

Project Name  
Imbalance

Description

"Imbalance provides an austere view of birth and death on Earth. Animated LEDs beckon participants to a pair of digital counters that display the number of people who have been born and who have died worldwide since the Gate opened for Burning Man 2022. Originally intended for Burning Man 2020 but destroyed by wildfire, Imbalance is reborn, simplified from exhaustion, wary but hopeful. By the end of Burning Man 2022, Imbalance's counters will report about 3,400,000 global births and 1,400,000 deaths."

Pages

1. Table of Contents
2. Overall View
3. Three View
4. Transport
5. Plywood Cut List
6. 2x4, 2x2 Cut List
7. Anchor Bracket Detail
8. Anchor Bracket Installation
9. Display Layout
10. Interior of Base
11. Electrical System
12. Power Budget
13. Battery Cable Assembly
14. Lighting System Details
15. Fuse Schedule
16. PCB Modifications
17. Button Cable
18. Pixelblaze DIN Adapter
19. Counter Temporary Power Cable
20. Breadboard Layout

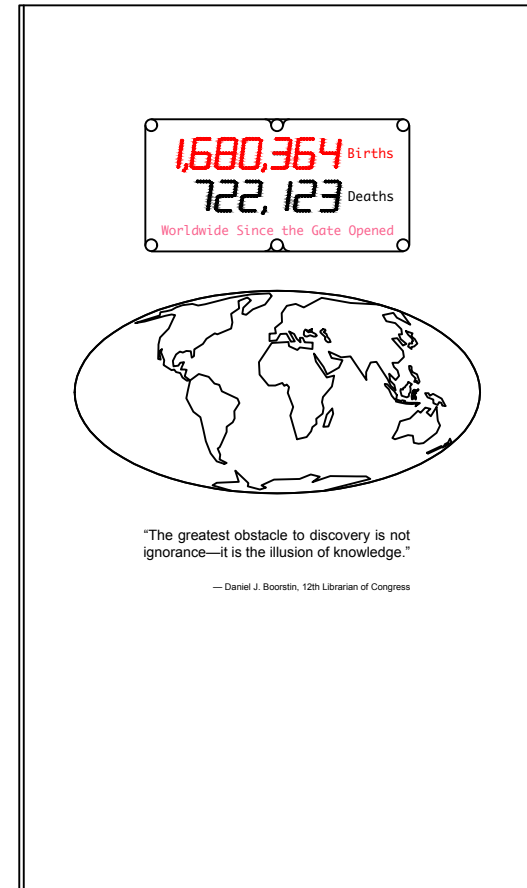
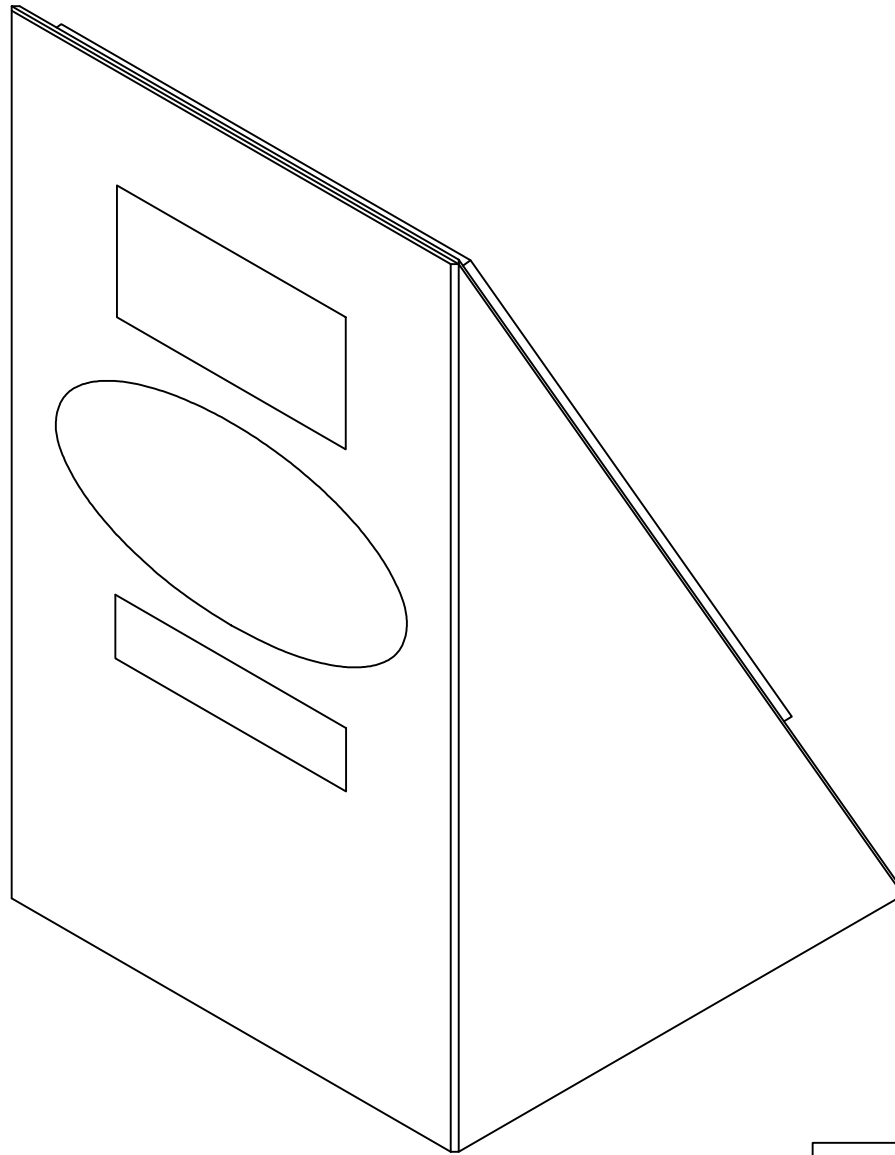
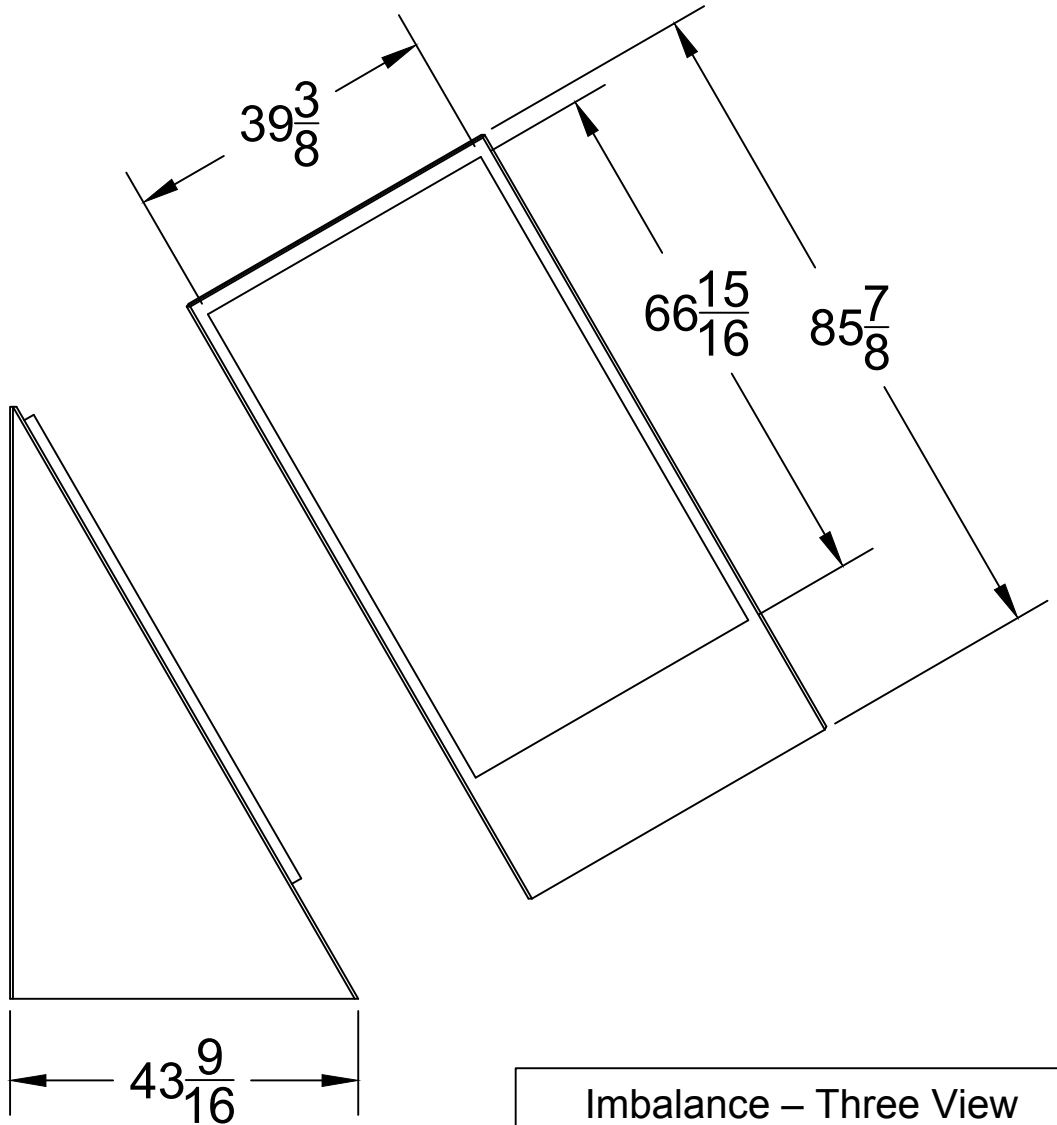
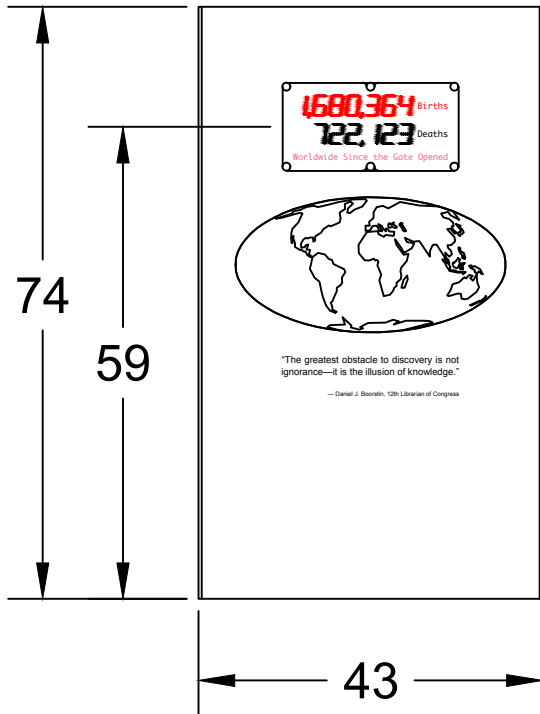
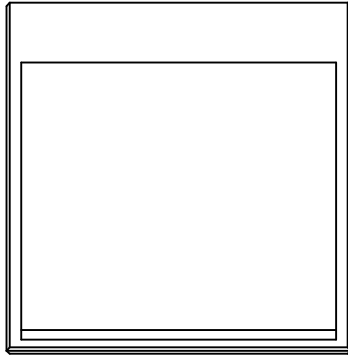


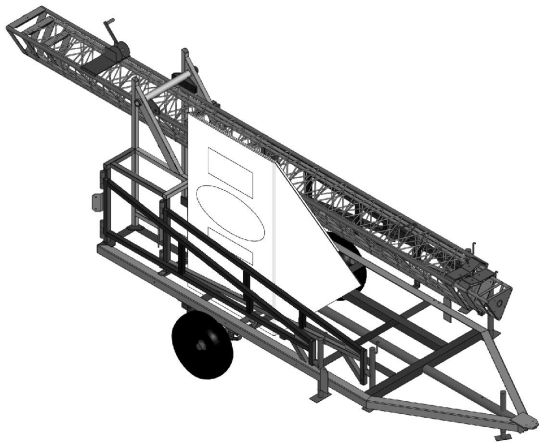
Table of Contents			
Event	Burning Man 2022	Project	Imbalance
Designer	Kerry Veenstra	Scale	None
		Revision	A



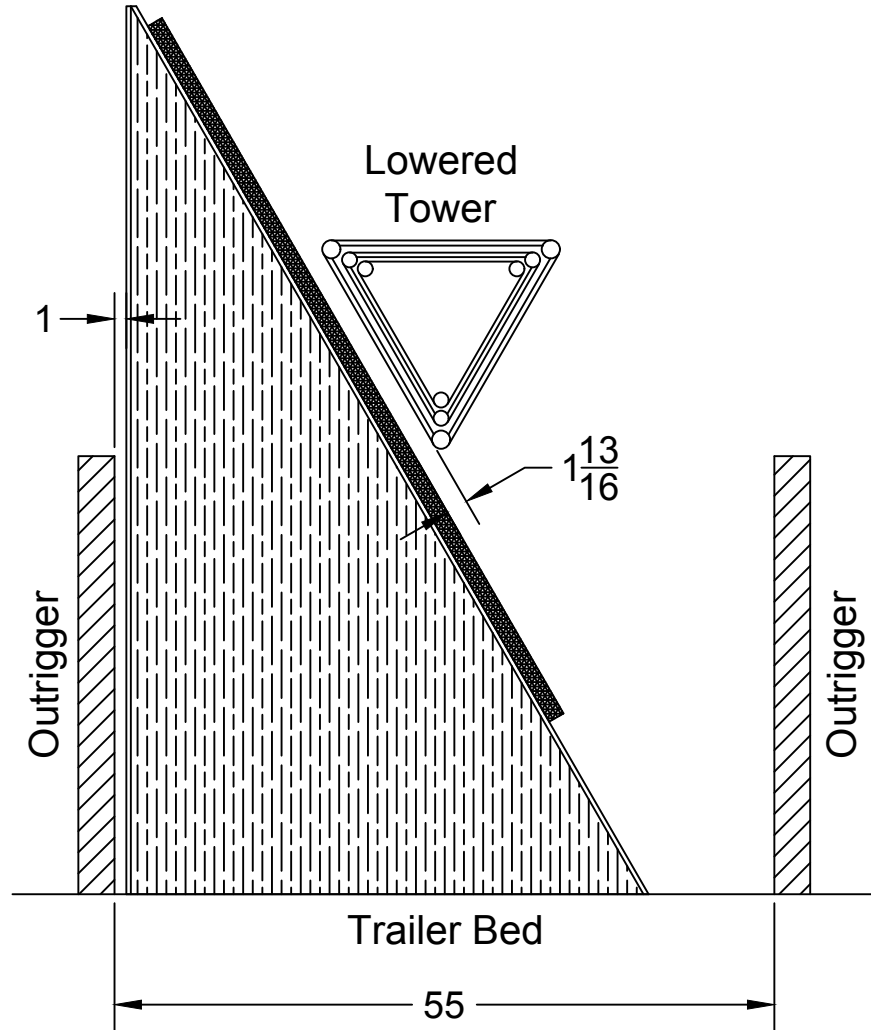
Imbalance – Overall View			
Event	Burning Man 2022	Project	Imbalance
Designer	Kerry Veenstra	Scale	$\frac{3}{4}'' = 1'$
		Revision	A



<b>Imbalance – Three View</b>			
Event	Burning Man 2022	Project	Imbalance
Designer	Kerry Veenstra	Scale	$\frac{1}{2}'' = 1'$
		Revision	A



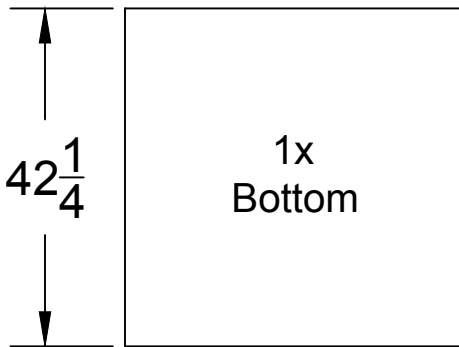
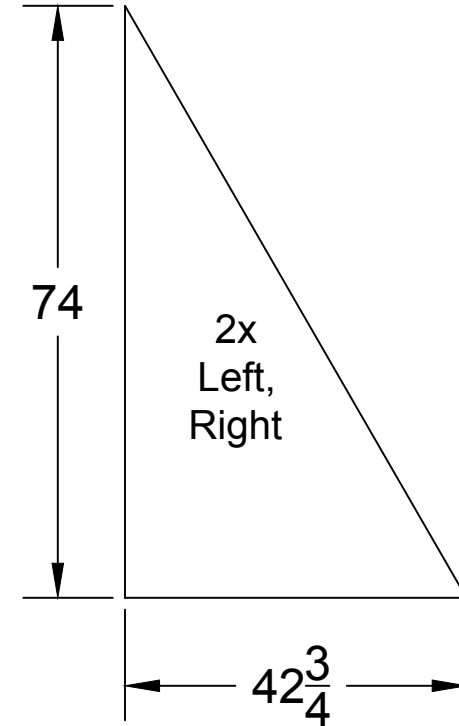
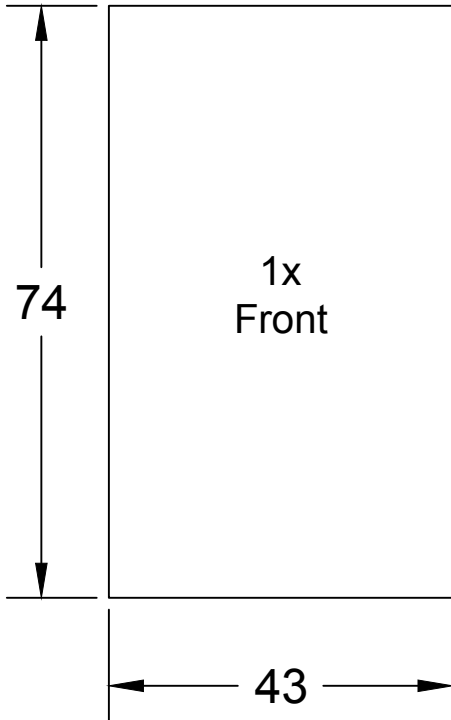
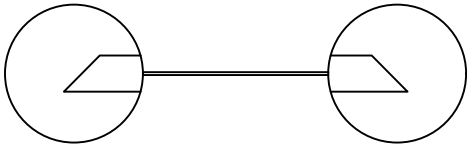
A tower trailer is being hauled to Burning Man for another project. Imbalance will be sized so that there is room for it on the trailer's bed between one folded outrigger and the lowered tower.



<b>Imbalance – Transport</b>			
Event	Burning Man 2022	Project	Imbalance
Designer	Kerry Veenstra	Scale	$\frac{3}{4}'' = 1'$
		Revision	A

45° Bevel

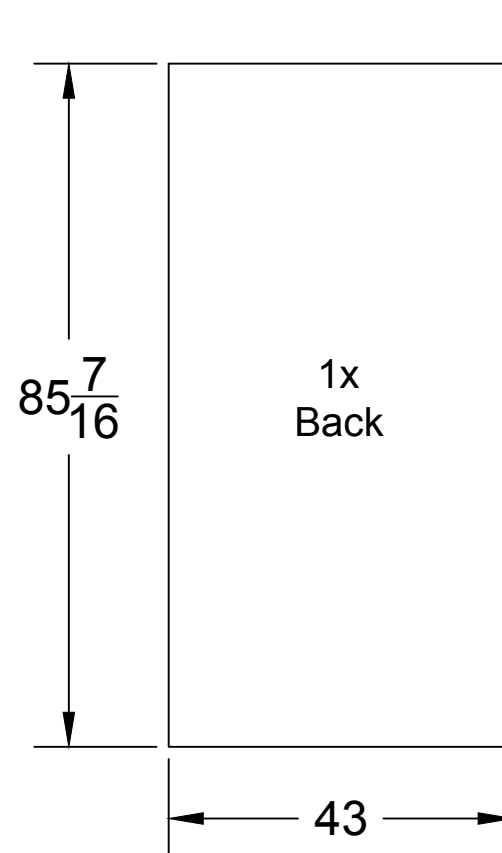
45° Bevel



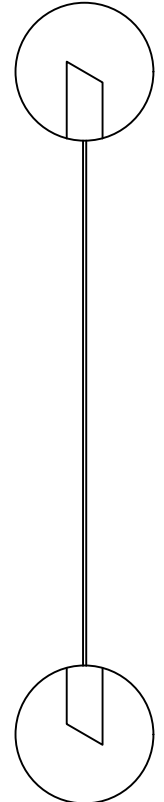
NOTE: DIMENSIONS  
NEED TO BE UPDATED

45° Bevel

45° Bevel



30°  
Bevel

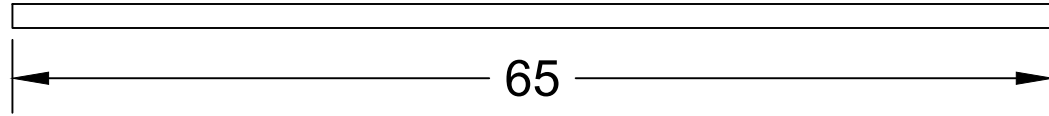


30° Bevel

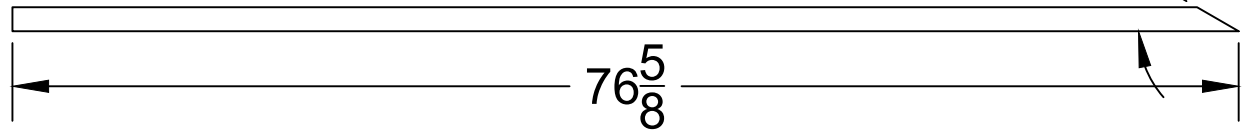
### Imbalance – Plywood Cut List

Event	Burning Man 2022	Project	Imbalance
Designer	Kerry Veenstra	Scale	1/2" = 1'
		Revision	A

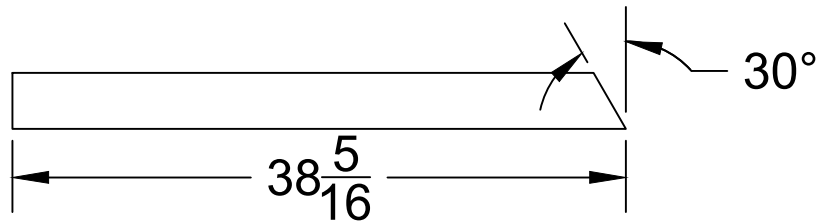
2x



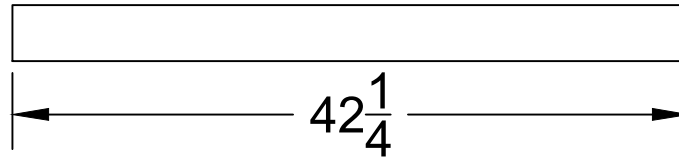
2x



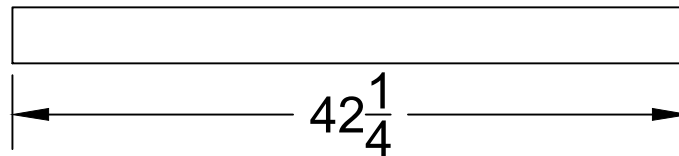
2x



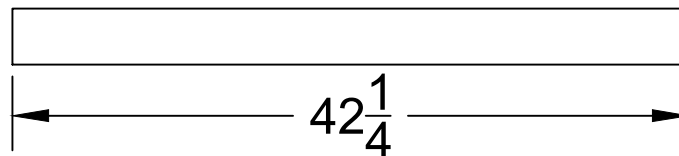
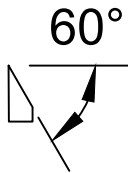
1x



1x

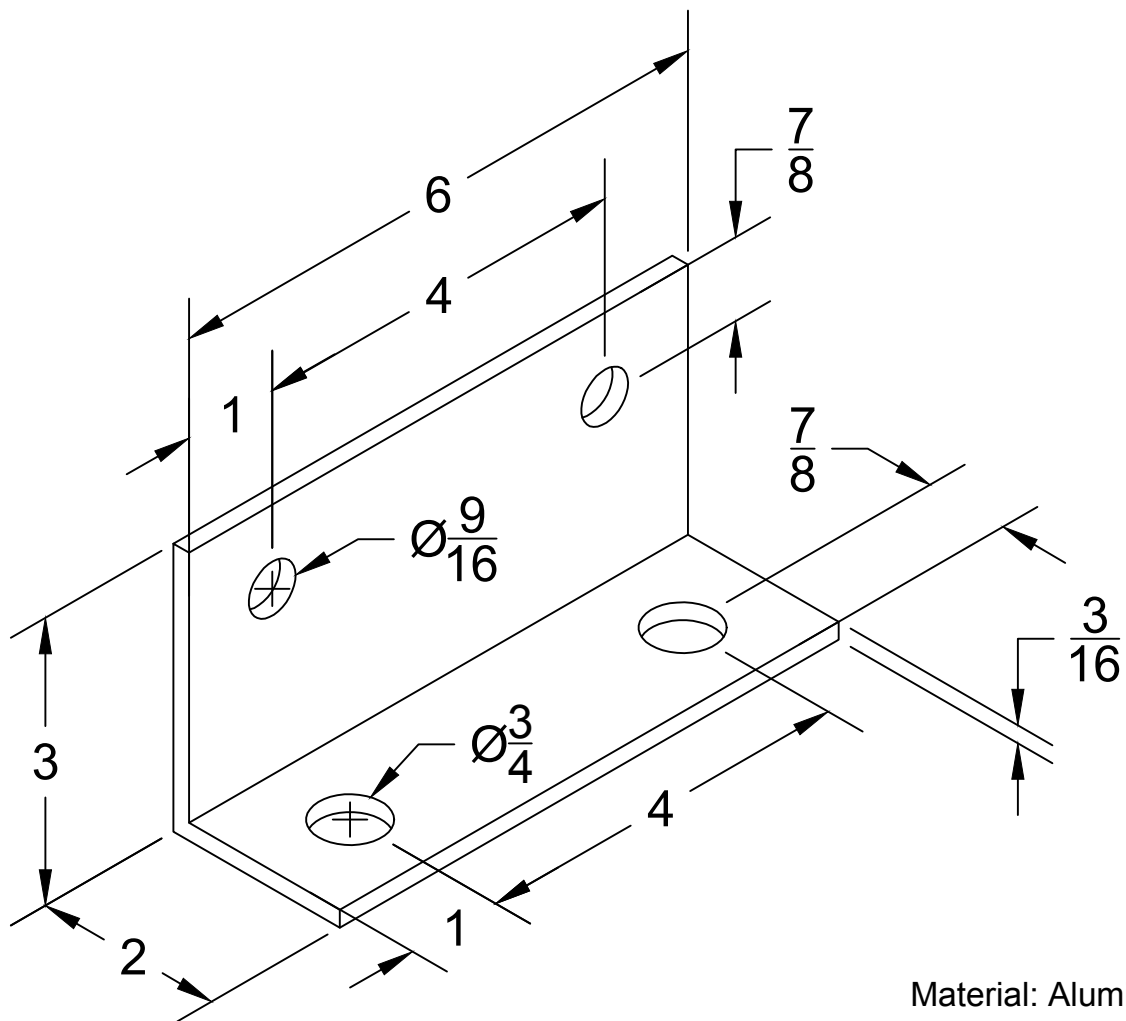


1x



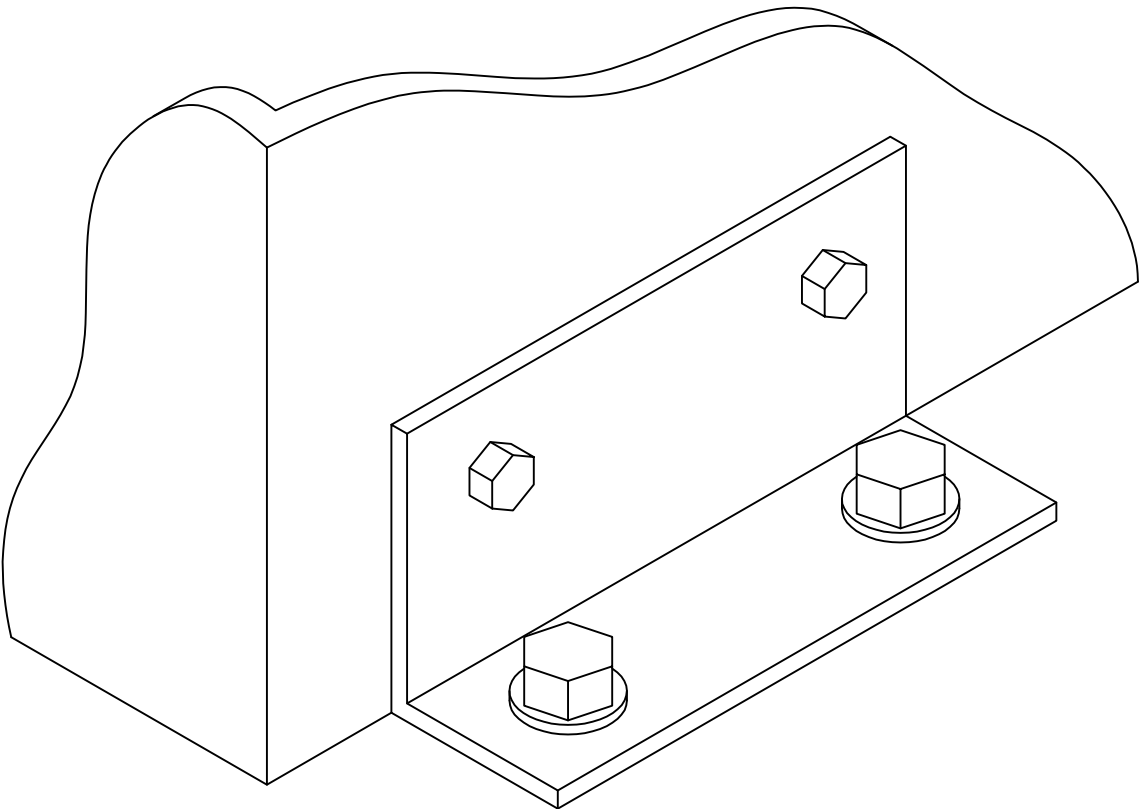
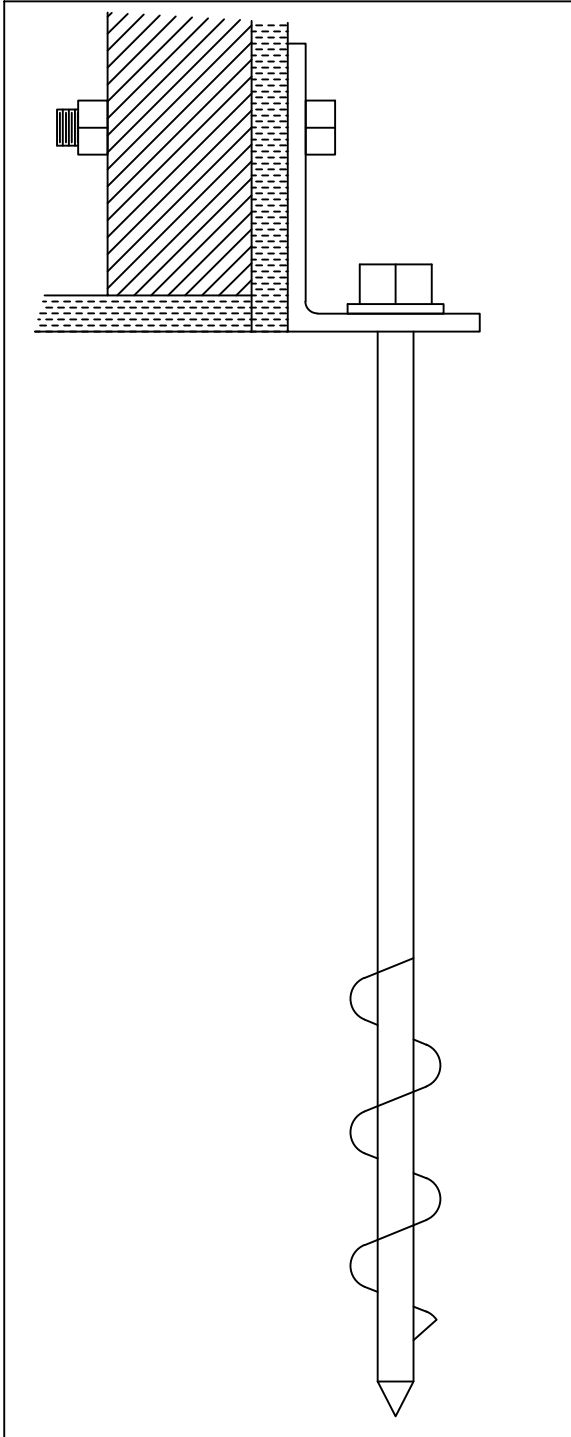
NOTE: DIMENSIONS  
NEED TO BE UPDATED

Imbalance – 2x4, 2x2 Cut List			
Event	Burning Man 2022	Project	Imbalance
Designer	Kerry Veenstra	Scale	1" = 1' Revision A



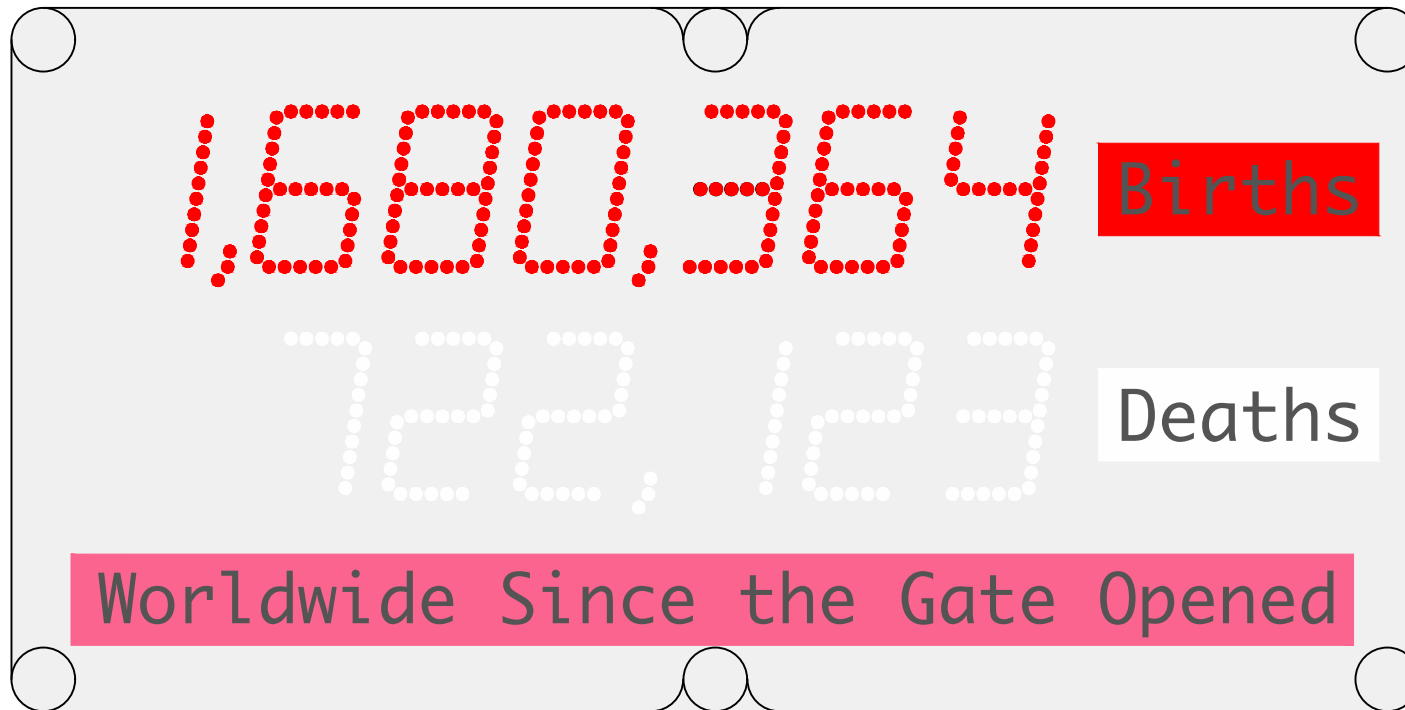
Material: Aluminum 3" x 2" 90°  
 angle  $\frac{3}{16}$ " thickness. Two  $\frac{9}{16}$ " holes  
 on the 3" side and two  $\frac{3}{4}$ " holes on  
 the 2" side.

Anchor Bracket Detail			
Event	Burning Man 2022	Project	Imbalance
Designer	Kerry Veenstra	Scale	$\frac{1}{2}$ " = 1"
		Revision	A



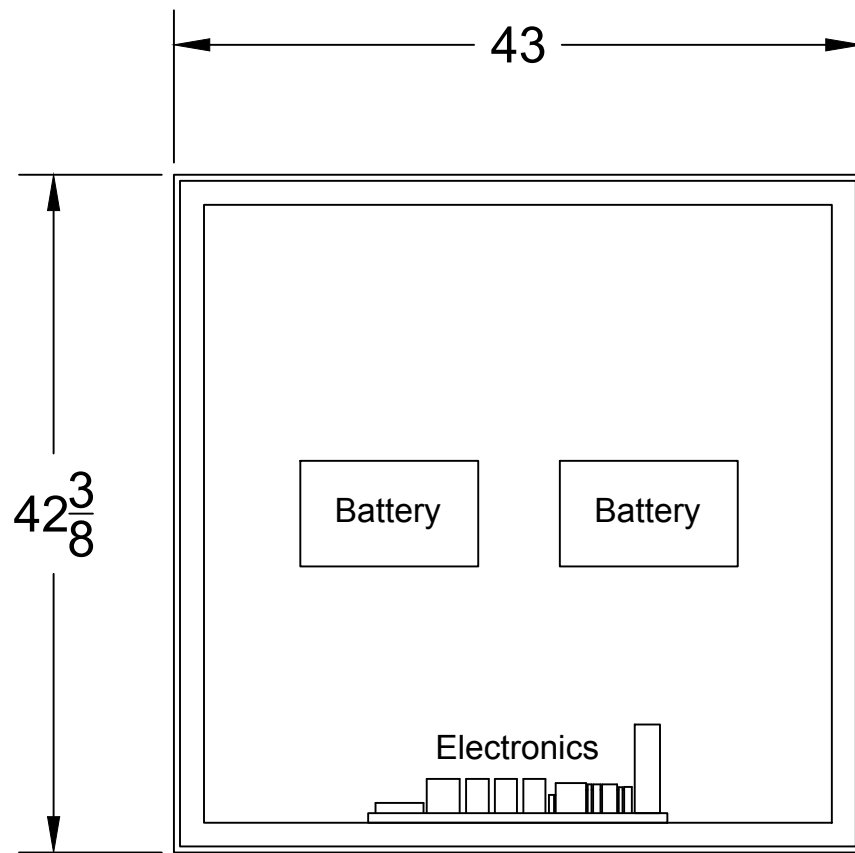
<b>Anchor Bracket Installation</b>			
Event	Burning Man 2022	Project	Imbalance
Designer	Kerry Veenstra	Scale	$\frac{1}{2}''=1''$
		Revision	A





A front piece of satin cloth is printed with the words "Births", "Deaths", and "Worldwide Since the Gate Opened". A back piece of satin cloth acts as a mask that is mostly black but that has white circles that are aligned with each display LED and white rectangles that are aligned with each set of words. Short pieces of LED strips are positioned for backlighting. These LEDs are programmed to create static red, white, and pink colors.

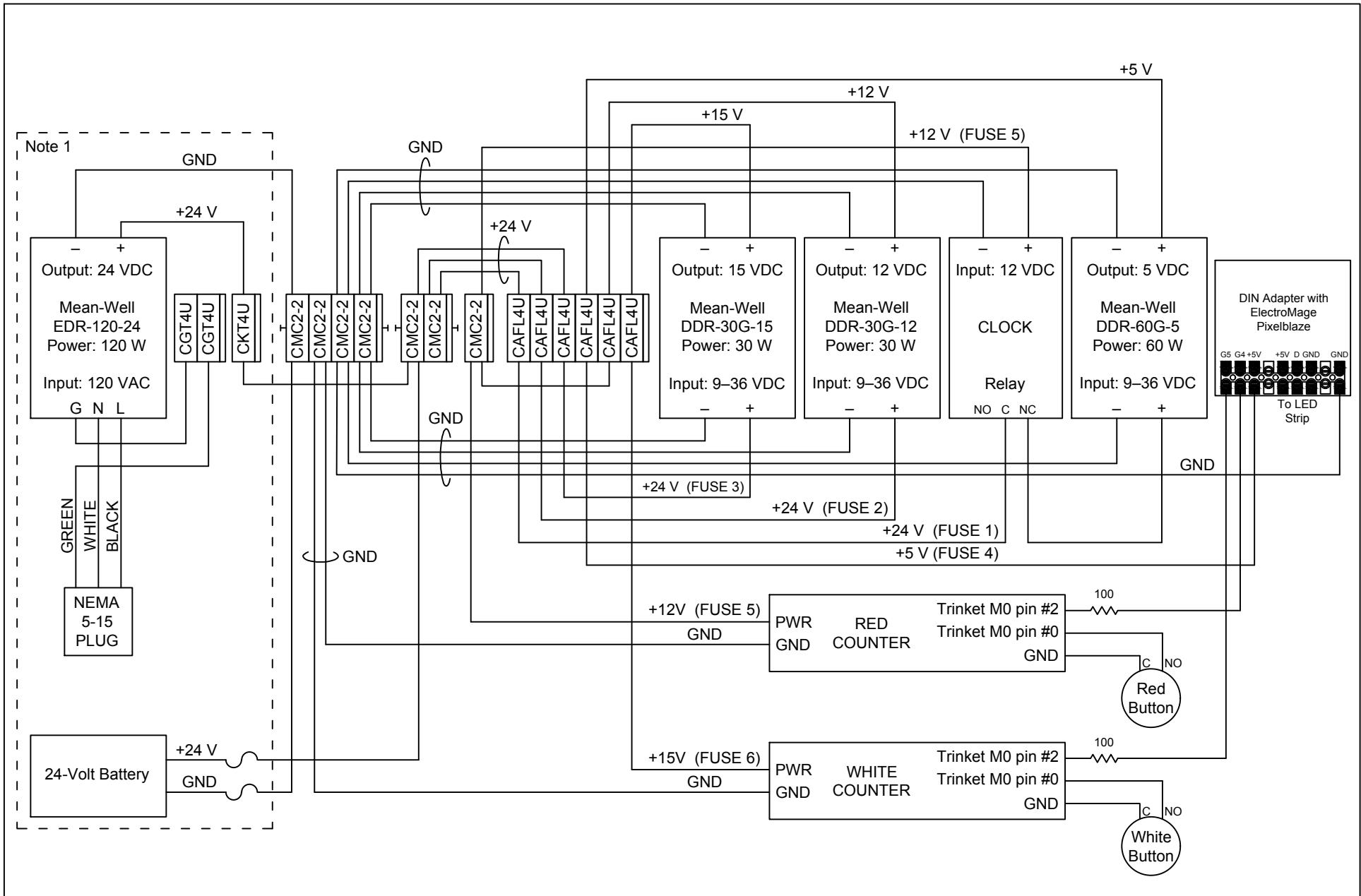
Display Layout			
Event	Burning Man 2022	Project	Imbalance
Designer	Kerry Veenstra	Scale	1:3
		Revision	A



Front

NOTE: DIMENSIONS  
NEED TO BE UPDATED

<b>Interior of Base</b>			
Event	Burning Man 2022	Project	Imbalance
Designer	Kerry Veenstra	Scale	1" = 1' Revision A



**Notes:**

1. During development, disconnect the battery, close the knife switch CKT4U, and plug in the 24-VDC power supply. On the playa, open the knife switch CKT4U, and connect the battery.

Electrical System			
Event	Burning Man 2022	Project	Imbalance
Designer	Kerry Veenstra	Scale	None
		Revision	A

Circuit	Load	Duration	Energy	Description
1.	13.9 W	24 hr	334 Wh	Input of 15-V DC-to-DC Converter
2.	9.3 W	24 hr	223 Wh	Input of 12-V DC-to-DC Converter
3.	2.68W	12 hr	32 Wh	Input of 5-V DC-to-DC Converter. Note: the 5-V power supply will be enabled only at night, and also, less than 10% of the LEDs will be illuminated simultaneously.

589 Wh

### Battery Size

589 Wh with one reserve day is 1178 Wh needed from the battery system each day.  
 $1178 \div 24 = 49$  Ah from each 12-V battery of a 24-V battery system.

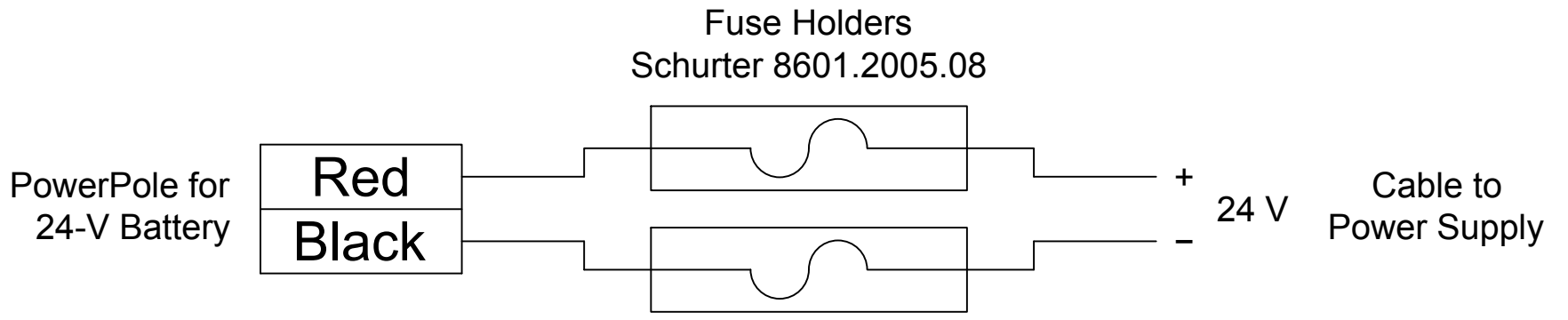
A 100 Ah deep cycle AGM 12-V battery drawn to 50% DOD can provide 50 Ah.

### Solar Power

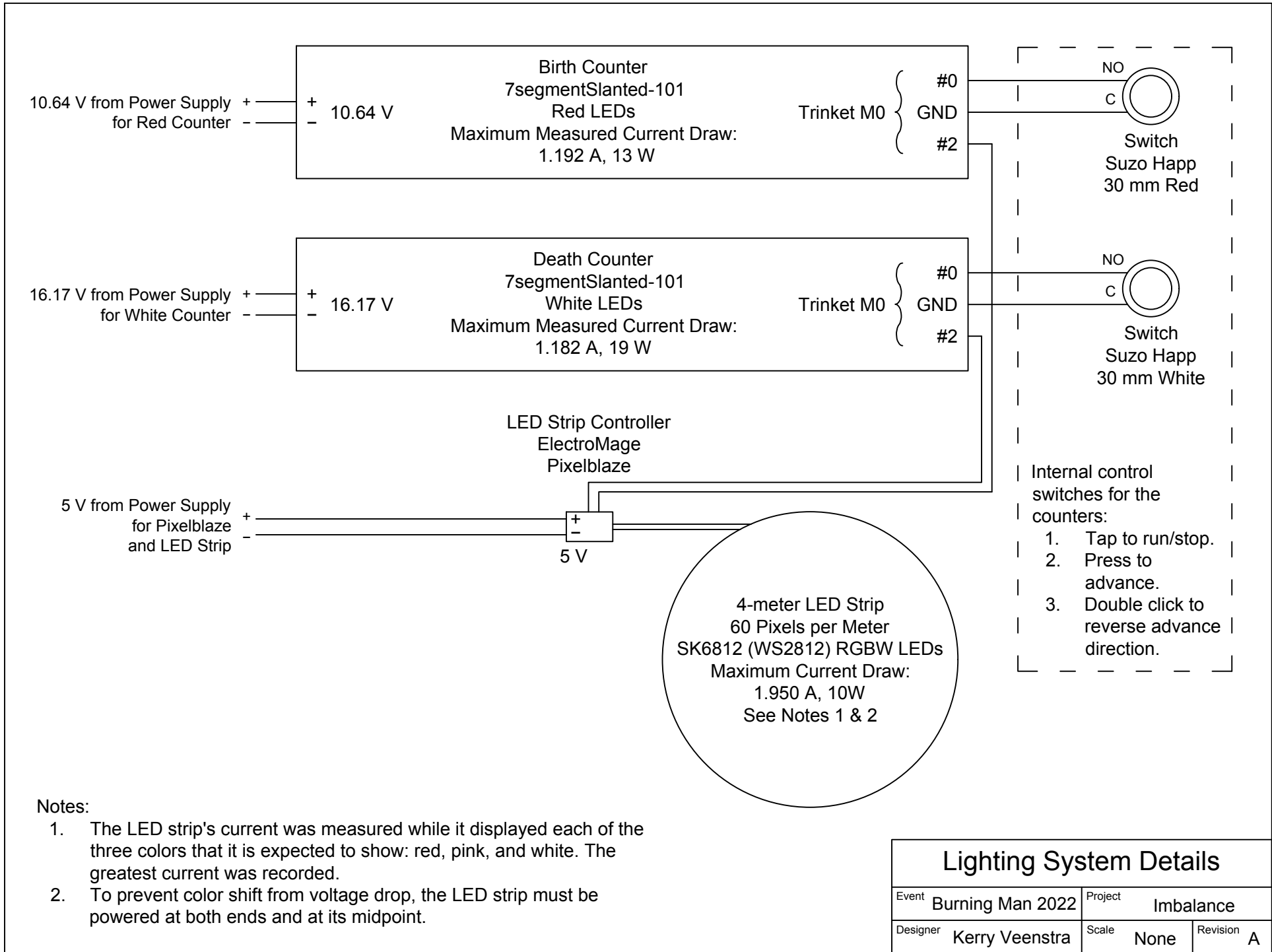
The insolation at Burning Man is more than 5 hours. To charge 1178 Wh over 5 hours with a 90% efficiency solar panel and a 90% efficiency MPPT charge controller, one needs an average of 291 W of solar power. Having a 300-W PV array will be more than adequate.

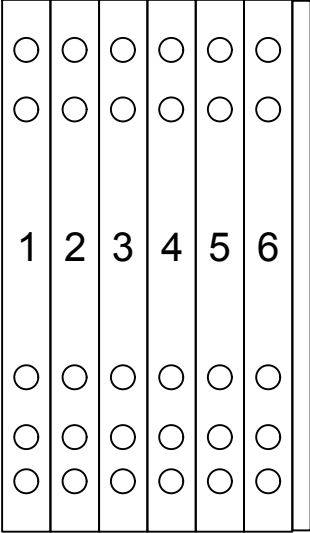
The batteries will need to be charged at an average current of 9.8 A. The Morningstar Prostar PS-MPPT-25M, which is rated for 25 A, is more than adequate for charging the batteries.

Power Budget			
Event	Burning Man 2022	Project	Imbalance
Designer	Kerry Veenstra	Scale	None
		Revision	A



<b>Battery Cable Assembly</b>			
Event	Burning Man 2022	Project	Imbalance
Designer	Kerry Veenstra	Scale	None
		Revision	A

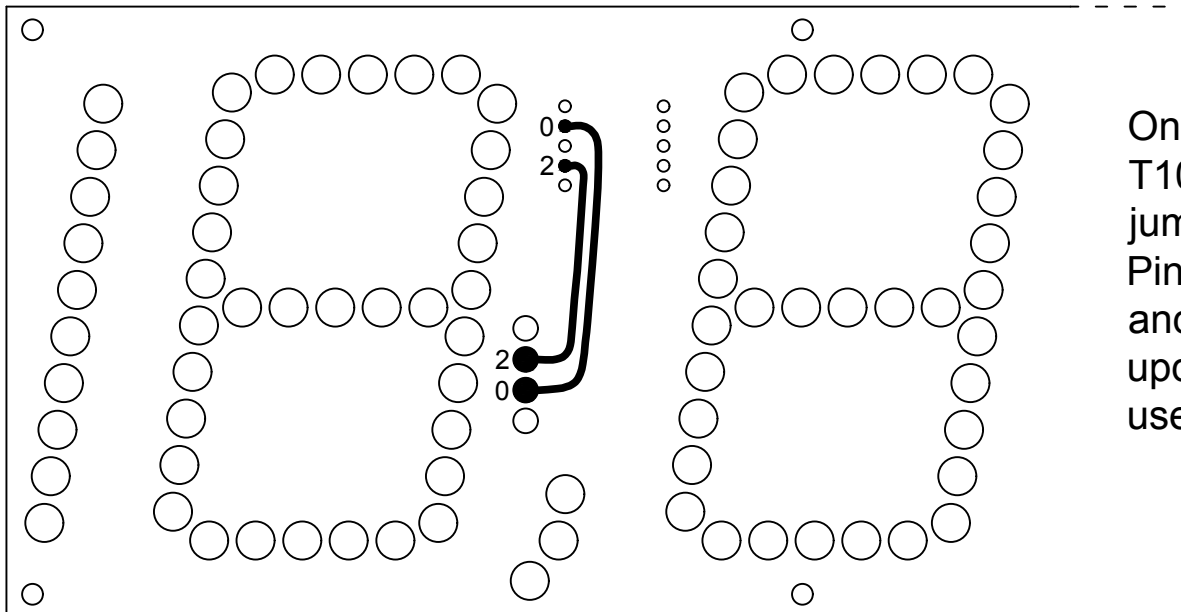
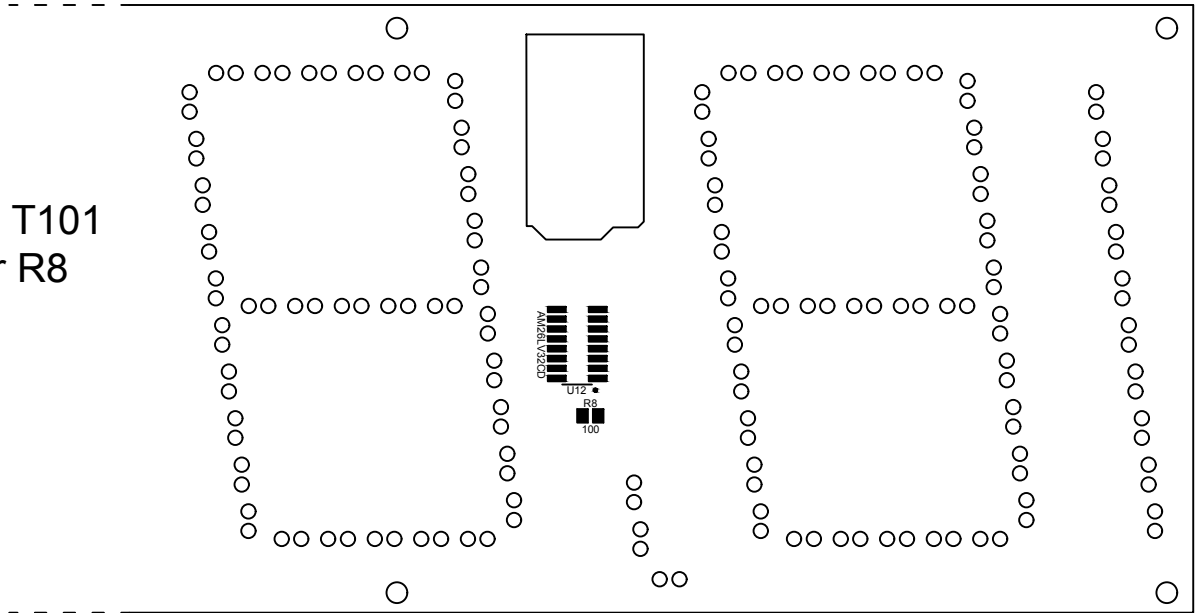


Fuse Positions	Fuse	Measured	Rating	Comment
	1.	0.894 A	2A	Input of 15-V DC-to-DC Converter
	2.	0.605 A	2A	Input of 12-V DC-to-DC Converter
	3.	0.491 A	2A	Input of 5-V DC-to-DC Converter
	4.	1.182 A	4A	Output of 15-V DC-to-DC Converter
	5.	1.192 A	4A	Output of 12-V DC-to-DC Converter
	6.	5.085 A	8A	Output of 5-V DC-to-DC Converter

Note: Fuse type 3AG or AGC will be adequate. These are 1 $\frac{1}{4}$ " x  $\frac{1}{4}$ " glass fuses. If time-delay fuses are preferred, then use type MDL.

Fuse Schedule			
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Designer	Kerry Veenstra	Scale	None
		Revision	A

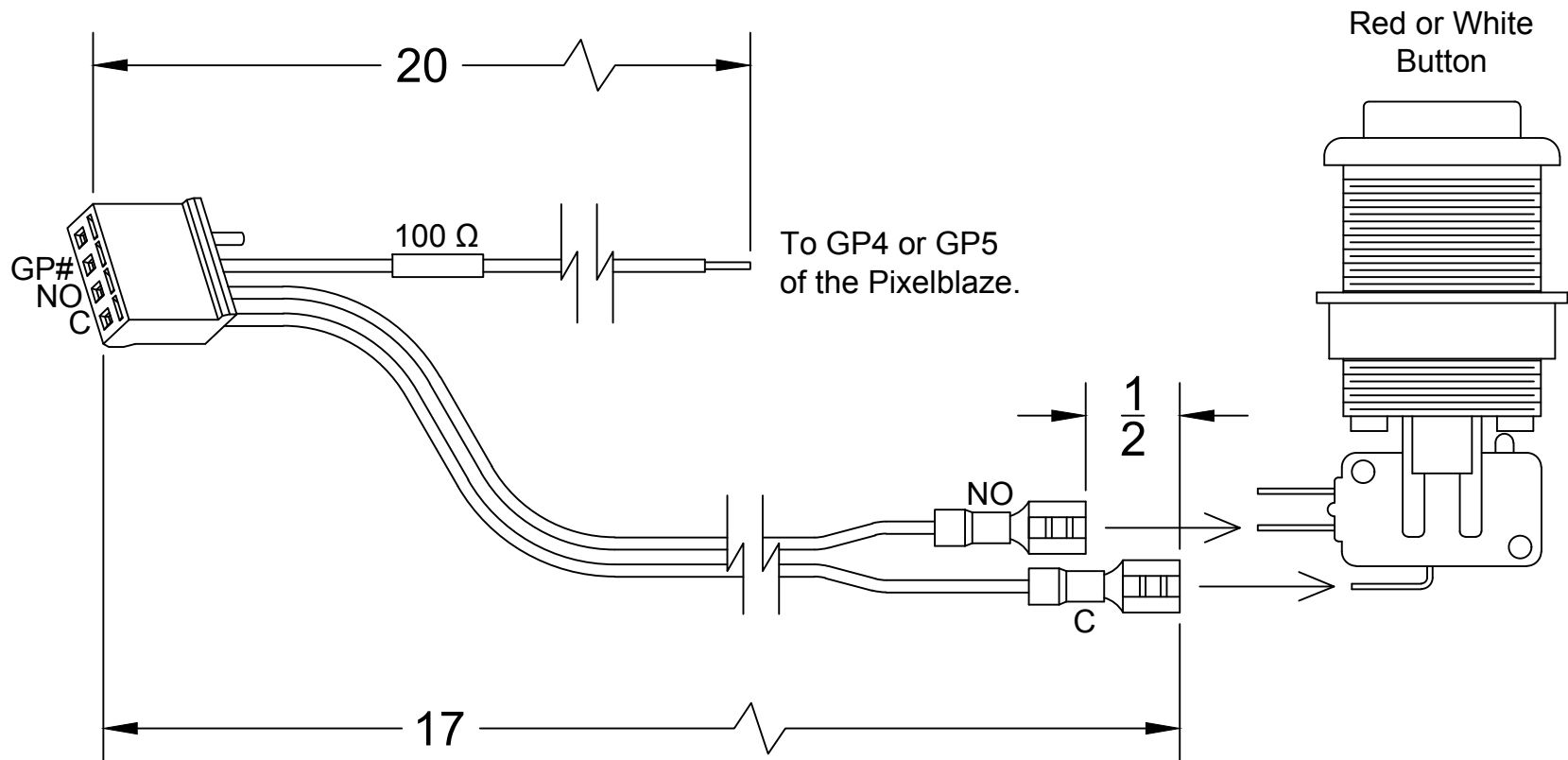
On the SMT side of the T101 PCB, leave the sites for R8 and U12 depopulated.



On the LED side of the T101 PCB, add two jumpers where shown. Pin 2 is the LE signal and is pulsed with each update; pin 0 can be used as an input.

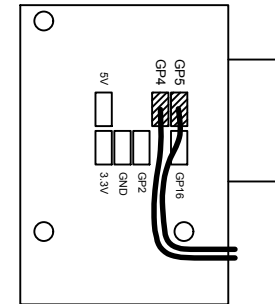
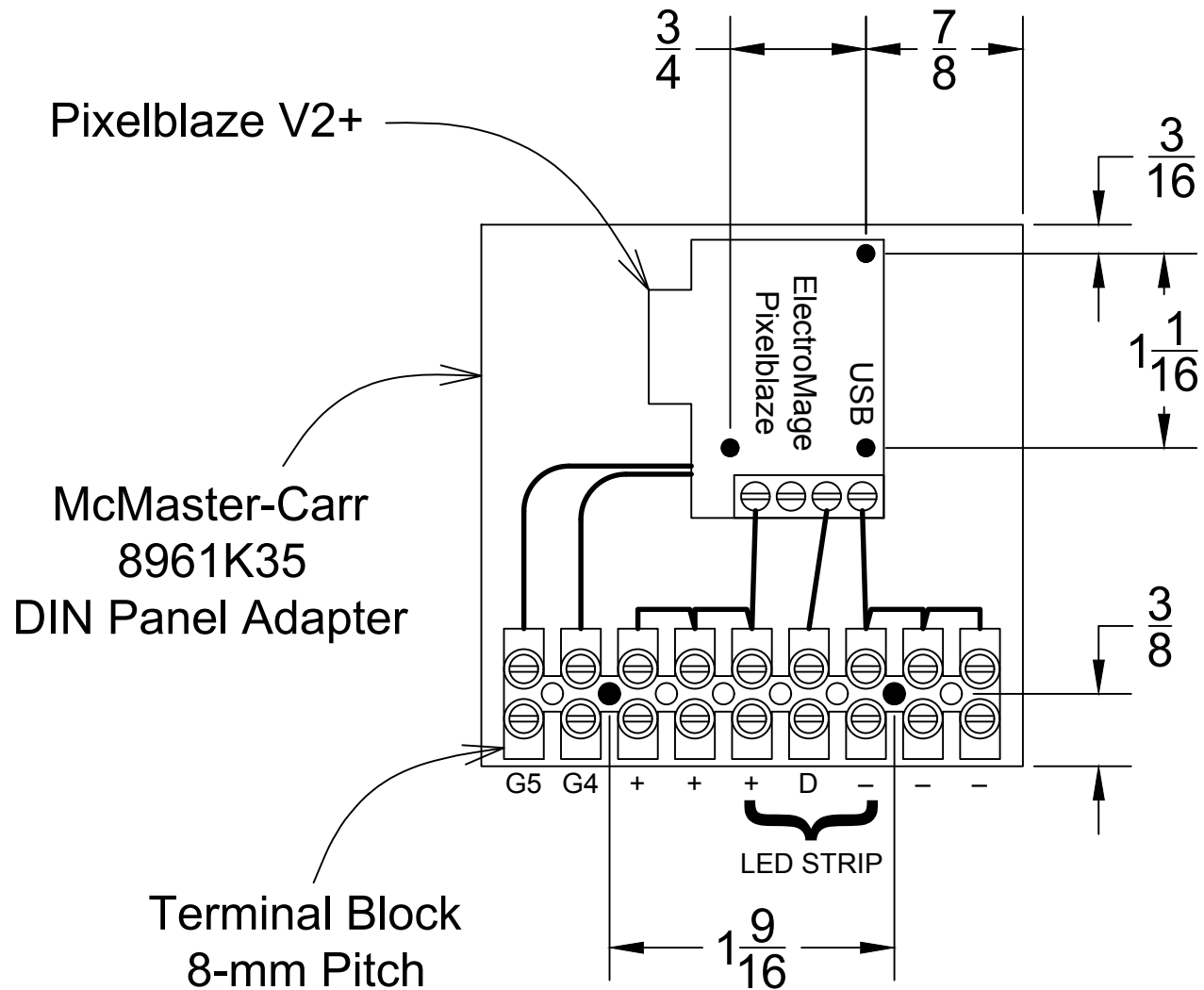
PCB Modifications			
Event	Burning Man 2022	Project	Imbalance
Designer	Kerry Veenstra	Scale	1:1
		Revision	A





Button Color	Pixelblaze GPIO
Red	GP4
White	GP5

Button Cable			
Event	Burning Man 2022	Project	Imbalance
Designer	Kerry Veenstra	Scale	1:1
		Revision	A



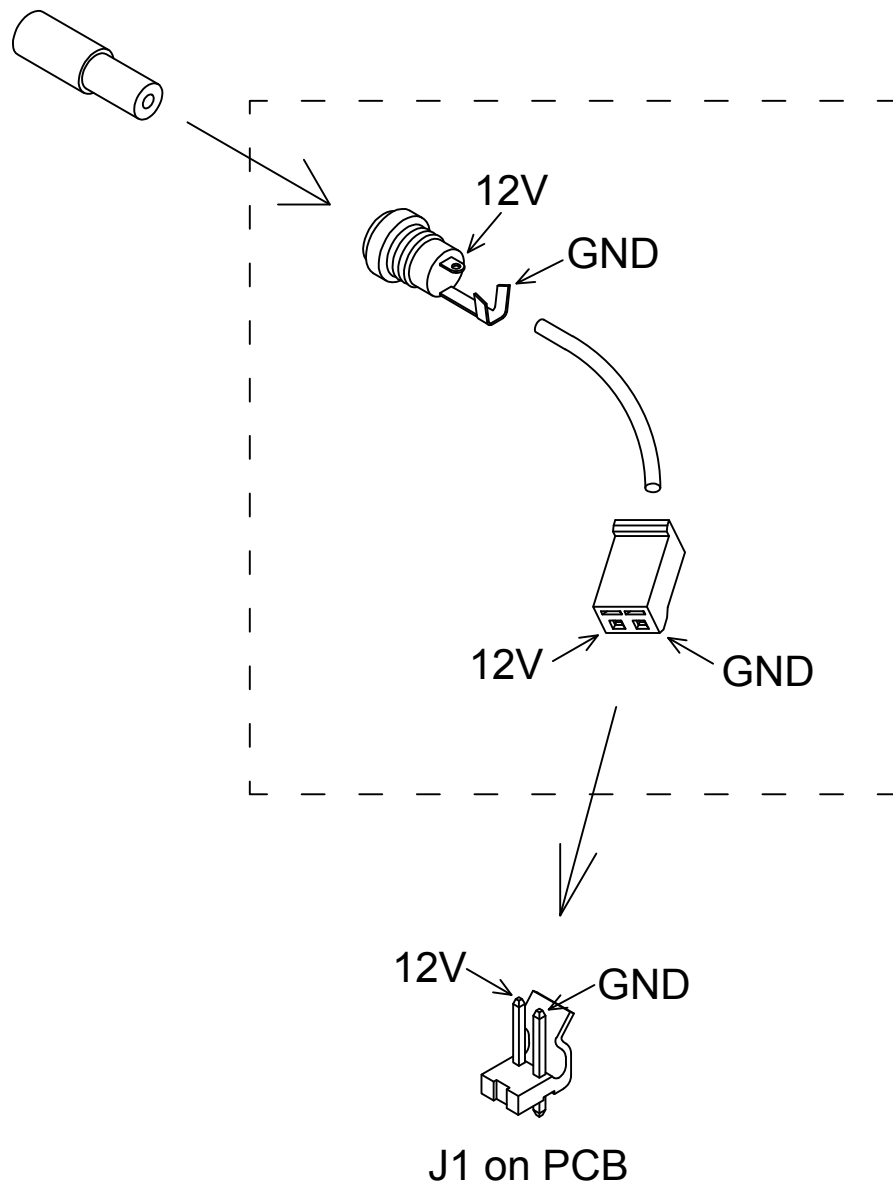
Underside View:  
Locations of pads  
GP4 and GP5

Attach the Pixelblaze using 2.5-mm nylon hardware, including  $\frac{1}{4}$ " standoffs.  
Attach the Terminal Block using 3-48 stainless hardware.

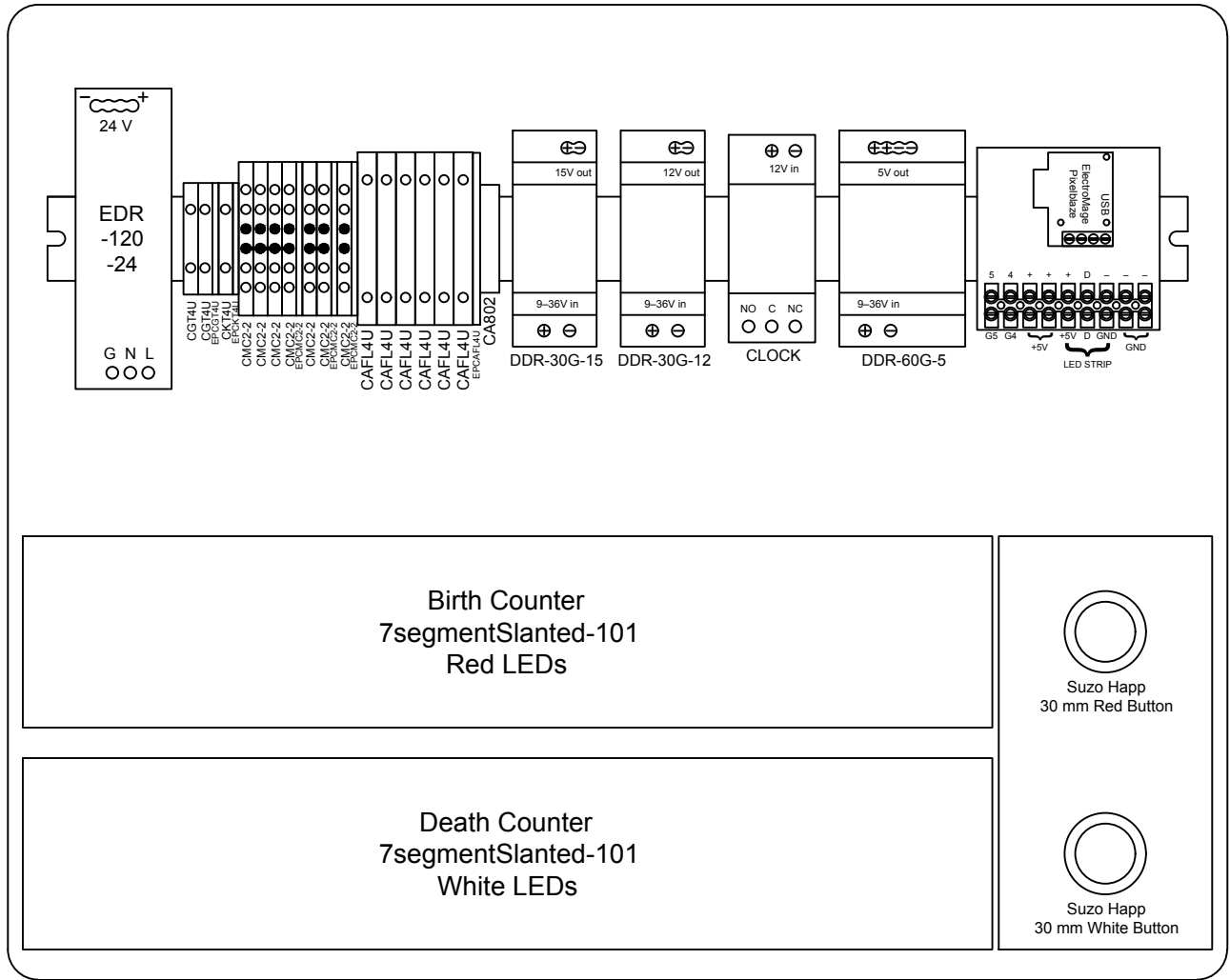
### Pixelblaze DIN Adapter

Event	Burning Man 2022	Project	Imbalance	
Designer	Kerry Veenstra	Scale	1:1	Revision A

# 12V Center From Power Adapter



<b>Counter Temporary Power Cable</b>			
Event	Burning Man 2022	Project	Imbalance
Designer	Kerry Veenstra	Scale	None
		Revision	A



Breadboard Layout			
Event	Burning Man 2022	Project	Imbalance
Designer	Kerry Veenstra	Scale	None
		Revision	A