# MLB

MALLEABLE
LOGIC BLOCK

Logic modules should be in every rack.

The goal with MLB was to make an alternative to LB5, our previous logic module, with a smaller footprint, at least for the 1U (24HP) version.

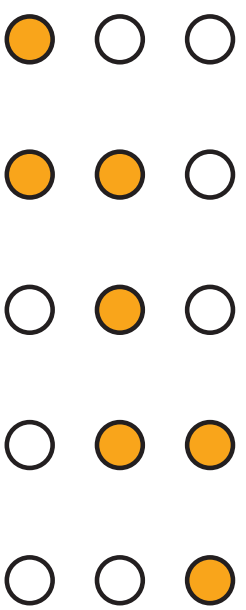
To make it possible, it was needed to reduce the number of I/Os.

All of the functions from LB5 were included though, so MLB outputs complementary signals for every boolean logic function, meaning you have access to 2 inverters, AND, NAND, OR, NOR, XOR, XNOR gates, and a D-type Flip-Flop with 2 outputs, which is the only function to make use of the Reset input.

In Flip-Flop mode, the A/C jack is used as the Clock input, and the B/D jack is the Data input.

The Mode in which MLB operates is selected via the potentiometer and the LEDs follow the pattern below.

When a jack is inserted in the Mode input, the potentiometer will act as an attenuator and the input has a 0~5V usable range, with under or over voltages protections.



NOT (CCW)

AND

OR

XOR

F/F (CW)

For the NOT function, the X and Y jacks respectively are the inverted outputs of the signals on the A and B inputs.

For all other functions, the X jack is the main function output while the Y jack is used to provide the complementary (inverted) output.

| A/B | NOT |
|---|---|
| 0 | 1 |
| 1 | 0 |

| A | B | AND |
|---|---|---|
| 0 | 0 | 0 |
| 0 | 1 | 0 |
| 1 | 0 | 0 |
| 1 | 1 | 1 |

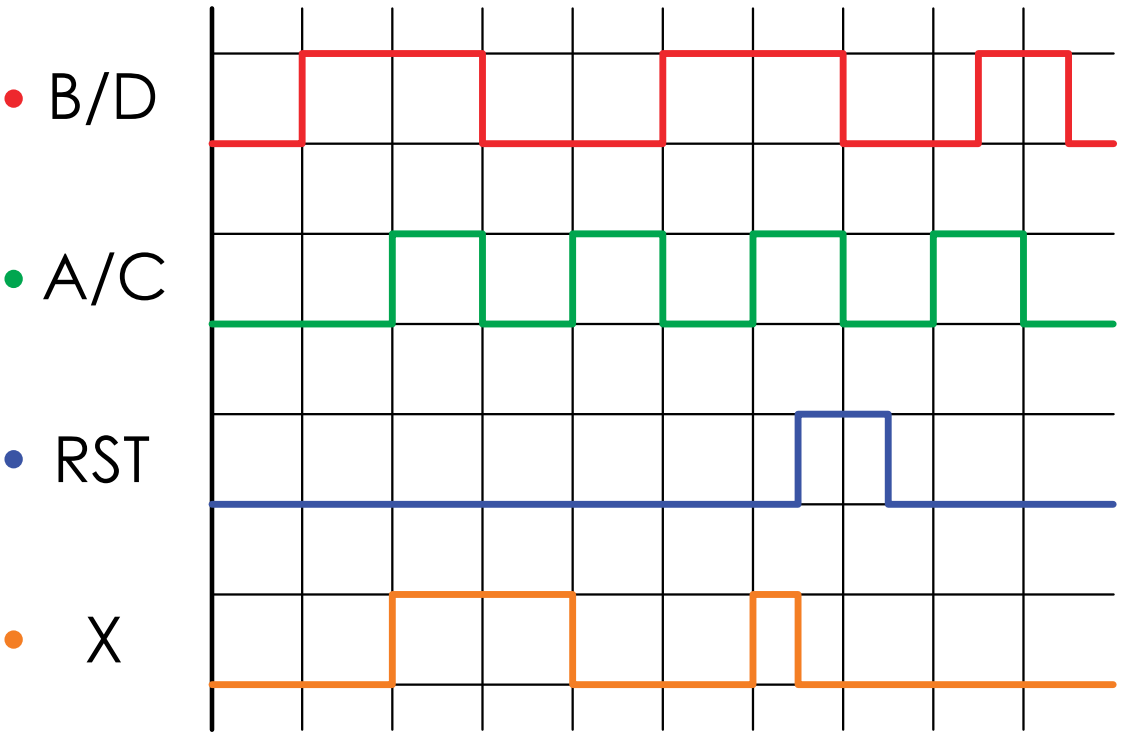
| A | B | OR |
|---|---|---|
| 0 | 0 | 0 |
| 0 | 1 | 1 |
| 1 | 0 | 1 |
| 1 | 1 | 1 |

| A | B | XOR |
|---|---|---|
| 0 | 0 | 0 |
| 0 | 1 | 1 |
| 1 | 0 | 1 |
| 1 | 1 | 0 |

The D-type Flip-Flop can be seen as a 1-bit digital sample & hold.

On every rising edge of the A/C input, the B/D input is sampled and output to the X jack. Changes on the B/D input until the next rising edge on A/C have no impact on the X output.

The Reset input is asynchronous and directly forces the X output to 0.



The Flip-Flop is internally reset as soon as the module is put in another mode, meaning there will be no memory effect and both outputs will be back to their default states, with X at 0 (0V) and Y at 1 (5V).

To use the Flip-Flop as a frequency divider, patch the Y output to the B/D input. At every rising edge on the A/C input, the inverted output will be sampled, resulting in an alternation for every cycle of the Clock.

An MS-20 style Ring Modulator is achievable by feeding both inputs with signals coming from VCOs, and setting the module mode to XOR.

Another trick with the XOR is to use it as a controllable signal inverter. Simply feed one input with the signal you want to invert, and the other one now is the inversion control : the signal would be inverted on the X output with a logical 1 control, or inverted on the Y output with a logical 0 control.

The AND function could be used as some primitive way to gate a signal, like a square LFO, at the press of a note on a keyboard.

The OR function can simply be used to combine triggers from multiple sources, and possibly create some variations in a sequence.

There might be infinite uses for logic modules, and taking advantage of the voltage control over the function available on the outputs, you could sequence MLB, and possibilities should be increased even more.

## MAIN SPECS

| | |
|---|---|
| FORMAT | 1U : 12HP |
| | 3U : 3HP |
| DEPTH | 35mm |

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