



Setting Up Dashboard Controls in Simulink

Lecture 73, v02

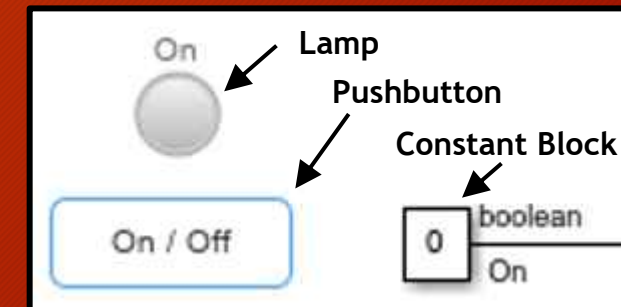
- [Dashboard Push Button to Control Constant Signal](#)
- [Dashboard Display of Clock Value](#)
- [Customizable Dashboard Pushbutton Block](#)
- [References](#)

Dashboard Push Button to Control Constant Signal

Overview of Approach

- The purpose is to provide a convenient user control of a constant (Boolean) signal
 - The convenience that is provided is in the form of a push button that controls the value of a Simulink “Constant Block”
 - It is assumed that the constant signal (either 0 or 1) controls some other part of the simulation
 - An Operator can use this push button to change the value of the constant block among either 0 or 1
- This is the basic setup
 - The “On / Off” Push Button controls the value of the “Constant Block”
 - The “Lamp” monitors the state of the signal labelled “On” coming out of the “Constant Block”
 - When the value of the constant block = 1, the Lamp lights up

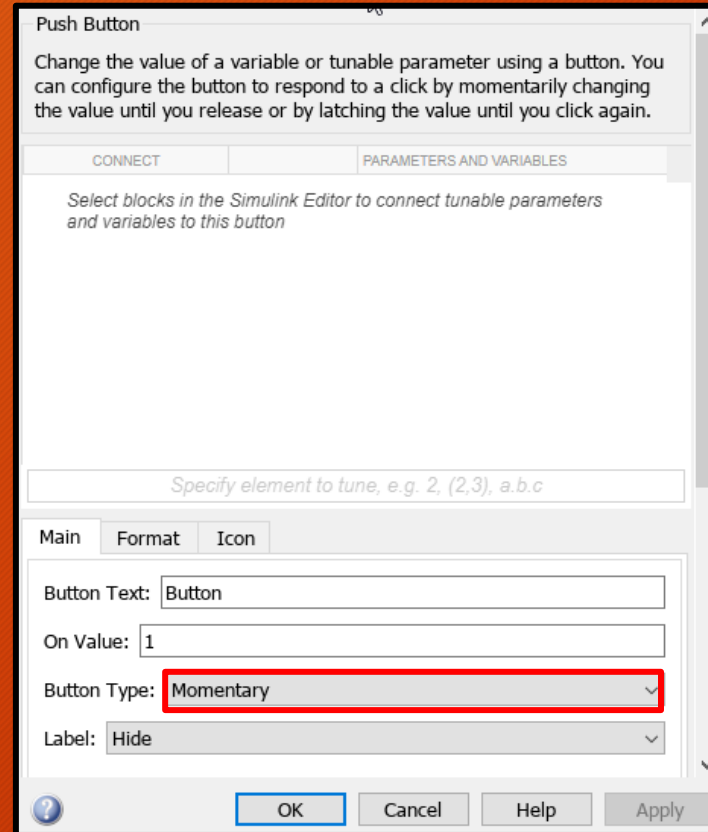
A Boolean signal is either 0 (False) or 1 (True)



Simulink Push Button

- Simulink offers two types of push buttons
 - Momentary
 - Default value is 0
 - Value only goes to 1 while the button is being pushed
 - Latched
 - Value switches among 0 and 1 each time the button is pushed

Momentary Push Button



Push Button

Change the value of a variable or tunable parameter using a button. You can configure the button to respond to a click by momentarily changing the value until you release or by latching the value until you click again.

CONNECT PARAMETERS AND VARIABLES

Select blocks in the Simulink Editor to connect tunable parameters and variables to this button

Specify element to tune, e.g. 2, (2,3), a.b.c

Main Format Icon

Button Text: Button

On Value: 1

Button Type: **Momentary**

Label: Hide

OK Cancel Help Apply

Latching Push Button



Push Button

Change the value of a variable or tunable parameter using a button. You can configure the button to respond to a click by momentarily changing the value until you release or by latching the value until you click again.

CONNECT PARAMETERS AND VARIABLES

Select blocks in the Simulink Editor to connect tunable parameters and variables to this button

Specify element to tune, e.g. 2, (2,3), a.b.c

Main Format Icon

Button Text: Button

On Value: 1

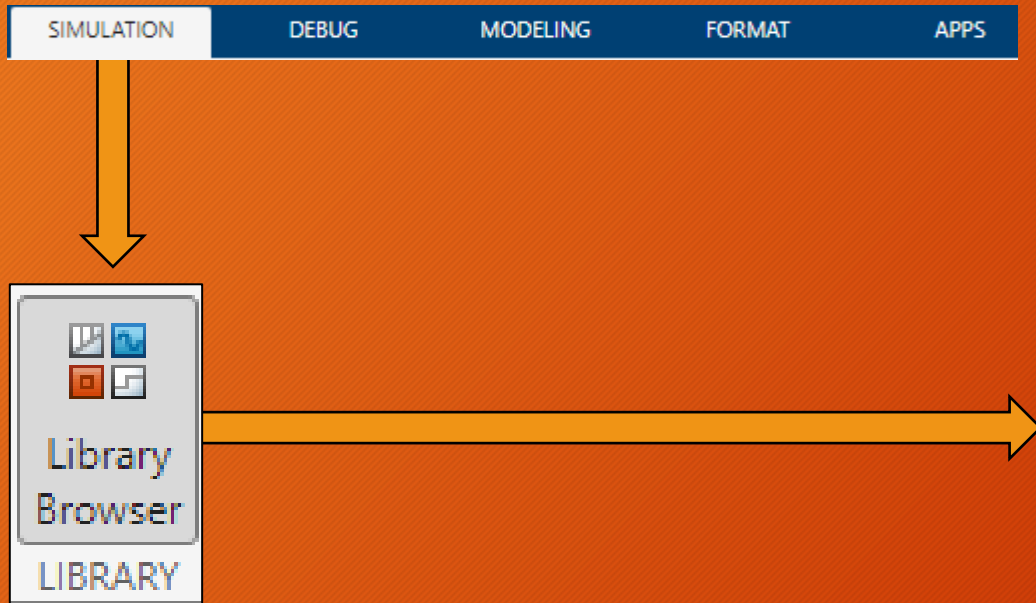
Button Type: **Latch**

Label: Hide

OK Cancel Help Apply

Simulink Blocks Used in this Setup

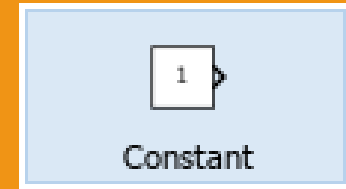
- The blocks shown here are found in the Simulink Library Browser under the sections as indicated below



- Simulink
 - Dashboard



- Simulink
 - Commonly Used Blocks



- Simulink
 - Dashboard
 - Customizable Blocks

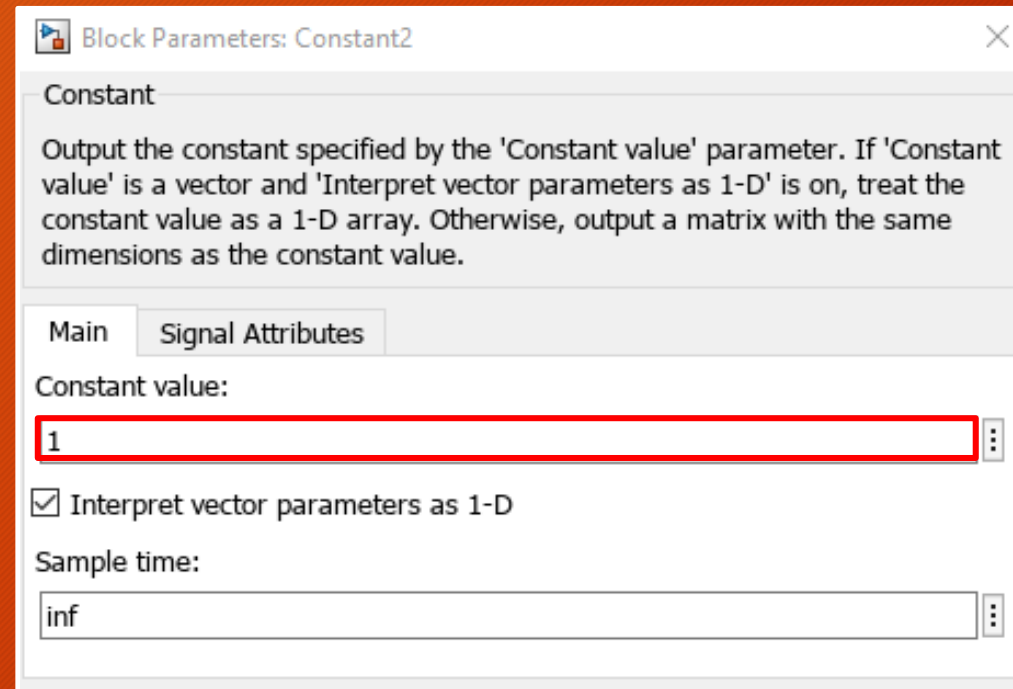
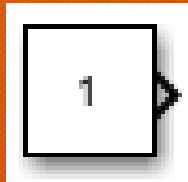


You may want to avoid use of the Customizable Push Button since it is somewhat difficult to set up, and I have noticed some strange behavior during execution

Set Up a Constant Block

- A Constant Block simply puts out a constant value on a signal line
- You can use the Dashboard Pushbutton Block in Latch Mode to control the value of the Constant Block to mimic “On / Off” behavior

Constant Block

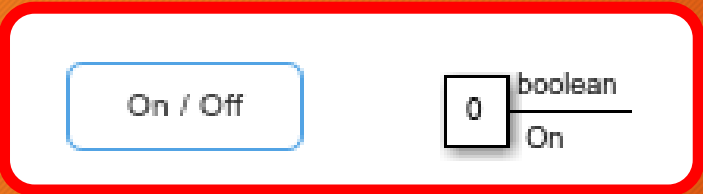


I have an issue with Simulink constant blocks in that you cannot indicate the initial value for the block to adopt at the start of a simulation run. This means that if you are going to run multiple runs, you have to configure the blocks the way you want them (the value that they should have) at the end of the prior run, so that the values will be set properly at the beginning of the next run.

Connect the Push Button to the Constant Block

The Push Button can be of type Momentary or Latch

Before



Block Parameters: Push Button1

Push Button

Change the value of a variable or tunable parameter using a button. You can configure the button to respond to a click by momentarily changing the value until you release or by latching the value until you click again.

CONNECT	PARAMETERS AND VARIABLES

Select blocks in the Simulink Editor to connect tunable parameters and variables to this button

Specify element to tune, e.g. 2, (2,3), a.b.c

Main Format Icon

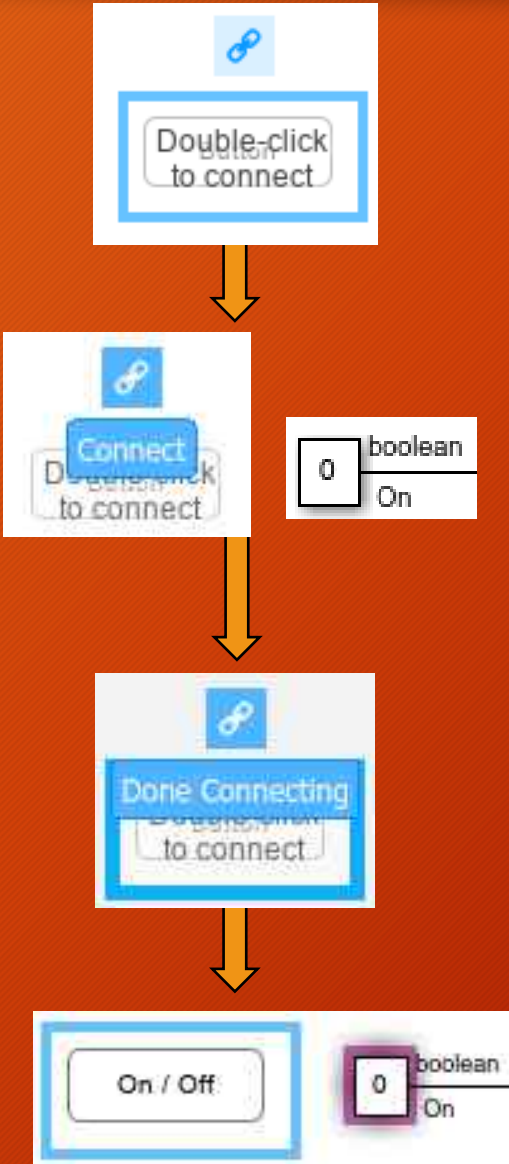
Button Text: On / Off

On Value: 1

Button Type: Latch

Label: Hide

After



Block Parameters: Push Button

Push Button

Change the value of a variable or tunable parameter using a button. You can configure the button to respond to a click by momentarily changing the value until you release or by latching the value until you click again.

CONNECT	PARAMETERS AND VARIABLES
	 Constant1 Value

Specify element to tune, e.g. 2, (2,3), a.b.c

Main Format Icon

Button Text: On / Off

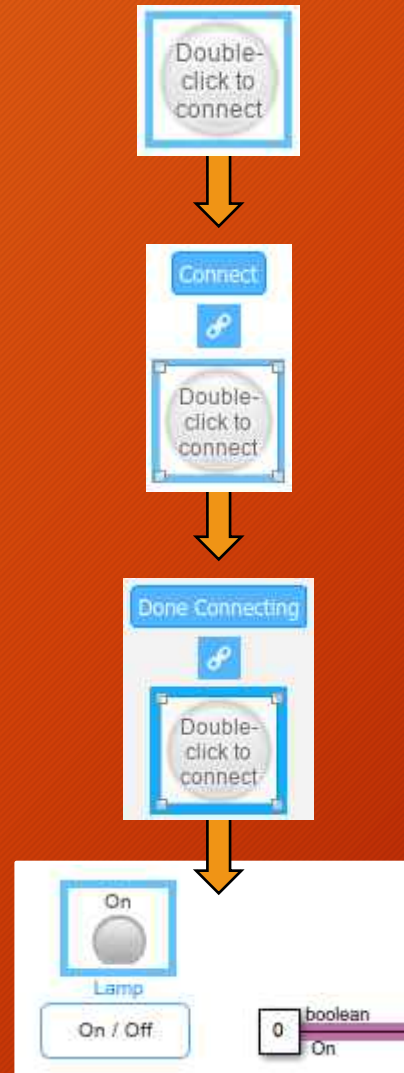
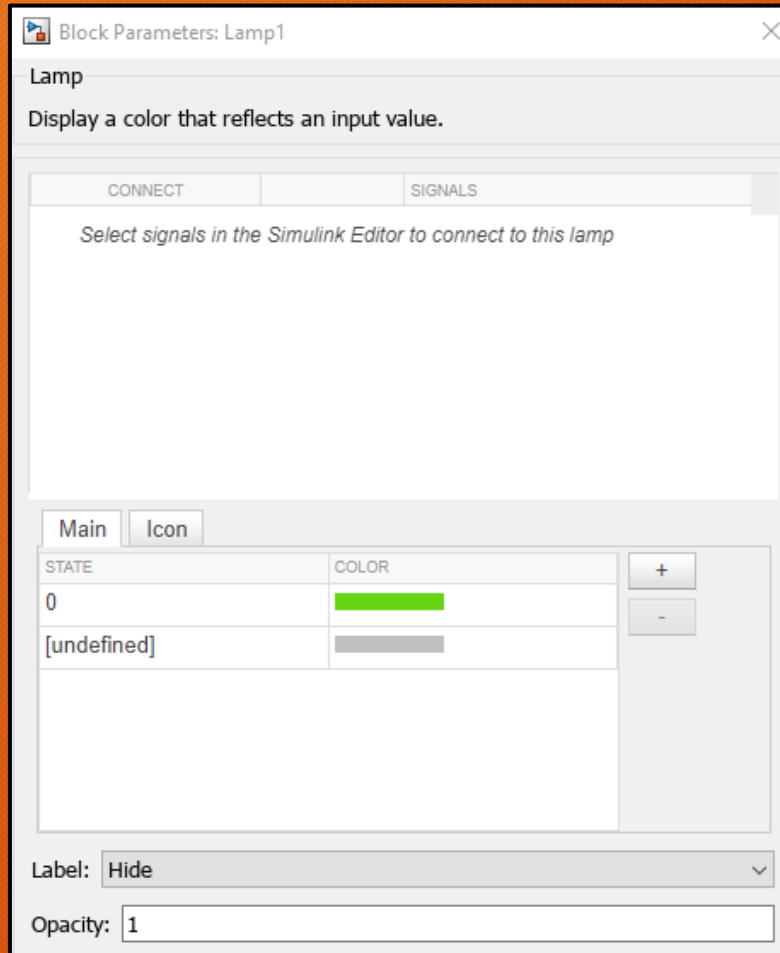
On Value: 1

Button Type: Latch

Label: Hide

Connect Lamp to Output of Constant Block

Before Connection



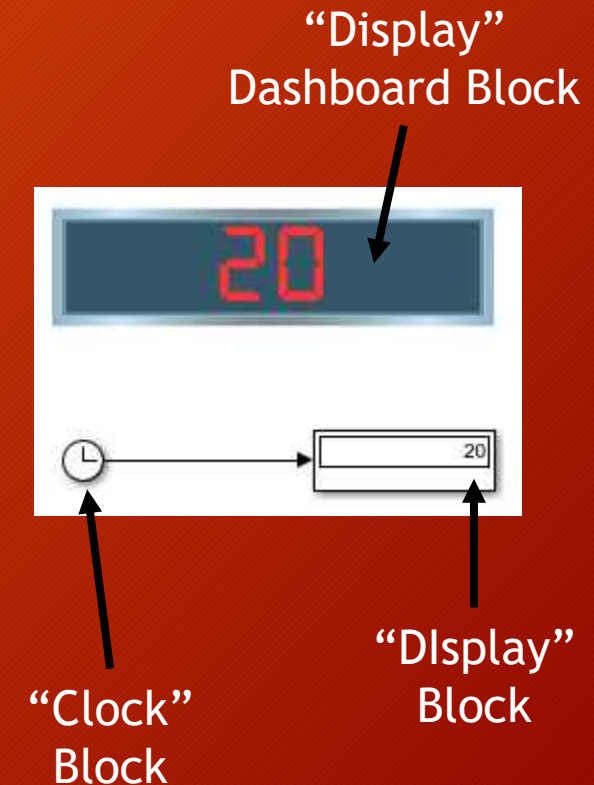
After Connection



Dashboard Display of Clock Value

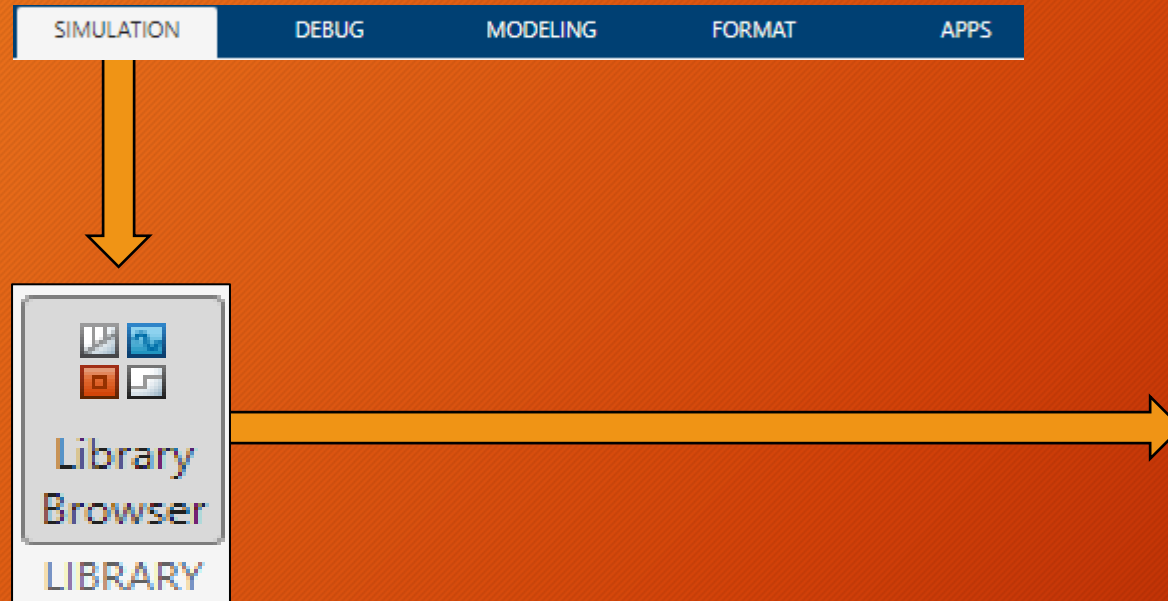
Overview of Approach

- The purpose is to provide an easier-to-read user display of the current simulation time
 - The Customizable “Display” Dashboard block can be made large enough to be easily seen (larger than the normal Display block)
 - An Operator can use this large display to more easily determine when to perform certain time-related actions during the simulation
- This is the basic setup
 - The “Clock” provides an output that reflects the current simulation time (it is required)
 - The “Display” Dashboard Block receives the time from the clock (it is also required)
 - This pair is required to provide the signal path that the Customizable “Display” Dashboard Block can monitor
 - The Customizable “Display” Dashboard Block monitors and displays the sim time coming out of the “Clock”

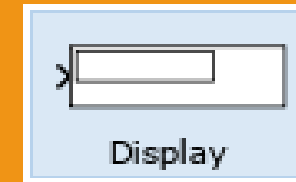
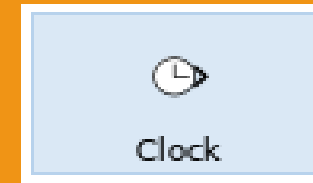


Simulink Blocks Used in this Setup

- The blocks shown here are found in the Simulink Library Browser under the sections as indicated below

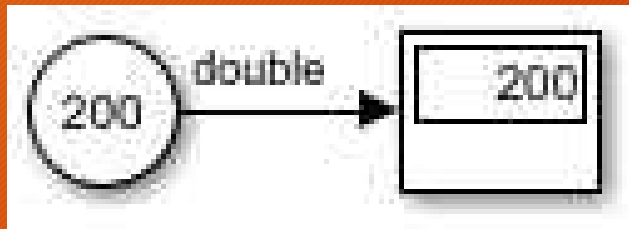


- Simulink
 - Sink
 - Clock
 - Display
 - Simulink
 - Dashboard
 - Customizable Blocks

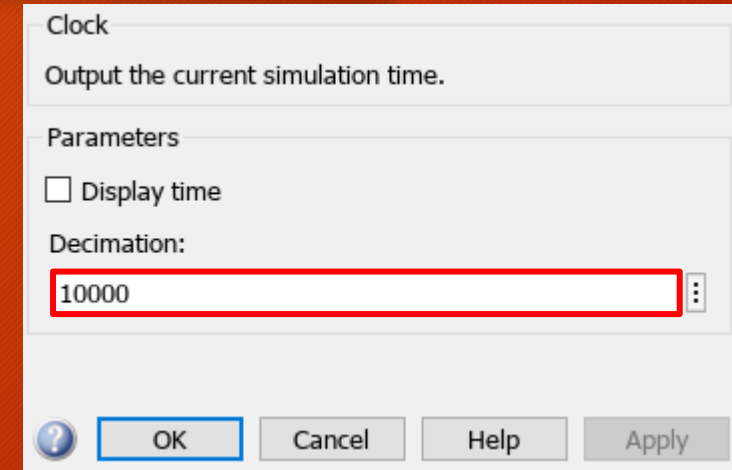


Connect the Clock to the Display Block

- A display block is often used to show the value of the clock
- The display block is often too small and hidden among a grouping of other standard Simulink blocks making it difficult to find when needing to see whether it is time to take some operator action to control the simulation



- The solution is to use the larger Customizable Display block
- The Customizable Display block can only be linked to a signal, so a signal path from the clock to a normal Simulink display block is established
- The Customizable Display block can be placed anywhere on the model drawing window



Clock
Output the current simulation time.

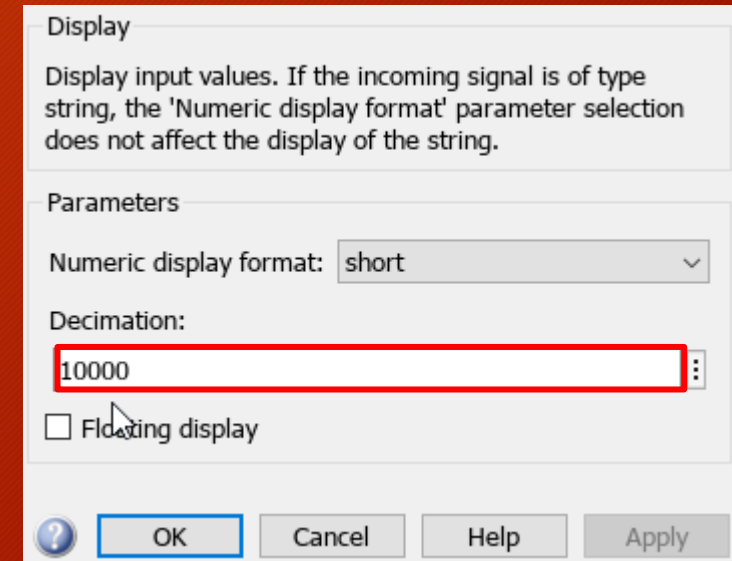
Parameters

☐ Display time

Decimation:

? OK Cancel Help Apply

Set as shown to display integer values



Display
Display input values. If the incoming signal is of type string, the 'Numeric display format' parameter selection does not affect the display of the string.

Parameters

Numeric display format:

Decimation:

☐ Floating display

? OK Cancel Help Apply

Connect Dashboard Display to Display Block

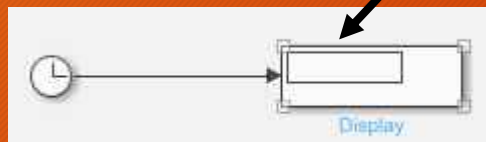
Click on elipssis



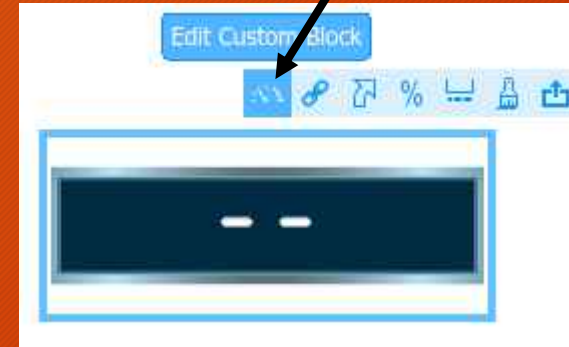
Click on link symbol



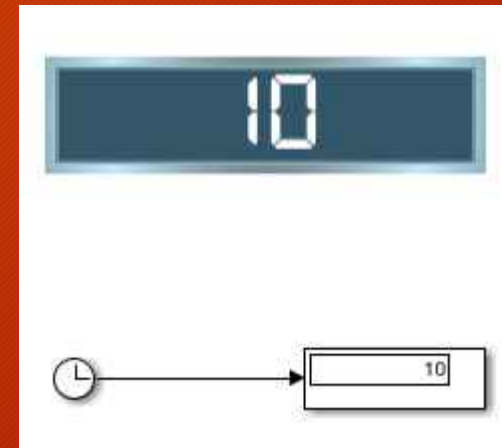
Click on "Display" block



Click here to open customization feature

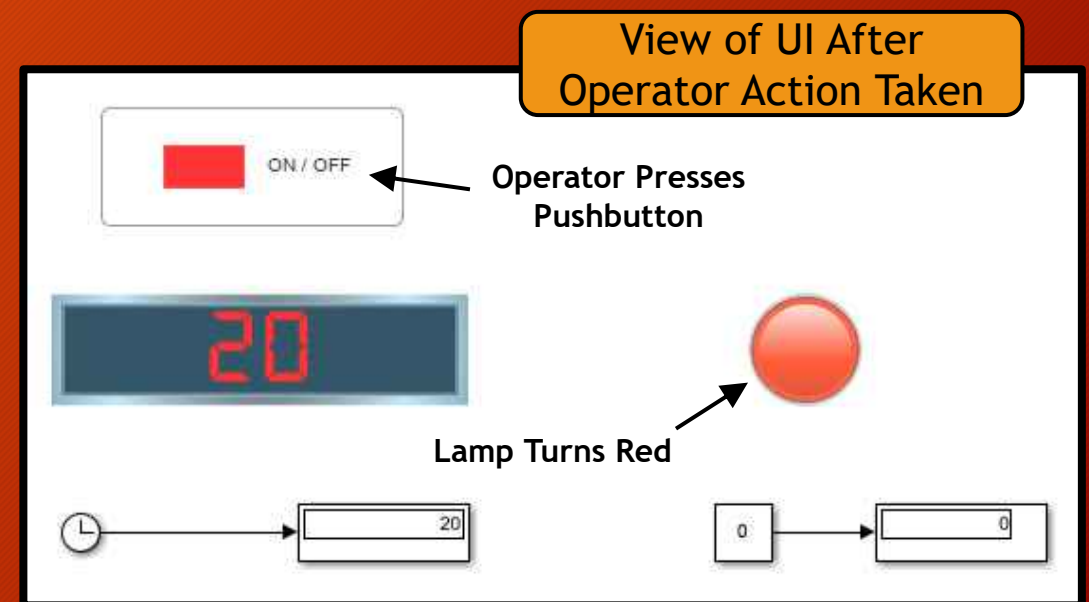
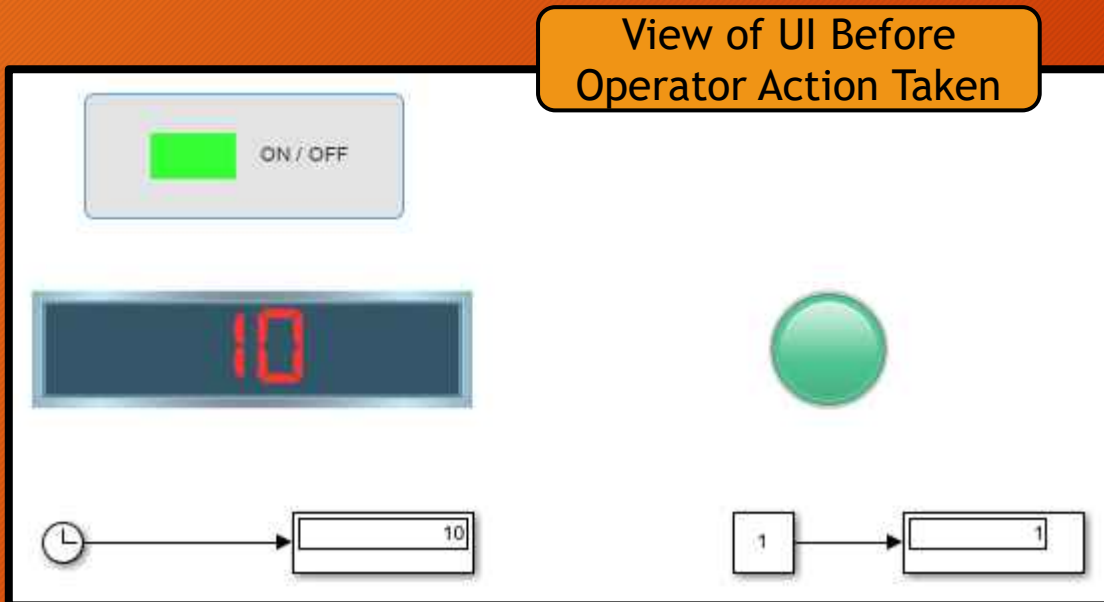


Customizate the Dashboard "Display" box



Dashboard Blocks Example Application

- The Customizable Display is large and clear and allows the operator to better know when to take operator actions (according to some scenario schedule of events)
- The pushbutton controls the value of the constant block
- The dashboard lamp indicates the actual state of the signal coming out of the constant block
- Example: Operator needs to change value of Constant Block from 1 to 0 at 20 seconds



Customizable Dashboard Pushbutton Block

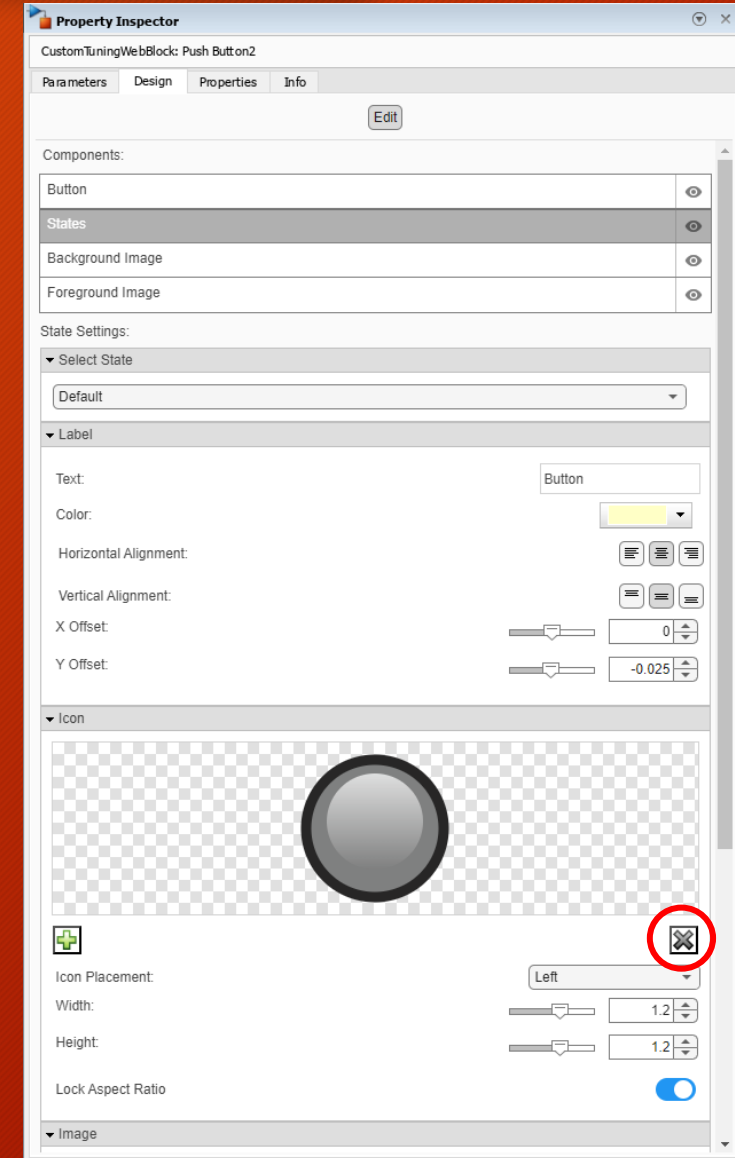
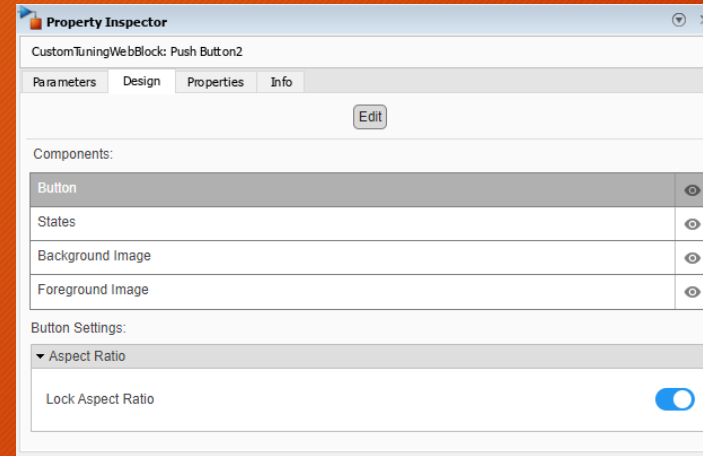


- My recommendation:
 - Avoid unless you develop some experience setting it up properly and getting it to work reliably
 - My experience has been that it is a little tricky to set up at first
 - I also witnessed some strange behavior during execution, but that may have been to my not fully understanding the set up procedure and possibly getting it wrong
 - I have not played with this control enough to know if a) I have set it up properly and b) it is working reliably
- The next few slides describe the set up procedure (as far as I understand it)
- When you first drag the Customizable Dashboard Pushbutton block onto the design palette, the tool asks you to connect the block to something (like a constant block)
- After doing so, the block looks like this: The image shows a rectangular block with a blue gradient and rounded corners. On the left side, there is a small white circle. To the right of the circle, the word "Button" is written in a light blue, sans-serif font.
- In my experience, the miniature lamp next to the button name has very limited controllability, I prefer to do away with it and use the normal Dashboard Lamp block instead to indicate the state of the Constant block controlled by the Pushbutton block

Customizable Dashboard Pushbutton Block (continued)

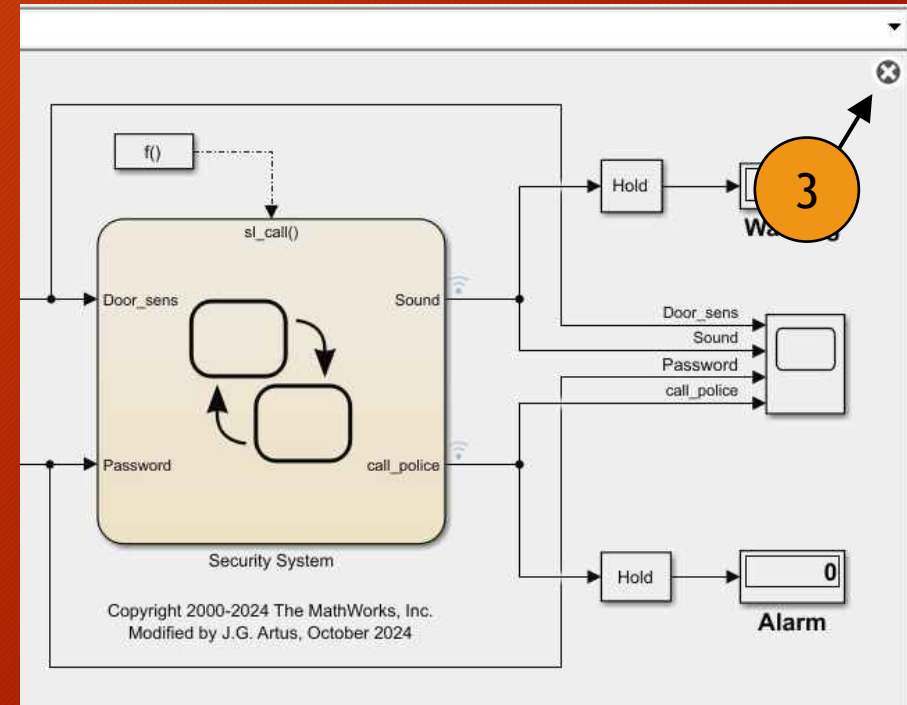
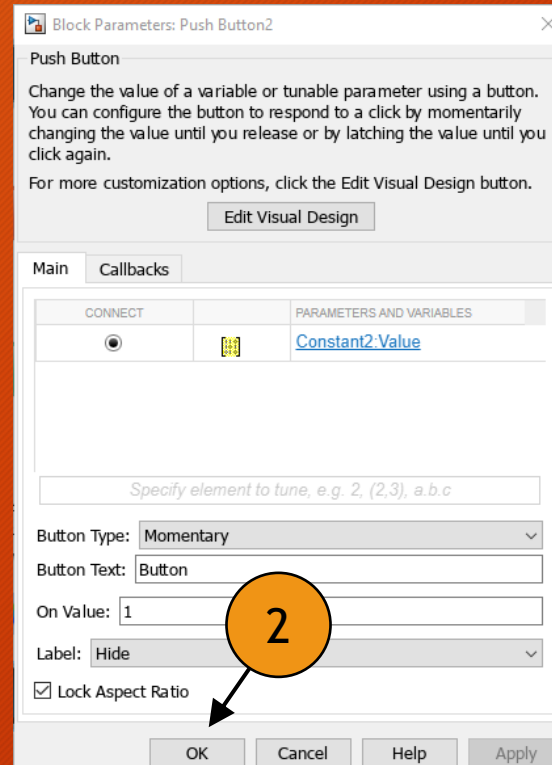
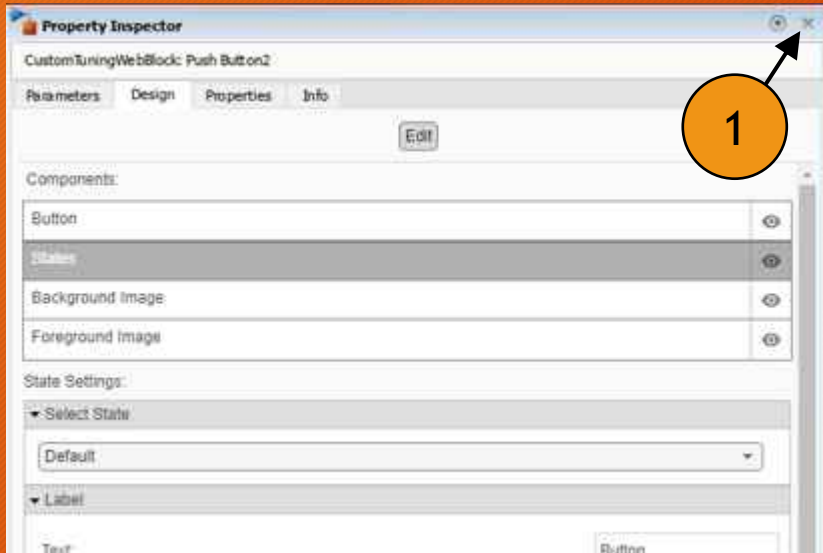
To customize the block follow theses steps:

- Right click on the pushbutton block and select “Block Parameters”
- Click “Edit Visual Design”
 - This will open up the “Property Inspector” window, with a very limited set of editing capabilities
- Go back to the Simulink Editor and left click on the Pushbutton block
 - This will open up additional editing fields Under “Label” use the Text field to set the label name of the block
- I do not use the lamp icon, so I turn it off by clicking on the big X under “Icon” on the right side
 - Note: Once the icon is removed, you cannot get it back, period
- You can go to the Simulink Editor and adjust the size of the button image, for example, to fit your modified label name



Customizable Dashboard Pushbutton Block (continued)

- Once all your edits are done, do the following
 - “X” out of the Property Inspector window
 - Click on “OK” on the Block Parameters window (if it is still open)
 - Click on the “X” at the upper right corner of the Simulink Editor
- You should now be back to normal Simulink Editor design mode



References

1. The MathWorks' User Guide for Simulink

https://www.mathworks.com/help/pdf_doc/simulink/simulink_ug.pdf