

## USER GUIDE

### PEDAL POWER GENERATOR



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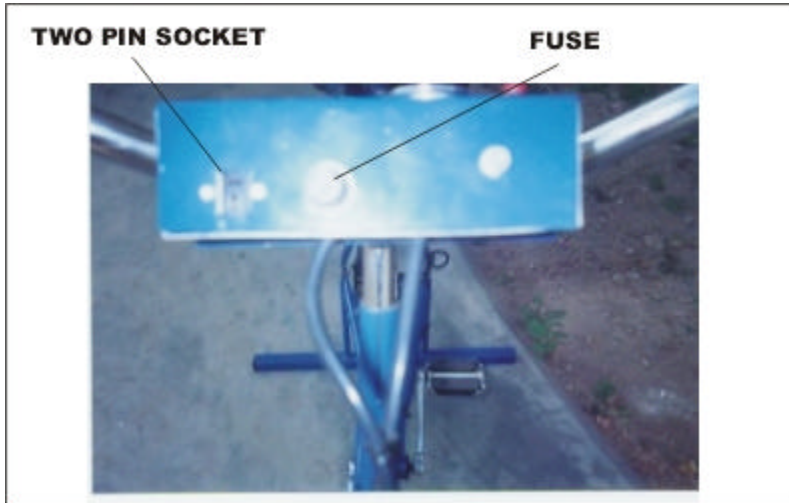
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## **1 : Preface**

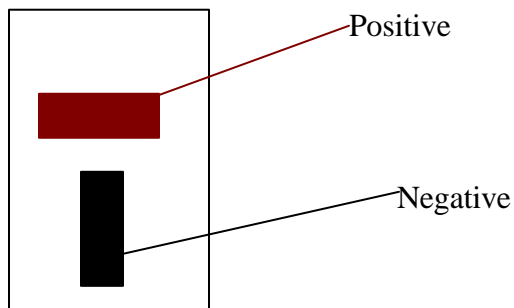
This guide is intended to help you to make the most effective use of your pedal power generator. We recommend that you read the guide to become completely familiar with the generator and, in particular to know what you will have to do to ensure that it is maintained in good order to give you efficient and reliable service.

## 2:Features



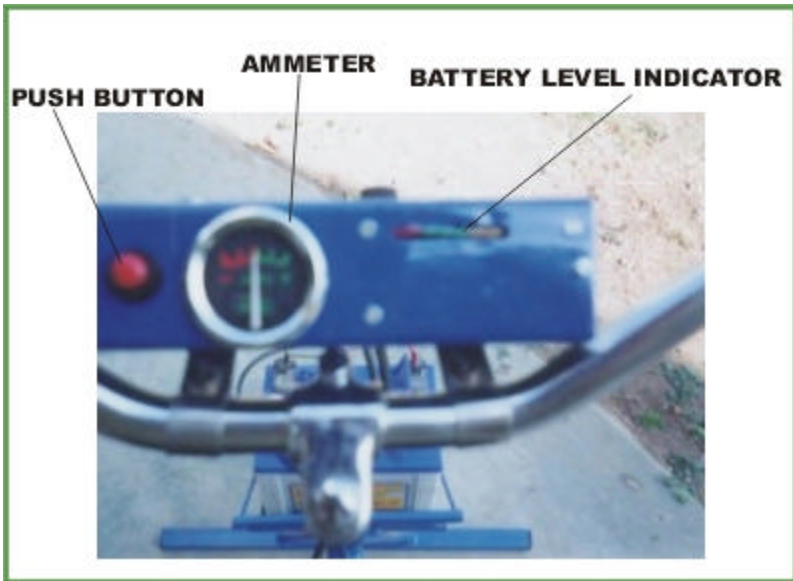
### Two pin socket (Female)

It is a 12 volt DC output. Connect the DC choke to this socket. Take care of polarity while connecting . If the choke is supplied by REAL than the socket connected with choke itself will take care of the polarity. If in any case the wire of the choke is to be replace connect the socket as per the circuit diagram only.



### Fuse

It is a 08 amp. bottle fuse to prevent any damage to the electrical components. In case the fuse is blown replace with the 08 amp. fuse only.



### Ammeter

Shows the current or rate of charging or amount of calories expended during pedaling. While pedaling it should indicate the positive charging. Full deflection is about 10 Amperes. Normally you should be able to pedal at 3-5 Amp. Level.

### Battery level indicator.

The colourful lights on the handle are LED lights. They show the voltage or charge level of the battery. As the battery is discharged the voltage and charge decrease and the LED lights turn off one by one. When it is recharged the lights turn back again one by one. By seeing which lights are 'ON' we can find out the voltage or charge level of the battery. Table below shows the voltage at which each LED turns off.

<u>LED</u>	<u>Battery Voltage</u>
Yellow1	12.7 V
Yellow2:	12.5 V

Green1: 12.2 V

Green2: 11.9 V

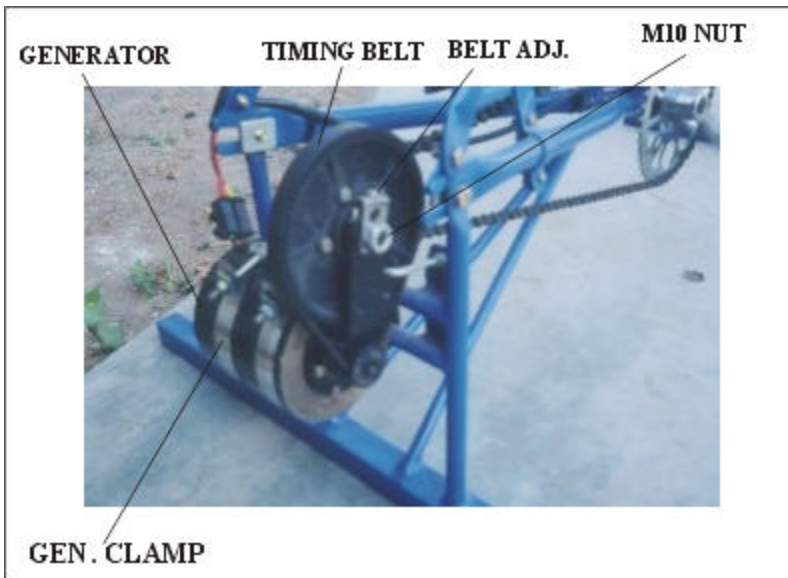
Green3: 11.6 V

Red1: 11.2 V

Red2: 10.82 V

To get an idea of the TRUE charge of your battery you should leave the battery idle for 20 minutes.(NO pedaling or lighting) Avoid using the battery when only the last two red indicators are illuminated. If the battery is used regularly until only the last red light is on, the battery life will be reduced. You should try and develop the habit of charging everyday so that all the green lights are 'ON'. If you can get the Yellow lights ON and leave the battery at full charge then even better.

If you do not connect the battery but directly connect the CFL lights or 12V tape recorder or other 12V equipment to the pedal generator and pedal, the LED lights indicate the voltage across the connected load.



### **Generator**

It is a permanent magnet DC generator. Suitable for 12 volt batteries from 12 Ah to 40 Ah rating. Smaller batteries get charged faster .

Nominal charging current 6 Amps.

Pedaling speed range: 60 - 90 rpm

### **Timing Belt**

HTD-450-5 mm(Pitch)-15mm(width)

### **C.T. Stud**

It is an adjustment stud for chain tension. When the chain gets loose un lock the checknut of C.T. Stud and after loosening the motor clamps then tight the nut of the stud to the required tension. Tight the check nut and motor clamp.

## Battery

For best results with battery use 12V ,40 AH tubular or 12V, 25-40 AH sealed maintenance free battery. If you need to charge lower voltage batteries then pedal very slowly or use your hand.

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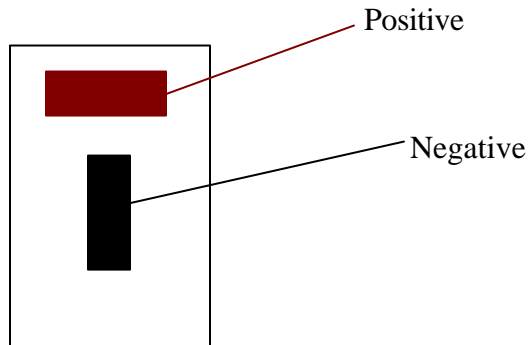
## Flywheel

The flywheel smoothens the pedaling of the cycle, making it comfortable for the legs and gives a steady light while pedaling.



## Choke and CFL

The Compact Fluorescent Lamps are energy saving bulbs to make the best use of the power you generate. The choke is just like a tube light choke, but one that works at 12V,DC rather than 230V ,AC current. Connect the CFL to the choke and the choke to the battery with red wire to the plus terminal and black wire to the minus terminal.



### 3: General Tips and Maintenance

REAL make pedal power generators are very simple in design and will provide years of dependable service. Adherence to the following guidelines will ensure that the life is maximised and operation is trouble free.

- Adjust the seat and handlebar height to provide a comfortable and secure riding position on the PPG. The rider's hands must be able to easily grasp the handlebar controls. Feet must rest comfortably on the pedals.
- The electric generator, battery and controls can be damaged by prolonged exposure to water. Do not allow PPG to be used in heavy rain.
- Stop use of the product if any wire becomes worn, broken, or damaged in any way. Have the product inspected and serviced by a qualified person.
- Do not modify the electrical controls or wiring. Use generator, battery and other items supplied or approved by REAL only.
- Replace the fuse on the PPG with a fuse of the same size and type.
- Batteries contain a sulfuric acid electrolyte, which is a highly corrosive poison, that will produce gases when recharged and explode if ignited. This can result into serious injuries. When working with batteries, you must have plenty of ventilation, remove jewelry and wristwatch, wear protective eyewear, keep a water bucket handy and exercise caution.
- Recharge batteries as soon as possible after use. Don't wait till the batteries are fully discharged. Allowing batteries to sit in a discharged state for a prolonged period of time is damaging to the future capacity of the battery.

- The drive of the PPG requires very minor attention. The drive belt (Timing Belt) will need adjusting to maintain proper tension. The belt should deflect about 6mm.(1/4 inch) with slight pressure applied at the center of the belt. To tighten the drive belt , loosen the axle nut(M10) and tight the belt adjustment screw(M5 chhd) until the proper tension is achieved . Tighten the axle nut and recheck belt tension.
- If the drive belt has broken or frayed , it will need to be replaced. Belt used is HTD-15mm -15mm timing belt. Call REAL at 0265-643224 or 0265-643289 to purchase a new belt. To replace the belt the big timing gear first need to be removed. To remove the gear ,open the axle nut(M10) and pull the gear. Install the belt onto the motor drive gear(small gear) and reverse this procedure to reinstall the gear. Make sure that the belt is properly seated in the grooves of the gears.
- Similarly the chain on the PPG will also need periodically adjustments. The chain should deflect 15mm with slight pressure applied at the center of the chain. To tighten the chain first loosen the generator clamp nuts and tighten the chain tensioner nut till proper tension is achieved. The chain used is 12.7x 3.3mm. (Conventional cycle chain)
- Apply small amount of oil on the chain for lubrication frequently.

### **Tools required to dismantle PPG :**

8-9mm Fixed and Ring Spanner  
10-11mm Fixed and Ring Spanner  
12-13mm Fixed and Ring Spanner &  
4" & 6 " Screw Drivers

## 4 : Using the Pedal Generator

### 4A: Without 12 V Battery

For best use of the Pedal Generator it is recommended that you connect the CFL lights (with 12 V chokes) directly to the Pedal Generator by plugging into the DC socket on the handle . You can connect up to four 11 W CFLs with chokes in parallel to the Pedal Generator. The more CFLs you connect the harder you will need to pedal.

Push the Red button and make sure that the Red and Green lights in the LED display are lighted but don't pedal much harder than that as you will supply excess voltage. It is ok if all LED lights are lighted but control your speed or the CFLs will burn out.

### **Rural Use**

For schools (especially boarding schools), meetings, NGO and movement offices, there will be many people who can easily share the pedaling at night. Put each CFL in a different room or region and people can take turns pedaling. The lights will be ON only when you pedal. Right from the first day it is better to form this habit rather than using a battery as your costs will be lower and also batteries eat up part of your energy and should be used only if you can't do without them.

For lighting individual homes in rural areas, 3-4 neighbours who are not living far away from each other can share one Pedal Generator and it can be placed at a convenient middle place. Put one 11 W CFL in each house and connect all of them in parallel to the pedal generator. At night each family or household can take 30 minutes or 45 minutes turns pedaling, lighting all houses as they pedal. If 3 houses are sharing a generator then  $3 \times 45 \text{ Minutes} = 2 \text{ Hours}$ , 15 Minutes lights for everyone, say from 7-9:15 PM.

In addition the 45 Minutes can be split between 2-3 members of the family.

## **For Urban Use as a Exercise Cycle:**

If the usage is solely as an exercise cycle and to demonstrate the principle of alternate energy in urban schools, then instead of the more expensive CFLs you can connect in parallel a few (say 3-4), 12 V, 20-30 W bulbs (that you can get from any auto shop for a few rupees each). While pedaling you will burn out calories and remain fit. The ammeter indicates the current you are supplying or the rate at which calories are being burnt. You can also connect some CFLs in parallel with the auto bulbs if you wish.

### **4B: WITH 12 V Battery**

If you wish to pedal in the morning and use lights at nights then you need to store the energy for which you need a 12 V battery. Charge the battery by connecting the red wire from Pedal Generator to the PLUS terminal and black to Minus terminal and turning the toggle switch on and pedaling. The ammeter must deflect at least some amount when you pedal or else you are not charging.

Use only CFL lights with battery as they consume the least power. Preferably use only 1-2 CFLs and not more than that. Roughly 1 hour of pedaling at 5 Amps will store 4 hours worth of light for 1 CFL or 2 hours worth for 2 CFLs. If you are charging at lower ampere you have to pedal correspondingly more. (Full deflection of ammeter is 10 Amps).

Additional pedaling can also be done in the night with the battery connected and lights running.

While using the batteries the most important thing is to limit the usage of the lights at night to the minimum possible and encourage as many people to pedal as much as possible every day. This will ensure that the battery isnt discharged fully and then it becomes tougher to recharge.

Every day check the LED display (after waiting for 20 Minutes at least as stated before) to make sure that the Green lights are ON. If only red lights are on avoid lighting at night and pedal for 2-3 days, a few hours each day, to recharge the battery. If no LED lights are ON your battery is dead and it will take lots of pedaling to recharge it (8 hours) -- in such a circumstance pedal without using for a week (one hour each day) or connect to solar or other battery chargers.

With the battery for lighting use only CFLs in urban and rural areas.

#### **4C: OTHER USES OF PEDAL GENERATOR**

You can run any 12 V device such as mike system, radio, taperecorder, laptop through 12 V adapter and TV (of 12 V). Be careful of polarity (plus and minus) while connecting. You can either pedal without battery or with battery. It is safer with battery as even if you pedal hard the battery will absorb excess power. If you are not using a battery then control your pedaling speed or else the equipment can get damaged. Mike, 12 V radio and 12 V tape-recorder take even lesser power than the CFLs and the Pedal Generator is EXCELLENT for them and you can cut down on your dry-cell or diesel expenses.

If you want to run lower voltage equipment (such as 6 V radio) then use your hands to turn the pedals and do not use the 12 V battery. To charge lower voltage batteries, use your hand and turn the pedals slowly.

## **5: Battery Information**

### **BATTERY :A word of caution.**

Batteries contain a sulphuric acid electrolyte, which is a highly corrosive poison, that will produce gases when recharged and explode if ignited. This can result into serious injuries. When working with batteries, you must have plenty of ventilation, remove jewelry and wristwatch, wear protective eyewear, keep a water bucket handy and exercise caution. Whenever possible, please follow the manufacturer's instructions for testing, installing and charging. This write up assumes a six-cell battery commonly used for 12 volt systems.

### **General**

Deep-cycle batteries are different from automotive batteries. Deep-cycle batteries are used to power motors, lights or other load in absence of continuous charging current. In engine driven vehicles a dynamo or alternator continuously charges the battery and the battery is never heavily discharged. They are built differently than the battery used to start a car, which has only to deliver short bursts of energy until the alternator takes over, providing the electricity to run the car and recharge the slightly discharged battery. A deep cycle battery goes through many deep discharges. Often, the battery is drained to nearly zero before it is recharged. Deep cycle batteries are specifically designed to handle hundreds of deep discharges. Even the best automotive batteries won't last more than about 50 deep cycles, and of those, only the first 15 or so will recharge fully.

### **"Deep Cycle" Batteries**

Deep cycle batteries are specially designed with denser active material and thicker plates to withstand deep discharge-recharge service. They are also reinforced by envelope and glass mat separators to reduce shedding of the active material. Car batteries, on the other hand, use porous active material and thin plates so that high-amp energy can be quickly delivered for maximum starting power. Repeated cycling weakens the positive plates and makes the active material fall from the grids.

## **Overcharge**

Overcharging a battery occurs when the battery remains on charge after it has reached full charge. Overcharging causes excess heat that can cause the plates within the cells to buckle and shed their active material.

Also, the battery will react to the overcharge by producing excess hydrogen and oxygen as the water within the electrolyte breaks down. The water that is lost due to overcharging can be replaced in a non-sealed battery; in a sealed battery the water loss is permanent and will negatively effect the battery's service life.

## **Life**

### **Effect of extreme heat on a battery.**

Extreme heat causes the water in the battery to evaporate faster than under normal temperatures. The heat also causes the grids that make up the positive plates to corrode more rapidly. These two factors are detrimental to the long-term life of the battery.

### **Effect of extreme cold on a battery.**

The amount of power a battery can produce is greatly reduced in the cold. At 17° Celsius, a battery will deliver only about 40 percent of the power it would at 27° Celsius. The slowing effect that cold temperatures have on a fully charged battery is not permanent. Using the battery itself warms up the battery to some extent. If a battery is not fully charged, however, the electrolyte can freeze and damage the plates or crack the container. Batteries at usable states of charge will not freeze at temperatures above &shy;20° C. As long as the battery does not actually freeze up; there is no permanent damage.

Both extremes create battery problems. Extreme heat will allow the battery to increase its performance level for a short term. However, internally it accelerates corrosion and other deterioration factors, which lead to an overall short battery life. Extreme cold temperatures within the battery result in a reduction of battery efficiency level, which reduces short-term performance. Life of the battery is considerably reduced by heat, overcharging and by keeping the battery in discharged condition.



## **Tips**

- Thinly coat the terminal and terminal clamps with a high temperature grease or petroleum jelly (Vaseline) to prevent corrosion.
- Use the battery so that the negative cable will connect to the negative terminal. Reversing the polarity of the electrical system will severely damage or destroy it.
- Perform preventative maintenance, especially during warm weather. This consists of visually inspecting for obvious problems like damaged case and leaks, corroded terminals, loose holding clamps and cable terminals.
- Recharge batteries as soon as possible after use.
- Allowing batteries to sit in a discharged state for a prolonged period of time is damaging to the future capacity of the battery. Limit the discharge of the batteries to about 75% of the capacity available. Shallower the average discharge, the longer the battery life.
- Buy the freshest and best quality battery. Only the rich can afford a cheap battery.

## **Storage**

Batteries left undercharged will tend to sulphate, a process whereby deposits form on the battery's plates, leading to premature failure. A battery has internal electrical leakage that will cause it to become fully discharged and sulphated over time. Prior to storing a battery, it should be fully charged and recharged when it reaches 80% state-of-charge or six months, whichever occurs first. If a battery is not fully charged during winter storage, the electrolyte can freeze and damage the plates or crack the container.

## **THE MOST COMMON CAUSES OF BATTERY FAILURES**

- Loss of electrolyte due to leakage, heat or overcharging,

- Sulfation in storage,
- Undercharging with voltages less than 13.8 volt
- Old age
- Vibration
- Freezing
- Corrosion and breakage of terminals.

### **Using a new battery**

There is a misconception that a battery must be fully discharged and charged 4 - 5 times during initial periods. This is not true. A deep cycle battery does not require a deep discharge at any time in its service life.

In fact, for best results, it is recommended to shallow or moderately discharge the first 5 to 10 cycles.

### **Batteries and 'Memory'**

Lead-acid batteries do not develop a memory. This is peculiar with Ni-Cd batteries used in cordless phones and computers. Lead-acid batteries have the ability to cycle to various amounts of depth of discharge anytime during their service life without a memory developing inside the battery. So ignore this aspect.

## **6: Warranty:**

This Limited Warranty is the only warranty for your PPG. There are no other expressed or implied warranties. The only uses for this product are described in this manual.

The Limited Warranty extends only to the original consumer and is not transferable to anyone else.

This Limited Warranty covers all parts of the Pedal power generator and is effective only if:

- The product is completely and correctly assembled;
- The product is used under normal conditions for its intended purpose;
- The product receives all necessary maintenance and adjustments.

This Limited Warranty does not cover normal wear and tear, normal maintenance items, nor any damage, failure or loss caused by improper assembly, maintenance, adjustment, storage or use of the PPG. This Limited Warranty will be void if the product is ever:

- Used in any manner contrary to the instructions in this Owner's Manual;
- Modified in any way;
- Rented.

The manufacturer of the PPG is not liable for incidental or consequential loss nor damage due directly or indirectly from the use of this product.

**All components are warranted for 12 months.**

The manufacturer will replace, without charge to you, any component found to be defective within the warranty period.



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