ICE_Dashboard_2021b

Design Description

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ICE_Dashboard_2021b: Design Description

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Chapter 1. Model Version

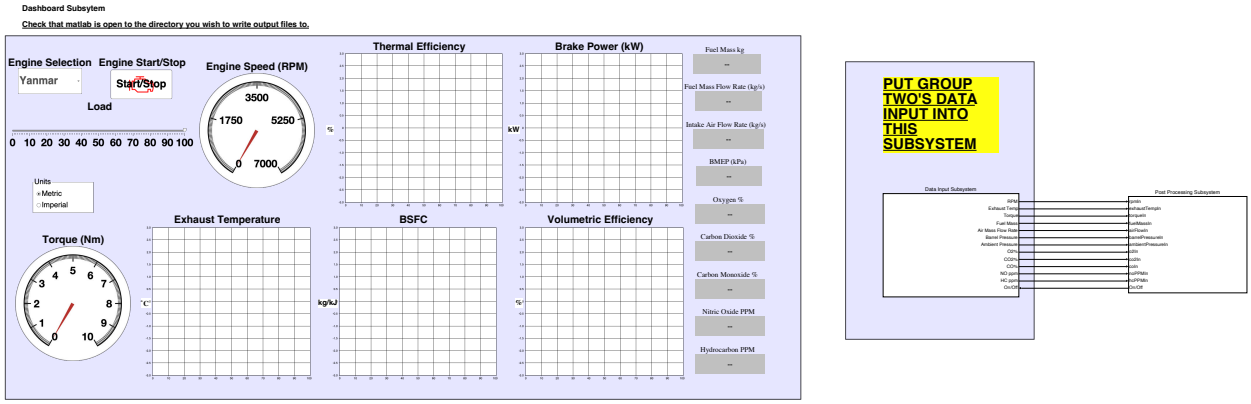
Version: 1.0

Last modified: Sat Apr 22 18:13:11 2023

Checksum: 3216345265 2170718280 878562279 1073391477

Chapter 2. Root System

Figure 2.1. ICE_Dashboard_2021b



Blocks

Parameters

"BMEP (kPa)" (DisplayBlock)

Table 2.1. "BMEP (kPa)" Parameters

Parameter	Value
Label	Hide
Binding	< Simulink.HMI.SignalSpecification>
ShowInitialText	on
Format	short
Alignment	Center
Opacity	1
Layout	Preserve dimensions
FormatString	%d
GridColor	[0.502 0.502 0.502]
ShowGrid	on

"Brake Power (kW)" (DashboardScope)

Table 2.2. "Brake Power (kW)" Parameters

Parameter	Value
Label	Hide
Binding	< Simulink.HMI.SignalSpecification>
ShowInitialText	on
LegendPosition	Hide
ScaleAtStop	on
UpdateMode	Scroll
NormalizeYAxis	off
TicksPosition	Outside
TickLabels	All
Grid	All
Border	on
Markers	off
FontColor	[0 0 0]
YLimits	[-3 3]
Colors	Color: [0 0.4471 0.7412] LineStyle: '-'

"BSFC" (DashboardScope)

Table 2.3. "BSFC" Parameters

Parameter	Value
Label	Hide
Binding	< Simulink.HMI.SignalSpecification>
ShowInitialText	on
LegendPosition	Hide
ScaleAtStop	on
UpdateMode	Scroll
NormalizeYAxis	off
TicksPosition	Outside
TickLabels	All
Grid	All
Border	on

Parameter	Value
Markers	off
FontColor	[0 0 0]
YLimits	[-3 3]
Colors	Color: [0 0.4471 0.7412] LineStyle: '-'

"Carbon Dioxide %" (DisplayBlock)

Table 2.4. "Carbon Dioxide %" Parameters

Parameter	Value
Label	Hide
Binding	< Simulink.HMI.SignalSpecification>
ShowInitialText	on
Format	short
Alignment	Center
Opacity	1
Layout	Preserve dimensions
FormatString	%d
GridColor	[0.502 0.502 0.502]
ShowGrid	on

"Carbon Monoxide %" (DisplayBlock)

Table 2.5. "Carbon Monoxide %" Parameters

Parameter	Value
Label	Hide
Binding	< Simulink.HMI.SignalSpecification>
ShowInitialText	on
Format	short
Alignment	Center
Opacity	1
Layout	Preserve dimensions
FormatString	%d
GridColor	[0.502 0.502 0.502]
ShowGrid	on

"Engine Selection" (ComboBox)

Table 2.6. "Engine Selection" Parameters

Parameter	Value
Label	Hide
Binding	< Simulink.HMI.ParamSourceInfo>
ShowInitialText	on
States	[6x1 struct w/ fields: Value, Label]
UseEnumeratedDataType	off
Opacity	1

"Engine Speed (RPM)" (CircularGaugeBlock)

Table 2.7. "Engine Speed (RPM)" Parameters

Parameter	Value
Label	Hide
Binding	< Simulink.HMI.SignalSpecification>
ShowInitialText	on
Limits	[0 1750 7000]
FontColor	[0 0 0]
Opacity	1
Scale Direction	Clockwise

"Engine Start/Stop" (PushButtonBlock)

Table 2.8. "Engine Start/Stop" Parameters

Parameter	Value
Label	Hide
Binding	< Simulink.HMI.ParamSourceInfo>
ShowInitialText	on
ButtonText	Start/Stop
OnValue	1
Opacity	1
Button Type	Latch
Icon	Engine

Parameter	Value
Icon Alignment	Center
IconOnColor	[0.19608 0.80392 0.19608]
IconOffColor	[1 0 0]
Customize Icon Color	On

"Exhaust Temperature" (DashboardScope)

Table 2.9. "Exhaust Temperature" Parameters

Parameter	Value
Label	Hide
Binding	< Simulink.HMI.SignalSpecification>
ShowInitialText	on
LegendPosition	Hide
ScaleAtStop	off
UpdateMode	Wrap
NormalizeYAxis	off
TicksPosition	Outside
TickLabels	All
Grid	All
Border	on
Markers	off
FontColor	[0 0 0]
YLimits	[-3 3]
Colors	Color: [0.8510 0.3255 0.0980] LineStyle: '-'

"Fuel Mass Flow Rate (kg/s)" (DisplayBlock)

Table 2.10. "Fuel Mass Flow Rate (kg/s)" Parameters

Parameter	Value
Label	Hide
Binding	< Simulink.HMI.SignalSpecification>
ShowInitialText	on
Format	short
Alignment	Center

Parameter	Value
Opacity	1
Layout	Preserve dimensions
FormatString	%d
GridColor	[0.502 0.502 0.502]
ShowGrid	on

"Fuel Mass kg" (DisplayBlock)

Table 2.11. "Fuel Mass kg" Parameters

Parameter	Value
Label	Hide
Binding	< Simulink.HMI.SignalSpecification>
ShowInitialText	on
Format	short
Alignment	Center
Opacity	1
Layout	Preserve dimensions
FormatString	%d
GridColor	[0.502 0.502 0.502]
ShowGrid	on

"Hydrocarbon PPM" (DisplayBlock)

Table 2.12. "Hydrocarbon PPM" Parameters

Parameter	Value
Label	Hide
Binding	< Simulink.HMI.SignalSpecification>
ShowInitialText	on
Format	short
Alignment	Center
Opacity	1
Layout	Preserve dimensions
FormatString	%d
GridColor	[0.502 0.502 0.502]

Parameter	Value
ShowGrid	on

"Intake Air Flow Rate (kg/s)" (DisplayBlock)

Table 2.13. "Intake Air Flow Rate (kg/s)" Parameters

Parameter	Value
Label	Hide
Binding	< Simulink.HMI.SignalSpecification>
ShowInitialText	on
Format	short
Alignment	Center
Opacity	1
Layout	Preserve dimensions
FormatString	%d
GridColor	[0.502 0.502 0.502]
ShowGrid	on

"Load" (SliderBlock)

Table 2.14. "Load" Parameters

Parameter	Value
Label	Hide
Binding	< Simulink.HMI.ParamSourceInfo>
ShowInitialText	on
Scale Type	Linear
Limits	[0 -1 100]

"Nitric Oxide PPM" (DisplayBlock)

Table 2.15. "Nitric Oxide PPM" Parameters

Parameter	Value
Label	Hide
Binding	< Simulink.HMI.SignalSpecification>
ShowInitialText	on

Parameter	Value
Format	short
Alignment	Center
Opacity	1
Layout	Preserve dimensions
FormatString	%d
GridColor	[0.502 0.502 0.502]
ShowGrid	on

"Oxygen %" (DisplayBlock)

Table 2.16. "Oxygen %" Parameters

Parameter	Value
Label	Hide
Binding	< Simulink.HMI.SignalSpecification>
ShowInitialText	on
Format	short
Alignment	Center
Opacity	1
Layout	Preserve dimensions
FormatString	%d
GridColor	[0.502 0.502 0.502]
ShowGrid	on

"Thermal Efficiency" (DashboardScope)

Table 2.17. "Thermal Efficiency" Parameters

Parameter	Value
Label	Hide
Binding	< Simulink.HMI.SignalSpecification>
ShowInitialText	on
LegendPosition	Hide
ScaleAtStop	on
UpdateMode	Scroll
NormalizeYAxis	off

Parameter	Value
TicksPosition	Outside
TickLabels	All
Grid	All
Border	on
Markers	off
FontColor	[0 0 0]
YLimits	[-3 3]
Colors	Color: [0 0.4471 0.7412] LineStyle: '-'

"Torque (Nm)" (CircularGaugeBlock)

Table 2.18. "Torque (Nm)" Parameters

Parameter	Value
Label	Hide
Binding	< Simulink.HMI.SignalSpecification>
ShowInitialText	on
Limits	[0 1 10]
FontColor	[0 0 0]
Opacity	1
Scale Direction	Clockwise

"Unit Selection" (RadioButtonGroup)

Table 2.19. "Unit Selection" Parameters

Parameter	Value
Label	Hide
Binding	< Simulink.HMI.ParamSourceInfo>
ShowInitialText	on
ButtonGroupName	Units
States	[2x1 struct w/ fields: Value, Label]
UseEnumeratedDataType	off
Opacity	1

"Volumetric Efficiency" (DashboardScope)

Table 2.20. "Volumetric Efficiency" Parameters

Parameter	Value
Label	Hide
Binding	< Simulink.HMI.SignalSpecification>
ShowInitialText	on
LegendPosition	Hide
ScaleAtStop	on
UpdateMode	Scroll
NormalizeYAxis	off
TicksPosition	Outside
TickLabels	All
Grid	All
Border	on
Markers	off
FontColor	[0 0 0]
YLimits	[-3 3]
Colors	Color: [0 0.4471 0.7412] LineStyle: '-'

Block Execution Order

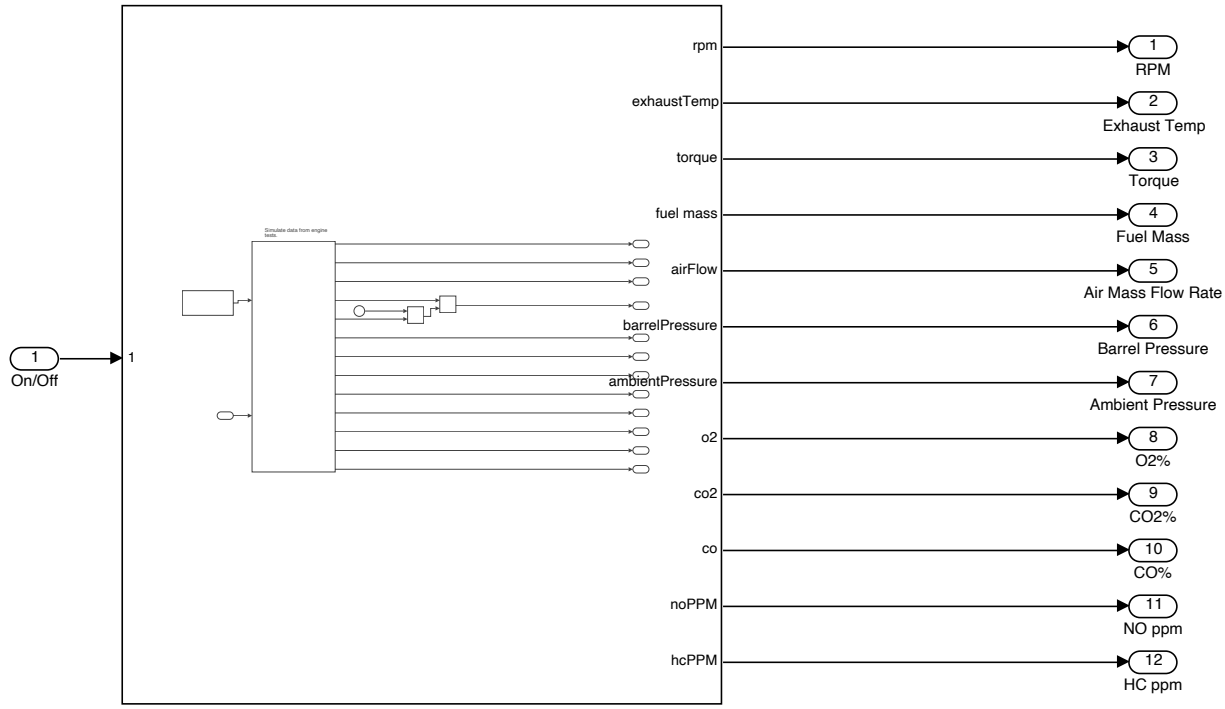
"ICE_Dashboard_2021b" is a multitasking model. Block execution order is not available for multitasking models.

Chapter 3. Subsystems

Data Input Subsystem

Figure 3.1. ICE_Dashboard_2021b/Data Input Subsystem

When connecting group 2's data input, replace the below subsystem taking care to connect the appropriate signals to the labeled output. The input signal to the subsystem is the on/off signal from the 'On/Off' button on the dashboard. Feel free to use or ignore this input however **do not** delete it elsewhere in the model.



Blocks

Parameters

"Air Mass Flow Rate" (Outport)

Table 3.1. "Air Mass Flow Rate" Parameters

Parameter	Value
Port number	5
Icon display	Port number
Output function call	off
Minimum	[]
Maximum	[]
Data type	Inherit: auto
Lock output data type setting against changes by the fixed-point tools	off
Output as nonvirtual bus in parent model	off
Bus virtuality	inherit
Data mode	inherit
Unit (e.g., m, m/s^2, N*m)	inherit
Port dimensions (-1 for inherited)	-1
Variable-size signal	Inherit
Sample time (-1 for inherited)	-1
Ensure outport is virtual	off
Source of initial output value	Dialog
Output when disabled	held
Initial output	[]
MustResolveToSignalObject	off
Specify output when source is unconnected	off
Constant value	0
Interpret vector parameters as 1-D	on

"Ambient Pressure" (Outport)

Table 3.2. "Ambient Pressure" Parameters

Parameter	Value
Port number	7
Icon display	Port number
Output function call	off
Minimum	[]
Maximum	[]

Parameter	Value
Data type	Inherit: auto
Lock output data type setting against changes by the fixed-point tools	off
Output as nonvirtual bus in parent model	off
Bus virtuality	inherit
Data mode	inherit
Unit (e.g., m, m/s^2, N*m)	inherit
Port dimensions (-1 for inherited)	-1
Variable-size signal	Inherit
Sample time (-1 for inherited)	-1
Ensure outport is virtual	off
Source of initial output value	Dialog
Output when disabled	held
Initial output	[]
MustResolveToSignalObject	off
Specify output when source is unconnected	off
Constant value	0
Interpret vector parameters as 1-D	on

"Barrel Pressure" (Outport)

Table 3.3. "Barrel Pressure" Parameters

Parameter	Value
Port number	6
Icon display	Port number
Output function call	off
Minimum	[]
Maximum	[]
Data type	Inherit: auto
Lock output data type setting against changes by the fixed-point tools	off
Output as nonvirtual bus in parent model	off
Bus virtuality	inherit
Data mode	inherit
Unit (e.g., m, m/s^2, N*m)	inherit
Port dimensions (-1 for inherited)	-1
Variable-size signal	Inherit

Parameter	Value
Sample time (-1 for inherited)	-1
Ensure outport is virtual	off
Source of initial output value	Dialog
Output when disabled	held
Initial output	[]
MustResolveToSignalObject	off
Specify output when source is unconnected	off
Constant value	0
Interpret vector parameters as 1-D	on

"CO%" (Outport)

Table 3.4. "CO%" Parameters

Parameter	Value
Port number	10
Icon display	Port number
Output function call	off
Minimum	[]
Maximum	[]
Data type	Inherit: auto
Lock output data type setting against changes by the fixed-point tools	off
Output as nonvirtual bus in parent model	off
Bus virtuality	inherit
Data mode	inherit
Unit (e.g., m, m/s^2, N*m)	inherit
Port dimensions (-1 for inherited)	-1
Variable-size signal	Inherit
Sample time (-1 for inherited)	-1
Ensure outport is virtual	off
Source of initial output value	Dialog
Output when disabled	held
Initial output	[]
MustResolveToSignalObject	off
Specify output when source is unconnected	off
Constant value	0

Parameter	Value
Interpret vector parameters as 1-D	on

"CO2%" (Outport)

Table 3.5. "CO2%" Parameters

Parameter	Value
Port number	9
Icon display	Port number
Output function call	off
Minimum	[]
Maximum	[]
Data type	Inherit: auto
Lock output data type setting against changes by the fixed-point tools	off
Output as nonvirtual bus in parent model	off
Bus virtuality	inherit
Data mode	inherit
Unit (e.g., m, m/s^2, N*m)	inherit
Port dimensions (-1 for inherited)	-1
Variable-size signal	Inherit
Sample time (-1 for inherited)	-1
Ensure outport is virtual	off
Source of initial output value	Dialog
Output when disabled	held
Initial output	[]
MustResolveToSignalObject	off
Specify output when source is unconnected	off
Constant value	0
Interpret vector parameters as 1-D	on

"Exhaust Temp" (Outport)

Table 3.6. "Exhaust Temp" Parameters

Parameter	Value
Port number	2
Icon display	Port number

Parameter	Value
Output function call	off
Minimum	[]
Maximum	[]
Data type	Inherit: auto
Lock output data type setting against changes by the fixed-point tools	off
Output as nonvirtual bus in parent model	off
Bus virtuality	inherit
Data mode	inherit
Unit (e.g., m, m/s^2, N*m)	inherit
Port dimensions (-1 for inherited)	-1
Variable-size signal	Inherit
Sample time (-1 for inherited)	-1
Ensure outport is virtual	off
Source of initial output value	Dialog
Output when disabled	held
Initial output	[]
MustResolveToSignalObject	off
Specify output when source is unconnected	off
Constant value	0
Interpret vector parameters as 1-D	on

"Fuel Mass" (Outport)

Table 3.7. "Fuel Mass" Parameters

Parameter	Value
Port number	4
Icon display	Port number
Output function call	off
Minimum	[]
Maximum	[]
Data type	Inherit: auto
Lock output data type setting against changes by the fixed-point tools	off
Output as nonvirtual bus in parent model	off
Bus virtuality	inherit
Data mode	inherit

Parameter	Value
Unit (e.g., m, m/s^2, N*m)	inherit
Port dimensions (-1 for inherited)	-1
Variable-size signal	Inherit
Sample time (-1 for inherited)	-1
Ensure outport is virtual	off
Source of initial output value	Dialog
Output when disabled	held
Initial output	[]
MustResolveToSignalObject	off
Specify output when source is unconnected	off
Constant value	0
Interpret vector parameters as 1-D	on

"HC ppm" (Outport)

Table 3.8. "HC ppm" Parameters

Parameter	Value
Port number	12
Icon display	Port number
Output function call	off
Minimum	[]
Maximum	[]
Data type	Inherit: auto
Lock output data type setting against changes by the fixed-point tools	off
Output as nonvirtual bus in parent model	off
Bus virtuality	inherit
Data mode	inherit
Unit (e.g., m, m/s^2, N*m)	inherit
Port dimensions (-1 for inherited)	-1
Variable-size signal	Inherit
Sample time (-1 for inherited)	-1
Ensure outport is virtual	off
Source of initial output value	Dialog
Output when disabled	held
Initial output	[]

Parameter	Value
MustResolveToSignalObject	off
Specify output when source is unconnected	off
Constant value	0
Interpret vector parameters as 1-D	on

"NO ppm" (Outport)

Table 3.9. "NO ppm" Parameters

Parameter	Value
Port number	11
Icon display	Port number
Output function call	off
Minimum	[]
Maximum	[]
Data type	Inherit: auto
Lock output data type setting against changes by the fixed-point tools	off
Output as nonvirtual bus in parent model	off
Bus virtuality	inherit
Data mode	inherit
Unit (e.g., m, m/s^2, N*m)	inherit
Port dimensions (-1 for inherited)	-1
Variable-size signal	Inherit
Sample time (-1 for inherited)	-1
Ensure outport is virtual	off
Source of initial output value	Dialog
Output when disabled	held
Initial output	[]
MustResolveToSignalObject	off
Specify output when source is unconnected	off
Constant value	0
Interpret vector parameters as 1-D	on

"O2%" (Outport)

Table 3.10. "O2%" Parameters

Parameter	Value
Port number	8
Icon display	Port number
Output function call	off
Minimum	[]
Maximum	[]
Data type	Inherit: auto
Lock output data type setting against changes by the fixed-point tools	off
Output as nonvirtual bus in parent model	off
Bus virtuality	inherit
Data mode	inherit
Unit (e.g., m, m/s^2, N*m)	inherit
Port dimensions (-1 for inherited)	-1
Variable-size signal	Inherit
Sample time (-1 for inherited)	-1
Ensure outport is virtual	off
Source of initial output value	Dialog
Output when disabled	held
Initial output	[]
MustResolveToSignalObject	off
Specify output when source is unconnected	off
Constant value	0
Interpret vector parameters as 1-D	on

"On/Off" (Inport)

Table 3.11. "On/Off" Parameters

Parameter	Value
Port number	1
Port dimensions (-1 for inherited)	-1
Sample time (-1 for inherited)	-1
Minimum	[]
Maximum	[]

Parameter	Value
Data type	Inherit: auto

"RPM" (Outport)

Table 3.12. "RPM" Parameters

Parameter	Value
Port number	1
Icon display	Port number
Output function call	off
Minimum	[]
Maximum	[]
Data type	Inherit: auto
Lock output data type setting against changes by the fixed-point tools	off
Output as nonvirtual bus in parent model	off
Bus virtuality	inherit
Data mode	inherit
Unit (e.g., m, m/s^2, N*m)	inherit
Port dimensions (-1 for inherited)	-1
Variable-size signal	Inherit
Sample time (-1 for inherited)	-1
Ensure outport is virtual	off
Source of initial output value	Dialog
Output when disabled	held
Initial output	[]
MustResolveToSignalObject	off
Specify output when source is unconnected	off
Constant value	0
Interpret vector parameters as 1-D	on

"Torque" (Outport)

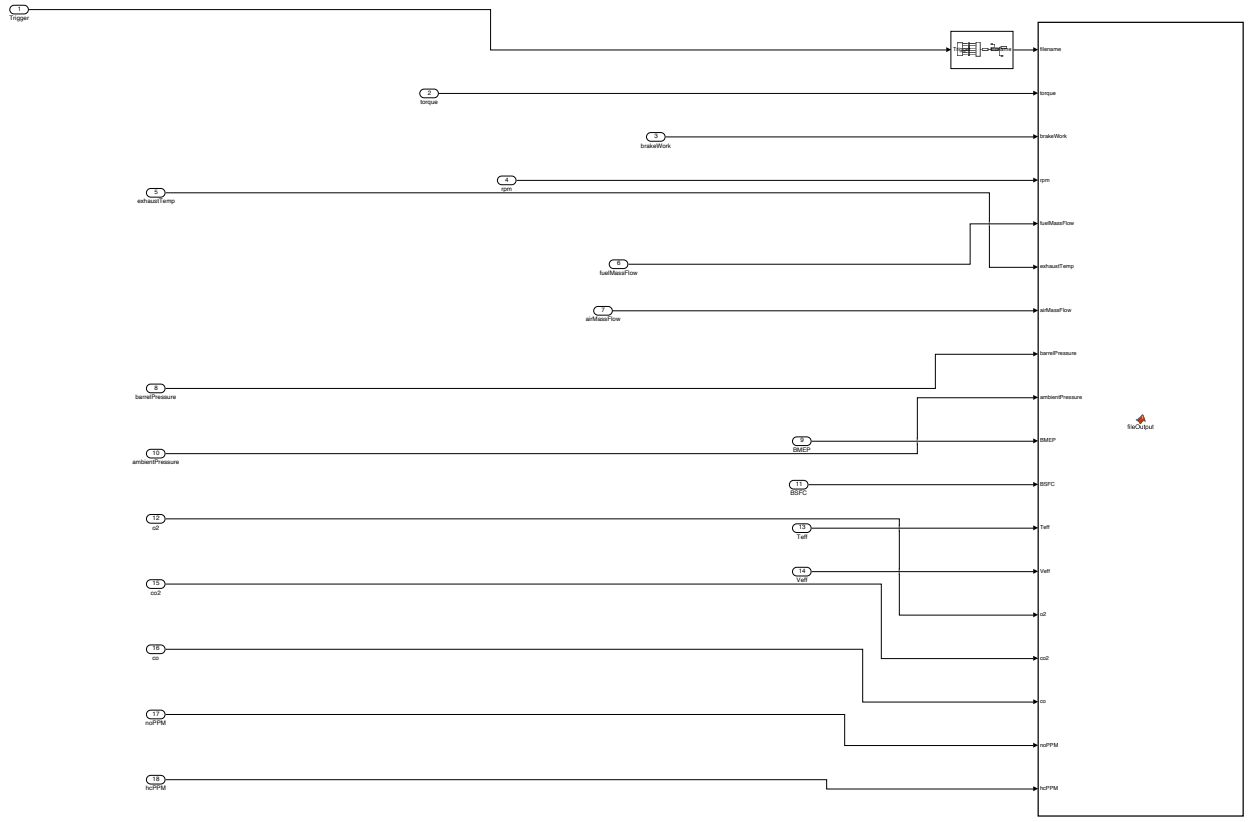
Table 3.13. "Torque" Parameters

Parameter	Value
Port number	3
Icon display	Port number

Parameter	Value
Output function call	off
Minimum	[]
Maximum	[]
Data type	Inherit: auto
Lock output data type setting against changes by the fixed-point tools	off
Output as nonvirtual bus in parent model	off
Bus virtuality	inherit
Data mode	inherit
Unit (e.g., m, m/s^2, N*m)	inherit
Port dimensions (-1 for inherited)	-1
Variable-size signal	Inherit
Sample time (-1 for inherited)	-1
Ensure outport is virtual	off
Source of initial output value	Dialog
Output when disabled	held
Initial output	[]
MustResolveToSignalObject	off
Specify output when source is unconnected	off
Constant value	0
Interpret vector parameters as 1-D	on

FILE I/O Subsystem

Figure 3.2. ICE_Dashboard_2021b/Post Processing Subsystem/FILE I//O Subsystem



Blocks

Parameters

"airMassFlow" (Inport)

Table 3.14. "airMassFlow" Parameters

Parameter	Value
Port number	7
Port dimensions (-1 for inherited)	-1
Sample time (-1 for inherited)	-1
Minimum	[]
Maximum	[]

Parameter	Value
Data type	Inherit: auto

"ambientPressure" (Inport)

Table 3.15. "ambientPressure" Parameters

Parameter	Value
Port number	10
Port dimensions (-1 for inherited)	-1
Sample time (-1 for inherited)	-1
Minimum	[]
Maximum	[]
Data type	Inherit: auto

"barrelPressure" (Inport)

Table 3.16. "barrelPressure" Parameters

Parameter	Value
Port number	8
Port dimensions (-1 for inherited)	-1
Sample time (-1 for inherited)	-1
Minimum	[]
Maximum	[]
Data type	Inherit: auto

"BMEP" (Inport)

Table 3.17. "BMEP" Parameters

Parameter	Value
Port number	9
Port dimensions (-1 for inherited)	-1
Sample time (-1 for inherited)	-1
Minimum	[]
Maximum	[]
Data type	Inherit: auto

"brakeWork" (Inport)

Table 3.18. "brakeWork" Parameters

Parameter	Value
Port number	3
Port dimensions (-1 for inherited)	-1
Sample time (-1 for inherited)	-1
Minimum	[]
Maximum	[]
Data type	Inherit: auto

"BSFC" (Inport)

Table 3.19. "BSFC" Parameters

Parameter	Value
Port number	11
Port dimensions (-1 for inherited)	-1
Sample time (-1 for inherited)	-1
Minimum	[]
Maximum	[]
Data type	Inherit: auto

"co" (Inport)

Table 3.20. "co" Parameters

Parameter	Value
Port number	16
Port dimensions (-1 for inherited)	-1
Sample time (-1 for inherited)	-1
Minimum	[]
Maximum	[]
Data type	Inherit: auto

"co2" (Inport)

Table 3.21. "co2" Parameters

Parameter	Value
Port number	15
Port dimensions (-1 for inherited)	-1
Sample time (-1 for inherited)	-1
Minimum	[]
Maximum	[]
Data type	Inherit: auto

"exhaustTemp" (Inport)

Table 3.22. "exhaustTemp" Parameters

Parameter	Value
Port number	5
Port dimensions (-1 for inherited)	-1
Sample time (-1 for inherited)	-1
Minimum	[]
Maximum	[]
Data type	Inherit: auto

"fuelMassFlow" (Inport)

Table 3.23. "fuelMassFlow" Parameters

Parameter	Value
Port number	6
Port dimensions (-1 for inherited)	-1
Sample time (-1 for inherited)	-1
Minimum	[]
Maximum	[]
Data type	Inherit: auto

"hcPPM" (Inport)

Table 3.24. "hcPPM" Parameters

Parameter	Value
Port number	18
Port dimensions (-1 for inherited)	-1
Sample time (-1 for inherited)	-1
Minimum	[]
Maximum	[]
Data type	Inherit: auto

"MATLAB Function3" (MATLAB Function)

Table 3.25. MATLAB Function3 Function Properties

Property	Value
Update Method	INHERITED
Sample Time	-1
Support variable-size arrays	1
Saturate on integer overflow	1
Treat these inherited Simulink signal types as fi objects	Fixed-point
MATLAB Function block fimath	Same as MATLAB Default
Input fi math	fimath(...)
Description	

Table 3.26. MATLAB Function3 Argument Summary

Name	Scope	Port	Data Type	Size
filename	Input	1	uint8	[1, 31]
torque	Input	2	double	1
brakeWork	Input	3	double	1
rpm	Input	4	double	1
fuelMassFlow	Input	5	double	1
exhaustTemp	Input	6	double	1

Name	Scope	Port	Data Type	Size
airMassFlow	Input	7	double	1
barrelPressure	Input	8	double	1
ambientPressure	Input	9	double	1
BMEP	Input	10	double	1
BSFC	Input	11	double	1
Teff	Input	12	double	1
Veff	Input	13	double	1
o2	Input	14	double	1
co2	Input	15	double	1
co	Input	16	double	1
noPPM	Input	17	double	1
hcPPM	Input	18	double	1

MATLAB Function3 Function Script

```
% log file generation - currently overwrites each run
% \r\n used for windows line termination style CRLF - switch to just \n if
% using unix like system
function fileOutput(filename,torque,brakeWork,rpm,fuelMassFlow,exhaust-
Temp,airMassFlow,barrelPressure,ambientPres-
sure,BMEP,BSFC,Teff,Veff,o2,co2,co,noPPM,hcPPM)
if ([0 0] ~= size(double(char(filename))))
    file = fopen(char(filename),'a');
    if (0 > file)
        return
    end


fprintf(file,'%.3f,%.3f,%.3f,%.3f,%.3f,%.3f,%.3f,%.3f,%.3f,%.3f,%.3
f,%.3f,%.3f,%.3f,%.3f\r\n', ...
        torque,brakeWork,rpm,fuelMassFlow,exhaustTemp,airMassFlow,barrelPres-
sure,ambientPressure,BMEP,BSFC,Teff,Veff,o2,co2,co,noPPM,hcPPM);
    fclose(file);
end
```

Table 3.27. MATLAB Function3 Supporting Functions

Function	Defined By	Path
char	MATLAB	
colon	MATLAB	
fclose	MATLAB	
feval	MATLAB	
fidCheck	MATLAB	

Function	Defined By	Path
fileManager	MATLAB	
floor	MATLAB	
fopen	MATLAB	
fprintf	MATLAB	
intmax	MATLAB	
intmin	MATLAB	
isFileIOExtrinsic	MATLAB	
isfi	MATLAB	
isnan	MATLAB	
isnumerictype	MATLAB	
issparse	MATLAB	
isstring	MATLAB	
upper	MATLAB	

"noPPM" (Inport)

Table 3.28. "noPPM" Parameters

Parameter	Value
Port number	17
Port dimensions (-1 for inherited)	-1
Sample time (-1 for inherited)	-1
Minimum	[]
Maximum	[]
Data type	Inherit: auto

"o2" (Inport)

Table 3.29. "o2" Parameters

Parameter	Value
Port number	12
Port dimensions (-1 for inherited)	-1
Sample time (-1 for inherited)	-1
Minimum	[]
Maximum	[]
Data type	Inherit: auto

"rpm" (Inport)

Table 3.30. "rpm" Parameters

Parameter	Value
Port number	4
Port dimensions (-1 for inherited)	-1
Sample time (-1 for inherited)	-1
Minimum	[]
Maximum	[]
Data type	Inherit: auto

"Teff" (Inport)

Table 3.31. "Teff" Parameters

Parameter	Value
Port number	13
Port dimensions (-1 for inherited)	-1
Sample time (-1 for inherited)	-1
Minimum	[]
Maximum	[]
Data type	Inherit: auto

"torque" (Inport)

Table 3.32. "torque" Parameters

Parameter	Value
Port number	2
Port dimensions (-1 for inherited)	-1
Sample time (-1 for inherited)	-1
Minimum	[]
Maximum	[]
Data type	Inherit: auto

"Trigger" (Inport)

Table 3.33. "Trigger" Parameters

Parameter	Value
Port number	1
Port dimensions (-1 for inherited)	-1
Sample time (-1 for inherited)	-1
Minimum	[]
Maximum	[]
Data type	Inherit: auto

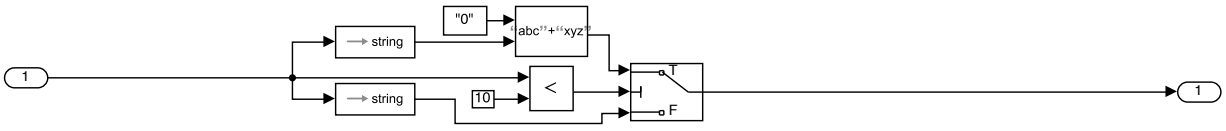
"Veff" (Inport)

Table 3.34. "Veff" Parameters

Parameter	Value
Port number	14
Port dimensions (-1 for inherited)	-1
Sample time (-1 for inherited)	-1
Minimum	[]
Maximum	[]
Data type	Inherit: auto

make sure days string is two numbers

Figure 3.3. ICE_Dashboard_2021b/Post Processing Subsystem/FILE I//O Subsystem/Subsystem/make sure days string is two numbers



Blocks

Parameters

"Constant3" (Constant)

Table 3.35. "Constant3" Parameters

Parameter	Value
Constant value	10
Interpret vector parameters as 1-D	off
Output minimum	[]
Output maximum	[]
Output data type	int8
Lock output data type setting against changes by the fixed-point tools	off
Sample time	inf
Frame period	inf

"In1" (Inport)

Table 3.36. "In1" Parameters

Parameter	Value
Port number	1
Port dimensions (-1 for inherited)	-1
Sample time (-1 for inherited)	-1
Minimum	[]
Maximum	[]
Data type	Inherit: auto

"Out1" (Outport)

Table 3.37. "Out1" Parameters

Parameter	Value
Port number	1
Icon display	Port number
Output function call	off
Minimum	[]
Maximum	[]
Data type	Inherit: auto
Lock output data type setting against changes by the fixed-point tools	off
Output as nonvirtual bus in parent model	off

Parameter	Value
Bus virtuality	inherit
Data mode	inherit
Unit (e.g., m, m/s^2, N*m)	inherit
Port dimensions (-1 for inherited)	-1
Variable-size signal	Inherit
Sample time (-1 for inherited)	-1
Ensure outport is virtual	off
Source of initial output value	Dialog
Output when disabled	held
Initial output	[]
MustResolveToSignalObject	off
Specify output when source is unconnected	off
Constant value	0
Interpret vector parameters as 1-D	on

"Relational Operator1" (RelationalOperator)

Table 3.38. "Relational Operator1" Parameters

Parameter	Value
Relational operator	<
Require all inputs to have the same data type	off
Output data type	boolean
Enable zero-crossing detection	on
Sample time (-1 for inherited)	-1
Integer rounding mode	Simplest

"String Concatenate" (StringConcatenate)

Table 3.39. "String Concatenate" Parameters

Parameter	Value
Number of inputs	2
Output data type	string

"String Constant1" (StringConstant)

Table 3.40. "String Constant1" Parameters

Parameter	Value
String	"0"
Output data type	string

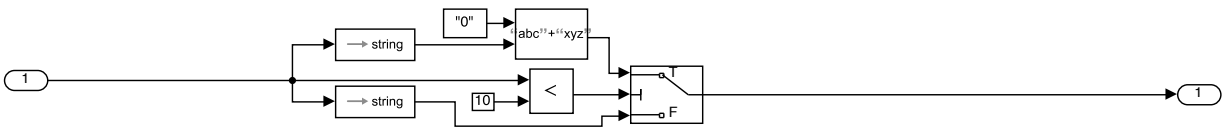
"Switch1" (Switch)

Table 3.41. "Switch1" Parameters

Parameter	Value
Criteria for passing first input	u2 > Threshold
Threshold	0
Require all data port inputs to have the same data type	off
Output minimum	[]
Output maximum	[]
Output data type	Inherit: Inherit via internal rule
Lock output data type setting against changes by the fixed-point tools	off
Integer rounding mode	Floor
Saturate on integer overflow	off
Enable zero-crossing detection	on
Sample time (-1 for inherited)	-1
Allow different data input sizes (Results in variable-size output signal)	off

make sure hours string is two numbers

Figure 3.4. ICE_Dashboard_2021b/Post Processing Subsystem/FILE I//O Subsystem/Subsystem/make sure hours string is two numbers



Blocks

Parameters

"Constant3" (Constant)

Table 3.42. "Constant3" Parameters

Parameter	Value
Constant value	10
Interpret vector parameters as 1-D	off
Output minimum	[]
Output maximum	[]
Output data type	int8
Lock output data type setting against changes by the fixed-point tools	off
Sample time	inf
Frame period	inf

"In1" (Inport)

Table 3.43. "In1" Parameters

Parameter	Value
Port number	1
Port dimensions (-1 for inherited)	-1
Sample time (-1 for inherited)	-1
Minimum	[]
Maximum	[]
Data type	Inherit: auto

"Out1" (Outport)

Table 3.44. "Out1" Parameters

Parameter	Value
Port number	1
Icon display	Port number
Output function call	off
Minimum	[]

Parameter	Value
Maximum	[]
Data type	Inherit: auto
Lock output data type setting against changes by the fixed-point tools	off
Output as nonvirtual bus in parent model	off
Bus virtuality	inherit
Data mode	inherit
Unit (e.g., m, m/s^2, N*m)	inherit
Port dimensions (-1 for inherited)	-1
Variable-size signal	Inherit
Sample time (-1 for inherited)	-1
Ensure outport is virtual	off
Source of initial output value	Dialog
Output when disabled	held
Initial output	[]
MustResolveToSignalObject	off
Specify output when source is unconnected	off
Constant value	0
Interpret vector parameters as 1-D	on

"Relational Operator1" (RelationalOperator)

Table 3.45. "Relational Operator1" Parameters

Parameter	Value
Relational operator	<
Require all inputs to have the same data type	off
Output data type	boolean
Enable zero-crossing detection	on
Sample time (-1 for inherited)	-1
Integer rounding mode	Simplest

"String Concatenate" (StringConcatenate)

Table 3.46. "String Concatenate" Parameters

Parameter	Value
Number of inputs	2

Parameter	Value
Output data type	string

"String Constant1" (StringConstant)

Table 3.47. "String Constant1" Parameters

Parameter	Value
String	"0"
Output data type	string

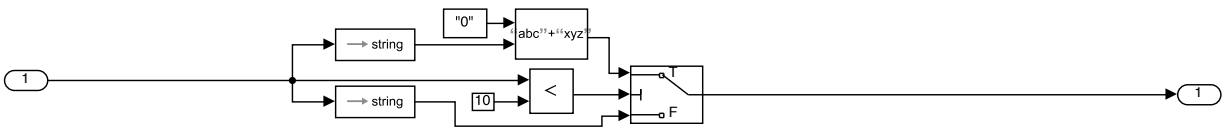
"Switch1" (Switch)

Table 3.48. "Switch1" Parameters

Parameter	Value
Criteria for passing first input	u2 > Threshold
Threshold	0
Require all data port inputs to have the same data type	off
Output minimum	[]
Output maximum	[]
Output data type	Inherit: Inherit via internal rule
Lock output data type setting against changes by the fixed-point tools	off
Integer rounding mode	Floor
Saturate on integer overflow	off
Enable zero-crossing detection	on
Sample time (-1 for inherited)	-1
Allow different data input sizes (Results in variable-size output signal)	off

make sure minutes string is two numbers

Figure 3.5. ICE_Dashboard_2021b/Post Processing Subsystem/FILE I//O Subsystem/Subsystem/make sure minutes string is two numbers



Blocks

Parameters

"Constant3" (Constant)

Table 3.49. "Constant3" Parameters

Parameter	Value
Constant value	10
Interpret vector parameters as 1-D	off
Output minimum	[]
Output maximum	[]
Output data type	int8
Lock output data type setting against changes by the fixed-point tools	off
Sample time	inf
Frame period	inf

"In1" (Inport)

Table 3.50. "In1" Parameters

Parameter	Value
Port number	1
Port dimensions (-1 for inherited)	-1
Sample time (-1 for inherited)	-1
Minimum	[]
Maximum	[]
Data type	Inherit: auto

"Out1" (Outport)

Table 3.51. "Out1" Parameters

Parameter	Value
Port number	1
Icon display	Port number
Output function call	off
Minimum	[]

Parameter	Value
Maximum	[]
Data type	Inherit: auto
Lock output data type setting against changes by the fixed-point tools	off
Output as nonvirtual bus in parent model	off
Bus virtuality	inherit
Data mode	inherit
Unit (e.g., m, m/s^2, N*m)	inherit
Port dimensions (-1 for inherited)	-1
Variable-size signal	Inherit
Sample time (-1 for inherited)	-1
Ensure outport is virtual	off
Source of initial output value	Dialog
Output when disabled	held
Initial output	[]
MustResolveToSignalObject	off
Specify output when source is unconnected	off
Constant value	0
Interpret vector parameters as 1-D	on

"Relational Operator1" (RelationalOperator)

Table 3.52. "Relational Operator1" Parameters

Parameter	Value
Relational operator	<
Require all inputs to have the same data type	off
Output data type	boolean
Enable zero-crossing detection	on
Sample time (-1 for inherited)	-1
Integer rounding mode	Simplest

"String Concatenate" (StringConcatenate)

Table 3.53. "String Concatenate" Parameters

Parameter	Value
Number of inputs	2

Parameter	Value
Output data type	string

"String Constant1" (StringConstant)

Table 3.54. "String Constant1" Parameters

Parameter	Value
String	"0"
Output data type	string

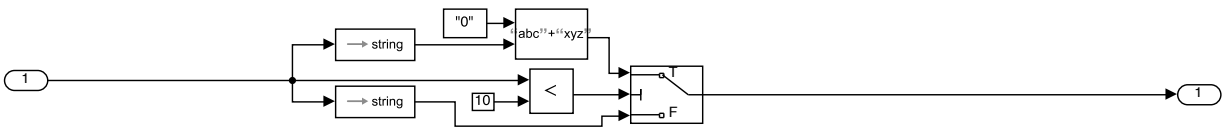
"Switch1" (Switch)

Table 3.55. "Switch1" Parameters

Parameter	Value
Criteria for passing first input	u2 > Threshold
Threshold	0
Require all data port inputs to have the same data type	off
Output minimum	[]
Output maximum	[]
Output data type	Inherit: Inherit via internal rule
Lock output data type setting against changes by the fixed-point tools	off
Integer rounding mode	Floor
Saturate on integer overflow	off
Enable zero-crossing detection	on
Sample time (-1 for inherited)	-1
Allow different data input sizes (Results in variable-size output signal)	off

make sure months string is two numbers

Figure 3.6. ICE_Dashboard_2021b/Post Processing Subsystem/FILE I//O Subsystem/Subsystem/make sure months string is two numbers



Blocks

Parameters

"Constant3" (Constant)

Table 3.56. "Constant3" Parameters

Parameter	Value
Constant value	10
Interpret vector parameters as 1-D	off
Output minimum	[]
Output maximum	[]
Output data type	int8
Lock output data type setting against changes by the fixed-point tools	off
Sample time	inf
Frame period	inf

"In1" (Inport)

Table 3.57. "In1" Parameters

Parameter	Value
Port number	1
Port dimensions (-1 for inherited)	-1
Sample time (-1 for inherited)	-1
Minimum	[]
Maximum	[]
Data type	Inherit: auto

"Out1" (Outport)

Table 3.58. "Out1" Parameters

Parameter	Value
Port number	1
Icon display	Port number
Output function call	off
Minimum	[]

Parameter	Value
Maximum	[]
Data type	Inherit: auto
Lock output data type setting against changes by the fixed-point tools	off
Output as nonvirtual bus in parent model	off
Bus virtuality	inherit
Data mode	inherit
Unit (e.g., m, m/s^2, N*m)	inherit
Port dimensions (-1 for inherited)	-1
Variable-size signal	Inherit
Sample time (-1 for inherited)	-1
Ensure outport is virtual	off
Source of initial output value	Dialog
Output when disabled	held
Initial output	[]
MustResolveToSignalObject	off
Specify output when source is unconnected	off
Constant value	0
Interpret vector parameters as 1-D	on

"Relational Operator1" (RelationalOperator)

Table 3.59. "Relational Operator1" Parameters

Parameter	Value
Relational operator	<
Require all inputs to have the same data type	off
Output data type	boolean
Enable zero-crossing detection	on
Sample time (-1 for inherited)	-1
Integer rounding mode	Simplest

"String Concatenate" (StringConcatenate)

Table 3.60. "String Concatenate" Parameters

Parameter	Value
Number of inputs	2

Parameter	Value
Output data type	string

"String Constant1" (StringConstant)

Table 3.61. "String Constant1" Parameters

Parameter	Value
String	"0"
Output data type	string

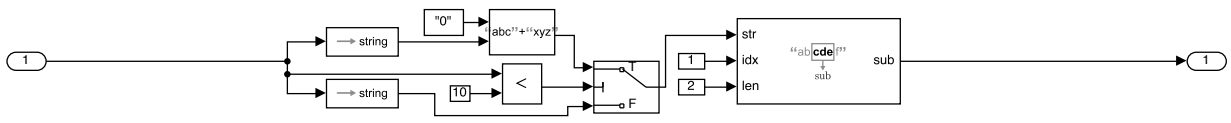
"Switch1" (Switch)

Table 3.62. "Switch1" Parameters

Parameter	Value
Criteria for passing first input	u2 > Threshold
Threshold	0
Require all data port inputs to have the same data type	off
Output minimum	[]
Output maximum	[]
Output data type	Inherit: Inherit via internal rule
Lock output data type setting against changes by the fixed-point tools	off
Integer rounding mode	Floor
Saturate on integer overflow	off
Enable zero-crossing detection	on
Sample time (-1 for inherited)	-1
Allow different data input sizes (Results in variable-size output signal)	off

make sure seconds string is two numbers

Figure 3.7. ICE_Dashboard_2021b/Post Processing Subsystem/FILE I//O Subsystem/Subsystem/make sure seconds string is two numbers



Blocks

Parameters

"Constant3" (Constant)

Table 3.63. "Constant3" Parameters

Parameter	Value
Constant value	10
Interpret vector parameters as 1-D	off
Output minimum	[]
Output maximum	[]
Output data type	int8
Lock output data type setting against changes by the fixed-point tools	off
Sample time	inf
Frame period	inf

"Constant4" (Constant)

Table 3.64. "Constant4" Parameters

Parameter	Value
Constant value	1
Interpret vector parameters as 1-D	off
Output minimum	[]
Output maximum	[]
Output data type	int8
Lock output data type setting against changes by the fixed-point tools	off
Sample time	inf
Frame period	inf

"Constant5" (Constant)

Table 3.65. "Constant5" Parameters

Parameter	Value
Constant value	2
Interpret vector parameters as 1-D	off

Parameter	Value
Output minimum	[]
Output maximum	[]
Output data type	uint8
Lock output data type setting against changes by the fixed-point tools	off
Sample time	inf
Frame period	inf

"In1" (Inport)

Table 3.66. "In1" Parameters

Parameter	Value
Port number	1
Port dimensions (-1 for inherited)	-1
Sample time (-1 for inherited)	-1
Minimum	[]
Maximum	[]
Data type	Inherit: auto

"Out1" (Outport)

Table 3.67. "Out1" Parameters

Parameter	Value
Port number	1
Icon display	Port number
Output function call	off
Minimum	[]
Maximum	[]
Data type	Inherit: auto
Lock output data type setting against changes by the fixed-point tools	off
Output as nonvirtual bus in parent model	off
Bus virtuality	inherit
Data mode	inherit
Unit (e.g., m, m/s^2, N*m)	inherit
Port dimensions (-1 for inherited)	-1
Variable-size signal	Inherit

Parameter	Value
Sample time (-1 for inherited)	-1
Ensure outport is virtual	off
Source of initial output value	Dialog
Output when disabled	held
Initial output	[]
MustResolveToSignalObject	off
Specify output when source is unconnected	off
Constant value	0
Interpret vector parameters as 1-D	on

"Relational Operator1" (RelationalOperator)

Table 3.68. "Relational Operator1" Parameters

Parameter	Value
Relational operator	<
Require all inputs to have the same data type	off
Output data type	boolean
Enable zero-crossing detection	on
Sample time (-1 for inherited)	-1
Integer rounding mode	Simplest

"String Concatenate" (StringConcatenate)

Table 3.69. "String Concatenate" Parameters

Parameter	Value
Number of inputs	2
Output data type	string

"String Constant1" (StringConstant)

Table 3.70. "String Constant1" Parameters

Parameter	Value
String	"0"
Output data type	string

"Substring1" (Substring)

Table 3.71. "Substring1" Parameters

Parameter	Value
Inherit maximum length from input	on
Output data type	string
Output string from 'idx' to end	off

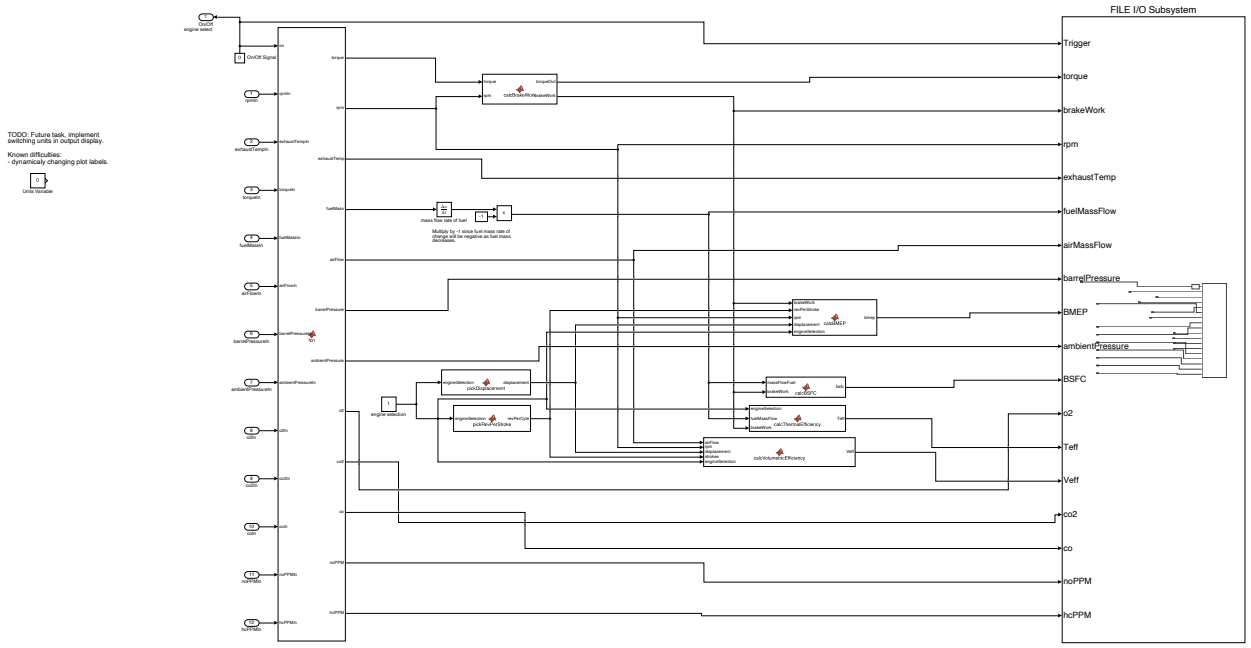
"Switch1" (Switch)

Table 3.72. "Switch1" Parameters

Parameter	Value
Criteria for passing first input	u2 > Threshold
Threshold	0
Require all data port inputs to have the same data type	off
Output minimum	[]
Output maximum	[]
Output data type	Inherit: Inherit via intern al rule
Lock output data type setting against changes by the fixed-point tools	off
Integer rounding mode	Floor
Saturate on integer overflow	off
Enable zero-crossing detection	on
Sample time (-1 for inherited)	-1
Allow different data input sizes (Results in variable-size output signal)	off

Post Processing Subsystem

Figure 3.8. ICE_Dashboard_2021b/Post Processing Subsystem



Blocks

Parameters

"airFlowIn" (Inport)

Table 3.73. "airFlowIn" Parameters

Parameter	Value
Port number	5
Port dimensions (-1 for inherited)	-1
Sample time (-1 for inherited)	-1
Minimum	[]
Maximum	[]
Data type	Inherit: auto

"ambientPressureIn" (Inport)

Table 3.74. "ambientPressureIn" Parameters

Parameter	Value
Port number	7
Port dimensions (-1 for inherited)	-1
Sample time (-1 for inherited)	-1
Minimum	[]
Maximum	[]
Data type	Inherit: auto

"barrelPressureIn" (Inport)

Table 3.75. "barrelPressureIn" Parameters

Parameter	Value
Port number	6
Port dimensions (-1 for inherited)	-1
Sample time (-1 for inherited)	-1
Minimum	[]
Maximum	[]
Data type	Inherit: auto

"Brake Work" (MATLAB Function)

Table 3.76. Brake Work Function Properties

Property	Value
Update Method	INHERITED
Sample Time	-1
Support variable-size arrays	1
Saturate on integer overflow	1
Treat these inherited Simulink signal types as fi objects	Fixed-point
MATLAB Function block fimath	Same as MATLAB Default

Property	Value
Input fi math	fimath(...)
Description	

Table 3.77. Brake Work Argument Summary

Name	Scope	Port	Data Type	Size
torque	Input	1	double	1
torqueOut	Output	1	double	1
rpm	Input	2	double	1
brakeWork	Output	2	double	1

Brake Work Function Script

```
% Calculate Brake Work (kW/s) based on Engine Speed (rpm) and Torque (Nm)
function [torqueOut,brakeWork] = calcBrakeWork(torque,rpm)
brakeWork = 2 * pi * (rpm/60.0) * torque;

% Using diff name to reduce confusions. Torque only used in this function
% so to clean up lines was brought into this function.
torqueOut = torque;
```

"co2In" (Inport)

Table 3.78. "co2In" Parameters

Parameter	Value
Port number	9
Port dimensions (-1 for inherited)	-1
Sample time (-1 for inherited)	-1
Minimum	[]
Maximum	[]
Data type	Inherit: auto

"coIn" (Inport)

Table 3.79. "coIn" Parameters

Parameter	Value
Port number	10

Parameter	Value
Port dimensions (-1 for inherited)	-1
Sample time (-1 for inherited)	-1
Minimum	[]
Maximum	[]
Data type	Inherit: auto

"Constant2" (Constant)

Table 3.80. "Constant2" Parameters

Parameter	Value
Constant value	-1
Interpret vector parameters as 1-D	on
Output minimum	[]
Output maximum	[]
Output data type	Inherit: Inherit from 'Constant value'
Lock output data type setting against changes by the fixed-point tools	off
Sample time	inf
Frame period	inf

"engine selection" (Constant)

Table 3.81. "engine selection" Parameters

Parameter	Value
Constant value	1
Interpret vector parameters as 1-D	on
Output minimum	[]
Output maximum	[]
Output data type	Inherit: Inherit from 'Constant value'
Lock output data type setting against changes by the fixed-point tools	off
Sample time	inf
Frame period	inf

"exhaustTempIn" (Inport)

Table 3.82. "exhaustTempIn" Parameters

Parameter	Value
Port number	2
Port dimensions (-1 for inherited)	-1
Sample time (-1 for inherited)	-1
Minimum	[]
Maximum	[]
Data type	Inherit: auto

"fuelMassIn" (Inport)

Table 3.83. "fuelMassIn" Parameters

Parameter	Value
Port number	4
Port dimensions (-1 for inherited)	-1
Sample time (-1 for inherited)	-1
Minimum	[]
Maximum	[]
Data type	Inherit: auto

"hcPPMIn" (Inport)

Table 3.84. "hcPPMIn" Parameters

Parameter	Value
Port number	12
Port dimensions (-1 for inherited)	-1
Sample time (-1 for inherited)	-1
Minimum	[]
Maximum	[]
Data type	Inherit: auto

"mass flow rate of fuel" (Derivative)

Table 3.85. "mass flow rate of fuel" Parameters

Parameter	Value
Coefficient c in the transfer function approximation s/(c*s + 1) used for linearization	inf

"MATLAB Function" (MATLAB Function)

Table 3.86. MATLAB Function Function Properties

Property	Value
Update Method	INHERITED
Sample Time	-1
Support variable-size arrays	1
Saturate on integer overflow	1
Treat these inherited Simulink signal types as fi objects	Fixed-point
MATLAB Function block fimath	Same as MATLAB Default
Input fi math	fimath(...)
Description	

Table 3.87. MATLAB Function Argument Summary

Name	Scope	Port	Data Type	Size
displacement	Output	1	double	1
engineSelection	Input	1	double	1

MATLAB Function Function Script

```
% Set engine displacement (m^3) based on dropdown menu choice from dashboard
function displacement = pickDisplacement(engineSelection)
data = [0.000296 0.000196 0.000475 000.0004667 0.000429 0.000225];

displacement = data(1,engineSelection);
```

"MATLAB Function1" (MATLAB Function)

Table 3.88. MATLAB Function1 Function Properties

Property	Value
Update Method	INHERITED
Sample Time	-1
Support variable-size arrays	1
Saturate on integer overflow	1
Treat these inherited Simulink signal types as fi objects	Fixed-point
MATLAB Function block fimath	Same as MATLAB Default
Input fi math	fimath(...)
Description	

Table 3.89. MATLAB Function1 Argument Summary

Name	Scope	Port	Data Type	Size
brakeWork	Input	1	double	1
bmep	Output	1	double	1
revPerStroke	Input	2	double	1
rpm	Input	3	double	1
displacement	Input	4	double	1
engineSelection	Input	5	double	1

MATLAB Function1 Function Script

```
% Calculate Brake Mean Effective Pressure (kPa).
function bmep = calcBMEP(brakeWork, revPerStroke, rpm,  displacement, engine-
Selection)
if(engineSelection == 1 || engineSelection == 2 || engineSelection == 5 ||
engineSelection ==6)
    bmep = ((brakeWork/((rpm/60)/revPerStroke))/displacement)/1000;
elseif(engineSelection==3)
     bmep = ((brakeWork/((rpm/60)/revPerStroke))/(displacement*4))/1000;
else
     bmep = ((brakeWork/((rpm/60)/revPerStroke))/(displacement*6))/1000;
end
```

"MATLAB Function2" (MATLAB Function)

Table 3.90. MATLAB Function2 Function Properties

Property	Value
Update Method	INHERITED
Sample Time	-1
Support variable-size arrays	1
Saturate on integer overflow	1
Treat these inherited Simulink signal types as fi objects	Fixed-point
MATLAB Function block fimath	Same as MATLAB Default
Input fi math	fimath(...)
Description	

Table 3.91. MATLAB Function2 Argument Summary

Name	Scope	Port	Data Type	Size
revPerCyle	Output	1	double	1
engineSelection	Input	1	double	1

MATLAB Function2 Function Script

```
% Set revolutions per cycle ( 1 for 2-stroke, 2 for 4-stroke ) based on
% engine selection from drop down menu on dashboard.
function revPerCyle = pickRevPerStroke(engineSelection)
data = [4 4 4 4 4 4];
revPerCyle = data(1,engineSelection);
```

"MATLAB Function5" (MATLAB Function)

Table 3.92. MATLAB Function5 Function Properties

Property	Value
Update Method	INHERITED
Sample Time	-1
Support variable-size arrays	1

Property	Value
Saturate on integer overflow	1
Treat these inherited Simulink signal types as fi objects	Fixed-point
MATLAB Function block fimath	Same as MATLAB Default
Input fi math	fimath(...)
Description	

Table 3.93. MATLAB Function5 Argument Summary

Name	Scope	Port	Data Type	Size
Teff	Output	1	double	1
engineSelection	Input	1	double	1
fuelMassFlow	Input	2	double	1
brakeWork	Input	3	double	1

MATLAB Function5 Function Script

```
function Teff = calcThermalEfficiency(engineSelection, fuelMassFlow, brake-
Work)

% Set lower heating value of fuel (J/kg) based on engine selection.
lowerHeatingValues = [47.3e6 44.4e6];
Qlhv = 0;
if(engineSelection == 3)
    Qlhv = fuelMassFlow * lowerHeatingValues(1, 2);
else
    Qlhv = fuelMassFlow * lowerHeatingValues(1,1);
end

Teff = (brakeWork/Qlhv) * 100;
```

"MATLAB Function6" (MATLAB Function)

Table 3.94. MATLAB Function6 Function Properties

Property	Value
Update Method	INHERITED
Sample Time	-1

Property	Value
Support variable-size arrays	1
Saturate on integer overflow	1
Treat these inherited Simulink signal types as fi objects	Fixed-point
MATLAB Function block fimath	Same as MATLAB Default
Input fi math	fimath(...)
Description	

Table 3.95. MATLAB Function6 Argument Summary

Name	Scope	Port	Data Type	Size
airFlow	Input	1	double	1
Veff	Output	1	double	1
rpm	Input	2	double	1
displacement	Input	3	double	1
strokes	Input	4	double	1
engineSelection	Input	5	double	1

MATLAB Function6 Function Script

```
% Calculate Volumetric Efficiency
function Veff = calcVolumetricEfficiency(airFlow, rpm, displacement,
strokes, engineSelection)
if(engineSelection == 1 || engineSelection == 2 || engineSelection == 5 ||
engineSelection == 6)
    Veff = ((strokes * airFlow) / (1.205 * displacement * (rpm / 60)));
elseif (engineSelection == 3)
    Veff = ((strokes * airFlow) / (1.205 * (displacement * 4) * (rpm / 60)));
else
    Veff = ((strokes * airFlow) / (1.205 * (displacement * 6) * (rpm / 60)));
end
```

"MATLAB Function8" (MATLAB Function)

Table 3.96. MATLAB Function8 Function Properties

Property	Value
Update Method	INHERITED

Property	Value
Sample Time	-1
Support variable-size arrays	1
Saturate on integer overflow	1
Treat these inherited Simulink signal types as fi objects	Fixed-point
MATLAB Function block fimath	Same as MATLAB Default
Input fi math	fimath(...)
Description	

Table 3.97. MATLAB Function8 Argument Summary

Name	Scope	Port	Data Type	Size
massFlowFuel	Input	1	double	1
bsfc	Output	1	double	1
brakeWork	Input	2	double	1

MATLAB Function8 Function Script

```
% calculate BSFC based on fuel mass flow rate (kg/s) and Brake Work (Nm).
function bsfc = calcBSFC(massFlowFuel,brakeWork)

bsfc = massFlowFuel./brakeWork;
```

"MATLAB Function9" (MATLAB Function)

Table 3.98. MATLAB Function9 Function Properties

Property	Value
Update Method	INHERITED
Sample Time	-1
Support variable-size arrays	1
Saturate on integer overflow	1
Treat these inherited Simulink signal types as fi objects	Fixed-point

Property	Value
MATLAB Function block fimath	Same as MATLAB Default
Input fi math	fimath(...)
Description	

Table 3.99. MATLAB Function9 Argument Summary

Name	Scope	Port	Data Type	Size
torque	Output	1	double	1
rpm	Output	2	double	1
exhaustTemp	Output	3	double	1
fuelMass	Output	4	double	1
airFlow	Output	5	double	1
barrelPressure	Output	6	double	1
ambientPressure	Output	7	double	1
on	Input	1	double	1
o2	Output	8	double	1
co2	Output	9	double	1
co	Output	10	double	1
noPPM	Output	11	double	1
hcPPM	Output	12	double	1
rpmIn	Input	2	double	1
exhaustTempIn	Input	3	double	1
torqueIn	Input	4	double	1
fuelMassIn	Input	5	double	1
airFlowIn	Input	6	double	1
barrelPressureIn	Input	7	double	1
ambientPressureIn	Input	8	double	1
o2In	Input	9	double	1
co2In	Input	10	double	1
coIn	Input	11	double	1
noPPMIn	Input	12	double	1
hcPPMIn	Input	13	double	1

MATLAB Function9 Function Script

```
% function to take input of
%
% returns:
%
%   rpm: engine     speed rev per minute
%   exhaustTemp:    exhaust temperature in celsius
%   torque:         torque in Newton-meters
%   torqueMeasured: boolean - true if torque is measured, false if not
%   volts:          voltage
%   amps:           current
%   fuelMass:       mass of fuel container at current time.
%

function [ torque,rpm,exhaustTemp,fuelMass,airFlow,barrelPressure,ambient-
Pressure,...
    o2,co2,co,noPPM,hcPPM ] = fcn(on,rpmIn,exhaustTempIn,torqueIn,fuelMas-
sIn,...
    airFlowIn,barrelPressureIn,ambientPressureIn,o2In,co2In,coIn,noPP-
MIn,hcPPMIn)
if(on == 1)
    rpm = rpmIn;
    exhaustTemp = exhaustTempIn;
    torque = torqueIn;
    fuelMass = fuelMassIn;
    airFlow = airFlowIn;
    barrelPressure = barrelPressureIn;
    ambientPressure = ambientPressureIn;
    o2 = o2In;
    co2 = co2In;
    co = coIn;
    noPPM = noPPMIn;
    hcPPM = hcPPMIn;
else
    rpm = 0;
    exhaustTemp = 0;
    torque = 0;
    fuelMass = 0;
    airFlow = 0;
    barrelPressure = 0;
    ambientPressure = 0;
    o2 = 0;
    co2 = 0;
    co = 0;
    noPPM = 0;
    hcPPM = 0;
end
```

"noPPMIn" (Inport)

Table 3.100. "noPPMIn" Parameters

Parameter	Value
Port number	11
Port dimensions (-1 for inherited)	-1
Sample time (-1 for inherited)	-1
Minimum	[]
Maximum	[]
Data type	Inherit: auto

"o2In" (Inport)

Table 3.101. "o2In" Parameters

Parameter	Value
Port number	8
Port dimensions (-1 for inherited)	-1
Sample time (-1 for inherited)	-1
Minimum	[]
Maximum	[]
Data type	Inherit: auto

"On/Off" (Outport)

Table 3.102. "On/Off" Parameters

Parameter	Value
Port number	1
Icon display	Port number
Output function call	off
Minimum	[]
Maximum	[]
Data type	Inherit: auto
Lock output data type setting against changes by the fixed-point tools	off
Output as nonvirtual bus in parent model	off
Bus virtuality	inherit
Data mode	inherit

Parameter	Value
Unit (e.g., m, m/s^2, N*m)	inherit
Port dimensions (-1 for inherited)	-1
Variable-size signal	Inherit
Sample time (-1 for inherited)	-1
Ensure outport is virtual	off
Source of initial output value	Dialog
Output when disabled	held
Initial output	[]
MustResolveToSignalObject	off
Specify output when source is unconnected	off
Constant value	0
Interpret vector parameters as 1-D	on

"On/Off Signal" (Constant)

Table 3.103. "On/Off Signal" Parameters

Parameter	Value
Constant value	0
Interpret vector parameters as 1-D	on
Output minimum	[]
Output maximum	[]
Output data type	Inherit: Inherit from 'Constant value'
Lock output data type setting against changes by the fixed-point tools	off
Sample time	inf
Frame period	inf

"Product1" (Product)

Table 3.104. "Product1" Parameters

Parameter	Value
Number of inputs	2
Multiplication	Element-wise(.*)
Multiply over	All dimensions
Dimension	1

Parameter	Value
Require all inputs to have the same data type	off
Output minimum	[]
Output maximum	[]
Output data type	Inherit: Inherit via internal rule
Lock output data type setting against changes by the fixed-point tools	off
Integer rounding mode	Floor
Saturate on integer overflow	off
Sample time (-1 for inherited)	-1

"rpmIn" (Inport)

Table 3.105. "rpmIn" Parameters

Parameter	Value
Port number	1
Port dimensions (-1 for inherited)	-1
Sample time (-1 for inherited)	-1
Minimum	[]
Maximum	[]
Data type	Inherit: auto

"torqueIn" (Inport)

Table 3.106. "torqueIn" Parameters

Parameter	Value
Port number	3
Port dimensions (-1 for inherited)	-1
Sample time (-1 for inherited)	-1
Minimum	[]
Maximum	[]
Data type	Inherit: auto

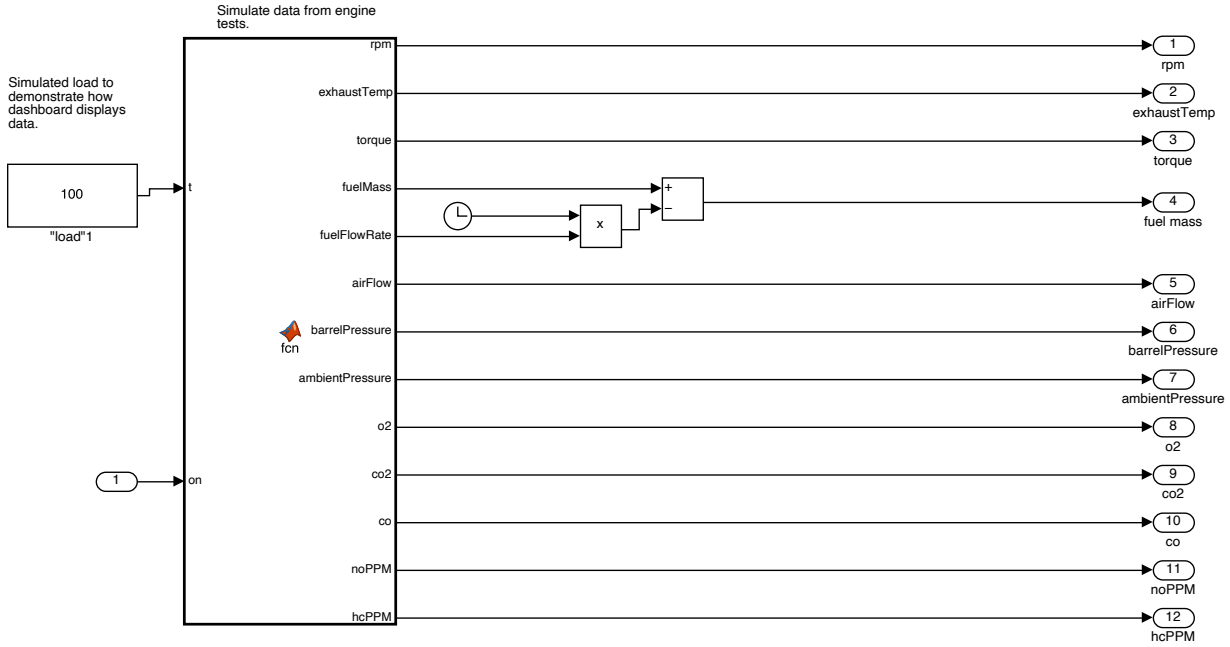
"Units Variable" (Constant)

Table 3.107. "Units Variable" Parameters

Parameter	Value
Constant value	0
Interpret vector parameters as 1-D	on
Output minimum	[]
Output maximum	[]
Output data type	Inherit: Inherit from 'Constant value'
Lock output data type setting against changes by the fixed-point tools	off
Sample time	inf
Frame period	inf

Subsystem

Figure 3.9. ICE_Dashboard_2021b/Data Input Subsystem/Subsystem



Blocks

Parameters

""load"1" (Constant)

Table 3.108. ""load"1" Parameters

Parameter	Value
Constant value	100
Interpret vector parameters as 1-D	on
Output minimum	[]
Output maximum	[]
Output data type	Inherit: Inherit from 'Constant value'
Lock output data type setting against changes by the fixed-point tools	off
Sample time	inf
Frame period	inf

"airFlow" (Outport)

Table 3.109. "airFlow" Parameters

Parameter	Value
Port number	5
Icon display	Port number
Output function call	off
Minimum	[]
Maximum	[]
Data type	Inherit: auto
Lock output data type setting against changes by the fixed-point tools	off
Output as nonvirtual bus in parent model	off
Bus virtuality	inherit
Data mode	inherit
Unit (e.g., m, m/s^2, N*m)	inherit
Port dimensions (-1 for inherited)	-1
Variable-size signal	Inherit
Sample time (-1 for inherited)	-1
Ensure outport is virtual	off
Source of initial output value	Dialog
Output when disabled	held
Initial output	[]

Parameter	Value
MustResolveToSignalObject	off
Specify output when source is unconnected	off
Constant value	0
Interpret vector parameters as 1-D	on

"ambientPressure" (Outport)

Table 3.110. "ambientPressure" Parameters

Parameter	Value
Port number	7
Icon display	Port number
Output function call	off
Minimum	[]
Maximum	[]
Data type	Inherit: auto
Lock output data type setting against changes by the fixed-point tools	off
Output as nonvirtual bus in parent model	off
Bus virtuality	inherit
Data mode	inherit
Unit (e.g., m, m/s^2, N*m)	inherit
Port dimensions (-1 for inherited)	-1
Variable-size signal	Inherit
Sample time (-1 for inherited)	-1
Ensure outport is virtual	off
Source of initial output value	Dialog
Output when disabled	held
Initial output	[]
MustResolveToSignalObject	off
Specify output when source is unconnected	off
Constant value	0
Interpret vector parameters as 1-D	on

"barrelPressure" (Outport)

Table 3.111. "barrelPressure" Parameters

Parameter	Value
Port number	6
Icon display	Port number
Output function call	off
Minimum	[]
Maximum	[]
Data type	Inherit: auto
Lock output data type setting against changes by the fixed-point tools	off
Output as nonvirtual bus in parent model	off
Bus virtuality	inherit
Data mode	inherit
Unit (e.g., m, m/s^2, N*m)	inherit
Port dimensions (-1 for inherited)	-1
Variable-size signal	Inherit
Sample time (-1 for inherited)	-1
Ensure outport is virtual	off
Source of initial output value	Dialog
Output when disabled	held
Initial output	[]
MustResolveToSignalObject	off
Specify output when source is unconnected	off
Constant value	0
Interpret vector parameters as 1-D	on

"Clock1" (Clock)

Table 3.112. "Clock1" Parameters

Parameter	Value
Display time	off
Decimation	10

"co" (Outport)

Table 3.113. "co" Parameters

Parameter	Value
Port number	10
Icon display	Port number
Output function call	off
Minimum	[]
Maximum	[]
Data type	Inherit: auto
Lock output data type setting against changes by the fixed-point tools	off
Output as nonvirtual bus in parent model	off
Bus virtuality	inherit
Data mode	inherit
Unit (e.g., m, m/s^2, N*m)	inherit
Port dimensions (-1 for inherited)	-1
Variable-size signal	Inherit
Sample time (-1 for inherited)	-1
Ensure outport is virtual	off
Source of initial output value	Dialog
Output when disabled	held
Initial output	[]
MustResolveToSignalObject	off
Specify output when source is unconnected	off
Constant value	0
Interpret vector parameters as 1-D	on

"co2" (Outport)

Table 3.114. "co2" Parameters

Parameter	Value
Port number	9
Icon display	Port number
Output function call	off
Minimum	[]
Maximum	[]

Parameter	Value
Data type	Inherit: auto
Lock output data type setting against changes by the fixed-point tools	off
Output as nonvirtual bus in parent model	off
Bus virtuality	inherit
Data mode	inherit
Unit (e.g., m, m/s^2, N*m)	inherit
Port dimensions (-1 for inherited)	-1
Variable-size signal	Inherit
Sample time (-1 for inherited)	-1
Ensure outport is virtual	off
Source of initial output value	Dialog
Output when disabled	held
Initial output	[]
MustResolveToSignalObject	off
Specify output when source is unconnected	off
Constant value	0
Interpret vector parameters as 1-D	on

"exhaustTemp" (Outport)

Table 3.115. "exhaustTemp" Parameters

Parameter	Value
Port number	2
Icon display	Port number
Output function call	off
Minimum	[]
Maximum	[]
Data type	Inherit: auto
Lock output data type setting against changes by the fixed-point tools	off
Output as nonvirtual bus in parent model	off
Bus virtuality	inherit
Data mode	inherit
Unit (e.g., m, m/s^2, N*m)	inherit
Port dimensions (-1 for inherited)	-1
Variable-size signal	Inherit

Parameter	Value
Sample time (-1 for inherited)	-1
Ensure outport is virtual	off
Source of initial output value	Dialog
Output when disabled	held
Initial output	[]
MustResolveToSignalObject	off
Specify output when source is unconnected	off
Constant value	0
Interpret vector parameters as 1-D	on

"fuel mass" (Outport)

Table 3.116. "fuel mass" Parameters

Parameter	Value
Port number	4
Icon display	Port number
Output function call	off
Minimum	[]
Maximum	[]
Data type	Inherit: auto
Lock output data type setting against changes by the fixed-point tools	off
Output as nonvirtual bus in parent model	off
Bus virtuality	inherit
Data mode	inherit
Unit (e.g., m, m/s^2, N*m)	inherit
Port dimensions (-1 for inherited)	-1
Variable-size signal	Inherit
Sample time (-1 for inherited)	-1
Ensure outport is virtual	off
Source of initial output value	Dialog
Output when disabled	held
Initial output	[]
MustResolveToSignalObject	off
Specify output when source is unconnected	off
Constant value	0

Parameter	Value
Interpret vector parameters as 1-D	on

"hcPPM" (Outport)

Table 3.117. "hcPPM" Parameters

Parameter	Value
Port number	12
Icon display	Port number
Output function call	off
Minimum	[]
Maximum	[]
Data type	Inherit: auto
Lock output data type setting against changes by the fixed-point tools	off
Output as nonvirtual bus in parent model	off
Bus virtuality	inherit
Data mode	inherit
Unit (e.g., m, m/s^2, N*m)	inherit
Port dimensions (-1 for inherited)	-1
Variable-size signal	Inherit
Sample time (-1 for inherited)	-1
Ensure outport is virtual	off
Source of initial output value	Dialog
Output when disabled	held
Initial output	[]
MustResolveToSignalObject	off
Specify output when source is unconnected	off
Constant value	0
Interpret vector parameters as 1-D	on

"In1" (Inport)

Table 3.118. "In1" Parameters

Parameter	Value
Port number	1
Port dimensions (-1 for inherited)	-1

Parameter	Value
Sample time (-1 for inherited)	-1
Minimum	[]
Maximum	[]
Data type	Inherit: auto

"MATLAB Function" (MATLAB Function)

Table 3.119. MATLAB Function Function Properties

Property	Value
Update Method	INHERITED
Sample Time	-1
Support variable-size arrays	1
Saturate on integer overflow	1
Treat these inherited Simulink signal types as fi objects	Fixed-point
MATLAB Function block fimath	Same as MATLAB Default
Input fi math	fimath(...)
Description	

Table 3.120. MATLAB Function Argument Summary

Name	Scope	Port	Data Type	Size
t	Input	1	double	1
rpm	Output	1	double	1
on	Input	2	double	1
exhaustTemp	Output	2	double	1
torque	Output	3	double	1
fuelMass	Output	4	double	1
fuelFlowRate	Output	5	double	1
airFlow	Output	6	double	1
barrelPressure	Output	7	double	1
ambientPressure	Output	8	double	1
o2	Output	9	double	1

Name	Scope	Port	Data Type	Size
co2	Output	10	double	1
co	Output	11	double	1
noPPM	Output	12	double	1
hcPPM	Output	13	double	1

MATLAB Function Function Script

```
function [ rpm,exhaustTemp,torque,fuelMass,fuelFlowRate,airFlow,barrelPres-
sure,ambientPressure,...
    o2,co2,co,noPPM,hcPPM ] = fcn(t,on)
if (on)
    data = (1 + t / 100.0) * [ 2000 125 2.258 2000.0 0.004 0.94 3.4 16.5
0.003 35 59 0.004 ];
    rpm = data(1);
    exhaustTemp = data(2);
    torque = data(3);
    fuelMass = data(4);
    airFlow = data(5);
    barrelPressure = data(6);
    ambientPressure = 29;
    o2 = data(7);
    co2 = data(8);
    co = data(9);
    noPPM = data(10);
    hcPPM = data(11);
    fuelFlowRate = data(12);
else
    rpm = 0;
    exhaustTemp = 0;
    torque = 0;
    fuelMass = 0;
    airFlow = 0;
    barrelPressure = 0;
    ambientPressure = 0;
    o2 = 0;
    co2 = 0;
    co = 0;
    noPPM = 0;
    hcPPM = 0;
    fuelFlowRate = 0;
end
```

Table 3.121. MATLAB Function Supporting Functions

Function	Defined By	Path
isnan	MATLAB	

"noPPM" (Outport)

Table 3.122. "noPPM" Parameters

Parameter	Value
Port number	11
Icon display	Port number
Output function call	off
Minimum	[]
Maximum	[]
Data type	Inherit: auto
Lock output data type setting against changes by the fixed-point tools	off
Output as nonvirtual bus in parent model	off
Bus virtuality	inherit
Data mode	inherit
Unit (e.g., m, m/s^2, N*m)	inherit
Port dimensions (-1 for inherited)	-1
Variable-size signal	Inherit
Sample time (-1 for inherited)	-1
Ensure outport is virtual	off
Source of initial output value	Dialog
Output when disabled	held
Initial output	[]
MustResolveToSignalObject	off
Specify output when source is unconnected	off
Constant value	0
Interpret vector parameters as 1-D	on

"o2" (Outport)

Table 3.123. "o2" Parameters

Parameter	Value
Port number	8
Icon display	Port number
Output function call	off
Minimum	[]
Maximum	[]

Parameter	Value
Data type	Inherit: auto
Lock output data type setting against changes by the fixed-point tools	off
Output as nonvirtual bus in parent model	off
Bus virtuality	inherit
Data mode	inherit
Unit (e.g., m, m/s^2, N*m)	inherit
Port dimensions (-1 for inherited)	-1
Variable-size signal	Inherit
Sample time (-1 for inherited)	-1
Ensure outport is virtual	off
Source of initial output value	Dialog
Output when disabled	held
Initial output	[]
MustResolveToSignalObject	off
Specify output when source is unconnected	off
Constant value	0
Interpret vector parameters as 1-D	on

"Product1" (Product)

Table 3.124. "Product1" Parameters

Parameter	Value
Number of inputs	2
Multiplication	Element-wise(.*)
Multiply over	All dimensions
Dimension	1
Require all inputs to have the same data type	off
Output minimum	[]
Output maximum	[]
Output data type	Inherit: Inherit via internal rule
Lock output data type setting against changes by the fixed-point tools	off
Integer rounding mode	Floor
Saturate on integer overflow	off
Sample time (-1 for inherited)	-1

"rpm" (Outport)

Table 3.125. "rpm" Parameters

Parameter	Value
Port number	1
Icon display	Port number
Output function call	off
Minimum	[]
Maximum	[]
Data type	Inherit: auto
Lock output data type setting against changes by the fixed-point tools	off
Output as nonvirtual bus in parent model	off
Bus virtuality	inherit
Data mode	inherit
Unit (e.g., m, m/s^2, N*m)	inherit
Port dimensions (-1 for inherited)	-1
Variable-size signal	Inherit
Sample time (-1 for inherited)	-1
Ensure outport is virtual	off
Source of initial output value	Dialog
Output when disabled	held
Initial output	[]
MustResolveToSignalObject	off
Specify output when source is unconnected	off
Constant value	0
Interpret vector parameters as 1-D	on

"Subtract1" (Sum)

Table 3.126. "Subtract1" Parameters

Parameter	Value
Icon shape	rectangular
List of signs	+-
Sum over	All dimensions
Dimension	1
Require all inputs to have the same data type	off

Parameter	Value
Accumulator data type	Inherit: Inherit via internal rule
Output minimum	[]
Output maximum	[]
Output data type	Inherit: Inherit via internal rule
Lock data type settings against changes by the fixed-point tools	off
Integer rounding mode	Floor
Saturate on integer overflow	off
Sample time (-1 for inherited)	-1

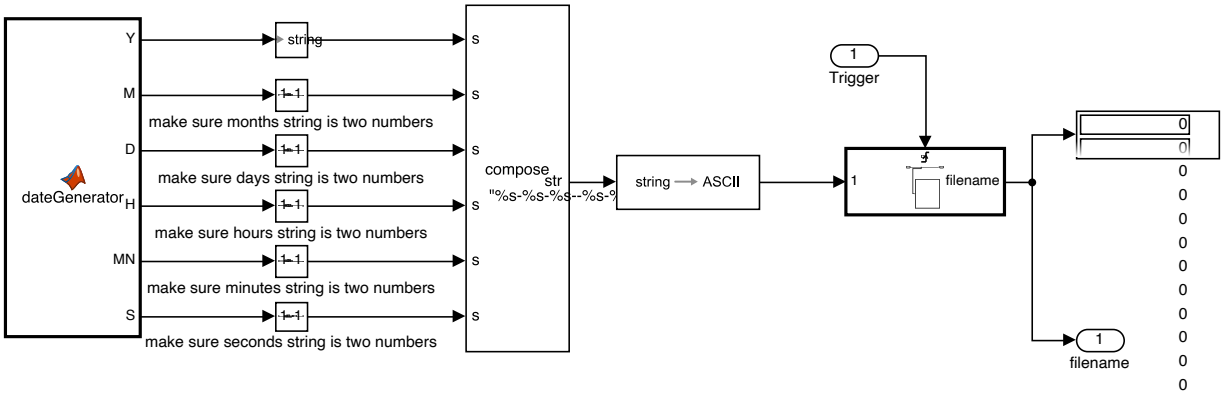
"torque" (Outport)

Table 3.127. "torque" Parameters

Parameter	Value
Port number	3
Icon display	Port number
Output function call	off
Minimum	[]
Maximum	[]
Data type	Inherit: auto
Lock output data type setting against changes by the fixed-point tools	off
Output as nonvirtual bus in parent model	off
Bus virtuality	inherit
Data mode	inherit
Unit (e.g., m, m/s^2, N*m)	inherit
Port dimensions (-1 for inherited)	-1
Variable-size signal	Inherit
Sample time (-1 for inherited)	-1
Ensure outport is virtual	off
Source of initial output value	Dialog
Output when disabled	held
Initial output	[]
MustResolveToSignalObject	off
Specify output when source is unconnected	off
Constant value	0
Interpret vector parameters as 1-D	on

Subsystem

Figure 3.10. ICE_Dashboard_2021b/Post Processing Subsystem/FILE I//O Subsystem/Subsystem



Blocks

Parameters

"Compose String" (ComposeString)

Table 3.128. "Compose String" Parameters

Parameter	Value
Format	"%s-%s-%s--%s-%s-%s-output.csv"
Output data type	string

"Display" (Display)

Table 3.129. "Display" Parameters

Parameter	Value
Numeric display format	short
Decimation	1
Floating display	off

"filename" (Outport)

Table 3.130. "filename" Parameters

Parameter	Value
Port number	1
Icon display	Port number
Output function call	off
Minimum	[]
Maximum	[]
Data type	Inherit: auto
Lock output data type setting against changes by the fixed-point tools	off
Output as nonvirtual bus in parent model	off
Bus virtuality	inherit
Data mode	inherit
Unit (e.g., m, m/s^2, N*m)	inherit
Port dimensions (-1 for inherited)	-1
Variable-size signal	Inherit
Sample time (-1 for inherited)	-1
Ensure outport is virtual	off
Source of initial output value	Dialog
Output when disabled	held
Initial output	[]
MustResolveToSignalObject	off
Specify output when source is unconnected	off
Constant value	0
Interpret vector parameters as 1-D	on

"MATLAB Function4" (MATLAB Function)

Table 3.131. MATLAB Function4 Function Properties

Property	Value
Update Method	INHERITED
Sample Time	-1
Support variable-size arrays	1
Saturate on integer overflow	1

Property	Value
Treat these inherited Simulink signal types as fi objects	Fixed-point
MATLAB Function block fimath	Same as MATLAB Default
Input fi math	fimath(...)
Description	

Table 3.132. MATLAB Function4 Argument Summary

Name	Scope	Port	Data Type	Size
Y	Output	1	double	1
M	Output	2	double	1
D	Output	3	double	1
H	Output	4	double	1
MN	Output	5	double	1
S	Output	6	double	1

MATLAB Function4 Function Script

```
function [Y, M, D, H, MN, S] = dateGenerator()
   Y = 0;
   M = 0;
   D = 0;
   H = 0;
   MN = 0;
   S = 0;
   [Y, M, D, H, MN, S] = datevec(datetime("now"));
end
```

Table 3.133. MATLAB Function4 Supporting Functions

Function	Defined By	Path
abs	MATLAB	
any	MATLAB	
ceil	MATLAB	
char	MATLAB	
coder.ExternalDependency	MATLAB	
coder.mixin.internal.SpoofReport	MATLAB	

Function	Defined By	Path
coder.mixin.internal.indexing.Paren	MATLAB	
colon	MATLAB	
datetime	MATLAB	
datevec	MATLAB	
feval	MATLAB	
fieldnames	MATLAB	
find	MATLAB	
fix	MATLAB	
floor	MATLAB	
idivide	MATLAB	
intmax	MATLAB	
intmin	MATLAB	
isequal	MATLAB	
isfi	MATLAB	
isfield	MATLAB	
isfinite	MATLAB	
isinf	MATLAB	
ismatrix	MATLAB	
isnan	MATLAB	
isnumerictype	MATLAB	
isrow	MATLAB	
issparse	MATLAB	
isstring	MATLAB	
lower	MATLAB	
matlab.internal.coder.datetime	MATLAB	
matlab.internal.coder.datetime.createFromDateVec	MATLAB	
matlab.internal.coder.datetime.days2ymd	MATLAB	
matlab.internal.coder.datetime.getDateVec	MATLAB	
matlab.internal.coder.datetime.secs2hms	MATLAB	
matlab.internal.coder.doubledouble.addToLoAndAdjust	MATLAB	

Function	Defined By	Path
matlab.internal.coder.doubledouble.divide	MATLAB	
matlab.internal.coder.doubledouble.divmod	MATLAB	
matlab.internal.coder.doubledouble.floor	MATLAB	
matlab.internal.coder.doubledouble.floorFrac	MATLAB	
matlab.internal.coder.doubledouble.minus	MATLAB	
matlab.internal.coder.doubledouble.plus	MATLAB	
matlab.internal.coder.doubledouble.split	MATLAB	
matlab.internal.coder.doubledouble.times	MATLAB	
matlab.internal.coder.doubledouble.two_diff	MATLAB	
matlab.internal.coder.doubledouble.two_prod	MATLAB	
matlab.internal.coder.doubledouble.two_sum	MATLAB	
max	MATLAB	
parseParameterInputsCG	MATLAB	
rem	MATLAB	
string	MATLAB	
strlength	MATLAB	
uncheckedChar	MATLAB	

"String to ASCII" (StringToASCII)

Table 3.134. "String to ASCII" Parameters

Parameter	Value
Output vector size	31

"Trigger" (Inport)

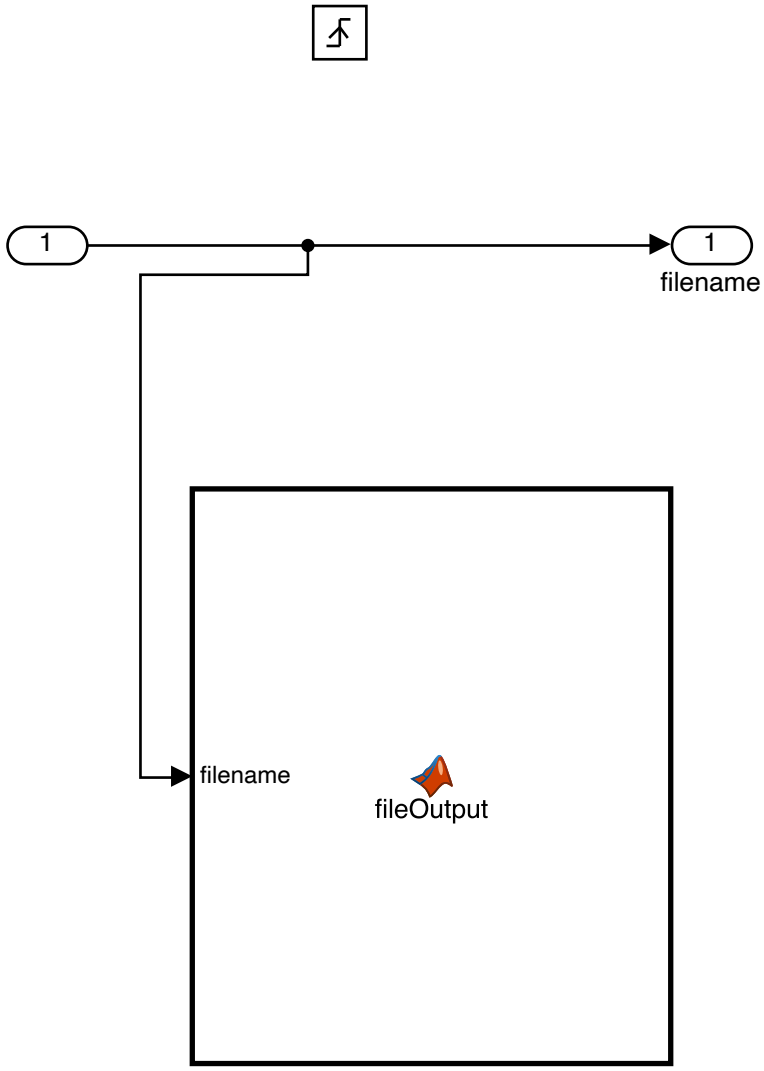
Table 3.135. "Trigger" Parameters

Parameter	Value
Port number	1
Port dimensions (-1 for inherited)	-1
Sample time (-1 for inherited)	-1
Minimum	[]
Maximum	[]
Data type	Inherit: auto

Triggered Subsystem

Checksum: 3690775704 3156363488 1995621253 2815425145

Figure 3.11. ICE_Dashboard_2021b/Post Processing Subsystem/FILE I//O Subsystem/Subsystem/Triggered Subsystem



Interface

Input Signals

The following tables describe external signals used to compute the subsystem's inputs.The name of the input signal is the name of the input port that accepts the signal. The number in angle brackets is the number of the input port. A dimension of [1 1] indicates a scalar signal.

Table 3.136.

Description:
Data Type: uint8
Signal Type: real
Width: 31
Dimensions: [2 1 31]

Output Signals

The following tables describe the signals output by this system. The name of the output signal is the name of the signal's parent block, i.e., the block that computes the signal. The number in angle brackets is the number of the port that emits the signal.

Table 3.137.

Description:
Data Type: uint8
Signal Type: real
Width: 31
Dimensions: [2 1 31]

Blocks

Parameters

"filename" (Outport)

Table 3.138. "filename" Parameters

Parameter	Value
Port number	1
Icon display	Port number
Output function call	off
Minimum	[]
Maximum	[]
Data type	Inherit: auto
Lock output data type setting against changes by the fixed-point tools	off
Output as nonvirtual bus in parent model	off
Bus virtuality	inherit
Data mode	inherit

Parameter	Value
Unit (e.g., m, m/s^2, N*m)	inherit
Port dimensions (-1 for inherited)	-1
Variable-size signal	Inherit
Sample time (-1 for inherited)	-1
Ensure outport is virtual	off
Source of initial output value	Dialog
Output when disabled	held
Initial output	[]
MustResolveToSignalObject	off
Specify output when source is unconnected	off
Constant value	0
Interpret vector parameters as 1-D	on

"In1" (Inport)

Table 3.139. "In1" Parameters

Parameter	Value
Port number	1
Port dimensions (-1 for inherited)	-1
Sample time (-1 for inherited)	-1
Minimum	[]
Maximum	[]
Data type	Inherit: auto

"MATLAB Function3" (MATLAB Function)

Table 3.140. MATLAB Function3 Function Properties

Property	Value
Update Method	INHERITED
Sample Time	-1
Support variable-size arrays	1
Saturate on integer overflow	1

Property	Value
Treat these inherited Simulink signal types as fi objects	Fixed-point
MATLAB Function block fimath	Same as MATLAB Default
Input fi math	fimath(...)
Description	

Table 3.141. MATLAB Function3 Argument Summary

Name	Scope	Port	Data Type	Size
filename	Input	1	uint8	[1, 31]

MATLAB Function3 Function Script

```
% log file generation - currently overwrites each run
% \r\n used for windows line termination style CRLF - switch to just \n if
% using unix like system
function fileOutput(filename)

if (0 ~= size(double(char(filename))))
    file = fopen(char(filename),'a');
    if (0 > file)
        return
    end

    fprintf(file,['torque,brakeWork,rpm,fuel mass flow,exhaust tempera-
ture,air mass flow..' ...
        ',barrel pressure,ambient pressure,BMEP,BSFC,thermal efficiency,...'
...
        'volumetric efficiency,o2,co2,co,no PPM,hc PPM\r\n']);
    fclose(file);
end
```

Table 3.142. MATLAB Function3 Supporting Functions

Function	Defined By	Path
char	MATLAB	
colon	MATLAB	
fclose	MATLAB	
feval	MATLAB	
fidCheck	MATLAB	
fileManager	MATLAB	
floor	MATLAB	

Function	Defined By	Path
fopen	MATLAB	
fprintf	MATLAB	
intmax	MATLAB	
intmin	MATLAB	
isFileIOExtrinsic	MATLAB	
isfi	MATLAB	
isnan	MATLAB	
isnumerictype	MATLAB	
issparse	MATLAB	
isstring	MATLAB	
upper	MATLAB	

"Trigger" (TriggerPort)

Table 3.143. "Trigger" Parameters

Parameter	Value
Trigger type	rising
Trigger time	on message available
Schedule as aperiodic partition	on
Treat as Simulink function	off
Execute function call asynchronously	off
Function visibility	global
Enable variant condition	off
Variant control	(inherit)
Generate preprocessor conditionals	off
States when enabling	held
Propagate sizes of variable-size signals	During execution
Show output port	off
Sample time type	triggered
Sample time	1
Enable zero-crossing detection	on
Initial trigger signal state	compatibility (no trigger on first evaluation)
Port dimensions	-1
Trigger signal sample time	-1
Minimum	[]

Parameter	Value
Maximum	[]
Data type	Inherit: auto
Interpolate data	on
FunctionPrototype	f()

Block Execution Order

"ICE_Dashboard_2021b" is a multitasking model. Block execution order is not available for multitasking models.

Chapter 4. Requirements

ICE_Dashboard_2021b does not contain requirements traceability links.

Chapter 5. System Model Configuration

Source: Model
Source Name: ICE_Dashboard_2021b

Table 5.1. ICE_Dashboard_2021b Configuration Set

Property	Value
Description	
Components	[ICE_Dashboard_2021b Configuration Set.Components(1), ICE_Dashboard_2021b Configuration Set.Components(2), ICE_Dashboard_2021b Configuration Set.Components(3), ICE_Dashboard_2021b Configuration Set.Components(4), ICE_Dashboard_2021b Configuration Set.Components(5), ICE_Dashboard_2021b Configuration Set.Components(6), ICE_Dashboard_2021b Configuration Set.Components(7), ICE_Dashboard_2021b Configuration Set.Components(8), ICE_Dashboard_2021b Configuration Set.Components(9), ICE_Dashboard_2021b Configuration Set.Components(10), ICE_Dashboard_2021b Configuration Set.Components(11)]
Name	Configuration

Table 5.2. ICE_Dashboard_2021b Configuration Set.Components(1)

Property	Value
Name	Solver
Description	
Components	
StartTime	0.0
StopTime	inf
AbsTol	auto
AutoScaleAbsTol	on
FixedStep	auto
InitialStep	auto
MaxOrder	5
ZcThreshold	auto
ConsecutiveZCsStepRelTol	10*128*eps
MaxConsecutiveZCs	1000
ExtrapolationOrder	4

NumberNewtonIterations	1
MaxStep	auto
MinStep	auto
MaxConsecutiveMinStep	1
RelTol	1e-3
EnableMultiTasking	on
AllowMultiTaskInputOutput	off
ConcurrentTasks	off
SolverName	FixedStepAuto
SolverType	Fixed-step
SolverJacobianMethodControl	auto
DaesscMode	auto
ShapePreserveControl	DisableAll
ZeroCrossControl	UseLocalSettings
ZeroCrossAlgorithm	Nonadaptive
SolverResetMethod	Fast
PositivePriorityOrder	off
AutoInsertRateTranBlk	on
SampleTimeConstraint	Unconstrained
InsertRTBMode	Whenever possible
SampleTimeProperty	
DecoupledContinuousIntegration	off
MinimalZcImpactIntegration	off
ODENIntegrationMethod	ode3
EnableFixedStepZeroCrossing	off
MaxZcPerStep	2
MaxZcBracketingIterations	10

Table 5.3. ICE_Dashboard_2021b Configuration Set.Components(2)

Property	**Value**
Name	Data Import/Export
Description	
Components	
Decimation	1
ExternalInput	[t, u]
FinalStateName	xFinal

InitialState	xInitial
LimitDataPoints	off
MaxDataPoints	1000
LoadExternalInput	off
LoadInitialState	off
SaveFinalState	off
SaveOperatingPoint	off
SaveFormat	Dataset
SaveOutput	on
SaveState	off
SignalLogging	on
DSMLogging	on
StreamToWks	on
InspectSignalLogs	off
SaveTime	on
ReturnWorkspaceOutputs	on
StateSaveName	xout
TimeSaveName	tout
OutputSaveName	yout
SignalLoggingName	logsout
DSMLoggingName	dsmout
OutputOption	RefineOutputTimes
OutputTimes	[]
ReturnWorkspaceOutputsName	out
Refine	1
LoggingToFile	off
DatasetSignalFormat	timeseries
LoggingFileName	out.mat
LoggingIntervals	[-inf, inf]

Table 5.4. ICE_Dashboard_2021b Configuration Set.Components(3)

Property	**Value**
Name	Optimization
Description	
Components	
BlockReduction	on

BooleanDataType	on
ConditionallyExecuteInputs	on
DefaultParameterBehavior	Tunable
InlineParams	off
UseDivisionForNetSlopeComputation	off
GainParamInheritBuiltInType	off
UseFloatMulNetSlope	off
InheritOutputTypeSmallerThanSingle	off
DefaultUnderspecifiedDataType	double
UseSpecifiedMinMax	off
InlineInvariantSignals	off
OptimizeBlockIOStorage	on
BufferReuse	on
ReuseModelBlockBuffer	off
GlobalBufferReuse	on
GlobalVariableUsage	Use global to hold temporary results
StrengthReduction	off
AdvancedOptControl	
ExpressionFolding	on
BooleansAsBitfields	off
BitfieldContainerType	uint_T
BitwiseOrLogicalOp	Same as modeled
EnableMemcpy	on
MemcpyThreshold	64
PassReuseOutputArgsAs	Individual arguments
PassReuseOutputArgsThreshold	12
LocalBlockOutputs	on
RollThreshold	5
StateBitsets	off
DataBitsets	off
ActiveStateOutputEnumStorageType	Native Integer
ZeroExternalMemoryAtStartup	off
ZeroInternalMemoryAtStartup	off
InitFltsAndDblsToZero	off
NoFixptDivByZeroProtection	off
EfficientFloat2IntCast	off

EfficientMapNaN2IntZero	on
LifeSpan	auto
EvaledLifeSpan	1
MaxStackSize	64
BufferReusableBoundary	on
SimCompilerOptimization	off
AccelVerboseBuild	off
OptimizeBlockOrder	speed
OptimizeDataStoreBuffers	on
BusAssignmentInplaceUpdate	on
DifferentSizesBufferReuse	on
UseRowMajorAlgorithm	off
OptimizationLevel	level2
OptimizationPriority	Balanced
OptimizationCustomize	off
LabelGuidedReuse	off
MultiThreadedLoops	off
DenormalBehavior	GradualUnderflow
EfficientTunableParamExpr	on

Table 5.5. ICE_Dashboard_2021b Configuration Set.Components(4)

Property	Value
Name	Diagnostics
Description	
Components	
RTPrefix	error
ConsistencyChecking	none
ArrayBoundsChecking	none
SignalInfNanChecking	none
StringTruncationChecking	error
SignalRangeChecking	none
ReadBeforeWriteMsg	UseLocalSettings
WriteAfterWriteMsg	UseLocalSettings
WriteAfterReadMsg	UseLocalSettings
AlgebraicLoopMsg	warning
ArtificialAlgebraicLoopMsg	warning

SaveWithDisabledLinksMsg	warning
SaveWithParameterizedLinksMsg	warning
CheckSSInitialOutputMsg	on
UnderspecifiedInitializationDetection	Simplified
MergeDetectMultiDrivingBlocksExec	error
SignalResolutionControl	UseLocalSettings
BlockPriorityViolationMsg	warning
MinStepSizeMsg	warning
TimeAdjustmentMsg	none
MaxConsecutiveZCsMsg	error
MaskedZcDiagnostic	warning
IgnoredZcDiagnostic	warning
SolverPrmCheckMsg	none
InheritedTsInSrcMsg	warning
MultiTaskDSMMsg	error
MultiTaskCondExecSysMsg	error
MultiTaskRateTransMsg	error
SingleTaskRateTransMsg	none
TasksWithSamePriorityMsg	warning
SigSpecEnsureSampleTimeMsg	warning
CheckMatrixSingularityMsg	none
IntegerOverflowMsg	warning
Int32ToFloatConvMsg	warning
ParameterDowncastMsg	error
ParameterOverflowMsg	error
ParameterUnderflowMsg	none
ParameterPrecisionLossMsg	warning
ParameterTunabilityLossMsg	error
FixptConstUnderflowMsg	none
FixptConstOverflowMsg	none
FixptConstPrecisionLossMsg	none
UnderSpecifiedDataTypeMsg	none
UnnecessaryDatatypeConvMsg	none
VectorMatrixConversionMsg	none
FcnCallInpInsideContextMsg	error
SignalLabelMismatchMsg	none

UnconnectedInputMsg	none
UnconnectedOutputMsg	none
UnconnectedLineMsg	none
UseOnlyExistingSharedCode	error
SFcnCompatibilityMsg	none
FrameProcessingCompatibilityMsg	error
UniqueDataStoreMsg	none
BusObjectLabelMismatch	warning
RootOutportRequireBusObject	warning
AssertControl	UseLocalSettings
AllowSymbolicDim	on
ModelReferenceIOMsg	none
ModelReferenceVersionMismatchMessage	none
ModelReferenceIOMismatchMessage	none
UnknownTsInhSupMsg	warning
ModelReferenceDataLoggingMessage	warning
ModelReferenceNoExplicitFinalValueMsg	none
ModelReferenceSymbolNameMessage	warning
ModelReferenceExtraNoncontSigs	error
StateNameClashWarn	none
OperatingPointInterfaceChecksumMismatchMsg	warning
NonCurrentReleaseOperatingPointMsg	error
PregeneratedLibrarySubsystemCodeDiagnostic	warning
InitInArrayFormatMsg	warning
StrictBusMsg	ErrorLevel1
BusNameAdapt	WarnAndRepair
NonBusSignalsTreatedAsBus	none
SFUnusedDataAndEventsDiag	warning
SFUnexpectedBacktrackingDiag	error
SFInvalidInputDataAccessInChartInitDiag	warning
SFNoUnconditionalDefaultTransitionDiag	error
SFTransitionOutsideNaturalParentDiag	warning
SFUnreachableExecutionPathDiag	warning
SFUndirectedBroadcastEventsDiag	warning
SFTransitionActionBeforeConditionDiag	warning
SFOutputUsedAsStateInMooreChartDiag	error

SFTemporalDelaySmallerThanSampleTimeDiag	warning
SFSelfTransitionDiag	warning
SFExecutionAtInitializationDiag	warning
SFMachineParentedDataDiag	error
IntegerSaturationMsg	warning
AllowedUnitSystems	all
UnitsInconsistencyMsg	warning
AllowAutomaticUnitConversions	on
RCSCRenamedMsg	warning
RCSCObservableMsg	warning
ForceCombineOutputUpdateInSim	off
UnderSpecifiedDimensionMsg	none
DebugExecutionForFMUViaOutOfProcess	off
ArithmeticOperatorsInVariantConditions	error
VariantConditionMismatch	none
InheritVATfromSVC	warning
VariantConfigNotUsedByTopModel	warning

Table 5.6. ICE_Dashboard_2021b Configuration Set.Components(5)

Property	**Value**
Name	Hardware Implementation
Description	
Components	
ProdBitPerChar	8
ProdBitPerShort	16
ProdBitPerInt	16
ProdBitPerLong	32
ProdBitPerLongLong	64
ProdBitPerFloat	32
ProdBitPerDouble	64
ProdBitPerPointer	16
ProdBitPerSizeT	16
ProdBitPerPtrDiffT	16
ProdLargestAtomicInteger	Char
ProdLargestAtomicFloat	None
ProdIntDivRoundTo	Zero

ProdEndianess	LittleEndian
ProdWordSize	8
ProdShiftRightIntArith	on
ProdLongLongMode	off
ProdHWDeviceType	Atmel->AVR
TargetBitPerChar	8
TargetBitPerShort	16
TargetBitPerInt	32
TargetBitPerLong	32
TargetBitPerLongLong	64
TargetBitPerFloat	32
TargetBitPerDouble	64
TargetBitPerPointer	32
TargetBitPerSizeT	32
TargetBitPerPtrDiffT	32
TargetLargestAtomicInteger	Char
TargetLargestAtomicFloat	None
TargetShiftRightIntArith	on
TargetLongLongMode	off
TargetIntDivRoundTo	Undefined
TargetEndianess	Unspecified
TargetWordSize	32
TargetPreprocMaxBitsSint	32
TargetPreprocMaxBitsUint	32
TargetHWDeviceType	Specified
TargetUnknown	off
ProdEqTarget	on
UseEmbeddedCoderFeatures	on
UseSimulinkCoderFeatures	on
HardwareBoardFeatureSet	EmbeddedCoderHSP

Table 5.7. ICE_Dashboard_2021b Configuration Set.Components(6)

Property	**Value**
Name	Model Referencing
Description	
Components	

UpdateModelReferenceTargets	IfOutOfDateOrStructuralChange
EnableRefExpFcnMdlSchedulingChecks	off
CheckModelReferenceTargetMessage	error
EnableParallelModelReferenceBuilds	off
ParallelModelReferenceErrorOnInvalidPool	on
ParallelModelReferenceMATLABWorkerInit	None
ModelReferenceNumInstancesAllowed	Multi
PropagateVarSize	Infer from blocks in model
ModelDependencies	
ModelReferencePassRootInputsByReference	on
ModelReferenceMinAlgLoopOccurrences	off
PropagateSignalLabelsOutOfModel	on
SupportModelReferenceSimTargetCustomCode	off
UseModelRefSolver	off

Table 5.8. ICE_Dashboard_2021b Configuration Set.Components(7)

Property	**Value**
Name	Simulation Target
Description	
Components	
SimCustomSourceCode	
SimCustomHeaderCode	
SimCustomInitializer	
SimCustomTerminator	
SimReservedNameArray	
SimUserSources	
SimUserIncludeDirs	
SimUserLibraries	
SimUserDefines	
SimCustomCompilerFlags	
SimCustomLinkerFlags	
SFSimEnableDebug	off
SFSimEcho	on
SimCtrlC	on
SimIntegrity	on
SimUseLocalCustomCode	on

SimParseCustomCode	on
SimAnalyzeCustomCode	off
SimDebugExecutionForCustomCode	off
SimGenImportedTypeDefs	off
CompileTimeRecursionLimit	50
EnableRuntimeRecursion	on
EnableImplicitExpansion	on
MATLABDynamicMemAlloc	on
MATLABDynamicMemAllocThreshold	65536
LegacyBehaviorForPersistentVarInContinuousTime	off
CustomCodeFunctionArrayLayout	
DefaultCustomCodeFunctionArrayLayout	NotSpecified
CustomCodeUndefinedFunction	FilterOut
CustomCodeGlobalsAsFunctionIO	off
DefaultCustomCodeDeterministicFunctions	None
CustomCodeDeterministicFunctions	
SimHardwareAcceleration	generic
SimTargetLang	C
GPUAcceleration	off
SimGPUMallocThreshold	200
SimGPUStackLimitPerThread	1024
SimGPUErrorChecks	off
SimGPUCustomComputeCapability	
SimGPUCompilerFlags	
SimDLTargetLibrary	mkl-dnn
SimDLAutoTuning	on

Table 5.9. ICE_Dashboard_2021b Configuration Set.Components(8)

Property	**Value**
Name	Code Generation
Description	Embedded Coder
SystemTargetFile	ert.tlc
EmbeddedCoderDictionary	
HardwareBoard	Arduino Uno
ShowCustomHardwareApp	off
ShowEmbeddedHardwareApp	off

TLCOptions	-aInlineSetEventsForThisBaseRateFcn=TLC_FALSE -aSuppressMultiTaskScheduler=TLC_FALSE -aRateBasedStepFcn=1
GenCodeOnly	off
MakeCommand	make_rtw
GenerateMakefile	on
PackageGeneratedCodeAndArtifacts	off
PackageName	
TemplateMakefile	ert_default_tmf
PostCodeGenCommand	codertarget.postCodeGenHookCommand(h)
GenerateReport	off
RTWVerbose	on
RetainRTWFile	off
ProfileTLC	off
TLCDebug	off
TLCCoverage	off
TLCAssert	off
RTWUseLocalCustomCode	on
RTWUseSimCustomCode	off
CustomSourceCode	
CustomHeaderCode	
CustomInclude	
CustomSource	
CustomLibrary	
CustomDefine	
CustomBLASCallback	
CustomLAPACKCallback	
CustomFFTCallback	
CustomInitializer	
CustomTerminator	
Toolchain	Arduino AVR
BuildConfiguration	Faster Runs
CustomToolchainOptions	
IncludeHyperlinkInReport	off
LaunchReport	off
PortableWordSizes	off
GenerateErtSFunction	off
CreateSILPILBlock	None

CodeExecutionProfiling	off
CodeExecutionProfileVariable	executionProfile
CodeProfilingSaveOptions	SummaryOnly
CodeProfilingInstrumentation	off
CodeStackProfiling	off
CodeStackProfileVariable	stackProfile
CodeCoverageSettings	ICE_Dashboard_2021b Configuration Set.Components(8).CodeCoverageSettings
SILDebugging	off
TargetLang	C
GenerateGPUCode	None
IncludeERTFirstTime	off
GenerateTraceInfo	off
GenerateTraceReport	off
GenerateTraceReportSl	off
GenerateTraceReportSf	off
GenerateTraceReportEml	off
GenerateWebview	off
GenerateCodeMetricsReport	off
GenerateCodeReplacementReport	off
RTWCompilerOptimization	off
ObjectivePriorities	
RTWCustomCompilerOptimizations	
CheckMdlBeforeBuild	Off
GPUKernelNamePrefix	
GPUDeviceID	-1
GPUMallocMode	discrete
GPUMallocThreshold	200
GPUEnableMemoryManager	off
GPUStackLimitPerThread	1024
GPUcuBLAS	on
GPUcuSOLVER	on
GPUcuFFT	on
GPUErrorChecks	off
GPUComputeCapability	3.5
GPUCustomComputeCapability	
GPUCompilerFlags	

GPUMaximumBlocksPerKernel	0
DLTargetLibrary	none
DLAutoTuning	on
DLArmComputeVersion	20.02.1
DLArmComputeArch	unspecified
Components	[ICE_Dashboard_2021b Configuration Set.Components(8).Components(1), ICE_Dashboard_2021b Configuration Set.Components(8).Components(2)]

Table 5.10. ICE_Dashboard_2021b Configuration Set.Components(9)

Property	Value
Description	Simulink Coverage Configuration Component
Components	
Name	Simulink Coverage
CovEnable	off
CovScope	EntireSystem
CovIncludeTopModel	on
RecordCoverage	off
CovPath	/
CovSaveName	covdata
CovCompData	
CovMetricSettings	dwe
CovFilter	
CovHTMLOptions	
CovNameIncrementing	off
CovForceBlockReductionOff	on
CovEnableCumulative	on
CovSaveCumulativeToWorkspaceVar	off
CovSaveSingleToWorkspaceVar	off
CovCumulativeVarName	covCumulativeData
CovCumulativeReport	off
CovSaveOutputData	on
CovOutputDir	slcov_output/$ModelName$
CovDataFileName	$ModelName$_cvdata
CovReportOnPause	on
CovModelRefEnable	off

CovModelRefExcluded	
CovExternalEMLEnable	on
CovSFcnEnable	on
CovBoundaryAbsTol	1.0000e-05
CovBoundaryRelTol	0.0100
CovUseTimeInterval	off
CovStartTime	0
CovStopTime	0
CovMetricStructuralLevel	Decision
CovMetricLookupTable	off
CovMetricSignalRange	off
CovMetricSignalSize	off
CovMetricObjectiveConstraint	off
CovMetricSaturateOnIntegerOverflow	off
CovMetricRelationalBoundary	off
CovLogicBlockShortCircuit	off
CovUnsupportedBlockWarning	on
CovMcdcMode	Masking
CovExcludeInactiveVariants	off

Table 5.11. ICE_Dashboard_2021b Configuration Set.Components(10)

Property	Value
Description	HDL Coder custom configuration component
Components	
Name	HDL Coder

Table 5.12. ICE_Dashboard_2021b Configuration Set.Components(11)

Property	Value
Description	Coder Target
Components	
Name	Coder Target
CoderTargetData	ICE_Dashboard_2021b Configuration Set.Components(11).CoderTargetData

Table 5.13. ICE_Dashboard_2021b Configuration Set.Components(8).CodeCoverageSettings

Property	Value
TopModelCoverage	off
ReferencedModelCoverage	off
CoverageTool	None

Table 5.14. ICE_Dashboard_2021b Configuration Set.Components(8).Components(1)

Property	Value
Name	Code Appearance
Description	
Components	
ForceParamTrailComments	on
GenerateComments	on
CommentStyle	Auto
IgnoreCustomStorageClasses	off
IgnoreTestpoints	off
MaxIdLength	31
ShowEliminatedStatement	on
OperatorAnnotations	on
SimulinkDataObjDesc	on
SFDataObjDesc	on
MATLABFcnDesc	off
MangleLength	1
SharedChecksumLength	8
CustomSymbolStrGlobalVar	RN$M
CustomSymbolStrType	NR$M_T
CustomSymbolStrField	NM
CustomSymbolStrFcn	RNMF
CustomSymbolStrFcnArg	rt$I$N$M
CustomSymbolStrBlkIO	rtb_NM
CustomSymbolStrTmpVar	NM
CustomSymbolStrMacro	RN$M
CustomSymbolStrUtil	NC

CustomSymbolStrEmxType	emxArray_MN
CustomSymbolStrEmxFcn	emx$M$N
CustomUserTokenString	
CustomCommentsFcn	
DefineNamingRule	None
DefineNamingFcn	
ParamNamingRule	None
ParamNamingFcn	
SignalNamingRule	None
SignalNamingFcn	
InsertBlockDesc	on
InsertPolySpaceComments	off
SimulinkBlockComments	on
BlockCommentType	BlockPathComment
StateflowObjectComments	off
MATLABSourceComments	off
EnableCustomComments	off
InternalIdentifier	Shortened
InlinedPrmAccess	Literals
ReqsInCode	off
UseSimReservedNames	off
ReservedNameArray	
EnumMemberNameClash	error

Table 5.15. ICE_Dashboard_2021b Configuration Set.Components(8).Components(2)

Property	**Value**
Name	Target
Description	
Components	
IsERTTarget	on
TargetLibSuffix	
TargetPreCompLibLocation	
TargetLangStandard	C99 (ISO)
CodeReplacementLibrary	None
UtilityFuncGeneration	Auto

MultiwordTypeDef	System defined
MultiwordLength	256
DynamicStringBufferSize	256
GenerateFullHeader	on
InferredTypesCompatibility	off
ExistingSharedCode	
GenerateSampleERTMain	off
GenerateTestInterfaces	off
ModelReferenceCompliant	on
ParMdlRefBuildCompliant	on
CompOptLevelCompliant	on
ConcurrentExecutionCompliant	on
IncludeMdlTerminateFcn	on
CombineOutputUpdateFcns	on
CombineSignalStateStructs	off
GroupInternalDataByFunction	off
SuppressErrorStatus	off
IncludeFileDelimiter	Auto
ERTCustomFileBanners	on
SupportAbsoluteTime	on
LogVarNameModifier	rt_
MatFileLogging	off
MultiInstanceERTCode	off
CodeInterfacePackaging	Nonreusable function
PurelyIntegerCode	off
SupportNonFinite	on
SupportComplex	on
SupportContinuousTime	on
SupportNonInlinedSFcns	off
RemoveDisableFunc	off
RemoveResetFunc	on
SupportVariableSizeSignals	on
ParenthesesLevel	Nominal
CastingMode	Nominal
ModelStepFunctionPrototypeControlCompliant	on
CPPClassGenCompliant	on

GRTInterface	off
GenerateAllocFcn	off
UseToolchainInfoCompliant	on
GenerateSharedConstants	on
LUTObjectStructOrderExplicitValues	Size,Breakpoints,Table
LUTObjectStructOrderEvenSpacing	Size,Breakpoints,Table
ArrayLayout	Column-major
UnsupportedSFcnMsg	error
ERTHeaderFileRootName	RE
ERTSourceFileRootName	RE
ERTDataFileRootName	$R_data
InstructionSetExtensions	{None}
OptimizeReductions	off
IsSLRTTarget	off
DSAsUniqueAccess	off
ExtMode	off
ExtModeTransport	3
ExtModeStaticAlloc	on
ExtModeAutomaticAllocSize	on
ExtModeMaxTrigDuration	10
ExtModeStaticAllocSize	250
ExtModeTesting	off
ExtModeMexFile	ext_xcp
ExtModeMexArgs	
ExtModeIntrfLevel	Level2 - Open
TargetOS	BareBoardExample
MultiInstanceErrorCode	Error
RootIOFormat	Individual arguments
RTWCAPISignals	off
RTWCAPIParams	off
RTWCAPIStates	off
RTWCAPIRootIO	off
ERTSrcFileBannerTemplate	ert_code_template.cgt
ERTHdrFileBannerTemplate	ert_code_template.cgt
ERTDataSrcFileTemplate	ert_code_template.cgt
ERTDataHdrFileTemplate	ert_code_template.cgt

ERTCustomFileTemplate	codertarget_file_process.tlc
EnableDataOwnership	off
SignalDisplayLevel	10
ParamTuneLevel	10
GlobalDataDefinition	Auto
DataDefinitionFile	global.c
GlobalDataReference	Auto
ERTFilePackagingFormat	Modular
RateTransitionBlockCode	Inline
DataReferenceFile	global.h
PreserveExpressionOrder	off
PreserveIfCondition	off
ConvertIfToSwitch	on
PreserveExternInFcnDecls	on
PreserveStaticInFcnDecls	on
SuppressUnreachableDefaultCases	on
EnableSignedLeftShifts	on
EnableSignedRightShifts	on
ImplementImageWithCVMat	off
IndentStyle	K&R
IndentSize	2
NewlineStyle	Default
MaxLineWidth	80
EnableUserReplacementTypes	off
ReplacementTypes	ICE_Dashboard_2021b Configuration Set.Components(8).Components(2).ReplacementTypes
MaxIdInt64	MAX_int64_T
MinIdInt64	MIN_int64_T
MaxIdUint64	MAX_uint64_T
MaxIdInt32	MAX_int32_T
MinIdInt32	MIN_int32_T
MaxIdUint32	MAX_uint32_T
MaxIdInt16	MAX_int16_T
MinIdInt16	MIN_int16_T
MaxIdUint16	MAX_uint16_T

MaxIdInt8	MAX_int8_T
MinIdInt8	MIN_int8_T
MaxIdUint8	MAX_uint8_T
BooleanTrueId	true
BooleanFalseId	false
TypeLimitIdReplacementHeaderFile	
MemSecPackage	--- None ---
MemSecFuncInitTerm	Default
MemSecFuncExecute	Default
MemSecFuncSharedUtil	Default
ArrayContainerType	C-style array

Table 5.16. ICE_Dashboard_2021b Configuration Set.Components(11).CoderTargetData

Field	Value
UseCoderTarget	true
TargetHardware	Arduino Uno
ExtModeProtocolInfo	ICE_Dashboard_2021b Configuration Set.Components(11).CoderTargetData.ExtModeProtocolInfo
ConnectionInfo	ICE_Dashboard_2021b Configuration Set.Components(11).CoderTargetData.ConnectionInfo
ExtMode	ICE_Dashboard_2021b Configuration Set.Components(11).CoderTargetData.ExtMode
RTOS	Baremetal
Scheduler_interrupt_source	0
Runtime	ICE_Dashboard_2021b Configuration Set.Components(11).CoderTargetData.Runtime
HostBoardConnection	ICE_Dashboard_2021b Configuration Set.Components(11).CoderTargetData.HostBoardConnection
ConnectedIO	ICE_Dashboard_2021b Configuration Set.Components(11).CoderTargetData.ConnectedIO
OverRunDetection	ICE_Dashboard_2021b Configuration Set.Components(11).CoderTargetData.OverRunDetection
AnalogInRefVoltage	ICE_Dashboard_2021b Configuration Set.Components(11).CoderTargetData.AnalogInRefVoltage
Serial	ICE_Dashboard_2021b Configuration Set.Components(11).CoderTargetData.Serial

I2C	ICE_Dashboard_2021b Configuration Set.Components(11).CoderTargetData.I2C
SPI	ICE_Dashboard_2021b Configuration Set.Components(11).CoderTargetData.SPI
Ethernet	ICE_Dashboard_2021b Configuration Set.Components(11).CoderTargetData.Ethernet
Wifi	ICE_Dashboard_2021b Configuration Set.Components(11).CoderTargetData.Wifi
ThingSpeak	ICE_Dashboard_2021b Configuration Set.Components(11).CoderTargetData.ThingSpeak
CAN	ICE_Dashboard_2021b Configuration Set.Components(11).CoderTargetData.CAN
Modbus	ICE_Dashboard_2021b Configuration Set.Components(11).CoderTargetData.Modbus
RS485	ICE_Dashboard_2021b Configuration Set.Components(11).CoderTargetData.RS485
Display	ICE_Dashboard_2021b Configuration Set.Components(11).CoderTargetData.Display
DataVersion	2016.02
DashboardCodegenInfo	ICE_Dashboard_2021b Configuration Set.Components(11).CoderTargetData.DashboardCodegenInfo
IOBlocksMode	connected

Table 5.17. ICE_Dashboard_2021b Configuration Set.Components(8).Components(2).ReplacementTypes

Field	Value
double	
single	
int32	
int16	
int8	
uint32	
uint16	
uint8	
boolean	
int	
uint	
char	
uint64	
int64	

Table 5.18. ICE_Dashboard_2021b Configuration Set.Components(11).CoderTargetData.ExtModeProtocolInfo

Field	Value
XCPonSerial	ICE_Dashboard_2021b Configuration Set.Components(11).CoderTargetData.ExtModeProtocolInfo.XCPonSerial
XCPonTCPIP	ICE_Dashboard_2021b Configuration Set.Components(11).CoderTargetData.ExtModeProtocolInfo.XCPonTCPIP
XCPonWiFi	ICE_Dashboard_2021b Configuration Set.Components(11).CoderTargetData.ExtModeProtocolInfo.XCPonWiFi

Table 5.19. ICE_Dashboard_2021b Configuration Set.Components(11).CoderTargetData.ConnectionInfo

Field	Value
XCPonSerial	ICE_Dashboard_2021b Configuration Set.Components(11).CoderTargetData.ConnectionInfo.XCPonSerial
XCPonTCPIP	ICE_Dashboard_2021b Configuration Set.Components(11).CoderTargetData.ConnectionInfo.XCPonTCPIP
XCPonWiFi	ICE_Dashboard_2021b Configuration Set.Components(11).CoderTargetData.ConnectionInfo.XCPonWiFi
Serial	ICE_Dashboard_2021b Configuration Set.Components(11).CoderTargetData.ConnectionInfo.Serial
TCPIP	ICE_Dashboard_2021b Configuration Set.Components(11).CoderTargetData.ConnectionInfo.TCPIP
WiFi	ICE_Dashboard_2021b Configuration Set.Components(11).CoderTargetData.ConnectionInfo.WiFi

Table 5.20. ICE_Dashboard_2021b Configuration Set.Components(11).CoderTargetData.ExtMode

Field	Value
Configuration	XCP on Serial
COMPortBaud	115200

Table 5.21. ICE_Dashboard_2021b Configuration Set.Components(11).CoderTargetData.Runtime

Field	Value
BuildAction	Build, load and run
DisableParallelBuild	0

ForceBuildStaticLibrary	0

Table 5.22. ICE_Dashboard_2021b Configuration Set.Components(11).CoderTargetData.HostBoardConnection

Field	Value
AppDownload_port_source	Manually Select
AppDownload_COMPort_select	/dev/cu.usbmodem14201
AppDownload_COMPort_specify	/dev/tty.usbmodemfa131
AppDownload_baud	115200(Default)
AppDownload_baud_specify	
ConnectedIO_serial_port	Serial 0
ConnectedIO_port_source1	Manually Select
ConnectedIO_port_source2	Manually Select
ConnectedIO_COMPort_select	/dev/cu.usbmodem14201
ConnectedIO_COMPort_specify	/dev/tty.usbmodemfa131
ConnectedIO_baud	921600(Default)
ConnectedIO_baud_specify	
ExternalMode_serial_port	Serial 0
ExternalMode_port_source1	Manually Select
ExternalMode_port_source2	Manually Select
ExternalMode_COMPort_select	/dev/cu.usbmodem14201
ExternalMode_COMPort_specify	/dev/tty.usbmodemfa131
ExternalMode_baud	115200
ExternalMode_baud_specify	
PIL_serial_port	Serial 0
PIL_port_source1	Manually Select
PIL_port_source2	Manually Select
PIL_COMPort_select	/dev/cu.usbmodem14201
PIL_COMPort_specify	/dev/tty.usbmodemfa131
PIL_baud	921600(Default)
PIL_baud_specify	

Table 5.23. ICE_Dashboard_2021b Configuration Set.Components(11).CoderTargetData.ConnectedIO

Field	Value

ConnectedIOMode	Auto
ActionOnOverrun	warning

Table 5.24. ICE_Dashboard_2021b Configuration Set.Components(11).CoderTargetData.OverRunDetection

Field	Value
Enable_overrun_detection	0
Digital_output_to_set_on_overrun	13

Table 5.25. ICE_Dashboard_2021b Configuration Set.Components(11).CoderTargetData.AnalogInRefVoltage

Field	Value
Analog_input_reference_voltage	0

Table 5.26. ICE_Dashboard_2021b Configuration Set.Components(11).CoderTargetData.Serial

Field	Value
Serial0_baud_rate	9600
Serial0_baud_specify	921600
Serial0_Config	SERIAL_8N1

Table 5.27. ICE_Dashboard_2021b Configuration Set.Components(11).CoderTargetData.I2C

Field	Value
I2C0BusSpeedHz	100000

Table 5.28. ICE_Dashboard_2021b Configuration Set.Components(11).CoderTargetData.SPI

Field	Value
SPI_clock_out_frequency	4000
SPI_mode	Mode 0 - Clock Polarity 0, Clock Phase 0
SPI_bitorder	MSB first
SDSlaveSelect	4
CANChipSelect	9

Table 5.29. ICE_Dashboard_2021b Configuration Set.Components(11).CoderTargetData.Ethernet

Field	Value
Disable_DHCP_Ethernet	0
Local_ip_address	192.168.0.20
Local_mac_address	DE:AD:BE:EF:FE:ED

Table 5.30. ICE_Dashboard_2021b Configuration Set.Components(11).CoderTargetData.Wifi

Field	Value
Wifi_Hardware	WiFi shield
Disable_DHCP_Wifi	0
Wifi_ip_address	192.168.1.20
Wifi_SSID	yourNetwork
Set_Wifi_Encryption	None
Wifi_WEP_key	D0D0DEADF00DABBADEAFBEADED
Wifi_WEP_key_index	0
Wifi_WPA_password	secretPassword
Wifi_ESP8266_HW_serial_port	Serial 0

Table 5.31. ICE_Dashboard_2021b Configuration Set.Components(11).CoderTargetData.ThingSpeak

Field	Value
Enable_CustomServer	0
IP_address	184.106.153.149
Port	80

Table 5.32. ICE_Dashboard_2021b Configuration Set.Components(11).CoderTargetData.CAN

Field	Value
CANBusSpeed	500
CANOscillatorFrequency	16
InterruptPin	2
AllowAllFilter	0

Buffer0IDType	Normal
AcceptanceMask0_Nor	0
AcceptanceFilter0_Nor	255
AcceptanceFilter1_Nor	255
AcceptanceMask0_Ext	0
AcceptanceFilter0_Ext	255
AcceptanceFilter1_Ext	255
Buffer1IDType	Normal
AcceptanceMask1_Nor	0
AcceptanceFilter2_Nor	255
AcceptanceFilter3_Nor	255
AcceptanceFilter4_Nor	255
AcceptanceFilter5_Nor	255
AcceptanceMask1_Ext	0
AcceptanceFilter2_Ext	255
AcceptanceFilter3_Ext	255
AcceptanceFilter4_Ext	255
AcceptanceFilter5_Ext	255

Table 5.33. ICE_Dashboard_2021b Configuration Set.Components(11).CoderTargetData.Modbus

Field	Value
Modbus_comms	RS485
Modbus_mode	Master
Modbus_slaveID	1
Modbus_configCoil	1
Modbus_CoilAddr	0
Modbus_CoilNum	1
Modbus_configInput	1
Modbus_InputAddr	0
Modbus_InputNum	1
Modbus_configHoldingReg	1
Modbus_HoldingRegAddr	0
Modbus_HoldingRegNum	1
Modbus_configInputReg	1
Modbus_InputRegAddr	0

Modbus_InputRegNum	1
Modbus_MasterTimeout	100

Table 5.34. ICE_Dashboard_2021b Configuration Set.Components(11).CoderTargetData.RS485

Field	Value
RS485_serial	Serial 0
RS485_baud	9600
RS485_Config	SERIAL_8N1
RS485_DEPin	8
RS485_REPin	9

Table 5.35. ICE_Dashboard_2021b Configuration Set.Components(11).CoderTargetData.Display

Field	Value
EnableCodegen	0
AppLaunchButton	

Table 5.36. ICE_Dashboard_2021b Configuration Set.Components(11).CoderTargetData.DashboardCodegenInfo

Field	Value
enableCodegen	false
circulargauge	ICE_Dashboard_2021b Configuration Set.Components(11).CoderTargetData.DashboardCodegenInfo.circulargauge
displayblock	ICE_Dashboard_2021b Configuration Set.Components(11).CoderTargetData.DashboardCodegenInfo.displayblock
pushbutton	ICE_Dashboard_2021b Configuration Set.Components(11).CoderTargetData.DashboardCodegenInfo.pushbutton

Table 5.37. ICE_Dashboard_2021b Configuration Set.Components(11).CoderTargetData.ExtModeProtocolInfo.XCPonSerial

Field	Value
HostInterface	Simulink
LoggingBufferAuto	true

LoggingBufferSize	250
LoggingBufferNum	2
MaxContigSamples	10

Table 5.38. ICE_Dashboard_2021b Configuration Set.Components(11).CoderTargetData.ExtModeProtocolInfo.XCPonTCPIP

Field	Value
HostInterface	Simulink
LoggingBufferAuto	true
LoggingBufferSize	250
LoggingBufferNum	2
MaxContigSamples	10

Table 5.39. ICE_Dashboard_2021b Configuration Set.Components(11).CoderTargetData.ExtModeProtocolInfo.XCPonWiFi

Field	Value
HostInterface	Simulink
LoggingBufferAuto	true
LoggingBufferSize	250
LoggingBufferNum	2
MaxContigSamples	10

Table 5.40. ICE_Dashboard_2021b Configuration Set.Components(11).CoderTargetData.ConnectionInfo.XCPonSerial

Field	Value
Baudrate	codertarget.arduinobase.registry.getBaudRate
COMPort	codertarget.arduinobase.internal.getExternalModeMexArgs('Serial')
Verbose	false

Table 5.41. ICE_Dashboard_2021b Configuration Set.Components(11).CoderTargetData.ConnectionInfo.XCPonTCPIP

Field	Value
IPAddress	codertarget.arduinobase.internal.getExternalModeMexArgs('Ethernet')
Port	17725

Verbose	false

Table 5.42. ICE_Dashboard_2021b Configuration Set.Components(11).CoderTargetData.ConnectionInfo.XCPonWiFi

Field	Value
IPAddress	codertarget.arduinobase.internal.getExternalModeMexArgs('Wifi')
Port	17725
Verbose	false

Table 5.43. ICE_Dashboard_2021b Configuration Set.Components(11).CoderTargetData.ConnectionInfo.Serial

Field	Value
IPAddress	codertarget.arduinobase.registry.getLoopbackIP;
Port	17725
Verbose	false

Table 5.44. ICE_Dashboard_2021b Configuration Set.Components(11).CoderTargetData.ConnectionInfo.TCPIP

Field	Value
IPAddress	codertarget.arduinobase.internal.getExternalModeMexArgs('Ethernet')
Port	17725
Verbose	false

Table 5.45. ICE_Dashboard_2021b Configuration Set.Components(11).CoderTargetData.ConnectionInfo.WiFi

Field	Value
IPAddress	codertarget.arduinobase.internal.getExternalModeMexArgs('Wifi')
Port	17725
Verbose	false

Table 5.46. ICE_Dashboard_2021b Configuration Set.Components(11).CoderTargetData.DashboardCodegenInfo.circulargauge

Field	Value
Codegen	true

Blockclass	codertarget.targetHiddenBlkInsert.internal.circularGauge
RegFcn	codertarget.arduinobase.blocks.registerDashboardBlk
ValidateFcn	codertarget.targetHiddenBlkInsert.internal.isDashboardBlockCodegenEnabled

Table 5.47. ICE_Dashboard_2021b Configuration Set.Components(11).CoderTargetData.DashboardCodegenInfo.displayblock

Field	Value
Codegen	true
Blockclass	codertarget.targetHiddenBlkInsert.internal.lcdTextDisplay
RegFcn	codertarget.arduinobase.blocks.registerDashboardBlk
ValidateFcn	codertarget.targetHiddenBlkInsert.internal.isDashboardBlockCodegenEnabled

Table 5.48. ICE_Dashboard_2021b Configuration Set.Components(11).CoderTargetData.DashboardCodegenInfo.pushbutton

Field	Value
Codegen	true
Blockclass	codertarget.targetHiddenBlkInsert.internal.pushButton
RegFcn	codertarget.arduinobase.blocks.registerDashboardBlk
ValidateFcn	codertarget.targetHiddenBlkInsert.internal.isDashboardBlockCodegenEnabled

Table 5.49. HDL Coder

Property	Value
HDLSubsystem	ICE_Dashboard_2021b
Workflow	Generic ASIC/FPGA
TargetPlatform	
ReferenceDesign	
ReferenceDesignPath	
CoeffPrefix	coeff
InputType	std_logic_vector
OutputType	Same as input type
ScalarizePorts	off
ScalarizedPortIndexing	Zero-based
SamplesPerCycle	1
InputFIFOSize	10
OutputFIFOSize	10

LargeDelayMemory	off
DelaySizeThreshold	1024
CoeffMultipliers	Multiplier
ResetType	Asynchronous
FIRAdderStyle	linear
MultiplierInputPipeline	0
MultiplierOutputPipeline	0
FoldingFactor	1
NumMultipliers	-1
OptimizeForHDL	off
TimingControllerPostfix	_tc
OptimizeTimingController	on
TimingControllerArch	default
CastBeforeSum	on
TCCounterLimitCompOp	>=
CheckHDL	off
EnablePrefix	enb
ClockEnableInputPort	clk_enable
ClockEnableOutputPort	ce_out
ClockInputPort	clk
ClockEdge	Rising
ResetInputPort	reset
SimulatorFlags	
HDLCompileFilePostfix	_compile.do
HDLCompileInit	vlib %s\n
HDLCompileTerm	
HDLCompileVerilogCmd	vlog %s %s\n
HDLCompileVHDLCmd	vcom %s %s\n
EnableForGenerateLoops	on
HDLMapFilePostfix	_map.txt
HDLMapSeparator	
HDLSimCmd	vsim -voptargs=+acc %s.%s\n
HDLSimFilePostfix	_sim.do
HDLSimProjectFilePostfix	_init.do
HDLSimInit	onbreak resume\nonerror resume\n
HDLSimProjectCmd	project addfile %s\n

HDLSimProjectTerm	project compileall\n
HDLSimProjectInit	project new . %s work\n
HDLSimTerm	run -all\n
HDLSimViewWaveCmd	add wave sim:%s\n
HDLSynthTool	None
HDLSynthCmd	
HDLSynthFilePostfix	
HDLSynthInit	
HDLSynthLibCmd	
HDLSynthLibSpec	
HDLSynthTerm	
ReservedWordPostfix	_rsvd
BlockGenerateLabel	_gen
VHDLLibraryName	work
UseSingleLibrary	off
VHDLArchitectureName	rtl
ClockProcessPostfix	_process
ComplexImagPostfix	_im
ComplexRealPostfix	_re
EntityConflictPostfix	_block
InstancePrefix	u_
InstancePostfix	
InstanceGenerateLabel	_gen
OutputGenerateLabel	outputgen
PackagePostfix	_pkg
SplitEntityArch	off
SplitMooreChartStateUpdate	on
SplitEntityFilePostfix	_entity
SplitArchFilePostfix	_arch
VectorPrefix	vector_of_
ClockInputs	Single
TriggerAsClock	off
AsyncResetPort	off
ConditionalizePipeline	off
InferControlPorts	off
UseRisingEdge	off

TargetDirectory	hdlsrc
TargetSubdirectory	Model
EDAScriptGeneration	on
AddInputRegister	on
AddOutputRegister	on
AddPipelineRegisters	off
PipelinePostfix	_pipe
InputPort	filter_in
OutputPort	filter_out
FracDelayPort	filter_fd
Name	filter
RemoveResetFrom	None
ResetAssertedLevel	Active-high
ReuseAccum	off
ScaleWarnBits	3
SerialPartition	-1
DALUTPartition	-1
DARadix	2
CoefficientSource	Internal
CoefficientMemory	Registers
InputComplex	off
AddRatePort	off
InputDataType	
GenerateHDLCode	on
GenerateModel	on
GenerateTB	off
GenerateCEGenModel	off
ObfuscateGeneratedHDLCode	off
GenerateRecordType	off
Traceability	off
RuntimeReport	off
ResourceReport	off
OptimizationReport	off
ErrorCheckReport	on
HDLGenerateWebview	off
IPCoreReport	off

Recommendations	off
RequirementComments	on
EnableComments	on
Backannotation	off
HierarchicalDistPipelining	off
PreserveDesignDelays	off
AcquireDesignDelaysForEMLOptimizations	off
ClockRatePipelining	on
CRPWithoutFlattening	on
CRPDelayBalancingIterLimit	10
UseCRPAlternativeStrategy	off
IncreaseCRPBudget	on
AdaptivePipelining	off
LUTMapToRAM	on
CloneModules	on
MinDelaysRequiredAtLocalMultirateOutput	1
ClockRatePipelineOutputPorts	off
BalanceClockRateOutputPorts	off
CriticalPathEstimation	off
TimingDatabaseDirectory	
StaticLatencyPathAnalysis	off
optimizeserializer	on
shareequalwl	on
sharedmulsign	Signed
MultiplierPromotionThreshold	0
RoutingFudgeFactor	0.5000
OptimizationCompatibilityCheck	off
NumCriticalPathsEstimated	1
CriticalPathEstimationFile	criticalPathEstimated
SLPAFile	staticLatPathAnalysis
SLPALoopsFile	staticLatLoops
SLPABackEdgeFile	staticLatLoopBackEdge

SLPAGMMapMATFile	staticLatGMMap
HardwarePipeliningCharacterizationFile	
HighlightFeedbackLoops	on
HighlightFeedbackLoopsFile	highlightFeedbackLoop
HighlightClockRatePipeliningDiagnostic	on
HighlightClockRatePipeliningFile	highlightClockRatePipelining
HighlightRemovedDeadBlocks	on
DistributedPipeliningBarriers	on
DistributedPipeliningBarriersFile	highlightDistributedPipeliningBarriers
HighlightLUTPipeliningDiagnostic	on
HighlightLUTPipeliningDiagnosticFile	highlightLUTPipeliningDiagnostic
SetLUTPipeliningOffScriptFile	setLUTPipelineOffScript
BlocksWithNoCharacterizationFile	highlightCriticalPathEstimationOffendingBlocks
AXIStreamingTransformFeatureControl	off
AXIInterface512BitDataPortFeatureControl	off
SerializerRatioThreshold	8192
RetimingCP	off
RetimingCPFile	highlightRetimingCP
ClearHighlightingFile	clearhighlighting
FunctionallyEquivalentRetiming	on
DistributedPipeliningPrecision	-1
DistributedPipelining	off
UseSynthesisEstimatesForDistributedPipelining	off
DistributedPipeliningPriority	Numerical Integrity
RetimingDetails	on

CriticalPathDetails	off
SignalNamesMangling	off
GuidedRetiming	off
LatencyConstraint	0
ReduceMatchingDelays	on
OptimizationData	
CPGuidanceFile	
CPAnnotationFile	
OptimizeMdlGen	on
MulticyclePathInfo	off
MulticyclePathConstraints	off
FloatingPointTargetConfiguration	
GenerateTargetComps	on
NativeFloatingPoint	off
FPToleranceValue	1.0000e-07
FPToleranceStrategy	DEFAULT
nfpLatency	DEFAULT
nfpDenormals	DEFAULT
sschdlMatrixProductSumCustomLatency	-1
AlteraBackwardIncompatibleSinCosPipeline	off
FamilyDevicePackageSpeed	
ToolName	
SynthesisToolChipFamily	
SynthesisToolDeviceName	
SynthesisToolPackageName	
SynthesisToolSpeedValue	
SynthesisTool	
SynthesisProjectAdditionalFiles	
SimulationLibPath	
XilinxSimulatorLibPath	
AdderSharingMinimumBitwidth	0
MultiplierSharingMinimumBitwidth	0

MultiplyAddSharingMinimumBitwidth	0
ShareAdders	off
ShareMultipliers	on
ShareMultiplyAdds	on
ShareMATLABBlocks	on
ShareAtomicSubsystems	on
ShareCounterSerDes	off
ShareFloatingPointIPs	on
PipelinedSharing	on
OptimizeCRPSharingRegisters	on
ClockRatePipeliningBudgetCheck	off
EnableFPGAWorkflow	off
FPGAWorkflowParameters	
GainMultipliers	Multiplier
ProductOfElementsStyle	linear
UserComment	
CustomFileHeaderComment	
CustomFileFooterComment	
DateComment	on
SafeZeroConcat	on
SumOfElementsStyle	linear
TargetLanguage	VHDL
Oversampling	1
ClockRatePipeliningFraction	1
Verbosity	1
TestBenchName	filter_tb
MultifileTestBench	off
IgnoreDataChecking	0
TestBenchPostfix	_tb
TestBenchDataPostfix	_data
TestBenchStimulus	
TestBenchUserStimulus	
TestBenchFracDelayStimulus	
TestBenchCoeffStimulus	

TestBenchRateStimulus	
ForceClockEnable	on
MinimizeClockEnables	off
MinimizeGlobalResets	off
NoResetInitializationMode	InsideModule
NoResetInitScript	noresetinitscript.tcl
ComplexMulElaboration	MultiplyAddBlock
FlattenBus	off
TestBenchClockEnableDelay	1
ForceClock	on
ClockHighTime	5
ClockLowTime	5
HoldTime	2
InputDataInterval	0
ForceReset	on
ErrorMargin	4
HoldInputDataBetweenSamples	on
InitializeTestBenchInputs	off
ResetLength	2
TestBenchReferencePostFix	_ref
GenerateValidationModel	off
RAMMappingThreshold	256
IOThreshold	5000
MapPipelineDelaysToRAM	off
RemoveRedundantCounters	on
ReplaceUnitDelayWithIntegerDelay	on
ConcatenateDelays	on
MergeDelaysOnFanouts	on
FoldDelaysToConstant	on
RAMArchitecture	WithClockEnable
RAMStyleAttributeName	
UseMatrixTypesInEML	on
InlineMATLABBlockCode	off
SubsystemReuse	Atomic only
InlineHDLCode	off

MaskParameterAsGeneric	off
InlineSubsystems	on
StringTypeSupport	off
DeleteUnusedBlocks	on
DeleteUnusedBlocksUnderMask	off
DeleteUnusedPorts	on
BalanceDelays	on
BalanceDelaysControlsFeedbackLoops	on
DelayAbsorption	on
TargetFrequency	0
ExtraEffortMargin	1
MaxOversampling	Inf
MaxComputationLatency	1
MultiplierPartitioningThreshold	Inf
TreatDelayBalancingFailureAs	Error
TransformDelaysWithControlLogic	on
TransformNonZeroInitValDelay	on
DelayElaborationLimit	20
GenerateCoSimBlock	off
HDLCodeCoverage	off
GenerateHDLTestBench	on
GenerateCoSimModel	None
GenerateSVDPITestBench	None
SimulationTool	Mentor Graphics Modelsim
CoSimModelSetup	CosimBlockAndDut
SynthesisOnDirective	
SynthesisOffDirective	
LoopUnrolling	off
InlineConfigurations	on
UseAggregatesForConst	off
UseVerilogTimescale	on
Timescale	`timescale 1 ns / 1 ns

VerilogFileExtension	.v
SystemVerilogFileExtension	.sv
VHDLFileExtension	.vhd
CodeGenerationOutput	GenerateHDLCode
GeneratedModelName	
GeneratedModelNamePrefix	gm_
ValidationModelNameSuffix	_vnl
LayoutStyle	Default
UseDotLayout	off
ShowCodeGenPIR	off
SerializeModel	0
SerializeIO	0
AutoRoute	on
AutoPlace	on
InterBlkHorzScale	1.7000
InterBlkVertScale	1.2000
CustomDotPath	
HighlightAncestors	on
HighlightColor	cyan
InitializeBlockRAM	on
InitializeRealPort	off
MapVectorPortToStream	off
UseFileIOInTestBench	on
TurnkeyWorkflow	off
AlteraWorkflow	off
GenerateFILBlock	off
CoSimLibPostfix	_cosim
TestBenchInitializeInputs	off
MinimizeIntermediateSignals	off
GenerateCodeInfo	off
GatewayoutWithDTC	off
IncrementalCodeGenForTopModel	off
HDLWFSmartbuild	on
HDLCodingStandard	None

HDLCodingStandardCustomizations	
ReferenceDesignParameter	
HDLLintTool	None
HDLLintInit	
HDLLintTerm	
HDLLintCmd	
ModulePrefix	
DetectBlackBoxNameCollision	Warning
PIRTC	on
UsePipelinedToolboxFunctions	on
savepirtoscript	off
ConcatenateHDLModules	off
ML2PIR	off
OptimBetweenMATLABAndSimulink	off
EnableTestpoints	off
BalanceDelaysForTestpoints	on
GenDUTPortForTunableParam	on
BalanceDelaysForTunableParam	on
TraceabilityStyle	Line Level
TraceabilityProcessing	off
TreatRealsInGeneratedCodeAs	Error
TreatBalanceDelaysOffAs	Error
EnumEncodingScheme	default
CompileStrategy	CompileAll
BuildToProtectModel	off
OptimizeConstants	on
OptimizeFixedPointConstants	off
FrameToSampleConversion	off
HDLDTO	off
UseArrangeSystem	off

TriggerAsClockWithoutSync Registers	on
CompactSwitch	off
SimIndexCheck	off

Chapter 6. Glossary

Atomic Subsystem. A subsystem treated as a unit by an implementation of the design documented in this report. The implementation computes the outputs of all the blocks in the atomic subsystem before computing the next block in the parent system's block execution order (sorted list).

Block Diagram. A Simulink block diagram represents a set of simultaneous equations that relate a system or subsystem's inputs to its outputs as a function of time. Each block in the diagram represents an equation of the form y = f(t, x, u) where t is the current time, u is a block input, y is a block output, and x is a system state (see the Simulink documentation for information on the functions represented by the various types of blocks that make up the diagram). Lines connecting the blocks represent dependencies among the blocks, i.e., inputs whose current values are the outputs of other blocks. An implementation of a design described in this document computes a root or atomic system's outputs at each time step by computing the outputs of the blocks in an order determined by block input/output dependencies.

Block Parameter. A variable that determines the output of a block along with its inputs, for example, the gain parameter of a Gain block.

Block Execution Order. The order in which Simulink evaluates blocks during simulation of a model. The block execution order determined by Simulink ensures that a block executes only after all blocks on whose outputs it depends are executed.

Checksum. A number that indicates whether different versions of a model or atomic subsystem differ functionally or only cosmetically. Different checksums for different versions of the same model or subsystem indicate that the versions differ functionally.

Design Variable. A symbolic (MATLAB) variable or expression used as the value of a block parameter. Design variables allow the behavior of the model to be altered by altering the value of the design variable.

Signal. A block output, so-called because block outputs typically vary with time.

Virtual Subsystem. A subsystem that is purely graphical, i.e., is intended to reduce the visual complexity of the block diagram of which it is a subsystem. An implementation of the design treats the blocks in the subsystem as part of the first nonvirtual ancestor of the virtual subsystem (see Atomic Subsystem).

Chapter 7. About this Report

Report Overview

This report describes the design of the ICE_Dashboard_2021b system. The report was generated automatically from a Simulink model used to validate the design. It contains the following sections:

Model Version. Specifies information about the version of the model from which this design description was generated. Includes the model checksum, a number that indicates whether different versions of the model differ functionally or only cosmetically. Different checksums for different versions indicate that the versions differ functionally.

Root System. Describes the design's root system.

Subsystems. Describes each of the design's subsystems.

Design Variables. Describes system design variables, i.e., MATLAB variables and expressions used as block parameter values.

System Model Configuration. Lists the configuration parameters, e.g., start and stop time, of the model used to simulate the system described by this report.

Requirements. Shows design requirements associated with elements of the design model. This section appears only if the design model contains requirements links.

Glossary. Defines Simulink terms used in this report.

Root System Description

This section describes a design's root system. It contains the following sections:

Diagram. Simulink block diagram that represents the algorithm used to compute the root system's outputs.

Description. Description of the root system. This section appears only if the model's root system has a Documentation property or a Doc block.

Interface. Name, data type, width, and other properties of the root system's input and output signals. The number of the block port that outputs the signal appears in angle brackets appended to the signal name. This section appears only if the root system has input or output ports.

Blocks. This section has two subsections:

- **Parameters.** Describes key parameters of blocks in the root system. This section also includes graphical and/or tabular representations of lookup table data used by lookup table blocks, i.e., blocks that use lookup tables to compute their outputs.
- **Block Execution Order.** Order in which blocks must be executed at each time step in order to ensure that each block's inputs are available when it executes.

State Charts. Describes state charts used in the root system. This section appears only if the root system contains Stateflow blocks.

Subsystem Descriptions

This section describes a design's subsystems. Each subsystem description contains the following sections:
Checksum. This section appears only if the subsystem is an atomic subsystem. The checksum indicates whether the version of the model subsystem used to generate this report differs functionally from other versions of the model subsystem. If two model checksums differ, the corresponding versions of the model differ functionally.
Diagram. Simulink block diagram that graphically represents the algorithm used to compute the subsystem's outputs.
Description. Description of the subsystem. This section appears only if the subsystem has a Documentation property or contains a Doc block.
Interface. Name, data type, width, and other properties of the subsystem's input and output signals. The number of the block port that outputs the signal appears in angle brackets appended to the signal name. This section appears only if the subsystem is atomic and has input or output ports.
Blocks. Blocks that this subsystem contains. This section has two subsections:

- **Parameters.** Key parameters of blocks in the subsystem. This section also includes graphical and/or tabular representations of lookup table data used by lookup table blocks, blocks that use lookup tables to compute their outputs.
- **Block Execution Order.** Order in which the subsystem's blocks must be executed at each time step in order to ensure that each block's inputs are available when the block executes .This section appears only if the subsystem is atomic. Note: in Acrobat(PDF) reports, the number in square brackets next to the block name is a hyperlink to the block parameter table. The number has no model significance.

State Charts. Describes state charts used in the subsystem. This section appears only if the root system contains Stateflow blocks.

State Chart Descriptions

This section describes the state machines used by Stateflow blocks to compute their outputs, i.e., Stateflow blocks. Each state machine description contains the following sections:
Chart. Diagram representing the state machine.
States. Describes the state machine's states. Each state description includes the state's diagram and diagrams and/or descriptions of graphical functions, Simulink functions, truth tables, and MATLAB functions parented by the state.

Transitions. Transitions between the state machine's states. Each transition description specifies the values of key transition properties. Appears only if a transition has properties that do not appear on the chart.
Junctions. Transition junctions. Each junction description specifies the values of key junction properties. Appears only if a junction has properties that do not appear on the chart.
Events. Events that trigger state transitions. Each event description specifies the values of key event properties.
Data. Data types and other properties of the Stateflow block's inputs, outputs, and other state machine data.
Targets. Executable implementations of the state machine used to compute the outputs of the corresponding Stateflow block.
MATLAB Supporting Functions. List of functions invoked by MATLAB functions defined in the chart.