Crane Safety Light Circuit

Name: _____ Date: _____

1. Describe how the "**5V Regulator Project**" works in regards to:

   a) What does a diode do? Would this circuit work without it? What do you think the main purpose of the diode is for?

   _____
   _____
   _____

   b) What does a capacitor do? Why do you think this circuit uses capacitors? What is the specific function of the capacitors in this circuit design?

   _____
   _____
   _____

   c) Describe what the L7805CV does and how it works.

   _____
   _____
   _____

2. Describe how the "**Adjustable Astable Timer Circuit**" works in regards to:

   a) What is a potentiometer? What does it do and how does it work? What is the function of the potentiometer in this circuit? What does it do?

   _____
   _____
   _____

   b) What is a 555 timer. What does a 555 timer do?

   _____
   _____
   _____

   c) Describe how the 555 timer works when it is configured in "astable mode".

   _____
   _____
   _____

   d) What does the capacitor do in this circuit? Why is the capacitor significant?

   _____
   _____
   _____

Crane Safety Light Circuit

Introduction:

Tall structures like large buildings are not built in a single week or even a month. It takes a long time, lots of effort, and equipment to build tall structures; therefore, there is a need for temporary cranes when these structures are being built.

As with any tall structure, the presence of any number of cranes can become a navigational obstacle for airplanes which has the potential to cause an accident. Therefore, "obstruction lights" or "safety lights" are installed on cranes to increase the visibility of the crane during night time operations. Obstruction lights are displayed at night and are positioned so that the lights are visible from all directions.

According to **Federal Aviation Administration (FAA)** and **International Civil Aviation Organization (ICAO)**, all structures exceeding 200 feet (or 61 meters) above ground level must be appropriately marked with obstruction lights.

BASIC RULES:

1. The number of light levels depends on the height of the structure;
2. The number and arrangement of light units at each level should be placed so the obstruction lights are visible from every angle;
3. Lights are applied to display the general shape of the structure;
4. The width and length of buildings determine the number of lights that need to be installed at each light level.

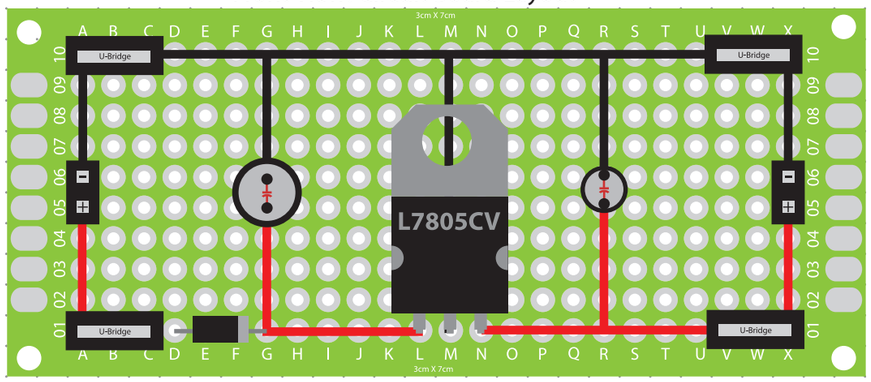
Height	Numbers and types of lighting
Height < 45m	**1 level of obstruction lights is needed:** • low-intensity obstruction lights
45m < Height < 105m	**2 levels of obstruction lights are needed:** • top-level with medium intensity. • intermediate with low intensity.
105m < Height < 210m	**4 levels of obstruction lights are needed:** • top with medium intensity. • 1st intermediate with low intensity. • 2nd intermediate with medium intensity • lower level with low intensity.

Low Intensity Red Lights:
Short cranes are installed with low intensity red lights. They are positioned as close as possible to the highest point and must be visible from all directions.

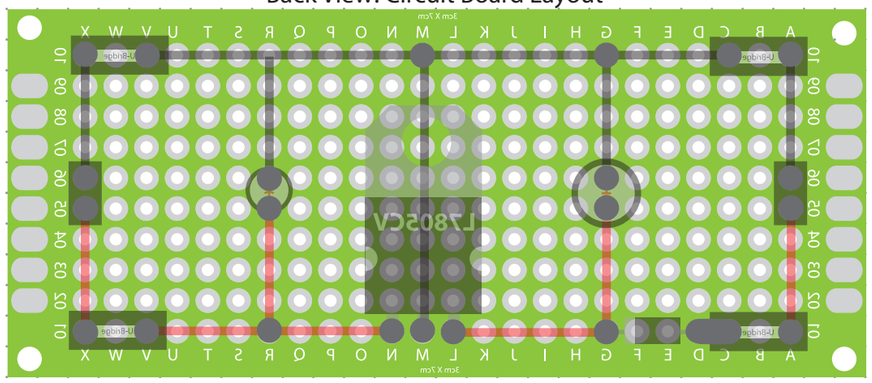
Medium Intensity Red Lights:
Tall cranes will also have medium intensity red lights installed that are positioned at the highest point and both ends of the crane jib. The lighting will indicate the crane's height and the radius of the crane's jib. Depending on the cranes hight multiple levels of medium intensity lights may be needed.

Review: *A crane is a machine that creates a mechanical advantage to move heavy loads. Cranes are mainly used for lifting and lowering construction materials. There are many different types of cranes but the most recognizable are the "tower crane" and the "truck mounted crane".*

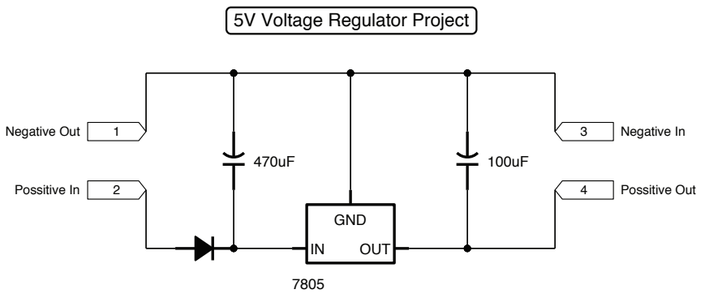
Front View: Circuit Board Layout



Back View: Circuit Board Layout



Electrical Schematics

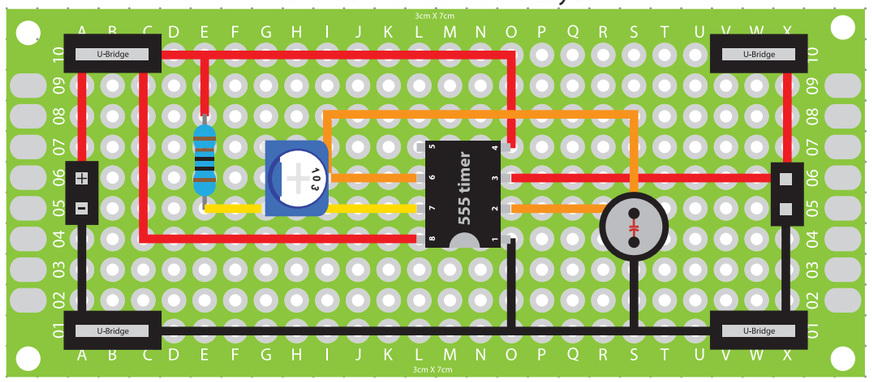


Materials:

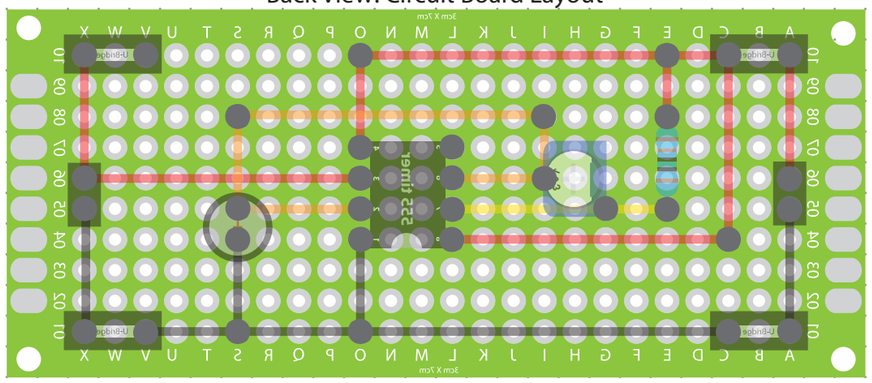
1	3x7cm Circuit Board
1	Diodes N4001 (1.0A/50V)
4	Pin Type Bridge Conectors
4	U-Type Bridge Conectors
1	470uF 25V Capacitor
1	100uF 25V Capacitor
1	10cm Length of Red Wire
1	10cm Length of Black Wire

Project: 5V Voltage Regulator Project	Client:	5mm Dot Grid Scale: 2:1
Designer: Scott A. Campbell	Builder:	

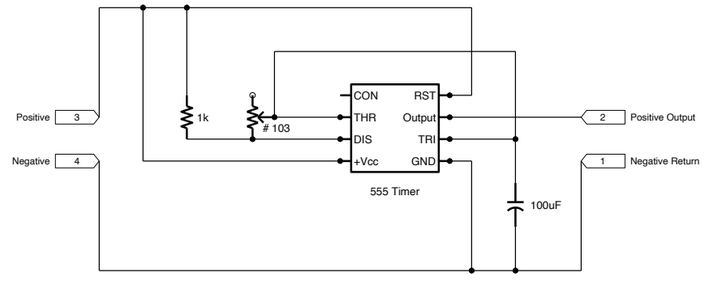
Front View: Circuit Board Layout



Back View: Circuit Board Layout



Electrical Schematics



Materials:

1	3x7cm Circuit Board
2	Bridge Pins
1	2-Pin Female Bridges
4	U-bridge connectors
1	555 Timer IC
1	1k Resistors
1	#103 variable resistor
1	100uF 25v capacitor
1	50cm assorted wires

Notes: *based on 5v input this circuit provides frequencies of 0.8hz ~125hz (1.25s ~ 8ms)*

Project: Adjustable Astable Timer Circuit	Client:	5mm Dot Grid Scale: 2:1
Designer: Scott A. Campbell	Builder:	