GroundSat

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What is a GroundSat?

- AMSAT (Amateur Satellite) CubeSat Simulator
- Earth-based, outdoor version
- Interacts through wireless communication
- Powered through batteries charged with solar panels
- Raspberry Pi Zero
Main Components

- Raspberry Pi Zero W
- Solar Panels and Solar Board
- Band Pass Filter
- MO Power Board
## Power

<table>
<thead>
<tr>
<th>Part Name</th>
<th>Operating Mode</th>
<th>Number of Parts</th>
<th>Current (mA)</th>
<th>Voltage (V)</th>
<th>Duty Cycle (%)</th>
<th>Power (A)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pi Zero W</td>
<td>Standby</td>
<td>1</td>
<td>100</td>
<td>5</td>
<td>80%</td>
<td>0.4</td>
</tr>
<tr>
<td></td>
<td>Transmit</td>
<td>1</td>
<td>140</td>
<td>5</td>
<td>20%</td>
<td>0.14</td>
</tr>
<tr>
<td>MoPower Board</td>
<td>Normal (90% efficiency)</td>
<td>1</td>
<td>100</td>
<td>9</td>
<td>100%</td>
<td>0.9</td>
</tr>
<tr>
<td>DC-DC Boost Converter</td>
<td>Normal</td>
<td>1</td>
<td>100</td>
<td>3.5</td>
<td>100%</td>
<td>0.35</td>
</tr>
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</tr>
<tr>
<td></td>
<td><strong>Total Power</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>1.79</strong></td>
</tr>
</tbody>
</table>
Transmitting and Receiving Data

- 433 MHz, 2 MHz Bandwidth Band Pass Filter
- Radio Frequency Transmission
- Receive through antenna and SDR Sharp
- Telemetry: AFSK Decoder
- Example: ‘Hello, Source 2020!’
Message being Transmitted
Message transmitted being read

Data being received

AFSK Decoder Output
Purpose and Future Plans

- Have something for kids to start getting involved with amateur radio and STEM
- Due to COVID-19, we were unable to put this in a weatherproof box and out on a pole in front of Gellersen to test
- Kits for kids
  - Take selfies from space
  - Scratch Programming
  - Play the radio