

BMC063. Binary Counter/Divider

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I. What it Does

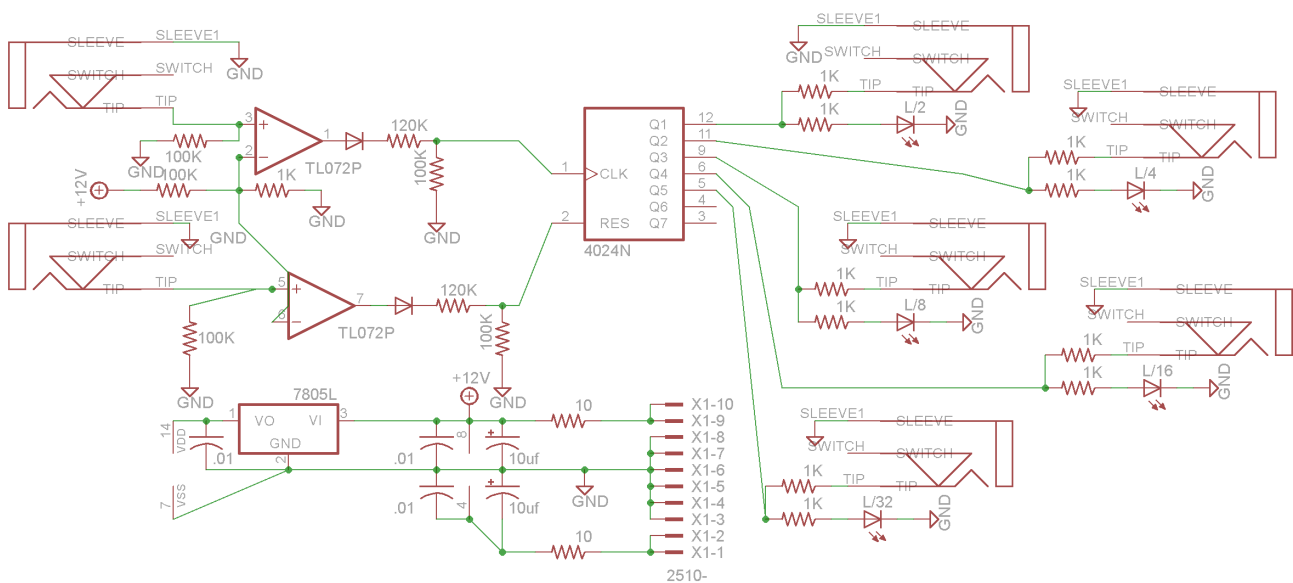
This module is a binary counter, meaning it counts the number of ticks on the clock input and outputs that number in binary. Each digit of the binary count has its own output. When inputting a steady clock signal, each output will act as a divider of that clock signal dividing by 2, 4, 8, 16 and 32. The division is the easiest to use

The module has two inputs:

- 1.Clock. This input increases the count when the input voltage goes above zero.
- 2.Reset/Mute. When the input signal goes above zero, all outputs will turn off, muting the module. When the signal returns to below zero after going above, the count will be reset to zero. If using this input as a pure reset, use a trigger input.

The module has five outputs, one for each bit of the binary count. The module counts from 0 to 63. Each output is a gate signal going transitioning between 0 and +5V.

II. Schematic



Above is the schematic for this module. At the center is the CD4024 CMOS binary counter module. To the left of the 4024 are the inputs and to its right are the outputs.

Each input is connected to the positive input terminal of an op amp wired as a comparator with a 100K resistor to ground setting the input impedance. The 100K/1K voltage divider sets the threshold for these comparators at .12V. The outputs of the comparators go through a switching diode to allow only positive voltage to pass and then a 120K/100K voltage divider which will reduce the voltage to ~5V when connecting to the input pins of the CD4024

Though the PCB is set up for a Eurorack style system with a +/-12V power supply, if you were building this circuit for a system with +/-15V, you'd replace the 120K resistors with 150K resistors.

Each output pin of the 4024 connects to an LED through a 1K current limiting resistor and to the tip of an output jack through a 1K resistor.

At the bottom of the schematic are the power connections. The external power comes in through a 10-pin power connector. The +/- voltage rails are each filtered by a passive filter formed by a 10ohm resistor and a 10uf capacitor. The TL072 is powered from the filtered +/- rails with .01uf capacitors placed near the power pins for further filtering. A 7805 voltage regulator creates a +5V supply for the 4024's power supply, and another .01uf capacitor is placed near its power pin.

III Construction

A.PARTS LIST

SEMICONDUCTORS

Name/Value	QTY	Notes
TL072	1	8 pin DIP package.
CD4024	1	
7805	1	TO-92 package
1N4148	2	Or any small switching diode
LED	5	3mm. Resistor values assume normal red LED, for high efficiency LEDs or brighter colors you may want to increase some resistor values

RESISTORS

Name/Value	QTY	Notes
10 ohms	2	All resistors 1/4W metal film except potentiometers
1K	11	
100K	5	
120K	2	

CAPACITORS

Name/Value	QTY	Notes
.1uf	3	cheap ceramic disc. Value not critical.
10uf	2	Electrolytic, 16V or higher rating.

OTHER

Name/Value	QTY	Notes
14 pin DIP socket	1	
8 pin DIP socket	1	
Power connector	1	Eurorack style
Jacks	7	PCB is designed around these jacks: PJ-323M

B. THE BOARD

The PCB is 97mm x 31mm. The jacks are spaced 13.97mm apart (.55 inch). Below are images of the PCB with and without traces present, and photos of a completed module. The image of the PCB with traces does not show connections to ground.

