



Discovery Technologies Inc.

Test Plan
for D-Charger Battery Pack

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Introduction

This test plan demonstrate the functional properties of the D-Charger as a whole. Firstly, we would like to test the mechanical connection and strength of the modules. Next, we tests to check the solar panel and the mechanical modules' capability of producing energy and soring the energy into the batteries. Lastly are the tests to check if the stored energy can charge the other electronic devices like cellphones or iPads.

Test Cases

Test Case #1: Hand Crank Module and Crank Bar Coupling	
User Input:	The user will match and attach the crank bar to the hand crank module and turn the crank bar.
Condition:	The crank bar should be able to couple with the module, allowing the user to turn the hand crank to generate electricity.
Expected Observation:	The crank bar should easily couple with the hand crank when matched correctly. After the crank bar is connected it can be turned to generate electricity, and when it is turned the LED should light up.

Test Case #2: Hand Crank and Feet Pedal Module Coupling	
User Input:	The user will match the socket with the connector and place the connector into the socket to couple the two modules.
Condition:	The two modules will be able to couple together, allowing the feet pedal module connect/ combine with the hand crank module. After connecting the feet pedal module will be able to turn the hand crank module's gears, turning the motor, and generating electricity.
Expected Observation:	The connector and socket easily couple together and allows the feet pedal generate energy using the motor inside the hand crank. The LED inside the hand crank should light up when the feet pedal is generating electricity.



Test Case #3: Feet Pedal Module Supporting Strength Test

User Input:	User’s physical weight will be placed on the Feet Pedal Module.
Condition:	The module will be able to withstand the weight of the user as the user stands upright, without any other support, as the user has the module attached to their feet. The user will stand for 1 minute without moving, then will also walk for one minute.
Expected Observation:	The module will not collapse as the user stands for a minute and walks for another minute.

Test Case #4: Solar Panel Charging

Condition:	Solar panel is placed in a position where it can easily receive light from a light source. (Use light in Lab1)
Expected Observation:	The LED that symbolizes the battery is charging should light up, meaning that enough energy was generated by the solar panel to charge the battery. The LED will stay on until the energy produced by the solar panel stops being enough for charging the battery.

Test Case #5: Hand Crank Charging

User Input:	The user will insert the hand crank rod into the cranking socket in the module. Then the user will provide a torque force by cranking using the rod to produce energy.
Condition:	The hand crank rod will be inserted into the hand crank socket, and is ready for the user to crank.
Expected Observation:	The LED that symbolizes that the battery is charging will light up, as long as the user is able to generate enough energy to charge the battery. When the LED’s light extinguishes, it symbolizes the user did is not producing enough energy for charging.



Test Case #6: Feet Pedal Charging	
User Input:	The user is walking which pushes the pedal that leads to torque for turning gears which will turn the motor to generating electricity.
Condition:	The pedal module will have a indentation spot for placing the hand crank with a protruding part. Where the protruding part is used to insert into the hand crank socket to turn the gears like the hand crank rod. The user will be walking with the pedal module attached/ strapped to their shoe.
Expected Observation:	The user should be able to walk relatively unaffected, while the module is attached to their shoe. In addition the module will be strong enough to withstand the weight of the user as they walk. Also the LED for charging will be lit indicating the storing of electrical energy in the battery. The LED will stay on until the energy produced becomes insufficient for charging the battery.

Test Case #7: Device Charging	
User Input:	User inserts a male USB connector into our female USB port on the hand crank module.
Condition:	The USB port is used to connect a device to the battery pack, using a USB cable, without having any of the charging modules active.
Expected Observation:	The user's device will display that it is charging, if it has the capabilities, and device will be charged as time passes.

Test Case #8: Charging a Device while Generating Energy	
User Input:	User can be providing a torque force by using the hand crank module, producing energy.
Condition:	The USB port is connected to a device and the battery is currently charging the device. Additionally the user can be generating energy using the solar panel, hand crank, or both.
Expected Observation:	The LED hoeing that the battery is being charged will light up until the charging stops or is not producing enough energy. Also we will see that the device is being charged, and its battery's charge is increasing, over time. Note that according to the circuit the energy generated is both charging the battery and the device simultaneously but at a slower rate.