SimAssist Guideline

Getting Started:

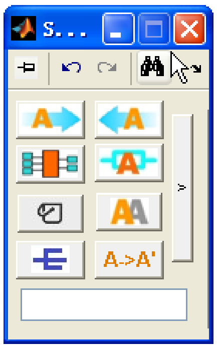
The plug-in tool SimAssist is designed to facilitate modeling using MATLAB/Simulink/Stateflow, it provides various built-in functionalities that relieve the user from repetitive and tedious operations during modeling. The ultimate target of this facility is to get ride of those algorithm-irrelevant operations as far as possible thus help software modeling engineers to focus mainly on how to realizing the control algorithm.

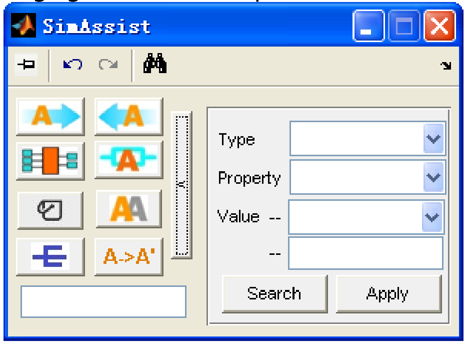
This tool is highly customizable by its infrastructure design.

- Functionalities are packed in seperate macro registration files.
- Behavior and features of block types are described in seperate block registration files.
- The registration files are scanned on every start, they are plug-and-play.

In this way the supported functionalities and blocks can be easily tailored or customized without affecting others.
Note: Basically every functionality is defined as a "Macro", which is essentially a script that perform a seriesof operations programatically.

The tools is interfaced by a GUI as the following figure (Standard/Expanded):





Of all the functionalities those may be used most frequently are linked with buttons on the GUI, while others can be invoked by executing brief commands in the bottom edit box.

Detail explanation of usage:

Button:

- **Propagate Upstream/ Propagate Downstream:**
  - Propagate string from upstream or downstream.
    - Propagate major string upstream or downstream to block
    - When multi-property blocks (e.g., Saturation, Lookup table, etc.) encounterd, format the string automatically. The way to format the string can be easily customized.
    - For BusCreator, this functionality trace downstream of the model to collect all the signals orginated from this block and generate appropriate number of inports as well as adding lines with corresponding name. This feature could be very useful when user have to create bus harness as inputs to a complex bus-input-based model (e.g., for purpose of unit test).
    - For BusSelector, if propagated from downstream, the signals selected will be changed accordingly, regardless of whether the inport is feed with a appropriate bus. If propagated from upstream, all the signals will be recursively selected as output. This can be useful when the input bus is multi-leveled, and you want to select them all out.
    - Propagation to Stateflow chart is also supported, corresponding input/output data objects will be generated in this condition
  - Create counterpart of block
    - If blocks like DataStoreRead/Write, From/Goto are currently selected, the propagate button may be used in inverse direction to generate the counterpart block, i.e., From<->Goto, DataStoreRead<->DataStoreWrite

- **Auto Align**
  - Layout around center block
    - If **only one** block selected, this functionality tries to layout the blocks connected on both sides, exclusively involved branches will also be shifted
  - Layout blocks
    - If more than one blocks selected, internally this functionality tries to align them horizontally with ports, and vertically by block types.
    - Also, externally blocks are grouped as a whole to align with ports
  - Resize on right mouse button click

        - If click right mouse on the button, the functionality tries to resize selected blocks vertically to adapt to its surrounding blocks
    - Straighten line
        - If line selected, the functionality tries to straighten the line together with its connected blocks

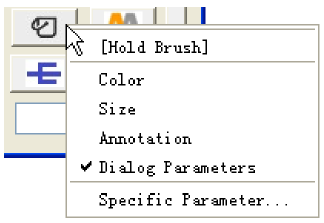
- **Smart Action**

  This button combines several features into one, perform different actions as per selected block type

    - Annotate block
        - Add annotation to block in predefined pattern, e.g., display datatype, major block parameters, etc.
    - Refine block
        - Standardize block parameter setting according to certain modeling guideline
        - Rename block name in accordance with major block parameter
    - Roll property
        - Roll block major property if selected block have an enumeration major property, e.g., Compare, Logic, Math, MinMax, ...
- **Format brush**

This button acts just like the format brush button in Microsoft Office, except that it copy parameter settings from source block and then brush it to the destination blocks

    - With single source block selected and click the "empty" button will set the source, and the button state changes to "filled"
    - Selecte blocks to be brushed, and click the button again, parameters that both source and destinations have will be copied from source to destination and the button reset to empty state
    - Right click on the button will invoke the menu



        - "Color", "Size", "Annotation" and "Dialog Properties" are options for user to select the target properties to be brushed. Items that are not checked will not be brushed.
        - Use "Specify Parameter..." option to specify effective source parameters if you don't want all parameters brushed to destination
        - Use "[Hold Brush]" button to keep the brush filled without reset to empty after brushing (default behavior), so as for multiple usage
    - **Multi ->Multi mode:** If multiple blocks are selected on copy action, the major property of these block will be saved and later brushed on destination blocks. This can be very useful to simultaneously transfer properties between a bunch of blocks when they cannot be connected (From -> Inport, for example). Note that lines are also supported as long as selected.

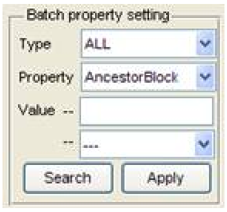
- **Show/Hide name**
    - Show/Hide name of selected block

- **Set signal object resolve**
    - Set the lines selected as "must resolve to signal object"

- A->A' **Standardize naming**
    - With blocks or lines selected, this functionality tries to standardize its abbreviation naming according to the dictionary
    - Dictionary is defined in SACFG_DICTIONARY.m file, modify this file to comply with customized modeling naming rule
    - Right click on the button will invoke the menu to enter Stateflow mode. In this mode only the objects currently

selected in the Stateflow editor will be renamed, otherwise the entire stateflow chart will be renamed throughly

Batch property setting



This function block aims to facilitate operation on a bunch of certain blocks, it provides a versatile way to check, modify and synchronize certain properties.

When “Search” executed, the function collects currently selected blocks and lists all the types and associated properties as well as the values in corresponding fields.

When “Apply” executed, the function applies on blocks that currently selected and filtered by type specified in “Type”. The specified “Property” of these blocks will be set to the specified "Value". The text string in the popup menu will be used as specified value if the above text field is empty, otherwise the string in text field will be used.

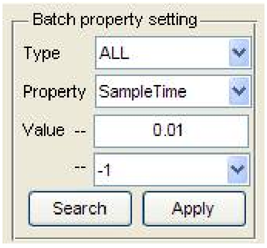
Note that whenever “Apply” is clicked, the function implements only on the currently selected blocks, which allows you to change selection range as needed at any time.

Also note the input Edit allows multiple expression or sequential expression, like "Kate, Jack, Mary" or "Val[1:5]", etc. It would be very convenient to use this feature in case there are multiple blocks with which you want to set their properties in series. Refer to the "Sequential Expression" part for detail usage.

Example 1:

Suppose you want to check and synchronize the sample time of all blocks under current system to “0.01”, which could be realized in the following steps:

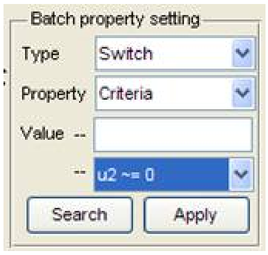
1. **Ctrl+A to select all the objects under current system**
2. **Click on “Search”, and select “All” in popup menu “Type”, select “SampleTime” from popup menu “Property”**
3. **If there is “0.01” in popup menu “Value” (which means there is at least one block whose sample time is 0.01), select and click on “Apply”, otherwise manually input “0.01” in the text field and click on “Apply”.**



Example 2:

Suppose you want to check if all the “Switch” blocks has been set to “u2~=0”, and make change if not:

1. **Ctrl+A to select all the objects under current system**
2. **Click on “Search”, and select “Switch” in popup menu “Type”, select “Criteria” from popup menu “Property”**
3. **Select “u2~=0” from popup menu “Value”, and apply**

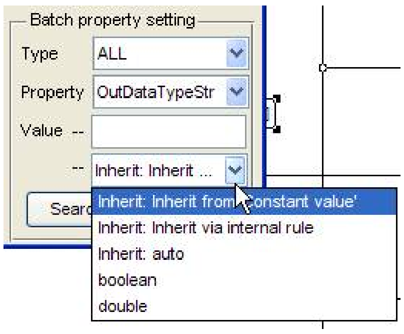


Example 3:

Suppose you want to check no “Inherit” data type has been used on some blocks:

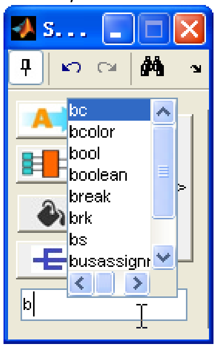
1. **Select the blocks to check**
2. **Select property “OutDataTypeStr”**
3. **Check value list in popup menu “Value” to see if “Inherit” data type exists**

The image below shows that there are several output data types within the selected blocks.



Command line:

Due to the limitation on GUI size, most other functions are invoked in command line. Command patterns can easily be added, removed or changed as necessary, as well as their priorities.



A prompt list will show according to the letters already entered.

Command line patterns:

In most cases, the command line adopts the pattern that a starting keyword ("cmd") and some optional suffix strings.

- General command patterns
  - cmd[option]
    - If suffix option is specified after the starting keyword, the string will be used to set the block major property, for example,
      - cnst5.0 creates a Constant block with name set to 5.0
      - fromabc creates a From block with tag set to "abc"
    - For certain commands the option is intepreted as a second operand, for example,
      - *5 creates a Multiply block as well as a Constant block with value 5 connected to its second port
      - ==5 creates a "==" RelationOperator block as well as a Constant block with value 5 connected to its second port
  - cmd[N]
    - For certain blocks, if suffix option is specified as an integer, it may be used to control the number of ports, for example,
      - bs6 creates a BusSelector with 6 outports
      - bc6 creates a BusCreator with 6 inports
      - min6 creates a Min block with 6 inports
  - cmd[N][option1][,option2][,...]
    - For certain blocks, suffix integer N is used to specify number of blocks to be created, and option is used to set the block major property, for example
      - "from5" creates five from blocks
      - "from5AAA BBB" creates five blocks and tagged correspondingly (use last option if not given enough number of options)
  - cmd[option1][,option2][,...]
    - For certain blocks with multiple major properties, e.g., Saturation, Lookup table, it is also possible to specify its parameter after the keyword. Multiple parameters can be seperated using whitespace or comma, for example,
      - l2ABC will creates a Lookup2D with Row, Column, and Table set as ABC_X, ABC_Y, ABC (note that the naming rules can be customized according to customer requirements)
      - "l2 AX BY CZ" or "l2AX,BY,CZ", they all creates a Lookup2D block with Row, Column, Table set as AX, BY, CZ
      - **"fromAAA BBB CCC" or "fromAAA,BBB,CCC" creates three blocks each tagged respectively**
      - **"cnst 5.0, ABC, -1" creates three Constant blocks each set with respective value**
  - cmd[options]
    - More complex options is possible for some commands, for example,
      - "ss i3 o3 atom" creates an Atomic SubSystem with 3 inports and 3 outports
  - Plain text with no command pattern match

        - Depending on whether there is any block currently selected:
            - if true, the text will be tried prefixed with a backlash "\", which tries to modify the major property of currently selection
            - if false, the command will be used like prefixed with "cnst", which tries to create Constant block(s) using the command string as Value
        - This feature might be quite frequently used to save typing effort, for example,
            - Provided no current selection, if the given command string is parsed without matching, it will be prefixed with "cnst" keyword automatically, for example,
                - "true" creates a Constant block with value "true"
                - "5.0" creates a Constant block with value "5.0"
                - "ABC" creates a Constant block with value "ABC" (suppose "ABC" is not a keyword)
            - Provided current selection exists, if given command string is parsed without matching, it will be prefixed with "\", for example
                - Select five "Inport" blocks and run command "aa,bb,cc,dd,ee", changes their names accordingly
                - Select five "Goto" blocks and run command "var[1:5]", changes their tags to "var1, var2, var3, var4, var5" accordingly
- Plus/Minus method
    - For each block selected, it can handle "+/-" commands if Plus/Minus methods are defined for that block type, for example,
        - +5 on a BusCreator block increaes number of inports by five
        - ++ on a BusSelector block select all signals recursively out from the input bus
        - + i5fc on a SubSystem block adds five inports and an Enable trigger port to it
    - Note that if there is no block selected, the +/- operator will be intepreted as adding a new Sum block
- Other command patterns

  There are also other less common command patterns, as are explained later in the Macros section, e.g.,

    - \ABC direct change of major property
    - ABC=>BCD string replace
    - $ system commands
- Hotkeys
    - For convenience come commands are associated with hotkey when the command line editbox is active.
        - Ctrl key is equivalent to "line" command
        - Alt+Arrow is equivalent to "wider", "narrower", "longer", "shorter" commands, they can be useful in adjusting size of multiple blocks at the same time
- Sequential expression
    - Sequential expression might be very useful when you want to create/change a series of properties that follows certain sequential rule
    - Usage pattern: series of expression enclosed in bracket pair like [expr1, expr2, ...]
    - The following sequence expression is allowed ("#" indicates number(s), and "A", "a", "Z", "z" indicates alphabet letters)
        - #:#, #:#:#
        - A:#:Z, a:#:z
        - "STR1, STR2, STR3", "STR1 STR2 STR3"
        - mix of the above patterns seperated with whitespace or comma
    - If mulitiple sequential expression exists, the shorter ones will be repeated to align with longest one, see the example.
    - Examples of the sequence expression part:
        - "PRE[1:10]TAIL" translates to sequence like {PRE1TAIL, PRE2TAIL, ...}
        - "PRE[1:2:10,AA,BB,CC]TAIL" translates to sequence like {PRE1TAIL, PRE3TAIL, ..., PRE9TAIL, ..., PREAATAIL, PREBBTAIL, PRECCTAIL}
        - "PRE[b:e]TAIL translates to sequence like {PREbTAIL, PREcTAIL, PREdTAIL, PREeTAIL}
        - "PRE[a:3:z]" translates to sequence like {PREa, PREd, PREg, ...}
        - "PRE[AA,BB,CC,A:3:Z]TAIL" translates to sequence like {PREAATAIL, PREBBTAIL, PRECCTAIL, PREATAIL, PREDTAIL, ...}
        - "PRE[1:5]MID[a:k]END" translates to sequence like {PRE1MIDaEND, PRE2MIDbEND, PRE3MIDcEND, PRE4MIDdEND, PRE5MIDeEND, PRE1MIDfEND, PRE2MIDgEND, PRE3MIDhEND, PRE4MIDiEND, PRE5MIDjEND, PRE1MIDkEND}
    - Examples of command usage
        - "ipTest[1:10]"creates ten inport named as "Test1, Test2, ..."
        - Select a bunch of SubSystems, say you want to name them using their schedule time, and "sch_[10, 20, 50, 100]ms", changes their names to "sch_10ms", "sch_20ms", ...
        - Suppose you have several signals in From blocks to merge, you can utilize sequential expression to name them in one line, like "sig_[idle, pwrup, pwrdn, run, afterrun]" tags the blocks like "sig_idle", "sig_pwrup", ...
- Insignificance of whitespace and order of options
    - In most cases, as long as there is no ambiguous, whitespace is insignificant in idnetifying command segments. Order of options (if any) is also insignificant. This relieves the user from remebering too many rules, for example:

        - "ipabc" is equivalent to "ip abc", they all creates an Inport block named as "abc"
        - "ssi5o6en" is equivalent to "ss en i5 o6", they all creates an Enable SubSystem with five inports and six outports
        - "and4" is equivalent to "and 4", they all creates a Logical AND block with four inputs
- Multiple commands in single run
    - Use "&" symbol to join several commands together in one session, for example,
        - "from & goto" is equivalent to execute "from" and then execute "goto"
    - Use "*N" suffix with command to execute the command N times
        - This can be very useful to create several blocks in a batch
        - "fromabc*5" is equivalent to execute "fromabc" five times, except the block will be automatically offset to avoid overlap
- Use clipboard for multiple inputs
    - The keyword "#cb", "#clip", "clipboard" in command will be replaced by actual string currently in clipboard (processed appropriately)
        - This can be extremely useful when modeling from documented requirement
        - "ip#cb" creates 5 inport and named correspondingly according to the clipboard content (assuming that clipboard with content "aaa bbb ccc ddd eee")

Scenario specific behaviors of command line:
There are some scenario specific behaviors that most blocks adopt:

- Auto number of inport/outport
    - For blocks like BusCreator, BusSelector, Merge, MinMax, etc. if command given with no option suffix, the number of inputs or outputs will be determined according to current selection of block or lines.
    - More specifically, number of inputs is determined according to number of unconnected outports and lines selected
    - Number of outputs is determined according to number of unconnected inports currently selected.
- Auto grounds/terminates with block
    - For sink-like blocks, e.g., Outport, Goto, etc., if command given with no option suffix, the currently selected lines or unconnected outports will be terminated with this type of block and signal name automatically propagated
    - For source-like blocks, e.g., Inport, From, etc., if command given with no option suffix, the currently selected unconnected inports and no source lines will be grounded with this type of block and signal name automatically propagated
    - For blocks that can be connected on both sides, if side option specified ("[" and "]", refer to the Global Session Option part), it will act as a sink or source block
    - The block terminates on lines can be positioned using mouse (use +/-ms option to enable/disable this feature)
- Auto insert block to line
    - For blocks that can be connected on both sides, if command given with no option suffix, the currently selected lines will be automatically inserted with this type of block, e.g., DataTypeConversion, RateTransition, etc.
- Auto line connection
    - When new blocks added with blocks or lines already selected, this tool will automatically add line to connect the already selected block/line with the newly added block
- Mouse position to assist location
    - Specify postion when adding new block
    - Specify space when adding new block
    - Use +ms/-ms option to alter the default behavior

Global session options:
There are some global options that can affect the command behaviour. These options are pre-processed and removed from the command string before it is actually executed, thus it can be put anywhere of the command string.

- :*DATATYPE* : Specifies data type to be set
    - The DATATYPE field can be one of the following expression, single, sgl, double, dbl, boolean, bool, uint8, u8, uint16, u16, uint32, u32, int8, i8, int16, i16, int32, i32
    - For example,
        - "cnst ABC:sgl" creates a Constant block and sets its output data type to single
        - "dt:bool" creates a DataTypeConversion block and sets its output data type to boolean
    - Note that this option status will be preserved for later session, i.e., you don't have to explicitly add this option if you want to use the same data type for next command run
    - Suffix the colon with nothing resets the data type to "Inherit...", in other words, do nothing
- [ ] : Side specifier
    - It happens that the user want to specify that the command shall take effect only on inport side or outport side, which can be realized by adding "[" symbol for inport only or "]" symbol for outport only, for example,
    - "clean[" performs the clean action only on its inport side
    - "dt]" add DataTypeConverter only to the outport side of selected block
- +c/-c : Controls whether to set random color, by default OFF

    - For example, "from +c" creates a From block and set random foreground color
    - Note that this option status will be preserved for later session
- +a/-a : Controls whether to append annotation, by default OFF
    - For example, "cnst ABC+a" creates and annotates a Constant block
    - Note that this option status will be preserved for later session
- +dt/-dt : Controls enable or disable automatically setting data type, by default ON
    - For example, "cnst ABC-dt" creates a Constant block but disables the data type setting behaviour
    - Note that this option status will be preserved for later session
- +ms/-ms: Controls enable or disable using mouse position as reference when adding blocks, by default on
    - For example, "goto-ms" adds block to selected line using default layout parameter defined for the block (in registration file) instead of mouse position as vertical reference
    - For example, "ip-ms" adds block to selected empty input port using default layout parameter defined for the block (in registration file) instead of mouse position as horizontal space reference
    - Note that this option status will be preserved for later session

Console command operator ($):
The "$" operator is defined as console command, it can be used to operate on the SimAssist elementary operations, such as list/add/remove or manage the blocks and macros supported, as well as import and export the database. So far the following commands are supported (functions yet to be refined and expanded):

- $+ , $add
    - Add new block type definition based on the current block selected
    - User can customize its pattern and behavior (routines) on the dialog box
- $-macro
    - List registered macros and user can select to remove them from database
- $-block
    - List registered blocks and user can select to remove them from database
- $cmdlist
    - List all the command patterns of macros in current database
- $saveas
    - Save the current database to mat file

Detailed description of block specific behaviours:

- Abs

Keyword	abs
Examples	• abs • abs5
Auto ground on selected ports/lines	Yes
Auto terminate on selected ports/lines	Yes
Insert in line	Yes
Multiple blocks at one time	absN, abs*N
String at inport	pass through
String at outport	pass through

- BusAssignment

Keyword	busassignment
Examples	busassignment
Propagate from upstream	Set corrsponding bus signal
Propagate from downstream	Trace forward to collect all bus signals and set as inport assigned signals
String at inport	Inport 1: pass through from 1st outport Other inports: corresponding bus signal
String at outport	Pass through from 1st inport
Plus operation	Not yet supported

Minus operation	Not yet supported
Clean operation	Not yet supported

- BusCreator

Keyword	bc, buscreator
Examples	• bc • bc5
Auto number of ports	Context dependent inport number
Propagate from downstream	Trace forward to collect all bus signals and set as input signals, a named line with no source may be generated at that port if necessary
String at inport	Corresponding downstream bus signals (indexed by port number)
String at outport	Block name
Plus operation	"+" add 1 inport "++" number of increase is determined according to unconnected ports curre ntly selected "+N" increase number of inports by N
Minus operation	"--" reduce 1 inport "-N" reduce number of inports by N
Clean operation	Arrange and remove unconnected inports

- BusSelector

Keyword	bs, busselector
Examples	• bs • bs5
Auto number of ports	Context dependent outport number
Propagate from upstream	Select all signals in the bus
Propagate from downstream	Set selected outport signal to corresponding downstream signals
String at inport	Block Name
String at outport	Corresponding selected signal
Plus operation	"+" add 1 outport "++" recursively select all signals from the incoming bus "+N" increase number of outports by N
Minus operation	"--" reduce 1 outport "-N" reduce number of outports by N
Clean operation	Arrange and remove unconnected outports

- Concatenate

Keyword	vecconcat, concat
Examples	• concat • concat5
Auto number of ports	Context dependent inport number
Propagate from downstream	Trace forward to collect all bus signals and set as input signals, a named line with no source may be generated at that port if necessary
String at inport	Corresponding downstream bus signals (indexed by port number)
String at outport	Block name

Annotation	Current concatenate mode (Vector or Matrix), and dimension information
Plus operation	"+" add 1 inport "++" number of increase is determined according to unconnected ports curre ntly selected "+N" increase number of inports by N
Minus operation	"--" reduce 1 inport "-N" reduce number of inports by N

- Constant

Keyword	cnst, const, constant
Examples	• cnst 5.0 • cnst5.0:sgl • cnst5.0,cnst1,cnst2 • true (if "true" doesn't match any existing keyword) • VariableName:sgl (if "VariableName" doesn't match any existing keyword)
Auto ground on selected ports/lines	Yes
Multiple blocks at one time	Yes
Brother blocks	Constant blocks within the same subsystem that same in 'Value'
Propagate from downstream	set property 'Value'
String at outport	Property 'Value'
Annotation	Show datatype of the block
Refine operation	Rename the block to be consistent with 'Value'

Note: The keyword may be omitted if the intended 'Value' doesn't match any keyword

- DataStoreMemory

Keyword	dsm
Examples	• dsm • dsm5 • dsmABCD • dsmAAA,BBB,CCC
Major property/Property sequence	DataStoreName
Multiple blocks at one time	Yes
Brother blocks	DataStoreRead, DataStoreWrite
Annotation	Show datatype of the block
Refine operation	Rename the block to be consistent with 'DataStoreName'
Other scenario dependent behavior	Create corresponding block if brother blocks currently selected

- DataStoreRead

Keyword	dsr
Examples	• dsr • dsr5 • dsrABCD • dsrAAA,BBB,CCC

Auto ground on selected ports/lines	Yes
Major property/Property sequence	DataStoreName
Multiple blocks at one time	Yes
Brother blocks	DataStoreMemory, DataStoreWrite
Propagate from downstream	DataStoreName
String at outport	DataStoreName
Refine operation	Rename the block to be consistent with 'DataStoreName'
Other scenario dependent behavior	Create corresponding block if brother blocks currently selected

- DataStoreWrite

Keyword	dsw
Examples	• dsw • dsw5 • dswABCD • dswAAA,BBB,CCC
Auto terminate on selected ports/lines	Yes
Major property/Property sequence	DataStoreName
Multiple blocks at one time	Yes
Brother blocks	DataStoreMemory, DataStoreRead
Propagate from upstream	DataStoreName
String at inport	DataStoreName
Refine operation	Rename the block to be consistent with 'DataStoreName'
Other scenario dependent behavior	Create corresponding block if brother blocks currently selected

- DataTypeConversion

Keyword	dt, datatype
Examples	• dt:sgl • dt:u8
Auto ground on selected ports/lines	Yes, with "[" option
Auto terminate on selected ports/lines	Yes, with "]" option
Insert in line	Yes
Multiple blocks at one time	dt*N
String at inport	pass through
String at outport	pass through

- DeadZone

Keyword	dzone, dz, deadzone
Examples	• dz • dz ABC • dzLo Hi
Auto ground on selected ports/lines	Yes, with "[" option
Auto terminate on selected ports/lines	Yes, with "]" option

Insert in line	Yes
Multiple blocks at one time	*N
Propagate from upstream	Set lower and upper bounds with suffix '_Lb' and '_Ub'
Propagate from downstream	Set lower and upper bounds with suffix '_Lb' and '_Ub'
String at inport	Suffix downstream string with 'Raw'
String at outport	pass through
Annotation	Range of deadzone

- Demux

Keyword	demux
Examples	demux demux5
Auto number of ports	Yes
String at inport	Block name
String at outport	Upstream name with suffix '_DN', where N indicates the outport number, i.e., dimension
Plus operation	Outport number
Minus operation	Outport number

- Display

Keyword	disp, display
Examples	disp disp5
Auto ground on selected ports/lines	Yes
Multiple blocks at one time	*N

- Enable

Keyword	en, enable
Examples	en

- From

Keyword	from
Examples	• from • fromabc • from+c • from5 • from5abc • fromAAA BBB CCC
Auto ground on selected ports/lines	Yes
Major property/Property sequence	GotoTag
Multiple blocks at one time	Yes
Brother blocks	Goto, GotoVisibility
Propagate from upstream	Generate corresponding 'Goto' block

Propagate from downstream	GotoTag
String at outport	GotoTag
Refine operation	Rename the block name to be consistent with 'GotoTag'

- FromWorkspace

Keyword	fromws, fromworkspace
Examples	• fromws • fromwsabc • fromws5 • fromwsAAA,BBB,CCC
Auto ground on selected ports/lines	Yes
Major property/Property sequence	VariableName
Multiple blocks at one time	Yes
Brother blocks	ToWorkspace
Propagate from upstream	Generate corresponding 'ToWorkspace' block
Propagate from downstream	VariableName
String at outport	VariableName
Refine operation	Rename the block name to be consistent with 'VariableName'

- Gain

Keyword	gain
Examples	gain gain2 gainabc gainAAA,BBB,CCC
Auto ground on selected ports/lines	Yes
Auto terminate on selected ports/lines	Yes
Insert in line	Yes
Major property/Property sequence	Gain
String at inport	pass through
String at outport	pass through

- Goto

Keyword	goto
Examples	• goto • goto5 • gotoabc • gotoAAA,BBB,CCC • goto5abc+c
Auto terminate on selected ports/lines	Yes
Major property/Property sequence	GotoTag
Multiple blocks at one time	Yes
Brother blocks	From, GotoVisibility
Propagate from upstream	GotoTag

Propagate from downstream	Create corresponding 'From' block
String at inport	GotoTag
Annotation	Display scope of the block
Refine operation	Rename the block name to be consistent with 'GotoTag'

- Ground

Keyword	gnd, ground
Examples	gnd gnd5
Auto ground on selected ports/lines	Yes
Multiple blocks at one time	Yes

- Inport

Keyword	ip, ipt, inport
Examples	ip ip5 ipabc ip5abc ipAAA,BBB,CCC
Auto ground on selected ports/lines	Yes
Major property/Property sequence	Name Port
Multiple blocks at one time	Yes
Propagate from upstream	Name
Propagate from downstream	Name
String at inport	Name
String at outport	Name

- Interpolation_n-D

Keyword	itp, interpnd
Examples	itp itp3abc: block with Dimension set as 3 and Table set as "abc"
Auto ground on selected ports/lines	Yes
Multiple blocks at one time	Yes
Propagate from downstream	Table
String at outport	Table
Annotation	Show Table name

- Logic

Keyword	and, or, not, xor, nor, nand
Examples	and5
Auto number of ports	Yes
String at inport	String representation based on port signals
String at outport	String representation based on port signals

Roll property operation	Roll across operators
Plus operation	Add one more inport
Minus operation	Remove inport by one
Clean operation	Clean unconnected inports and reorder them to neaten up layout

- Lookup

Keyword	l1, lookup, lu1d
Examples	l1 l1abc l1abcX,abcY l1abcX abcY
Auto number of ports	
Auto ground on selected ports/lines	Yes
Auto terminate on selected ports/lines	Yes
Insert in line	Yes
Multiple blocks at one time	Yes
Propagate from upstream	Propagate to X axis variable with suffix (InputValues property)
Propagate from downstream	Table
String at inport	InputValues property
String at outport	Table
Annotation	Display X, Y variable
Refine operation	Rename X axis with "_X" suffix on Table field

- Lookup2D

Keyword	l2, lookup2d, lu2d
Examples	l2 l2abc l2abcX,abcY,abc
Auto ground on selected ports/lines	Yes
Multiple blocks at one time	Yes
Propagate from downstream	Table
String at inport	Corresponding axis string
String at outport	Table
Annotation	Display X, Y, Z variable
Refine operation	Rename X, Y axis with "_X", "_Y" suffix on Table field

- Math

Keyword	math, exp, log, log10, square, sqrt, reciprocal, pow, rem, mod
Examples	exp pow*2
Auto ground on selected ports/lines	Yes
Auto terminate on selected ports/lines	Yes
Insert in line	Yes
Roll property operation	Roll across operators

- Merge

Keyword	mg, merge
Examples	mg mg5
Auto number of ports	Yes
Multiple blocks at one time	*N
String at inport	Rename by outport string with suffix _In[N]
String at outport	Use string from inport 1
Plus operation	"+" add 1 inport "++" number of increase is determined according to unconnected por ts currently selected "+N" increase number of inports by N
Minus operation	"--" reduce 1 inport "-N" reduce number of inports by N
Clean operation	Arrange and remove unconnected inports

- MinMax

Keyword	mn, mx, min, max
Examples	mn max5
Auto number of ports	Yes
Multiple blocks at one time	*N
Plus operation	"+" add 1 inport "++" number of increase is determined according to unconnected por ts currently selected "+N" increase number of inports by N
Minus operation	"--" reduce 1 inport "-N" reduce number of inports by N
Clean operation	Arrange and remove unconnected inports

- MotoHawk Calibration

Keyword	mh cal
Examples	mhcal mhcalABC4.0 mhcal1e-1ABC
Auto ground on selected ports/lines	Yes
Multiple blocks at one time	*N
Propagate from downstream	"nam" and "val"
String at outport	val

- MotoHawk Probe

Keyword	mh prb
Examples	mhprb mhprbabc
Auto terminate on selected ports/lines	Yes

Multiple blocks at one time	Yes
Propagate from upstream	nam
String at inport	nam

- Mux

Keyword	mux
Examples	• mux • mux5
Auto number of ports	Context dependent inport number
String at inport	Downstream signal suffixed by dimensioni "_D[N]"
Plus operation	"+" add 1 inport "++" number of increase is determined according to unconnected ports curre ntly selected "+N" increase number of inports by N
Minus operation	"--" reduce 1 inport "-N" reduce number of inports by N

- Outport

Keyword	op, opt, outport
Examples	op5 opabc op5abc opAAA,BBB,CCC
Major Property/Property sequence	Name Port
Auto terminate on selected ports/lines	Yes
Multiple blocks at one time	Yes
Propagate from upstream	Name
Propagate from downstream	Name
String at inport	Name

- PreLookup

Keyword	pl, prelookup
Examples	pl5 pl5abc
Auto terminate on selected ports/lines	Yes
Major property	BreakpointsData
Multiple blocks at one time	Yes
Propagate from upstream	BreakpointsData
String at outport	"BreakpointsData" suffix with "_k", "_f"
Annotation	Display BreakpointsData and IndexSearchMethod

- Product

Keyword	*, /

Examples	*** */* /abc *5.0:sgl
2nd Operand	Yes

- RateTransition

Keyword	rt, rate, ratetrans
Examples	rt rt5
Auto ground on selected ports/lines	Yes
Auto terminate on selected ports/lines	Yes
Insert in line	Yes
Multiple blocks at one time	Yes
Propagate from upstream	Pass through
Propagate from downstream	Pass through
String at inport	Pass through
String at outport	Pass through

- RelationalOperator

Keyword	==, ~=, <, <=, >=, >
Examples	>= ==ABC ~=5:u8
2nd Operand	Yes
Roll property operation	Yes

- Rounding

Keyword	floor, round, ceil, fix
Examples	floor ceil3
Auto ground on selected ports/lines	Yes
Auto terminate on selected ports/lines	Yes
Insert in line	Yes
Multiple blocks at one time	Yes
Propagate from upstream	Pass through
Propagate from downstream	Pass through
String at inport	Pass through
String at outport	Pass through
Roll property operation	Yes

- Saturate

Keyword	sat, saturate

Examples	sat satA satHi,Lo
Auto ground on selected ports/lines	Yes
Auto terminate on selected ports/lines	Yes
Insert in line	Yes
Propagate from upstream	Set upper/lower limit with suffix "_Hi", "_Lo"
Propagate from downstream	Set upper/lower limit with suffix "_Hi", "_Lo"
String at inport	Downstream string suffix with "Raw"
Annotation	Show upper and lower limit

- Scope

Keyword	scope, scopes
Examples	scope scopes scope5 scopes5
Auto number of ports	Yes, when used with "scope" pattern
Auto terminate on selected ports/lines	Yes, when used with "scopes" pattern
Multiple blocks at one time	Yes, when used with "scopes" pattern
Plus operation	"+" add 1 inport "++" number of increase is determined according to unconnected por ts currently selected "+N" increase number of inports by N
Minus operation	"--" reduce 1 inport "-N" reduce number of inports by N
Clean operation	Arrange and remove unconnected inports

- SignalConversion

Keyword	sigconv, signalconv
Examples	sigconv sigconv5
Auto ground on selected ports/lines	Yes
Auto terminate on selected ports/lines	Yes
Insert in line	Yes
Multiple blocks at one time	Yes
Propagate from upstream	Pass through
Propagate from downstream	Pass through
String at inport	Pass through
String at outport	Pass through

- SignalSpecification

Keyword	sigspec, signalspec

Examples	sigspec sigspec5 sigspec:u8
Auto ground on selected ports/lines	Yes
Auto terminate on selected ports/lines	Yes
Insert in line	Yes
Multiple blocks at one time	Yes
Propagate from upstream	Pass through
Propagate from downstream	Pass through
String at inport	Pass through
String at outport	Pass through

- CAN Pack/Unpack

String at inport	Corresponding CAN signal name
String at outport	Corresponding CAN signal name

- Sqrt

Keyword	sqrt
Examples	sqrt sqrt5
Auto ground on selected ports/lines	Yes
Auto terminate on selected ports/lines	Yes
Insert in line	Yes

Note that this block is version dependent

- Stateflow

Keyword	sf, stateflow
Examples	sf sfi5o6 sf i5 o6 e2 fc chartname sfin5out6event2fc
Auto number of ports	Yes
Multiple blocks at one time	*N
Propagate from upstream	Propagate to Stateflow Data name at corresponding inport
Propagate from downstream	Propagate to Stateflow Data/Event name at corresponding outport
String at inport	Name of corresponding Stateflow Data
String at outport	Name of corresponding Stateflow Data/Event
Plus operation	+iN: add inport by N +oN: add outport by N +eN: add event output by N +fc: add function call trigger on the chart +iN is equivalent to +inN +oN is equivalent to +outN +eN is equivalent to +eventN
Minus operation	vice versa: -iN, -oN, -eN, -fc
Clean operation	Arrange and remove unconnected inports and outports

- SubSystem

Keyword	ss, subsystem
Examples	ss ssi5o6 ss i5 o6 fc en sysname sfin5out6fcensysname
Auto number of ports	Yes
Multiple blocks at one time	*N
Propagate from upstream	Propagate to Inport name at corresponding inport
Propagate from downstream	Propagate to Outport name at corresponding outport
String at inport	Name of corresponding Inport block
String at outport	Name of corresponding Outport block
Plus operation	+iN: add inport by N +oN: add outport by N +fc: add function call trigger on the chart +iN is equivalent to +inN +oN is equivalent to +outN
Minus operation	vice versa: -iN, -oN, -eN, -fc
Clean operation	Arrange and remove unconnected inports and outports

- Sum

Keyword	+, -
Examples	+++ +-+ -abc +5.0:sgl
2nd Operand	Yes

- Switch

Keyword	sw, switch
Examples	sw sw1 sw3
Auto terminate on selected ports/lines	When used with "sw" pattern
Insert in line	Yes when used with "sw1" or "sw3" pattern, the number indicates wh ich port to connect
Multiple blocks at one time	*N
String at inport	Pass through
String at outport	Pass through the 3rd inport
Refine operation	Set Criteria to "u2 ~= 0"

- Terminator

Keyword	term, terminator
Examples	term term5
Auto terminate on selected ports/lines	Yes

Multiple blocks at one time	Yes

- ToWorkspace

Keyword	tows, toworkspace
Examples	tows towsabc tows5
Auto terminate on selected ports/lines	Yes
Multiple blocks at one time	Yes
Refine operation	Rename block

- TriggerPort

Keyword	trig, trigger, fc
Examples	trig fc trigfc (equivalent to "fc") trigr (rising) trigf (falling) trig e (either) trigeName

- Trigonometry

Keyword	sin,cos,tan,asin,acos,atan,atan2,sinh,cosh,tanh,asinh,acosh,atanh,sincos
Examples	sin5
Auto ground on selected ports/lines	Yes
Auto terminate on selected ports/lines	Yes
Insert in line	Yes
Multiple blocks at one time	Yes
Major property	Operator
Roll property operation	Roll through major property

- UnitDelay

Keyword	ud, dly, unitdelay
Examples	dly dlyabc dlyAAA,BBB,CCC dly5
Auto ground on selected ports/lines	Yes
Auto terminate on selected ports/lines	Yes
Insert in line	Yes
Multiple blocks at one time	*N
Major property	X0
String at inport	Pass through
String at outport	Pass through
Roll property operation	Roll through major property

Annotation	Display X0

- General MotoHawk blocks
- SiLTest blocks

Detailed description of script macros:

- Annotation macro

Keyword	anno
Examples	anno anno- annoAnnotation for the block anno+ extra annotation anno+\nextra annotation on another line
Explanation	If given with no option string, call the annotation method of the block if available Else if given with option string, use it as the block annotation "anno-" removes annotation from selected blocks "anno+ extra annotation" appends the preceding string to the current annotation Note that Simulink block annotation supports escape symbol "\n" for a new line

- Connect line macro

Keyword	line
HotKey	Ctrl
Examples	line
Explanation	Connect line automatically among the unconnected ports and lines that is currently selected

- Connect line macro

Keyword	autoline
Examples	autoline
Explanation	Connect between selected ports and lines with same name matched

- Break link macro

Keyword	brk, break
Examples	brk
Explanation	Break library link of the currently selected blocks

- Adjust block size macro

Keyword	short(er), long(er), narrow(er), wide(r)
HotKey	Alt + ArrowKey: Left (narrower), Right(wider), Up(longer), Down(shorter)
Examples	short long2.5 narrow wide
Explanation	Change block size of the currently selected blocks. Use extra option as scale factor if given, otherwise use default value 1.1

- Clean macro

Keyword	clean
Examples	clean
Explanation	This command involves three actions: 1. Clean up unconnected lines that currently selected 2. Clean up unconnected blocks that currently selected 3. Call clean method of the currently selected blocks if defined, for example reorder the lines, remove unconnected ports, etc.

- Add color macro

Keyword	color, bcolor, fcolor
Examples	color (random forground color for each block) fcolor (equivalent to "color") bcolorgreen (set background color of selected blocks to green) colorsame/color=/color== (set forground color of selected blocks with the same random color)
Explanation	If given no option, set forground color (color/fcolor) or background color (bcolor) to random color for each selected block If given option "same", "=" or "==", set selected blocks with the same random color If given option as color name of RGB specification, set selected blocks with the specified color

- Add data compare macro

Keyword	datacompare
Examples	datacompare
Explanation	Given selected subsystem, add a 2 element Mux block together with a Inport block connected at 2nd i nput. This macro is intended for use with ExpData2Sim tools to compare outcome of simulated data w ith vehicle test data

- Set data type macro

Keyword	single, sgl, double, dbl, boolean, bool, uint8, u8, uint16, u16, uint32, u32, int8, i8, int16, i16, int32, i32
Examples	sgl
Explanation	Set the block output data type to the specified one

- Line to from/goto macro

Keyword	line2fg
Examples	line2fg
Explanation	Convert each selected line to From/Goto pair

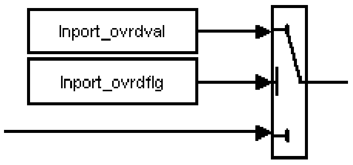
- Magnetic connection macro

Keyword	magnetic
Examples	magnetic
Explanation	With subsystem selected, search across the current system by name to find the matching Inport/Outpo rt/From/Goto and make connection between them. This function intends to relieve the user from the condition that the current layer has been such a mes s that hard to find a specific block. It is very covenient to be used in combination with "line2fg" that fir st establish line connections and then convert the lines to From/Goto pair.

- Set property macro

Keyword	\, \\, ...
Examples	\abc \\abc \\\-1 \abc,bcd,cde,eee
Explanation	With number of N backlashes prefixed, set the Nth parameter of the selected block to the option valu e. If not specified, use the order of "DialogParameters" as default. For example, for a "UnitDelay" block, "\ABC" sets X0 of the block to "ABC", "\\\-1" sets the Sample Tim e to "-1" If multiple values given and multiple blocks selected, the values will be set to block one by one, this c an be very useful when modeling from external documentation requirement

- Insert override pattern macro

Keyword	ovrd
HotKey	
Examples	ovrd
Explanation	With line selected, insert override pattern on the line. 

- String replace

Keyword	=>
Examples	ABC=>BCD ^=>VABC_ $=>_ovrdflg (\w+)Voltage=>$1Volt
Explanation	Replace string on the currenly selected blocks, supports MATLAB regular expression. Note 1: ^ indicates start of string, $ indicates end of string, i.e., "^=>" can be used to add prefix to stri ng, while "$=>" can be used to add suffix to string Note 2: With Stateflow selected, all objects inside of it will be replaced Note 3: With SubSystem selected, the blocks inside of it will not be replaced. Use SimReplace tool ifyo u want to do so

- Stateflow Replace

Keyword	>>
Examples	ABC>>BCD ^>>VABC_ $>>_ovrdflg (\w+)Voltage>>$1Volt
Explanation	Replace string only on the currenly selected Stateflow objects. Note that only use this command when Stateflow Editor is currently active.

- unname

Keyword	unname

Examples	unname
Explanation	Remove name of selected line

- MotoHawk to Simulink macro

Keyword	m2s
Examples	m2s (equivalent to "m2sall") m2s cal (MotoHawk Calibration to Simulink Constant) m2s dr (MotoHawk DataRead to Simulink Constant) m2s pl (Prelookup) m2s i1 (Interpolation 1D) m2s i2 (Interpolation 2D) m2s1d (Lookup 1D) m2s 2d (Lookup 2D) m2s all (equivalent to "pl, i1, i2, 1d, 2d, cal, dr") m2s table (equivalent to "1d, 2d") m2s scalar (equivalent to "cal, dr") m2s pretable (equivalent to "pl, i1, i2") m2s p1 (Interpolation 1D to Simulink Lookup) m2s p2 (Interpolation 2D to Simulink Lookup2D)
Explanation	Convert selected MotoHawk blocks to Simulink blocks

- Simulink to MotoHawk macro

Keyword	s2m
Examples	s2m (equivalent to "s2mall") s2m cal (Simulink Constant to MotoHawk Calibration) s2m pl (Prelookup) s2m i1 (Interpolation 1D) s2m i2 (Interpolation 2D) s2m1d (Lookup 1D) s2m 2d (Lookup 2D) s2m probe (Remove probe and convert to Signal Resolve on line) s2m all (equivalent to "pl, i1, i2, 1d, 2d, cal, probe") s2m table (equivalent to "1d, 2d") s2m scalar (equivalent to "cal") s2m pretable (equivalent to "pl, i1, i2")
Explanation	Convert selected Simulink blocks to corrsponding MotoHawk blocks