PRODUCE YOUR OWN EMERGENCY ELECTRICITY WITHOUT WIND, SUN OR FUEL

Last updated - 12/29/2012

This System consists of a used multi-speed bicycle, a D.C. permanent-magnet scooter motor (used as a generator), a bike chain from a used child's bike, a wood frame to support both the bike and the motor/generator, an on/off switch, cables and connector assemblies, a battery case and lid (used to mount a 12 volt deep-cycle battery, a D.C.to A.C. inverter, a volt meter, and a trickle battery charger). Note that the trickle battery charger is used to maintain the battery charge level when there is grid power and the system is not being used.

USE AND APPLICATION

In our world today, our homes are full of small electrical gadgets, tools and appliances. Most of these use little electricity and generally are used for a short period of time. This system can be of great value in an emergency by providing power to these items when there is insufficient wind, no sun (i.e. sun shines 1 out of 3 days during the winter) or at night. It makes no noise to attract others like gasoline driven generators do and it can be operated indoors.

While this system will not run large energy using items such as electric water heaters, electric stoves/ovens and air conditioners, it can charge 12 volt batteries of any size and type (including car and motorcycle batteries) as well as operate other 12 volt D.C. loads. With the battery/inverter, it can be used to provide A.C. power for lighting, to operate and to charge the batteries for small hand tools, appliance, computers, printers and telephones phones, to charge AA and AAA type rechargeable batteries (used in shavers, toothbrushes, flash lights, alarm systems, radios, small TVs), to provide power to operate wood pellet stoves (used for cooking food, heating rooms and for disinfecting and distilling water) and for operating kitchen tools such as blenders and mixers. If the battery/inverter is sufficiently large, it can operate a small microwave oven for sufficient time to cook a meal. The limiting factor is the strength of the bike rider. While the generator can generate 350 watts, an out-of-shape, older person such as myself, can only

produce a continual 40 watts of power. A young athlete could produce a burst of up to 110 watts for a short period of time, but a continual output of about 60 to 70 watts is about the limit. This means that if a tool which requires 80 watts to operate is run for ten minutes, then the bike rider would have to generate 40 watts for twenty minutes to replace the energy used.

SCOOTER MOTOR/GENERATOR SPECIFICATIONS

Model: MY1016Z3

No-load speed (rpm): 3850

No-load current (amps): < 2.5

Rating speed (rpm): 3000

Rating voltage (d.c.volts): 24

Rating power (watts): 350

Rating current (amps): <18.7

Efficiency (%): >78

Gear reduction ratio: (88:9) = 9.778

Sprocket (teeth): 9

BIKE CHAIN

Pitch (inch): o.5

Roller diameter (inch): 0.3

Roller width (inch): 0.16

BIKE (TEN SPEED)

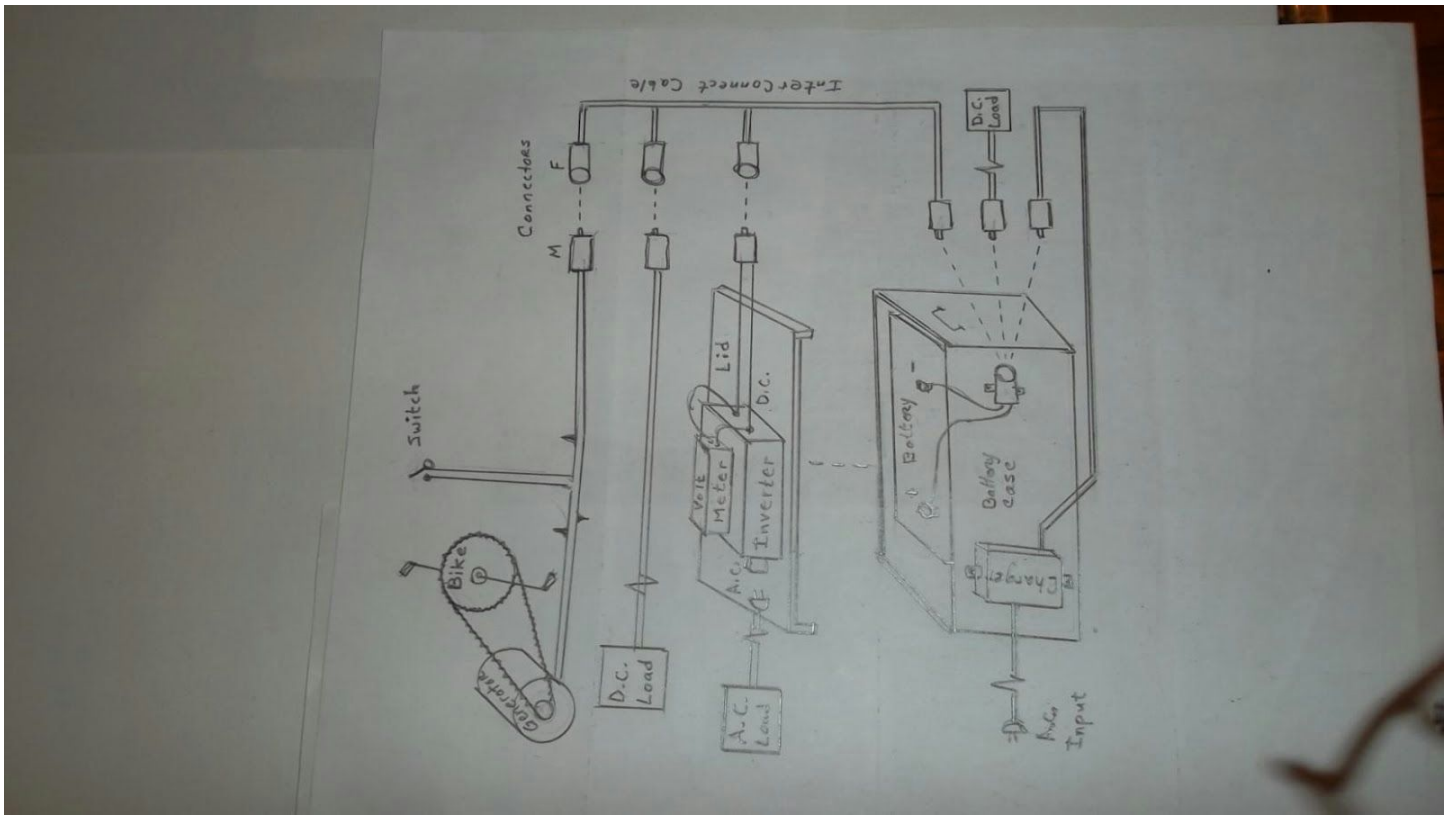
Pedal Sprockets (teeth):	28	38	48
Reduction ratio (bike teeth/gen. teeth)	28/9=3.11	38/9=4.22	48/9=5.33
Total Speed Reduction (Bike X Gen)	3.11X9.778=30.41	4.22X9.778=41.26	5.33X9.8=52.2
Estimates for 13.5 volt output:			
Generator speed at 13.5 volts (rpm)	3000X13.5/24=1687.5		
Bike pedal rpm (Gen rpm/reduction)	1687.5/30.41=55.5	1687.5/41.26=40.9	1687/52.2=32.4
Bike pedal rpm at 78% efficiency	55.5/.78=71	40.9/.78=52	32.4/.78=42
Measured 13.5V pedal speed (rpm)	not measured	49	not measured
Overall system efficiency	not measured	78X49/52=73.5	not measured

CONFIGURATION AND WIRING DIAGRAMS

CONNECTORS: Any type connectors can be used provided they maintain the proper voltage polarity when being connected, disconnected and reconnected, and provided they can handle at least 10 amps. This system uses automotive d.c. connectors of the type used for the cigarette lighter. Both male (M) and female (F) gender are needed as shown on the wiring diagram. These can be purchased at any auto parts store or on line. They are safe and easy to use; however some contain diodes making them not bi-directional in the flow of current which is a problem depending on what you are planning to do. Also some connectors are fused at levels below 10 amps. In these cases, a larger fuse usually can be used without problem.

GENERATOR CABLE: The generator cable is short and needs to be extended and routed through a switch to a male connector. The switch is best located near the bike handle bars for easy access once the rider is on the bike and peddling. The switch is for safety purposes and should remain in the "off" position allowing the rider to mount the bike without the generator turning the bike peddles. Note that the generator will run either clockwise or counter-clockwise depending on the polarity of the voltage on the generator cable wires. To run the bike forward, the black wire must be positive and the red wire must be negative.

INTERCONNECT CABLE: This cable is used to connect all components in the system to the battery through a female connector mounted on the battery case. It consists of a single male connector and multiple female connectors. A splitter cable consisting of one male connector and two or three female connectors can be purchased at most auto parts stores; however some are not bi-directional allowing current to flow only from the male connector to the female connectors. Also some have five to seven amp fuses which need to be replaced with 10 amp fuses. This cable can be easily built if the desired configuration cannot be found.



BATTERY CASE LID: Based on the needs, any size and type inverter can be mounted on the case lid. In this system, an inexpensive 400 watt, modified sign wave inverter is bolted onto the lid of the battery case and a voltmeter is mounted on top of it using a plastic tie. The volt meter leads connect to the d.c. terminals of the inverter which then connects to a male connector through a cable. This configuration allows the lid to be removed from the battery case without disturbing the wiring and it allows the battery voltage to be monitored whenever the inverted is connected to the battery via the interconnect cable.

BATTERY CASE: In this system, a battery case is used to protect the battery and to provide for mounting of the female connector to which all other components are connected to the battery via the Interconnect cable. It also provides mounting of the small battery charger which maintains the battery voltage when the electrical grid is up and the battery is not being used. The battery case in this system is several inches longer than the battery and serves as storage space for the interconnect cable, fuses, and a second inverter.

BATTERY: This system uses a 12 volt deep-cycle 80 amp-hour battery, however any type and size can be used. A deep- cycle battery should be used since the battery will be discharged often below its normal charged level. Car and motorcycle batteries can be used in an emergency, however they do not hold up well when they are deeply discharged frequently. With all battery types, one should attempt to maintain the battery voltage as near as possible to the full charge level by supplying an equal amount of energy (via the bike generator) as is being consumed by the load. By using the volt meter to measure the battery voltage before applying the load and by pumping the bike sufficient fast to maintain that same voltage while the load is connected, one will be supplying equivalent energy as is being consumed by the load.


DANGER / POISON
ON BOARD
BATTERY CHARGER
VECTOR
CEN-TECH


ON BOARD
BATTERY CHARGER
VECTOR

BIKE AND GENERATOR ASSEMBLY

A support frame was built using 2X6 boards and plywood to allow bike frame to be mounted about the same distance from the floor as when it was on wheels. This allowed the rider to get on and off easily. The motor/generator was mounted on a separate piece of plywood allowing it to be moved relative to the frame in order to adjust the alignment and the tension on the chain.