

Add Signals to your Layout with JMRI/PanelPro

Dick Bronson - *R R - C irK its*, *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 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 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.



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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.



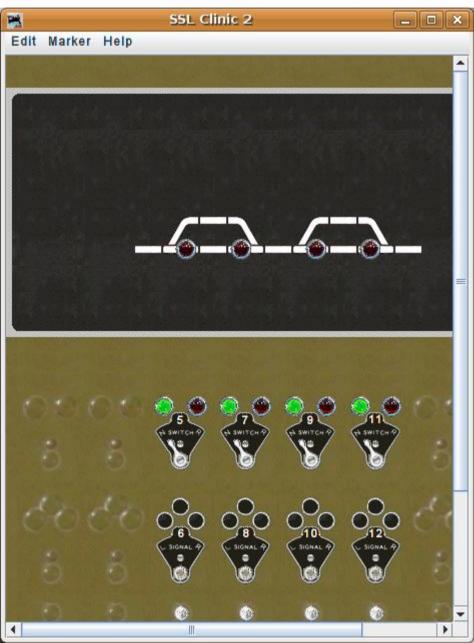
- SSL basics
 - ABS defaults to 'Clear' signals, and drops to 'Stop' if the block immediately beyond the signal is occupied, or if the switch (turnout) beyond the signal is set against the direction of traffic.
 - Therefore ABS requires input information for track occupancy and for switch position.
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

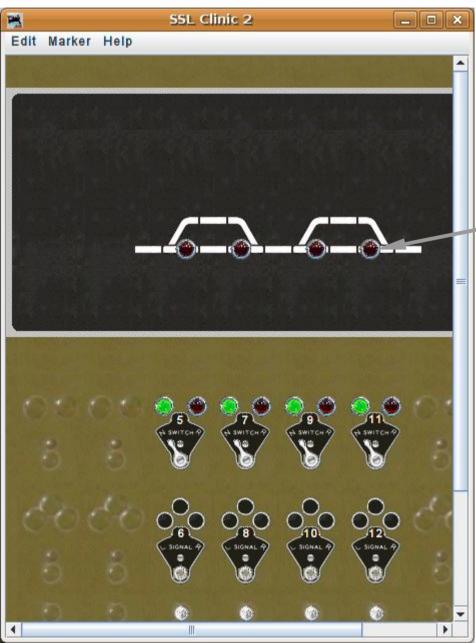
- In some cases a signal at the block boundry may not be visible due to terrain, tunnels, buildings, etc. In that case a slave or 'Distant' signal could be used as a 'heads up'. In SSL checking the 'Is Distant Signal' will tie a signal to the next (Protected) signal and show the most restrictive setting 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 basics
 - Re-open our new SSL-Clinic-2 panel.





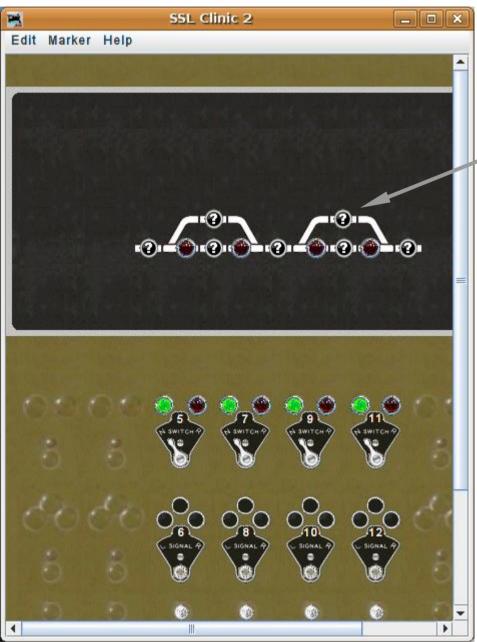
- SSL basics
 - Re-open our new SSL-Clinic-2 panel.
 - We already have occupancy sensors for our OS sections.



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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.

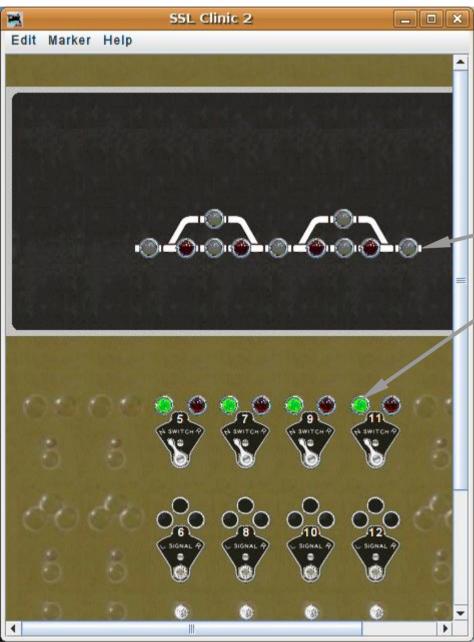




SSL basics

Position each new sensor
 image where appropriate.

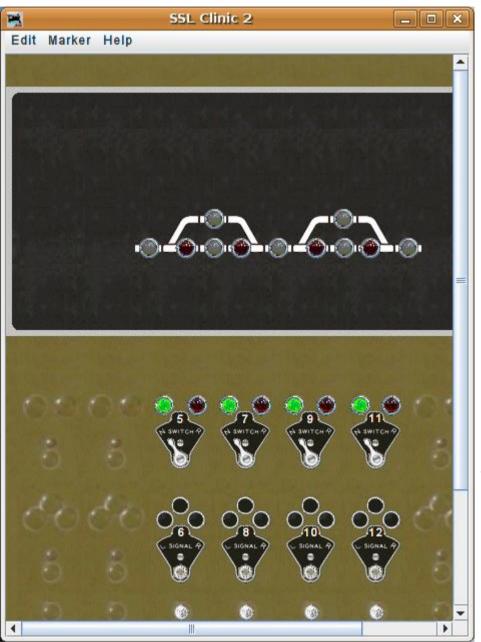




SSL basics

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





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.

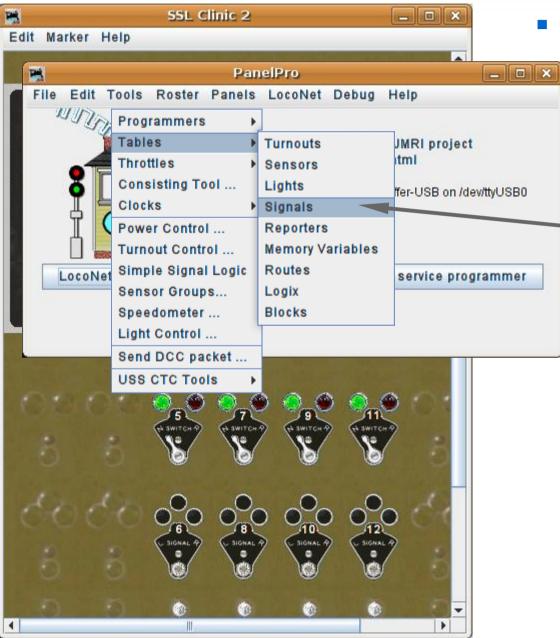




- Signal head basics
 - Go to the PanelPro
 window and select 'tools'.







- 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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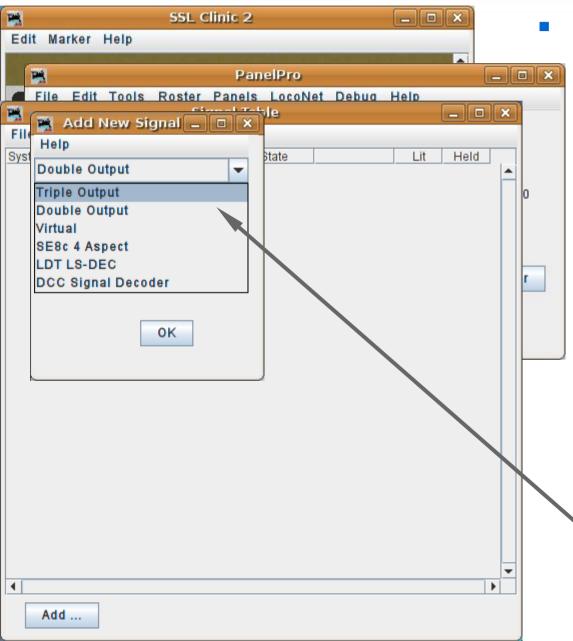
- Signal head basics
 - Go to the PanelPro window and select 'tools'.
 - Navigate to 'Tables' –
 'Signals' and click to open the 'Signal Table'.
 - Click 'Add ...' to add new signal heads.



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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'.
 - Click 'Add ...' to add new signal heads.
 - This brings up a new
 window requesting specifics on the hardware.





- Signal head basics
 - 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 Head'. For example 'LH' for Digitrax LocoNet devices.
 - Individual output lines get entered here. (e.g. LT25)



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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)



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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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	Flash Red output number: Closed 💌			
	Dark output number: Closed 👻			
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Signal head basics

LDT LS-DEC. Littfinski Daten Technik Light Signal Decoder. This signal decoder has different versions that directly support many of the complex european multi-head signal systems.



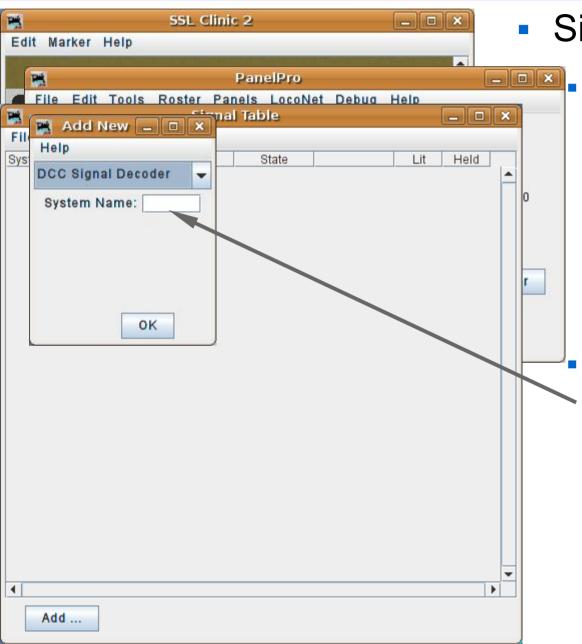
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Signal head basics

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.





- 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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	System Name: LH1	0
	Green output number:	
	Red output number:	
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Signal head basics

Our example is using the 'LocoNet Simulator' or TC-64 with encoding, so select 'Double Output'.



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<u>- 3ys</u> i	Double Output	
	System Name: LH1	0
	Green output number:	
	Red output number:	
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	SearchLight Signals using directly connected 3 lead tri-color LEDs	
	Line 8 R1 W 1K Protection H3	
	2 Line 6 R3 W 1K 3 Line 5 R4 W 330 5 5 6 7 10 Line 4 R5 W 1K 8 Line 3 R5 W 330 9 10 Line 3 R5 W 330 10 Line 3 R5 W 330	
	T Line 4 R5 R5 B Line 3 R6 R6 <t< td=""><td></td></t<>	
	Line 1 RB 330 H2	
	Specify "2 turnout" H1 or "SE8c" mode Adjust resistance values to apply a balanced valuer	
	achive a balanced yellow	
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Signal head basics

Our example is using the 'LocoNet Simulator' or TC-64 with encoding, so select 'Double Output'.

My searchlight signals are wired opposite to this, so line 1 is red, line 2 is green etc.



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	Green output number: LT18	
	Red output number: LT17	
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	OK H4	
	3 Line 5 R4 R4 5 5 10 10 6 Line 4 R5 1K 7 Line 3 R6 330 9 Line 3 R6 10	
	E 8 Line 3 R6 330	
	Line 1 RB 330	
	Specify "2 turnout"	
	or "SE8c" mode Adjust resistance values to achive a balanced yellow	
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Signal head basics

- Our example is using the 'LocoNet Simulator' or TC-64 with encoding, so select 'Double Output'.
- My searchlight signals are wired opposite to this, so line 1 is red, line 2 is green etc.

 The TC-64 signal port base address is 16, so the output lines start with LT17, LT18, etc. (port address plus line number)



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	Green output number: LT18	
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	Line 2 R7,WW	
	Specify "2 turnout"	
	or "SE8c" mode Adju	ist resistance values to ve a balanced yellow
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Signal head basics

- Our example is using the 'LocoNet Simulator' or TC-64 with encoding, so select 'Double Output'.
- My searchlight signals are wired opposite to this, so line 1 is red, line 2 is green etc.
- The TC-64 signal port base address is 16, so the output lines start with LT17, LT18, etc. (port address plus line number)
- Click 'OK' to add a signal.



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LH1 Plant 6 Facing Diverging Dark Delete 🕑		0
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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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PanelPro								
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LH3	Plant 6 Trailing Main	Green	Delete	~				
LH4	Plant 6 Trailing Diverging	Green	Delete	~				
LH5	Plant 8 Facing Diverging	Green	Delete	V			r	
LH6	Plant 8 Facing Main	Green	Delete	~				
LH7	Plant 8 Trailing Main	Green	Delete	~				
LH8	Plant 8 Trailing Diverging	Green	Delete	V				
LH9	Plant 10 Facing Diverging	Dark	Delete	V				
LH10	Plant 10 Facing Main	Dark	Delete	~				
LH11	Plant 10 Trailing Main	Dark	Delete	~				
LH12	Plant 10 Trailing Diverging	Dark	Delete	~				
LH13	Plant 12 Facing Diverging	Dark	Delete	~				
LH14	Plant 12 Facing Main	Dark	Delete	~				
LH15	Plant 12 Trailing Main	Dark	Delete	~				
LH16	Plant 12 Trailing Diverging	Dark	Delete	~		-		
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Signal head basics

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

Add ...



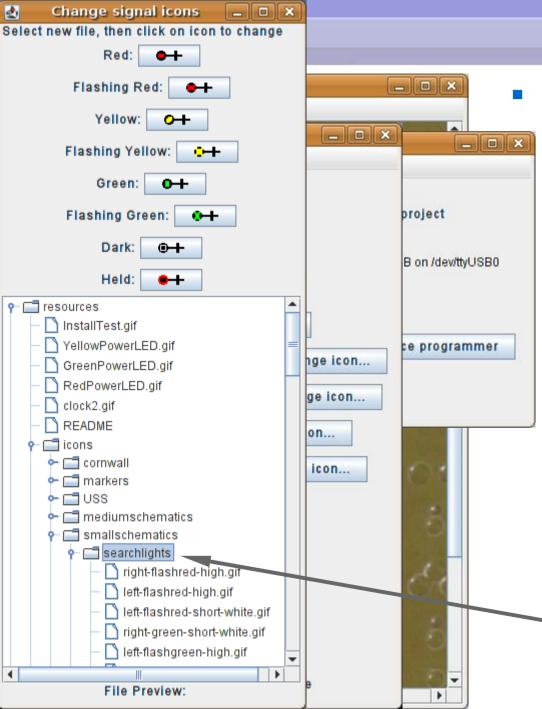
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SSL (Simple Signal Logic)

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Syste A	User Name	State		Lit	Held			
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LH3	Plant 6 Trailing Main	Green	Delete	~				
LH4	Plant 6 Trailing Diverging	Green	Delete	~				
LH5	Plant 8 Facing Diverging	Green	Delete	~		r		
LH6	Plant 8 Facing Main	Green	Delete	~				
LH7	Plant 8 Trailing Main	Green	Delete	~				
LH8	Plant 8 Trailing Diverging	Green	Delete	2				
LH9	Plant 10 Facing Diverging	Dark	Delete	~				
LH10	Plant 10 Facing Main	Dark	Delete	~				
LH11	Plant 10 Trailing Main	Dark	Delete	~				
LH12	Plant 10 Trailing Diverging	Dark	Delete	~				
LH13	Plant 12 Facing Diverging	Dark	Delete	~				
LH14	Plant 12 Facing Main	Dark	Delete	~				
LH15	Plant 12 Trailing Main	Dark	Delete	~				
LH16	Plant 12 Trailing Diverging	Dark	Delete	~		-		
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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.

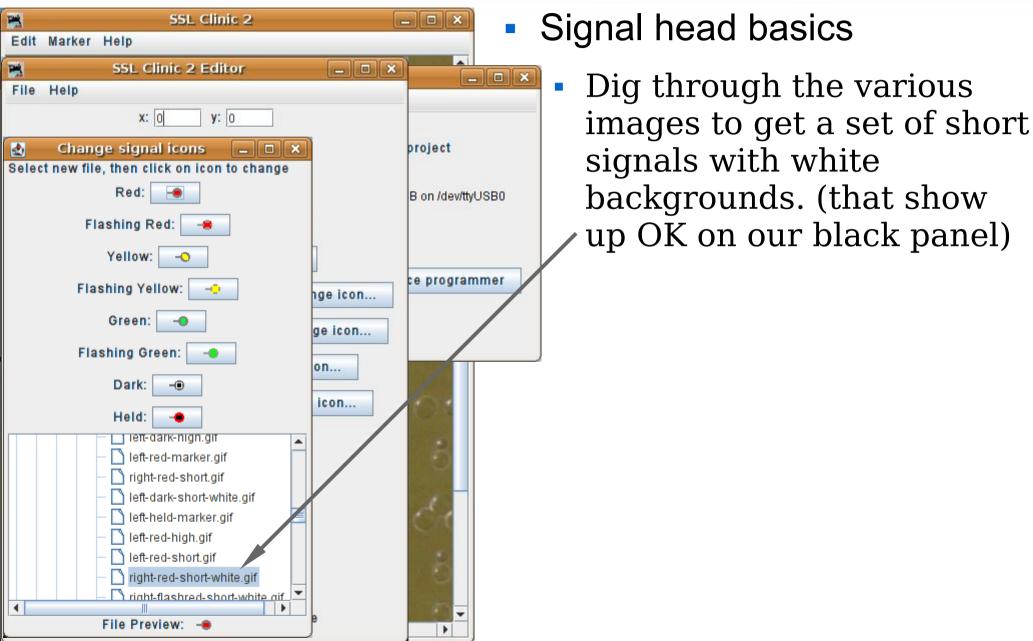


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Signal head basics

- 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.





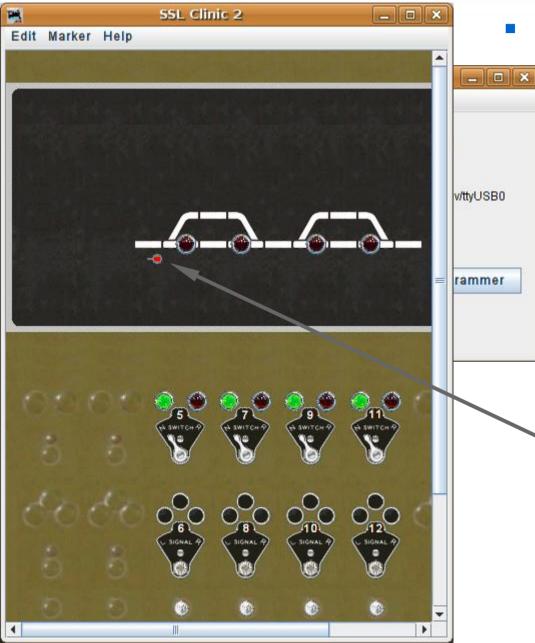


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Add sig	nal head: LH1 Change icon	01	
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	Add RPS Reporter	C C	
	Add multi-sensor	1	
	Add Fast clock:		
Ľ	Panel items popup menus active		

Signal head basics

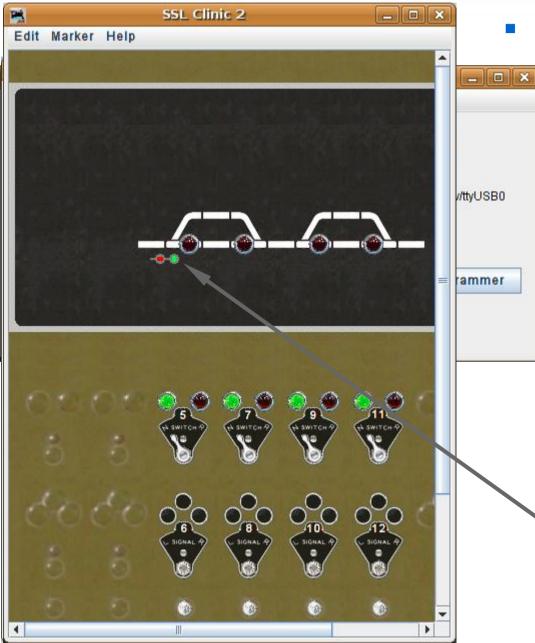
- Dig through the various images to get a set of short signals with white backgrounds. (that show up OK on our black panel)
- Enter the first head. (LH1)
 'Facing Diverging' will be the lower signal of 2 heads.





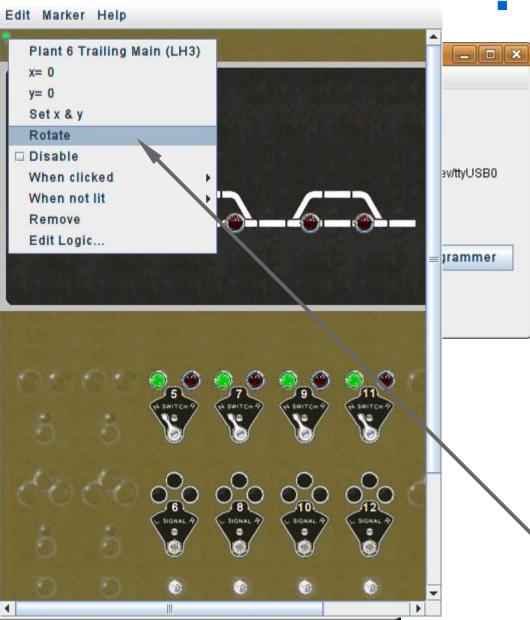
- Signal head basics
 - Dig through the various images to get a set of short signals with white backgrounds. (that show up OK on our black panel)
 - Enter the first head. (LH1) 'Facing Diverging' will be the lower signal of 2 heads.
 - Move the signal into position.





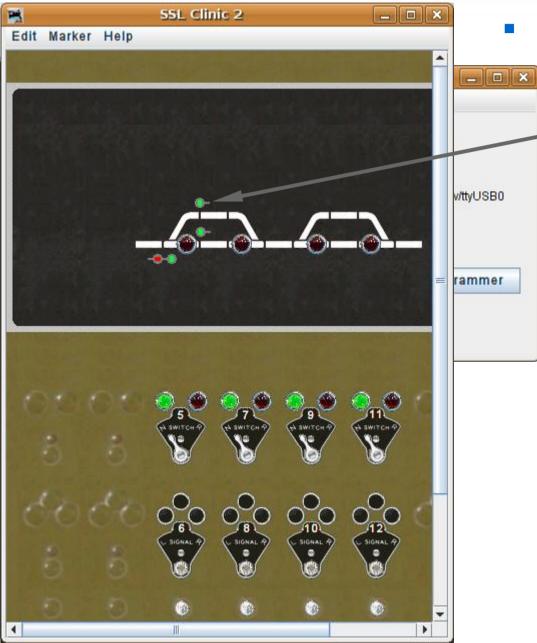
- Signal head basics
 - Dig through the various images to get a set of short signals with white backgrounds. (that show up OK on our black panel)
 - Enter the first head. (LH1) 'Facing Diverging' will be the lower signal of 2 heads.
 - Move the signal into position.
 - Add the second head and
 place it above the first one.





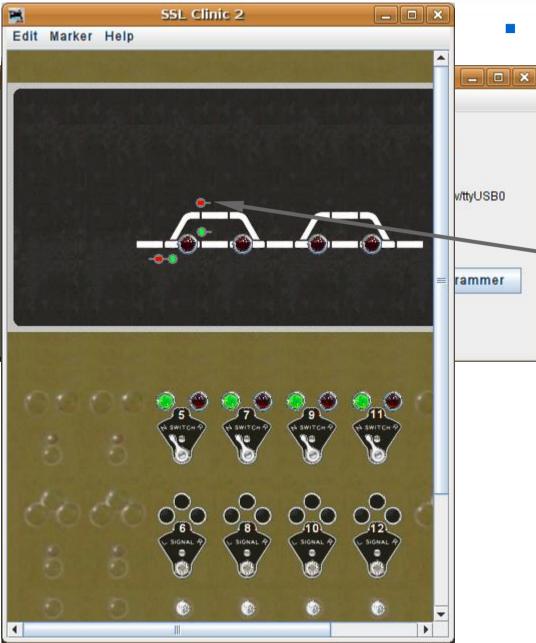
- Signal head basics
 - Dig through the various images to get a set of short signals with white backgrounds. (that show up OK on our black panel)
 - Enter the first head. (LH1) 'Facing Diverging' will be the lower signal of 2 heads.
 - Move the signal into position.
 - Add the second head and place it above the first one.
 - #3 and #4 need rotating.





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

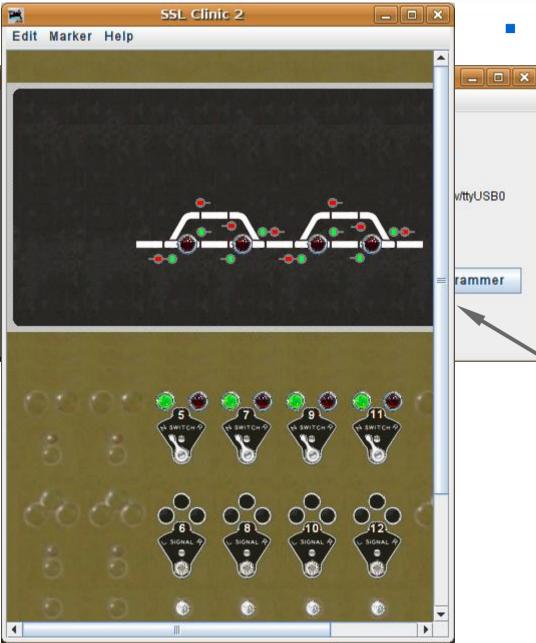




- Signal head basics
 - Continue to place your signals, rotating them as required.
 - Clicking on the images will

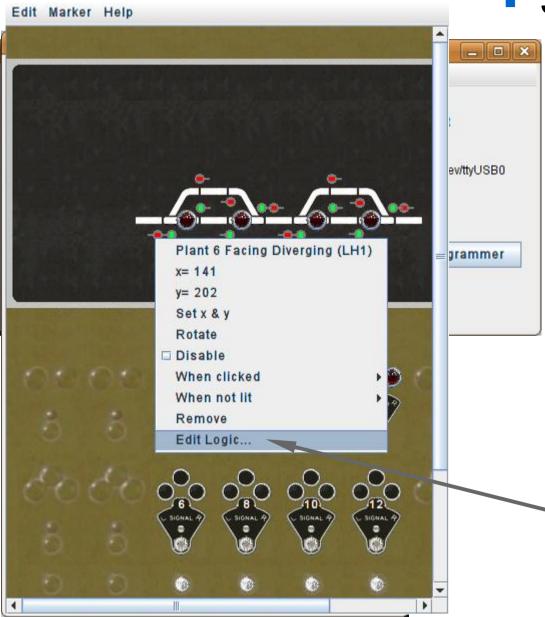
 change the signals on your layout. This allows you to easily check your locations.





- Signal head basics
 - 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.





- 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',



2	SSL Clinic 2	
E	Edit Marker Help	
		X
1	🚆 Signal logic for Plant 6 Facing Diverging 📃 🗆 🗙	
	File Help	
	Signal Named Plant 6 Facing Diverging	_
	On Single Block	
	O Main Leg of Turnout	
	O Diverging Leg of Turnout	
	On Facing-Point Turnout	
	Protects Sensor/s mer	
SN I	Protects Signal 🔄 🗌 Limited Speed	
	🗌 With Flashing Yellow 🔛 Is Distant Signal	
	Approach Lighting Sensor	
	Apply	
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Signal Logic

 This automatically brings up the SSL edit window for the selected signal head.

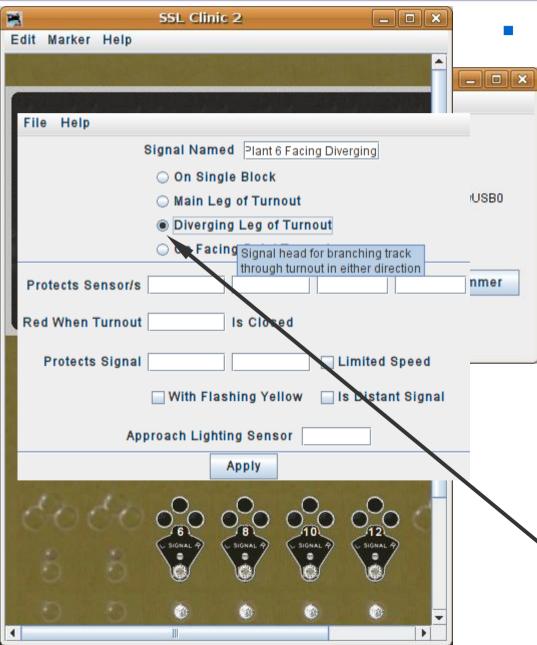
• First select the proper mode for this signal head.



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	File Help	
	Signal Named Plant 6 Facing Diverging	
	On Single Block	
	Main Leg of Turnout	30
	 Diverging Log of Signal head for main track On Facing-Point through turnout in either direction 	
	Protects Sensor/s	er
	Protects Signal 🔄 🗌 LimNed Speed	
	🔤 With Flashing Yellow 🛛 Is Distant Signal	
	Approach Lighting Sensor	
	Apply	
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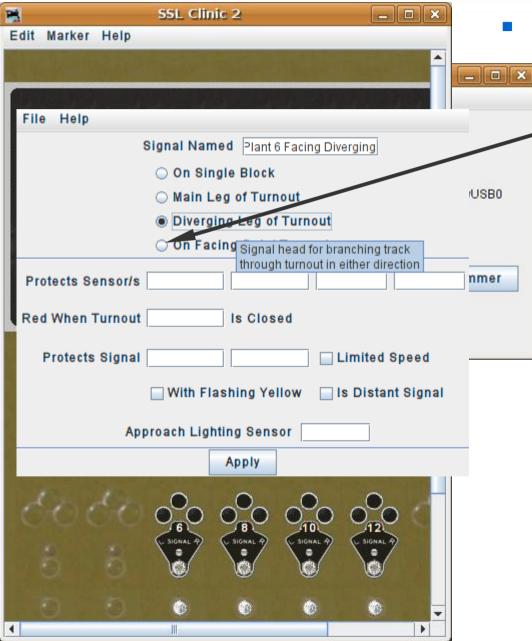
- This automatically brings up the SSL edit window for the selected signal head.
- First select the proper mode for this signal head.
- There is pop up help for virtually every item in the SSL editor to help you understand the function of each item. Simply pause your mouse over the item in question.





- This 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.





Signal Logic

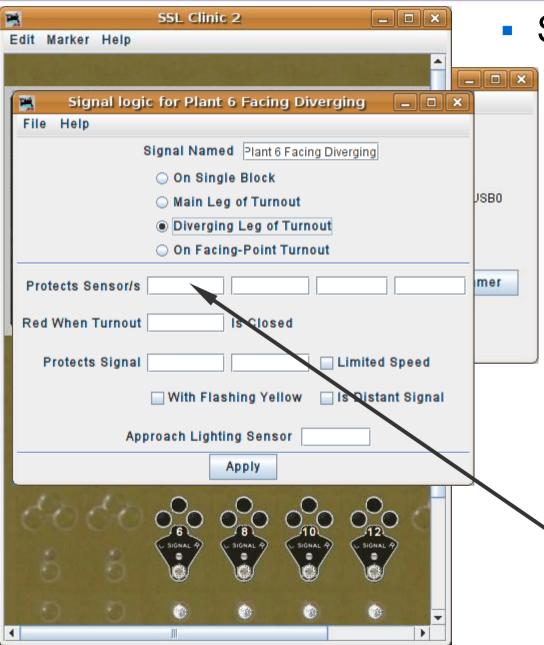
 Do NOT choose 'On
 Facing-Point Turnout' unless you just have a single head controlling both routes.



-	SSL Clinic 2	
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ſ	🚆 Signal logic for Plant 6 Facing Diverging 📃 🗆 🗙	
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	Signal Named Plant 6 Facing Diverging	
	🔾 On Single Block	
	Main Leg of Turnout	JSB0
	Diverging Leg of Turnout	
	On Facing-Point Turnout	
	Protects Sensor/s	imer
2	Red When Turnout Is Closed	
	Protects Signal Limited Speed	
	🗌 With Flashing Yellow 🛛 Is Distant Signal	
	Approach Lighting Sensor	
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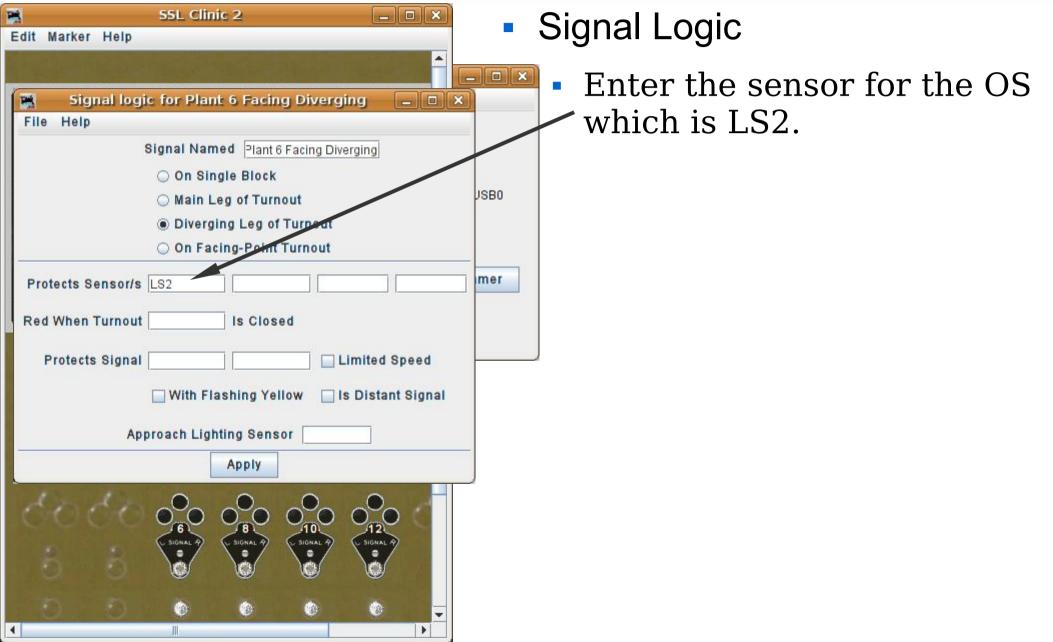
- Do NOT choose 'On Facing-Point Turnout' unless you just have a single head controlling both routes.
- 'Protects' means that a signal goes to 'stop' in front of these sensors when they are active. I.e. It is the track that is being protected from any train that might be entering it.



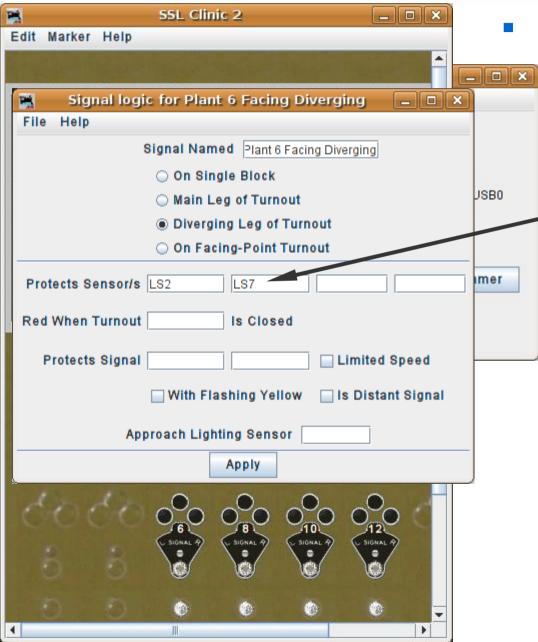


- Do NOT choose 'On Facing-Point Turnout' unless you just have a single head controlling both routes.
- 'Protects' means that a signal goes to 'stop' in front of these sensors when they are active. I.e. It is the track that is being protected from any train that might be entering it.
- One reason, if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









- 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.



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Edit Marker Help	
File Help	
Signal Named Plant 6 Facing Diverging	
On Single Block	
Main Leg of Turnout	JSB0
Diverging Leg of Turnout	
On Facing-Point Turnout	
Protects Sensor/s LS2 LS7	imer
Red When Turnout LT1	
Protects Signal Limited Spee	d
🗌 With Flashing Yellow 🛛 Is Distant Sig	Inal
Approach Lighting Sensor	
Apply	

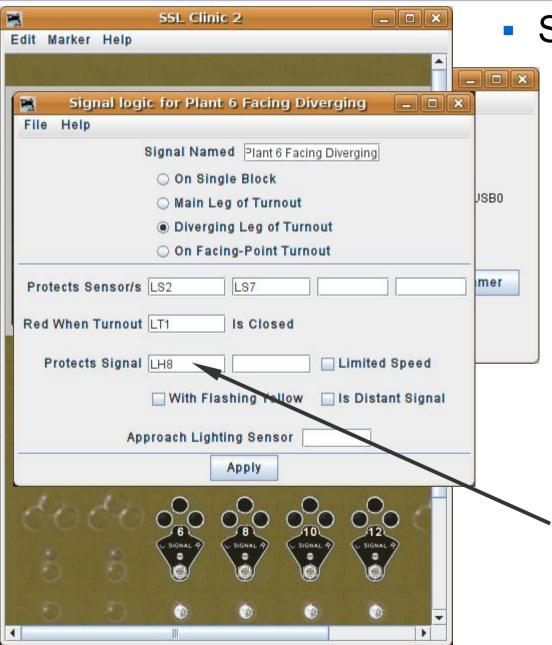
- Enter the sensor for the OS which is LS2.
- This signal head is for the diverging route, so it also needs to protect the siding, i.e. LS7.
- Of course we need to know what turnout is involved, so we enter LT1.



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Edit Marker Help	
File Help	
Signal Named Plant 6 Facing Diverging	
On Single Block	
Main Leg of Turnout	JSB0
Diverging Leg of Turnout	
On Facing-Point Turnout	
Protects Sensor/s LS2 LS7	imer
Red When Turnout LT1	
Protects Signal Limited Spee	d
🗌 With Flashing Yellow 🛛 Is Distant Sig	Inal
Approach Lighting Sensor	
Apply	

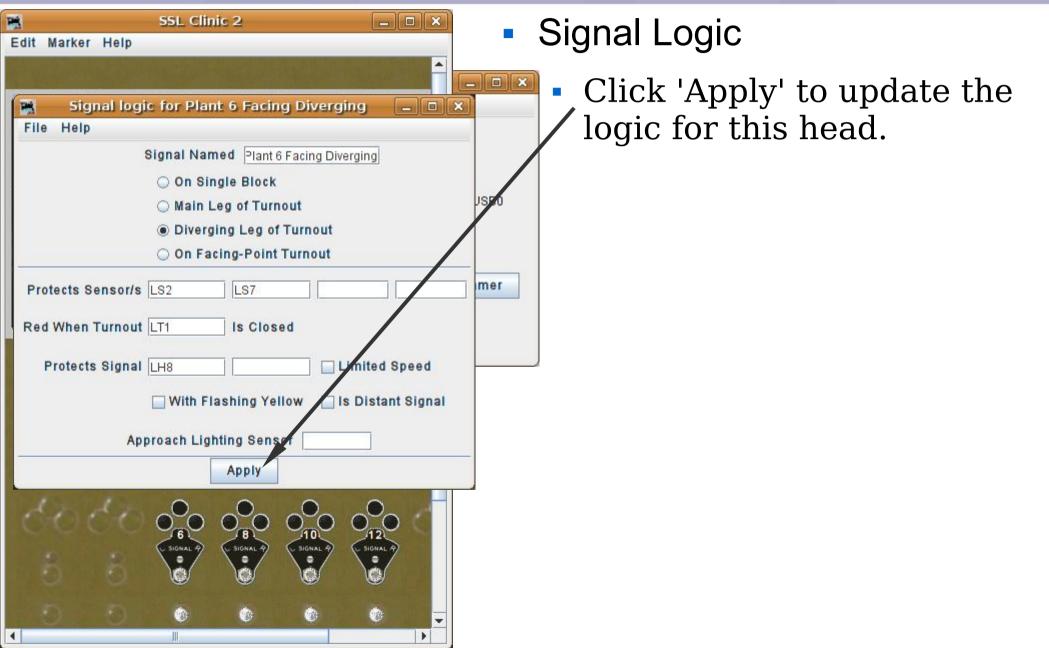
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- This signal head is for the diverging route, so it also needs to protect the siding, i.e. LS7.
- Of course we need to know what turnout is involved, so we enter LT1.





- 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.



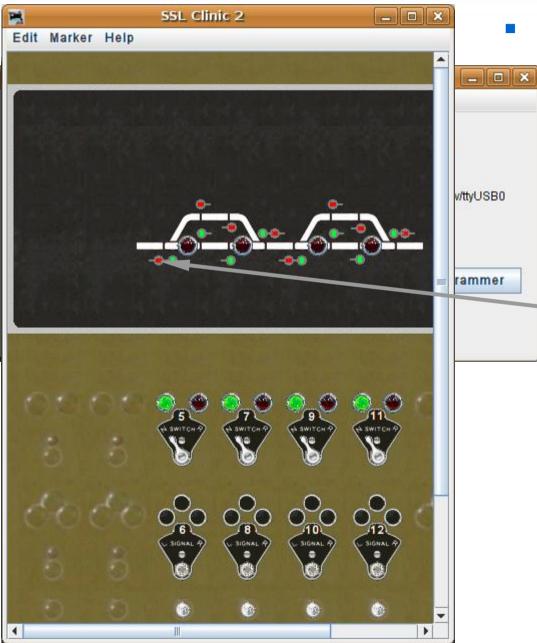




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6	Signal logic for Plant 6 Facing Diverging 📃 🗆 🗙		
	File Help		
	Signal Named Plant 6 Facing Diverging		
	On Single Block		
	Main Leg of Turnout	USB0	
	Diverging Leg of Turnout		
	On Facing-Point Turnout		
	Protects Sensor/s LS2 LS7	mer	
	Red When Turnout LT1 Is Closed		
	Protects Signal LH8 Limited Speed		
	🗌 With Flashing Yellow 🛛 🗌 Is Distant Signal		
	Approach Lighting Sensor		
	Apply		
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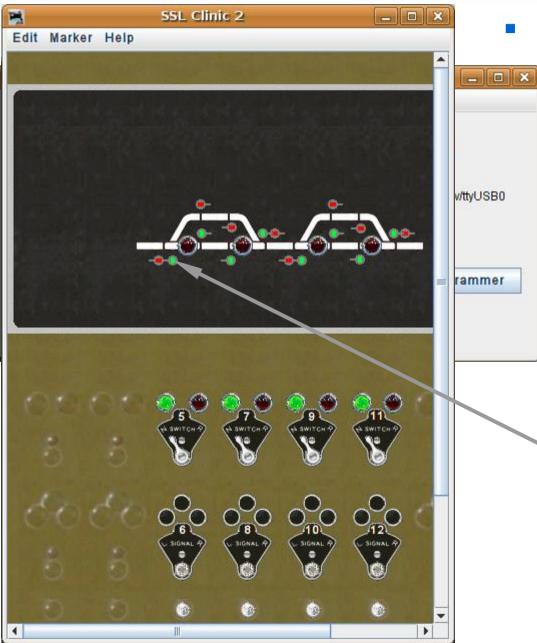
- Click 'Apply' to update the logic for this head.
- Close the edit window when done.





- 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.





- 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 Clinic 2	
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	📑 Signal logic for Plant 6 Facing Main 💶 🗆 🗙	
	File Help	6B0
	Signal Named Plant 6 Facing Main	
	On Single Block	
	Main Leg of Turnout	
	 Diverging Leg of Turnout 	her
	On Facing-Point Turnout	
	Protects Sensor/s LS2 LS3	1
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	Red When Turnout LT1 Is Thrown	
	Protects Signal LH7	
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	Approach Lighting Sensor	
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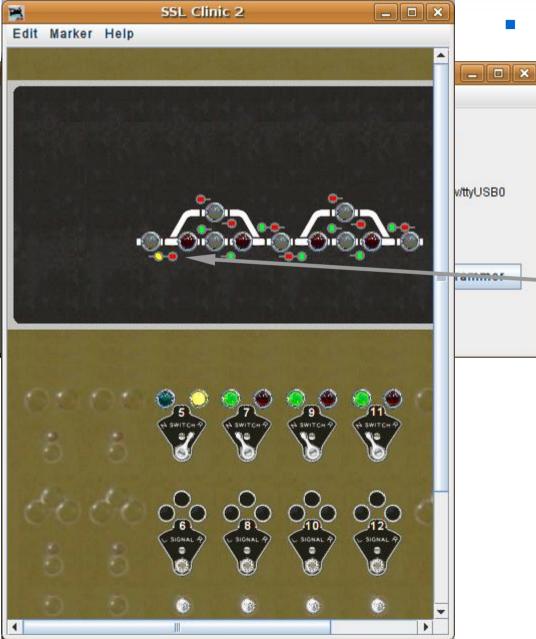
- Click 'Apply' to update the logic for this head.
- Close the edit window when done.
- The signal is now red because the turnout is against traffic on the diverging route.
- Right click the next head to bring up its edit window.
- This is the 'main' leg of the route.



-	SSL Clinic 2	
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	Signal logic for Plant 6 Facing Main 📃 🗆 🗙	
	Signal logic for Plant 6 Facing Main	
		6B0
	⊖ On Single Block	
L	 Main Leg of Turnout 	
	Diverging Leg of Turnout	her
	 On Facing-Point Turnout 	
L		
	Protects Sensor/s LS2 LS3	
	Red When Turnout LT1 Is Thrown	
	Protects Signal LH7	
	🔤 With Flashing Yellow 🔤 Is Distant Signal	
	Approach Lighting Sensor	
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- 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.

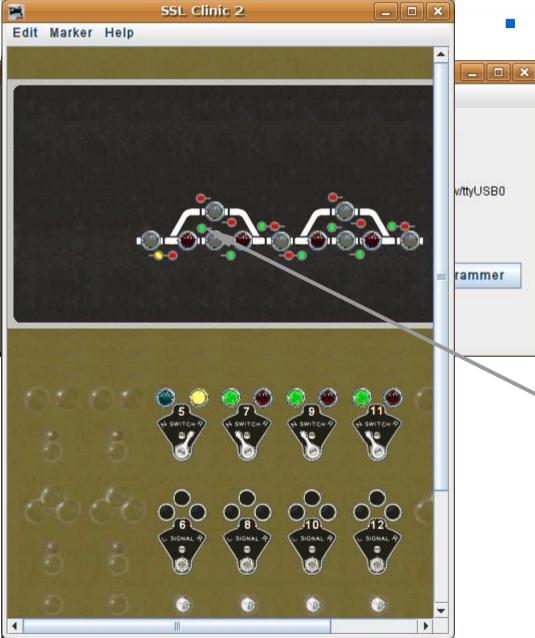




Signal Logic

 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.





- 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.



W	SSL Clinic 2	_ 	
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I	File Help		
I	Signal Named Plant 6 Trailing Main		ISB0
I	On Single Block		
I	Main Leg of Turnout		
I	Diverging Leg of Turnout		mer
I	On Facing-Point Turnout		
L	Protects Sensor/s LS2		
	Red When Turnout LT1 Is Thrown		
	Protects Signal	hed Speed	
	🔤 With Flashing Yellow 🔤 Is D	istant Signal	
	Approach Lighting Sensor		
	Apply		
	SIGNAL P SIGNAL P SIGNAL P SIGNAL P SIGNAL P SIGNAL P		
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- 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.

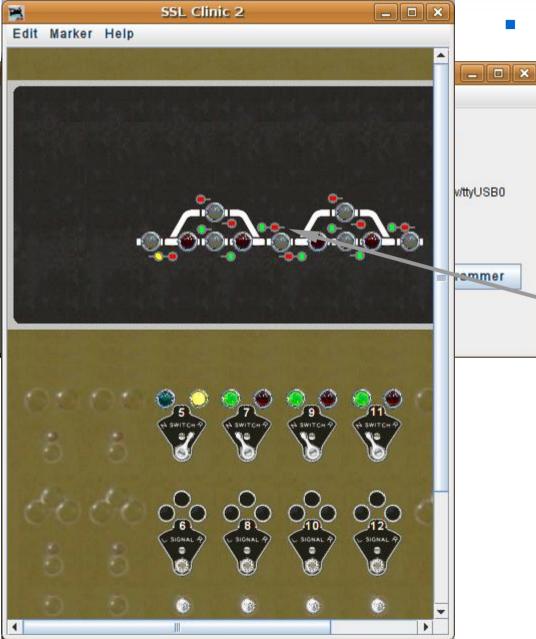


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	🔀 Signal logic for Plant 6 Trailing Diverging 💶 🗆 🗙	
	File Help	
	Signal Named 'lant 6 Trailing Diverging ISI	B0
l	On Single Block	
	Main Leg of Turnout	
l	Diverging Leg of Turnout m	er
l	On Facing-Point Turnout	
	Protects Sensor/s LS2 LS1	
	Red When Turnout LT1 Is Closed	
	Protects Signal Limited Speed	
	🗌 With Flashing Yellow 🛛 Is Distant Signal	
	Approach Lighting Sensor	
	Apply	
	SIGNAL A SIGNAL A SIGNAL A SIGNAL A	
	5 5 6 6 6 -	
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Signal Logic

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





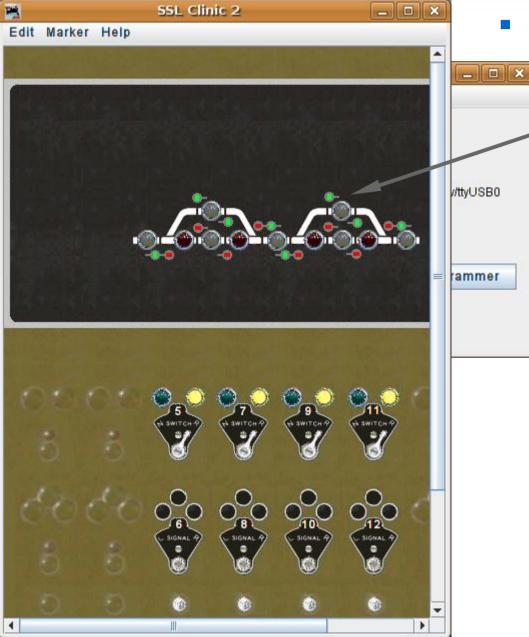
- The information for the diverging leg is identical to the main leg in this direction.
- Continue to add the logic for each signal until they are all complete.



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	🚆 🛛 Signal logic for Plant 8 Trailing Diverging 💦 💶 🗙	
	File Help	
	Signal Named 'Iant 8 Trailing Diverging	
l	On Single Block	ISB0
l	Main Leg of Turnout	
l	Diverging Leg of Turnout	
I	On Facing-Point Turnout	mer
	Protects Sensor/s LS6 LS5	
	Red When Turnout LT2 Is Closed	
	Protects Signal LH10 LH9	
	🗌 With Flashing Yellow 🛛 Is Distant Signal	
	Approach Lighting Sensor	
	Apply	
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- 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.)





Signal Logic

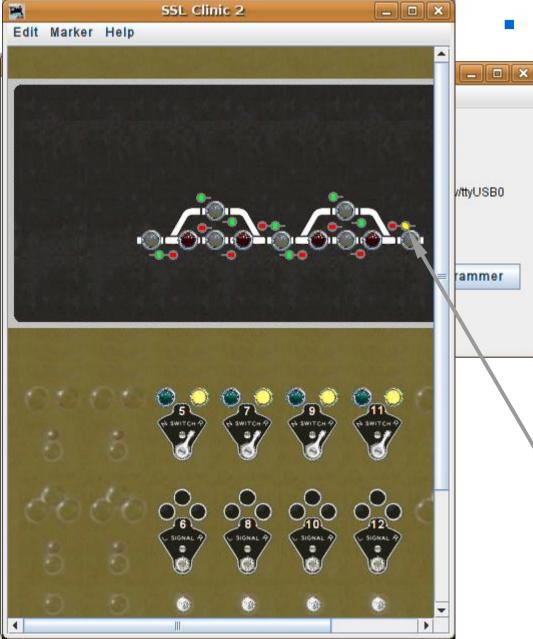
 Notice that setting all the turnouts to reverse (diverging) gives us green signals through the passing sidings. Many rail roads would limit the speed in this situation by using the 'approach' signal.



-	SSL Clinic 2	
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	Signal logic for Plant 12 Facing Diverging 📃 🗆 🗙	
	File Help	
	Signal Named lant 12 Facing Diverging	
	🔾 On Single Block	6B0
	Main Leg of Turnout	
	Oiverging Leg of Turnout	
	On Facing-Point Turnout	her
	Protects Sensor/s LS13 LS14	
	Red When Turnout LT4 Is Closed	
	Protects Signal LH12	
	🗌 With Flashing Yellow 🔄 Is Distant Signal	
	Approach Lighting Sensor	
	Apply	
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	SIGNAL ? SIGNAL ? SIGNAL ? SIGNAL ?	
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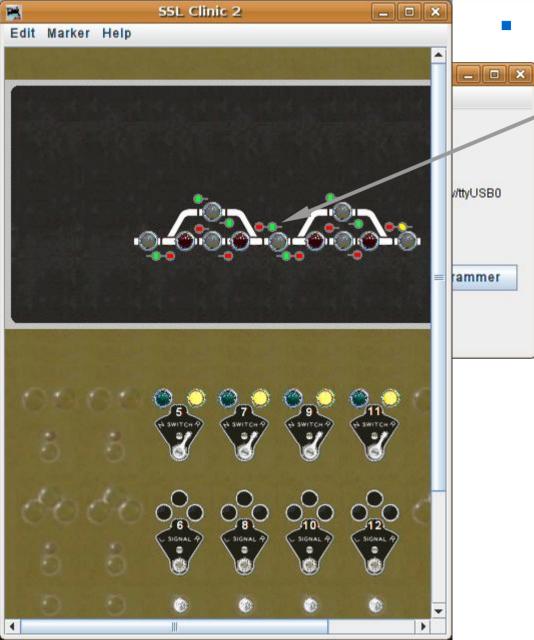
- Notice that setting all the turnouts to reverse (diverging) gives us green signals through the passing sidings. Many rail roads would limit the speed in this situation by using the 'approach' signal.
- SSL supports this practice simply by checking the 'Limited Speed' box.





- 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.

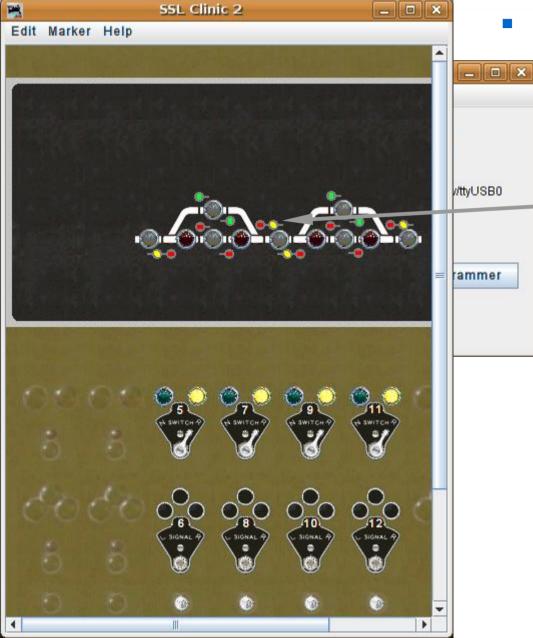




Signal Logic

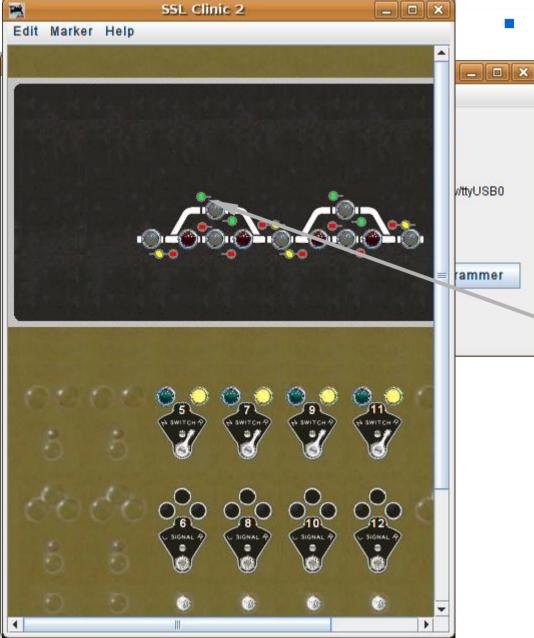
 Make the same changes to the other diverging routes.





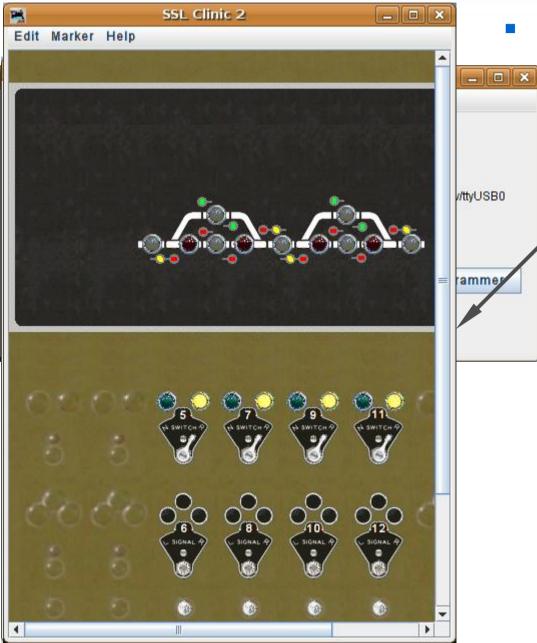
- Make the same changes to the other diverging routes.
- Now trains are warned
 slow down when entering the reverse route.





- 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.

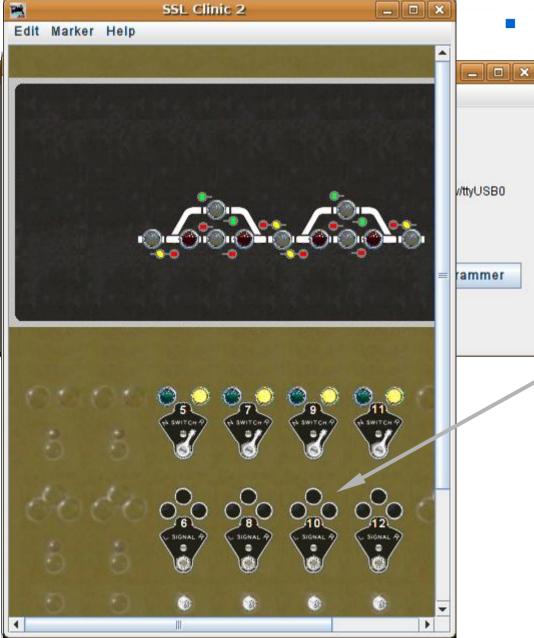




Signal Logic

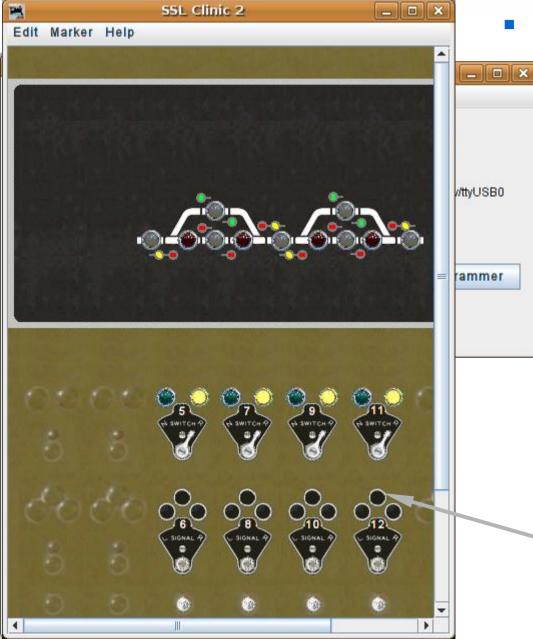
 As previously mentioned, a prototype ABS system would not have a remote panel, so in reality this panel is the foundation for a CTC system.





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- Actually this is how CTC works. CTC over rides an underlying ABS system with permissive inputs from the dispatcher.





- 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'.



- 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)