**Power Supply Test Plan for: Team Panama City Beach**

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**Introduction:**

**Diagram, schematic

Description automatically generated**  
**Figure 1. Schematic for Power Supply**

**Graphical user interface, diagram

Description automatically generated with medium confidence**

**Figure 2. PCB Layout with Probe Points for Capacitor Supply**

|  |  |  |  |
| --- | --- | --- | --- |
| ID | Definition | Verified By | Associated Feature |
| FP 1.1 | The power supply shall sustain a 1A continuous draw for the duration in FP1.0 | Experimentation | Functional |
| FP 1.2 | The power supply shall provide a voltage between 12V max and 6V min to the vehicle for the duration in FP1.0 | Experimentation | Functional |
| FP 1.3 | The power supply shall be able to source peak currents up to 2A for 5s without damage | Experimentation & Observational | Functional |
| FP 2.1 | The power supply will charge from 0V to [Max V here] in 3 minutes or less using the wired charger | Experiment | Functional & Rechargeable |
| FP 2.2 | The power supply will charge from 0V to [Max V here] in 7 minutes or less using the wireless charger | Experiment | Functional & Rechargeable |

**Procedures:**

**FP 1.1:**

Materials:

Battery Tester, Timer, DMM

Procedure:

Before beginning the test, ensure that the power supply is fully charged. Setup the battery tester to draw a consistent 1 Amp of current. Using a DMM, measure the beginning voltage of the supply with the positive probe at V\_Cap and the negative probe at V\_ground and record it. Hook up the battery tester to the output of the buck boost set to an output of [V\_buck\_out]. Turn on the battery tester to begin drawing power and begin the timer. When 2 minutes are completed turn off the battery tester and stop drawing power from the supply. Measure the voltage of the supply again and ensure that the voltage is higher than 4V. (make it 4 to ensure above 3.5 working voltage for buck boost? Maybe repeat a couple times like the charging)

Results:

The supply will pass the test if the power supply measures above 4V after 1 Amp of current is drawn for 2 minutes from a full charge 9 out of 10 tests.

**FP 1.2:**

Materials:

DMM, Computer, Python Power Script (pre-written)

Procedure:

Charge up the power supply up to [Our Vmax]. Use the DMM and measure the voltage at the capacitors at V\_Cap and V\_ground. Then measure the output voltage of the buck boost converter. This should stay constant if the capacitor voltage is higher than 3.5V supplied to the buck boost. Complete a two-minute run of the vehicle around the track, while exporting power data from the INA. When the run is complete measure the power supply at V\_Cap and V\_ground and verify that it is above 4V (0.5V higher than the minimum buck boost requirement). Then measure the output voltage from the buck boost and verify that it matches the voltage measured from the buck boost previous to the start of the run. Save the exported data to a .txt file by copying it from the terminal and pasting it. Rename the file within the open() function to the .txt file. Run the script and then open the output file. The voltage seen at the output should be constant and match the output of the buck boost throughout the run.

Results:

The power supply will pass the test if the voltage supplied to the vehicle remains between 12V and 6V for the duration of 2 minutes. This will include that the beginning measurement from the buck boost output is equal to the ending measurement as well as the load voltage seen measured by the INA.

Example load voltage measurement from battery:

**FP 1.3:**

Materials:

Battery Tester, Timer

Procedure:

Setup the battery tester to draw 2 Amps of current. Hook up the battery tester to the output of the buck boost set to an output of [V\_buck\_out]. Turn on the battery tester to begin drawing power and start the timer. When 5 seconds are reached turn off the battery tester. Examine the top and bottom of the board for any burned leads, resistors, diodes, etc. Probe the voltage at V\_Cap and V\_ground and verify there is no damage to the capacitors. Then probe the output of the buck boost and verify there is an output of [V\_buck].

Results:

The power supply will pass the test if no components are damaged and functionally operates after the 5 seconds of 2 Amp current draw.

**FP 2.1:**

Materials:

DMM, Wall Outlet, 120V AC to 12V DC Power supply, Timer

Procedure:

Using the DMM, measure the beginning voltage at V\_Cap and V\_ground and ensure that the voltage is at 0V. Keep the DMM placed on the probe sites and plug in the wired 120V AC to 12V DC power supply to the power input of the vehicle power supply and start the timer. When the DMM measures [Our V Max], stop the timer and record the time. Repeat this process at least 5 times. (We might just be able to take it out but he mentioned repeating experiments?? If we wanna say like do 5 and test passes if 4/5 complete within the 3 minutes)

Results:

The power supply will pass the test if it charges from 0V seen at the capacitors to V\_Max withing 3 minutes 4 out of 5 times on the wired charger.

**FP 2.2:**

Materials:

DMM, Timer, Wireless Charger

Procedure:

Using the DMM, measure the beginning voltage at V\_Cap and V\_ground and ensure that the voltage is at 0V. Keep the DMM placed on the probe sites and connect the power supply to the wireless charger and start the timer. When the DMM measures [OUR V Max], stop the timer and record the time. Repeat this process at least 5 times. (same as before however we do it)

Results:

The power supply will pass the test if it charges from 0V seen at the capacitors to V\_Max withing 7 minutes 4 out of 5 times on the wireless charger.