



Create a Detailed CTC Machine Model 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
- Add Signals to your Layout with JMRI/PanelPro
10:00 PM, Sunday, July 13th
- Introduction to Layout Control with JMRI/PanelPro
Repeated 4:00 PM, Friday, July 18th



CTC Logix

- Logix
 - The CTC panel that we have just covered is controlled by JMRI Logix rather than a cabinet full of relays like the prototype.



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- Remember that the CTC panel and its equipment are acting as a over ride controlling interface for the basic ABS system that is located in the trackside signal control boxes.



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- The CTC panel that we have just covered is controlled by JMRI Logix rather than a cabinet full of relays like the prototype.
- Remember that the CTC panel and its equipment are acting as a over ride controlling interface for the basic ABS system that is located in the trackside signal control boxes.
- Commands are sent back and forth between the plant and the CTC system via a pulse width encoding system.



CTC Logix

- Logix
 - The CTC panel that we have just covered is controlled by JMRI Logix rather than a cabinet full of relays like the prototype.
 - Remember that the CTC panel and its equipment are acting as a over ride controlling interface for the basic ABS system that is located in the trackside signal control boxes.
 - Commands are sent back and forth between the plant and the CTC system via a pulse width encoding system.
 - The prototype used one line to send and receive all information for each of the plants under its control.



CTC Logix

- Logix
 - The coded commands actually were sent quite slowly and one at a time. We will simulate the delays and relay sounds, but not the fact that each command had to be queued before it was sent. This may cause overlapping relay sounds in our simulation that were not heard in the original panels.



CTC Logix

■ Logix

- I have tried to divide the Logix entries in a way that not only makes them possible to understand, but also to allow some potential for automatic generation of the CTC logic similar to SSL.

System...	User Name	Enabled	Delete	Edit
IX-SENS-IN:	Sensor inputs	<input checked="" type="checkbox"/>	Delete	Edit
IX:P10:INIT:	Plant 10 Initialization	<input checked="" type="checkbox"/>	Delete	Edit
IX:P10:ITD:	10 Intermediate Traffic Dir...	<input checked="" type="checkbox"/>	Delete	Edit
IX:P10:MTD:	10 Main Traffic Direction R	<input checked="" type="checkbox"/>	Delete	Edit
IX:P10:PTD:	10 Passing Traffic Directio...	<input checked="" type="checkbox"/>	Delete	Edit
IX:P10:SH:	Plant 10 Signal Heads	<input checked="" type="checkbox"/>	Delete	Edit
IX:P10:SI:	Plant 10 Signal Indicators	<input checked="" type="checkbox"/>	Delete	Edit
IX:P10:SL:	Plant 10 Signal Lever	<input checked="" type="checkbox"/>	Delete	Edit
IX:P10:SND:	Plant 10 Sounds	<input checked="" type="checkbox"/>	Delete	Edit
IX:P12:INIT:	Plant 12 Initialization	<input checked="" type="checkbox"/>	Delete	Edit
IX:P12:ITD:	12 Intermediate Traffic Dir...	<input checked="" type="checkbox"/>	Delete	Edit
IX:P12:MTD:	12 Main Traffic Direction L	<input checked="" type="checkbox"/>	Delete	Edit
IX:P12:PTD:	12 Passing Traffic Direction L	<input checked="" type="checkbox"/>	Delete	Edit
IX:P12:SH:	Plant 12 Signal Heads	<input checked="" type="checkbox"/>	Delete	Edit
IX:P12:SI:	Plant 12 Signal Indicators	<input checked="" type="checkbox"/>	Delete	Edit
IX:P12:SL:	Plant 12 Signal Lever	<input checked="" type="checkbox"/>	Delete	Edit
IX:P12:SND:	Plant 12 Sounds	<input checked="" type="checkbox"/>	Delete	Edit
IX:P2:INIT:	Plant 2 Initialization	<input checked="" type="checkbox"/>	Delete	Edit
IX:P4:INIT:	Plant 4 Initialization	<input checked="" type="checkbox"/>	Delete	Edit
IX:P6:INIT:	Plant 6 Initialization	<input checked="" type="checkbox"/>	Delete	Edit
IX:P6:ITD:	6 Intermediate Traffic Dire...	<input checked="" type="checkbox"/>	Delete	Edit
IX:P6:MTD:	6 Main Traffic Direction R	<input checked="" type="checkbox"/>	Delete	Edit
IX:P6:PTD:	6 Passing Traffic Direction R	<input checked="" type="checkbox"/>	Delete	Edit
IX:P6:SH:	Plant 6 Signal Heads	<input checked="" type="checkbox"/>	Delete	Edit
IX:P6:SI:	Plant 6 Signal Indicators	<input checked="" type="checkbox"/>	Delete	Edit
IX:P6:SL:	Plant 6 Signal Lever	<input checked="" type="checkbox"/>	Delete	Edit
IX:P6:SND:	Plant 6 Sounds	<input checked="" type="checkbox"/>	Delete	Edit



CTC Logix

- Logix

- I have tried to divide the Logix entries in a way that not only makes them possible to understand, but also to allow some potential for automatic generation of the CTC logic similar to SSL.
- Logix relating to the signals are called 'Plant' and are prefixed with "IX:P---".



System...	User Name	Enabled	Delete	Edit
IX-SENS-IN:	Sensor inputs	<input checked="" type="checkbox"/>	Delete	Edit
IX:P10:INIT:	Plant 10 Initialization	<input checked="" type="checkbox"/>	Delete	Edit
IX:P10:ITD:	10 Intermediate Traffic Dir...	<input checked="" type="checkbox"/>	Delete	Edit
IX:P10:MTD:	10 Main Traffic Direction R	<input checked="" type="checkbox"/>	Delete	Edit
IX:P10:PTD:	10 Passing Traffic Directio...	<input checked="" type="checkbox"/>	Delete	Edit
IX:P10:SH:	Plant 10 Signal Heads	<input checked="" type="checkbox"/>	Delete	Edit
IX:P10:SI:	Plant 10 Signal Indicators	<input checked="" type="checkbox"/>	Delete	Edit
IX:P10:SL:	Plant 10 Signal Lever	<input checked="" type="checkbox"/>	Delete	Edit
IX:P10:SND:	Plant 10 Sounds	<input checked="" type="checkbox"/>	Delete	Edit
IX:P12:INIT:	Plant 12 Initialization	<input checked="" type="checkbox"/>	Delete	Edit
IX:P12:ITD:	12 Intermediate Traffic Dir...	<input checked="" type="checkbox"/>	Delete	Edit
IX:P12:MTD:	12 Main Traffic Direction L	<input checked="" type="checkbox"/>	Delete	Edit
IX:P12:PTD:	12 Passing Traffic Direction L	<input checked="" type="checkbox"/>	Delete	Edit
IX:P12:SH:	Plant 12 Signal Heads	<input checked="" type="checkbox"/>	Delete	Edit
IX:P12:SI:	Plant 12 Signal Indicators	<input checked="" type="checkbox"/>	Delete	Edit
IX:P12:SL:	Plant 12 Signal Lever	<input checked="" type="checkbox"/>	Delete	Edit
IX:P12:SND:	Plant 12 Sounds	<input checked="" type="checkbox"/>	Delete	Edit
IX:P2:INIT:	Plant 2 Initialization	<input checked="" type="checkbox"/>	Delete	Edit
IX:P4:INIT:	Plant 4 Initialization	<input checked="" type="checkbox"/>	Delete	Edit
IX:P6:INIT:	Plant 6 Initialization	<input checked="" type="checkbox"/>	Delete	Edit
IX:P6:ITD:	6 Intermediate Traffic Dire...	<input checked="" type="checkbox"/>	Delete	Edit
IX:P6:MTD:	6 Main Traffic Direction R	<input checked="" type="checkbox"/>	Delete	Edit
IX:P6:PTD:	6 Passing Traffic Direction R	<input checked="" type="checkbox"/>	Delete	Edit
IX:P6:SH:	Plant 6 Signal Heads	<input checked="" type="checkbox"/>	Delete	Edit
IX:P6:SI:	Plant 6 Signal Indicators	<input checked="" type="checkbox"/>	Delete	Edit
IX:P6:SL:	Plant 6 Signal Lever	<input checked="" type="checkbox"/>	Delete	Edit
IX:P6:SND:	Plant 6 Sounds	<input checked="" type="checkbox"/>	Delete	Edit



CTC Logix

- Logix

- I have tried to divide the Logix entries in a way that not only makes them possible to understand, but also to allow some potential for automatic generation of the CTC logic similar to SSL.
- Logix relating to the signals are called 'Plant' and are prefixed with "IX:P---".
- Logix that control the switches are "IX:S---".

System...	User Name	Enabled	Delete	Edit
IX:P2:INIT:	Plant 2 Initialization	<input checked="" type="checkbox"/>	Delete	Edit
IX:P4:INIT:	Plant 4 Initialization	<input checked="" type="checkbox"/>	Delete	Edit
IX:P6:INIT:	Plant 6 Initialization	<input checked="" type="checkbox"/>	Delete	Edit
IX:P6:ITD:	6 Intermediate Traffic Dire...	<input checked="" type="checkbox"/>	Delete	Edit
IX:P6:MTD:	6 Main Traffic Direction R	<input checked="" type="checkbox"/>	Delete	Edit
IX:P6:PTD:	6 Passing Traffic Direction R	<input checked="" type="checkbox"/>	Delete	Edit
IX:P6:SH:	Plant 6 Signal Heads	<input checked="" type="checkbox"/>	Delete	Edit
IX:P6:SI:	Plant 6 Signal Indicators	<input checked="" type="checkbox"/>	Delete	Edit
IX:P6:SL:	Plant 6 Signal Lever	<input checked="" type="checkbox"/>	Delete	Edit
IX:P6:SND:	Plant 6 Sounds	<input checked="" type="checkbox"/>	Delete	Edit
IX:P8:INIT:	Plant 8 Initialization	<input checked="" type="checkbox"/>	Delete	Edit
IX:P8:ITD:	8 Intermediate Traffic Dire...	<input checked="" type="checkbox"/>	Delete	Edit
IX:P8:MTD:	8 Main Traffic Direction L	<input checked="" type="checkbox"/>	Delete	Edit
IX:P8:PTD:	8 Passing Traffic Direction L	<input checked="" type="checkbox"/>	Delete	Edit
IX:P8:SH:	Plant 8 Signal Heads	<input checked="" type="checkbox"/>	Delete	Edit
IX:P8:SI:	Plant 8 Signal Indicators	<input checked="" type="checkbox"/>	Delete	Edit
IX:P8:SL:	Plant 8 Signal Lever	<input checked="" type="checkbox"/>	Delete	Edit
IX:P8:SND:	Plant 8 Sounds	<input checked="" type="checkbox"/>	Delete	Edit
IX:S11:OS:	Switch 11 OS	<input checked="" type="checkbox"/>	Delete	Edit
IX:S11:SC:	Switch 11 Control	<input checked="" type="checkbox"/>	Delete	Edit
IX:S5:OS:	Switch 5 OS	<input checked="" type="checkbox"/>	Delete	Edit
IX:S5:SC:	Switch 5 Control	<input checked="" type="checkbox"/>	Delete	Edit
IX:S7:OS:	Switch 7 OS	<input checked="" type="checkbox"/>	Delete	Edit
IX:S7:SC:	Switch 7 Control	<input checked="" type="checkbox"/>	Delete	Edit
IX:S9:OS:	Switch 9 OS	<input checked="" type="checkbox"/>	Delete	Edit
IX:S9:SC:	Switch 9 Control	<input checked="" type="checkbox"/>	Delete	Edit
IX:TRA:IN:	Off panel traffic	<input checked="" type="checkbox"/>	Delete	Edit



CTC Logix

■ Logix

- The 'IX:P' is followed by each signals panel position number. (not the mile marker or actual signal name.) e.g. 12.



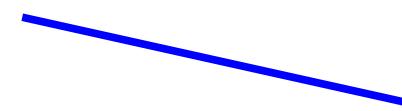
System...	User Name	Enabled	Delete	Edit
IX-SENS-IN:	Sensor inputs	<input checked="" type="checkbox"/>	Delete	Edit
IX:P10:INIT:	Plant 10 Initialization	<input checked="" type="checkbox"/>	Delete	Edit
IX:P10:ITD:	10 Intermediate Traffic Dir...	<input checked="" type="checkbox"/>	Delete	Edit
IX:P10:MTD:	10 Main Traffic Direction R	<input checked="" type="checkbox"/>	Delete	Edit
IX:P10:PTD:	10 Passing Traffic Directio...	<input checked="" type="checkbox"/>	Delete	Edit
IX:P10:SH:	Plant 10 Signal Heads	<input checked="" type="checkbox"/>	Delete	Edit
IX:P10:SI:	Plant 10 Signal Indicators	<input checked="" type="checkbox"/>	Delete	Edit
IX:P10:SL:	Plant 10 Signal Lever	<input checked="" type="checkbox"/>	Delete	Edit
IX:P10:SND:	Plant 10 Sounds	<input checked="" type="checkbox"/>	Delete	Edit
IX:P12:INIT:	Plant 12 Initialization	<input checked="" type="checkbox"/>	Delete	Edit
IX:P12:ITD:	12 Intermediate Traffic Dir...	<input checked="" type="checkbox"/>	Delete	Edit
IX:P12:MTD:	12 Main Traffic Direction L	<input checked="" type="checkbox"/>	Delete	Edit
IX:P12:PTD:	12 Passing Traffic Direction L	<input checked="" type="checkbox"/>	Delete	Edit
IX:P12:SH:	Plant 12 Signal Heads	<input checked="" type="checkbox"/>	Delete	Edit
IX:P12:SI:	Plant 12 Signal Indicators	<input checked="" type="checkbox"/>	Delete	Edit
IX:P12:SL:	Plant 12 Signal Lever	<input checked="" type="checkbox"/>	Delete	Edit
IX:P12:SND:	Plant 12 Sounds	<input checked="" type="checkbox"/>	Delete	Edit
IX:P2:INIT:	Plant 2 Initialization	<input checked="" type="checkbox"/>	Delete	Edit
IX:P4:INIT:	Plant 4 Initialization	<input checked="" type="checkbox"/>	Delete	Edit
IX:P6:INIT:	Plant 6 Initialization	<input checked="" type="checkbox"/>	Delete	Edit
IX:P6:ITD:	6 Intermediate Traffic Dire...	<input checked="" type="checkbox"/>	Delete	Edit
IX:P6:MTD:	6 Main Traffic Direction R	<input checked="" type="checkbox"/>	Delete	Edit
IX:P6:PTD:	6 Passing Traffic Direction R	<input checked="" type="checkbox"/>	Delete	Edit
IX:P6:SH:	Plant 6 Signal Heads	<input checked="" type="checkbox"/>	Delete	Edit
IX:P6:SI:	Plant 6 Signal Indicators	<input checked="" type="checkbox"/>	Delete	Edit
IX:P6:SL:	Plant 6 Signal Lever	<input checked="" type="checkbox"/>	Delete	Edit
IX:P6:SND:	Plant 6 Sounds	<input checked="" type="checkbox"/>	Delete	Edit



CTC Logix

- Logix

- The 'IX:P' is followed by each signals panel position number. (not the mile marker or actual signal name.) e.g. 12.
- In like manner the switches are identified by their panel location. e.g. 5.



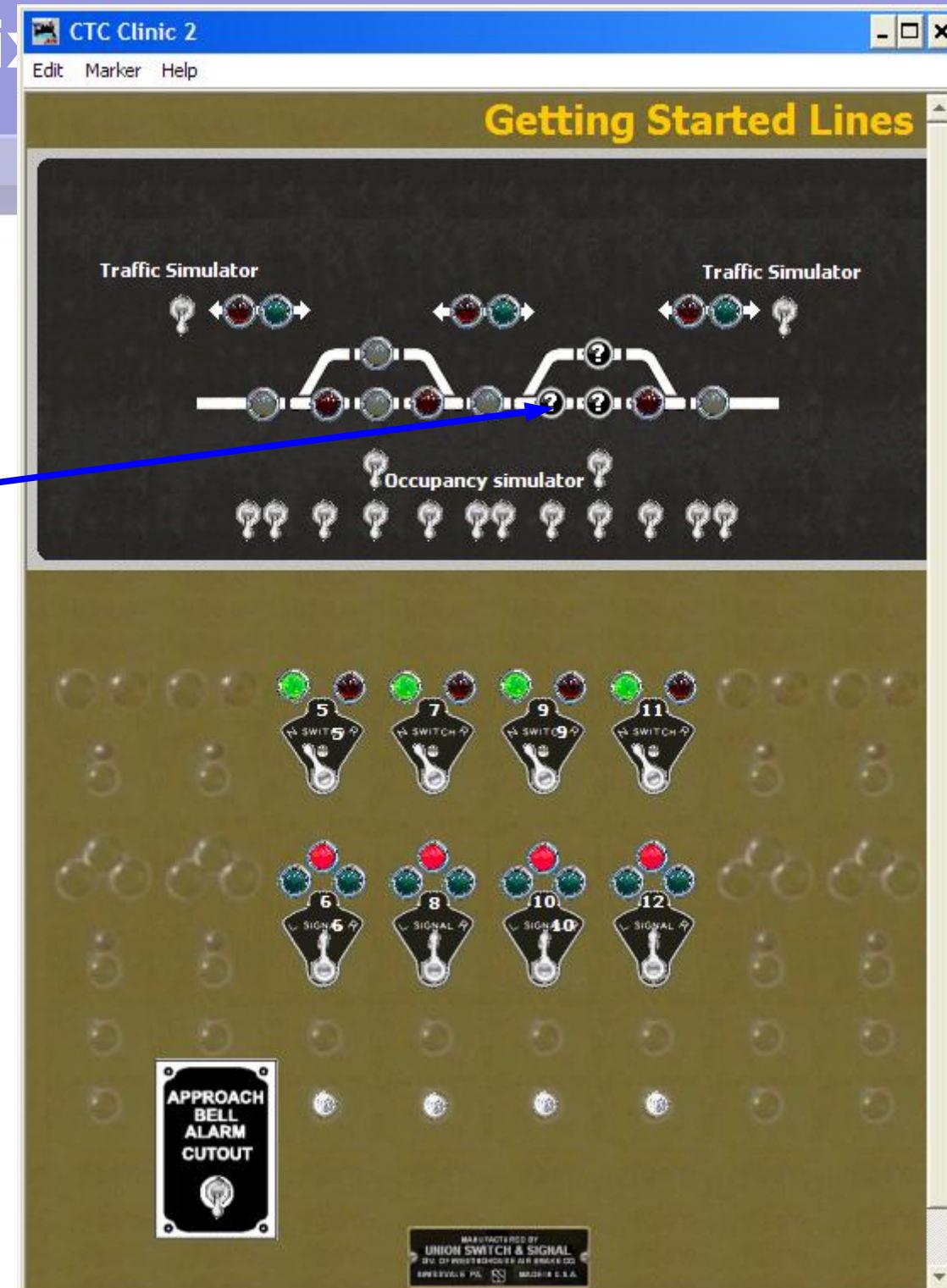
System...	User Name	Enabled	Delete	Edit
IX:P2:INIT:	Plant 2 Initialization	<input checked="" type="checkbox"/>	Delete	Edit
IX:P4:INIT:	Plant 4 Initialization	<input checked="" type="checkbox"/>	Delete	Edit
IX:P6:INIT:	Plant 6 Initialization	<input checked="" type="checkbox"/>	Delete	Edit
IX:P6:ITD:	6 Intermediate Traffic Dire...	<input checked="" type="checkbox"/>	Delete	Edit
IX:P6:MTD:	6 Main Traffic Direction R	<input checked="" type="checkbox"/>	Delete	Edit
IX:P6:PTD:	6 Passing Traffic Direction R	<input checked="" type="checkbox"/>	Delete	Edit
IX:P6:SH:	Plant 6 Signal Heads	<input checked="" type="checkbox"/>	Delete	Edit
IX:P6:SI:	Plant 6 Signal Indicators	<input checked="" type="checkbox"/>	Delete	Edit
IX:P6:SL:	Plant 6 Signal Lever	<input checked="" type="checkbox"/>	Delete	Edit
IX:P6:SND:	Plant 6 Sounds	<input checked="" type="checkbox"/>	Delete	Edit
IX:P8:INIT:	Plant 8 Initialization	<input checked="" type="checkbox"/>	Delete	Edit
IX:P8:ITD:	8 Intermediate Traffic Dire...	<input checked="" type="checkbox"/>	Delete	Edit
IX:P8:MTD:	8 Main Traffic Direction L	<input checked="" type="checkbox"/>	Delete	Edit
IX:P8:PTD:	8 Passing Traffic Direction L	<input checked="" type="checkbox"/>	Delete	Edit
IX:P8:SH:	Plant 8 Signal Heads	<input checked="" type="checkbox"/>	Delete	Edit
IX:P8:SI:	Plant 8 Signal Indicators	<input checked="" type="checkbox"/>	Delete	Edit
IX:P8:SL:	Plant 8 Signal Lever	<input checked="" type="checkbox"/>	Delete	Edit
IX:P8:SND:	Plant 8 Sounds	<input checked="" type="checkbox"/>	Delete	Edit
IX:S11:OS:	Switch 11 OS	<input checked="" type="checkbox"/>	Delete	Edit
IX:S11:SC:	Switch 11 Control	<input checked="" type="checkbox"/>	Delete	Edit
IX:S5:OS:	Switch 5 OS	<input checked="" type="checkbox"/>	Delete	Edit
IX:S5:SC:	Switch 5 Control	<input checked="" type="checkbox"/>	Delete	Edit
IX:S7:OS:	Switch 7 OS	<input checked="" type="checkbox"/>	Delete	Edit
IX:S7:SC:	Switch 7 Control	<input checked="" type="checkbox"/>	Delete	Edit
IX:S9:OS:	Switch 9 OS	<input checked="" type="checkbox"/>	Delete	Edit
IX:S9:SC:	Switch 9 Control	<input checked="" type="checkbox"/>	Delete	Edit
IX:TRA:IN:	Off panel traffic	<input checked="" type="checkbox"/>	Delete	Edit



CTC Logix

Initial State

- As soon as we load the panel we need to initialize the plant. Initially all of our IS and IT entries will come up as unknown and remain that way until we activate them. It would be very annoying to the CTC operator to require him to click on every entry point, so we will devise a Logix to do that work for him.
- Note: some hardware does not remember its last state and also must be initialized after power on in a similar way.

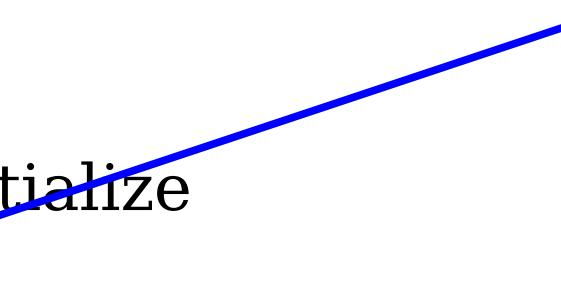




CTC Logix

- Conditionals

- First we initialize each plant.



System...	User Name	Enabled	Delete	Edit
IX-SENS-IN:	Sensor inputs	<input checked="" type="checkbox"/>	Delete	Edit
IX:P10:INIT:	Plant 10 Initialization	<input checked="" type="checkbox"/>	Delete	Edit
IX:P10:ITD:	10 Intermediate Traffic Dir...	<input checked="" type="checkbox"/>	Delete	Edit
IX:P10:MTD:	10 Main Traffic Direction R	<input checked="" type="checkbox"/>	Delete	Edit
IX:P10:PTD:	10 Passing Traffic Directio...	<input checked="" type="checkbox"/>	Delete	Edit
IX:P10:SH:	Plant 10 Signal Heads	<input checked="" type="checkbox"/>	Delete	Edit
IX:P10:SI:	Plant 10 Signal Indicators	<input checked="" type="checkbox"/>	Delete	Edit
IX:P10:SL:	Plant 10 Signal Lever	<input checked="" type="checkbox"/>	Delete	Edit
IX:P10:SND:	Plant 10 Sounds	<input checked="" type="checkbox"/>	Delete	Edit
IX:P12:INIT:	Plant 12 Initialization	<input checked="" type="checkbox"/>	Delete	Edit
IX:P12:ITD:	12 Intermediate Traffic Dir...	<input checked="" type="checkbox"/>	Delete	Edit
IX:P12:MTD:	12 Main Traffic Direction L	<input checked="" type="checkbox"/>	Delete	Edit
IX:P12:PTD:	12 Passing Traffic Direction L	<input checked="" type="checkbox"/>	Delete	Edit
IX:P12:SH:	Plant 12 Signal Heads	<input checked="" type="checkbox"/>	Delete	Edit
IX:P12:SI:	Plant 12 Signal Indicators	<input checked="" type="checkbox"/>	Delete	Edit
IX:P12:SL:	Plant 12 Signal Lever	<input checked="" type="checkbox"/>	Delete	Edit
IX:P12:SND:	Plant 12 Sounds	<input checked="" type="checkbox"/>	Delete	Edit
IX:P2:INIT:	Plant 2 Initialization	<input checked="" type="checkbox"/>	Delete	Edit
IX:P4:INIT:	Plant 4 Initialization	<input checked="" type="checkbox"/>	Delete	Edit
IX:P6:INIT:	Plant 6 Initialization	<input checked="" type="checkbox"/>	Delete	Edit
IX:P6:ITD:	6 Intermediate Traffic Dire...	<input checked="" type="checkbox"/>	Delete	Edit
IX:P6:MTD:	6 Main Traffic Direction R	<input checked="" type="checkbox"/>	Delete	Edit
IX:P6:PTD:	6 Passing Traffic Direction R	<input checked="" type="checkbox"/>	Delete	Edit
IX:P6:SH:	Plant 6 Signal Heads	<input checked="" type="checkbox"/>	Delete	Edit
IX:P6:SI:	Plant 6 Signal Indicators	<input checked="" type="checkbox"/>	Delete	Edit
IX:P6:SL:	Plant 6 Signal Lever	<input checked="" type="checkbox"/>	Delete	Edit
IX:P6:SND:	Plant 6 Sounds	<input checked="" type="checkbox"/>	Delete	Edit



CTC Logix

- **Conditionals**

- First we initialize each plant.
- Each plant has its own initialization because a large panel would have too many actions to fit in one operation.

The screenshot shows the CTC Logix software interface. At the top, there is a window titled "Logix Table" which displays a list of logix entries:

System...	User Name	Enabled	Delete	Edit
IX-SENS-IN:	Sensor inputs	<input checked="" type="checkbox"/>	Delete	Edit
IX:P10:INIT:	Plant 10 Initialization	<input checked="" type="checkbox"/>	Delete	Edit
IX:P10:ITD:	10 Intermediate Traffic Dir...	<input checked="" type="checkbox"/>	Delete	Edit
IX:P10:MTD:	10 Main Traffic Direction R	<input checked="" type="checkbox"/>	Delete	Edit
IX:P10:PTD:	10 Passing Traffic Directio...	<input checked="" type="checkbox"/>	Delete	Edit
IX:P10:SH:	Plant 10 Signal Heads	<input checked="" type="checkbox"/>	Delete	Edit

Below it is another window titled "Edit Logix" which shows the configuration for the "Plant 10 Initialization" entry:

Logix System Name: IX:P10:INIT
Logix User Name: Plant 10 Initialization

Conditionals (in Order of Calculation, max 50)

System Name	User Name	State	Edit
IX:P10:INIT:C1	Init Check	False	Edit

At the bottom of the "Edit Logix" window are several buttons: New Conditional, Reorder, Calculate, Done, and Delete Logix.



Conditionals

Init Check

IF (Expression)

- **NOT IS:IP
(Internal Sensor
Initialize Panel)
active**

THEN (Action)

- 1. Trigger Route
IR:P10:INIT to do
the work.

Note: one of the things one route will do is set the internal sensor IS:IP active to prevent it from happening again.

Edit Conditional

Conditional System Name IX:P10:INIT:C1
Conditional User Name **Init Check**

Logical Expression
State Variables (max 20)

		Variable Type	Name	Data 1	Data 2	State	Triggers Cal...	
	NOT	Sensor Active	IS:IP	N/A	N/A		<input checked="" type="checkbox"/>	Delete

Add State Variable Check State Variables

Actions

Action 1 - Trigger Action On Change To True On Change To False On Change
Action 1 - Type Trigger Route

Action 2 - Trigger Action On Change To True On Change To False On Change
Action 2 - Type None

Update Conditional Cancel Delete Conditional



CTC Logix

■ Routes

- The route initializes the turnout that is part of this plant.

Add/Edit Route

Route System Name: IR:P10:INIT

Route User Name: Initialize Plant 10

Show: All Included Turnouts and Sensors

System Name	User Name	Include	Set State
LT9	Switch 9	<input checked="" type="checkbox"/>	Set Closed

Please select Turnouts to be included in this Route.

System Name	User Name	Include	Set State
IS:P10:CB	Plant 10 Code Button	<input checked="" type="checkbox"/>	Set Inactive
IS:P10:SLI	Plant 10 Signal Left Indicator	<input checked="" type="checkbox"/>	Set Inactive
IS:P10:SLL	Plant 10 Signal Left Lever	<input checked="" type="checkbox"/>	Set Inactive
IS:P10:SLR	Plant 10 Stack L Register	<input checked="" type="checkbox"/>	Set Inactive
IS:P10:SNI	Plant 10 Signals Normal Indicator	<input checked="" type="checkbox"/>	Set Active

Play sound file: Run script:

Enter Sensor that Activates when Route Turnouts are correctly aligned (optional):

Enter Sensors that trigger this Route (optional)

Sensors: On Active On Active On Active On Active

Enter a Turnout that triggers this Route (optional)

Turnout: Condition:

Enter additional delay between Turnout Commands (optional), added delay: (milliseconds)

Enter a Turnout that controls the lock for this Route (optional)

Turnout: Condition:

To change this Route, make changes above, then click 'Update Route'.
To leave Edit mode, without changing this Route, click 'Cancel',

CTC Logix



■ Routes

- The route initializes the turnout that is part of this plant.
- And then sets all the various indicators so the panel looks OK when it starts up.

Add/Edit Route

Route System Name: IR:P10:INIT

Route User Name: Initialize Plant 10

Show: All Included Turnouts and Sensors

Please select Turnouts to be included in this Route.

System Name	User Name	Include	Set State
LT9	Switch 9	<input checked="" type="checkbox"/>	Set Closed

Please select Sensors to be included in this Route.

System Name	User Name	Include	Set State
IS:P10:CB	Plant 10 Code Button	<input checked="" type="checkbox"/>	Set Inactive
IS:P10:SLI	Plant 10 Signal Left Indicator	<input checked="" type="checkbox"/>	Set Inactive
IS:P10:SLL	Plant 10 Signal Left Lever	<input checked="" type="checkbox"/>	Set Inactive
IS:P10:SLR	Plant 10 Stack L Register	<input checked="" type="checkbox"/>	Set Inactive
IS:P10:SNI	Plant 10 Signals Normal Indicator	<input checked="" type="checkbox"/>	Set Active

Play sound file: Run script:

Enter Sensor that Activates when Route Turnouts are correctly aligned (optional):

Enter Sensors that trigger this Route (optional)

Sensors: On Active On Active On Active On Active

Enter a Turnout that triggers this Route (optional)

Turnout: Condition:

Enter additional delay between Turnout Commands (optional), added delay: (milliseconds)

Enter a Turnout that controls the lock for this Route (optional)

Turnout: Condition:

To change this Route, make changes above, then click 'Update Route'.

To leave Edit mode, without changing this Route, click 'Cancel',

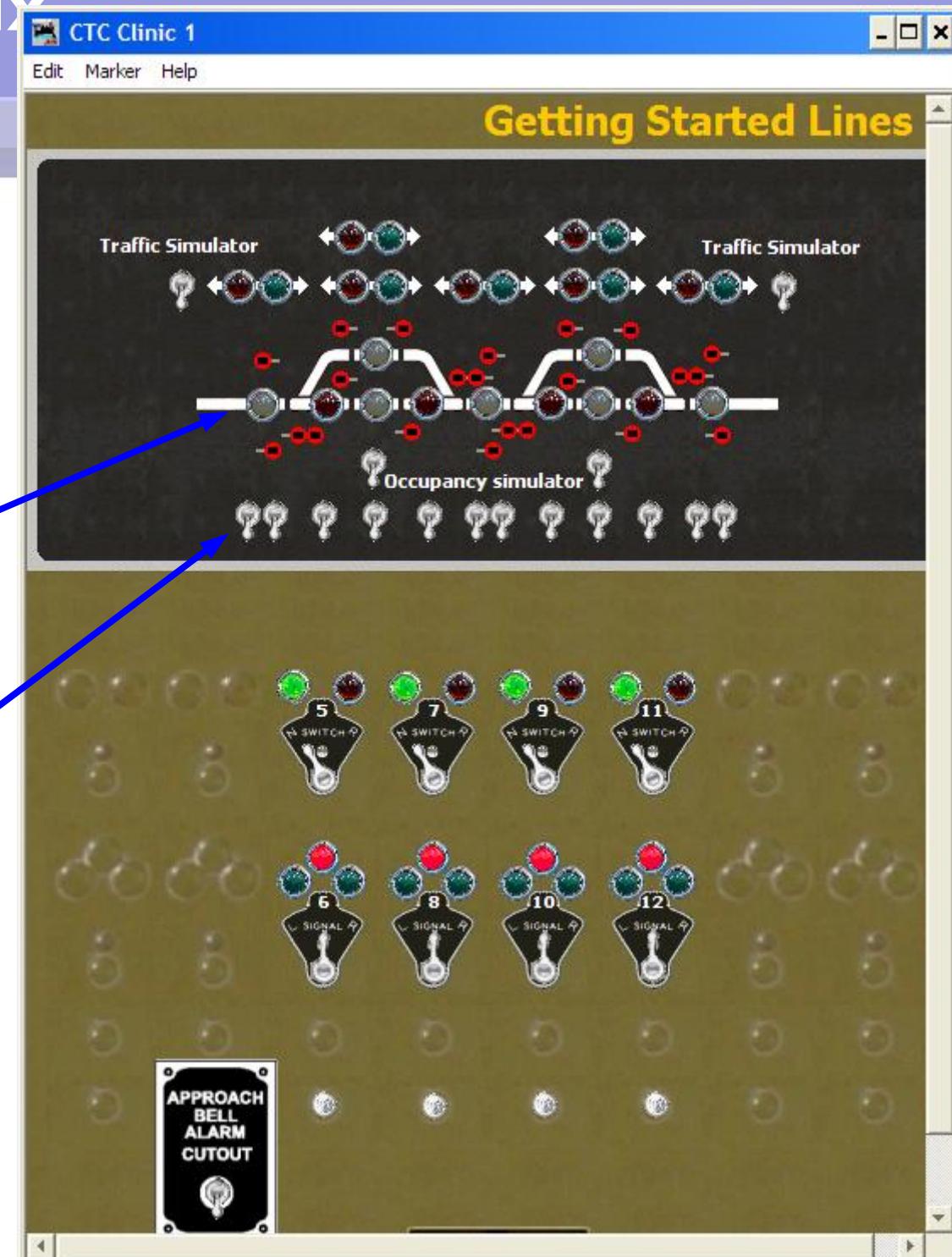


CTC Logix

- Sensor Input

- Sensor inputs trigger a code relay sequence and then light the corresponding lamp.

Remember this demo allows you to simulate the sensor inputs by flipping the toggle switches.

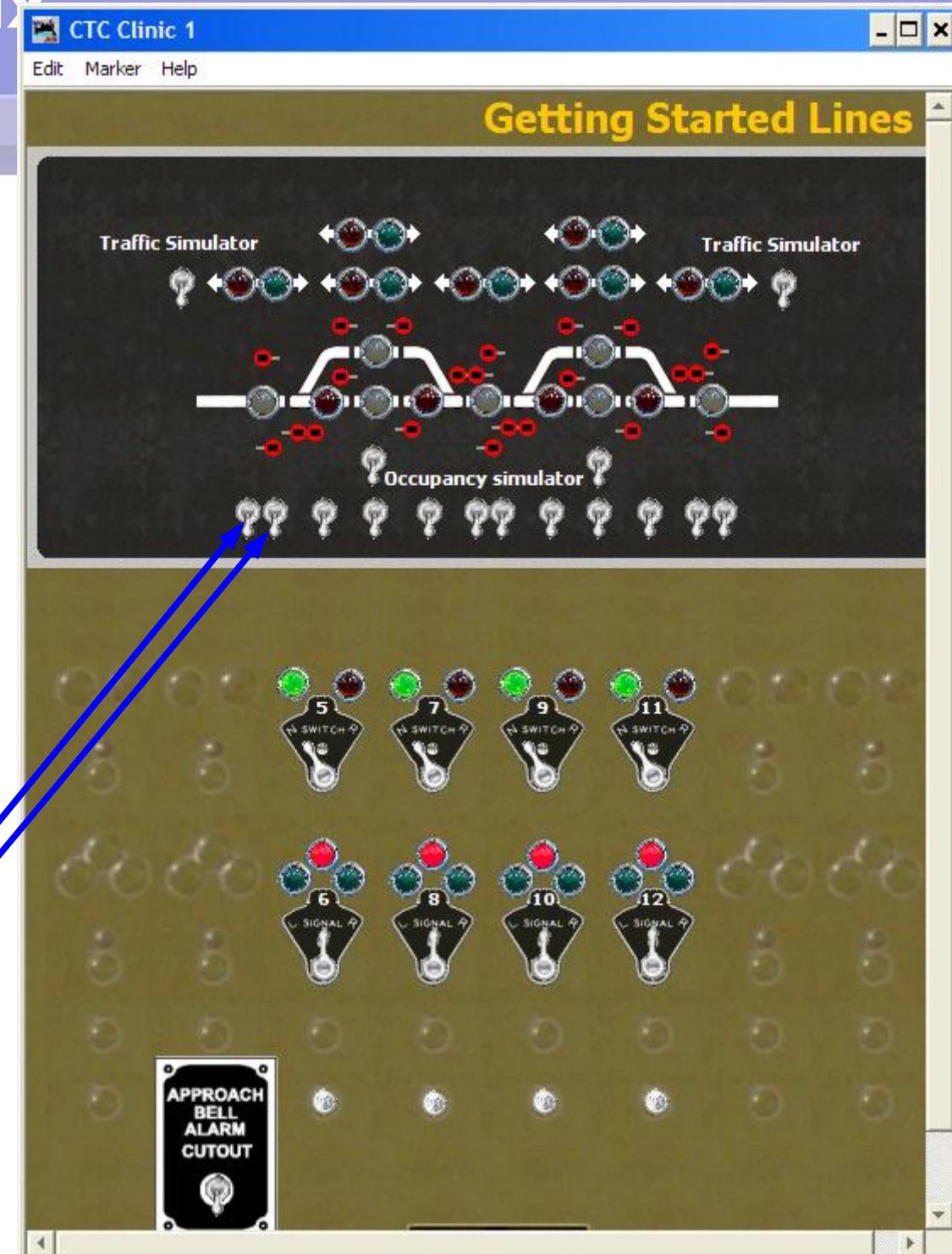




CTC Logix

- Sensor Input

- Sensor inputs trigger a code relay sequence and then light the corresponding lamp. Remember this demo allows you to simulate the sensor inputs by flipping the toggle switches.
- We are simulating two intermediate blocks. The CTC indication shows them all as one lamp.





CTC Logix

- Logix
 - The sensor inputs are all under IX:SENS. We will look at them first.

Logix Table

System...	User Name	Enabled	Delete	Edit
IX:SENS-IN:	Sensor inputs	<input checked="" type="checkbox"/>	Delete	Edit
IX:P10:INIT:	Plant 10 Initialization	<input checked="" type="checkbox"/>	Delete	Edit
IX:P10:ITD:	10 Intermediate Traffic Dir...	<input checked="" type="checkbox"/>	Delete	Edit
IX:P10:MTD:	10 Main Traffic Direction R	<input checked="" type="checkbox"/>	Delete	Edit
IX:P10:PTD:	10 Passing Traffic Directio...	<input checked="" type="checkbox"/>	Delete	Edit
IX:P10:SH:	Plant 10 Signal Heads	<input checked="" type="checkbox"/>	Delete	Edit
IX:P10:SI:	Plant 10 Signal Indicators	<input checked="" type="checkbox"/>	Delete	Edit
IX:P10:SL:	Plant 10 Signal Lever	<input checked="" type="checkbox"/>	Delete	Edit
IX:P10:SND:	Plant 10 Sounds	<input checked="" type="checkbox"/>	Delete	Edit
IX:P12:INIT:	Plant 12 Initialization	<input checked="" type="checkbox"/>	Delete	Edit
IX:P12:ITD:	12 Intermediate Traffic Dir...	<input checked="" type="checkbox"/>	Delete	Edit
IX:P12:MTD:	12 Main Traffic Direction L	<input checked="" type="checkbox"/>	Delete	Edit
IX:P12:PTD:	12 Passing Traffic Direction L	<input checked="" type="checkbox"/>	Delete	Edit
IX:P12:SH:	Plant 12 Signal Heads	<input checked="" type="checkbox"/>	Delete	Edit
IX:P12:SI:	Plant 12 Signal Indicators	<input checked="" type="checkbox"/>	Delete	Edit
IX:P12:SL:	Plant 12 Signal Lever	<input checked="" type="checkbox"/>	Delete	Edit
IX:P12:SND:	Plant 12 Sounds	<input checked="" type="checkbox"/>	Delete	Edit
IX:P2:INIT:	Plant 2 Initialization	<input checked="" type="checkbox"/>	Delete	Edit
IX:P4:INIT:	Plant 4 Initialization	<input checked="" type="checkbox"/>	Delete	Edit
IX:P6:INIT:	Plant 6 Initialization	<input checked="" type="checkbox"/>	Delete	Edit
IX:P6:ITD:	6 Intermediate Traffic Dire...	<input checked="" type="checkbox"/>	Delete	Edit
IX:P6:MTD:	6 Main Traffic Direction R	<input checked="" type="checkbox"/>	Delete	Edit
IX:P6:PTD:	6 Passing Traffic Direction R	<input checked="" type="checkbox"/>	Delete	Edit
IX:P6:SH:	Plant 6 Signal Heads	<input checked="" type="checkbox"/>	Delete	Edit
IX:P6:SI:	Plant 6 Signal Indicators	<input checked="" type="checkbox"/>	Delete	Edit
IX:P6:SL:	Plant 6 Signal Lever	<input checked="" type="checkbox"/>	Delete	Edit
IX:P6:SND:	Plant 6 Sounds	<input checked="" type="checkbox"/>	Delete	Edit



CTC Logix

- Logix
 - The sensor inputs are all under IX:SENS. We will look at them first.
 - Click 'Edit' to open the list of conditionals.

Logix Table

System...	User Name	Enabled	Delete	Edit
IX:SENS-IN:	Sensor inputs	<input checked="" type="checkbox"/>	Delete	Edit
IX:P10:INIT:	Plant 10 Initialization	<input checked="" type="checkbox"/>	Delete	Edit
IX:P10:ITD:	10 Intermediate Traffic Dir...	<input checked="" type="checkbox"/>	Delete	Edit
IX:P10:MTD:	10 Main Traffic Direction R	<input type="checkbox"/>	Delete	Edit
IX:P10:PTD:	10 Passing Traffic Directio...	<input checked="" type="checkbox"/>	Delete	Edit
IX:P10:SH:	Plant 10 Signal Heads	<input checked="" type="checkbox"/>	Delete	Edit
IX:P10:SI:	Plant 10 Signal Indicators	<input checked="" type="checkbox"/>	Delete	Edit
IX:P10:SL:	Plant 10 Signal Lever	<input checked="" type="checkbox"/>	Delete	Edit
IX:P10:SND:	Plant 10 Sounds	<input checked="" type="checkbox"/>	Delete	Edit
IX:P12:INIT:	Plant 12 Initialization	<input checked="" type="checkbox"/>	Delete	Edit
IX:P12:ITD:	12 Intermediate Traffic Dir...	<input checked="" type="checkbox"/>	Delete	Edit
IX:P12:MTD:	12 Main Traffic Direction L	<input checked="" type="checkbox"/>	Delete	Edit
IX:P12:PTD:	12 Passing Traffic Direction L	<input checked="" type="checkbox"/>	Delete	Edit
IX:P12:SH:	Plant 12 Signal Heads	<input checked="" type="checkbox"/>	Delete	Edit
IX:P12:SI:	Plant 12 Signal Indicators	<input checked="" type="checkbox"/>	Delete	Edit
IX:P12:SL:	Plant 12 Signal Lever	<input checked="" type="checkbox"/>	Delete	Edit
IX:P12:SND:	Plant 12 Sounds	<input checked="" type="checkbox"/>	Delete	Edit
IX:P2:INIT:	Plant 2 Initialization	<input checked="" type="checkbox"/>	Delete	Edit
IX:P4:INIT:	Plant 4 Initialization	<input checked="" type="checkbox"/>	Delete	Edit
IX:P6:INIT:	Plant 6 Initialization	<input checked="" type="checkbox"/>	Delete	Edit
IX:P6:ITD:	6 Intermediate Traffic Dire...	<input checked="" type="checkbox"/>	Delete	Edit
IX:P6:MTD:	6 Main Traffic Direction R	<input checked="" type="checkbox"/>	Delete	Edit
IX:P6:PTD:	6 Passing Traffic Direction R	<input checked="" type="checkbox"/>	Delete	Edit
IX:P6:SH:	Plant 6 Signal Heads	<input checked="" type="checkbox"/>	Delete	Edit
IX:P6:SI:	Plant 6 Signal Indicators	<input checked="" type="checkbox"/>	Delete	Edit
IX:P6:SL:	Plant 6 Signal Lever	<input checked="" type="checkbox"/>	Delete	Edit
IX:P6:SND:	Plant 6 Sounds	<input checked="" type="checkbox"/>	Delete	Edit



CTC Logix

- Conditionals
 - Each sensor has its own entry.

The image shows two windows related to CTC Logix:

Logix Table window (Top):

System...	User Name	Enabled	Delete	Edit
IX-SENS-IN:	Sensor inputs	<input checked="" type="checkbox"/>	Delete	Edit
IX:P10:INIT:	Plant 10 Initialization	<input checked="" type="checkbox"/>	Delete	Edit
IX:P10:ITD:	10 Intermediate Traffic Dir...	<input checked="" type="checkbox"/>	Delete	Edit
IX:P10:MTD:	10 Main Traffic Direction R	<input checked="" type="checkbox"/>	Delete	Edit
IX:P10:PTD:	10 Passing Traffic Directio...	<input checked="" type="checkbox"/>	Delete	Edit
IX:P10:SH:	Plant 10 Signal Heads	<input checked="" type="checkbox"/>	Delete	Edit

Edit Logix window (Bottom):

Help

Logix System Name: IX-SENS-IN:
Logix User Name: Sensor inputs

Conditionals (in Order of Calculation, max 50)

System Name	User Name	State	Edit
IX-SENS-IN:C1	LS1-on	False	Edit
IX-SENS-IN:C3	LS2-on	False	Edit
IX-SENS-IN:C4	LS2-off	True	Edit
IX-SENS-IN:C5	LS3-on	False	Edit
IX-SENS-IN:C6	LS3-off	True	Edit
IX-SENS-IN:C7	LS4-on	False	Edit
IX-SENS-IN:C8	LS4-off	True	Edit
IX-SENS-IN:C9	LS5-on	False	Edit
IX-SENS-IN:C10	LS5-off	True	Edit
IX-SENS-IN:C11	LS6-on	False	Edit
IX-SENS-IN:C12	LS6-off	True	Edit

New Conditional Reorder Calculate

Done Delete Logix



CTC Logix

- Conditions

- Each sensor has its own entry.
- Click 'Edit' for each Conditional's list of variables and actions.
Start with LS2-on.

Logix Table

System...	User Name	Enabled	Delete	Edit
IX-SENS-IN:	Sensor inputs	<input checked="" type="checkbox"/>	Delete	Edit
IX:P10:INIT:	Plant 10 Initialization	<input checked="" type="checkbox"/>	Delete	Edit
IX:P10:ITD:	10 Intermediate Traffic Dir...	<input checked="" type="checkbox"/>	Delete	Edit
IX:P10:MTD:	10 Main Traffic Direction R	<input checked="" type="checkbox"/>	Delete	Edit
IX:P10:PTD:	10 Passing Traffic Directio...	<input checked="" type="checkbox"/>	Delete	Edit
IX:P10:SH:	Plant 10 Signal Heads	<input checked="" type="checkbox"/>	Delete	Edit

Edit Logix

Help

Logix System Name IX-SENS-IN:

Logix User Name Sensor inputs

Conditionals (in Order of Calculation, max 50)

System Name	User Name	State	Edit
IX-SENS-IN:C1	LS1-on	False	Edit
IX-SENS-IN:C3	LS2-on	False	Edit
IX-SENS-IN:C4	LS2-off	True	Edit
IX-SENS-IN:C5	LS3-on	False	Edit
IX-SENS-IN:C6	LS3-off	True	Edit
IX-SENS-IN:C7	LS4-on	False	Edit
IX-SENS-IN:C8	LS4-off	True	Edit
IX-SENS-IN:C9	LS5-on	False	Edit
IX-SENS-IN:C10	LS5-off	True	Edit
IX-SENS-IN:C11	LS6-on	False	Edit
IX-SENS-IN:C12	LS6-off	True	Edit

New Conditional Reorder Calculate

Done Delete Logix



Conditionals

LS2-on

IF (Expression)

- LS2 (The sensor or panel toggle image) is active

THEN (Action)

- 1. Play the sound of relays
- 2. Delay for 5 sec.
And then turn on the lamp.

Note: This conditional is simple, with a 1:1 relationship between the expression and its resulting actions.

Edit Conditional

Conditional System Name IX-SENS-IN:C3
Conditional User Name LS2-on

Logical Expression
State Variables (max 20)

	Variable Type	Name	Data 1	Data 2	State	Triggers Cal...	Delete
	Sensor Active	LS2	N/A	N/A		<input checked="" type="checkbox"/>	Delete

Add State Variable Check State Variables

Actions

Action 1 - Trigger Action On Change To True On Change To False On Change
Action 1 - Type Play Sound File Set sources/sounds/Code-receive.wav

Action 2 - Trigger Action On Change To True On Change To False On Change
Action 2 - Type Delayed Set Sensor IS:55:OSI Active 5

Update Conditional Cancel Delete Conditional



CTC Logix

■ Conditionals

- Each sensor has its own entry.
- Click 'Edit' for each Conditional's list of variables and actions. Start with LS2-on.
- 'LS2-off' is just the reverse of 'LS2-on'.

The image shows two windows from the CTC Logix software:

Logix Table window (Top):

System...	User Name	Enabled	Delete	Edit
IX-SENS-IN:	Sensor inputs	<input checked="" type="checkbox"/>	Delete	Edit
IX:P10:INIT:	Plant 10 Initialization	<input checked="" type="checkbox"/>	Delete	Edit
IX:P10:ITD:	10 Intermediate Traffic Dir...	<input checked="" type="checkbox"/>	Delete	Edit
IX:P10:MTD:	10 Main Traffic Direction R	<input checked="" type="checkbox"/>	Delete	Edit
IX:P10:PTD:	10 Passing Traffic Directio...	<input checked="" type="checkbox"/>	Delete	Edit
IX:P10:SH:	Plant 10 Signal Heads	<input checked="" type="checkbox"/>	Delete	Edit

Edit Logix window (Bottom):

Logix System Name: IX-SENS-IN:
Logix User Name: Sensor inputs

Conditionals (in Order of Calculation, max 50)

System Name	User Name	State	Edit
IX-SENS-IN:C1	LS1-on	False	Edit
IX-SENS-IN:C3	LS2-on	False	Edit
IX-SENS-IN:C4	LS2-off	True	Edit
IX-SENS-IN:C5	LS3-on	False	Edit
IX-SENS-IN:C6	LS3-off	True	Edit
IX-SENS-IN:C7	LS4-on	False	Edit
IX-SENS-IN:C8	LS4-off	True	Edit
IX-SENS-IN:C9	LS5-on	False	Edit
IX-SENS-IN:C10	LS5-off	True	Edit
IX-SENS-IN:C11	LS6-on	False	Edit
IX-SENS-IN:C12	LS6-off	True	Edit

Buttons at the bottom of the Edit Logix window:

- New Conditional
- Reorder
- Calculate
- Done
- Delete Logix



CTC Logix

- **Conditionals**

- Each sensor has its own entry.
- Click 'Edit' for each Conditional's list of variables and actions. Start with 'LS2-on'.
- 'LS2-off' is just the reverse of 'LS2-on'.
- Next look at LS1-on.

The screenshot shows the CTC Logix software interface with two main windows:

- Logix Table**: A grid of entries for various logics. The columns are labeled "System...", "User Name", "Enabled", and "Delete/Edit". The entries include:
 - IX-SENS-IN: Sensor inputs (Enabled checked)
 - IX:P10:INIT: Plant 10 Initialization (Enabled checked)
 - IX:P10:ITD: 10 Intermediate Traffic Dir... (Enabled checked)
 - IX:P10:MTD: 10 Main Traffic Direction R (Enabled checked)
 - IX:P10:PTD: 10 Passing Traffic Directio... (Enabled checked)
 - IX:P10:SH: Plant 10 Signal Heads (Enabled checked)
- Edit Logix**: A configuration window for the selected entry "IX-SENS-IN".
 - Header: Logix System Name IX-SENS-IN; Logix User Name Sensor inputs
 - Section: Conditionals (in Order of Calculation, max 50)

System Name	User Name	State	Action
IX-SENS-IN:C1	LS1-on	False	Edit
IX-SENS-IN:C3	LS2-on	False	Edit
IX-SENS-IN:C4	LS2-off	True	Edit
IX-SENS-IN:C5	LS3-on	False	Edit
IX-SENS-IN:C6	LS3-off	True	Edit
IX-SENS-IN:C7	LS4-on	False	Edit
IX-SENS-IN:C8	LS4-off	True	Edit
IX-SENS-IN:C9	LS5-on	False	Edit
IX-SENS-IN:C10	LS5-off	True	Edit
IX-SENS-IN:C11	LS6-on	False	Edit
IX-SENS-IN:C12	LS6-off	True	Edit
 - Buttons: New Conditional, Reorder, Calculate, Done, Delete Logix



Conditionals

LS1-on

We are now watching the state of the first two blocks which form an intermediate block. If neither sensor is active, and then either one becomes active, we will play the relay sound, delay for 5 seconds while the sound plays, and then turn on the lamp.

Long sections of single track are often formed of several blocks, each with their own signals. The CTC machine only shows the operator that one or more of these blocks is occupied.

Edit Conditional

Conditional System Name IX-SENS-IN:C1
Conditional User Name LS1-on

Logical Expression

State Variables (max 20)							
		Variable Type	Name	Data 1	Data 2	State	Triggers Cal...
		Sensor Active	LS1	N/A	N/A		<input checked="" type="checkbox"/> Delete
AND	NOT	Sensor Active	LS4	N/A	N/A		<input checked="" type="checkbox"/> Delete

Add State Variable Check State Variables

Actions

Action 1 - Trigger Action On Change To True On Change To False On Change

Action 1 - Type Play Sound File Set sources/sounds/Code-receive.wav

Action 2 - Trigger Action On Change To True On Change To False On Change

Action 2 - Type Delayed Set Sensor IS:55:ITI Active 5

Update Conditional Cancel Delete Conditional



Conditionals

LS1-on

IF (Expression)

- LS1 (The sensor or panel toggle image) is active
- LS4 is NOT already active

Screenshot of the "Edit Conditional" dialog box showing the logical expression for the "LS1-on" conditional.

The Conditional System Name is IX-SENS-IN:C1 and the Conditional User Name is LS1-on.

The Logical Expression table shows two state variables:

		Variable Type	Name	Data 1	Data 2	State	Triggers Cal...	Delete
	Sensor Active	LS1	N/A	N/A		<input checked="" type="checkbox"/>	Delete	
AND	NOT	Sensor Active	LS4	N/A	N/A	<input checked="" type="checkbox"/>	Delete	

Buttons at the bottom include "Add State Variable" and "Check State Variables".

THEN (Action)

- 1. Play the sound of relays
- 2. Delay for 5 sec. And then turn on the lamp.

Screenshot of the "Edit Conditional" dialog box showing the actions for the "LS1-on" conditional.

Action 1 - Trigger Action: On Change To True

Action 1 - Type: Play Sound File

Action 1 - Value: sources/sounds/Code-receive.wav

Action 2 - Trigger Action: On Change To True

Action 2 - Type: Delayed Set Sensor

Action 2 - Value: IS:55:ITI

Action 2 - Subsequent: Active

Action 2 - Value: 5

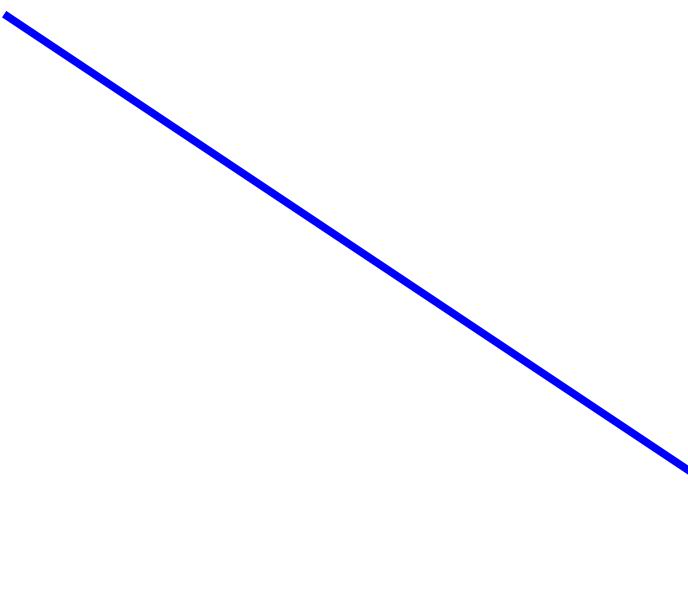
Buttons at the bottom include "Update Conditional", "Cancel", and "Delete Conditional".



CTC Logix

■ Logix

- Next we will look at the switch control levers.



System...	User Name	Enabled	Delete	Edit
IX:P2:INIT:	Plant 2 Initialization	<input checked="" type="checkbox"/>	Delete	Edit
IX:P4:INIT:	Plant 4 Initialization	<input checked="" type="checkbox"/>	Delete	Edit
IX:P6:INIT:	Plant 6 Initialization	<input checked="" type="checkbox"/>	Delete	Edit
IX:P6:ITD:	6 Intermediate Traffic Dire...	<input checked="" type="checkbox"/>	Delete	Edit
IX:P6:MTD:	6 Main Traffic Direction R	<input checked="" type="checkbox"/>	Delete	Edit
IX:P6:PTD:	6 Passing Traffic Direction R	<input checked="" type="checkbox"/>	Delete	Edit
IX:P6:SH:	Plant 6 Signal Heads	<input checked="" type="checkbox"/>	Delete	Edit
IX:P6:SI:	Plant 6 Signal Indicators	<input checked="" type="checkbox"/>	Delete	Edit
IX:P6:SL:	Plant 6 Signal Lever	<input checked="" type="checkbox"/>	Delete	Edit
IX:P6:SND:	Plant 6 Sounds	<input checked="" type="checkbox"/>	Delete	Edit
IX:P8:INIT:	Plant 8 Initialization	<input checked="" type="checkbox"/>	Delete	Edit
IX:P8:ITD:	8 Intermediate Traffic Dire...	<input checked="" type="checkbox"/>	Delete	Edit
IX:P8:MTD:	8 Main Traffic Direction L	<input checked="" type="checkbox"/>	Delete	Edit
IX:P8:PTD:	8 Passing Traffic Direction L	<input checked="" type="checkbox"/>	Delete	Edit
IX:P8:SH:	Plant 8 Signal Heads	<input checked="" type="checkbox"/>	Delete	Edit
IX:P8:SI:	Plant 8 Signal Indicators	<input checked="" type="checkbox"/>	Delete	Edit
IX:P8:SL:	Plant 8 Signal Lever	<input checked="" type="checkbox"/>	Delete	Edit
IX:P8:SND:	Plant 8 Sounds	<input checked="" type="checkbox"/>	Delete	Edit
IX:S11:OS:	Switch 11 OS	<input checked="" type="checkbox"/>	Delete	Edit
IX:S11:SC:	Switch 11 Control	<input checked="" type="checkbox"/>	Delete	Edit
IX:S5:OS:	Switch 5 OS	<input checked="" type="checkbox"/>	Delete	Edit
IX:S5:SC:	Switch 5 Control	<input checked="" type="checkbox"/>	Delete	Edit
IX:S7:OS:	Switch 7 OS	<input checked="" type="checkbox"/>	Delete	Edit
IX:S7:SC:	Switch 7 Control	<input checked="" type="checkbox"/>	Delete	Edit
IX:S9:OS:	Switch 9 OS	<input checked="" type="checkbox"/>	Delete	Edit
IX:S9:SC:	Switch 9 Control	<input checked="" type="checkbox"/>	Delete	Edit
IX:TRA:IN:	Off panel traffic	<input checked="" type="checkbox"/>	Delete	Edit



CTC Logix

- Logix

- Next we will look at the switch control levers.
- There are a series of conditionals.
 - Send Reverse

The screenshot shows the CTC Logix software interface. At the top, there is a menu bar with 'File' and 'Help'. Below the menu is a toolbar with icons for 'New Conditional', 'Reorder', 'Calculate', 'Done', and 'Delete Logix'.

Logix Table Window:

System...	User Name	Enabled	Delete	Edit
IX:P2:INIT:	Plant 2 Initialization	<input checked="" type="checkbox"/>	Delete	Edit
IX:P4:INIT:	Plant 4 Initialization	<input checked="" type="checkbox"/>	Delete	Edit
IX:P6:INIT:	Plant 6 Initialization	<input checked="" type="checkbox"/>	Delete	Edit
IX:P6:ITD:	6 Intermediate Traffic Dire...	<input checked="" type="checkbox"/>	Delete	Edit
IX:P6:MTD:	6 Main Traffic Direction R	<input checked="" type="checkbox"/>	Delete	Edit
IX:P6:PTD:	6 Passing Traffic Direction R	<input checked="" type="checkbox"/>	Delete	Edit

Edit Logix Window:

Logix System Name: IX:S5:SC:
Logix User Name: Switch 5 Control

Conditionals (in Order of Calculation, max 50)

System Name	User Name	State	Edit
IX:S5:SC:C1	Switch 5 Send Reverse	False	Edit
IX:S5:SC:C2	Switch 5 Send Normal	False	Edit
IX:S5:SC:C3	Switch 5 Thrown Feedback	False	Edit
IX:S5:SC:C4	Switch 5 Closed Feedback	True	Edit
IX:S5:SC:C5	Switch 5 RN	False	Edit
IX:S5:SC:C6	Switch 5 NR	False	Edit
IX:S5:SC:C7	Switch 5 consistent	True	Edit



Conditionals

Send Reverse

IF (Expression)

- IS:P6:CB (The code button) is pressed
- IS:S5:CL (Control Lever) is inactive
- IS:S5:OSI (OS Ind.) is inactive
- IS:P6:SNI (Signals Normal)
- IS:S5:RI Not already Reverse

Conditional System Name IX:S5:SC:C1
Conditional User Name Switch 5 Send Reverse

Logical Expression

		Variable Type	Name	Data 1	Data 2	State	Triggers Cal...	
	Sensor Active	IS:P6:CB	N/A	N/A	False	<input checked="" type="checkbox"/>	Delete	
AND	Sensor Inactive	IS:S5:CL	N/A	N/A	False	<input type="checkbox"/>	Delete	
AND	Sensor Inactive	IS:S5:OSI	N/A	N/A	True	<input type="checkbox"/>	Delete	
AND	Sensor Active	IS:P6:SNI	N/A	N/A	True	<input type="checkbox"/>	Delete	
AND NOT	Sensor Active	IS:S5:RI	N/A	N/A	True	<input type="checkbox"/>	Delete	

All state variables are OK.

Add State Variable Check State Variables

Actions

Action 1 - Trigger Action On Change To True On Change To False On Change

Action 1 - Type Play Sound File resources/sounds/Code-send.wav

Action 2 - Trigger Action On Change To True On Change To False On Change

Action 2 - Type Delayed Set Sensor IS:S5:SR Active 5

Update Conditional Cancel Delete Conditional



CTC Logix

■ Logix

- Next we will look at the switch control levers.
- There are a series of conditionals.
 - Send Reverse
 - Send Normal

The screenshot shows the CTC Logix software interface. At the top, there is a title bar with the text "CTC Logix". Below the title bar, there are two windows:

- Logix Table**: A table window showing a list of logix entries. The columns are: System..., User Name, Enabled, Delete, and Edit. The entries are:
 - IX:P2:INIT: Plant 2 Initialization
 - IX:P4:INIT: Plant 4 Initialization
 - IX:P6:INIT: Plant 6 Initialization
 - IX:P6:ITD: 6 Intermediate Traffic Dire...
 - IX:P6:MTD: 6 Main Traffic Direction R
 - IX:P6:PTD: 6 Passing Traffic Direction R
- Edit Logix**: A configuration window with the following fields:
 - Logix System Name: IX:S5:SC
 - Logix User Name: Switch 5 Control
 - Conditionals (in Order of Calculation, max 50): A table showing seven conditional entries. The columns are: System Name, User Name, State, and Edit. The entries are:
 - IX:S5:SC:C1: Switch 5 Send Reverse: False
 - IX:S5:SC:C2: Switch 5 Send Normal: False
 - IX:S5:SC:C3: Switch 5 Thrown Feedback: False
 - IX:S5:SC:C4: Switch 5 Closed Feedback: True
 - IX:S5:SC:C5: Switch 5 RN: False
 - IX:S5:SC:C6: Switch 5 NR: False
 - IX:S5:SC:C7: Switch 5 consistent: True

At the bottom of the "Edit Logix" window, there are several buttons: New Conditional, Reorder, Calculate, Done, and Delete Logix.



Conditionals

Send Normal

IF (Expression)

- IS:P6:CB (The code button) is pressed
- IS:S5:CL (Control Lever) is **active**
- IS:S5:OSI (OS Ind.) is inactive
- IS:P6:SNI (Signals Normal)
- IS:S5:NI Not already **Normal**

Diagram illustrating the configuration of a Conditional System named "IX:S5:SC:C2" for "Switch 5 Send Normal".

Logical Expression: State Variables (max 20)

		Variable Type	Name	Data 1	Data 2	State	Triggers Cal...	
		Sensor Active	IS:P6:CB	N/A	N/A	False	<input checked="" type="checkbox"/>	Delete
AND		Sensor Active	IS:S5:CL	N/A	N/A	False	<input type="checkbox"/>	Delete
AND		Sensor Inactive	IS:S5:OSI	N/A	N/A	True	<input type="checkbox"/>	Delete
AND		Sensor Active	IS:P6:SNI	N/A	N/A	True	<input type="checkbox"/>	Delete
AND	NOT	Sensor Active	IS:S5:NI	N/A	N/A	True	<input type="checkbox"/>	Delete

Actions:

- Action 1 - Trigger Action: On Change To True On Change To False On Change
- Action 1 - Type: Play Sound File resources/sounds/Code-send.wav
- Action 2 - Trigger Action: On Change To True On Change To False On Change
- Action 2 - Type: Delayed Set Sensor IS:S5:SN Active 5

Buttons at the bottom: Update Conditional, Cancel, Delete Conditional.



CTC Logix

■ Logix

- Next we will look at the switch control levers.
- There are a series of conditionals.
 - Send Reverse
 - Send Normal
 - Feedback

The screenshot shows the CTC Logix software interface. At the top, there is a title bar with the text "CTC Logix". Below the title bar, there are two windows:

- Logix Table**: A table window showing a list of logix entries. The columns are "System..." (containing logix names like IX:P2:INIT, IX:P4:INIT, etc.), "User Name" (containing descriptions like "Plant 2 Initialization", "Plant 4 Initialization", etc.), "Enabled" (checkboxes all checked), "Delete" (button), and "Edit" (button).
- Edit Logix**: A configuration window. It has a header "Edit Logix" and a sub-header "Help". It displays "Logix System Name IX:S5:SC:" and "Logix User Name Switch 5 Control". Below these, it says "Conditionals (in Order of Calculation, max 50)". A table below lists seven conditionals for "Switch 5":

System Name	User Name	State	Action
IX:S5:SC:C1	Switch 5 Send Reverse	False	Edit
IX:S5:SC:C2	Switch 5 Send Normal	False	Edit
IX:S5:SC:C3	Switch 5 Thrown Feedback	False	Edit
IX:S5:SC:C4	Switch 5 Closed Feedback	True	Edit
IX:S5:SC:C5	Switch 5 RN	False	Edit
IX:S5:SC:C6	Switch 5 NR	False	Edit
IX:S5:SC:C7	Switch 5 consistent	True	Edit

At the bottom of the "Edit Logix" window are buttons for "New Conditional", "Reorder", "Calculate", "Done", and "Delete Logix".



Conditionals

Rev Feedback

IF (Expression)

- LT5 (The turnout has moved)

THEN (Action)

- 1. Delay and then send command to set the indication.
- 2. Play sound.

Note: the two actions are performed immediately. The sound does not wait for the delay to complete. The result is, you hear the sound, then the lamp changes.

The screenshot shows the 'Edit Conditional' dialog box. At the top, it displays the Conditional System Name (IX:S5:SC:C3) and Conditional User Name (Switch 5 Throwed Feedback). Below this is a table titled 'Logical Expression' with one row:

	Variable Type	Name	Data 1	Data 2	State	Triggers Cal...	Delete
	Turnout Thrown	LT5	N/A	N/A	False	<input checked="" type="checkbox"/>	Delete

Below the table are buttons for 'Add State Variable' and 'Check State Variables'. The 'Actions' section contains two entries:

- Action 1 - Trigger Action: On Change To True (radio button selected), On Change To False, On Change. Action 1 - Type: Delayed Set Sensor, Target: IS:S5:RI, Active: 5.
- Action 2 - Trigger Action: On Change To True (radio button selected), On Change To False, On Change. Action 2 - Type: Play Sound File, File: sources/sounds/Code-receive.wav.

At the bottom of the dialog are buttons for 'Update Conditional', 'Cancel', and 'Delete Conditional'.



CTC Logix

■ Logix

- Next we will look at the switch control levers.
- There are a series of conditionals.
 - Send Reverse
 - Send Normal
 - Feedback
 - In motion

The screenshot shows the CTC Logix software interface. At the top, there is a menu bar with 'File' and 'Help'. Below the menu is a toolbar with icons for 'New Conditional', 'Reorder', 'Calculate', 'Done', and 'Delete Logix'.

Logix Table Window:

System...	User Name	Enabled	Delete	Edit
IX:P2:INIT:	Plant 2 Initialization	<input checked="" type="checkbox"/>	Delete	Edit
IX:P4:INIT:	Plant 4 Initialization	<input checked="" type="checkbox"/>	Delete	Edit
IX:P6:INIT:	Plant 6 Initialization	<input checked="" type="checkbox"/>	Delete	Edit
IX:P6:ITD:	6 Intermediate Traffic Dire...	<input checked="" type="checkbox"/>	Delete	Edit
IX:P6:MTD:	6 Main Traffic Direction R	<input checked="" type="checkbox"/>	Delete	Edit
IX:P6:PTD:	6 Passing Traffic Direction R	<input checked="" type="checkbox"/>	Delete	Edit

Edit Logix Window:

Logix System Name: IX:S5:SC:
Logix User Name: Switch 5 Control

Conditionals (in Order of Calculation, max 50)

System Name	User Name	State	Edit
IX:S5:SC:C1	Switch 5 Send Reverse	False	Edit
IX:S5:SC:C2	Switch 5 Send Normal	False	Edit
IX:S5:SC:C3	Switch 5 Thrown Feedback	False	Edit
IX:S5:SC:C4	Switch 5 Closed Feedback	True	Edit
IX:S5:SC:C5	Switch 5 RN	False	Edit
IX:S5:SC:C6	Switch 5 NR	False	Edit
IX:S5:SC:C7	Switch 5 consistent	True	Edit



Conditionals

Out of corraspondance

IF (Expression)

- IS:S5:CL (The lever is Reversed)
- The indicator is NOT yet reverse

THEN (Action)

- 1. No action

Note:

This conditional does not do anything, but its condition may be checked by other conditionals to see if the turnout is aligned OK.

Edit Conditional

Conditional System Name IX:S5:SC:C5
Conditional User Name Switch 5 RN

Logical Expression
State Variables (max 20)

		Variable Type	Name	Data 1	Data 2	State	Triggers Cal...	
AND	Sensor Inactive	IS:S5:CL	N/A	N/A	False	<input checked="" type="checkbox"/>	Delete	
NOT	Sensor Active	IS:S5:RI	N/A	N/A	False	<input checked="" type="checkbox"/>	Delete	

Add State Variable Check State Variables

Actions

Action 1 - Trigger Action On Change To True On Change To False On Change
Action 1 - Type None

Action 2 - Trigger Action On Change To True On Change To False On Change
Action 2 - Type None

Update Conditional Cancel Delete Conditional

		Variable Type	Name	Data 1	Data 2	State	Triggers Cal...	
AND	Sensor Inactive	IS:S5:CL	N/A	N/A	False	<input checked="" type="checkbox"/>	Delete	
NOT	Sensor Active	IS:S5:RI	N/A	N/A	False	<input checked="" type="checkbox"/>	Delete	



CTC Logix

■ Logix

- Next we will look at the switch control levers.
- There are a series of conditionals.
 - Send Reverse
 - Send Normal
 - Feedback
 - In motion
 - Aligned

The screenshot shows the CTC Logix software interface. At the top, there is a window titled "Logix Table" which displays a list of logix entries:

System...	User Name	Enabled	Delete	Edit
IX:P2:INIT:	Plant 2 Initialization	<input checked="" type="checkbox"/>	Delete	Edit
IX:P4:INIT:	Plant 4 Initialization	<input checked="" type="checkbox"/>	Delete	Edit
IX:P6:INIT:	Plant 6 Initialization	<input checked="" type="checkbox"/>	Delete	Edit
IX:P6:ITD:	6 Intermediate Traffic Dire...	<input checked="" type="checkbox"/>	Delete	Edit
IX:P6:MTD:	6 Main Traffic Direction R	<input checked="" type="checkbox"/>	Delete	Edit
IX:P6:PTD:	6 Passing Traffic Direction R	<input checked="" type="checkbox"/>	Delete	Edit

Below it, another window titled "Edit Logix" is open. It shows the "Logix System Name" set to "IX:S5:SC" and the "Logix User Name" set to "Switch 5 Control". A section labeled "Conditionals (in Order of Calculation, max 50)" contains a table:

System Name	User Name	State	Edit
IX:S5:SC:C1	Switch 5 Send Reverse	False	Edit
IX:S5:SC:C2	Switch 5 Send Normal	False	Edit
IX:S5:SC:C3	Switch 5 Thrown Feedback	False	Edit
IX:S5:SC:C4	Switch 5 Closed Feedback	True	Edit
IX:S5:SC:C5	Switch 5 RN	False	Edit
IX:S5:SC:C6	Switch 5 NR	False	Edit
IX:S5:SC:C7	Switch 5 consistent	True	Edit

At the bottom of the "Edit Logix" window are several buttons: "New Conditional", "Reorder", "Calculate", "Done", and "Delete Logix".



Conditionals

In correspondance

IF (Expression)

- False Switch 5 NR
- False Switch 5 RN

THEN (Action)

- 1. No action

Note:

This conditional checks the previous two and by elimination assumes that the turnout is now aligned OK. This conditional may be checked by others that need to know that Sw5 is OK.

Screenshot of the JMRI Conditional Editor window titled "Edit Conditional".

The Conditional System Name is IX:S5:SC:C7 and the Conditional User Name is "Switch 5 consistent".

The Logical Expression section shows a table for State Variables (max 20) with two rows:

		Variable Type	Name	Data 1	Data 2	State	Triggers Cal...	Delete
	Conditional False	Switch 5 NR	N/A	N/A	False	<input checked="" type="checkbox"/>	Delete	
AND	Conditional False	Switch 5 RN	N/A	N/A	False	<input checked="" type="checkbox"/>	Delete	

Buttons at the bottom of the Logical Expression section include "Add State Variable" and "Check State Variables".

The Actions section contains two sections for Action 1 and Action 2:

- Action 1 - Trigger Action: Radio buttons for "On Change To True" (selected), "On Change To False", and "On Change". The "Type" dropdown is set to "None".
- Action 2 - Trigger Action: Radio buttons for "On Change To True", "On Change To False", and "On Change". The "Type" dropdown is set to "None".

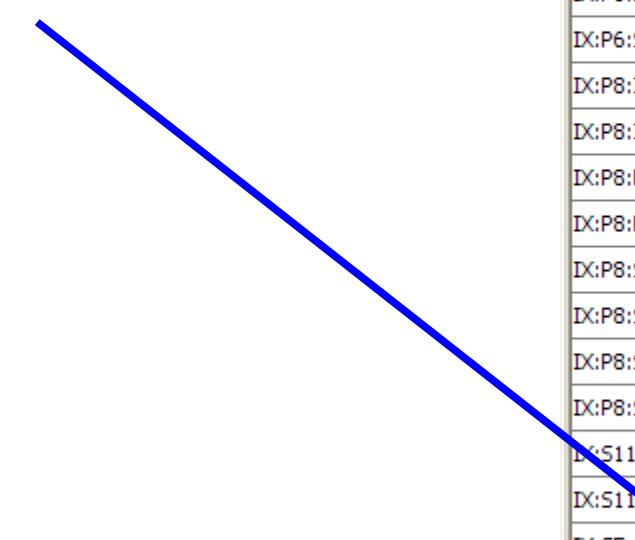
Buttons at the bottom of the Actions section include "Update Conditional", "Cancel", and "Delete Conditional".



CTC Logix

- Logix

- Now we will look at some details of the OS sections.



System...	User Name	Enabled	Delete	Edit
IX:P2:INIT:	Plant 2 Initialization	<input checked="" type="checkbox"/>	Delete	Edit
IX:P4:INIT:	Plant 4 Initialization	<input checked="" type="checkbox"/>	Delete	Edit
IX:P6:INIT:	Plant 6 Initialization	<input checked="" type="checkbox"/>	Delete	Edit
IX:P6:ITD:	6 Intermediate Traffic Dire...	<input checked="" type="checkbox"/>	Delete	Edit
IX:P6:MTD:	6 Main Traffic Direction R	<input checked="" type="checkbox"/>	Delete	Edit
IX:P6:PTD:	6 Passing Traffic Direction R	<input checked="" type="checkbox"/>	Delete	Edit
IX:P6:SH:	Plant 6 Signal Heads	<input checked="" type="checkbox"/>	Delete	Edit
IX:P6:SI:	Plant 6 Signal Indicators	<input checked="" type="checkbox"/>	Delete	Edit
IX:P6:SL:	Plant 6 Signal Lever	<input checked="" type="checkbox"/>	Delete	Edit
IX:P6:SND:	Plant 6 Sounds	<input checked="" type="checkbox"/>	Delete	Edit
IX:P8:INIT:	Plant 8 Initialization	<input checked="" type="checkbox"/>	Delete	Edit
IX:P8:ITD:	8 Intermediate Traffic Dire...	<input checked="" type="checkbox"/>	Delete	Edit
IX:P8:MTD:	8 Main Traffic Direction L	<input checked="" type="checkbox"/>	Delete	Edit
IX:P8:PTD:	8 Passing Traffic Direction L	<input checked="" type="checkbox"/>	Delete	Edit
IX:P8:SH:	Plant 8 Signal Heads	<input checked="" type="checkbox"/>	Delete	Edit
IX:P8:SI:	Plant 8 Signal Indicators	<input checked="" type="checkbox"/>	Delete	Edit
IX:P8:SL:	Plant 8 Signal Lever	<input checked="" type="checkbox"/>	Delete	Edit
IX:P8:SND:	Plant 8 Sounds	<input checked="" type="checkbox"/>	Delete	Edit
IX:S11:OS:	Switch 11 OS	<input checked="" type="checkbox"/>	Delete	Edit
IX:S11:SC:	Switch 11 Control	<input checked="" type="checkbox"/>	Delete	Edit
IX:S5:OS:	Switch 5 OS	<input checked="" type="checkbox"/>	Delete	Edit
IX:S5:SC:	Switch 5 Control	<input checked="" type="checkbox"/>	Delete	Edit
IX:S7:OS:	Switch 7 OS	<input checked="" type="checkbox"/>	Delete	Edit
IX:S7:SC:	Switch 7 Control	<input checked="" type="checkbox"/>	Delete	Edit
IX:S9:OS:	Switch 9 OS	<input checked="" type="checkbox"/>	Delete	Edit
IX:S9:SC:	Switch 9 Control	<input checked="" type="checkbox"/>	Delete	Edit
IX:TRA:IN:	Off panel traffic	<input checked="" type="checkbox"/>	Delete	Edit



CTC Logix

- Logix

- Now we will look at some details of the OS sections.
- There are two sets of OS conditions.

A screenshot of the CTC Logix software interface showing two windows: "Logix Table" and "Edit Logix".

The "Logix Table" window displays a list of logix entries:

System...	User Name	Enabled	Delete	Edit
IX:P2:INIT:	Plant 2 Initialization	<input checked="" type="checkbox"/>	Delete	Edit
IX:P4:INIT:	Plant 4 Initialization	<input checked="" type="checkbox"/>	Delete	Edit
IX:P6:INIT:	Plant 6 Initialization	<input checked="" type="checkbox"/>	Delete	Edit
IX:P6:ITD:	6 Intermediate Traffic Dire...	<input checked="" type="checkbox"/>	Delete	Edit
IX:P6:MTD:	6 Main Traffic Direction R	<input checked="" type="checkbox"/>	Delete	Edit
IX:P6:PTD:	6 Passing Traffic Direction R	<input checked="" type="checkbox"/>	Delete	Edit

The "Edit Logix" window shows settings for a specific system:

Logix System Name: IX:S5:OS:
Logix User Name: Switch 5 OS

Conditionals (in Order of Calculation, max 50):

System Name	User Name	State	Edit
IX:S5:OS:C1	OS 5 Main	False	Edit
IX:S5:OS:C2	OS 5 Passing	False	Edit

Buttons at the bottom include: New Conditional, Reorder, Calculate, Done, and Delete Logix.



Logix

- There are two OS conditionals, Main and Passing.
 - At first glance 'OS occupied' seems like a simple concept. Things get more complex in real life. If you are on the single track (intermediate track) then the OS is always considered part of the single track block for occupancy. I.e. the single track is not clear until the adjacent OS is also clear.

However, if you are on the main or passing sidings, then things are more complex. The OS is only considered to be a part of the block when the turnout is aligned to include the OS. I.e. If a train is on the OS it only 'occupies' the block/s that the OS turnout aligns with. It does not occupy the other siding.

This is because a 'block' includes all the track between a signal and the next opposing signal, but the OS itself is interspaced between the two sets of signals.



Conditionals

OS Main

IF (Expression)

- LT5 (The turnout is Closed)
- LS2 (The sensor is active)

THEN (Action)

- 1. Set IS:S5:OSM active if change to true
- 2. Set ISS5:OSM to inactive if change to false.

Screenshot of the "Edit Conditional" dialog box:

Conditional System Name: IX:S5:OS:C1
Conditional User Name: OS 5 Main

Logical Expression:

		Variable Type	Name	Data 1	Data 2	State	Triggers Cal...	
AND		Turnout Closed	LT5	N/A	N/A	False	<input checked="" type="checkbox"/>	Delete
		Sensor Active	LS2	N/A	N/A	False	<input checked="" type="checkbox"/>	Delete

Add State Variable Check State Variables

Actions:

Action 1 - Trigger Action: On Change To True On Change To False On Change

Action 1 - Type: Set Sensor IS:S5:OSM Active

Action 2 - Trigger Action: On Change To True On Change To False On Change

Action 2 - Type: Set Sensor IS:S5:OSM Inactive

Update Conditional Cancel Delete Conditional

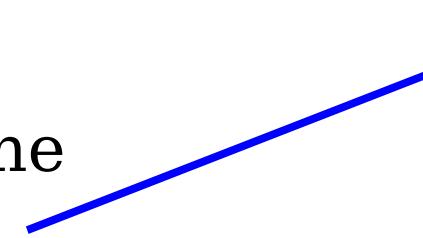
Two blue arrows point from the "IF (Expression)" list items to the "Logical Expression" table, and one blue arrow points from the "THEN (Action)" list items to the "Actions" section.



CTC Logix

■ Logix

- Now we will look at some details of the OS sections.
- Next we go to the signal levers.



System...	User Name	Enabled	Delete	Edit
IX:P2:INIT:	Plant 2 Initialization	<input checked="" type="checkbox"/>	Delete	Edit
IX:P4:INIT:	Plant 4 Initialization	<input checked="" type="checkbox"/>	Delete	Edit
IX:P6:INIT:	Plant 6 Initialization	<input checked="" type="checkbox"/>	Delete	Edit
IX:P6:ITD:	6 Intermediate Traffic Dire...	<input checked="" type="checkbox"/>	Delete	Edit
IX:P6:MTD:	6 Main Traffic Direction R	<input checked="" type="checkbox"/>	Delete	Edit
IX:P6:PTD:	6 Passing Traffic Direction R	<input checked="" type="checkbox"/>	Delete	Edit
IX:P6:SH:	Plant 6 Signal Heads	<input checked="" type="checkbox"/>	Delete	Edit
IX:P6:SI:	Plant 6 Signal Indicators	<input checked="" type="checkbox"/>	Delete	Edit
IX:P6:SL:	Plant 6 Signal Lever	<input checked="" type="checkbox"/>	Delete	Edit
IX:P6:SND:	Plant 6 Sounds	<input checked="" type="checkbox"/>	Delete	Edit
IX:P8:INIT:	Plant 8 Initialization	<input checked="" type="checkbox"/>	Delete	Edit
IX:P8:ITD:	8 Intermediate Traffic Dire...	<input checked="" type="checkbox"/>	Delete	Edit
IX:P8:MTD:	8 Main Traffic Direction L	<input checked="" type="checkbox"/>	Delete	Edit
IX:P8:PTD:	8 Passing Traffic Direction L	<input checked="" type="checkbox"/>	Delete	Edit
IX:P8:SH:	Plant 8 Signal Heads	<input checked="" type="checkbox"/>	Delete	Edit
IX:P8:SI:	Plant 8 Signal Indicators	<input checked="" type="checkbox"/>	Delete	Edit
IX:P8:SL:	Plant 8 Signal Lever	<input checked="" type="checkbox"/>	Delete	Edit
IX:P8:SND:	Plant 8 Sounds	<input checked="" type="checkbox"/>	Delete	Edit
IX:S11:OS:	Switch 11 OS	<input checked="" type="checkbox"/>	Delete	Edit
IX:S11:SC:	Switch 11 Control	<input checked="" type="checkbox"/>	Delete	Edit
IX:S5:OS:	Switch 5 OS	<input checked="" type="checkbox"/>	Delete	Edit
IX:S5:SC:	Switch 5 Control	<input checked="" type="checkbox"/>	Delete	Edit
IX:S7:OS:	Switch 7 OS	<input checked="" type="checkbox"/>	Delete	Edit
IX:S7:SC:	Switch 7 Control	<input checked="" type="checkbox"/>	Delete	Edit
IX:S9:OS:	Switch 9 OS	<input checked="" type="checkbox"/>	Delete	Edit
IX:S9:SC:	Switch 9 Control	<input checked="" type="checkbox"/>	Delete	Edit
IX:TRA:IN:	Off panel traffic	<input checked="" type="checkbox"/>	Delete	Edit



CTC Logix

■ Logix

- Now we will look at some details of the OS sections.
- Next we go to the signal levers.
 - There are two physical positions, (but three logical positions) plus the central 'Signals Normal' (stop)

The screenshot shows the CTC Logix software interface with two main windows:

- Logix Table**: A grid of logix entries. The columns are labeled "System...", "User Name", "Enabled", and "Delete/Edit". The rows contain the following data:

IX:P2:INIT:	Plant 2 Initialization	<input checked="" type="checkbox"/>	Delete	Edit
IX:P4:INIT:	Plant 4 Initialization	<input checked="" type="checkbox"/>	Delete	Edit
IX:P6:INIT:	Plant 6 Initialization	<input checked="" type="checkbox"/>	Delete	Edit
IX:P6:ITD:	6 Intermediate Traffic Dire...	<input checked="" type="checkbox"/>	Delete	Edit
IX:P6:MTD:	6 Main Traffic Direction R	<input checked="" type="checkbox"/>	Delete	Edit
IX:P6:PTD:	6 Passing Traffic Direction R	<input checked="" type="checkbox"/>	Delete	Edit
- Edit Logix**: A configuration window with the following fields:
 - Logix System Name: IX:P6:SL:
 - Logix User Name: Plant 6 Signal Lever
 - Conditionals (in Order of Calculation, max 50): A grid of conditional entries. The columns are labeled "System Name", "User Name", "State", and "Edit". The rows contain:

IX:P6:SL:C1	Set 6 Clear L	False	Edit
IX:P6:SL:C2	Set 6 Clear Main R	False	Edit
IX:P6:SL:C3	Set 6 Clear Pass R	False	Edit
 - Buttons at the bottom: New Conditional, Reorder, Calculate, Done, and Delete Logix.



Conditionals

Set Clear Left

IF (Expression)

- IS:P6:CB Code Button
- IS:P6:SLL Signal Lever Left
- NOT IS:S5:ITR Indicate Traffic R
- NOT IS:S5:SLI Signal Left Ind.
- NOT IS:S5:SRI Signal Right Ind.

Edit Conditional

Conditional System Name IX:P6:SL:C1
Conditional User Name Set 6 Clear L

Logical Expression

		Variable Type	Name	Data 1	Data 2	State	Triggers Cal...
		Sensor Active	IS:P6:CB	N/A	N/A	False	<input checked="" type="checkbox"/>
AND		Sensor Active	IS:P6:SLL	N/A	N/A	False	<input type="checkbox"/>
AND	NOT	Sensor Active	IS:S5:ITR	N/A	N/A	True	<input type="checkbox"/>
AND	NOT	Sensor Active	IS:P6:SLI	N/A	N/A	True	<input type="checkbox"/>
AND	NOT	Sensor Active	IS:P6:SRI	N/A	N/A	True	<input type="checkbox"/>

Add State Variable Check State Variables

Actions

Action 1 - Trigger Action On Change To True On Change To False On Change
Action 1 - Type Trigger Route IR:P6:SO

Action 2 - Trigger Action On Change To True On Change To False On Change
Action 2 - Type Delayed Set Sensor IS:P6:SLR Active 5

Update Conditional Cancel Delete Conditional



■ Stacking Trains (Follow-on traffic)

- CTC allows the operator to send multiple trains into the same single track as long as they are following one another. He really has no way to tell how far any train has progressed because the underlying ABS is controlling the train spacing. Once a train enters the OS, the signals normal light comes on. (and the OS bell rings, if it is not cut off)

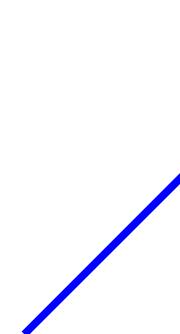
Once the OS has cleared, the operator may allow another train to follow the first, by realigning the switch, if necessary, and then pressing the code button once again. The signals normal will go off as before, but all traffic indicators will remain off until the original train has proceeded far enough to let the ABS clear (Usually to approach) the head block single track signal, which allows the next train to proceed. At that point a directional 'clear' indicator will light again, letting the operator know the next train may follow the first. When the following train enters the OS the OS bell will sound again, etc.



CTC Logix

■ Logix

- Now we will look at some details of the OS sections.
- Next we go to the signal levers.
- Then Signal Indicators



System...	User Name	Enabled	Delete	Edit
IX:P2:INIT:	Plant 2 Initialization	<input checked="" type="checkbox"/>	Delete	Edit
IX:P4:INIT:	Plant 4 Initialization	<input checked="" type="checkbox"/>	Delete	Edit
IX:P6:INIT:	Plant 6 Initialization	<input checked="" type="checkbox"/>	Delete	Edit
IX:P6:ITD:	6 Intermediate Traffic Dire...	<input checked="" type="checkbox"/>	Delete	Edit
IX:P6:MTD:	6 Main Traffic Direction R	<input checked="" type="checkbox"/>	Delete	Edit
IX:P6:PTD:	6 Passing Traffic Direction R	<input checked="" type="checkbox"/>	Delete	Edit
IX:P6:SH:	Plant 6 Signal Heads	<input checked="" type="checkbox"/>	Delete	Edit
IX:P6:SI:	Plant 6 Signal Indicators	<input checked="" type="checkbox"/>	Delete	Edit
IX:P6:SL:	Plant 6 Signal Lever	<input checked="" type="checkbox"/>	Delete	Edit
IX:P6:SND:	Plant 6 Sounds	<input checked="" type="checkbox"/>	Delete	Edit
IX:P8:INIT:	Plant 8 Initialization	<input checked="" type="checkbox"/>	Delete	Edit
IX:P8:ITD:	8 Intermediate Traffic Dire...	<input checked="" type="checkbox"/>	Delete	Edit
IX:P8:MTD:	8 Main Traffic Direction L	<input checked="" type="checkbox"/>	Delete	Edit
IX:P8:PTD:	8 Passing Traffic Direction L	<input checked="" type="checkbox"/>	Delete	Edit
IX:P8:SH:	Plant 8 Signal Heads	<input checked="" type="checkbox"/>	Delete	Edit
IX:P8:SI:	Plant 8 Signal Indicators	<input checked="" type="checkbox"/>	Delete	Edit
IX:P8:SL:	Plant 8 Signal Lever	<input checked="" type="checkbox"/>	Delete	Edit
IX:P8:SND:	Plant 8 Sounds	<input checked="" type="checkbox"/>	Delete	Edit
IX:S11:OS:	Switch 11 OS	<input checked="" type="checkbox"/>	Delete	Edit
IX:S11:SC:	Switch 11 Control	<input checked="" type="checkbox"/>	Delete	Edit
IX:S5:OS:	Switch 5 OS	<input checked="" type="checkbox"/>	Delete	Edit
IX:S5:SC:	Switch 5 Control	<input checked="" type="checkbox"/>	Delete	Edit
IX:S7:OS:	Switch 7 OS	<input checked="" type="checkbox"/>	Delete	Edit
IX:S7:SC:	Switch 7 Control	<input checked="" type="checkbox"/>	Delete	Edit
IX:S9:OS:	Switch 9 OS	<input checked="" type="checkbox"/>	Delete	Edit
IX:S9:SC:	Switch 9 Control	<input checked="" type="checkbox"/>	Delete	Edit
IX:TRA:IN:	Off panel traffic	<input checked="" type="checkbox"/>	Delete	Edit



CTC Logix

■ Logix

- Now we will look at some details of the OS sections.
- Next we go to the signal levers.
- Then Signal Indicators
 - Several ways to set 'Signals Normal'

Logix Table

System...	User Name	Enabled	Delete	Edit
IX:P2:INIT:	Plant 2 Initialization	<input checked="" type="checkbox"/>	Delete	Edit
IX:P4:INIT:	Plant 4 Initialization	<input checked="" type="checkbox"/>	Delete	Edit
IX:P6:INIT:	Plant 6 Initialization	<input checked="" type="checkbox"/>	Delete	Edit
IX:P6:ITD:	6 Intermediate Traffic Dire...	<input checked="" type="checkbox"/>	Delete	Edit
IX:P6:MTD:	6 Main Traffic Direction R	<input checked="" type="checkbox"/>	Delete	Edit
IX:P6:PTD:	6 Passing Traffic Direction R	<input checked="" type="checkbox"/>	Delete	Edit

Edit Logix

Help

Logix System Name IX:P6:SI:
Logix User Name Plant 6 Signal Indicators

Conditionals (in Order of Calculation, max 50)

System Name	User Name	State	Edit
IX:P6:SI:C1	6 OS Sets Signals Normal from L	False	Edit
IX:P6:SI:C2	6 OS Sets Signals Normal from R	False	Edit
IX:P6:SI:C3	6 Lever N sets Signals Normal	False	Edit
IX:P6:SI:C4	Unstack 6L	False	Edit
IX:P6:SI:C5	Unstack 6R	False	Edit
IX:P6:SI:C6	6 Set Signals Normal from lever L	False	Edit
IX:P6:SI:C7	6 Set Signals Normal from lever R	False	Edit
IX:P6:SI:C8	6 Set Signals Normal Lap Conflict Main	False	Edit
IX:P6:SI:C9	6 Set Signals Normal Lap Conflict Pass	False	Edit
IX:P6:SI:C10	6 Set Signals Normal Lap Conflict Int	False	Edit

New Conditional Reorder Calculate

Done Delete Logix



Conditionals

Set Signals Normal

IF (Expression)

- IS:S5:OSI OS Indicator
- IS:P6:SLI Signal Left Indicator

THEN (Action)

- 1. Set IS:P6:SNI Signals Normal Indicator

Edit Conditional

Conditional System Name IX:P6:SI:C1
Conditional User Name 6 OS Sets Signals Normal from L

Logical Expression

		Variable Type	Name	Data 1	Data 2	State	Triggers Cal...	
	Sensor Active	IS:S5:OSI	N/A	N/A	False	<input checked="" type="checkbox"/>	Delete	
AND	Sensor Active	IS:P6:SLI	N/A	N/A	False	<input type="checkbox"/>	Delete	

Add State Variable Check State Variables

Actions

Action 1 - Trigger Action On Change To True On Change To False On Change

Action 1 - Type Set Sensor IS:P6:SNI Active

Action 2 - Trigger Action On Change To True On Change To False On Change

Action 2 - Type None

Update Conditional Cancel Delete Conditional

		Variable Type	Name	Data 1	Data 2	State	Triggers Cal...	
	Sensor Active	IS:S5:OSI	N/A	N/A	False	<input checked="" type="checkbox"/>	Delete	
AND	Sensor Active	IS:P6:SLI	N/A	N/A	False	<input type="checkbox"/>	Delete	



Conditionals

Set Signals Normal

IF (Expression)

- IS:P6:CB Code Button
- IS:P6:SNL Signal Normal Lever
- NOT IS:P6:SNI Signal Normal Indicator

Logical Expression

		Variable Type	Name	Data 1	Data 2	State	Triggers Cal...	
		Sensor Active	IS:P6:CB	N/A	N/A	False	<input checked="" type="checkbox"/>	Delete
AND		Sensor Active	IS:P6:SNL	N/A	N/A	False	<input type="checkbox"/>	Delete
AND	NOT	Sensor Active	IS:P6:SNI	N/A	N/A	True	<input type="checkbox"/>	Delete

Add State Variable Check State Variables

Actions

Action 1 - Trigger Action On Change To True On Change To False On Change

Action 1 - Type IR:P6:SO

Action 2 - Trigger Action On Change To True On Change To False On Change

Action 2 - Type IS:P6:SNI Active 10

Update Conditional Cancel Delete Conditional

THEN (Action)

- 1. Trig IR:P6:SO Signals Off
- Delay set IS:P6:SNI Signals Normal Ind.



- Setting Signals Normal with the lever.

This is one operation that will get you negative comments. It means you changed your mind about an action, and are about to drop a stop signal in the face of a moving train. The prototype will impose a long delay at this point to allow the train to proceed to the next signal (in case he already passed the signal you just dropped to red) and also time enough for him to stop when he sees the next red. (possibly running past it)

Only after the delay has timed out will the 'Signals Normal' indicator light again and allow for any changes in turnout position or traffic direction, and then only if the any trains are safely stopped short of the OS.

Prototype delays can be from 2-10 minutes. We used 10 seconds here. Modelers would not put up with a prototypical delay without spending the time forming a lynch mob for the dispatcher.



CTC Logix

- Logix

- Now we will look at some details of the OS sections.
- Next we go to the signal levers.
- Then Signal Indicators
 - Several ways to set 'Signals Normal'
 - Unstack traffic

Logix Table

System...	User Name	Enabled	Delete	Edit
IX:P2:INIT:	Plant 2 Initialization	<input checked="" type="checkbox"/>	Delete	Edit
IX:P4:INIT:	Plant 4 Initialization	<input checked="" type="checkbox"/>	Delete	Edit
IX:P6:INIT:	Plant 6 Initialization	<input checked="" type="checkbox"/>	Delete	Edit
IX:P6:ITD:	6 Intermediate Traffic Dire...	<input checked="" type="checkbox"/>	Delete	Edit
IX:P6:MTD:	6 Main Traffic Direction R	<input checked="" type="checkbox"/>	Delete	Edit
IX:P6:PTD:	6 Passing Traffic Direction R	<input checked="" type="checkbox"/>	Delete	Edit

Edit Logix

Help

Logix System Name IX:P6:SI:
Logix User Name Plant 6 Signal Indicators

Conditionals (in Order of Calculation, max 50)

System Name	User Name	State	Edit
IX:P6:SI:C1	6 OS Sets Signals Normal from L	False	Edit
IX:P6:SI:C2	6 OS Sets Signals Normal from R	False	Edit
IX:P6:SI:C3	6 Lever N sets Signals Normal	False	Edit
IX:P6:SI:C4	Unstack 6L	False	Edit
IX:P6:SI:C5	Unstack 6R	False	Edit
IX:P6:SI:C6	6 Set Signals Normal from lever L	False	Edit
IX:P6:SI:C7	6 Set Signals Normal from lever R	False	Edit
IX:P6:SI:C8	6 Set Signals Normal Lap Conflict Main	False	Edit
IX:P6:SI:C9	6 Set Signals Normal Lap Conflict Pass	False	Edit
IX:P6:SI:C10	6 Set Signals Normal Lap Conflict Int	False	Edit

New Conditional Reorder Calculate

Done Delete Logix



Conditionals

Unstack 6 Left

IF (Expression)

- IS:P6:SLR Stack Left Register

- IS:S5:OSI OS Indicator

- IX:S5:SC:C7 Switch Control (Consistent)

- NOT LS1 (block)

Edit Conditional

Conditional System Name IX:P6:SI:C4
Conditional User Name Unstack 6L

Logical Expression

		Variable Type	Name	Data 1	Data 2	State	Triggers Cal...	Delete
		Sensor Active	IS:P6:SLR	N/A	N/A	False	<input checked="" type="checkbox"/>	Delete
AND		Sensor Inactive	IS:S5:OSI	N/A	N/A	False	<input checked="" type="checkbox"/>	Delete
AND		Conditional True	IX:S5:SC:C7	N/A	N/A	True	<input checked="" type="checkbox"/>	Delete
AND	NOT	Sensor Active	LS1	N/A	N/A	True	<input checked="" type="checkbox"/>	Delete

Add State Variable Check State Variables

Actions

Action 1 - Trigger Action On Change To True On Change To False On Change

Action 1 - Type Set Sensor IS:P6:SLI Active

Action 2 - Trigger Action On Change To True On Change To False On Change

Action 2 - Type Delayed Set Sensor IS:P6:SLR Inactive 1

Update Conditional Cancel Delete Conditional



CTC Logix

■ Logix

- Now we will look at some details of the OS sections.
- Next we go to the signal levers.
- Then Signal Indicators
 - Several ways to set 'Signals Normal'
 - Unstack traffic
 - Conflict resolution due to simultaneous conflicting moves

The screenshot shows the CTC Logix software interface. At the top, there is a menu bar with 'File' and 'Help'. Below the menu is a toolbar with icons for 'New Conditional', 'Reorder', 'Calculate', 'Done', and 'Delete Logix'.
Logix Table Window:
This window displays a table of logix entries. The columns are 'System...', 'User Name', 'Enabled', 'Delete', and 'Edit'. The entries are:

IX:P2:INIT:	Plant 2 Initialization	<input checked="" type="checkbox"/>	Delete	Edit
IX:P4:INIT:	Plant 4 Initialization	<input checked="" type="checkbox"/>	Delete	Edit
IX:P6:INIT:	Plant 6 Initialization	<input checked="" type="checkbox"/>	Delete	Edit
IX:P6:ITD:	6 Intermediate Traffic Dire...	<input checked="" type="checkbox"/>	Delete	Edit
IX:P6:MTD:	6 Main Traffic Direction R	<input checked="" type="checkbox"/>	Delete	Edit
IX:P6:PTD:	6 Passing Traffic Direction R	<input checked="" type="checkbox"/>	Delete	Edit

Edit Logix Window:
This window shows settings for a specific logix entry. It includes fields for 'Logix System Name' (set to IX:P6:SI:) and 'Logix User Name' (set to Plant 6 Signal Indicators). Below these are sections for 'Conditionals' and 'Script'.
Conditionals (in Order of Calculation, max 50):
This section contains a table of conditional entries. The columns are 'System Name', 'User Name', 'State', and 'Edit'. The entries are:

IX:P6:SI:C1	6 OS Sets Signals Normal from L	False	Edit
IX:P6:SI:C2	6 OS Sets Signals Normal from R	False	Edit
IX:P6:SI:C3	6 Lever N sets Signals Normal	False	Edit
IX:P6:SI:C4	Unstack 6L	False	Edit
IX:P6:SI:C5	Unstack 6R	False	Edit
IX:P6:SI:C6	6 Set Signals Normal from lever L	False	Edit
IX:P6:SI:C7	6 Set Signals Normal from lever R	False	Edit
IX:P6:SI:C8	6 Set Signals Normal Lap Conflict Main	False	Edit
IX:P6:SI:C9	6 Set Signals Normal Lap Conflict Pass	False	Edit
IX:P6:SI:C10	6 Set Signals Normal Lap Conflict Int	False	Edit

A blue arrow points to the last row of the 'Conditionals' table, specifically to the 'User Name' column for entry IX:P6:SI:C10.



- **Conflicting moves (overlaped traffic direction)**

It is possible to setup conflicting moves on a CTC machine, especially with boundary traffic where both operators may simultaneously choose to send opposing traffic on the single track that joins two districts. The code traffic delays involved leave a gap between the sending of a signal and the registering of that information in the next CTC machine.

This conflict resolution Logix immediately detects these conflicts once they appear, and restores all the signals to stop, and then imposes a timeout delay for any traffic that has responded to the brief signal flash.

A single operator should not setup traffic that conflicts with himself. Phone or radio communications with adjoining districts should prevent these conflicts in the first place. In either case the machine detects the errors and locks the signals back to stop long enough to resolve them.



CTC Logix

- Logix
 - Now we will look at some details of the OS sections.
 - Next we go to the signal levers.
 - Then Signal Indicators
 - Finally Signal Heads

System...	User Name	Enabled	Delete	Edit
IX:P2:INIT:	Plant 2 Initialization	<input checked="" type="checkbox"/>	Delete	Edit
IX:P4:INIT:	Plant 4 Initialization	<input checked="" type="checkbox"/>	Delete	Edit
IX:P6:INIT:	Plant 6 Initialization	<input checked="" type="checkbox"/>	Delete	Edit
IX:P6:ITD:	6 Intermediate Traffic Direction	<input checked="" type="checkbox"/>	Delete	Edit
IX:P6:MTD:	6 Main Traffic Direction R	<input checked="" type="checkbox"/>	Delete	Edit
IX:P6:PTD:	6 Passing Traffic Direction R	<input checked="" type="checkbox"/>	Delete	Edit
IX:P6:SH:	Plant 6 Signal Heads	<input checked="" type="checkbox"/>	Delete	Edit
IX:P6:SI:	Plant 6 Signal Indicators	<input checked="" type="checkbox"/>	Delete	Edit
IX:P6:SL:	Plant 6 Signal Lever	<input checked="" type="checkbox"/>	Delete	Edit
IX:P6:SND:	Plant 6 Sounds	<input checked="" type="checkbox"/>	Delete	Edit
IX:P8:INIT:	Plant 8 Initialization	<input checked="" type="checkbox"/>	Delete	Edit
IX:P8:ITD:	8 Intermediate Traffic Directi...	<input checked="" type="checkbox"/>	Delete	Edit
IX:P8:MTD:	8 Main Traffic Direction L	<input checked="" type="checkbox"/>	Delete	Edit
IX:P8:PTD:	8 Passing Traffic Direction L	<input checked="" type="checkbox"/>	Delete	Edit
IX:P8:SH:	Plant 8 Signal Heads	<input checked="" type="checkbox"/>	Delete	Edit
IX:P8:SI:	Plant 8 Signal Indicators	<input checked="" type="checkbox"/>	Delete	Edit
IX:P8:SL:	Plant 8 Signal Lever	<input checked="" type="checkbox"/>	Delete	Edit
IX:P8:SND:	Plant 8 Sounds	<input checked="" type="checkbox"/>	Delete	Edit
IX:S11:OS:	Switch 11 OS	<input checked="" type="checkbox"/>	Delete	Edit
IX:S11:SC:	Switch 11 Control	<input checked="" type="checkbox"/>	Delete	Edit
IX:S5:OS:	Switch 5 OS	<input checked="" type="checkbox"/>	Delete	Edit
IX:S5:SC:	Switch 5 Control	<input checked="" type="checkbox"/>	Delete	Edit
IX:S7:OS:	Switch 7 OS	<input checked="" type="checkbox"/>	Delete	Edit
IX:S7:SC:	Switch 7 Control	<input checked="" type="checkbox"/>	Delete	Edit
IX:S9:OS:	Switch 9 OS	<input checked="" type="checkbox"/>	Delete	Edit
IX:S9:SC:	Switch 9 Control	<input checked="" type="checkbox"/>	Delete	Edit
IX:TRA:IN:	Off panel traffic	<input checked="" type="checkbox"/>	Delete	Edit



CTC Logix

■ Logix

- Now we will look at some details of the OS sections.
- Next we go to the signal levers.
- Then Signal Indicators
- Finally Signal Heads
 - Each signal is set by the ABS logic (SSL) in the Plant. The CTC over-rides the normal ABS with 'Hold.'

The screenshot shows the CTC Logix software interface. At the top, there is a title bar with the text "Logix Table". Below it is a menu bar with "File" and "Help" options. The main area contains a table with columns for System Name, User Name, Enabled, Delete, and Edit. The rows list various logix entries:

System Name	User Name	Enabled	Delete	Edit
IX:P2:INIT:	Plant 2 Initialization	<input checked="" type="checkbox"/>	Delete	Edit
IX:P4:INIT:	Plant 4 Initialization	<input checked="" type="checkbox"/>	Delete	Edit
IX:P6:INIT:	Plant 6 Initialization	<input checked="" type="checkbox"/>	Delete	Edit
IX:P6:ITD:	6 Intermediate Traffic Direction	<input checked="" type="checkbox"/>	Delete	Edit
IX:P6:MTD:	6 Main Traffic Direction R	<input checked="" type="checkbox"/>	Delete	Edit
IX:P6:PTD:	6 Passing Traffic Direction R	<input checked="" type="checkbox"/>	Delete	Edit

Below this window is another titled "Edit Logix". It has a "Help" button and a "Logix System Name IX:P6:SH:" field containing "Plant 6 Signal Heads". Underneath is a section for "Conditionals (in Order of Calculation, max 50)". A blue arrow points from the text "Each signal is set by the ABS logic (SSL) in the Plant. The CTC over-rides the normal ABS with 'Hold.'" to the "Edit" column of the row for "IX:P6:SH:C3". The "Edit Logix" window also features buttons for "New Conditional", "Reorder", "Calculate", "Done", and "Delete Logix".



Conditionals

LH1 Hold

IF (Expression)

- IS:P6:SRI Signal Right Indicator
- LT5 Turnout 5 position

THEN (Action)

- 1. Clear LH1 Signal Head 1 hold on change to true
- 2. Set LH1 Signal Head 1 to hold on change to false

Edit Conditional

Conditional System Name IX:P6:SH:C1
Conditional User Name LH1 Hold

Logical Expression
State Variables (max 20)

	Variable Type	Name	Data 1	Data 2	State	Triggers Cal...	
Sensor Active	IS:P6:SRI	N/A	N/A	False	<input checked="" type="checkbox"/>	Delete	
AND	Turnout Thrown	LT5	N/A	N/A	False	<input checked="" type="checkbox"/>	Delete

Add State Variable Check State Variables

Actions

Action 1 - Trigger Action On Change To True On Change To False On Change

Action 1 - Type Clear Signal Held LH1

Action 2 - Trigger Action On Change To True On Change To False On Change

Action 2 - Type Set Signal Held LH1

Update Conditional Cancel Delete Conditional



- What we have covered so far:
 - CTC Panel operation detail (CTC-clinic-1)
 - CTC Panel Logix (CTC-clinic-2)
- Where we are going next:
 - CTC Prototype Panel (CTC-clinic-3)