# **Demo2022b**

**Design Description**

**bryantboatright**

**Demo2022b: Design Description**

by bryantboatright

Published 22-Apr-2023 09:21:24

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# **Chapter 1. Model Version**

**Version:** 3.7

**Last modified:** Fri Apr 21 01:14:39 2023

**Checksum:** 1564967035 2775754222 2967489902 573370372

# **Chapter 2. Root System**

**Figure 2-1. Demo2022b**

## **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 |
| 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 |
| 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 (g/s)" (DisplayBlock)**

**Table 2-10. "Fuel Mass Flow Rate (g/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 |

#### **"Fuel Mass g" (DisplayBlock)**

**Table 2-11. "Fuel Mass g" 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 ] |
| 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 |
| 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 |
| 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**

"Demo2022b" is a multitasking model. Block execution order is not available for multitasking models.

# **Chapter 3. Subsystems**

## **Data Input Subsystem**

**Figure 3-1. Demo2022b/Data Input Subsystem**

### **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 | [] |
| 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 |
| 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 |
| 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 |
| 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 |
| 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 | [] |
| 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 | [] |
| 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 |
| 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 |

## **make sure days string is two numbers**

**Figure 3-2. Demo2022b/Post Processing Subsystem/Subsystem/make sure days string is two numbers**

### **Blocks**

#### **Parameters**

##### *"Constant3" (Constant)*

**Table 3-14. "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 3-15. "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 3-16. "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 |
| 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 3-17. "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 3-18. "String Concatenate" Parameters**

| **Parameter** | **Value** |
| --- | --- |
| Number of inputs | 2 |
| Output data type | string |

##### *"String Constant1" (StringConstant)*

**Table 3-19. "String Constant1" Parameters**

| **Parameter** | **Value** |
| --- | --- |
| String | "0" |
| Output data type | string |

##### *"Switch1" (Switch)*

**Table 3-20. "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 3-3. Demo2022b/Post Processing Subsystem/Subsystem/make sure hours string is two numbers**

### **Blocks**

#### **Parameters**

##### *"Constant3" (Constant)*

**Table 3-21. "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 3-22. "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 3-23. "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 |
| 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 3-24. "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 3-25. "String Concatenate" Parameters**

| **Parameter** | **Value** |
| --- | --- |
| Number of inputs | 2 |
| Output data type | string |

##### *"String Constant1" (StringConstant)*

**Table 3-26. "String Constant1" Parameters**

| **Parameter** | **Value** |
| --- | --- |
| String | "0" |
| Output data type | string |

##### *"Switch1" (Switch)*

**Table 3-27. "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 3-4. Demo2022b/Post Processing Subsystem/Subsystem/make sure minutes string is two numbers**

### **Blocks**

#### **Parameters**

##### *"Constant3" (Constant)*

**Table 3-28. "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 3-29. "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 3-30. "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 |
| 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 3-31. "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 3-32. "String Concatenate" Parameters**

| **Parameter** | **Value** |
| --- | --- |
| Number of inputs | 2 |
| Output data type | string |

##### *"String Constant1" (StringConstant)*

**Table 3-33. "String Constant1" Parameters**

| **Parameter** | **Value** |
| --- | --- |
| String | "0" |
| Output data type | string |

##### *"Switch1" (Switch)*

**Table 3-34. "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 3-5. Demo2022b/Post Processing Subsystem/Subsystem/make sure months 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 |
| 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 seconds string is two numbers**

**Figure 3-6. Demo2022b/Post Processing Subsystem/Subsystem/make sure seconds 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 |

##### *"Constant4" (Constant)*

**Table 3-43. "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 3-44. "Constant5" Parameters**

| **Parameter** | **Value** |
| --- | --- |
| Constant value | 2 |
| Interpret vector parameters as 1-D | off |
| 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 3-45. "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 3-46. "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 |
| 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 3-47. "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 3-48. "String Concatenate" Parameters**

| **Parameter** | **Value** |
| --- | --- |
| Number of inputs | 2 |
| Output data type | string |

##### *"String Constant1" (StringConstant)*

**Table 3-49. "String Constant1" Parameters**

| **Parameter** | **Value** |
| --- | --- |
| String | "0" |
| Output data type | string |

##### *"Substring1" (Substring)*

**Table 3-50. "Substring1" Parameters**

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

##### *"Switch1" (Switch)*

**Table 3-51. "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 |

## **Post Processing Subsystem**

**Figure 3-7. Demo2022b/Post Processing Subsystem**

### **Blocks**

#### **Parameters**

##### *"air mass flow" (Derivative)*

**Table 3-52. "air mass flow" Parameters**

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

##### *"airFlowIn" (Inport)*

**Table 3-53. "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 3-54. "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 3-55. "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 3-56. 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 |
| Input fi math | fimath(...  ) |
| Description |  |

**Table 3-57. 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 3-58. "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 3-59. "coIn" Parameters**

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

##### *"Constant2" (Constant)*

**Table 3-60. "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 3-61. "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 3-62. "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 3-63. "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 3-64. "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 |

##### *"Magical Constant" (Constant)*

**Table 3-65. "Magical Constant" Parameters**

| **Parameter** | **Value** |
| --- | --- |
| Constant value | 0.004865 |
| 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 |

##### *"mass flow rate of fuel" (Derivative)*

**Table 3-66. "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 3-67. 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 3-68. 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 3-69. 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 3-70. 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, engineSelection)

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 3-71. 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 3-72. 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 Function3" (MATLAB Function)*

**Table 3-73. 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 3-74. 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 |
| 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,exhaustTemp,airMassFlow,barrelPressure,ambientPressure,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,%.3f,%.3f,%.3f,%.3f,%.3f,%.3f,%.3f\r\n', ...

torque,brakeWork,rpm,fuelMassFlow,exhaustTemp,airMassFlow,barrelPressure,ambientPressure,BMEP,BSFC,Teff,Veff,o2,co2,co,noPPM,hcPPM);

fclose(file);

end

**Table 3-75. MATLAB Function3 Supporting Functions**

| **Function** | **Defined By** | **Path** |
| --- | --- | --- |
| char | MATLAB |  |
| colon | MATLAB |  |
| fclose | MATLAB |  |
| feval | MATLAB |  |
| fidCheck | MATLAB |  |
| 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 |  |

##### *"MATLAB Function5" (MATLAB Function)*

**Table 3-76. MATLAB Function5 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 3-77. 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, brakeWork)

% 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 3-78. MATLAB Function6 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 3-79. MATLAB Function6 Argument Summary**

| **Name** | **Scope** | **Port** | **Data Type** | **Size** |
| --- | --- | --- | --- | --- |
| magicConstant | 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(magicConstant, rpm, displacement, strokes, engineSelection)

if(engineSelection == 1 || engineSelection == 2 || engineSelection == 5 || engineSelection == 6)

Veff = ((strokes \* magicConstant) / (1.205 \* displacement \* (rpm / 60)));

elseif (engineSelection == 3)

Veff = ((strokes \* magicConstant) / (1.205 \* (displacement \* 4) \* (rpm / 60)));

else

Veff = ((strokes \* magicConstant) / (1.205 \* (displacement \* 6) \* (rpm / 60)));

end

##### *"MATLAB Function8" (MATLAB Function)*

**Table 3-80. MATLAB Function8 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 3-81. 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 3-82. 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 |
| MATLAB Function block fimath | Same as MATLAB Default |
| Input fi math | fimath(...  ) |
| Description |  |

**Table 3-83. 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,ambientPressure,...

o2,co2,co,noPPM,hcPPM ] = fcn(on,rpmIn,exhaustTempIn,torqueIn,fuelMassIn,...

airFlowIn,barrelPressureIn,ambientPressureIn,o2In,co2In,coIn,noPPMIn,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 3-84. "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 3-85. "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 3-86. "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 |
| 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 3-87. "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 3-88. "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 |

##### *"rpmIn" (Inport)*

**Table 3-89. "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 3-90. "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 3-91. "Units Variable" 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 |

## **Subsystem**

**Figure 3-8. Demo2022b/Data Input Subsystem/Subsystem**

### **Blocks**

#### **Parameters**

##### *""load"1" (Constant)*

**Table 3-92. ""load"1" Parameters**

| **Parameter** | **Value** |
| --- | --- |
| Constant value | 37.20666430343849 |
| 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 3-93. "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 | [] |
| MustResolveToSignalObject | off |
| Specify output when source is unconnected | off |
| Constant value | 0 |
| Interpret vector parameters as 1-D | on |

##### *"ambientPressure" (Outport)*

**Table 3-94. "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 3-95. "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 3-96. "Clock1" Parameters**

| **Parameter** | **Value** |
| --- | --- |
| Display time | off |
| Decimation | 10 |

##### *"co" (Outport)*

**Table 3-97. "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 3-98. "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 |

##### *"exhaustTemp" (Outport)*

**Table 3-99. "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 |
| 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 flow rate" (Outport)*

**Table 3-100. "fuel flow rate" 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 |
| Interpret vector parameters as 1-D | on |

##### *"hcPPM" (Outport)*

**Table 3-101. "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 3-102. "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 Function" (MATLAB Function)*

**Table 3-103. 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 3-104. 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 |
| 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,barrelPressure,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 3-105. MATLAB Function Supporting Functions**

| **Function** | **Defined By** | **Path** |
| --- | --- | --- |
| isnan | MATLAB |  |

##### *"noPPM" (Outport)*

**Table 3-106. "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 3-107. "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 |

##### *"Product1" (Product)*

**Table 3-108. "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 3-109. "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 3-110. "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 |
| 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 3-111. "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 3-9. Demo2022b/Post Processing Subsystem/Subsystem**

### **Blocks**

#### **Parameters**

##### *"Compose String" (ComposeString)*

**Table 3-112. "Compose String" Parameters**

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

##### *"Display" (Display)*

**Table 3-113. "Display" Parameters**

| **Parameter** | **Value** |
| --- | --- |
| Numeric display format | short |
| Decimation | 1 |
| Floating display | off |

##### *"filename" (Outport)*

**Table 3-114. "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 3-115. MATLAB Function4 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 3-116. 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 3-117. MATLAB Function4 Supporting Functions**

| **Function** | **Defined By** | **Path** |
| --- | --- | --- |
| abs | MATLAB |  |
| any | MATLAB |  |
| ceil | MATLAB |  |
| char | MATLAB |  |
| coder.ExternalDependency | MATLAB |  |
| coder.mixin.internal.SpoofReport | MATLAB |  |
| 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 |  |
| 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 3-118. "String to ASCII" Parameters**

| **Parameter** | **Value** |
| --- | --- |
| Output vector size | 31 |

##### *"Trigger" (Inport)*

**Table 3-119. "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 3-10. Demo2022b/Post Processing 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 3-120.**

|  |
| --- |
| 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 3-121.**

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

### **Blocks**

#### **Parameters**

##### *"filename" (Outport)*

**Table 3-122. "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 |

##### *"In1" (Inport)*

**Table 3-123. "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 3-124. 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 3-125. 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 temperature,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 3-126. MATLAB Function3 Supporting Functions**

| **Function** | **Defined By** | **Path** |
| --- | --- | --- |
| char | MATLAB |  |
| colon | MATLAB |  |
| fclose | MATLAB |  |
| feval | MATLAB |  |
| fidCheck | MATLAB |  |
| 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 |  |

##### *"Trigger" (TriggerPort)*

**Table 3-127. "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 | [] |
| Maximum | [] |
| Data type | Inherit: auto |
| Interpolate data | on |
| FunctionPrototype | f() |

### **Block Execution Order**

"Demo2022b" is a multitasking model. Block execution order is not available for multitasking models.

# **Chapter 4. Requirements**

Demo2022b does not contain requirements traceability links.

# **Chapter 5. System Model Configuration**

|  |  |
| --- | --- |
| Source: | Model |
| Source Name: | Demo2022b |

**Table 5-1. Demo2022b Configuration Set**

|  |  |
| --- | --- |
| **Property** | **Value** |
| Description |  |
| Components | [[Demo2022b Configuration Set.Components(1) [000]](#ID_mw_95_385eebe919a832bf40e50dc4c8832ad3) , [Demo2022b Configuration Set.Components(2) [000]](#ID_mw_95_5f547c64ebe7046ef4e391290405c680) , [Demo2022b Configuration Set.Components(3) [000]](#ID_mw_95_e76db7cafda256a1c61adc6a1754edd1) , [Demo2022b Configuration Set.Components(4) [000]](#ID_mw_95_b12fb9858f1b75468147ee2ff84d40c6) , [Demo2022b Configuration Set.Components(5) [000]](#ID_mw_95_9941bc6b6369fbcce9f3801c6db2a02f) , [Demo2022b Configuration Set.Components(6) [000]](#ID_mw_95_b2ea340fa80960d006adf31ca22f33c0) , [Demo2022b Configuration Set.Components(7) [000]](#ID_mw_95_01eea99f2f01d67244e3597fd0a6b467) , [Demo2022b Configuration Set.Components(8) [000]](#ID_mw_95_9852356420a4833d9e1567056a15b54a) , [Demo2022b Configuration Set.Components(9) [000]](#ID_mw_95_1b2e7e1707b27995652019ae8fb22af6) , [Demo2022b Configuration Set.Components(10) [000]](#ID_mw_95_b3e7bfd59f6b7363b8abdf5b239a6e7c) , [Demo2022b Configuration Set.Components(11) [000]](#ID_mw_95_8371551c2f738d2ce9a06035eb119cf3) ] |
| Name | Configuration |

**Table 5-2.** [**Demo2022b Configuration Set.Components [000]**](#ID_mw_95_81ca466b97512b1c0935d543180bd188) **(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.** [**Demo2022b Configuration Set.Components [000]**](#ID_mw_95_81ca466b97512b1c0935d543180bd188) **(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.** [**Demo2022b Configuration Set.Components [000]**](#ID_mw_95_81ca466b97512b1c0935d543180bd188) **(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.** [**Demo2022b Configuration Set.Components [000]**](#ID_mw_95_81ca466b97512b1c0935d543180bd188) **(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.** [**Demo2022b Configuration Set.Components [000]**](#ID_mw_95_81ca466b97512b1c0935d543180bd188) **(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.** [**Demo2022b Configuration Set.Components [000]**](#ID_mw_95_81ca466b97512b1c0935d543180bd188) **(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.** [**Demo2022b Configuration Set.Components [000]**](#ID_mw_95_81ca466b97512b1c0935d543180bd188) **(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.** [**Demo2022b Configuration Set.Components [000]**](#ID_mw_95_81ca466b97512b1c0935d543180bd188) **(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 | [Demo2022b Configuration Set.Components(8).CodeCoverageSettings [000]](#ID_mw_95_2af6046a393e59657f0545e2dce88aca) |
| 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 | [[Demo2022b Configuration Set.Components(8).Components(1) [000]](#ID_mw_95_392a537007efe04ba37a5eb3ecc3794c) , [Demo2022b Configuration Set.Components(8).Components(2) [000]](#ID_mw_95_7ce0f21fa305a09ae955456d9da9039a) ] |

**Table 5-10.** [**Demo2022b Configuration Set.Components [000]**](#ID_mw_95_81ca466b97512b1c0935d543180bd188) **(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.** [**Demo2022b Configuration Set.Components [000]**](#ID_mw_95_81ca466b97512b1c0935d543180bd188) **(10)**

|  |  |
| --- | --- |
| **Property** | **Value** |
| Description | HDL Coder custom configuration component |
| Components |  |
| Name | HDL Coder |

**Table 5-12.** [**Demo2022b Configuration Set.Components [000]**](#ID_mw_95_81ca466b97512b1c0935d543180bd188) **(11)**

|  |  |
| --- | --- |
| **Property** | **Value** |
| Description | Coder Target |
| Components |  |
| Name | Coder Target |
| CoderTargetData | [Demo2022b Configuration Set.Components(11).CoderTargetData [000]](#ID_mw_95_a8037a483178b7de5825a24633842499) |

**Table 5-13.** [**Demo2022b Configuration Set.Components(8) [000]**](#ID_mw_95_9852356420a4833d9e1567056a15b54a) **.CodeCoverageSettings**

|  |  |
| --- | --- |
| **Property** | **Value** |
| TopModelCoverage | off |
| ReferencedModelCoverage | off |
| CoverageTool | None |

**Table 5-14.** [**Demo2022b Configuration Set.Components(8).Components [000]**](#ID_mw_95_49fb975dd1799bfc655509a18ac6a590) **(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 | $R$N$M |
| CustomSymbolStrType | $N$R$M\_T |
| CustomSymbolStrField | $N$M |
| CustomSymbolStrFcn | $R$N$M$F |
| CustomSymbolStrFcnArg | rt$I$N$M |
| CustomSymbolStrBlkIO | rtb\_$N$M |
| CustomSymbolStrTmpVar | $N$M |
| CustomSymbolStrMacro | $R$N$M |
| CustomSymbolStrUtil | $N$C |
| CustomSymbolStrEmxType | emxArray\_$M$N |
| 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.** [**Demo2022b Configuration Set.Components(8).Components [000]**](#ID_mw_95_49fb975dd1799bfc655509a18ac6a590) **(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 | $R$E |
| ERTSourceFileRootName | $R$E |
| ERTDataFileRootName | $R\_data |
| InstructionSetExtensions | {None} |
| OptimizeReductions | off |
| IsSLRTTarget | off |
| DSAsUniqueAccess | off |
| ExtMode | off |
| ExtModeTransport | 3 |
| ExtModeStaticAlloc | on |
| ExtModeAutomaticAllocSize | off |
| 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 | [Demo2022b Configuration Set.Components(8).Components(2).ReplacementTypes [000]](#ID_mw_95_39dfd0882b20eae8b49a4c91d8c1873d) |
| 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.** [**Demo2022b Configuration Set.Components(11) [000]**](#ID_mw_95_8371551c2f738d2ce9a06035eb119cf3) **.CoderTargetData**

|  |  |
| --- | --- |
| **Field** | **Value** |
| UseCoderTarget | true |
| TargetHardware | Arduino Uno |
| ExtModeProtocolInfo | [Demo2022b Configuration Set.Components(11).CoderTargetData.ExtModeProtocolInfo [000]](#ID_mw_95_cc1b20dce459fcbd818502b6045d37a9) |
| ConnectionInfo | [Demo2022b Configuration Set.Components(11).CoderTargetData.ConnectionInfo [000]](#ID_mw_95_dfa8d245dd5fbe027782a9359d19094f) |
| ExtMode | [Demo2022b Configuration Set.Components(11).CoderTargetData.ExtMode [000]](#ID_mw_95_c107dc15685e9f3284d78b1169b27c57) |
| RTOS | Baremetal |
| Scheduler\_interrupt\_source | 0 |
| Runtime | [Demo2022b Configuration Set.Components(11).CoderTargetData.Runtime [000]](#ID_mw_95_aedf8ffe5f0f9aa468fd49c68a6fd701) |
| HostBoardConnection | [Demo2022b Configuration Set.Components(11).CoderTargetData.HostBoardConnection [000]](#ID_mw_95_97d2b3bc20e8335b30e2a5a0d0852831) |
| ConnectedIO | [Demo2022b Configuration Set.Components(11).CoderTargetData.ConnectedIO [000]](#ID_mw_95_55ed53873915724fcd5674e9469e581b) |
| OverRunDetection | [Demo2022b Configuration Set.Components(11).CoderTargetData.OverRunDetection [000]](#ID_mw_95_d888491a2768cf54d875b4f7494dd952) |
| AnalogInRefVoltage | [Demo2022b Configuration Set.Components(11).CoderTargetData.AnalogInRefVoltage [000]](#ID_mw_95_b1d4a2ea15a7a9d74e208fd50a1dfed6) |
| Serial | [Demo2022b Configuration Set.Components(11).CoderTargetData.Serial [000]](#ID_mw_95_4b389cf8083c195c06fa468809c53e74) |
| I2C | [Demo2022b Configuration Set.Components(11).CoderTargetData.I2C [000]](#ID_mw_95_48a22b7cc5f82930df3d7d6b7726e8a7) |
| SPI | [Demo2022b Configuration Set.Components(11).CoderTargetData.SPI [000]](#ID_mw_95_7761cfac7651ee9624d000b663cf7929) |
| Ethernet | [Demo2022b Configuration Set.Components(11).CoderTargetData.Ethernet [000]](#ID_mw_95_1eca49936d5ac04733ce17d026777ea4) |
| Wifi | [Demo2022b Configuration Set.Components(11).CoderTargetData.Wifi [000]](#ID_mw_95_be467c41080e5666201c797ac1ce0be2) |
| ThingSpeak | [Demo2022b Configuration Set.Components(11).CoderTargetData.ThingSpeak [000]](#ID_mw_95_8b9d07d7c3aa525b3925c0b2791a74c2) |
| CAN | [Demo2022b Configuration Set.Components(11).CoderTargetData.CAN [000]](#ID_mw_95_745d4e7989b5c2222f001d04c1635b53) |
| Modbus | [Demo2022b Configuration Set.Components(11).CoderTargetData.Modbus [000]](#ID_mw_95_947d46861adc349837f42138d668dc1d) |
| RS485 | [Demo2022b Configuration Set.Components(11).CoderTargetData.RS485 [000]](#ID_mw_95_ccc8bf0384b7158e4d84d0e2ae79e720) |
| Display | [Demo2022b Configuration Set.Components(11).CoderTargetData.Display [000]](#ID_mw_95_7de3f8a78c004a7fbbcd15ad2a41359e) |
| DataVersion | 2016.02 |
| DashboardCodegenInfo | [Demo2022b Configuration Set.Components(11).CoderTargetData.DashboardCodegenInfo [000]](#ID_mw_95_cb5afdb2ffb1a5e7c184d6b6d6a1a29f) |
| IOBlocksMode | connected |

**Table 5-17.** [**Demo2022b Configuration Set.Components(8).Components(2) [000]**](#ID_mw_95_7ce0f21fa305a09ae955456d9da9039a) **.ReplacementTypes**

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

**Table 5-18.** [**Demo2022b Configuration Set.Components(11).CoderTargetData [000]**](#ID_mw_95_a8037a483178b7de5825a24633842499) **.ExtModeProtocolInfo**

|  |  |
| --- | --- |
| **Field** | **Value** |
| XCPonSerial | [Demo2022b Configuration Set.Components(11).CoderTargetData.ExtModeProtocolInfo.XCPonSerial [000]](#ID_mw_95_648ddd04c96c2a16b9e962c1ec6de5d8) |
| XCPonTCPIP | [Demo2022b Configuration Set.Components(11).CoderTargetData.ExtModeProtocolInfo.XCPonTCPIP [000]](#ID_mw_95_1fd2ced53c08192f13a33f113b228551) |
| XCPonWiFi | [Demo2022b Configuration Set.Components(11).CoderTargetData.ExtModeProtocolInfo.XCPonWiFi [000]](#ID_mw_95_54a2ee5abcd11d3ea26ea1990ef1bf3a) |

**Table 5-19.** [**Demo2022b Configuration Set.Components(11).CoderTargetData [000]**](#ID_mw_95_a8037a483178b7de5825a24633842499) **.ConnectionInfo**

|  |  |
| --- | --- |
| **Field** | **Value** |
| XCPonSerial | [Demo2022b Configuration Set.Components(11).CoderTargetData.ConnectionInfo.XCPonSerial [000]](#ID_mw_95_b2f1b6265da59a45f80c3586f12a232c) |
| XCPonTCPIP | [Demo2022b Configuration Set.Components(11).CoderTargetData.ConnectionInfo.XCPonTCPIP [000]](#ID_mw_95_629a56e98108d8be420b7124cc48c181) |
| XCPonWiFi | [Demo2022b Configuration Set.Components(11).CoderTargetData.ConnectionInfo.XCPonWiFi [000]](#ID_mw_95_266aa90aa5d9e0cc058d8eb0bc9ced6e) |

**Table 5-20.** [**Demo2022b Configuration Set.Components(11).CoderTargetData [000]**](#ID_mw_95_a8037a483178b7de5825a24633842499) **.ExtMode**

|  |  |
| --- | --- |
| **Field** | **Value** |
| Configuration | XCP on Serial |
| COMPortBaud | 115200 |

**Table 5-21.** [**Demo2022b Configuration Set.Components(11).CoderTargetData [000]**](#ID_mw_95_a8037a483178b7de5825a24633842499) **.Runtime**

|  |  |
| --- | --- |
| **Field** | **Value** |
| BuildAction | Build, load and run |
| DisableParallelBuild | 0 |
| ForceBuildStaticLibrary | 0 |

**Table 5-22.** [**Demo2022b Configuration Set.Components(11).CoderTargetData [000]**](#ID_mw_95_a8037a483178b7de5825a24633842499) **.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.** [**Demo2022b Configuration Set.Components(11).CoderTargetData [000]**](#ID_mw_95_a8037a483178b7de5825a24633842499) **.ConnectedIO**

|  |  |
| --- | --- |
| **Field** | **Value** |
| ConnectedIOMode | Auto |
| ActionOnOverrun | warning |

**Table 5-24.** [**Demo2022b Configuration Set.Components(11).CoderTargetData [000]**](#ID_mw_95_a8037a483178b7de5825a24633842499) **.OverRunDetection**

|  |  |
| --- | --- |
| **Field** | **Value** |
| Enable\_overrun\_detection | 0 |
| Digital\_output\_to\_set\_on\_overrun | 13 |

**Table 5-25.** [**Demo2022b Configuration Set.Components(11).CoderTargetData [000]**](#ID_mw_95_a8037a483178b7de5825a24633842499) **.AnalogInRefVoltage**

|  |  |
| --- | --- |
| **Field** | **Value** |
| Analog\_input\_reference\_voltage | 0 |

**Table 5-26.** [**Demo2022b Configuration Set.Components(11).CoderTargetData [000]**](#ID_mw_95_a8037a483178b7de5825a24633842499) **.Serial**

|  |  |
| --- | --- |
| **Field** | **Value** |
| Serial0\_baud\_rate | 9600 |
| Serial0\_baud\_specify | 921600 |
| Serial0\_Config | SERIAL\_8N1 |

**Table 5-27.** [**Demo2022b Configuration Set.Components(11).CoderTargetData [000]**](#ID_mw_95_a8037a483178b7de5825a24633842499) **.I2C**

|  |  |
| --- | --- |
| **Field** | **Value** |
| I2C0BusSpeedHz | 100000 |

**Table 5-28.** [**Demo2022b Configuration Set.Components(11).CoderTargetData [000]**](#ID_mw_95_a8037a483178b7de5825a24633842499) **.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.** [**Demo2022b Configuration Set.Components(11).CoderTargetData [000]**](#ID_mw_95_a8037a483178b7de5825a24633842499) **.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.** [**Demo2022b Configuration Set.Components(11).CoderTargetData [000]**](#ID_mw_95_a8037a483178b7de5825a24633842499) **.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.** [**Demo2022b Configuration Set.Components(11).CoderTargetData [000]**](#ID_mw_95_a8037a483178b7de5825a24633842499) **.ThingSpeak**

|  |  |
| --- | --- |
| **Field** | **Value** |
| Enable\_CustomServer | 0 |
| IP\_address | 184.106.153.149 |
| Port | 80 |

**Table 5-32.** [**Demo2022b Configuration Set.Components(11).CoderTargetData [000]**](#ID_mw_95_a8037a483178b7de5825a24633842499) **.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.** [**Demo2022b Configuration Set.Components(11).CoderTargetData [000]**](#ID_mw_95_a8037a483178b7de5825a24633842499) **.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.** [**Demo2022b Configuration Set.Components(11).CoderTargetData [000]**](#ID_mw_95_a8037a483178b7de5825a24633842499) **.RS485**

|  |  |
| --- | --- |
| **Field** | **Value** |
| RS485\_serial | Serial 0 |
| RS485\_baud | 9600 |
| RS485\_Config | SERIAL\_8N1 |
| RS485\_DEPin | 8 |
| RS485\_REPin | 9 |

**Table 5-35.** [**Demo2022b Configuration Set.Components(11).CoderTargetData [000]**](#ID_mw_95_a8037a483178b7de5825a24633842499) **.Display**

|  |  |
| --- | --- |
| **Field** | **Value** |
| EnableCodegen | 0 |
| AppLaunchButton |  |

**Table 5-36.** [**Demo2022b Configuration Set.Components(11).CoderTargetData [000]**](#ID_mw_95_a8037a483178b7de5825a24633842499) **.DashboardCodegenInfo**

|  |  |
| --- | --- |
| **Field** | **Value** |
| enableCodegen | false |
| circulargauge | [Demo2022b Configuration Set.Components(11).CoderTargetData.DashboardCodegenInfo.circulargauge [000]](#ID_mw_95_971c31567d9bcada481685f074f23463) |
| displayblock | [Demo2022b Configuration Set.Components(11).CoderTargetData.DashboardCodegenInfo.displayblock [000]](#ID_mw_95_b26135de66ecf1baf25b51b973d6822f) |
| pushbutton | [Demo2022b Configuration Set.Components(11).CoderTargetData.DashboardCodegenInfo.pushbutton [000]](#ID_mw_95_a24081bf768d87d4d866f56d1f7165a1) |

**Table 5-37.** [**Demo2022b Configuration Set.Components(11).CoderTargetData.ExtModeProtocolInfo [000]**](#ID_mw_95_cc1b20dce459fcbd818502b6045d37a9) **.XCPonSerial**

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

**Table 5-38.** [**Demo2022b Configuration Set.Components(11).CoderTargetData.ExtModeProtocolInfo [000]**](#ID_mw_95_cc1b20dce459fcbd818502b6045d37a9) **.XCPonTCPIP**

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

**Table 5-39.** [**Demo2022b Configuration Set.Components(11).CoderTargetData.ExtModeProtocolInfo [000]**](#ID_mw_95_cc1b20dce459fcbd818502b6045d37a9) **.XCPonWiFi**

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

**Table 5-40.** [**Demo2022b Configuration Set.Components(11).CoderTargetData.ConnectionInfo [000]**](#ID_mw_95_dfa8d245dd5fbe027782a9359d19094f) **.XCPonSerial**

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

**Table 5-41.** [**Demo2022b Configuration Set.Components(11).CoderTargetData.ConnectionInfo [000]**](#ID_mw_95_dfa8d245dd5fbe027782a9359d19094f) **.XCPonTCPIP**

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

**Table 5-42.** [**Demo2022b Configuration Set.Components(11).CoderTargetData.ConnectionInfo [000]**](#ID_mw_95_dfa8d245dd5fbe027782a9359d19094f) **.XCPonWiFi**

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

**Table 5-43.** [**Demo2022b Configuration Set.Components(11).CoderTargetData.DashboardCodegenInfo [000]**](#ID_mw_95_cb5afdb2ffb1a5e7c184d6b6d6a1a29f) **.circulargauge**

|  |  |
| --- | --- |
| **Field** | **Value** |
| Codegen | true |
| Blockclass | codertarget.targetHiddenBlkInsert.internal.circularGauge |
| RegFcn | codertarget.arduinobase.blocks.registerDashboardBlk |
| ValidateFcn | codertarget.targetHiddenBlkInsert.internal.isDashboardBlockCodegenEnabled |

**Table 5-44.** [**Demo2022b Configuration Set.Components(11).CoderTargetData.DashboardCodegenInfo [000]**](#ID_mw_95_cb5afdb2ffb1a5e7c184d6b6d6a1a29f) **.displayblock**

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

**Table 5-45.** [**Demo2022b Configuration Set.Components(11).CoderTargetData.DashboardCodegenInfo [000]**](#ID_mw_95_cb5afdb2ffb1a5e7c184d6b6d6a1a29f) **.pushbutton**

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

**Table 5-46. HDL Coder**

|  |  |
| --- | --- |
| **Property** | **Value** |
| HDLSubsystem | Demo2022b |
| 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 |
| TriggerAsClockWithoutSyncRegisters | 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 Demo2022b 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.