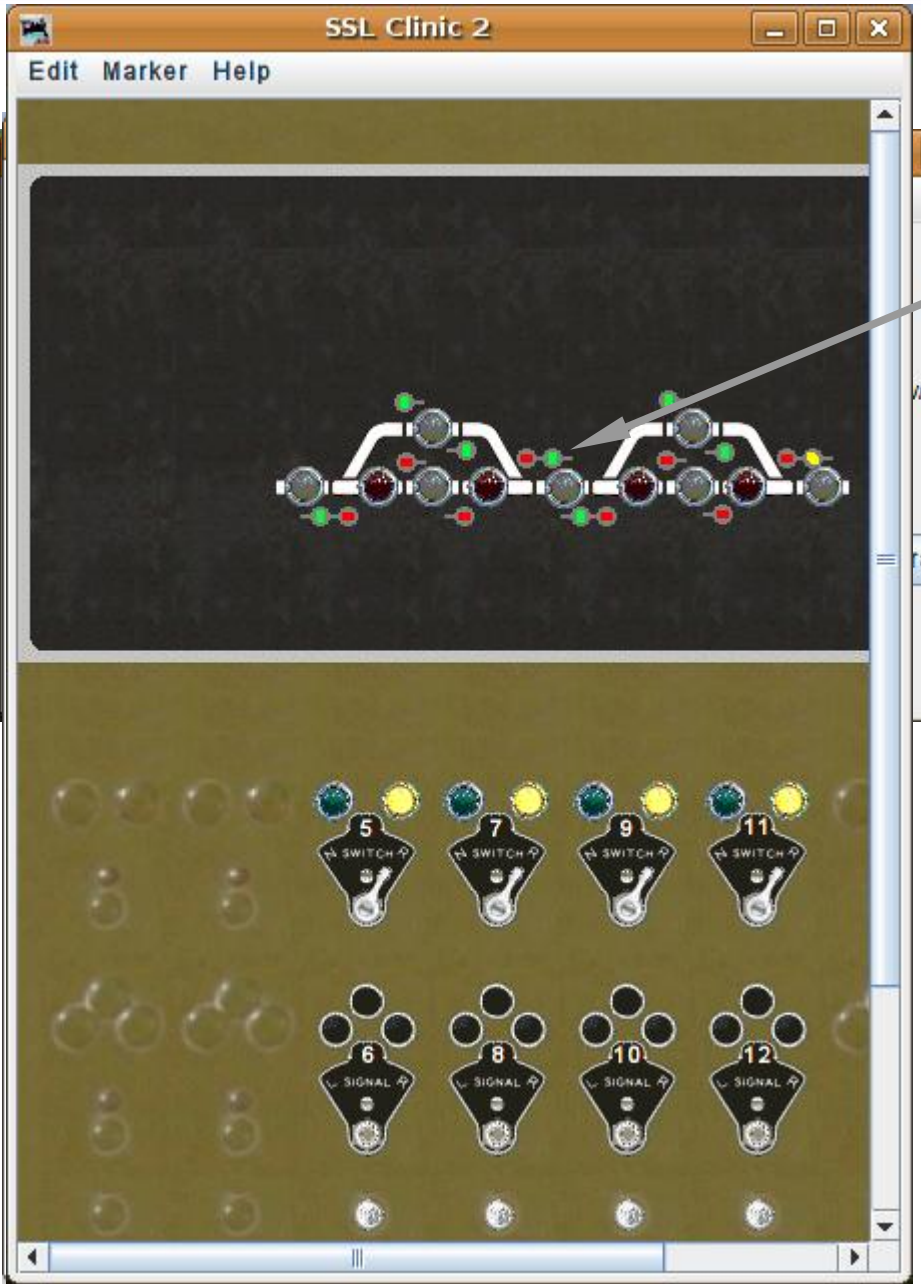


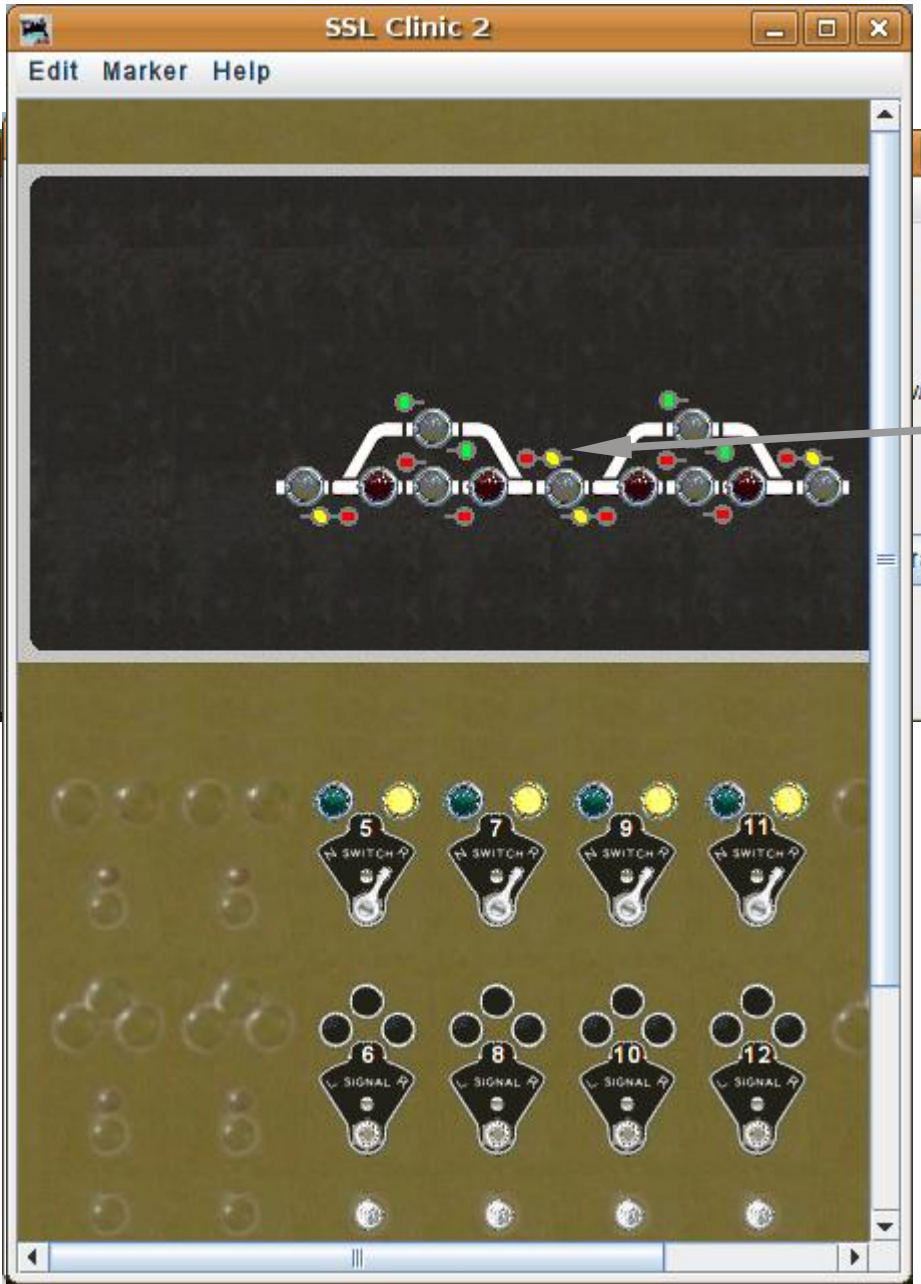
- Signal Logic
  - Notice that setting all the turnouts to reverse (diverging) gives us green signals through the passing sidings. Many rail roads would limit the speed in this situation by using the 'approach' signal.
  - SSL supports this practice simply by checking the 'Limited Speed' box.
  - Click 'Apply' and the diverging signal now shows 'Y' as its maximim speed.

SSL (Simple Signal Logic)



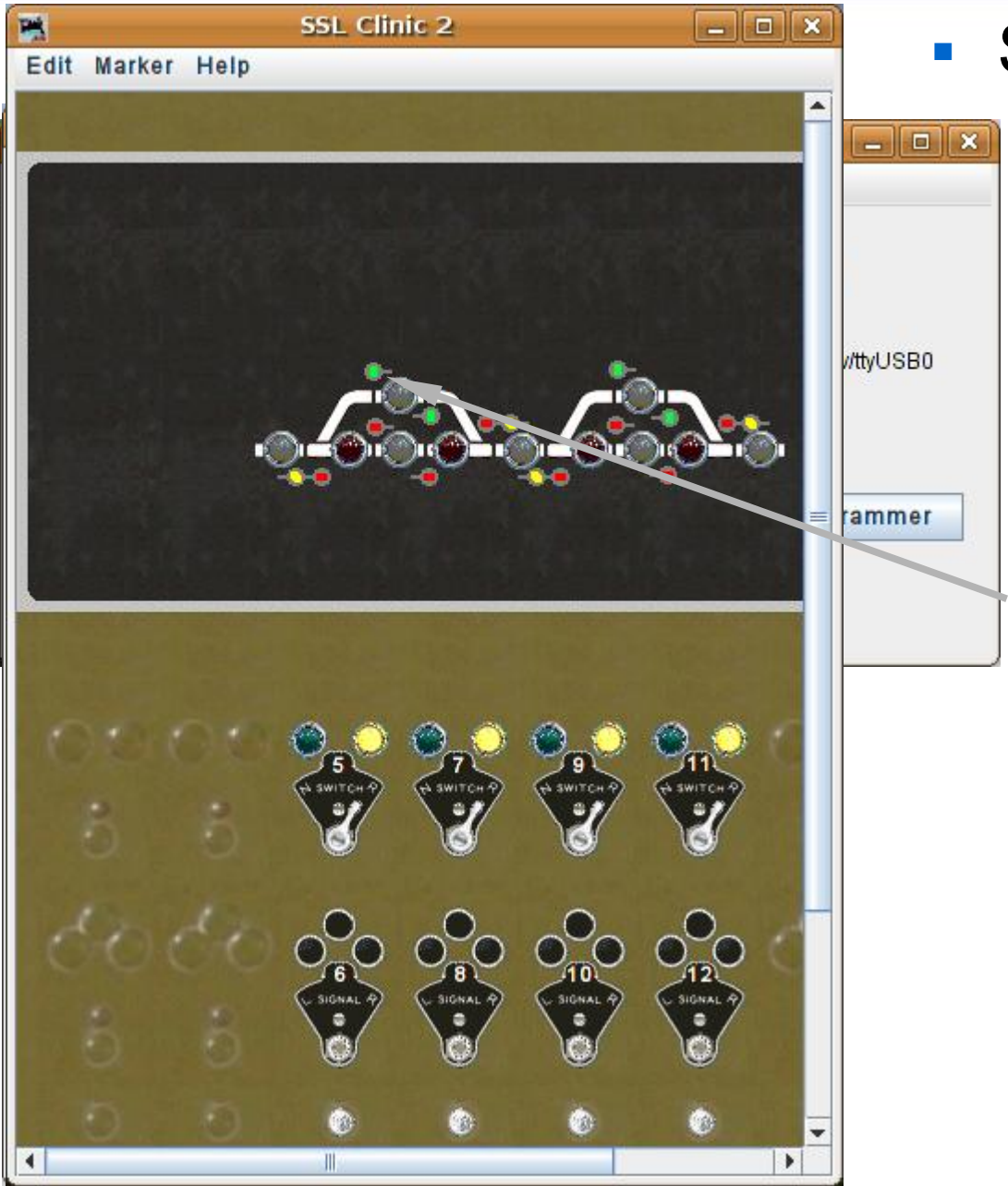
- Signal Logic
  - Make the same changes to the other diverging routes.

SSL (Simple Signal Logic)



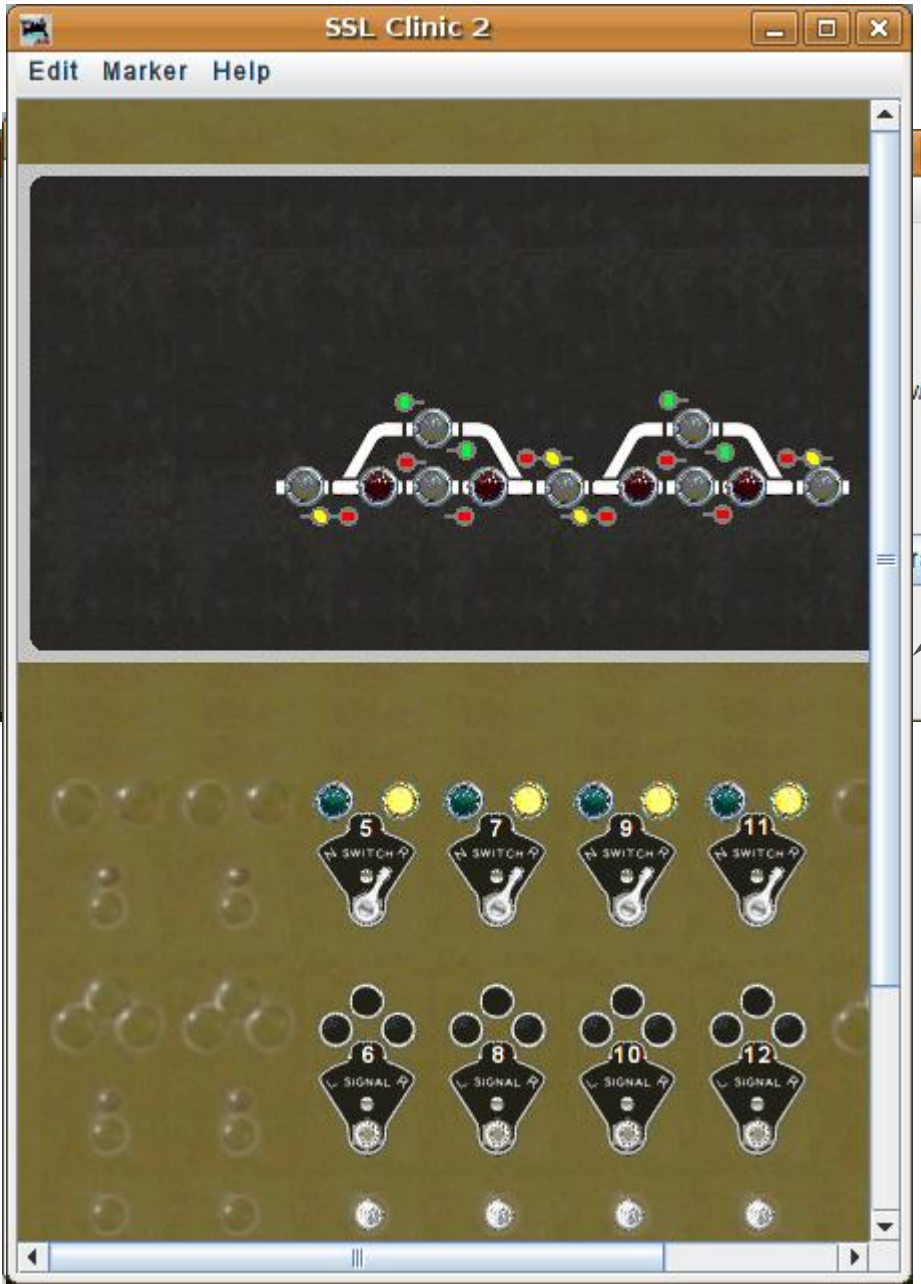
- Signal Logic
  - Make the same changes to the other diverging routes.
  - Now trains are warned slow down when entering the reverse route.

SSL (Simple Signal Logic)



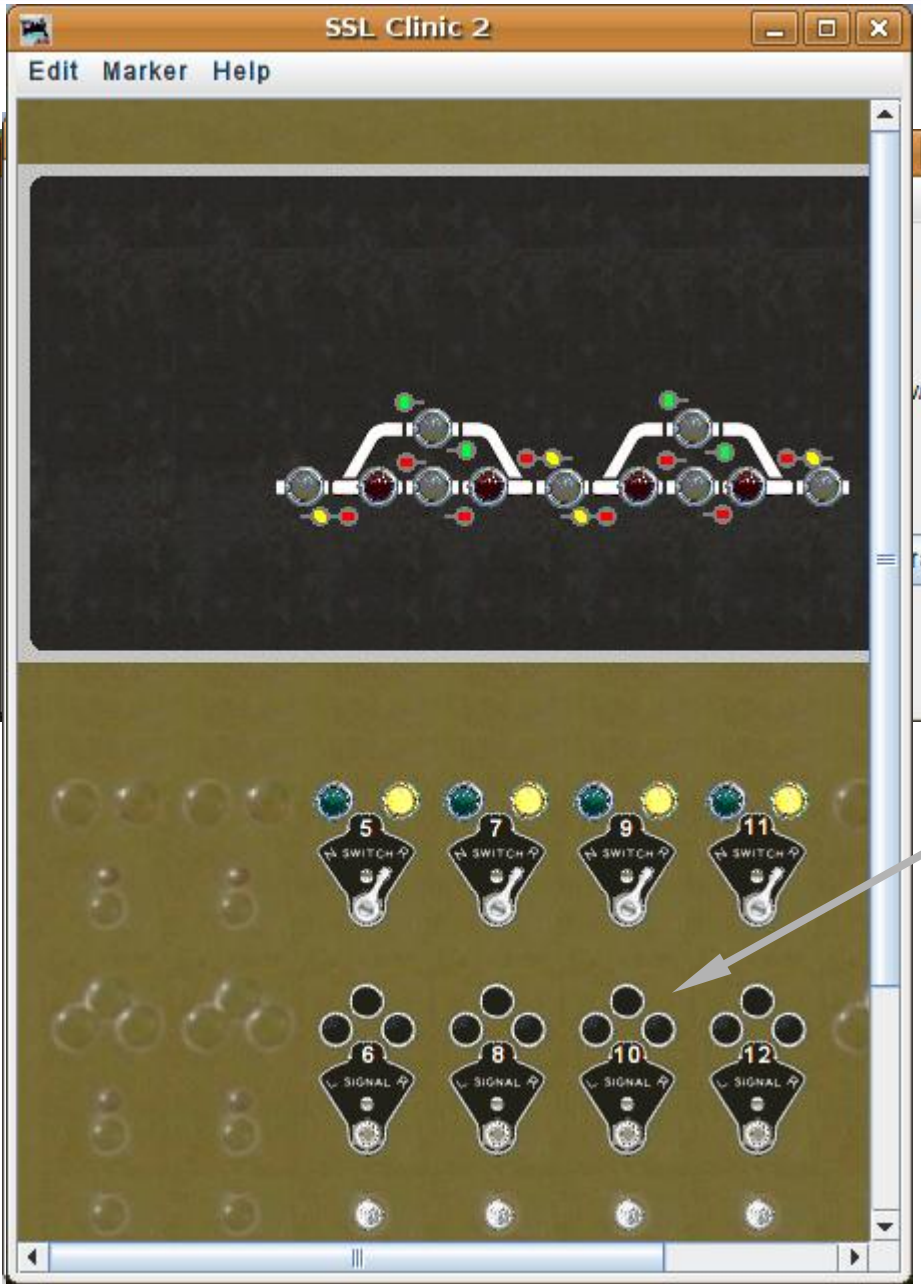
- Signal Logic
  - Make the same changes to the other diverging routes.
  - Now trains are warned slow down when entering the reverse route.
  - Rules can cover the speed while exiting a passing siding. Usually a green at the exit of a siding means the train may accelerate to posted speed after leaving the siding.

SSL (Simple Signal Logic)



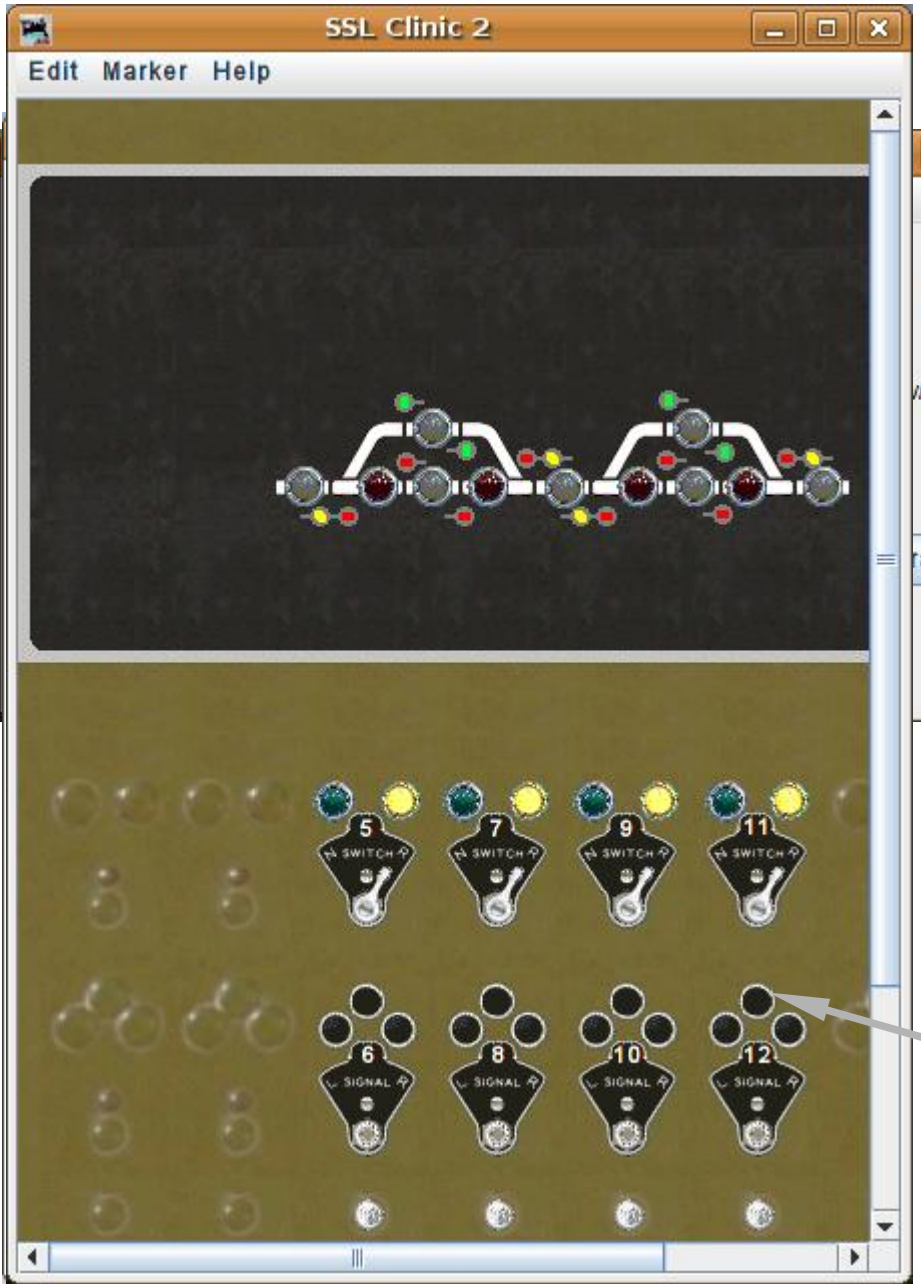
- Signal Logic
  - As previously mentioned, a prototype ABS system would not have a remote panel, so in reality this panel is the foundation for a CTC system.

SSL (Simple Signal Logic)



- Signal Logic
  - As previously mentioned, a prototype ABS system would not have a remote panel, so in reality this panel is the foundation for a CTC system.
  - Actually this is how CTC works. CTC over rides an underlying ABS system with permissive inputs from the dispatcher.

SSL (Simple Signal Logic)



- Signal Logic
  - As previously mentioned, a prototype ABS system would not have a remote panel, so in reality this panel is the foundation for a CTC system.
  - Actually this is how CTC works. CTC over rides an underlying ABS system with permissive inputs from the dispatcher.
  - The 'Normal' input from the CTC system 'holds' each signal at 'Stop'.

SSL (Simple Signal Logic)

- What we have covered so far:
  - Placing signals on a panel.
  - Simple Signal Logic (SSL-clinic-2).
- Where we are going next:
  - CTC Panel Logix (CTC-clinic-1)