



MULTIFUNCTIONAL HUMAN POWERED GENERATOR

ONE MEDIA PLAYER PER TEACHER (OMPT)

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PROJECT OVERVIEW

The purpose of this project is to provide an efficient method to fully charge a 3.7 Volt Lithium Ion battery pack via human power in an area without access to electricity. Currently, solar panels or car batteries, both with their failings, are the only means of charging batteries in the field.

The constraints of the project include:

- Design must interface with any Lithium Ion battery via a USB port.
- Design must be small and weigh less than 14 lbs for ease of transport.
- Design must protect an onboard battery from overcharge and indicate when charging is complete.
- Design should be dust, water, and sun resistant to prolong operational life.

The objectives of the project include:

- Device must be easy to operate for the required charge time via a foot treadle system.
- The final product will be inexpensive to allow for OMPT members to distribute it to 3rd world countries.



HOW IT WORKS

The generator design is powered by a foot treadle rocking back and forth similar to antique sewing machines. The linear motion of the treadle is transformed to rotational motion by a drive shaft /piston linkage. The drive shaft then drives a flywheel attached to a dynamo. The flywheel retains momentum which smoothes the user input.

The dynamo outputs 3 phase AC power and then the power is converted to DC via a full -wave bridge rectifier. The voltage provided by an onboard solar panel and the output of the rectifier is regulated to 8.4 Volts for charging the 7.4 volt onboard battery. An indicator LED displays when the battery is charging. A second regulator drops voltages from the dynamo, solar panel, or the battery to the standard 5 Volts supplied by a USB port. Small capacitors are used to smooth the voltage pulses from the dynamo through the circuit.

Benefits of the foot treadle system:

- Allows the user to alternate feet during operation.
- The user can perform other tasks while operating.
- Low maintenance & durable

COMPONENT SELECTION

Due to the required low weight of the final design, the generator consists of an aluminum frame encased by ABS plastic sheets. The flywheel was fabricated as an aluminum casting. The pedal was constructed out of ABS sheet reinforced by aluminum struts along its length. The drive shaft was made from 3/8 inch steel rod formed into the designated shape.

The dynamo chosen was a ZSFD-0918 Mini Dynamo. This device is used in many of the hand crank flashlights and similar products. The onboard battery chosen was a TENERGY 7.4 Volt 2200 mAh Lithium Ion battery. When fully charged, the onboard battery will be able to fully charge the projector batteries before the user must operate the treadle again.

PROJECT OUTLOOK

The foot treadle powered generator will allow for an ergonomic method by which OMPT can recharge the batteries for a number of electronic devices essential to their cause in the field. They will now be able to charge their batteries at any time, and in any place.

