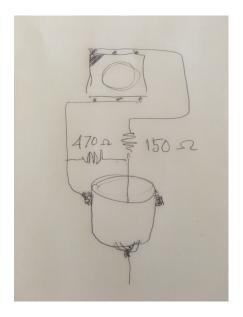
## **Making My Own Pinball LED Lamps**

Parts Used: 5050SMD LED's 150  $\Omega$  resistor 1/4w 470  $\Omega$  resister 1/4w Old #44 or #47 bulb base.

## **Background**

I wanted to save some money making my own LED's. Turns out I can make them for pennies each. I am making these for my older games that use the #44 bulb base, but these can be adapted to the #555 base as well. There are two variations; one for feature lamp circuits (DC), and the other for general illumination (AC) circuits.

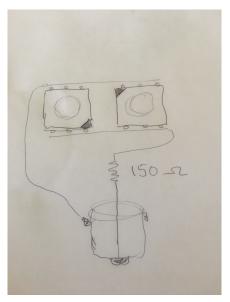
The SMD's are available in varying brightness and colors. I prefer the warm white 5050's. They are quite bright and match the warmth of incandescents well. Internally they consist of three LED's, so they are polarity sensitive. Note the notch in the corner of the SMD. See picture below. Observe the notch location during assembly.



## **Feature Lamps**

The feature lamp arrangement looks like this sketch.

Two resistors are used; the 150  $\Omega$  is used to limit the current/voltage to the SMD, and the other one to provide a load to the driver circuit to eliminate flicker.



## **General Illumination (GI) Lamps**

The GI lamp arrangement looks like this:

The GI lamps are seeing the current change direction each cycle (i.e., 60HZ). Therefore, when arranged as shown, when one lamp is on the other is off. Then the cycle reverses; the off lamp turns on and the other turns off. This happens so quickly the "flicker" is unnoticed.