

Free Form LD editor

straton user guide – Rev. 2

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straton



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Overview

Ladder editor enables free drawing and arrangement of LD items, and supports advanced graphic features such as drag and drop.

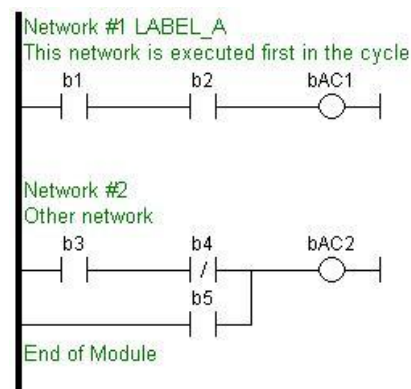
LD diagram components

2.1. Networks

A program is entered as a list of independent networks. Networks are executed sequentially from the top to the bottom. The head of a network is drawn on a full row in the editor, grouping the following pieces of information:

- the number of the network (from 1 to N)
- an optional label name used as a target for jump operations
- an optional "pragma", i.e. a directive for conditional compiling
- an optional multiline description (comment)

No item can be put on a network header row. No line can go through it. The end of a program is marked with a special "End of module" row. Nothing can be inserted after this row.



Double click on the header of a network to enter its label, directive and description. New networks can be inserted on empty rows. Pressing "DEL" when the first network is selected removes the network and its whole contents. In case of another network, its content is merged with the previous network.

There cannot be two networks having the same label in a program. If such a situation occurs in case of a copy operation, you will be prompted to:

- either specify another label name for the new network
- or remove the label on the new network.

2.2. Power rails and lines

Vertical power rails are used in LD language for representing the limits of a rung. The power rail on the left represents the TRUE value and initiates the rung state. Any object connected to this rail is always powered.

Horizontal lines always represent a data flow from the left to the right.

If a vertical line has several items connected on the left, then it represents an "OR" operation.

You can insert at any location a segment of horizontal line in order to freely draw flow lines. The "vertical line" button enables you to set or remove (toggle) a segment of vertical line on the right of the selected cell.

2.3. Contacts and coils

Contacts are basic graphic elements of the LD language. A contact is associated to a boolean variable written upon its graphic symbol. A contact sets the state of the rung on its right side, according to the value of the associated variable and the rung state on its left side.

Below are the possible contact symbols and how they change the flow:

<code>boolVariable</code> -] [-	Normal: the flow on the right is the boolean AND between the flow on the left and the associated variable.
<code>boolVariable</code> -] / [-	Negated: the flow on the right is the boolean AND between the flow on the left and the negation of the associated variable.
<code>boolVariable</code> -] P [-	Positive pulse: the flow on the right is TRUE only when the flow on the left is TRUE and the associated variable changes from FALSE to TRUE (rising edge)
<code>boolVariable</code> -] N [-	Negative pulse: the flow on the right is TRUE only when the flow on the left is TRUE and the associated variable changes from TRUE to FALSE (falling edge)
<code>boolVariable</code> -] / P [-	Not positive pulse: the flow on the right is TRUE only when the flow on the left is TRUE and the associated variable does not change from FALSE to TRUE (rising edge)
<code>boolVariable</code> -] / N [-	Not negative pulse: the flow on the right is TRUE only when the flow on the left is TRUE and the associated variable does not change from TRUE to FALSE (falling edge)

Note: When a contact or a coil is selected, you can press the SPACE bar to change its type (normal, negated, pulse...)

Two serial normal contacts represent an AND operation. Two contacts in parallel represent an OR operation.

Coils are basic graphic elements of the LD language. A coil is associated to a boolean variable written upon its graphic symbol. A coil performs a change of the associated variable according to the **flow** on its left side.

Below are the possible coil symbols:

boolVariable - () -	Normal: the associated variable is forced to the value of the flow on the left of the coil.
boolVariable - (/) -	Negated: the associated variable is forced to the negation of the flow on the left of the coil.
boolVariable - (S) -	Set: the associated variable is forced to TRUE if the flow on the left is TRUE. (no action if the flow is FALSE)
boolVariable - (R) -	Reset: the associated variable is forced to FALSE if the flow on the left is TRUE. (no action if the rung state is FALSE)
boolVariable - (P) -	Positive pulse: the variable is TRUE when the flow on the left changes from FALSE to TRUE
boolVariable - (N) -	Negative pulse: the variable is TRUE when the flow on the left changes from TRUE to FALSE

Note: When a contact or a coil is selected, you can press the SPACE bar to change its type (normal, negated, pulse...)

Important notes: Although coils are commonly put at the end, the rung may be continued after a coil. The flow is **never changed** by a coil symbol.

2.4. Function blocks

Functions and function blocks can be used in LD diagrams. Blocks are always connected to the flow line (powered) by their first input and first output. If the first input of a block is not boolean, a special input called "EN" is added, and means that the block is not executed if the input flow is FALSE. If the first output is not boolean, a special output called "OK" is added. The special "OK" output always has the same state as the first input (the flow).

In case of a function block, the instance of the block must be specified and is shown on the top of the block. Double click on the top of the block to select the instance. You can also double click somewhere else in the block to change its type.

Boolean inputs and outputs of blocks can be directly linked to contacts and coils. Block inputs and outputs can also be specified using specific data in/out items (see below).

2.5. Data In/Out

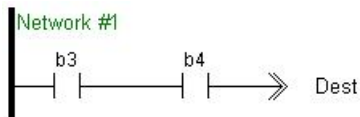
The "data in" and "data out" items are used to initiate a flow (line) with the value of a variable, or to force a variable on output with the value of a flow:

```
VarIn>- ..... ->VarOut
```

When used with a block, the "data in" and "data out" items can be put close to the block without any line in between to connect a variable to an input or output of the block.

2.6. Jumps and RETURN

A jump to a label branches the execution of the program after the specified label. In LD language, the ">>" symbol, followed by the target label name, is used as a coil at the end of a rung:

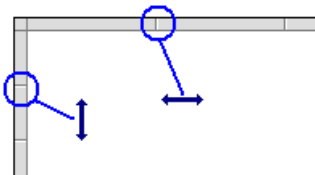


The jump is performed only if the rung state on input is TRUE. The destination label must be specified on a network of the same program. The special "<RETURN>" destination specifies a jump to the end of the program.

Editing features

3.1. Selection grid

The diagram is entered in a logical grid. All objects are snapped to the grid. You can use the commands of the "View" menu for displaying or hiding grid points. This helps you locating errors detected by the compiler, or aligning objects in the diagram. At any moment you can use the commands of the "View" menu for zooming in or out the edited diagram. You also can press the [+] and [-] keys of the numerical keypad for zooming the diagram in or out. You also can drag the separation lines in vertical and horizontal rulers to freely resize the cells of the grid:



The current position in the grid is always highlighted by a dotted cell:



If you click on the current position, then the cell is drawn as grey, meaning that it can be dragged somewhere else in the diagram (see below). You also can select multiple cells with the mouse, or using the arrows of the keyboard with the SHIFT key pressed.

Click on the left border (grey ruler) to select a full row.

Other selection commands are available from the keyboard:

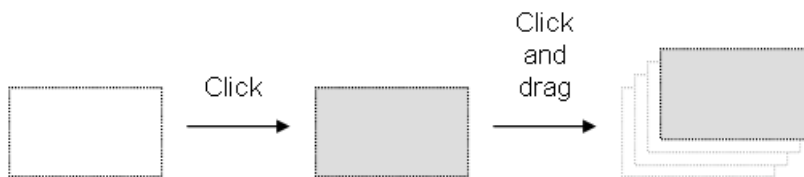
<i>Ctrl + Page Up Down</i>	moves the caret to previous or next network header
<i>Home</i>	moves the caret to the left of the line if pressed again, moves the caret to the head of the network
<i>End</i>	moves the caret to the end of the line

Ctrl + A

selects the whole network
if pressed again, selects the whole program

3.2. Moving and copying items

When you click on the current position, then the cell is drawn as grey, meaning that it can be copied or moved. Click again on the selection to drag it with the mouse.



Dragging the selected items moves them to the specified location. If you press the "CTRL" key while dragging, then items are copied.

To move a function block, you must select it entirely.

If you move or copy items on a non empty area, you will be prompted to confirm the overwriting of items in the area.

When you move or copy items just upon a network header, the network is automatically moved in order to give the required extra space for moved items.

The "Copy / Cut / Paste" commands can also be used as an alternative to drag and drop.

A rectangular selection within the diagram cannot go cross a network header, i.e. all selected items must be within the same network. To select a complete network or more, you must select complete rows. For that, move the caret to the left border or click on the left side ruler (grey).

3.3. Comment texts

Multiline comment texts may be entered on any network header. Commands are available for importing or exporting comment texts to/from text files. This feature enables easy localization of programs.

When exporting comment texts, each comment block will be identified in the text file by a number. You have the selection to use for this number:

- the internal "index number" of networks,
- or the visible network number of networks.

The first method using internal index numbers should be preferred, as such numbers are kept when networks are moved or removed.

When importing comment texts you have the selection of either updating only comment texts of networks found in the import text file, or cleaning all comment texts not found in the import file.

Shortcuts

Shortcut	Action
F4	Adds a contact in the selected cell
F9	Adds a coil in the selected cell
Ctrl + J	<p>Adds a horizontal line in the selected cell if there is no line already present.</p> <p>Deletes the line in the selected cell if there is already a line.</p> <p>The carret moves to the left.</p>
Ctrl + K	<p>Adds a horizontal line in the selected cell if there is no line already present.</p> <p>Deletes the line in the selected cell if there is already a line.</p> <p>The carret moves to the right.</p>
Ctrl + M	<p>Adds a vertical line in the selected cell if there is no line already present.</p> <p>Deletes the line in the selected cell if there is already a line.</p> <p>The carret moves down.</p>
Ctrl + I	<p>Adds a vertical line in the selected cell if there is no line already present.</p> <p>Deletes the line in the selected cell if there is already a line.</p> <p>The carret moves up.</p>
Shift + Page Up/Down	Selects the column from the carret to the top or the bottom of the network
Shift + Home	Selects the line from the carret to the begining of the line
Shift + End	Selects the line from the carret to the end of the line
Page Up/Down	Moves the carret to the beginning or the end of the program

Shortcut	Action
Space bar on a contact or a coil	Changes the state of the contact or the coil: / P /P N /N
Shift + F9	Adds a jump in the selected cell
F8	Adds a function block in the selected cell