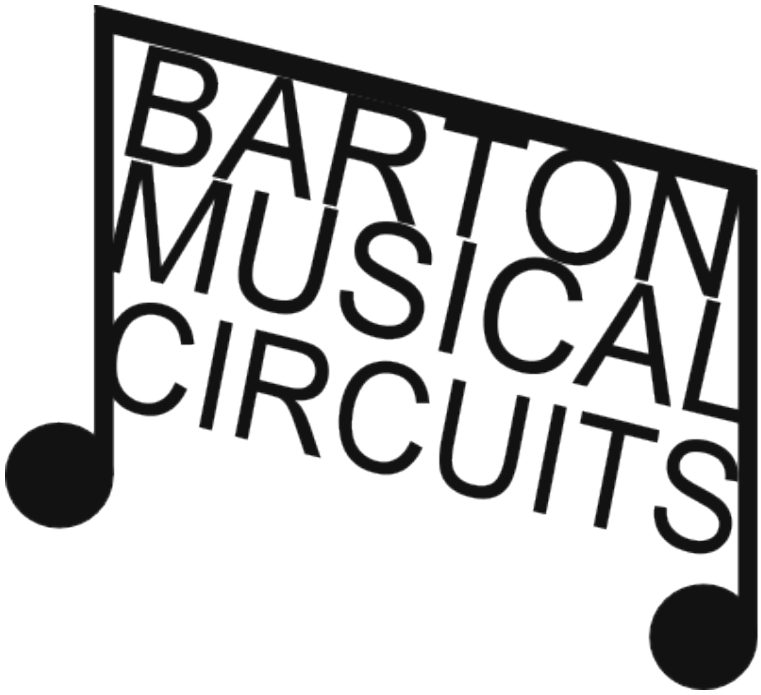


BMC056. Utility Buttons

Last updated 4-10-2019

If you have any questions, or need help trouble shooting, please e-mail Michael@Bartonmusicalcircuits.com

I.Overview/Features

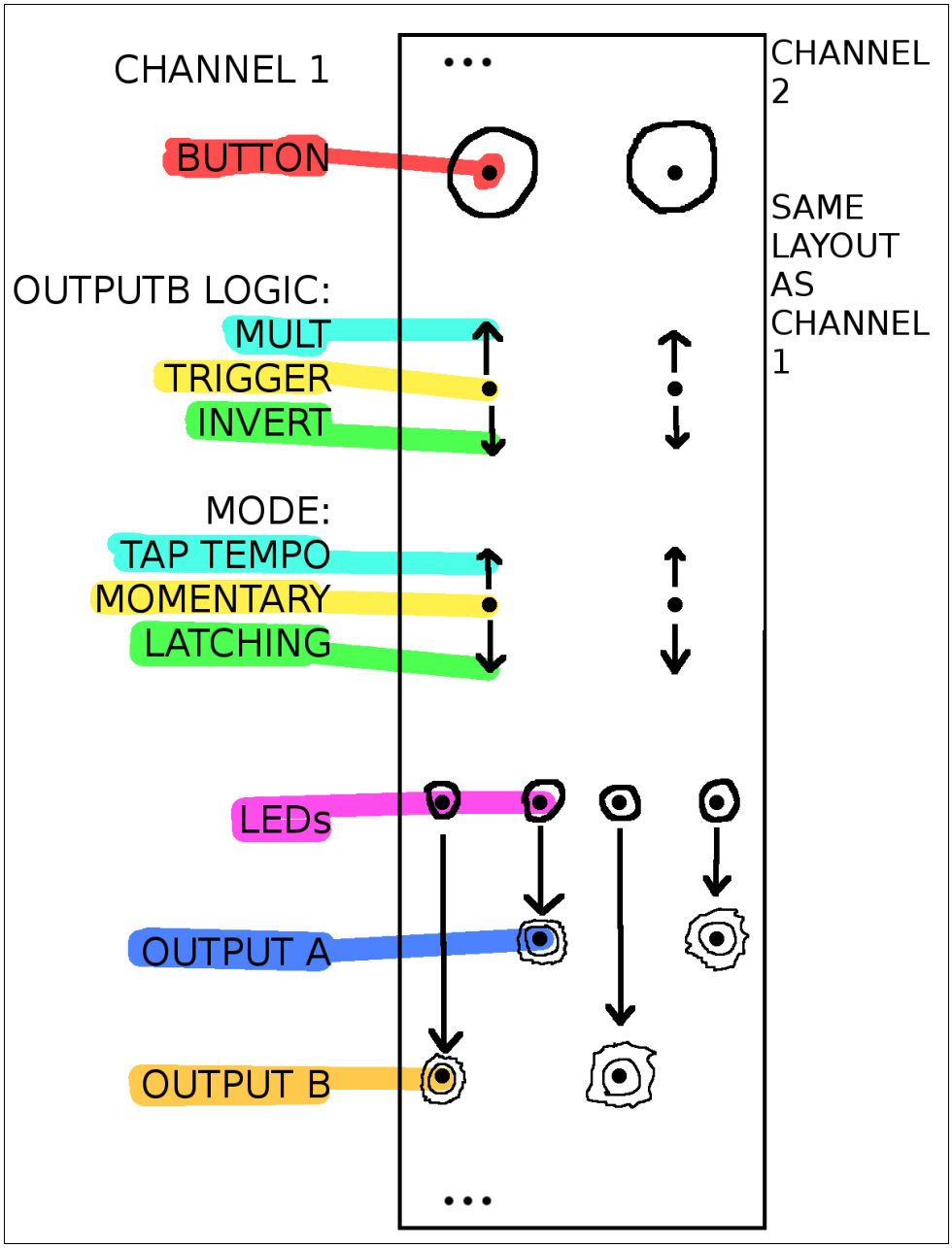
Utility Buttons is a module that provides Gate/Trigger outputs that are controlled by a pushbutton. The design idea came from a suggestion from a builder of one of my previous modules, feel free to make suggestions, as I just might design them!

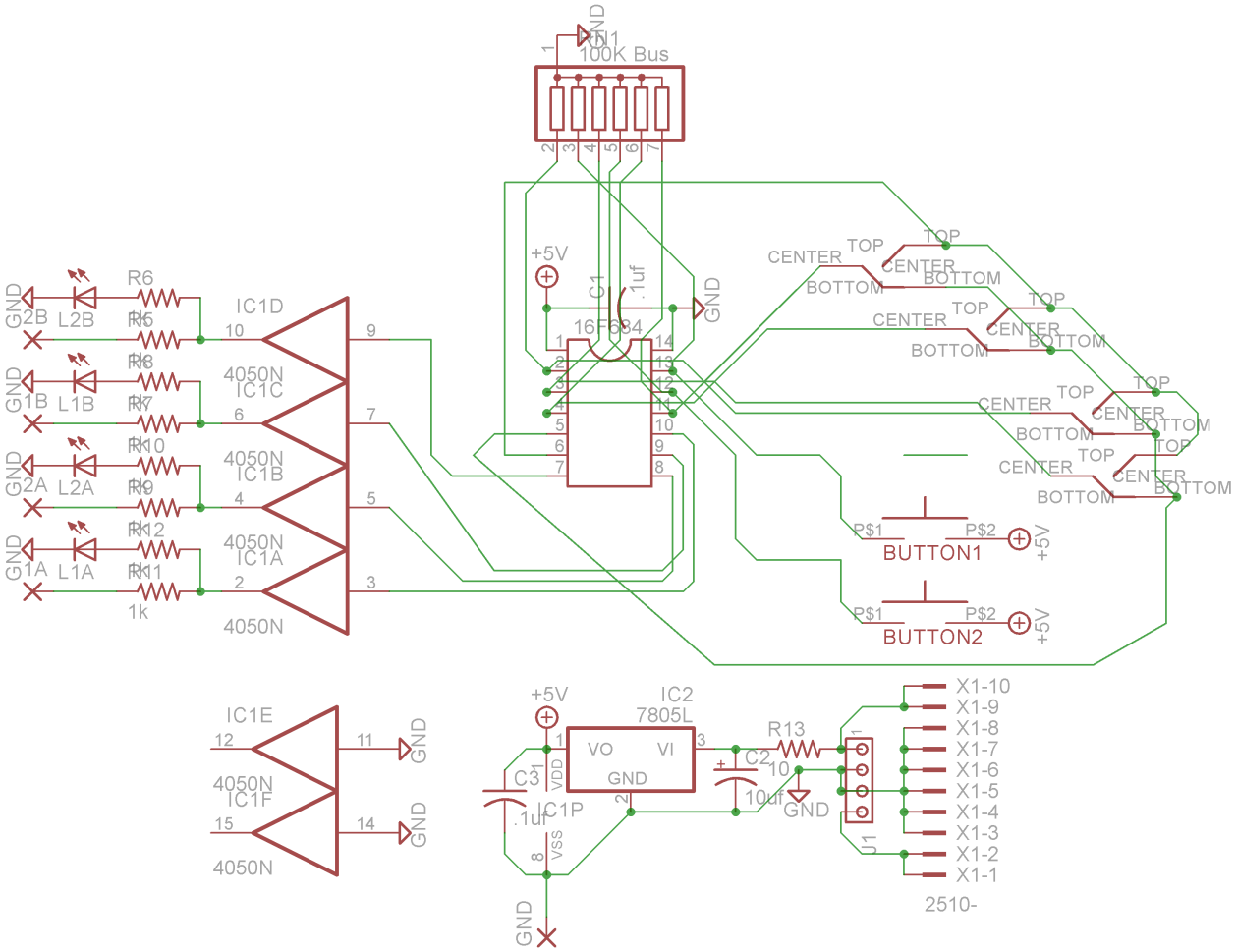
The buttons can operate in three modes, selected by a toggle:
1.Momentary – The A output is on while the button is pressed down.
2.Latching – The A output is turned on or off with each button press.
3.Tap Tempo – The A output will turn on and off at a tempo set by pressing the button twice.

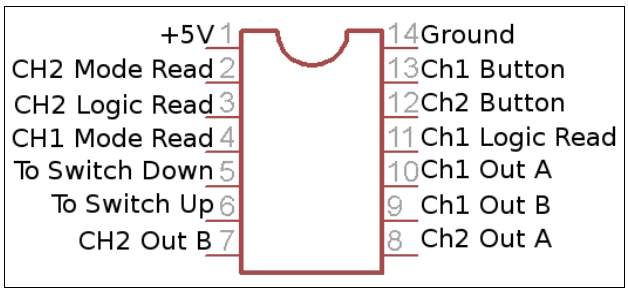
Each button has two Outputs, A and B. The A outputs logic is unchanging, but the B outputs logic is selected by a toggle.
1.Mult – The B output is on when the A output is on.
2.Trigger – The B output will turn on for ~1ms when the A output is first turned on.
3.Invert – The B output is on when the A output is off.

When an output is On, it will output +5V and when it is off it will output 0V.

To the right is a diagram of toggle positions to Logic/Mode.







II. Schematic.

Above is the full schematic for this project. To the right is pinout for the 16F684 PIC microcontroller.

At the top is a 100K resistor buss that keeps all the input pins of the PIC at 0V when an input is not active. In the upper right are the four toggles. The center of each toggle is sent to an input pin on the PIC. The top and bottom connections of the toggles are connected to output pins of the PIC, these outputs are turned on one at a time to scan the position of the toggles. Below the toggles are the two pushbuttons. A CD4050 chip is connected to the output pins of the PIC and buffers the output. At the bottom are the unused gates of the 4050, the +5V voltage regulator and the power filtering.

III. Construction

A.Parts List

Semiconductors

Name	Quantity	Notes
16F684 PIC	1	Preprogrammed, should have come with your PCB
CD4050 Buffer	1	16 pin DIP packaging

7805L Voltage Regulator	1	TO-92 Package
LED	4	3mm packaging

Resistors

Name/Value	Quantity	Notes
10 ohm	1	All resistors 1/4w metal Film for all resistors unless otherwise noted
1K ohm	8	
7 pin 100K resistor bussed array	1	Can be made with 6 100K resistors, instructions here.

Capacitors

Name/Value	Quantity	Notes
.01uf	2	Ceramic disc. Value not critical
10uf	1	Electrolytic, at least 16V rating.

Other

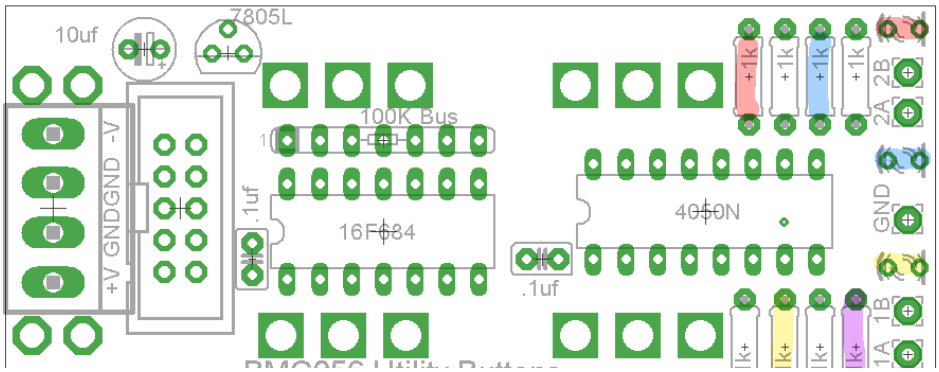
Name/Value	Quantity	Notes
Power connecter	1	Eurorack or MOTM
14 pin DIP socket	1	
16 pin DIP socket	1	
Mono jack	4	Whatever standard input/output jack you use in your synth system. Panel mounted, solder lugs.
Pushbutton	2	2mm pins spaced 4mm apart. I use these.
SPDT On-Off-On	4	I use these.

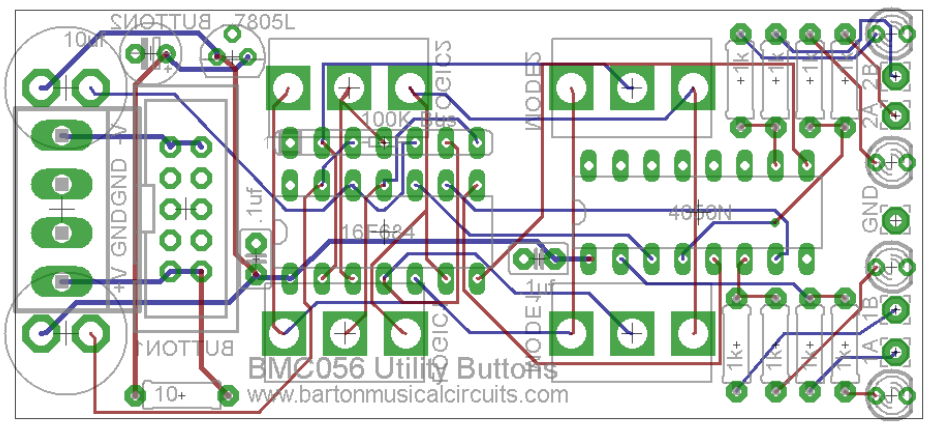
B. The PCB

The PCB is 75mm x 34mm.

On the right is an image of the top of the PCB. The resistors that control LED brightness are highlighted with the same color as the LED they control. If you'd like to decrease brightness of an LED, use a higher value resistor.

An image of the PCB with all PCB traces is on the right.





C. Wiring/Photos

Wiring is very easy for this module.
1.Connect “GND” to the sleeve of a jack.
2.Connect the “1A” ”1B” ”2A” and ”2B” wirepads to the tip connectors of their respective jacks.
3.If using a panel made of nonconductive material (like wood or plastic) connect the sleeves of the other jacks to the sleeve of the grounded jack.

To the upper right is a close up of wiring.
Below is a close up of a homemade resistor array.
Bottom right is a photo of a completed module.