

Extras

Ladder diagrams

- Are specialized schematics commonly used to document industrial control logic systems.
- They are called “ladder” diagrams because they resemble a ladder, with two vertical rails (supply power) and as many “rungs” (horizontal lines) as there are control circuits to represent.

<https://www.solisplc.com/tutorials/how-to-read-ladder-logic>

Function block diagram

- FBD programming is a common language for PLCs following the IEC 61131 standard.
- An FBD (function block diagram) program is a graphical programming language that joins functions together to produce an output.

<https://control.com/technical-articles/plc-programming-with-function-block-diagrams/>

<https://www.realpars.com/blog/ladder-logic-vs-function-block-diagrams>

https://www.researchgate.net/publication/340558962_Controlling_a_smart_traffic_light_using_Programmable_logic_controller_PLC

Converting a ladder diagram (LD) into a functional block diagram (FBD)

Converting a ladder diagram (LD) into a functional block diagram (FBD) involves breaking down the logical operations represented by the ladder rungs into individual function blocks and then arranging them in a graphical representation.

Here are the steps to convert a ladder diagram into a functional block diagram:

1. **Analyze the Ladder Logic:** Review the ladder diagram and identify the logical operations represented by each rung. This includes identifying input conditions, output actions, and any logical operations (such as AND, OR, NOT) used in the rungs.
2. **Identify Function Blocks:** Break down each logical operation into individual function blocks. For example, a rung with an AND operation might be represented by an AND function block in the FBD.
3. **Assign Inputs and Outputs:** Assign inputs and outputs to each function block based on the inputs and outputs used in the ladder diagram. Inputs represent conditions or signals that control the operation of the function block, while outputs represent the result of the logical operation.
4. **Arrange Function Blocks:** Arrange the function blocks in the FBD layout, connecting them with lines to represent the flow of data or control signals between blocks. Organize the layout in a clear and logical manner to represent the control logic of the original ladder diagram.

5. **Review and Test:** Review the FBD to ensure it accurately represents the control logic of the original ladder diagram. Test the FBD to verify that it functions correctly and performs the same logical operations as the ladder diagram.
6. **Documentation:** Document the FBD layout, including function block descriptions, inputs, outputs, and connections, to provide a clear and concise representation of the control logic.

By following these steps, you can effectively convert a ladder diagram into a functional block diagram, providing a graphical representation of the control logic that is easier to understand and modify.

Converting a functional block diagram (FBD) into a ladder diagram (LD)

Converting a functional block diagram (FBD) into a ladder diagram (LD) involves breaking down the function blocks into logical operations represented by ladder rungs. Here's how you can do it:

1. **Identify Function Blocks:** Review the FBD and identify each function block along with its inputs and outputs.
2. **Translate Function Blocks into Logic:** For each function block, translate its functionality into logical operations that can be represented by ladder rungs. This may involve using basic logic elements such as contacts (input conditions), coils (outputs), and logical operations (AND, OR, etc.).
3. **Map Inputs and Outputs:** Assign input conditions and outputs to the appropriate contacts and coils in the ladder diagram. Inputs represent conditions or signals that control the operation of the ladder rungs, while outputs represent the result of the logical operations.
4. **Create Ladder Rungs:** Use the identified logical operations to create ladder rungs in the LD. Each rung should represent a specific logical operation or condition based on the function blocks from the FBD.
5. **Connect Ladder Rungs:** Connect the ladder rungs using vertical power rails (rails) and horizontal power rails (rungs) to represent the flow of control logic between the logical operations.
6. **Review and Test:** Review the ladder diagram to ensure it accurately represents the control logic of the original FBD. Test the ladder diagram to verify that it functions correctly and performs the same logical operations as the FBD.
7. **Documentation:** Document the ladder diagram, including ladder rung descriptions, input conditions, outputs, and connections, to provide a clear and concise representation of the control logic.

By following these steps, you can effectively convert a functional block diagram into a ladder diagram, providing a graphical representation of the control logic that is commonly used in programmable logic controllers (PLCs) and industrial automation applications.

screen of the programming terminal. For example, to enter a pair of contacts the key marked:



might be used, followed by its address being keyed in. To enter an output the key marked:



might be used, followed by its address. To indicate the start of a junction:



might be pressed; to indicate the end of a junction path:



To indicate horizontal circuit links, the following key might be used:



The terminal then translates the program drawn on the screen into machine language.

<http://www.pogoni.etf.rs/VezbeRP/W.Boltorn%20Ladder%20and%20FBD%2001-Ch11.pdf>