

## **BMC064. Decade Counter**

If you have any questions, or need help trouble shooting, please e-mail  
[Michael@Bartonmusicalcircuits.com](mailto:Michael@Bartonmusicalcircuits.com)

**I What it does**

**II Schematics**

**III Construction**

**A.Parts List**

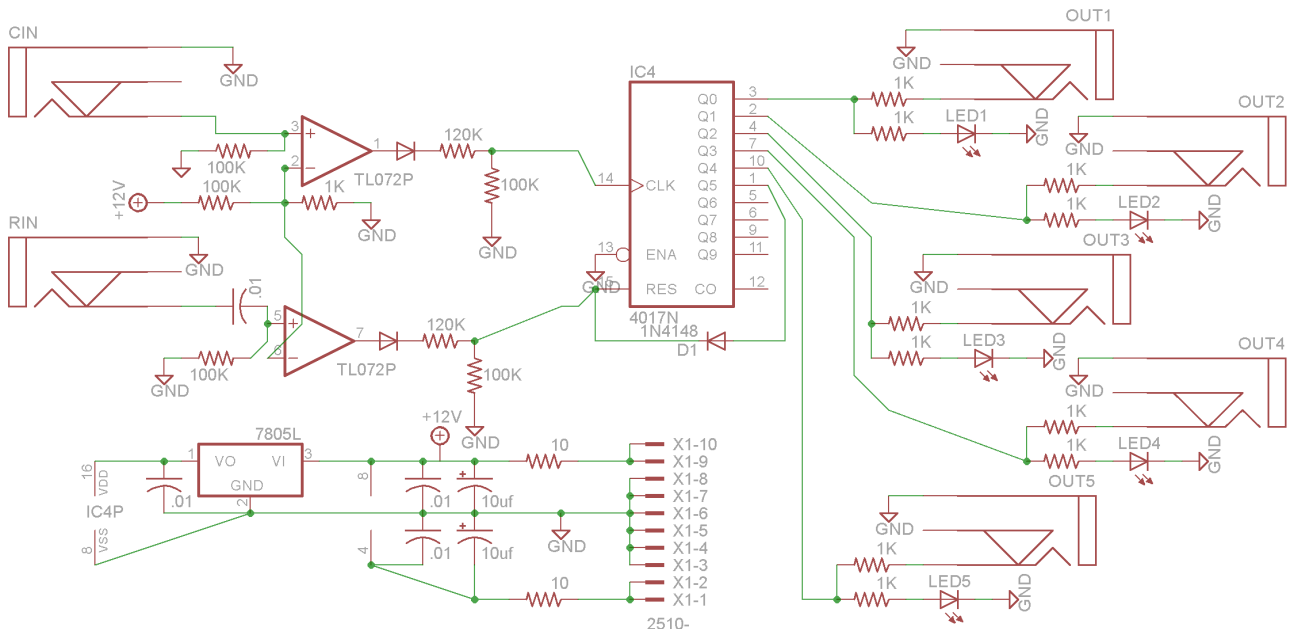
**B.The Board**

## I. What it Does

This module is a decade counter with 5 outputs. Each gate or trigger input to the clock will increase the count by one changing which output is active. After 5 outputs or when a gate or trigger is input to the reset input, the count goes back to the first output.

The module has five outputs. 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 CD4017 CMOS decade counter IC. To the left of the 4024 are the inputs and to it's right are the outputs and below are power connections.

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 CD4014.

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.

The reset input has a .01uF capacitor connecting the jack to the comparator which converts gate signals into trigger signals. Normally when the reset input is high, inputs to the clock are ignored, so by making sure the reset input is high only a short time, we avoid muting problems. A diode also connects the 6<sup>th</sup> unused output of the CD4017 to the Reset input to limit the number of outputs to five.

Each output pin of the 4017 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 4017's power supply, and another .01uF capacitor is placed near it's power pin.

### III Construction

#### A.PARTS LIST

#### SEMICONDUCTORS

Name/Value	QTY	Notes
TL072	1	8 pin DIP package.
CD4017	1	16 pin DIP package
7805	1	TO-92 package
1N4148	3	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
16 pin DIP socket	1	
8 pin DIP socket	1	
Power connecter	1	Right angle 2x5 2.54mm, <a href="#">like this</a> .
Jacks	7	PCB is designed around these jacks: <a href="#">PJ-323M</a>

## 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. The image of the PCB with traces does not show connections to ground.

