

Second Generation Bicycle Charging Station

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Team 22

Operations Manual

Document

*Submitted towards partial fulfillment of the requirements for
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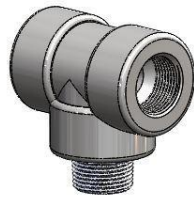
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Stand Assembly

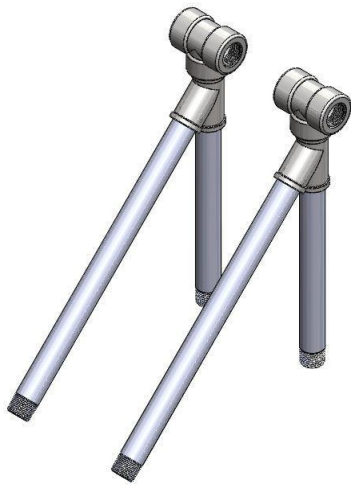
Below are the instructions for assembling the current stand for the bicycle charging station. It should be kept in mind that there are many possible stand designs achievable with standard pipe fittings. The current stand utilizes 1/2" galvanized steel pipe fittings that are threaded on both ends. While the basic shape of the stand remains constant, the straight lengths of pipe used may vary in future iterations, depending on the specific bike dimensions. Future iterations are encouraged to experiment with sizes and materials appropriate for their specific application.



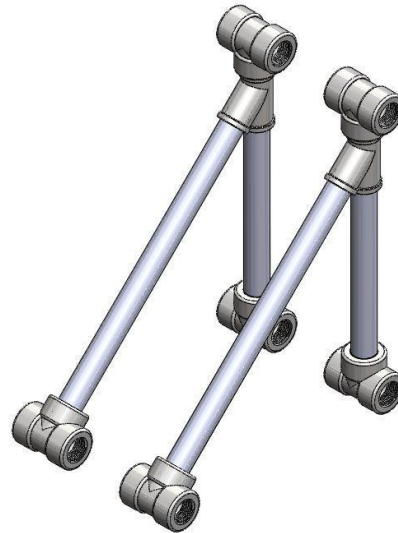
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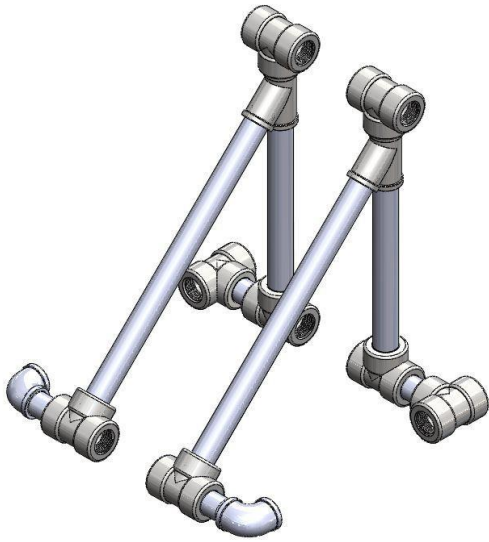
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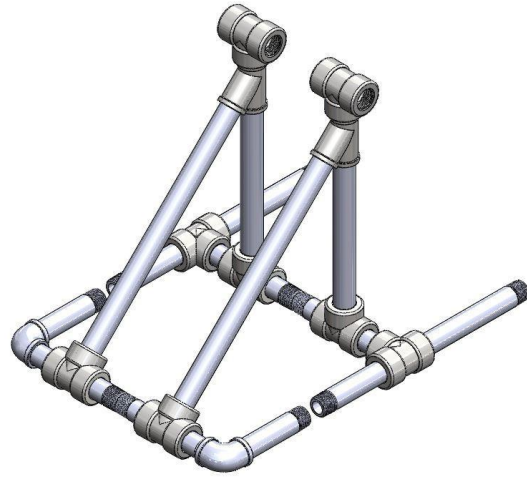
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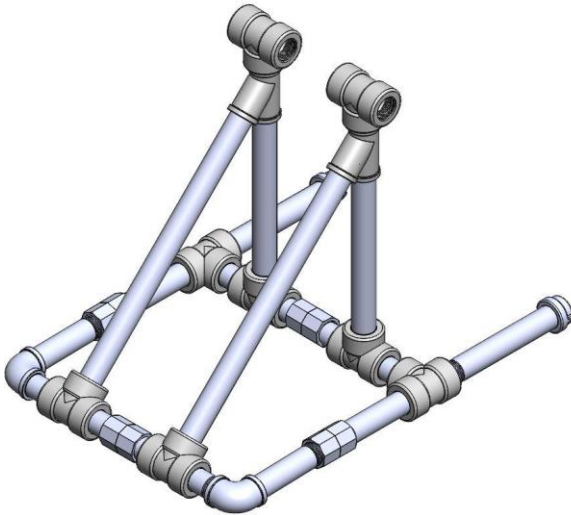
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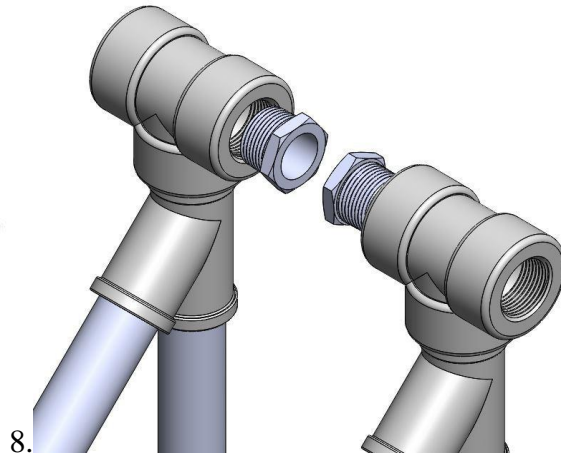
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A list of required fittings are shown below. 1/2" fittings were used, although future iterations may find that a different size suits the needs of the bicycle. The recommended straight lengths of pipe are also shown below.

Required Fittings

Part	Quantity
1/2" Flare Nut	2
1/2" Tee	8
1/2" 90 Deg Elbow	2
1/2" Cap	2
1/2" Swivel	4

Recommended Straight Lengths

Part	Quantity
1/2" Short	2
1/2"x 18"	2
1/2" x 3"	2
1/2" x 12"	2
1/2" x 9"	2
1/2" x 6"	4
1/2" x 2.5"	4

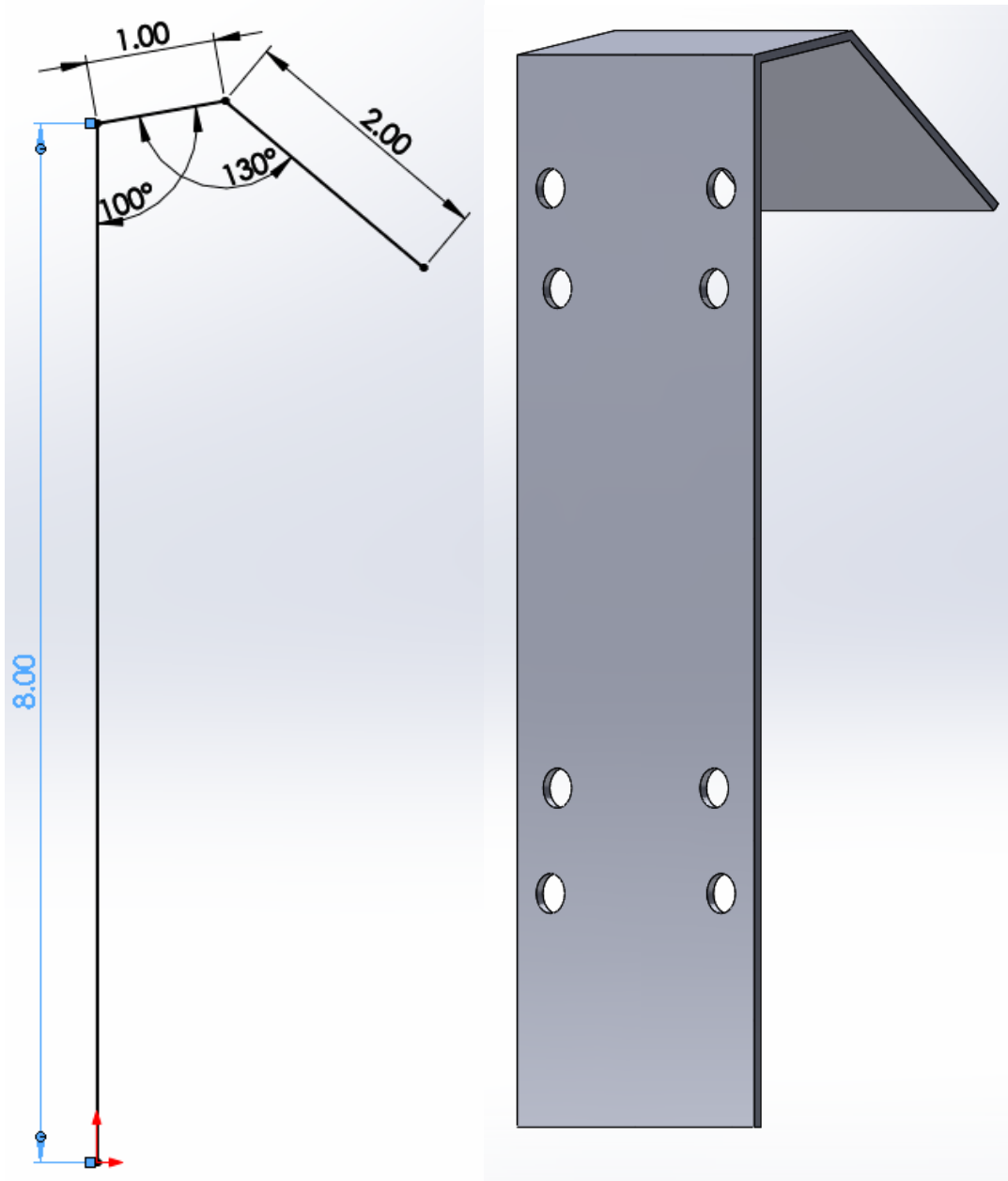
Transporting the Station

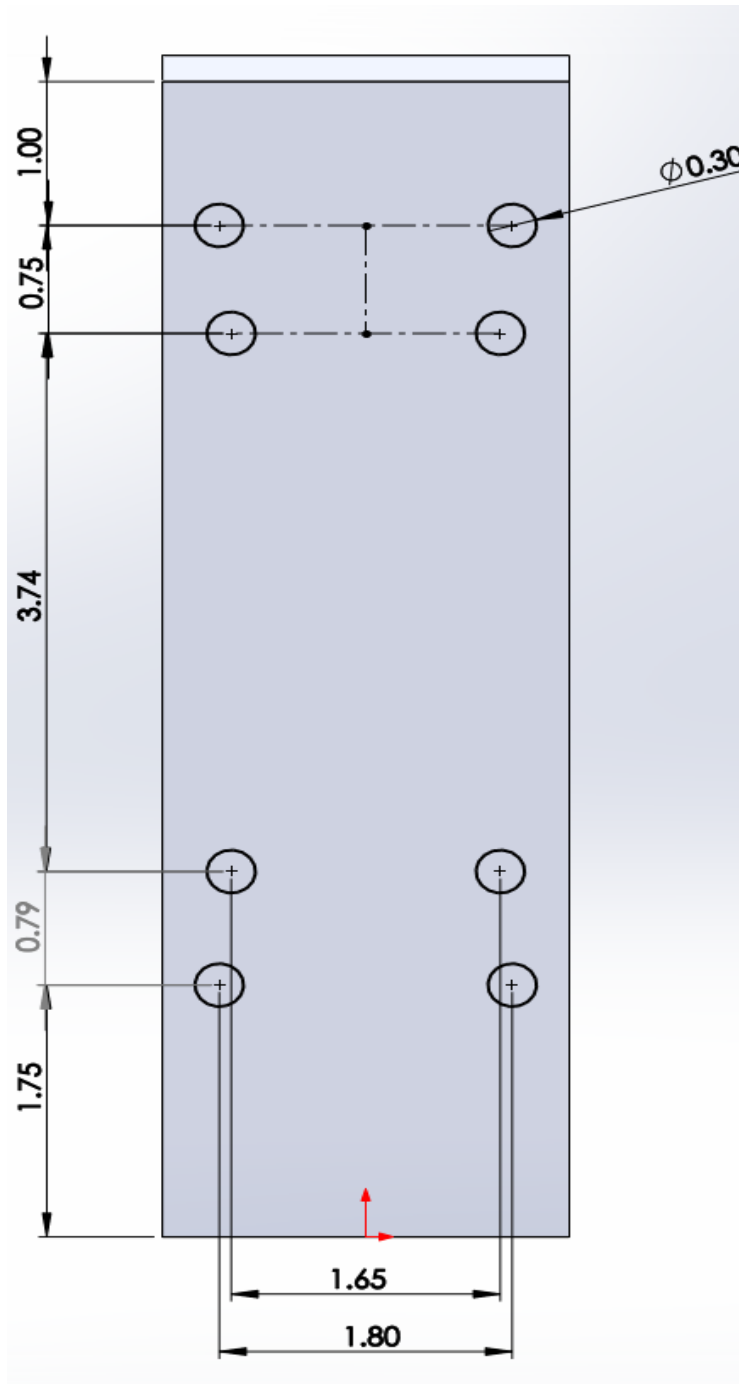
The design of the rear stand allows the station to be easily moved from location to location. The stand rotates about the axle of the rear wheel and locks in an upright position for transport. The stand is fixed with the use of a bolt-clamping hanger assembly, located on the seatpost. The fixed configuration is shown below. Each time the stand has been moved from one configuration to the other, it may be necessary to re-tighten the nuts on each side of the axle using a 17 mm wrench. Prior to the transportation of the bike station it is recommended that one of the generator cords is disconnected to prevent the flow of current through the rest of the electronic components minimizing the risk of overloading the delicate electrical components.



Generator Mounting

The Second Generation Bicycle Charging Station incorporates a 300 W generator mounted directly to the frame. Mounting was accomplished by using a custom 14 Gage steel plate according to the dimensions below. The angles were placed with a sheet metal hand brake and can be modified to the specifications and allowances of the bike. The 8 drilled holes allow for generator placement to allow for a straight chain alignment. The top and bottom two holes are for U-bracket placement to the rear seat stay and can be adjusted for varying frame diameters. All fastenings should be accompanied by appropriate size washers for weight distribution.



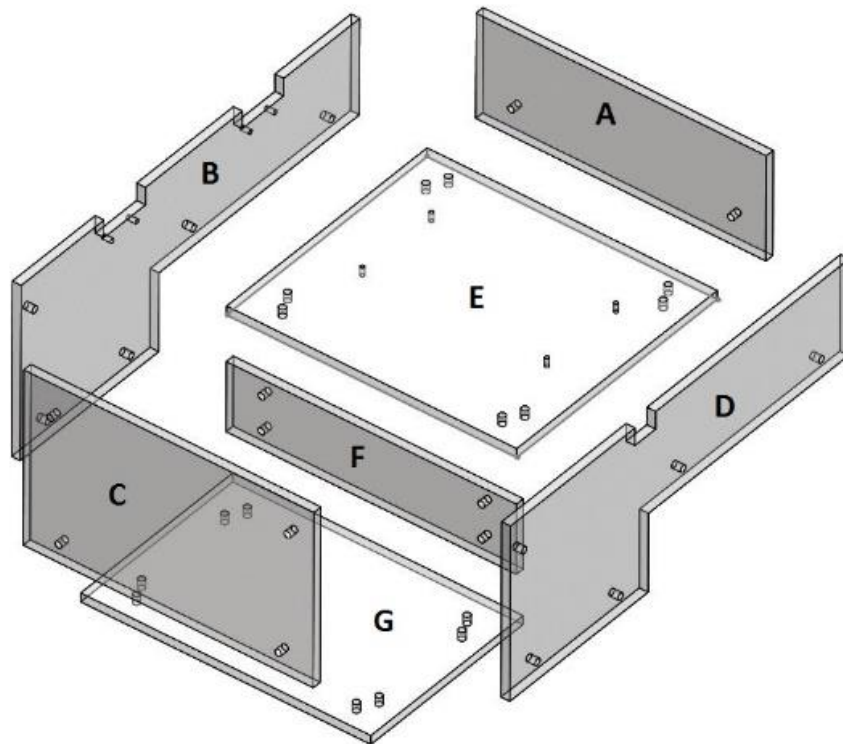


Display Housing

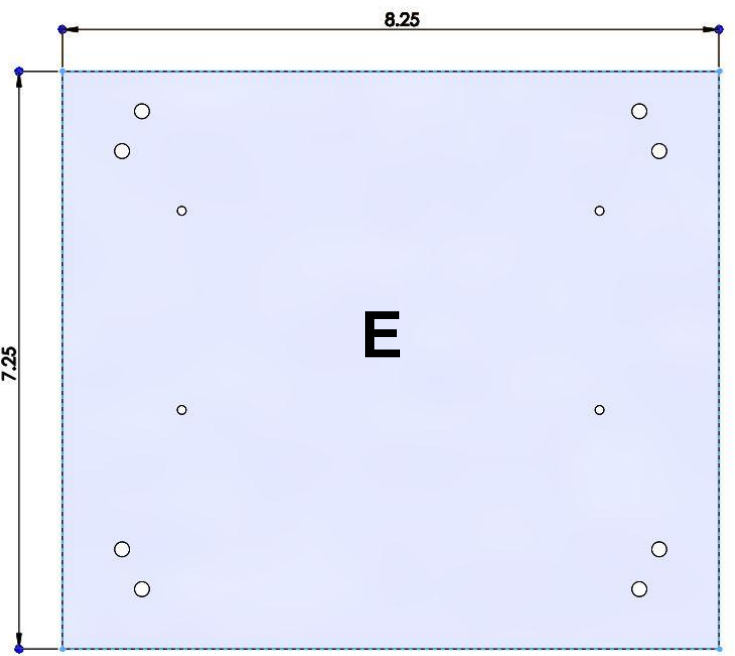
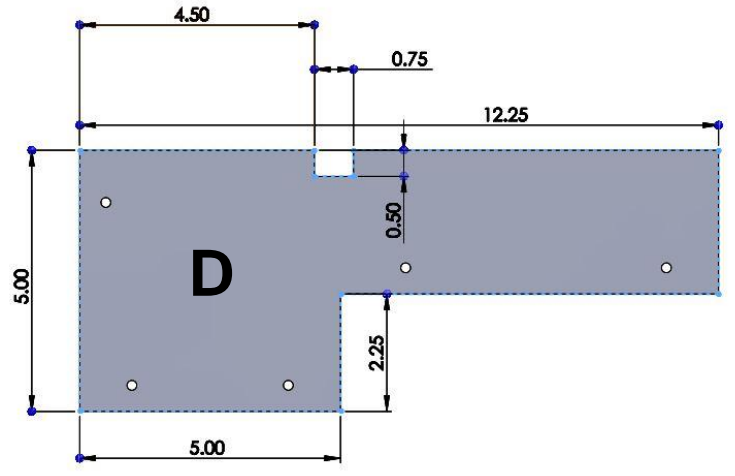
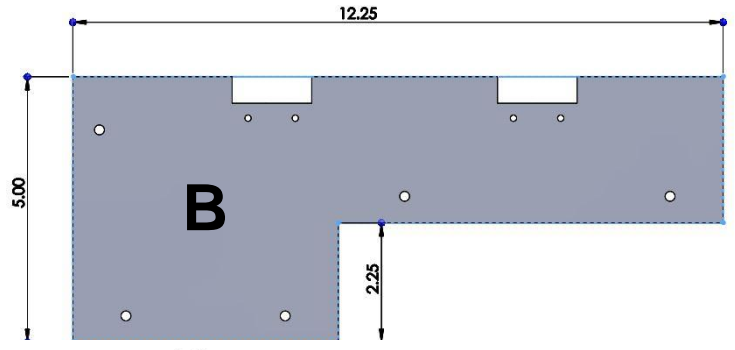
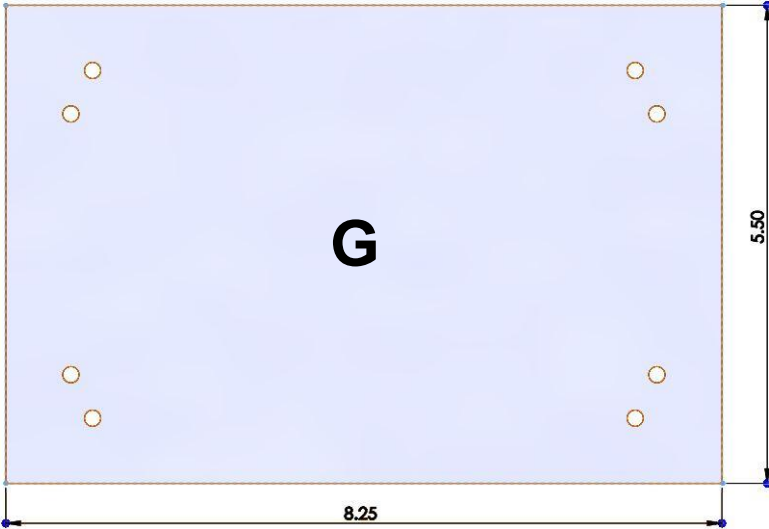
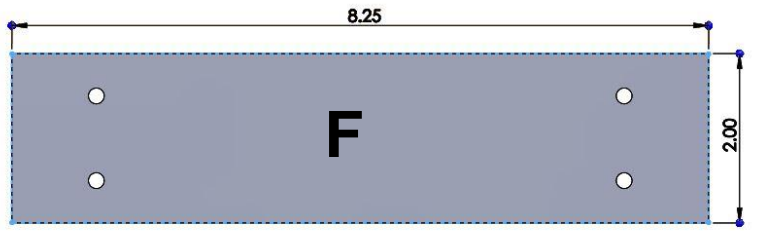
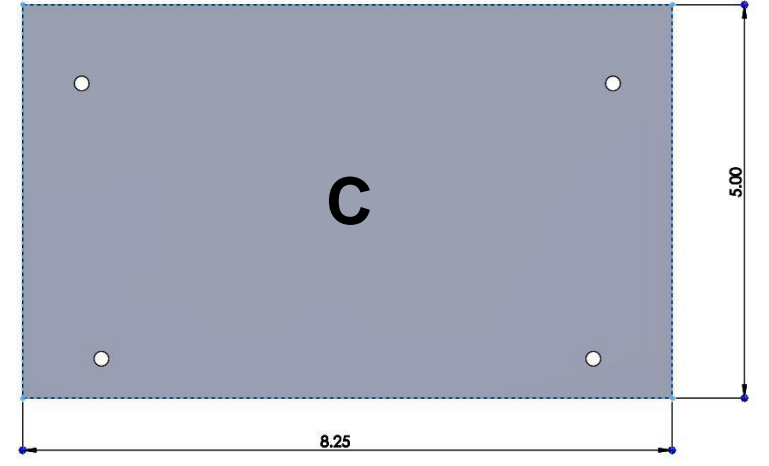
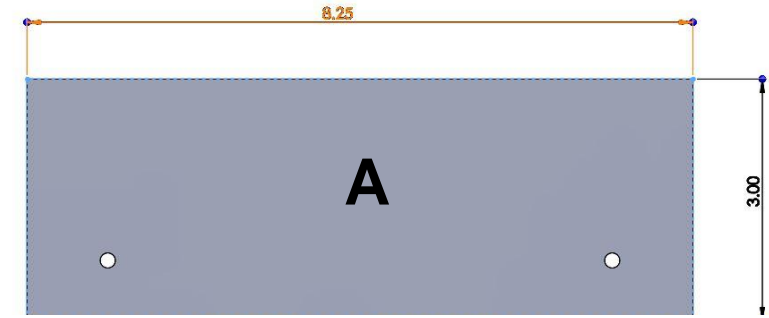
The housing for all of the electrical components provides a safe and secure enclosure designed to protect the delicate electronics associated with the system. This particular design utilizes transparent plexiglass to promote curiosity and showcase the various items contained within the housing. All materials used are found at common hardware stores and all prep-work can be done with common hand tools. Please refer to assembly instructions and the part list for detailed information on materials used.

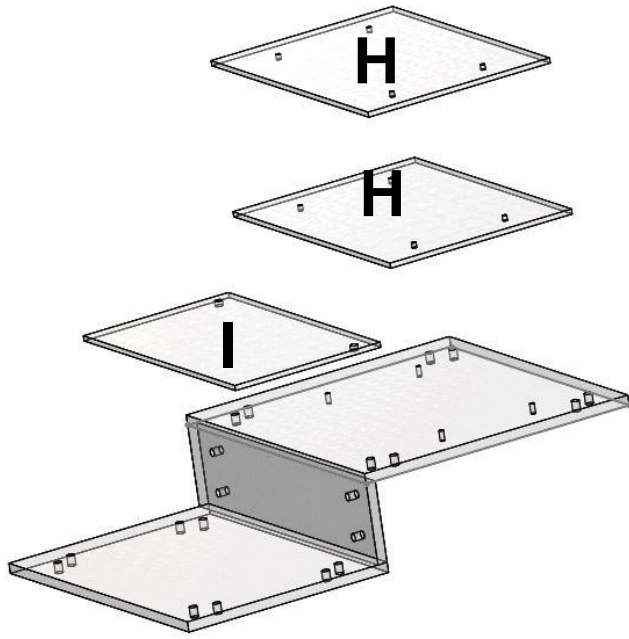
Part Letter	Part Name
A	Display Front
B	Hinge Side
C	Inverter Back
D	Latch Side
E	Display Bottom
F	Inverter Side
G	Inverter Bottom
H	Display Shelves
I	Electronics Housing
J	Lid

Hardware Parts	Quantity
10-32, 5/8 inch Machine Screw	42
10-32 Nut	42
6-24, 2 inch Machine Screw	4
6-24 Nut	4
Hinges	2
Hasp Latch	1

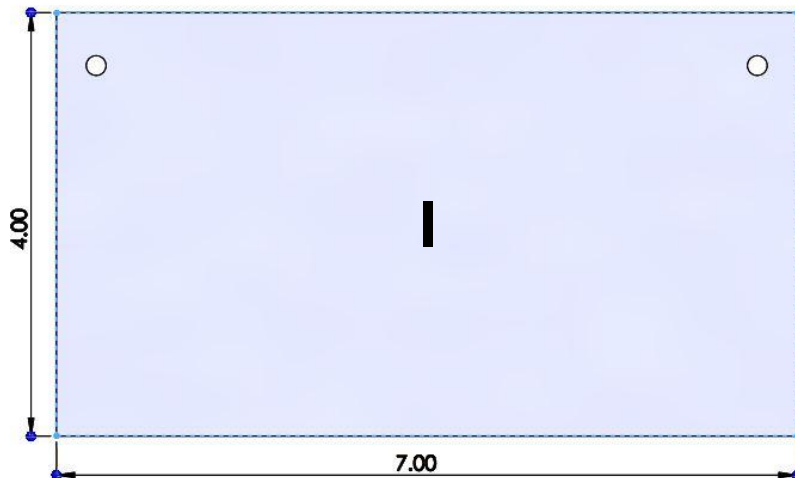
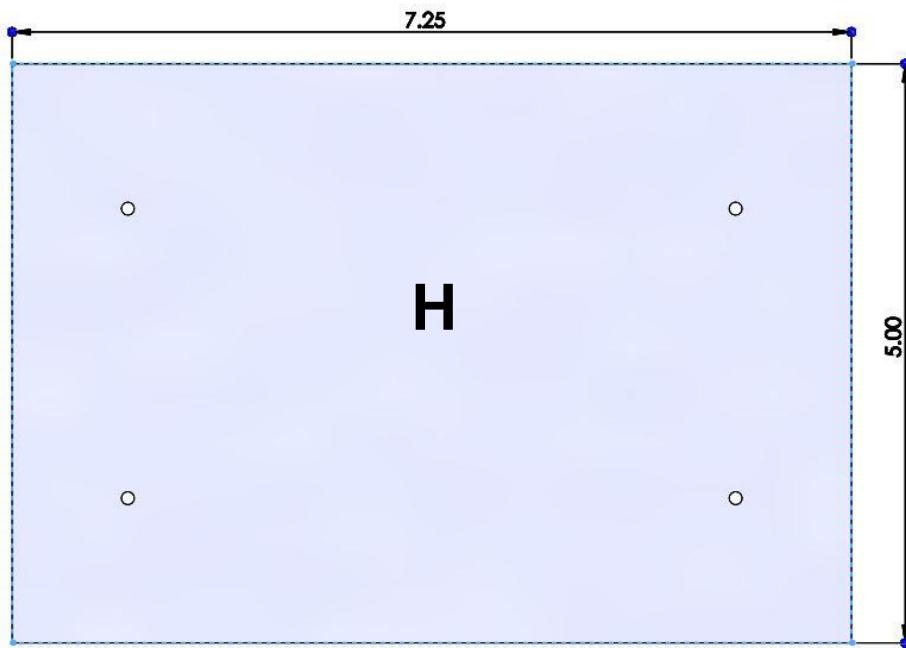


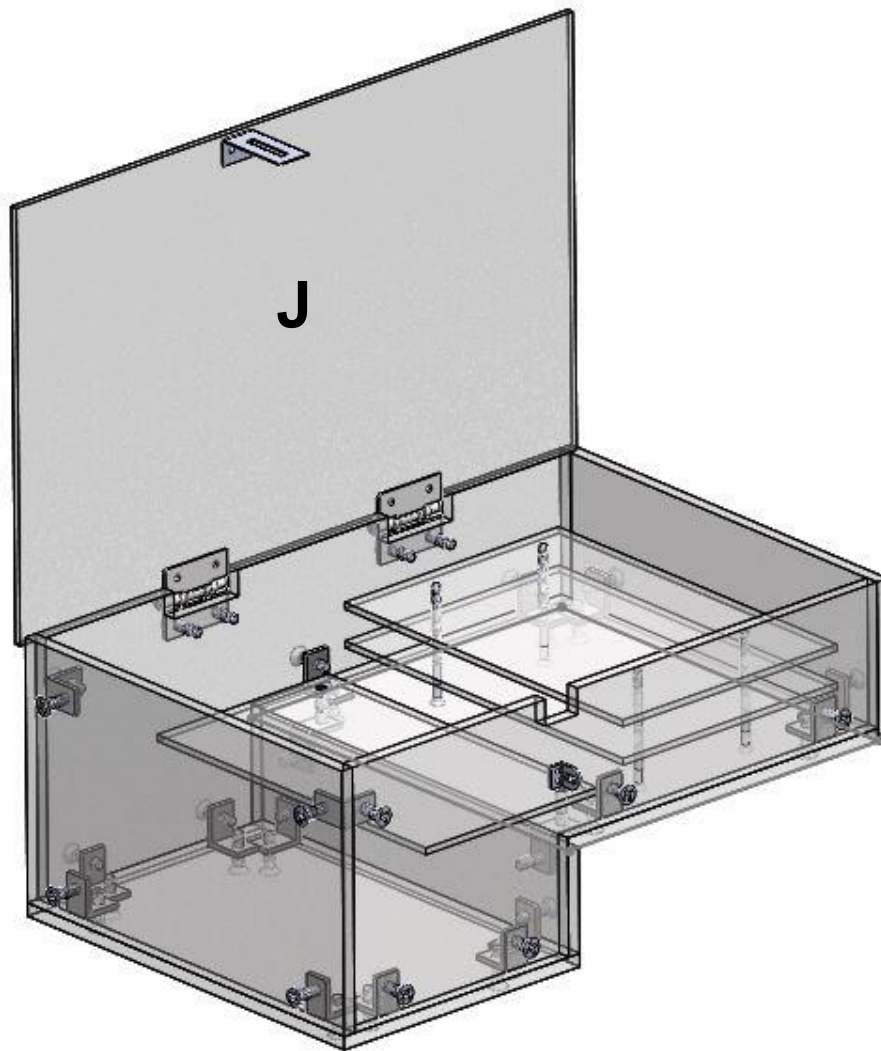
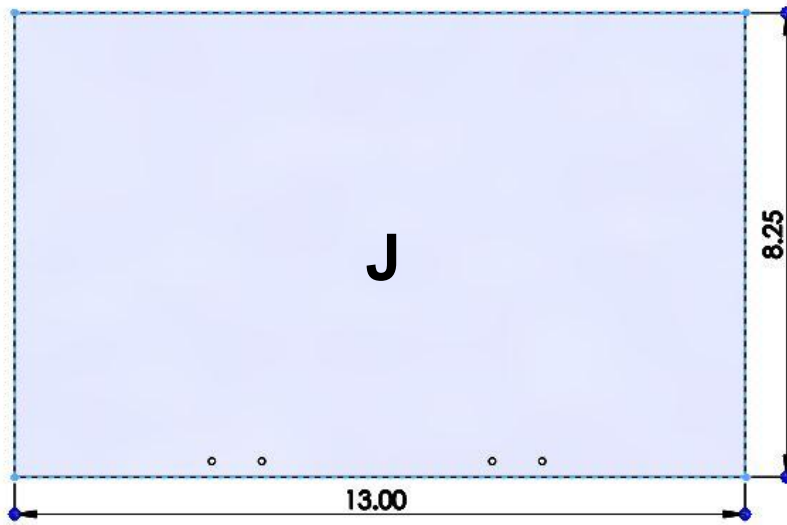
Box Assembly





Shelf Assembly





Full Assembly

Electrical Components:

The raspberry pi is used to power the display and present visual effects as well as feedback to the user using the display. If user does not receive visual feedback: examine the power logger to see if it's working, examine power cable to the raspberry pi, restart raspberry pi, check SD card.

Inverter is used to power all electronic devices. If inverter is not functioning, do the following: Check if the inverter is on, check for smoking, check the connection to the generator, test voltage using digit multimeter. Make sure the user is pedaling a constant rate (no fluctuation).

The display is used for visual effects as well as instant feedback to user. If the display is not functioning, then do the following: Check the wiring connected to the display to ensure that a proper connection is established, check if the display is in HDMI mode using input buttons connected to the display chip, check if ribbon cable is damaged, check HDMI cable from the raspberry pi to the display chip to see if there are no loose connections.

The SD card operates the raspberry pi and is also used for memory storage. If the program on the raspberry pi is displayed incorrectly or seems to have a glitch, then do the following: restart raspberry pi, make sure to bike at a constant rate, make sure the SD card is formatted to FAT32, replace SD card if the above do not work.

The charging cables allow for user to power various electronic devices. If the device is not being charged, then do the following: Check to see if the inverter is on, check the connection to the cables to ensure that there is no disconnected wires, and make sure the device that is being charged is not faulty.

The buttons are integrated into the system to flip between frames of the display. If buttons do not work, do the following: Make sure the buttons are being pushed all the way, make sure buttons are connected to the raspberry pi, unscrew and re-screw buttons to the housing.

The relay and zener diode is to ensure that the inverter works correctly. If the relay is making a noise, then reverse generator leads coming into the inverter.