

**F14 Project**  
**Design Description**  
**The MathWorks Inc.**

# **F14 Project: Design Description**

by The MathWorks Inc.

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# Chapter 1. Model Version

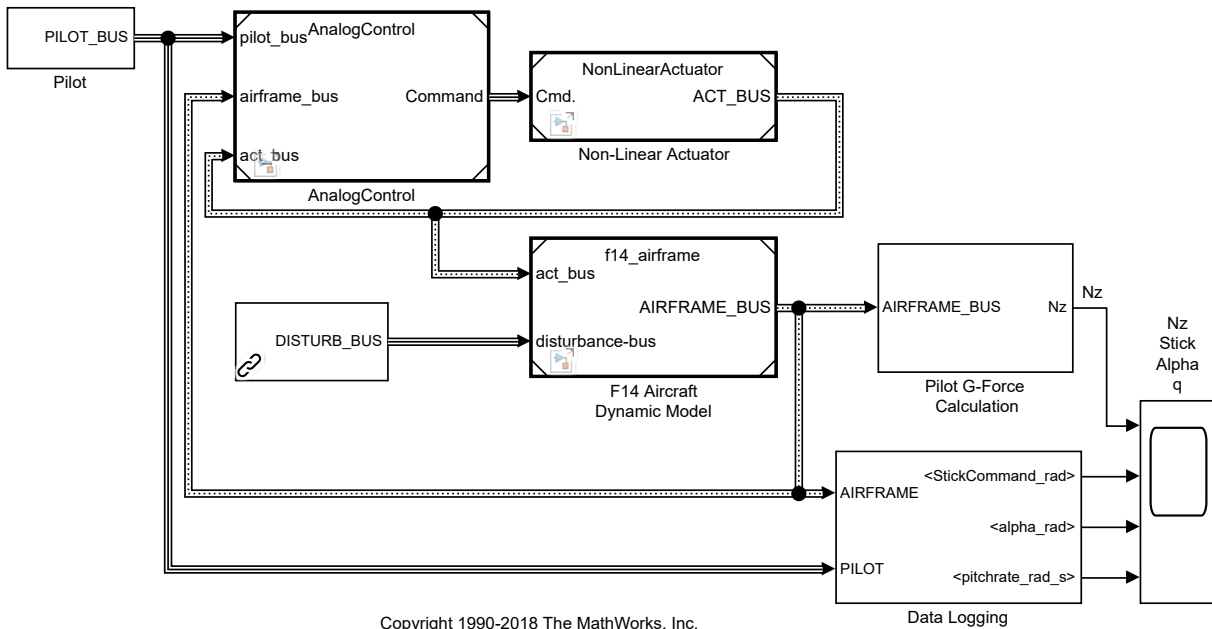
**Version:** 1.92

**Last modified:** Sat Sep 26 02:00:56 2020

**Checksum:** 772984435 3091032808 688455055 3652797903

# Chapter 2. Root System

Figure 2.1. slproject\_f14



## Blocks

## Parameters

### "AnalogControl" (ModelReference)

Table 2.1. "AnalogControl" Parameters

Parameter	Value
Model name	AnalogControl
ModelFile	AnalogControl.slx
ModelName	AnalogControl
Simulation mode	Normal
Show model initialize port	off
Show model reset ports	off
Show model terminate port	off

Parameter	Value
Schedule rates	off
Schedule rates with	Ports
AutoFillPortDiscreteRates	on
Code interface	Model reference
Variant	off
Base sample time(-1 for inherited)	-1

## "F14 Aircraft Dynamic Model" (ModelReference)

**Table 2.2. "F14 Aircraft Dynamic Model" Parameters**

Parameter	Value
Model name	f14_airframe
ModelFile	f14_airframe.slx
ModelName	f14_airframe
Simulation mode	Normal
Show model initialize port	off
Show model reset ports	off
Show model terminate port	off
Schedule rates	off
Schedule rates with	Ports
AutoFillPortDiscreteRates	on
Code interface	Model reference
Variant	off
Base sample time(-1 for inherited)	-1

## "Non-Linear Actuator" (ModelReference)

**Table 2.3. "Non-Linear Actuator" Parameters**

Parameter	Value
Model name	NonLinearActuator
ModelFile	NonLinearActuator.slx
ModelName	NonLinearActuator
Simulation mode	Normal
Show model initialize port	off

Parameter	Value
Show model reset ports	off
Show model terminate port	off
Schedule rates	off
Schedule rates with	Ports
AutoFillPortDiscreteRates	on
Code interface	Model reference
Variant	off
Base sample time(-1 for inherited)	-1

## Block Execution Order

1. (Constant)
2. [Non-Linear Actuator](#) (ModelReference)
3. [W-gust model](#) (TransferFcn)
4. [Gain](#) (Gain)
5. [Gain2](#) (Gain)
6. [Gain3](#) (Gain)
7. [Q-gust model](#) (TransferFcn)
8. [Gain1](#) (Gain)
9. [Sum](#) (Sum)
10. [F14 Aircraft Dynamic Model](#) (ModelReference)
11. [Gain3](#) (Gain)
12. [Product](#) (Product)
13. [Sum2](#) (Sum)
14. [Gain4](#) (Gain)
15. [Pilot](#) (SignalGenerator)
16. [SigConversion InsertedFor Bus Selector1 at outport 0](#) (SignalConversion)
17. [SigConversion InsertedFor Bus Selector1 at outport 1](#) (SignalConversion)
18. [Nz Stick Alpha q](#) (Scope)
19. [AnalogControl](#) (ModelReference)
20. [White Noise](#) (RandomNumber)
21. [Output](#) (Gain)

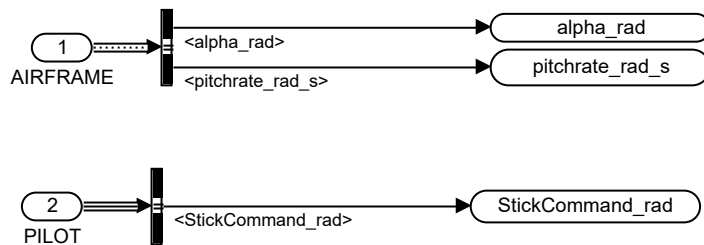


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# Chapter 3. Subsystems

## Data Logging

Figure 3.1. slproject\_f14/Data Logging



## Blocks

### Parameters

#### "AIRFRAME" (Inport)

Table 3.1. "AIRFRAME" Parameters

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

#### "alpha\_rad" (Outport)

Table 3.2. "alpha\_rad" Parameters

Parameter	Value
Port number	2
Icon display	Signal name

Parameter	Value
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
Unit (e.g., m, m/s <sup>2</sup> , 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	off

### "Bus Selector" (BusSelector)

**Table 3.3. "Bus Selector" Parameters**

Parameter	Value
Output signals	StickCommand_rad
Output as virtual bus	off
InputSignals	StickCommand_rad

#### Output Hierarchy:

1. *Bus Selector*
  1. <StickCommand\_rad>

### "Bus Selector1" (BusSelector)

**Table 3.4. "Bus Selector1" Parameters**

Parameter	Value
Output signals	alpha_rad,pitchrate_rad_s
Output as virtual bus	off

Parameter	Value
InputSignals	alpha_rad wdot pitchrate_rad_s pitchrate_rad_s_s

### Output Hierarchy:

1. *Bus Selector1*
  1. <alpha\_rad>
  2. <pitchrate\_rad\_s>

### "Out3" (Output)

**Table 3.5. "Out3" Parameters**

Parameter	Value
Port number	3
Icon display	Signal name
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
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 outputport 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	off

## "PILOT" (Inport)

**Table 3.6. "PILOT" Parameters**

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

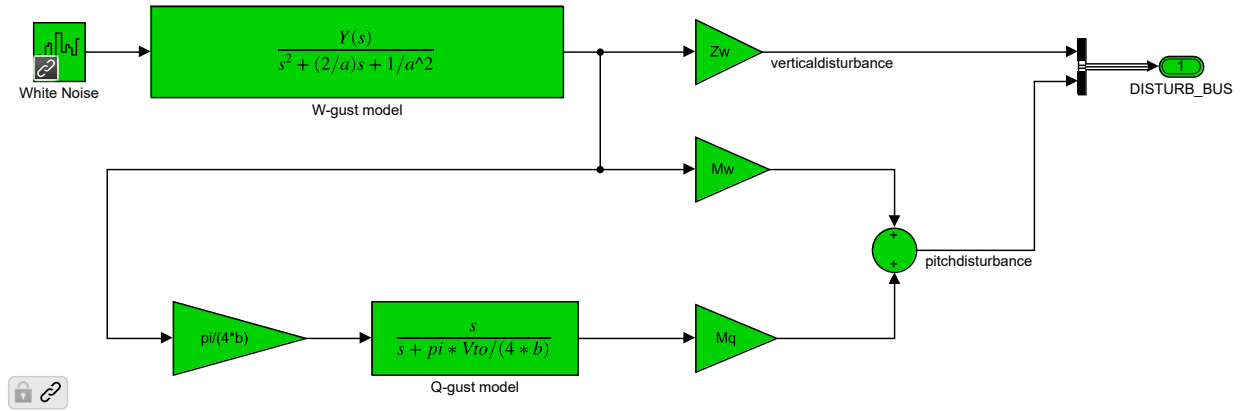
## "Stick\_rad" (Outport)

**Table 3.7. "Stick\_rad" Parameters**

Parameter	Value
Port number	1
Icon display	Signal name
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
Unit (e.g., m, m/s <sup>2</sup> , 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	off

# Dryden Wind Gust

Figure 3.2. slproject\_f14/Dryden Wind Gust



## Blocks

### Parameters

#### "Bus Creator" (BusCreator)

Table 3.8. "Bus Creator" Parameters

Parameter	Value
Number of inputs	'verticaldisturbance','pitchdisturbance'
Display option	bar
Data type	Bus: DISTURB_BUS
Output as nonvirtual bus	off
Use names from inputs instead of from bus object	on

#### "DISTURB\_BUS" (Outport)

Table 3.9. "DISTURB\_BUS" Parameters

Parameter	Value
Port number	1
Icon display	Port number
Minimum	[]
Maximum	[]

Parameter	Value
Data type	Bus: DISTURB_BUS
Lock output data type setting against changes by the fixed-point tools	off
Output as nonvirtual bus in parent model	off
Unit (e.g., m, m/s <sup>2</sup> , 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

### "Gain" (Gain)

**Table 3.10. "Gain" Parameters**

Parameter	Value
Gain	Zw
Multiplication	Element-wise(K.*u)
Parameter minimum	[]
Parameter maximum	[]
Parameter data type	Inherit: Same as input
Output minimum	[]
Output maximum	[]
Output data type	Inherit: Same as input
Lock output data type setting against changes by the fixed-point tools	off
Integer rounding mode	Floor
Saturate on integer overflow	on
Sample time (-1 for inherited)	-1

**"Gain1" (Gain)****Table 3.11. "Gain1" Parameters**

Parameter	Value
Gain	Mq
Multiplication	Element-wise(K.*u)
Parameter minimum	[]
Parameter maximum	[]
Parameter data type	Inherit: Same as input
Output minimum	[]
Output maximum	[]
Output data type	Inherit: Same as input
Lock output data type setting against changes by the fixed-point tools	off
Integer rounding mode	Floor
Saturate on integer overflow	on
Sample time (-1 for inherited)	-1

**"Gain2" (Gain)****Table 3.12. "Gain2" Parameters**

Parameter	Value
Gain	Mw
Multiplication	Element-wise(K.*u)
Parameter minimum	[]
Parameter maximum	[]
Parameter data type	Inherit: Same as input
Output minimum	[]
Output maximum	[]
Output data type	Inherit: Same as input
Lock output data type setting against changes by the fixed-point tools	off
Integer rounding mode	Floor
Saturate on integer overflow	on
Sample time (-1 for inherited)	-1

**"Gain3" (Gain)****Table 3.13. "Gain3" Parameters**

Parameter	Value
Gain	$\pi/(4*b)$
Multiplication	Element-wise( $K.*u$ )
Parameter minimum	[]
Parameter maximum	[]
Parameter data type	Inherit: Same as input
Output minimum	[]
Output maximum	[]
Output data type	Inherit: Same as input
Lock output data type setting against changes by the fixed-point tools	off
Integer rounding mode	Floor
Saturate on integer overflow	on
Sample time (-1 for inherited)	-1

**"Q-gust model" (TransferFcn)****Table 3.14. "Q-gust model" Parameters**

Parameter	Value
Numerator coefficients	[1 0]
Denominator coefficients	[1 $\pi*Vto/(4*b)$ ]
Generate tunable representation in code	off
State Name (e.g., 'position')	"

**"Sum" (Sum)****Table 3.15. "Sum" Parameters**

Parameter	Value
Icon shape	round
List of signs	++
Sum over	All dimensions
Dimension	1
Require all inputs to have the same data type	on
Accumulator data type	Inherit: Inherit via internal rule



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

### "W-gust model" (TransferFcn)

**Table 3.16. "W-gust model" Parameters**

Parameter	Value
Numerator coefficients	Swg/sqrt(a^3)*[sqrt(3)*a,1]
Denominator coefficients	[1 (2/a) 1/a^2]
Generate tunable representation in code	off
State Name (e.g., 'position')	"

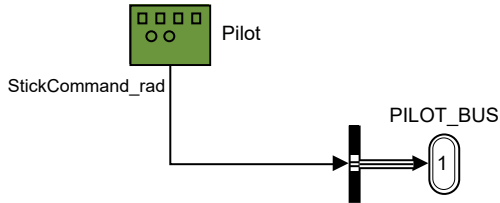
### "White Noise" (SubSystem)

**Table 3.17. "White Noise" Parameters**

Parameter	Value
SimulinkmasksNoisePower_MP	10
SimulinkmasksSampleTime_MP	0.01
SimulinkmasksSeed_MP	23341
SimulinkmasksInterpretVectorParametersAs1D_MP	on

# Pilot

Figure 3.3. slproject\_f14/Pilot



## Blocks

### Parameters

#### "Bus Creator" (BusCreator)

Table 3.18. "Bus Creator" Parameters

Parameter	Value
Number of inputs	1
Display option	bar
Data type	Bus: PILOT_BUS
Output as nonvirtual bus	off
Use names from inputs instead of from bus object	on

#### "Pilot" (SignalGenerator)

Table 3.19. "Pilot" Parameters

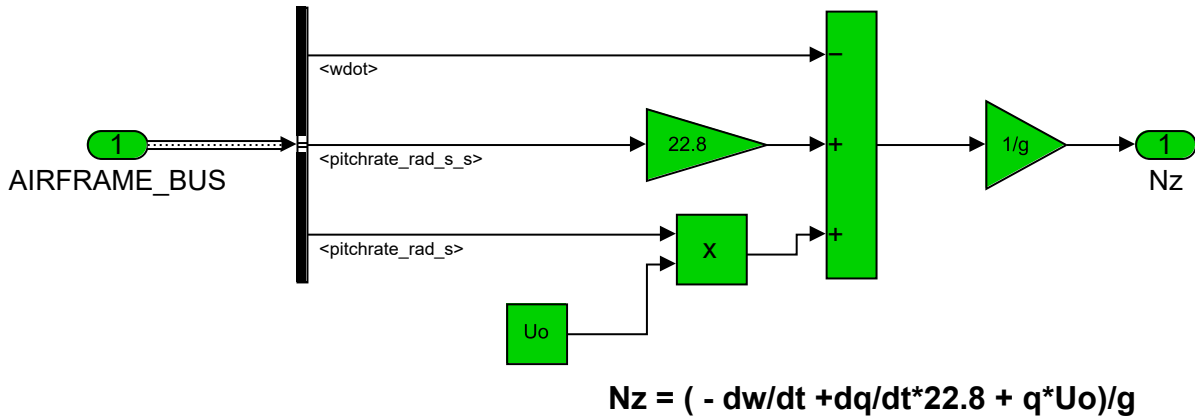
Parameter	Value
Wave form	square
Time (t)	Use simulation time
Amplitude	1
Frequency	.1
Units	Hertz
Interpret vector parameters as 1-D	on

**"PILOT\_BUS" (Output)****Table 3.20. "PILOT\_BUS" Parameters**

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

# Pilot G-Force Calculation

Figure 3.4. slproject\_f14/Pilot G-Force Calculation



## Blocks

### Parameters

" " (Constant)

Table 3.21. " " Parameters

Parameter	Value
Constant value	Uo
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

**"AIRFRAME\_BUS" (Inport)****Table 3.22. "AIRFRAME\_BUS" Parameters**

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

**"Bus Selector" (BusSelector)****Table 3.23. "Bus Selector" Parameters**

Parameter	Value
Output signals	wdot,pitchrate_rad_s_s,pitchrate_rad_s
Output as virtual bus	off
InputSignals	alpha_rad wdot pitchrate_rad_s pitchrate_rad_s_s

**Output Hierarchy:**

1. *Bus Selector*
  1. <wdot>
  2. <pitchrate\_rad\_s\_s>
  3. <pitchrate\_rad\_s>

**"Gain3" (Gain)****Table 3.24. "Gain3" Parameters**

Parameter	Value
Gain	22.8
Multiplication	Element-wise(K.*u)
Parameter minimum	[]
Parameter maximum	[]
Parameter data type	Inherit: Same as input
Output minimum	[]
Output maximum	[]

Parameter	Value
Output data type	Inherit: Same as input
Lock output data type setting against changes by the fixed-point tools	off
Integer rounding mode	Floor
Saturate on integer overflow	on
Sample time (-1 for inherited)	-1

### "Gain4" (Gain)

**Table 3.25. "Gain4" Parameters**

Parameter	Value
Gain	1/g
Multiplication	Element-wise(K.*u)
Parameter minimum	[]
Parameter maximum	[]
Parameter data type	Inherit: Same as input
Output minimum	[]
Output maximum	[]
Output data type	Inherit: Same as input
Lock output data type setting against changes by the fixed-point tools	off
Integer rounding mode	Floor
Saturate on integer overflow	on
Sample time (-1 for inherited)	-1

### "Nz" (Outport)

**Table 3.26. "Nz" Parameters**

Parameter	Value
Port number	1
Icon display	Port number
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
Unit (e.g., m, m/s <sup>2</sup> , N*m)	inherit

Parameter	Value
Port dimensions (-1 for inherited)	-1
Variable-size signal	Inherit
Sample time (-1 for inherited)	-1
Ensure output 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	off

### "Product" (Product)

**Table 3.27. "Product" 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	on
Output minimum	[]
Output maximum	[]
Output data type	Inherit: Same as first input
Lock output data type setting against changes by the fixed-point tools	off
Integer rounding mode	Zero
Saturate on integer overflow	on
Sample time (-1 for inherited)	-1

### "Sum2" (Sum)

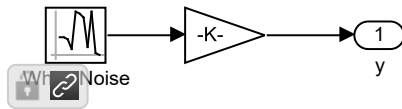
**Table 3.28. "Sum2" Parameters**

Parameter	Value
Icon shape	rectangular
List of signs	-++

Parameter	Value
Sum over	All dimensions
Dimension	1
Require all inputs to have the same data type	on
Accumulator data type	Inherit: Inherit via internal rule
Output minimum	[]
Output maximum	[]
Output data type	Inherit: Same as first input
Lock data type settings against changes by the fixed-point tools	off
Integer rounding mode	Floor
Saturate on integer overflow	on
Sample time (-1 for inherited)	-1

## White Noise

Figure 3.5. slproject\_f14/Dryden Wind Gust/White Noise



## Blocks

### Parameters

#### "Output" (Gain)

Table 3.29. "Output" Parameters

Parameter	Value
Gain	$\sqrt{\text{Cov}}/\sqrt{\text{Ts}(1)}$
Multiplication	Element-wise( $K.*u$ )
Parameter minimum	[]
Parameter maximum	[]
Parameter data type	Inherit: Same as input
Output minimum	[]
Output maximum	[]



Parameter	Value
Output data type	Inherit: Same as input
Lock output data type setting against changes by the fixed-point tools	off
Integer rounding mode	Floor
Saturate on integer overflow	on
Sample time (-1 for inherited)	-1

### "White Noise" (RandomNumber)

**Table 3.30. "White Noise" Parameters**

Parameter	Value
Mean	0
Variance	1
Seed	seed
Sample time	Ts
Interpret vector parameters as 1-D	on

### "y" (Outport)

**Table 3.31. "y" Parameters**

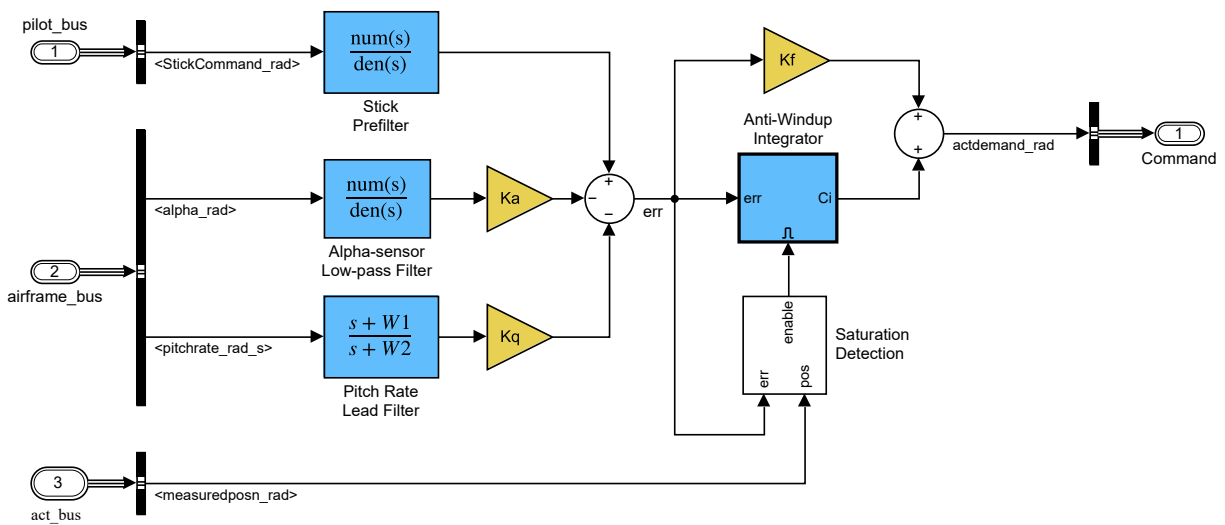
Parameter	Value
Port number	1
Icon display	Port number
Minimum	[]
Maximum	[]
Data type	Inherit: auto
Lock output data type setting against changes by the fixed-point tools	off
Output as nonvirtual bus in parent model	off
Unit (e.g., m, m/s <sup>2</sup> , N*m)	inherit
Port dimensions (-1 for inherited)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

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

## AnalogControl

Checksum: 1199510280 699756124 2521430005 1303788270

Figure 3.6. AnalogControl



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## 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 3.32.

Description:  
Data Type: double  
Width: 2

Dimensions: [-2 2 1 1 1 1 ]

### Table 3.33.

Description:

Data Type: double

Width: 4

Dimensions: [-2 4 1 1 1 1 1 1 1 ]

### Table 3.34.

Description:

Data Type: double

Width: 1

Dimensions: [1 1 ]

## 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 3.35.

Description:

Data Type: double

Width: 1

Dimensions: [1 1 ]

## Blocks

### Parameters

#### "act\_bus" (Inport)

**Table 3.36. "act\_bus" Parameters**

Parameter	Value
Port number	3
Port dimensions (-1 for inherited)	-1
Sample time (-1 for inherited)	-1
Minimum	[]

Parameter	Value
Maximum	[]
Data type	Bus: ACT_BUS

### "airframe\_bus" (Inport)

**Table 3.37. "airframe\_bus" Parameters**

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

### "Alpha-sensor Low-pass Filter" (TransferFcn)

**Table 3.38. "Alpha-sensor Low-pass Filter" Parameters**

Parameter	Value
Numerator coefficients	[1]
Denominator coefficients	[Tal,1]
Generate tunable representation in code	off
State Name (e.g., 'position')	"

### "Bus Creator" (BusCreator)

**Table 3.39. "Bus Creator" Parameters**

Parameter	Value
Number of inputs	1
Display option	bar
Data type	Bus: CONTROL_BUS
Output as nonvirtual bus	off
Use names from inputs instead of from bus object	on

**"Bus Selector" (BusSelector)****Table 3.40. "Bus Selector" Parameters**

Parameter	Value
Output signals	measuredposn_rad
Output as virtual bus	off
InputSignals	actualposn_rad measuredposn_rad

**Output Hierarchy:**

1. *Bus Selector*
  1. <measuredposn\_rad>

**"Bus Selector1" (BusSelector)****Table 3.41. "Bus Selector1" Parameters**

Parameter	Value
Output signals	StickCommand_rad
Output as virtual bus	off
InputSignals	StickCommand_rad

**Output Hierarchy:**

1. *Bus Selector1*
  1. <StickCommand\_rad>

**"Bus Selector2" (BusSelector)****Table 3.42. "Bus Selector2" Parameters**

Parameter	Value
Output signals	alpha_rad,pitchrate_rad_s
Output as virtual bus	off
InputSignals	alpha_rad wdot pitchrate_rad_s pitchrate_rad_s_s

**Output Hierarchy:**

1. *Bus Selector2*
  1. <alpha\_rad>
  2. <pitchrate\_rad\_s>

**"Command" (Outport)****Table 3.43. "Command" Parameters**

Parameter	Value
Port number	1
Icon display	Port number
Minimum	[]
Maximum	[]
Data type	Bus: CONTROL_BUS
Lock output data type setting against changes by the fixed-point tools	off
Output as nonvirtual bus in parent model	off
Unit (e.g., m, m/s <sup>2</sup> , 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	off

**"Gain" (Gain)****Table 3.44. "Gain" Parameters**

Parameter	Value
Gain	Kf
Multiplication	Element-wise(K.*u)
Parameter minimum	[]
Parameter maximum	[]
Parameter data type	Inherit: Same as input
Output minimum	[]
Output maximum	[]
Output data type	Inherit: Same as input

Parameter	Value
Lock output data type setting against changes by the fixed-point tools	off
Integer rounding mode	Floor
Saturate on integer overflow	on
Sample time (-1 for inherited)	-1

### "Gain2" (Gain)

**Table 3.45. "Gain2" Parameters**

Parameter	Value
Gain	Kq
Multiplication	Element-wise(K.*u)
Parameter minimum	[]
Parameter maximum	[]
Parameter data type	Inherit: Same as input
Output minimum	[]
Output maximum	[]
Output data type	Inherit: Same as input
Lock output data type setting against changes by the fixed-point tools	off
Integer rounding mode	Floor
Saturate on integer overflow	on
Sample time (-1 for inherited)	-1

### "Gain3" (Gain)

**Table 3.46. "Gain3" Parameters**

Parameter	Value
Gain	Ka
Multiplication	Element-wise(K.*u)
Parameter minimum	[]
Parameter maximum	[]
Parameter data type	Inherit: Same as input
Output minimum	[]
Output maximum	[]
Output data type	Inherit: Same as input
Lock output data type setting against changes by the fixed-point tools	off

Parameter	Value
Integer rounding mode	Floor
Saturate on integer overflow	on
Sample time (-1 for inherited)	-1

### "pilot\_bus" (Inport)

**Table 3.47. "pilot\_bus" Parameters**

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

### "Pitch Rate Lead Filter" (TransferFcn)

**Table 3.48. "Pitch Rate Lead Filter" Parameters**

Parameter	Value
Numerator coefficients	[1,W1]
Denominator coefficients	[1,W2]
Generate tunable representation in code	off
State Name (e.g., 'position')	"

### "Stick Prefilter" (TransferFcn)

**Table 3.49. "Stick Prefilter" Parameters**

Parameter	Value
Numerator coefficients	[1]
Denominator coefficients	[Ts,1]
Generate tunable representation in code	off
State Name (e.g., 'position')	"



**"Sum" (Sum)****Table 3.50. "Sum" Parameters**

Parameter	Value
Icon shape	round
List of signs	2
Sum over	All dimensions
Dimension	1
Require all inputs to have the same data type	on
Accumulator data type	Inherit: Inherit via internal rule
Output minimum	[]
Output maximum	[]
Output data type	Inherit: Same as first input
Lock data type settings against changes by the fixed-point tools	off
Integer rounding mode	Floor
Saturate on integer overflow	on
Sample time (-1 for inherited)	-1

**"Sum2" (Sum)****Table 3.51. "Sum2" Parameters**

Parameter	Value
Icon shape	round
List of signs	+--
Sum over	All dimensions
Dimension	1
Require all inputs to have the same data type	on
Accumulator data type	Inherit: Inherit via internal rule
Output minimum	[]
Output maximum	[]
Output data type	Inherit: Same as first input
Lock data type settings against changes by the fixed-point tools	off
Integer rounding mode	Floor
Saturate on integer overflow	on
Sample time (-1 for inherited)	-1

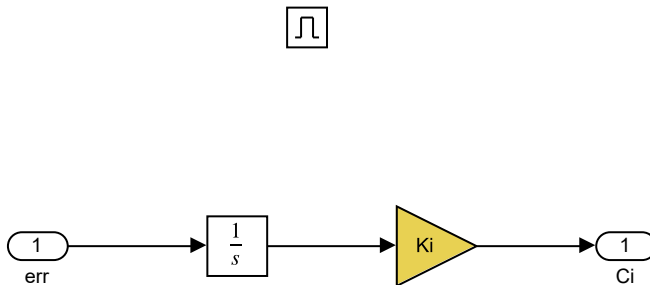
## Block Execution Order

1. [Constant](#) (Constant)
2. [Alpha-sensor Low-pass Filter](#) (TransferFcn)
3. [Stick Prefilter](#) (TransferFcn)
4. [Gain3](#) (Gain)
5. [Pitch Rate Lead Filter](#) (TransferFcn)
6. [Gain2](#) (Gain)
7. [Sum2](#) (Sum)
8. [Sign](#) (Signum)
9. [Sign1](#) (Signum)
10. [Relational Operator](#) (RelationalOperator)
11. [Abs](#) (Abs)
12. [Compare](#) (RelationalOperator)
13. [Logical Operator](#) (Logic)
14. [Anti-Windup Integrator](#)
  1. [Integrator](#) (Integrator)
  2. [Gain1](#) (Gain)
15. [Gain](#) (Gain)
16. [Sum](#) (Sum)

## Anti-Windup Integrator

Checksum: 2483658708 2438643697 3105105705 3397776929

**Figure 3.7. AnalogControl/Anti-Windup Integrator**



## 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 3.52.**

Description:  
 Data Type: double  
 Width: 1  
 Dimensions: [1 1 ]

## 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 3.53.**

Description:  
 Data Type: double  
 Width: 1  
 Dimensions: [1 1 ]

## Blocks

### Parameters

#### "Ci" (Output)

**Table 3.54. "Ci" Parameters**

Parameter	Value
Port number	1
Icon display	Port number
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
Unit (e.g., m, m/s <sup>2</sup> , N*m)	inherit
Port dimensions (-1 for inherited)	-1
Variable-size signal	Inherit
Sample time (-1 for inherited)	-1
Ensure outputport is virtual	off

Parameter	Value
Source of initial output value	Dialog
Output when disabled	held
Initial output	0
MustResolveToSignalObject	off
Specify output when source is unconnected	off
Constant value	0
Interpret vector parameters as 1-D	off

### "Enable" (EnablePort)

**Table 3.55. "Enable" Parameters**

Parameter	Value
States when enabling	held
Propagate sizes of variable-size signals	Only when enabling
Show output port	off
Enable zero-crossing detection	on
Port dimensions	1
Sample time	-1
Minimum	[]
Maximum	[]
Data type	double
Interpolate data	on

### "err" (Inport)

**Table 3.56. "err" Parameters**

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

**"Gain1" (Gain)****Table 3.57. "Gain1" Parameters**

Parameter	Value
Gain	Ki
Multiplication	Element-wise(K.*u)
Parameter minimum	[]
Parameter maximum	[]
Parameter data type	Inherit: Same as input
Output minimum	[]
Output maximum	[]
Output data type	Inherit: Same as input
Lock output data type setting against changes by the fixed-point tools	off
Integer rounding mode	Floor
Saturate on integer overflow	on
Sample time (-1 for inherited)	-1

**"Integrator" (Integrator)****Table 3.58. "Integrator" Parameters**

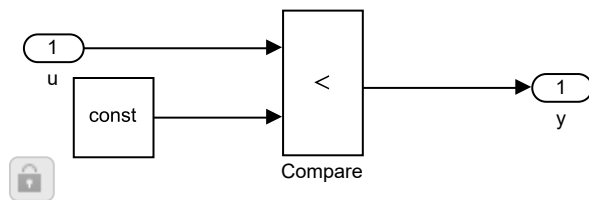
Parameter	Value
External reset	none
Initial condition source	internal
Initial condition	0
Limit output	off
Upper saturation limit	inf
Lower saturation limit	-inf
Wrap state	off
Wrapped state upper value	pi
Wrapped state lower value	-pi
Show saturation port	off
Show state port	off
Ignore limit and reset when linearizing	off
Enable zero-crossing detection	on
State Name (e.g., 'position')	"

## Block Execution Order

1. [Integrator](#) (Integrator)
2. [Gain1](#) (Gain)

## Compare To Saturation Position

**Figure 3.8. AnalogControl/Saturation Detection/Compare To Saturation Position**



## Blocks

### Parameters

#### "Compare" (RelationalOperator)

**Table 3.59. "Compare" Parameters**

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

#### "Constant" (Constant)

**Table 3.60. "Constant" Parameters**

Parameter	Value
Constant value	const
Interpret vector parameters as 1-D	on

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

### "u" (Inport)

**Table 3.61. "u" Parameters**

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

### "y" (Outport)

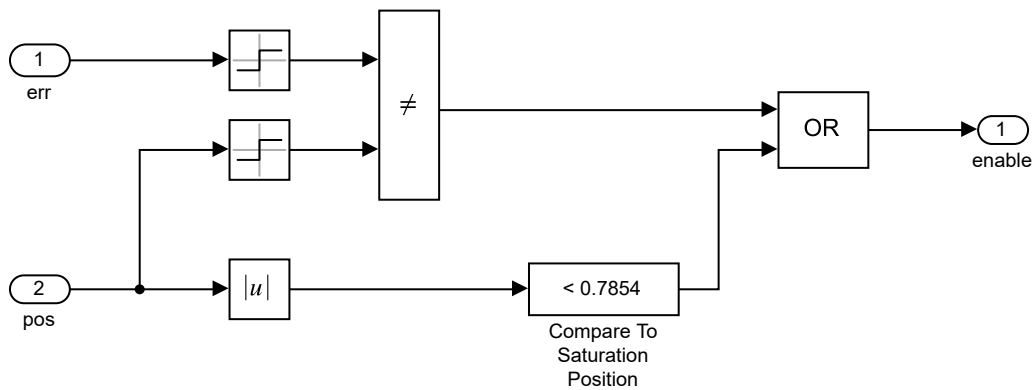
**Table 3.62. "y" Parameters**

Parameter	Value
Port number	1
Icon display	Port number
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
Unit (e.g., m, m/s <sup>2</sup> , N*m)	inherit
Port dimensions (-1 for inherited)	-1
Variable-size signal	Inherit
Sample time (-1 for inherited)	-1
Ensure outport is virtual	off

Parameter	Value
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

## Saturation Detection

Figure 3.9. AnalogControl/Saturation Detection



## Blocks

### Parameters

#### "Abs" (Abs)

Table 3.63. "Abs" Parameters

Parameter	Value
Enable zero-crossing detection	off
Sample time (-1 for inherited)	-1
Output minimum	[]
Output maximum	[]
Output data type	Inherit: Same as input



Parameter	Value
Lock output data type setting against changes by the fixed-point tools	off
Integer rounding mode	Floor
Saturate on integer overflow	off

### "Compare To Saturation Position" (SubSystem)

**Table 3.64. "Compare To Saturation Position" Parameters**

Parameter	Value
SimulinkmasksOperator_MP	<
SimulinkmasksConstantValue_MP	0.785398
SimulinkmasksOutputDataType_MP	boolean
SimulinkmasksEnableZerocrossingDetection_MP	off

### "enable" (Outport)

**Table 3.65. "enable" Parameters**

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

Parameter	Value
Interpret vector parameters as 1-D	off

**"err" (Inport)****Table 3.66. "err" Parameters**

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

**"Logical Operator" (Logic)****Table 3.67. "Logical Operator" Parameters**

Parameter	Value
Operator	OR
Number of input ports	2
Icon shape	rectangular
Require all inputs and output to have the same data type	off
Output data type	boolean
Sample time (-1 for inherited)	-1

**"pos" (Inport)****Table 3.68. "pos" Parameters**

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

**"Relational Operator" (RelationalOperator)****Table 3.69. "Relational Operator" Parameters**

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

**"Sign" (Signum)****Table 3.70. "Sign" Parameters**

Parameter	Value
Enable zero-crossing detection	off
Sample time (-1 for inherited)	-1

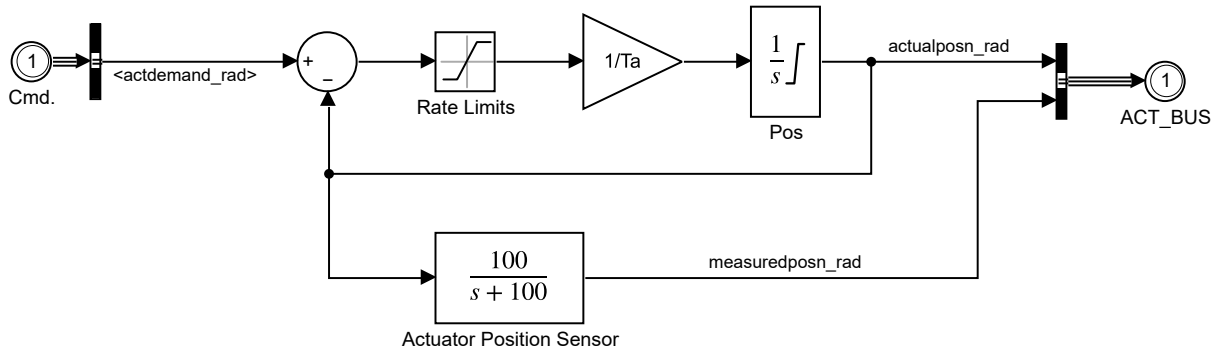
**"Sign1" (Signum)****Table 3.71. "Sign1" Parameters**

Parameter	Value
Enable zero-crossing detection	off
Sample time (-1 for inherited)	-1

## NonLinearActuator

**Checksum:** 2071902061 2746619288 750196418 2754563969

**Figure 3.10. NonLinearActuator**



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## 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 3.72.**

Description:  
Data Type: double  
Width: 1  
Dimensions: [1 1]

### 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 3.73.**

Description:  
Data Type: double  
Width: 2  
Dimensions: [-2 2 1 1 1 1]

## Blocks

### Parameters

#### "ACT\_BUS" (Outport)

**Table 3.74. "ACT\_BUS" Parameters**

Parameter	Value
Port number	1
Icon display	Port number
Minimum	[]
Maximum	[]
Data type	Bus: ACT_BUS
Lock output data type setting against changes by the fixed-point tools	off
Output as nonvirtual bus in parent model	on
Unit (e.g., m, m/s <sup>2</sup> , 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	0
MustResolveToSignalObject	off
Specify output when source is unconnected	off
Constant value	0
Interpret vector parameters as 1-D	off

#### "Actuator Position Sensor" (TransferFcn)

**Table 3.75. "Actuator Position Sensor" Parameters**

Parameter	Value
Numerator coefficients	[100]
Denominator coefficients	[1 100]
Generate tunable representation in code	off
State Name (e.g., 'position')	"

**"Bus Creator" (BusCreator)****Table 3.76. "Bus Creator" Parameters**

Parameter	Value
Number of inputs	2
Display option	bar
Data type	Bus: ACT_BUS
Output as nonvirtual bus	off
Use names from inputs instead of from bus object	on

**"Bus Selector" (BusSelector)****Table 3.77. "Bus Selector" Parameters**

Parameter	Value
Output signals	actdemand_rad
Output as virtual bus	off
InputSignals	actdemand_rad

**Output Hierarchy:**

1. *Bus Selector*
  1. <actdemand\_rad>

**"Cmd." (Inport)****Table 3.78. "Cmd." Parameters**

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

**"Gain" (Gain)****Table 3.79. "Gain" Parameters**

Parameter	Value
Gain	1/Ta
Multiplication	Element-wise(K.*u)
Parameter minimum	[]
Parameter maximum	[]
Parameter data type	Inherit: Same as input
Output minimum	[]
Output maximum	[]
Output data type	Inherit: Same as input
Lock output data type setting against changes by the fixed-point tools	off
Integer rounding mode	Floor
Saturate on integer overflow	on
Sample time (-1 for inherited)	-1

**"Pos" (Integrator)****Table 3.80. "Pos" Parameters**

Parameter	Value
External reset	none
Initial condition source	internal
Initial condition	0
Limit output	on
Upper saturation limit	$\pi \cdot 45/180$
Lower saturation limit	$-\pi \cdot 45/180$
Wrap state	off
Wrapped state upper value	$\pi$
Wrapped state lower value	$-\pi$
Show saturation port	off
Show state port	off
Ignore limit and reset when linearizing	off
Enable zero-crossing detection	on
State Name (e.g., 'position')	"

**"Rate Limits" (Saturate)****Table 3.81. "Rate Limits" Parameters**

Parameter	Value
Upper limit	0.5
Lower limit	-0.5
Treat as gain when linearizing	on
Enable zero-crossing detection	on
Sample time (-1 for inherited)	-1
Output minimum	[]
Output maximum	[]
Output data type	Inherit: Same as input
Lock output data type setting against changes by the fixed-point tools	off
Integer rounding mode	Floor

**"Sum" (Sum)****Table 3.82. "Sum" Parameters**

Parameter	Value
Icon shape	round
List of signs	+-
Sum over	All dimensions
Dimension	1
Require all inputs to have the same data type	on
Accumulator data type	Inherit: Inherit via internal rule
Output minimum	[]
Output maximum	[]
Output data type	Inherit: Same as first input
Lock data type settings against changes by the fixed-point tools	off
Integer rounding mode	Floor
Saturate on integer overflow	on
Sample time (-1 for inherited)	-1

**Block Execution Order**

1. [TmpSynthesizedDirectFeedthroughAtomicSubsystem](#)
  1. [Sum](#) (Sum)

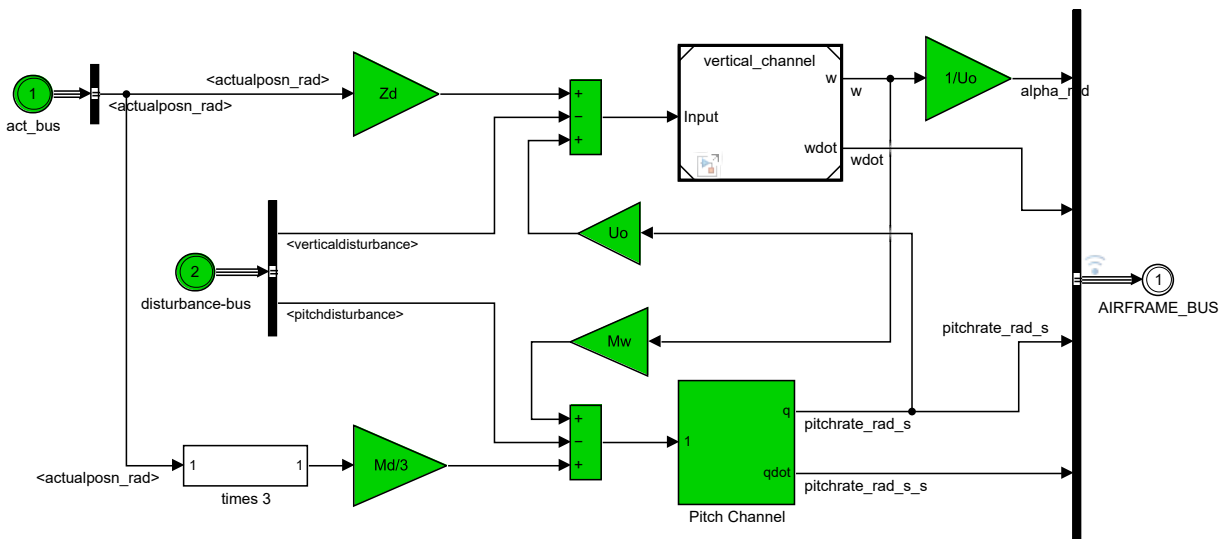


2. [Rate Limits](#) (Saturate)
3. [Gain](#) (Gain)
2. [Actuator Position Sensor](#) (TransferFcn)
3. [Pos](#) (Integrator)
4. [BusConversion InsertedFor ACT\\_BUS at inport 0 BusCreator1](#) (BusCreator)

## f14\_airframe

Checksum: 1305655279 3920200153 2274852790 3405426861

Figure 3.11. f14\_airframe



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## 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 3.83.

Description:

Data Type: double

Width: 2

Dimensions: [-2 2 1 1 1 1]

**Table 3.84.**

Description:

Data Type: double

Width: 2

Dimensions: [-2 2 1 1 1 1 ]

### 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 3.85.**

Description:

Data Type: double

Width: 4

Dimensions: [-2 4 1 1 1 1 1 1 1 1 ]

### Blocks

#### Parameters

##### "act\_bus" (Inport)

**Table 3.86. "act\_bus" Parameters**

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

**"AIRFRAME\_BUS" (Outport)****Table 3.87. "AIRFRAME\_BUS" Parameters**

Parameter	Value
Port number	1
Icon display	Port number
Minimum	[]
Maximum	[]
Data type	Bus: AIRFRAME_BUS
Lock output data type setting against changes by the fixed-point tools	off
Output as nonvirtual bus in parent model	on
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	0
MustResolveToSignalObject	off
Specify output when source is unconnected	off
Constant value	0
Interpret vector parameters as 1-D	off

**"Bus Creator" (BusCreator)****Table 3.88. "Bus Creator" Parameters**

Parameter	Value
Number of inputs	'alpha_rad','wdot','pitchrate_rad_s','pitchrate_rad_s_s'
Display option	bar
Data type	Bus: AIRFRAME_BUS
Output as nonvirtual bus	off
Use names from inputs instead of from bus object	on

**"Bus Selector" (BusSelector)****Table 3.89. "Bus Selector" Parameters**

Parameter	Value
Output signals	actualposn_rad
Output as virtual bus	off
InputSignals	actualposn_rad measuredposn_rad

**Output Hierarchy:**

1. *Bus Selector*
  1. <actualposn\_rad>

**"Bus Selector1" (BusSelector)****Table 3.90. "Bus Selector1" Parameters**

Parameter	Value
Output signals	verticaldisturbance,pitchdisturbance
Output as virtual bus	off
InputSignals	verticaldisturbance pitchdisturbance

**Output Hierarchy:**

1. *Bus Selector1*
  1. <verticaldisturbance>
  2. <pitchdisturbance>

**"disturbance-bus" (Inport)****Table 3.91. "disturbance-bus" Parameters**

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

**"Gain3" (Gain)****Table 3.92. "Gain3" Parameters**

Parameter	Value
Gain	Uo
Multiplication	Element-wise(K.*u)
Parameter minimum	[]
Parameter maximum	[]
Parameter data type	Inherit: Same as input
Output minimum	[]
Output maximum	[]
Output data type	Inherit: Same as input
Lock output data type setting against changes by the fixed-point tools	off
Integer rounding mode	Floor
Saturate on integer overflow	on
Sample time (-1 for inherited)	-1

**"Gain4" (Gain)****Table 3.93. "Gain4" Parameters**

Parameter	Value
Gain	Mw
Multiplication	Element-wise(K.*u)
Parameter minimum	[]
Parameter maximum	[]
Parameter data type	Inherit: Same as input
Output minimum	[]
Output maximum	[]
Output data type	Inherit: Same as input
Lock output data type setting against changes by the fixed-point tools	off
Integer rounding mode	Floor
Saturate on integer overflow	on
Sample time (-1 for inherited)	-1

**"Gain5" (Gain)****Table 3.94. "Gain5" Parameters**

Parameter	Value
Gain	Zd
Multiplication	Element-wise(K.*u)
Parameter minimum	[]
Parameter maximum	[]
Parameter data type	Inherit: Same as input
Output minimum	[]
Output maximum	[]
Output data type	Inherit: Same as input
Lock output data type setting against changes by the fixed-point tools	off
Integer rounding mode	Floor
Saturate on integer overflow	on
Sample time (-1 for inherited)	-1

**"Gain6" (Gain)****Table 3.95. "Gain6" Parameters**

Parameter	Value
Gain	Md/3
Multiplication	Element-wise(K.*u)
Parameter minimum	[]
Parameter maximum	[]
Parameter data type	Inherit: Same as input
Output minimum	[]
Output maximum	[]
Output data type	Inherit: Same as input
Lock output data type setting against changes by the fixed-point tools	off
Integer rounding mode	Floor
Saturate on integer overflow	on
Sample time (-1 for inherited)	-1

**"Gain7" (Gain)****Table 3.96. "Gain7" Parameters**

Parameter	Value
Gain	1/Uo
Multiplication	Element-wise(K.*u)
Parameter minimum	[]
Parameter maximum	[]
Parameter data type	Inherit: Same as input
Output minimum	[]
Output maximum	[]
Output data type	Inherit: Same as input
Lock output data type setting against changes by the fixed-point tools	off
Integer rounding mode	Floor
Saturate on integer overflow	on
Sample time (-1 for inherited)	-1

**"Model" (ModelReference)****Table 3.97. "Model" Parameters**

Parameter	Value
Model name	vertical_channel
ModelFile	vertical_channel.slx
ModelName	vertical_channel
Simulation mode	Normal
Show model initialize port	off
Show model reset ports	off
Show model terminate port	off
Schedule rates	off
Schedule rates with	Ports
AutoFillPortDiscreteRates	on
Code interface	Model reference
Variant	off
Base sample time(-1 for inherited)	-1

**"Sum1" (Sum)****Table 3.98. "Sum1" Parameters**

Parameter	Value
Icon shape	rectangular
List of signs	+ - +
Sum over	All dimensions
Dimension	1
Require all inputs to have the same data type	on
Accumulator data type	Inherit: Inherit via internal rule
Output minimum	[]
Output maximum	[]
Output data type	Inherit: Same as first input
Lock data type settings against changes by the fixed-point tools	off
Integer rounding mode	Floor
Saturate on integer overflow	on
Sample time (-1 for inherited)	-1

**"Sum2" (Sum)****Table 3.99. "Sum2" Parameters**

Parameter	Value
Icon shape	rectangular
List of signs	+ - +
Sum over	All dimensions
Dimension	1
Require all inputs to have the same data type	on
Accumulator data type	Inherit: Inherit via internal rule
Output minimum	[]
Output maximum	[]
Output data type	Inherit: Same as first input
Lock data type settings against changes by the fixed-point tools	off
Integer rounding mode	Floor
Saturate on integer overflow	on
Sample time (-1 for inherited)	-1

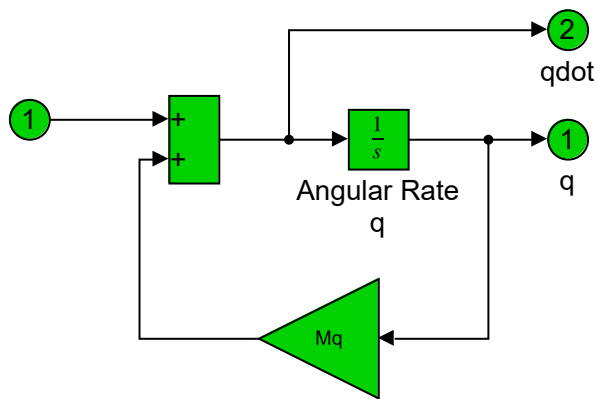


## Block Execution Order

1. [Gain5](#) (Gain)
2. [Angular Rate q](#) (Integrator)
3. [Gain3](#) (Gain)
4. [Sum1](#) (Sum)
5. [Model](#) (ModelReference)
6. [Gain7](#) (Gain)
7. [Gain4](#) (Gain)
8. [Gain](#) (Gain)
9. [Gain6](#) (Gain)
10. [Sum2](#) (Sum)
11. [Gain](#) (Gain)
12. [Sum](#) (Sum)
13. [TAQSigLogging InsertedFor Bus Creator at output 0 1](#) (ToAsyncQueueBlock)
14. [BusConversion InsertedFor AIRFRAME BUS at inport 0 BusCreator1](#) (BusCreator)

## Pitch Channel

Figure 3.12. f14\_airframe/Pitch Channel



## Blocks

## Parameters

**"Angular Rate q " (Integrator)****Table 3.100. "Angular Rate q " Parameters**

Parameter	Value
External reset	none
Initial condition source	internal
Initial condition	0
Limit output	off
Upper saturation limit	inf
Lower saturation limit	-inf
Wrap state	off
Wrapped state upper value	pi
Wrapped state lower value	-pi
Show saturation port	off
Show state port	off
Ignore limit and reset when linearizing	off
Enable zero-crossing detection	on
State Name (e.g., 'position')	"

**"Gain" (Gain)****Table 3.101. "Gain" Parameters**

Parameter	Value
Gain	Mq
Multiplication	Element-wise(K.*u)
Parameter minimum	[]
Parameter maximum	[]
Parameter data type	Inherit: Same as input
Output minimum	[]
Output maximum	[]
Output data type	Inherit: Same as input
Lock output data type setting against changes by the fixed-point tools	off
Integer rounding mode	Floor
Saturate on integer overflow	on
Sample time (-1 for inherited)	-1

**"Input" (Inport)****Table 3.102. "Input" Parameters**

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

**"q" (Outport)****Table 3.103. "q" Parameters**

Parameter	Value
Port number	1
Icon display	Port number
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
Unit (e.g., m, m/s <sup>2</sup> , 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	off

**"qdot" (Outport)****Table 3.104. "qdot" Parameters**

Parameter	Value
Port number	2
Icon display	Port number
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
Unit (e.g., m, m/s <sup>2</sup> , 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	off

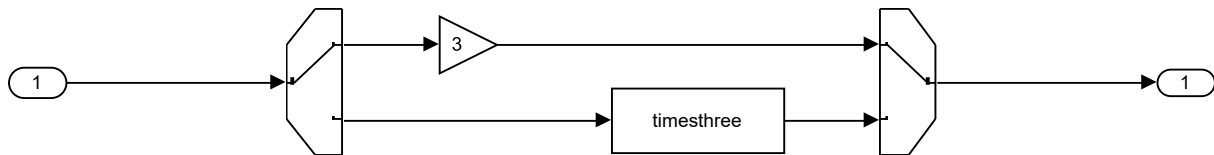
**"Sum" (Sum)****Table 3.105. "Sum" Parameters**

Parameter	Value
Icon shape	rectangular
List of signs	++
Sum over	All dimensions
Dimension	1
Require all inputs to have the same data type	on
Accumulator data type	Inherit: Inherit via internal rule
Output minimum	[]
Output maximum	[]

Parameter	Value
Output data type	Inherit: Same as first input
Lock data type settings against changes by the fixed-point tools	off
Integer rounding mode	Floor
Saturate on integer overflow	on
Sample time (-1 for inherited)	-1

## times 3

Figure 3.13. f14\_airframe/times 3



## Blocks

### Parameters

#### "Gain" (Gain)

Table 3.106. "Gain" Parameters

Parameter	Value
Gain	3
Multiplication	Element-wise(K.*u)
Parameter minimum	[]
Parameter maximum	[]
Parameter data type	Inherit: Inherit via internal rule
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

Parameter	Value
Saturate on integer overflow	off
Sample time (-1 for inherited)	-1

### "In1" (Inport)

**Table 3.107. "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

### "Manual Variant Sink" (VariantSink)

**Table 3.108. "Manual Variant Sink" Parameters**

Parameter	Value
SimulinkdialogManualVariantNumChoices	2

### "Manual Variant Source" (VariantSource)

**Table 3.109. "Manual Variant Source" Parameters**

Parameter	Value
SimulinkdialogManualVariantNumChoices	2

### "Out3" (Outport)

**Table 3.110. "Out3" Parameters**

Parameter	Value
Port number	1
Icon display	Port number
Minimum	[]
Maximum	[]

Parameter	Value
Data type	Inherit: auto
Lock output data type setting against changes by the fixed-point tools	off
Output as nonvirtual bus in parent model	off
Unit (e.g., m, m/s <sup>2</sup> , N*m)	inherit
Port dimensions (-1 for inherited)	-1
Variable-size signal	Inherit
Sample time (-1 for inherited)	-1
Ensure output 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	off

### "S-Function" (S-Function)

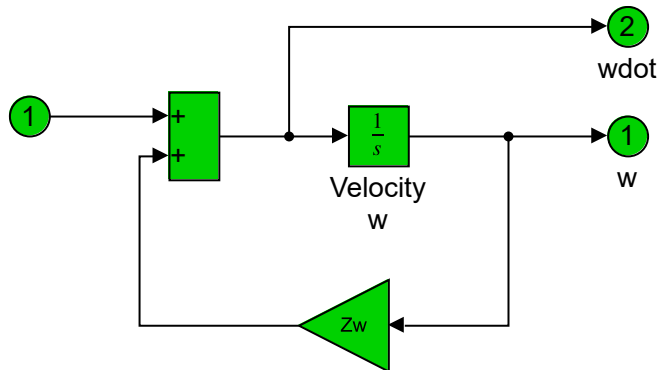
**Table 3.111. "S-Function" Parameters**

Parameter	Value
S-function name	timesthree
S-function modules	"

## vertical\_channel

**Checksum:** 3859973047 3050922831 3784170869 2704687445

**Figure 3.14. vertical\_channel**



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## 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 3.112.**

Description:  
Data Type: double  
Width: 1  
Dimensions: [1 1]

### 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 3.113.**

Description:  
Data Type: double  
Width: 1  
Dimensions: [1 1]



**Table 3.114.**

Description:

Data Type: double

Width: 1

Dimensions: [1 1 ]

## Blocks

### Parameters

#### "Gain" (Gain)

**Table 3.115. "Gain" Parameters**

Parameter	Value
Gain	Zw
Multiplication	Element-wise(K.*u)
Parameter minimum	[]
Parameter maximum	[]
Parameter data type	Inherit: Same as input
Output minimum	[]
Output maximum	[]
Output data type	Inherit: Same as input
Lock output data type setting against changes by the fixed-point tools	off
Integer rounding mode	Floor
Saturate on integer overflow	on
Sample time (-1 for inherited)	-1

#### "Input" (Inport)

**Table 3.116. "Input" Parameters**

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

Parameter	Value
Data type	Inherit: auto

## "Sum" (Sum)

**Table 3.117. "Sum" Parameters**

Parameter	Value
Icon shape	rectangular
List of signs	++
Sum over	All dimensions
Dimension	1
Require all inputs to have the same data type	on
Accumulator data type	Inherit: Inherit via internal rule
Output minimum	[]
Output maximum	[]
Output data type	Inherit: Same as first input
Lock data type settings against changes by the fixed-point tools	off
Integer rounding mode	Floor
Saturate on integer overflow	on
Sample time (-1 for inherited)	-1

## "Velocity w" (Integrator)

**Table 3.118. "Velocity w" Parameters**

Parameter	Value
External reset	none
Initial condition source	internal
Initial condition	0
Limit output	off
Upper saturation limit	inf
Lower saturation limit	-inf
Wrap state	off
Wrapped state upper value	pi
Wrapped state lower value	-pi
Show saturation port	off
Show state port	off

Parameter	Value
Ignore limit and reset when linearizing	off
Enable zero-crossing detection	on
State Name (e.g., 'position')	"

## "w" (Outport)

**Table 3.119. "w" Parameters**

Parameter	Value
Port number	1
Icon display	Port number
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
Unit (e.g., m, m/s <sup>2</sup> , 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	off

## "wdot" (Outport)

**Table 3.120. "wdot" Parameters**

Parameter	Value
Port number	2
Icon display	Port number
Minimum	[]

Parameter	Value
Maximum	[]
Data type	Inherit: auto
Lock output data type setting against changes by the fixed-point tools	off
Output as nonvirtual bus in parent model	off
Unit (e.g., m, m/s <sup>2</sup> , 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	off

## Block Execution Order

1. [Velocity w](#) (Integrator)
2. [Gain](#) (Gain)
3. [Sum](#) (Sum)

---

# Chapter 4. System Design Variables

## Design Variable Summary

**Table 4.1. Design Variables**

Variable Name	Parent Blocks	Size	Bytes	Class	Value
ACT_BUS	<a href="#">AnalogControl</a> <a href="#">F14 Aircraft Dynamic Model</a> <a href="#">Non-Linear Actuator</a>	1x1	172	Simulink. Bus	< Simulink.Bus>
AIRFRAME_BUS	<a href="#">AnalogControl</a> <a href="#">F14 Aircraft Dynamic Model</a>	1x1	298	Simulink. Bus	< Simulink.Bus>
CONTROL_BUS	<a href="#">AnalogControl</a> <a href="#">Non-Linear Actuator</a>	1x1	90	Simulink. Bus	< Simulink.Bus>
DISTURB_BUS	<a href="#">Dryden Wind Gust</a> <a href="#">F14 Aircraft Dynamic Model</a>	1x1	182	Simulink. Bus	< Simulink.Bus>
Ka	<a href="#">AnalogControl</a>	1x1	8	double	0.6770
Kf	<a href="#">AnalogControl</a>	1x1	8	double	-1.7460
Ki	<a href="#">AnalogControl</a>	1x1	8	double	-3.8640
Kq	<a href="#">AnalogControl</a>	1x1	8	double	0.8156
Md	<a href="#">F14 Aircraft Dynamic Model</a>	1x1	8	double	-6.8847
Mq	<a href="#">Dryden Wind Gust</a> <a href="#">F14 Aircraft Dynamic Model</a>	1x1	8	double	-0.6571
Mw	<a href="#">Dryden Wind Gust</a> <a href="#">F14 Aircraft Dynamic Model</a>	1x1	8	double	-0.0059
PILOT_BUS	<a href="#">AnalogControl</a> <a href="#">Bus Creator</a> <a href="#">PILOT_BUS</a>	1x1	96	Simulink. Bus	< Simulink.Bus>
Swg	<a href="#">Dryden Wind Gust</a>	1x1	8	double	3
Ta	<a href="#">Non-Linear Actuator</a>	1x1	8	double	0.0500
Tal	<a href="#">AnalogControl</a>	1x1	8	double	0.3959
Ts	<a href="#">AnalogControl</a> <a href="#">Dryden Wind Gust</a>	1x1	8	double	0.1000
Uo	<a href="#">F14 Aircraft Dynamic Model</a>	1x1	8	double	689.4000
Vto	<a href="#">Dryden Wind Gust</a>	1x1	8	double	690.4000
W1	<a href="#">AnalogControl</a>	1x1	8	double	2.9710
W2	<a href="#">AnalogControl</a>	1x1	8	double	4.1440

Variable Name	Parent Blocks	Size	Bytes	Class	Value
Zd	<a href="#">F14 Aircraft Dynamic Model</a>	1x1	8	double	-63.9979
Zw	<a href="#">Dryden Wind Gust</a> <a href="#">F14 Aircraft Dynamic Model</a>	1x1	8	double	-0.6385
a	<a href="#">Dryden Wind Gust</a>	1x1	8	double	2.5348
b	<a href="#">Dryden Wind Gust</a>	1x1	8	double	64.1300
g	<a href="#">Gain4</a> <a href="#">Gain4</a>	1x1	8	double	32.2000

**Table 4.2. Functions used in Design Variable Expressions**

Function Name	Parent Blocks	Calling character vector
Cov	<a href="#">Dryden Wind Gust</a>	Cov

## Design Variable Details

**Table 4.3. ACT\_BUS**

Property	Value
Alignment	-1
Elements	<a href="#">[ACT_BUS.Elements(1), ACT_BUS.Elements(2)]</a>
Description	
DataScope	Auto
HeaderFile	

**Table 4.4. ACT\_BUS.Elements(1)**

Property	Value
Min	
Max	
DimensionsMode	Fixed
Description	
Unit	
Name	actualposn_rad
DataType	double
Complexity	real
Dimensions	1

**Table 4.5. ACT\_BUS.Elements(2)**

Property	Value
Min	
Max	
DimensionsMode	Fixed
Description	
Unit	
Name	measuredposn_rad
DataType	double
Complexity	real
Dimensions	1

**Used by Blocks:**

- [slproject\\_f14/AnalogControl](#)
- [slproject\\_f14/F14 Aircraft Dynamic Model](#)
- [slproject\\_f14/Non-Linear Actuator](#)

**Resolved in:** data dictionary (buses.slidd)

**Table 4.6. AIRFRAME\_BUS**

Property	Value
Alignment	-1
Elements	<a href="#">[AIRFRAME_BUS.Elements(1), AIRFRAME_BUS.Elements(2), AIRFRAME_BUS.Elements(3), AIRFRAME_BUS.Elements(4)]</a>
Description	
DataScope	Auto
HeaderFile	

**Table 4.7. AIRFRAME\_BUS.Elements(1)**

Property	Value
Min	
Max	
DimensionsMode	Fixed
Description	
Unit	
Name	alpha_rad
DataType	double

Complexity	real
Dimensions	1

**Table 4.8. AIRFRAME\_BUS.Elements(2)**

Property	Value
Min	
Max	
DimensionsMode	Fixed
Description	
Unit	
Name	wdot
DataType	double
Complexity	real
Dimensions	1

**Table 4.9. AIRFRAME\_BUS.Elements(3)**

Property	Value
Min	
Max	
DimensionsMode	Fixed
Description	
Unit	
Name	pitchrate_rad_s
DataType	double
Complexity	real
Dimensions	1

**Table 4.10. AIRFRAME\_BUS.Elements(4)**

Property	Value
Min	
Max	
DimensionsMode	Fixed
Description	
Unit	



Name	pitchrate_rad_s_s
DataType	double
Complexity	real
Dimensions	1

**Used by Blocks:**

- [slproject\\_f14/AnalogControl](#)
- [slproject\\_f14/F14 Aircraft Dynamic Model](#)

**Resolved in:** data dictionary (buses.slidd)

**Table 4.11. CONTROL\_BUS**

Property	Value
Alignment	-1
Elements	<a href="#">CONTROL_BUS.Elements</a>
Description	
DataScope	Auto
HeaderFile	

**Table 4.12. CONTROL\_BUS.Elements**

Property	Value
Min	
Max	
DimensionsMode	Fixed
Description	
Unit	
Name	actdemand_rad
DataType	double
Complexity	real
Dimensions	1

**Used by Blocks:**

- [slproject\\_f14/AnalogControl](#)
- [slproject\\_f14/Non-Linear Actuator](#)

**Resolved in:** data dictionary (buses.slidd)

**Table 4.13. DISTURB\_BUS**

Property	Value
Alignment	-1
Elements	<a href="#">[DISTURB_BUS.Elements(1), DISTURB_BUS.Elements(2)]</a>
Description	
DataScope	Auto
HeaderFile	

**Table 4.14. DISTURB\_BUS.Elements(1)**

Property	Value
Min	
Max	
DimensionsMode	Fixed
Description	
Unit	
Name	verticaldisturbance
DataType	double
Complexity	real
Dimensions	1

**Table 4.15. DISTURB\_BUS.Elements(2)**

Property	Value
Min	
Max	
DimensionsMode	Fixed
Description	
Unit	
Name	pitchdisturbance
DataType	double
Complexity	real
Dimensions	1

**Used by Blocks:**

- [slproject\\_f14/Dryden Wind Gust/Bus Creator](#)
- [slproject\\_f14/Dryden Wind Gust/DISTURB\\_BUS](#)
- [slproject\\_f14/F14 Aircraft Dynamic Model](#)

**Resolved in:** data dictionary (buses.sldd)

**Ka.** 0.6770

**Used by Blocks:**

- [slproject\\_f14/AnalogControl](#)

**Resolved in:** data dictionary (controller.sldd)

**Kf.** -1.7460

**Used by Blocks:**

- [slproject\\_f14/AnalogControl](#)

**Resolved in:** data dictionary (controller.sldd)

**Ki.** -3.8640

**Used by Blocks:**

- [slproject\\_f14/AnalogControl](#)

**Resolved in:** data dictionary (controller.sldd)

**Kq.** 0.8156

**Used by Blocks:**

- [slproject\\_f14/AnalogControl](#)

**Resolved in:** data dictionary (controller.sldd)

**Md.** -6.8847

**Used by Blocks:**

- [slproject\\_f14/F14 Aircraft Dynamic Model](#)

**Resolved in:** data dictionary (system\_model.sldd)

**Mq.** -0.6571

**Used by Blocks:**

- [slproject\\_f14/Dryden Wind Gust/Gain1](#)
- [slproject\\_f14/F14 Aircraft Dynamic Model](#)

**Resolved in:** data dictionary (system\_model.sldd)

**Mw.** -0.0059

**Used by Blocks:**

- [slproject\\_f14/Dryden Wind Gust/Gain2](#)
- [slproject\\_f14/F14 Aircraft Dynamic Model](#)

**Resolved in:** data dictionary (system\_model.sldd)

**Table 4.16. PILOT\_BUS**

Property	Value
Alignment	-1
Elements	<a href="#">PILOT_BUS.Elements</a>
Description	
DataScope	Auto
HeaderFile	

**Table 4.17. PILOT\_BUS.Elements**

Property	Value
Min	
Max	
DimensionsMode	Fixed
Description	
Unit	
Name	StickCommand_rad
DataType	double
Complexity	real
Dimensions	1

**Used by Blocks:**

- [slproject\\_f14/AnalogControl](#)
- [slproject\\_f14/Pilot/Bus Creator](#)
- [slproject\\_f14/Pilot/PILOT\\_BUS](#)

**Resolved in:** data dictionary (buses.slidd)

Ta. 0.0500

**Used by Blocks:**

- [slproject\\_f14/Non-Linear Actuator](#)

**Resolved in:** data dictionary (system\_model.slidd)

Tal. 0.3959

**Used by Blocks:**

- [slproject\\_f14/AnalogControl](#)

**Resolved in:** data dictionary (controller.slidd)

Ts. 0.1000

**Used by Blocks:**

- [slproject\\_f14/AnalogControl](#)

**Resolved in:** data dictionary (controller.slidd)

Uo. 689.4000

**Used by Blocks:**

- [slproject\\_f14/F14 Aircraft Dynamic Model](#)
- [slproject\\_f14/Pilot G-Force Calculation/](#)

**Resolved in:** data dictionary (system\_model.slidd)

W1. 2.9710

**Used by Blocks:**

- [slproject\\_f14/AnalogControl](#)

**Resolved in:** data dictionary (controller.slidd)

W2. 4.1440

**Used by Blocks:**

- [slproject\\_f14/AnalogControl](#)

**Resolved in:** data dictionary (controller.slidd)

Zd. -63.9979

**Used by Blocks:**

- [slproject\\_f14/F14 Aircraft Dynamic Model](#)

**Resolved in:** data dictionary (system\_model.slidd)

Zw. -0.6385

**Used by Blocks:**

- [slproject\\_f14/Dryden Wind Gust/Gain](#)
- [slproject\\_f14/F14 Aircraft Dynamic Model](#)

**Resolved in:** data dictionary (system\_model.slidd)

g. 32.2000

**Used by Blocks:**

- [slproject\\_f14/Pilot G-Force Calculation/Gain4](#)

**Resolved in:** data dictionary (system\_model.slidd)

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# Chapter 5. Requirements

slproject\_f14 does not contain requirements traceability links.

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# Chapter 6. System Model Configuration

Source: Model  
Source Name: slproject\_f14

**Table 6.1. slproject\_f14 Configuration Set**

Property	Value
Description	
Components	[ <a href="#">slproject_f14 Configuration Set.Components(1)</a> , <a href="#">slproject_f14 Configuration Set.Components(2)</a> , <a href="#">slproject_f14 Configuration Set.Components(3)</a> , <a href="#">slproject_f14 Configuration Set.Components(4)</a> , <a href="#">slproject_f14 Configuration Set.Components(5)</a> , <a href="#">slproject_f14 Configuration Set.Components(6)</a> , <a href="#">slproject_f14 Configuration Set.Components(7)</a> , <a href="#">slproject_f14 Configuration Set.Components(8)</a> , <a href="#">slproject_f14 Configuration Set.Components(9)</a> ]
Name	Configuration

**Table 6.2. slproject\_f14 Configuration Set.Components(1)**

Property	Value
Name	Solver
Description	
Components	
StartTime	0.0
StopTime	10.0
AbsTol	auto
AutoScaleAbsTol	on
FixedStep	auto
InitialStep	auto
MaxOrder	5
ZcThreshold	auto
ConsecutiveZCsStepRelTol	10*128*eps
MaxConsecutiveZCs	1000
ExtrapolationOrder	4
NumberNewtonIterations	1
MaxStep	0.1

MinStep	auto
MaxConsecutiveMinStep	1
RelTol	1e-3
EnableMultiTasking	on
ConcurrentTasks	off
SolverName	VariableStepAuto
SolverType	Variable-step
SolverJacobianMethodControl	auto
ShapePreserveControl	DisableAll
ZeroCrossControl	UseLocalSettings
ZeroCrossAlgorithm	Nonadaptive
SolverResetMethod	Fast
PositivePriorityOrder	off
AutoInsertRateTranBlk	off
SampleTimeConstraint	Unconstrained
InsertRTBMode	Whenever possible
SampleTimeProperty	
DecoupledContinuousIntegration	off
MinimalZcImpactIntegration	off
ODENIntegrationMethod	ode3

**Table 6.3. slproject f14 Configuration Set.Components(2)**

Property	Value
Name	Data Import/Export
Description	
Components	
Decimation	1
ExternalInput	[t, u]
FinalStateName	xFinal
InitialState	xInitial
LimitDataPoints	on
MaxDataPoints	1000
LoadExternalInput	off
LoadInitialState	off
SaveFinalState	off
SaveOperatingPoint	off



SaveFormat	Array
SaveOutput	off
SaveState	off
SignalLogging	off
DSMLogging	on
InspectSignalLogs	off
SaveTime	off
ReturnWorkspaceOutputs	off
StateSaveName	xout
TimeSaveName	tout
OutputSaveName	yout
SignalLoggingName	slproject_f14
DSMLoggingName	dsmout
OutputOption	RefineOutputTimes
OutputTimes	[]
ReturnWorkspaceOutputsName	out
Refine	1
LoggingToFile	off
DatasetSignalFormat	timeseries
LoggingFileName	out.mat
LoggingIntervals	[-inf, inf]

**Table 6.4. slproject\_f14 Configuration Set.Components(3)**

Property	Value
Name	Optimization
Description	
Components	
BlockReduction	on
BooleanDataType	on
ConditionallyExecuteInputs	on
DefaultParameterBehavior	Tunable
InlineParams	off
UseDivisionForNetSlopeComputation	off
GainParamInheritBuiltInType	off
UseFloatMulNetSlope	off
InheritOutputTypeSmallerThanSingle	off

DefaultUnderspecifiedDataType	double
UseSpecifiedMinMax	off
InlineInvariantSignals	off
OptimizeBlockIOStorage	on
BufferReuse	on
GlobalBufferReuse	on
GlobalVariableUsage	None
StrengthReduction	off
AdvancedOptControl	
ExpressionFolding	on
BooleansAsBitfields	off
BitfieldContainerType	uint_T
BitwiseOrLogicalOp	Same as modeled
EnableMemcpy	on
MemcpyThreshold	64
PassReuseOutputArgsAs	Structure reference
PassReuseOutputArgsThreshold	12
LocalBlockOutputs	on
RollThreshold	5
StateBitsets	off
DataBitsets	off
ActiveStateOutputEnumStorageType	Native Integer
ZeroExternalMemoryAtStartup	on
ZeroInternalMemoryAtStartup	on
InitFltsAndDblsToZero	on
NoFixptDivByZeroProtection	off
EfficientFloat2IntCast	off
EfficientMapNaN2IntZero	on
LifeSpan	inf
EvaledLifeSpan	Inf
MaxStackSize	Inherit from target
BufferReusableBoundary	on
SimCompilerOptimization	off
AccelVerboseBuild	off
OptimizeBlockOrder	off
OptimizeDataStoreBuffers	on

BusAssignmentInplaceUpdate	on
DifferentSizesBufferReuse	off
UseRowMajorAlgorithm	off
OptimizationLevel	level2
OptimizationPriority	Balanced
OptimizationCustomize	on
LabelGuidedReuse	off
MultiThreadedLoops	off
DenormalBehavior	GradualUnderflow
EfficientTunableParamExpr	off

**Table 6.5. slproject f14 Configuration Set.Components(4)**

Property	Value
Name	Diagnostics
Description	
Components	
RTPrefix	error
ConsistencyChecking	none
ArrayBoundsChecking	none
SignalInfNanChecking	none
StringTruncationChecking	error
SignalRangeChecking	none
ReadBeforeWriteMsg	UseLocalSettings
WriteAfterWriteMsg	UseLocalSettings
WriteAfterReadMsg	UseLocalSettings
AlgebraicLoopMsg	warning
ArtificialAlgebraicLoopMsg	warning
SaveWithDisabledLinksMsg	warning
SaveWithParameterizedLinksMsg	none
CheckSSInitialOutputMsg	on
UnderspecifiedInitializationDetection	Classic
MergeDetectMultiDrivingBlocksExec	none
CheckExecutionContextRuntimeOutputMsg	off
SignalResolutionControl	TryResolveAllWithWarning
BlockPriorityViolationMsg	warning
MinStepSizeMsg	warning

## Chapter 6. System Model Configuration

TimeAdjustmentMsg	none
MaxConsecutiveZCsMsg	error
MaskedZcDiagnostic	warning
IgnoredZcDiagnostic	warning
SolverPrmCheckMsg	warning
InheritedTsInSrcMsg	warning
MultiTaskDSMMsg	warning
MultiTaskCondExecSysMsg	none
MultiTaskRateTransMsg	error
SingleTaskRateTransMsg	none
TasksWithSamePriorityMsg	warning
SigSpecEnsureSampleTimeMsg	warning
CheckMatrixSingularityMsg	none
IntegerOverflowMsg	warning
Int32ToFloatConvMsg	warning
ParameterDowncastMsg	error
ParameterOverflowMsg	error
ParameterUnderflowMsg	none
ParameterPrecisionLossMsg	warning
ParameterTunabilityLossMsg	warning
FixptConstUnderflowMsg	none
FixptConstOverflowMsg	none
FixptConstPrecisionLossMsg	none
UnderSpecifiedDataTypeMsg	none
UnnecessaryDatatypeConvMsg	none
VectorMatrixConversionMsg	none
FcnCallInpInsideContextMsg	warning
SignalLabelMismatchMsg	none
UnconnectedInputMsg	warning
UnconnectedOutputMsg	warning
UnconnectedLineMsg	warning
UseOnlyExistingSharedCode	error
SFcnCompatibilityMsg	none
FrameProcessingCompatibilityMsg	error
UniqueDataStoreMsg	none
BusObjectLabelMismatch	warning

## Chapter 6. System Model Configuration

RootOutputRequireBusObject	warning
AssertControl	UseLocalSettings
AllowSymbolicDim	off
ModelReferenceIOMsg	none
ModelReferenceVersionMismatchMessage	none
ModelReferenceIOMismatchMessage	none
UnknownTsInhSupMsg	warning
ModelReferenceDataLoggingMessage	warning
ModelReferenceNoExplicitFinalValueMsg	none
ModelReferenceSymbolNameMessage	warning
ModelReferenceExtraNoncontSigs	error
StateNameClashWarn	warning
OperatingPointInterfaceChecksumMismatchMsg	warning
NonCurrentReleaseOperatingPointMsg	error
PregeneratedLibrarySubsystemCodeDiagnostic	warning
InitInArrayFormatMsg	warning
StrictBusMsg	ErrorLevel1
BusNameAdapt	WarnAndRepair
NonBusSignalsTreatedAsBus	none
SFUnusedDataAndEventsDiag	warning
SFUnexpectedBacktrackingDiag	warning
SFInvalidInputDataAccessInChartInitDiag	warning
SFNoUnconditionalDefaultTransitionDiag	warning
SFTransitionOutsideNaturalParentDiag	warning
SFUnreachableExecutionPathDiag	warning
SFUndirectedBroadcastEventsDiag	warning
SFTransitionActionBeforeConditionDiag	warning
SFOutputUsedAsStateInMooreChartDiag	error
SFTemporalDelaySmallerThanSampleTimeDiag	warning
SFSelfTransitionDiag	warning
SFExecutionAtInitializationDiag	none
SFMachineParentedDataDiag	warning
IntegerSaturationMsg	warning
AllowedUnitSystems	all
UnitsInconsistencyMsg	warning
AllowAutomaticUnitConversions	on

RCSCRenamedMsg	warning
RCSCObservableMsg	warning
ForceCombineOutputUpdateInSim	off
UnderSpecifiedDimensionMsg	none
DebugExecutionForFMUViaOutOfProcess	off
ArithmeticOperatorsInVariantConditions	warning
VariantConditionMismatch	none

**Table 6.6. slproject f14 Configuration Set.Components(5)**

Property	Value
Name	Hardware Implementation
Description	
Components	
ProdBitPerChar	8
ProdBitPerShort	16
ProdBitPerInt	32
ProdBitPerLong	32
ProdBitPerLongLong	64
ProdBitPerFloat	32
ProdBitPerDouble	64
ProdBitPerPointer	32
ProdBitPerSizeT	64
ProdBitPerPtrDiffT	64
ProdLargestAtomicInteger	Char
ProdLargestAtomicFloat	None
ProdIntDivRoundTo	Undefined
ProdEndianness	Unspecified
ProdWordSize	32
ProdShiftRightIntArith	on
ProdLongLongMode	off
ProdHWDeviceType	32-bit Generic
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
TargetEndianness	Unspecified
TargetWordSize	32
TargetPreprocMaxBitsSint	32
TargetPreprocMaxBitsUint	32
TargetHWDeviceType	Specified
TargetUnknown	off
ProdEqTarget	on
UseEmbeddedCoderFeatures	on
UseSimulinkCoderFeatures	on
HardwareBoardFeatureSet	EmbeddedCoderHSP

**Table 6.7. slproject f14 Configuration Set.Components(6)**

Property	Value
Name	Model Referencing
Description	
Components	
UpdateModelReferenceTargets	IfOutOfDateOrStructuralChange
EnableRefExpFcnMdlSchedulingChecks	on
CheckModelReferenceTargetMessage	error
EnableParallelModelReferenceBuilds	off
ParallelModelReferenceErrorOnInvalidPool	on
ParallelModelReferenceMATLABWorkerInit	None
ModelReferenceNumInstancesAllowed	Multi
PropagateVarSize	Infer from blocks in model
ModelDependencies	
ModelReferencePassRootInputsByReference	on

ModelReferenceMinAlgLoopOccurrences	on
PropagateSignalLabelsOutOfModel	off
SupportModelReferenceSimTargetCustomCode	off

**Table 6.8. slproject f14 Configuration Set.Components(7)**

Property	Value
Name	Simulation Target
Description	
Components	
SimCustomSourceCode	
SimCustomHeaderCode	
SimCustomInitializer	
SimCustomTerminator	
SimReservedNameArray	
SimUserSources	
SimUserIncludeDirs	
SimUserLibraries	
SimUserDefines	
SFSimEnableDebug	off
SFSimEcho	on
SimCtrlC	on
SimIntegrity	on
SimUseLocalCustomCode	off
SimParseCustomCode	on
SimAnalyzeCustomCode	off
SimDebugExecutionForCustomCode	off
SimGenImportedTypeDefs	off
CompileTimeRecursionLimit	50
EnableRuntimeRecursion	on
MATLABDynamicMemAlloc	on
MATLABDynamicMemAllocThreshold	65536
CustomCodeFunctionArrayLayout	
DefaultCustomCodeFunctionArrayLayout	NotSpecified
CustomCodeUndefinedFunction	UseInterfaceOnly
CustomCodeGlobalsAsFunctionIO	off
SimTargetLang	C



GPUAcceleration	off
SimGPUMallocThreshold	200
SimGPUStackLimitPerThread	1024
SimGPUErrorChecks	off
SimGPUCustomComputeCapability	
SimGPUCompilerFlags	
SimDLTargetLibrary	mkl-dnn
SimDLAutoTuning	on

**Table 6.9. slproject f14 Configuration Set.Components(8)**

Property	Value
Name	Code Generation
Description	
SystemTargetFile	grt.tlc
HardwareBoard	None
ShowCustomHardwareApp	off
ShowEmbeddedHardwareApp	off
TLCOptions	
GenCodeOnly	off
MakeCommand	make_rtw
GenerateMakefile	on
PackageGeneratedCodeAndArtifacts	off
PackageName	
TemplateMakefile	grt_default_tmf
PostCodeGenCommand	
GenerateReport	off
RTWVerbose	on
RetainRTWFile	off
ProfileTLC	off
TLCDebug	off
TLCCoverage	off
TLCAssert	off
RTWUseLocalCustomCode	off
RTWUseSimCustomCode	off
CustomSourceCode	
CustomHeaderCode	

## Chapter 6. System Model Configuration

CustomInclude	
CustomSource	
CustomLibrary	
CustomDefine	
CustomBLASCallback	
CustomLAPACKCallback	
CustomFFTCallback	
CustomInitializer	
CustomTerminator	
Toolchain	Automatically locate an installed toolchain
BuildConfiguration	Faster Builds
CustomToolchainOptions	
IncludeHyperlinkInReport	off
LaunchReport	off
PortableWordSizes	off
GenerateErtSFunction	off
CreateSILPILBlock	None
CodeExecutionProfiling	off
CodeExecutionProfileVariable	executionProfile
CodeProfilingSaveOptions	SummaryOnly
CodeProfilingInstrumentation	off
CodeCoverageSettings	<a href="#">slproject_f14 Configuration Set.Components(8).CodeCoverageSettings</a>
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
GPUStackLimitPerThread	1024
GPUcuBLAS	on
GPUcuSOLVER	on
GPUcuFFT	on
GPUErrorChecks	off
GPUComputeCapability	3.5
GPUCustomComputeCapability	
GPUCompilerFlags	
DLTargetLibrary	none
DLAutoTuning	on
DLArmComputeVersion	19.05
DLArmComputeArch	unspecified
Components	[ <a href="#">slproject_f14 Configuration Set.Components(8).Components(1)</a> , <a href="#">slproject_f14 Configuration Set.Components(8).Components(2)</a> ]

**Table 6.10. [slproject\\_f14 Configuration Set.Components\(9\)](#)**

Property	Value
Description	Simulink Coverage Configuration Component
Components	
Name	Simulink Coverage
CovEnable	off
CovScope	EntireSystem
CovIncludeTopModel	on
RecordCoverage	off
CovPath	/
CovSaveName	covdata
CovCompData	
CovMetricSettings	dw
CovFilter	

CovHTMLOptions	
CovNameIncrementing	off
CovForceBlockReductionOff	on
CovEnableCumulative	on
CovSaveCumulativeToWorkspaceVar	on
CovSaveSingleToWorkspaceVar	on
CovCumulativeVarName	covCumulativeData
CovCumulativeReport	off
CovSaveOutputData	on
CovOutputDir	slcov_output/\$ModelName\$
CovDataFileName	\$ModelName\$_cvdata
CovReportOnPause	on
CovModelRefEnable	off
CovModelRefExcluded	
CovExternalEMLEnable	off
CovSFcnEnable	off
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

**Table 6.11. slproject f14 Configuration**  
**Set.Components(8).CodeCoverageSettings**

Property	Value
TopModelCoverage	off

ReferencedModelCoverage	off
CoverageTool	None

**Table 6.12. slproject f14 Configuration Set.Components(8).Components(1)**

Property	Value
Name	Code Appearance
Description	
Components	
ForceParamTrailComments	off
GenerateComments	on
CommentStyle	Auto
IgnoreCustomStorageClasses	on
IgnoreTestpoints	off
MaxIdLength	31
ShowEliminatedStatement	off
OperatorAnnotations	off
SimulinkDataObjDesc	off
SFDataObjDesc	off
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	off
InsertPolySpaceComments	off
SimulinkBlockComments	on
BlockCommentType	BlockPathComment
StateflowObjectComments	on
MATLABSourceComments	off
EnableCustomComments	off
InternalIdentifier	Shortened
InlinedPrmAccess	Literals
ReqsInCode	off
UseSimReservedNames	off
ReservedNameArray	
EnumMemberNameClash	error

**Table 6.13. `slproject f14` Configuration Set.Components(8).Components(2)**

Property	Value
Name	Target
Description	
Components	
IsERTTarget	off
TargetLibSuffix	
TargetPreCompLibLocation	
TargetLangStandard	C89/C90 (ANSI)
CodeReplacementLibrary	None
UtilityFuncGeneration	Auto
MultiwordTypeDef	System defined
MultiwordLength	2048
DynamicStringBufferSize	256
GenerateFullHeader	on
InferredTypesCompatibility	off
ExistingSharedCode	
GenerateSampleERTMain	off

GenerateTestInterfaces	off
ModelReferenceCompliant	on
ParMdlRefBuildCompliant	on
CompOptLevelCompliant	on
ConcurrentExecutionCompliant	on
IncludeMdlTerminateFcn	on
CombineOutputUpdateFcns	off
CombineSignalStateStructs	off
GroupInternalDataByFunction	off
SuppressErrorStatus	off
IncludeFileDelimiter	Auto
ERTCustomFileBanners	off
SupportAbsoluteTime	on
LogVarNameModifier	rt_
MatFileLogging	on
MultiInstanceERTCode	off
CodeInterfacePackaging	Nonreusable function
PurelyIntegerCode	off
SupportNonFinite	on
SupportComplex	on
SupportContinuousTime	on
SupportNonInlinedSFcns	on
RemoveDisableFunc	off
RemoveResetFunc	off
SupportVariableSizeSignals	off
ParenthesesLevel	Nominal
CastingMode	Nominal
ModelStepFunctionPrototypeControlCompliant	off
CPPClassGenCompliant	on
GRTInterface	on
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
ExtMode	off
ExtModeStaticAlloc	off
ExtModeTesting	off
ExtModeStaticAllocSize	1000000
ExtModeTransport	0
ExtModeMexFile	ext_comm
ExtModeMexArgs	
ExtModeIntrfLevel	Level1
RTWCAPISignals	off
RTWCAPIParams	off
RTWCAPIStates	off
RTWCAPIRootIO	off
GenerateASAP2	off
MultiInstanceErrorCode	Error



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# Chapter 7. 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).

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# Chapter 8. About this Report

## Report Overview

This report describes the design of the F14 Project 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.