Fully Wired Electronics - Mini-Logic

User Manual

FULLY WIRED
ELECTRONICS

Contents:

Limited Warranty:

Fully Wired Electronics warrants this product to be free of defects in materials or construction for a one year (twelve month) period from the date of purchase[1]. Proof of purchase via a receipt or invoice is required when making a warranty claim.

Malfunction resulting from incorrect power supply voltages, reversed or backwards Eurorack bus board connections, faulty or damaged cables, incorrect patching, general misuse, the modification of the faceplate and/or the products circuitry or any other causes of malfunction that Fully Wired Electronics deems to be at the fault of the user are not covered by this limited warranty. Normal service rates will be applied.

Attempting to alter and/or modify this product in any way will void this limited warranty.

During this one year limited warranty period, all defective products will be repaired or replaced at the discretion of Fully Wired Electronics. Products must be returned directly to Fully Wired Electronics, with the customer paying the cost of transit to Fully Wired Electronics.

Fully Wired Electronics accepts and implies that no responsibility will be taken for harm to person and equipment through the operation of this product.

[1] For pre-orders this is applicable from the date of shipment rather than the date of purchase

Installation and Safety:

Prior to installing and uninstalling this product, please ensure that your Eurorack power supply is turned OFF. Installing or uninstalling this product without doing so is potentially dangerous, running the risk of causing damage to your equipment and electrocuting yourself. To minimise the possibility of backwards or reversed power supply connections, the module is fitted with a shrouded 10 (2x5) pin header. Despite this precaution please ensure that both the power cable header, and the power supply headers are orientated correctly. Also ensure that there is NO damage to the power cable being used. A damaged power cable may cause harm to the module, the power supply being used, or yourself!

Foreword:

Thank you for purchasing the Fully Wired Electronics - Mini-Logic. We value all of our customers for their support. Your purchase is greatly appreciated!

Special thanks to everyone who was involved during the development and production of this module, and the journey of Fully Wired Electronics for your help and unwavering support!

Module Overview:

The Fully Wired Electronics - Mini-Logic is a 2 input, 8 output 6HP Boolean Logic module, outputting all Boolean Logic types according to the state of both gate inputs. The module features AND, NAND, OR, NOR, XOR, XNOR and two NOT outputs. For more information on logic gates and their functions, please see the subsequent chapter (Logic Gates in Practice).

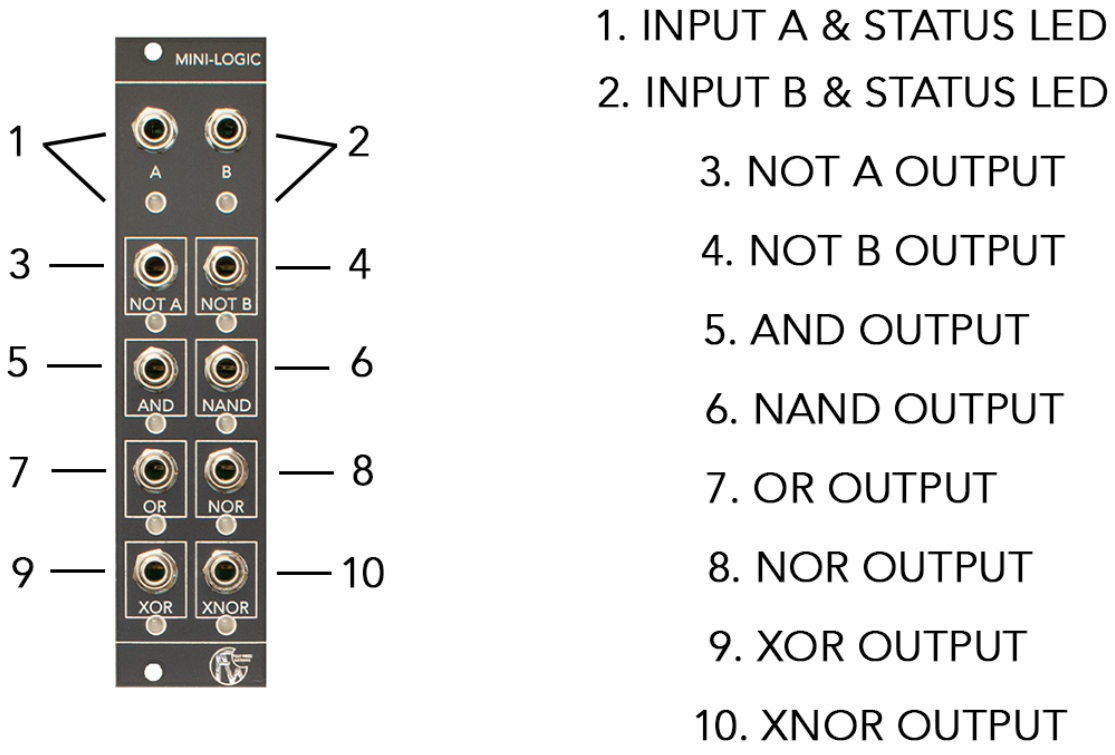

Fig 1. Mini-Logic panel overview

The two inputs, both located at the top of the module, work independently of each other. When a gate or trigger signal is detected on one of the inputs, the associated input LED, which is located directly under the both inputs, will illuminate. Both inputs are used to alter the states of the outputs, and is the only way to do so on the Mini-Logic. Each of the outputs are visualised on the module through the use of rectangular boxes around each of the output jack sockets. The output states for each of the logic types are indicated through the LEDs located below its associated output jack socket. By default the NOT 1, NOT 2, NAND, NOR and XNOR LEDs will all be illuminated once the module receives power, assuming no gate or trigger signal is active at either of the inputs. Once a gate or trigger signal is detected the states of each output, and its respective LED, will change according to the appropriate truth table for the logic gate type.

Each input would expect to receive a +5V gate or trigger signal, however under normal operation should tolerate signals up to +12V. The Mini-Logic will only output +5V signals.

Logic Gates in Practice:

NOT Gates:

NOT gates are the simplest of the 7 logic types, as they have a single input and a single output. This gate type simply outputs an inverted copy of the signal at its input. This means if the state of the input is logical low (0), the output state will be logical high (1). The reverse of this is also true, meaning a logical high (1) at the input, will result in a logical low at the output. This can be seen in Fig. 2 below.

INPUT	OUTPUT
0	1
1	0

Fig. 2 - NOT Gate Truth Table

AND Gates:

The output of the AND gate remains in a low (0) state, whilst both of the inputs are in a logical low (0) state. The same is true if only one of the inputs receives a signal and enters a logical high (1) state. Both inputs are required to be in a logical high (1) state for the output to go into a high (1) state, as seen in Fig. 3.

INPUT A	INPUT B	OUTPUT
0	0	0
1	0	0
0	1	0
1	1	1

Fig. 3 - AND Gate Truth Table

NAND Gates:

NAND Gates build upon AND gates through incorporating NOT gates, causing the inverse operation. The output of a NAND gate will remain in a logical high (1) state until both inputs (in the case of a two input NAND gate) are in a high (1) state, at which point the output will turn to a logic low (0) state. If only one of the inputs is in a high (1) state, the output will remain high (1), as seen in Fig. 4, Due to this functionality, NAND gates are the inverse of AND gates.

INPUT A	INPUT B	OUTPUT
0	0	1
1	0	1
0	1	1
1	1	0

Fig. 4 - NAND Gate Truth Table

OR Gates:

The output of an OR gate will be high (1) if either of the inputs are high (1). The same is true if both inputs are simultaneously in a high (1) state. For the output of an OR gate to be low (0), both inputs need to simultaneously be low (0), as seen in Fig. 5.

INPUT A	INPUT B	OUTPUT
0	0	0
1	0	1
0	1	1
1	1	1

Fig. 5 - OR Gate Truth Table

NOR Gates:

NOR Gates have the inverse operation of OR Gates and incorporate NOT gates to activate this. The output state of a NOR gate, by default, will be high (1), as seen within Fig. 6. Whilst either or both of the inputs are in a high (1) state, the output of the NOR gate will go low (0).

INPUT A	INPUT B	OUTPUT
0	0	1
1	0	0
0	1	0
1	1	0

Fig. 6 - NOR Gate Truth Table

XOR Gates:

As seen in Fig. 7, the output of a XOR gate will be low (0) by default, not both inputs are in a low (0) state. If either inputs, but not both, are in a high (1) state, the output of the XOR gate will also be in a high (1) state. Should both inputs be in a logic high (1) state, the output will go low (0).

INPUT A	INPUT B	OUTPUT
0	0	0
1	0	1
0	1	1
1	1	0

Fig. 7 - XOR Gate Truth Table

XNOR Gates:

XNOR Gate is an inverted version of a XOR Gate, achieved through incorporating NOT gates. When both inputs are in a low (0) state, the output will be in a high (1) state. The same is true when both inputs are in a high (1) state. As seen in Fig. 8, when either inputs, but not both, are in a high (1) state the output of the XNOR Gate will be low (0).

INPUT A	INPUT B	OUTPUT
0	0	1
1	0	0
0	1	0
1	1	1

Fig. 8 - XNOR Gate Truth Table

Technical Specifications:

- Module Format: 3U
- Module Width: 6HP
- Module Depth: 32mm
- Power:
    - +12v current draw: 15mA
    - -12v current draw: 0mA
    - +5v current draw: 0mA