

# MB-ModulBox NG



*Under Heavy Development @ 9/8/2016*

## Introduction

The MB-Modulbox-NG Project is a modern version of the **Modulbox** project .  
In short words, it's a **Eurorack-size compliant Modular MIDIbox Control Surface** based upon MB-NG.

From a **Main Part**, **small modules would be chained to Build the custom-sized control surface of your dreams by choosing the MIDI controls you want.**

Main part would also allow **Access to Menus for configuring and saving things on SD Card** , and optionnal **External Analog Inputs/Outputs** to trigger from external sensors and/or drive your analog synth.

**Each Small Module will have a Different type of Interaction** and will include Digital Shift Registers and/or Multiplexers For Analog lines . Then modules would be chained one to another up to main part.

Modules **Chain Connectors will be 2.54mm dual row pinheader** (Molex?) and will carry Digital/Analog bus lines and Current supply. PSU Main input will be on main part PCB.

## Main Part Features

1. **STM32F4 Board**
2. **Standard Control Surface** with 6 Tactile switches, Push - Encoder , **OLED** Graphical screen
3. **SD Card Slot** (+USB in?)
4. **2xMIDI IN + 2xMIDI OUT 2.5mm jack Plugs**
5. **Optionnal 16x3.5mm jacks** for external **Analog Ins/Analog Outs** with External interfaces for expanding.

## Community users working on it

- **Ksir** - Modulbox Original Designer - PCB Design - Programming
- **Psykhaze** - Documentation - Frontpanel design - PCB Design - Programming
- **Latigid On** - PCB Design - Troubleshooting Help

## Getting Involved ?

Just let a Private message on the forum to users already involved

## Software Tools used

- **Inkscape Vector Drawing Software** - Front panel Concept Drawing
- **KiCAD PCB** - PCB Design | **KiCAD Libairies**
- **FreeCAD 3D Technical Drawing** - Case Design
- **Code::Blocks Integrated Development environment** - GUI Software - MIOS programming
- **JUCE** - Cross-Platform Audio/MIDI/GUI Library

## PCB process

1. Parts List – Datasheets Gathering – Reference selection
2. KiCAD Library
3. Schematics
4. FootPrint Creation / Association to schematics
5. Netlist Export
6. Make Pcb routing - Put pinheader/jumper to Strategic Troubleshooting Places.

## Architecture

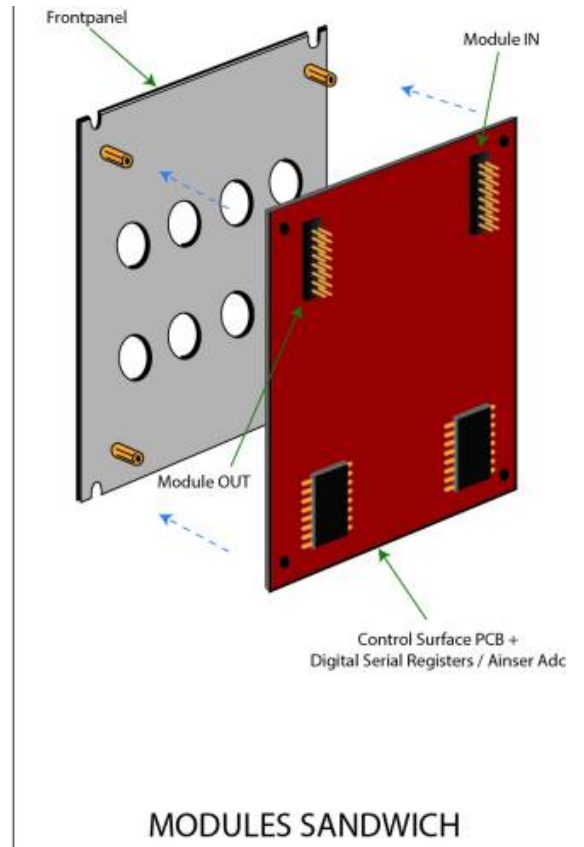
### Modulbox-NG



### Eurorack design

- **Eurorack Design is 3U Height** So frontpanel =  $5,25'' = 133mm - rails = 128,5mm$  Height . Sandwich Design is ok here due to non heating components and allow to spare space.
- **Modules Frontpanels are 8HP-multiple wide (8HP=40,3mm)** see [Eurorack Specification](#).  
Frontpanel back spacers glued with JB-weld to avoid front screwing. [Eurorack Templates PDF](#)
- **PCB Size is 100mm height** To stay compliant to [Eurocard Specification](#)

### Splitted View



## Tech Demos Videos



 <b>Video</b>
  <b>Video</b>
  <b>Video</b>
  <b>Video</b>
  <b>Video</b>
  <b>Video</b>

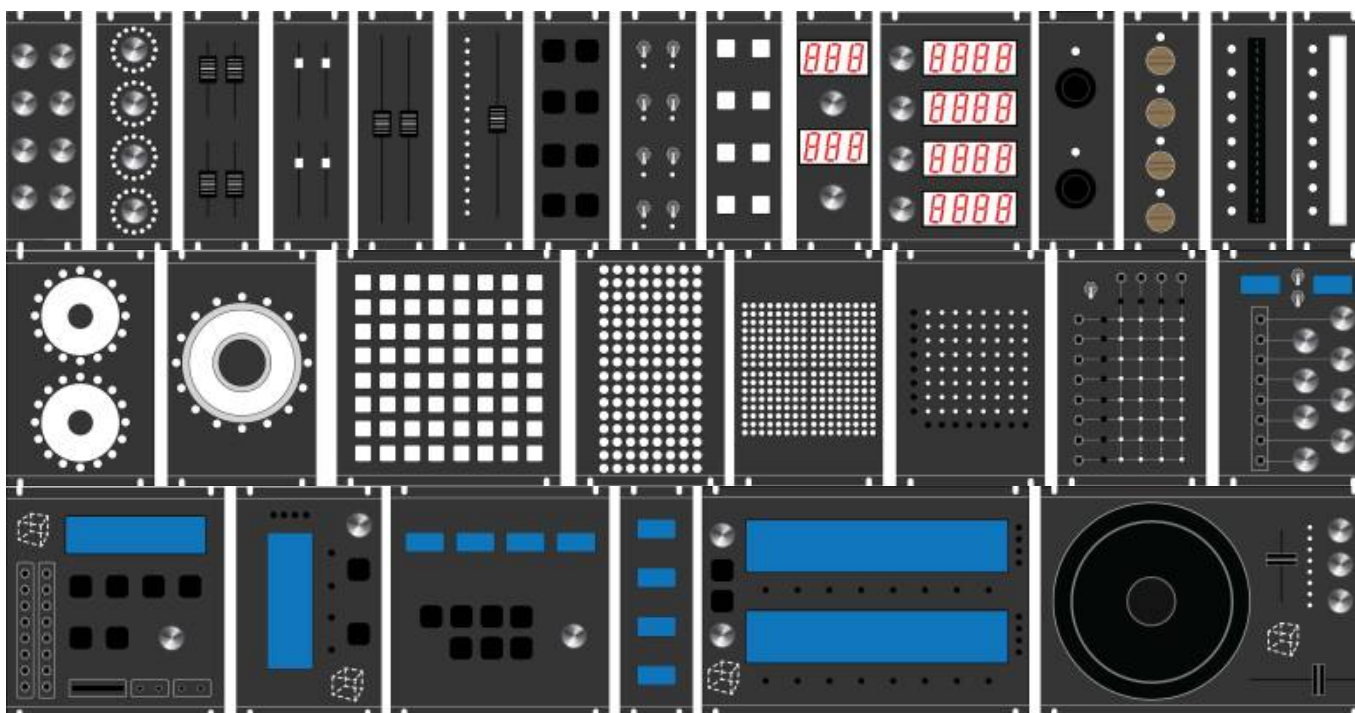


## Modules List + UI Parts

Module	N°	Analog	LED	Encoders	Switches	HP	User	Display
Main UI+Main PCB	1	Jacksx16		x1 PushRotary	Tactilex6	24	Psykhaze	Graphic-OLEDx1
Horizontal 4xOLEDS SCSE	2			x1 PushRotary	Tactilex7	24		Small-OLEDx4
Vertical 4xOLEDS	3					16		Small-OLEDx4
LCD Vertical SCS	4			x1 PushRotary	Tactilex(4+4+2)	16		CLCD 20x4
LCD Horizontal Extended SCS	5			x2 PushRotary	Tactilex22	32	Psykhaze	2xCLCD 40x4
Encoders x8	6			x8 PushRotary		8	Ksir	
Pots x8	7	Pots x8				8	Ksir	
LED Ring Encoders x4	8		16x4 3mm	x4 PushRotary		8		
Faders 2x2	9	Fadersx4				8		
Light-Fader 2x2	10	Light-Fadersx4				8		
Long Faders x2	11	Long Fadersx2				8	Psykhaze	
Motor Fader x1	12	Motor Fader	16x3mm			8	Psykhaze	
Switches x8 A	13				Tactilex8	8	Ksir	
Switches x8 B	14		8xBicolor		Toggle 3 polesx8	8	Ksir	
Light-Switches x8 A	15		Bicolor Opt		Light Tactilex8	8	Ksir	
Light-Switches x8 B	16				Light Togglex8	8	Ksir	
Numeric Displayx2	17			x2 PushRotary		8		2x Numeric
Numeric Displayx4	18			x4 PushRotary		16		4x Numeric
8x8 LED Modulation Matrix	19		x(8x8)3mm		Tactilex(8+8)	16		

Module	N°	Analog	LED	Encoders	Switches	HP	User	Display
16x16 LED DotMatrix	20					16	Psykhaze	4xDotMatrix
8x16 RGB DotMatrix	21					16	Psykhaze	2xDotMatrix
Additional Analog In or Out Interface	22	Jacksx8		x8 PushRotary	Toggle 4 polesx2	16	Psykhaze	Small-OLEDx2
Crosspoint Matrix 8x4(x4)	23	Jacksx(8+4)	x(8x4) 3mm		Toggle 4poles, Tactilex(8+4)	16	Psykhaze	
Adafruit Silicon 3mm 8x8 Matrix	24		x(8x8)3mm		Adafruit Silicon (4x4)x4	24	Psykhaze	
Joystick	25	2xJoystick	2xRGB			8		
Linear Touch	26	1x(Force)Linear Sensor	8xWS2812			8	Psykhaze	
Circular touch	27	1x(2x)Circular Sensor	16(x2)xWS2812			16	Psykhaze	
Force touch	28	4xForce touch	4xRGB			8		
MiniDeck DJ Control	29	1xScratchFader+1xVertical Fader	x8 3mm	x1 Code Wheel +x3 PushRotary		32		

## Frontpanels Layouts



## Modules Ins/Outs + Related Parts

.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Digital Ins	8	0	>16	/	12	30	16	/	8	/	/	?	8	24	8

.	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>	<b>10</b>	<b>11</b>	<b>12</b>	<b>13</b>	<b>14</b>	<b>15</b>	
74HC165 #	1	0>2	/	2	4	2	/	1	/	/	/	?	1	3	1	
Digital Outs	/	/	/	/	/	/	/	16	/	/	/	16+?	/	16	8>16	
74HC595 #	/	/	/	/	/	/	/	2	/	/	/	2+?	/	2	1>2	
Analog Ins	/	/	/	/	/	/	16	/	8	8	4	?	/	/	/	
CLCD #	/	/	/	1	2	/	/	/	/	/	/	/	/	/	/	
OLED #	1	1>8	4	/	/	/	/	/	/	/	/	/	/	/	/	
.	<b>16</b>	<b>17</b>	<b>18</b>	<b>19</b>	<b>20</b>	<b>21</b>	<b>22</b>	<b>23</b>	<b>24</b>	<b>25</b>	<b>26</b>	<b>27</b>	<b>28</b>	<b>29</b>	<b>30</b>	<b>31</b>
Digital Ins	16	4	8	16	/	/	24	15	16	16	32	/	3	/	/	12
74HC165 #	2	1	1	2	/	/	3	2	2	2	4	/	1	/	/	2
Digital Outs	8	16	32?	16	16	32	/	16	16	/	/	6	/	/	12	8
74HC595 #	1	2	4	2	2	4	/	2	2	/	/	1	/	/	2	1
Analog Ins	/	/	/	/	/	/	0>8	/	/	/	/	8	/	3>6	8	8
CLCD #	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
OLED #	/	/	/	/	/	/	1	/	/	/	/	/	/	/	/	/

## Parts References

### Parts Datasheets

Designation	Datasheet Link	Reference
Serial Register IN	<a href="#">74HC165</a>	cd74hc165
Serial Register OUT	<a href="#">74HC595</a>	cd74hc595
Line Driver	<a href="#">74HCT541</a>	cd74hct541
OptoCoupler	<a href="#">6N138</a>	6N138M
Analog>Digital Converter	<a href="#">MCP3208</a>	MCP3208
Multiplexer switch	<a href="#">MOS4051</a>	cd74hc4051
Digital>Analog Converter	<a href="#">MAX525</a>	MAX525
Operational Amplifier	<a href="#">MCP600X</a>	MCP6008
Crosspoint Switch	<a href="#">CD22m3494</a>	CD22m3494
Switch Rotary Encoder	<a href="#">Alps EC11E</a>	EC11E15244B2
5mm WS2812 LED	<a href="#">WS2812</a>	APA-106-F5
5mm RGB LED	<a href="#">RGB LED</a>	SL-R596CR4G3B5W-F12
Tactile Switch	<a href="#">Small Round Tactile Switch</a>	SKHHDTA010
Tactile Switch 2	<a href="#">Square Tactile Switch</a>	03.0752
Light-Tactile Switch	<a href="#">Square Light Tactile switch</a>	B3W-9000-G1N, B3W-9000-R1N, B3W-9000-Y1N, B3W-9000-RG2N
Toggle Switch 3/4 Poles	<a href="#">Toggle Switch</a>	100SP1T2B3M2QEH
Light-Toggle Switch	<a href="#">Light Toggle Switch</a>	G12JPCF
Code Wheel+ Optical Encoder	<a href="#">Encoder+ Code Wheel</a>	HEDB-9100-C12
Fader	<a href="#">Bourns PTA</a>	PTA3043-2015CPB103,PTA6043-2015CPB103

Designation	Datasheet Link	Reference
Long Fader	<a href="#">ALPS RS series</a>	RSA0N11S9A0K
Long Fader 2	<a href="#">Bourns PTB</a>	PTB0143-2010BPB103
Light-Fader	<a href="#">Bourns PTL</a>	PTL30-10G1-103B2, PTL30-15R1-104B2, PTL60-10G1-103B2, PTL60-15R1-104B2
Motor Fader	<a href="#">Alps MotorFader 60mm</a>	RS60N11M9A0F
Rotary Pot	<a href="#">ALPS Rotary pot</a>	RK09L1140A66
SD Card Socket	<a href="#">SD Socket</a>	SDCRD-GM-271
OLED 256x64px 3,12"	<a href="#">Newhaven OLED</a>	NHD-3.12-25664UMY3
OLED 256x64px 3,2 "	<a href="#">3.2" OLED</a>	ER-OLEDM032
OLED 128x64px 0,96"	<a href="#">0.96" OLED</a>	ER-OLEDM0.96
CLCD 20x4	<a href="#">20x4 LCD</a>	ERM2004
CLCD 40x4	<a href="#">40x4 LCD</a>	ERM4004
8x8 Monochrome DotMatrix	<a href="#">8x8 Dotmatrix</a>	TC15-11EWA
8x8 RGB DotMatrix	<a href="#">8x8 RGB Dotmatrix</a>	YSM-2388CRGBC
3 Digits Numeric Display	<a href="#">3 Digits Numeric Display</a>	BA56-12SRWA
Silicon 4x4 Button Matrix 5mm	<a href="#">Silicon 4x4 5mm Button Matrix</a>	/
Silicon 4x4 Button Matrix 3mm	<a href="#">Silicon 4x4 3mm Button Matrix</a>	/
jack 3,5mm mono	<a href="#">Jack 3.5mm</a>	35RAPC2AV, PJ301BM
Joystick 1	<a href="#">Joystick 1</a>	/
Joystick 2	<a href="#">Joystick 2</a>	/
Force Touch Sensor	<a href="#">Interlink FSR402</a>	34-00015
Ring Sensor	<a href="#">Interlink Ring Sensor</a>	40-24131
Linear+Force Sensor	<a href="#">Interlink linear+force sensor</a>	34-00022
Linear Touch Sensor	<a href="#">SpectraSymbol SoftPot</a>	SP-L-0100-103-ST
Circular Touch Sensor	<a href="#">SpectraSymbol SoftPot</a>	SP-R-0046-103-ST

## Buy Places

- [Mouser](#)
- [Buydisplay](#)
- [Interlink Force Sensors @ Digkey](#)
- [Interlink Ring Sensor @ Roboshop](#)
- [SpectraSymbol Circular Tactile Sensor @Adafruit](#)
- [SpectraSymbol Linear Tactile Sensor @Adafruit](#)

## Software / Firmware

- [JUCE Ressources](#)

A **GUI** will be developed with JUCE Library to make your **MIDI mapping** upon your custom control

interface and make your **custom infos display on OLED / CLCDs / LEDs Matrixes**. Upon a list of **Pre-made functions**, you would be able to connect a **MIDI mapping** to Controller / Sequencer / Other MIDibox apps functions into the JUCE GUI

**TODO:** Make a inkscape sketch For the JUCE GUI then remake it with **Projucer**

From:

<https://www.midibox.org/dokuwiki/> - **MIDibox**

Permanent link:

<https://www.midibox.org/dokuwiki/doku.php?id=mb-modulbox-ng&rev=1470802813>

Last update: **2016/08/10 04:20**

