

 <b>BOSCH</b>		<b>TELECOPY</b>		<b>DATE</b> <b>20/6/02</b>
<b>TO:</b>	<b>ALEX WEIR</b>	<b>FROM:</b>	RBSA Hotline	
<b>Company</b>		<b>Company</b>	<b>ROBERT BOSCH</b>	
<b>Phone</b>		<b>Phone</b>	(011) 651-9800	
<b>Fax</b>	09447092368602	<b>Fax</b>	(011) 651-9801	
<b>E mail <a href="mailto:rbsahotline.za@za.bosch.com">rbsahotline.za@za.bosch.com</a></b>				
<b>No of pages TWO</b>				
<b>Re: ALTERNATORS</b>				

**GOOD DAY**

THE ALTERNATOR RECOMMENDED WOULD BE THE UNIVERSAL TYPE.

PART No **9 120 690 170** THIS ONE IS A **55 AMP**.

THERE IS ALSO A 70 AMP ONE BUT THE CUT IN SPEED IS DIFFERENT.

PLEASE COULD YOU CONTACT A **FANIE VAN DER WALT** ON **027 11 531 7600**

HE WILL HELP YOU ON PRICES etc.

IN REGARDS TO REGULATORS BOTH AARE THE SAME SPEC AS WITH MOST ONES IN THE K TPYE RANGE.

REGARDS

GORDON GILES

TECHNICAL ADVISOR AUTOMOTIVE




## BOSCH Choice of alternator, characteristic curves

7

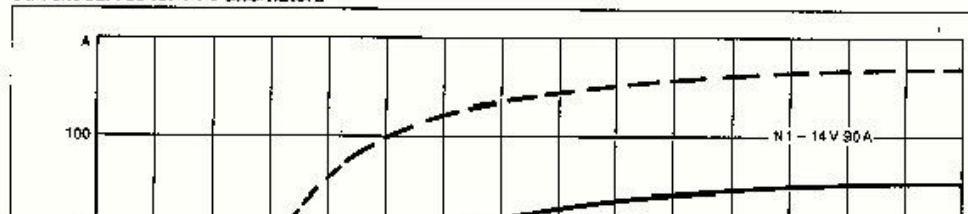
### Choice of alternator, characteristic curves

#### 14 V alternators (table 1)

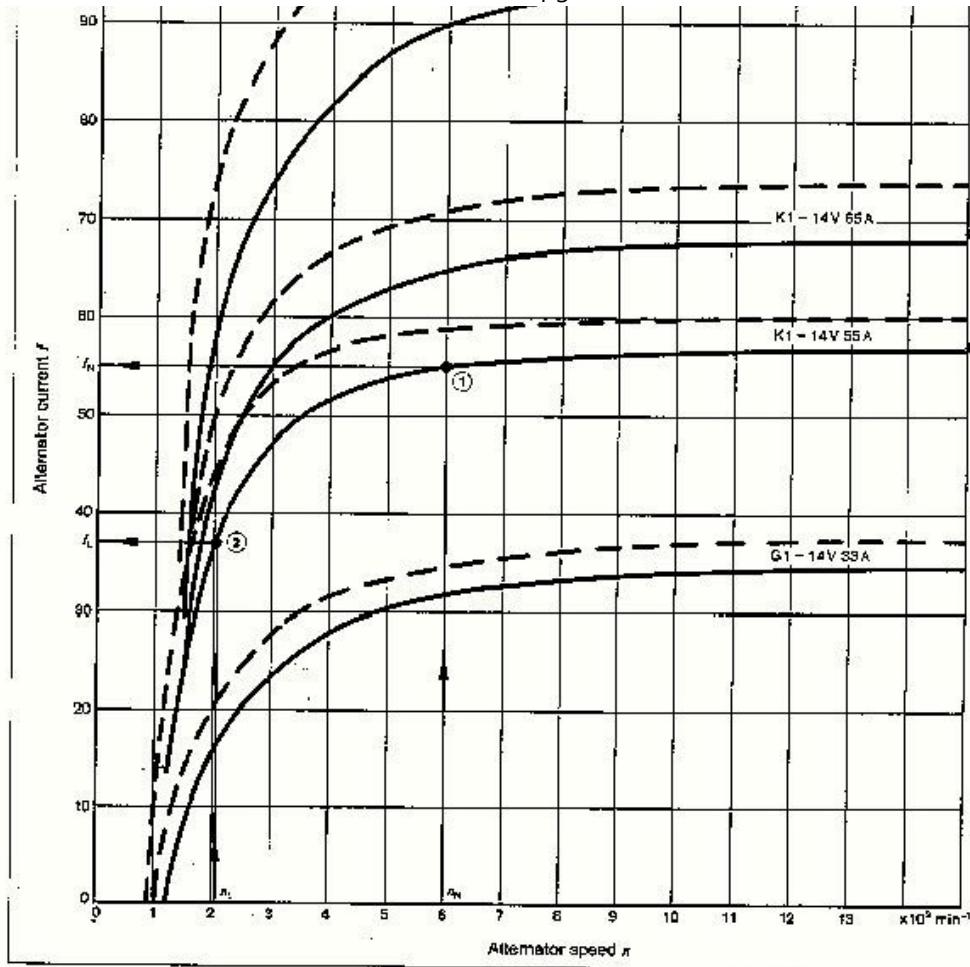
Output range from ... to	Alternator		Max. speed (at max. engine speed)	Speed at 2/3 $I_N$	Mass moment of inertia	Dynamic bearing load of drive-end roller bearings	Support arm position	Fig.	Wght.	Type (curve)	Part No. 1)
	Rated current	Rated speed									
$P_V$ W	$I_N$ A	$n_n$ min <sup>-1</sup>	$n_G \text{ max}$ min <sup>-1</sup>	$n$ min <sup>-1</sup>	$J$ kg·cm <sup>2</sup>	$C_{dyn}$ N		$m$ kg			
... 300	33	7000	12000	2700	6.5	7500	0° center	10	3.0	G1-14 V	<del>0 120 339 512</del>
							60° left	10	3.0	33 A (with Z-diode)	<del>0 120 339 531</del>
							60° right	10	3.0		<del>0 120 339 536</del>
300 ... 550	55	6000	11000	2000	14.0	10800	60° left/right	12	4.2	K1-14 V	<del>0 120 489 710</del>
							60° left/right	12	4.5	55 A	<del>0 120 489 725</del>
550 ... 675	65	6000	11000	2100	14.0	10800	60° left	13	4.7	K1-14 V 65 A	<del>0 120 489 756</del>
675 ... 950	90	6000	10000	2200	24.0	17600	60° left/right	10	6.2	N1-14 V	<del>0 120 469 526</del>
			11000	2200	24.0	10800	60° left	11	5.6	90 A	<del>0 120 469 532</del>

1) Without fan and pulley; these must be ordered separately (pages 14 and 15).

#### Current curves for 14 V alternators

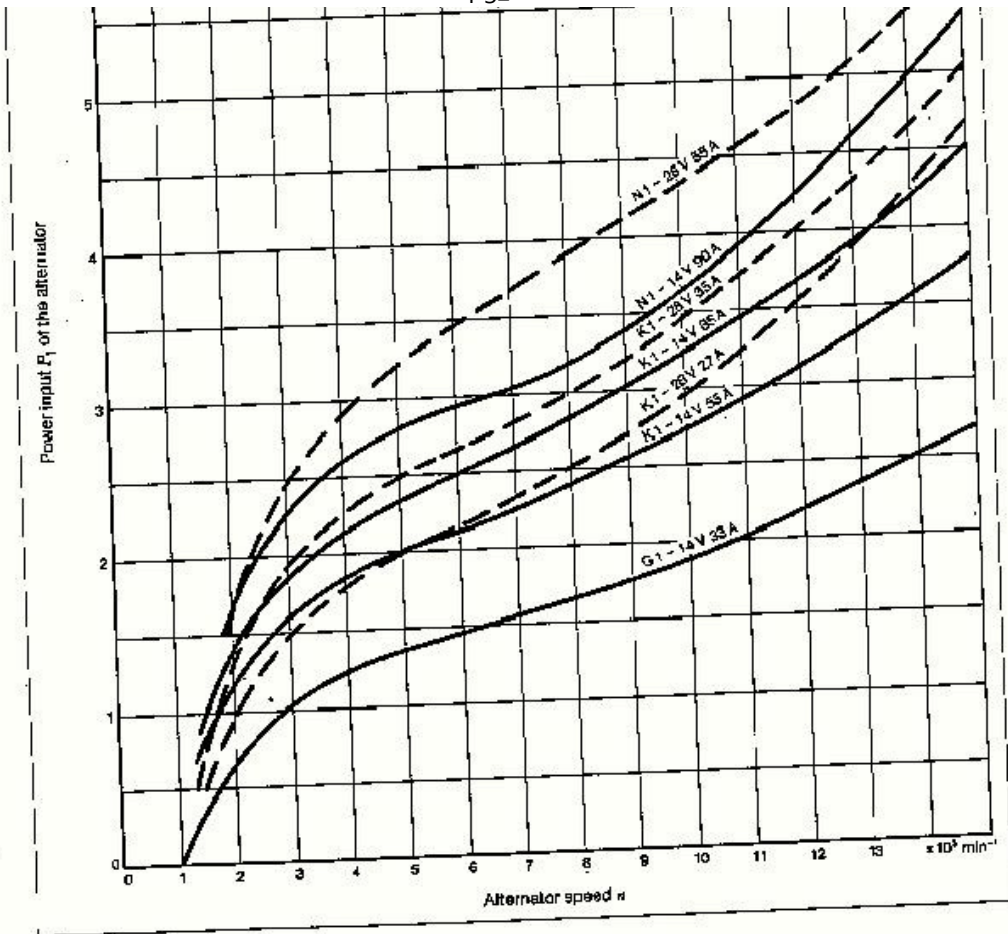


Alternator current as a function of speed.  
 Alternator  
 --- cold  
 — at final operating temperature  
 Ambient temperature approx. 25 °C.  
 Alternator voltage













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**USER GUIDE**

## **PEDAL POWER GENERATOR**





**Rashron Energy and Auto Pvt. Ltd.**

603, GIDC, Makarpura, Vadodara, 390010, Gujarat, India

PHONE :- 0091-265-643224, 643289.

FAX :- 0091-265-638778.

Web Site : [www.ecozen.com](http://www.ecozen.com)

E-MAIL :- [info@ecozen.com](mailto:info@ecozen.com)

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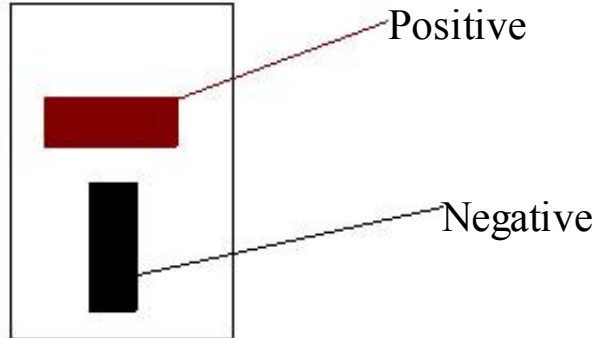
## 2:Features



### 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

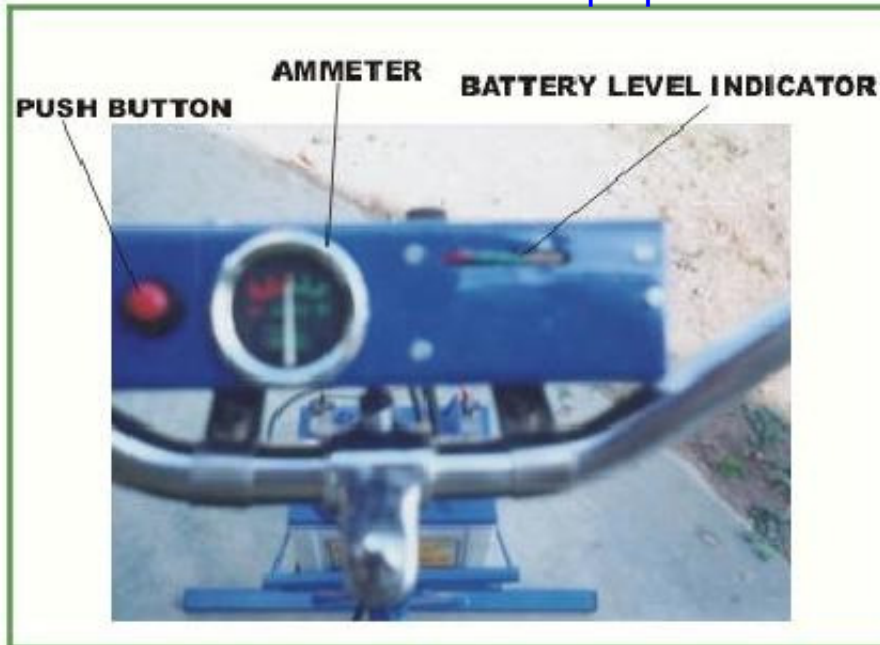
socket as per the circuit diagram only.



### 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.

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### 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.

#### LED Battery Voltage

Yellow1 12.7 V

Yellow2: 12.5 V

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Green1: 12.2 V

Green2: 11.9 V

Green3: 11.6 V

Red1: 11.2 V

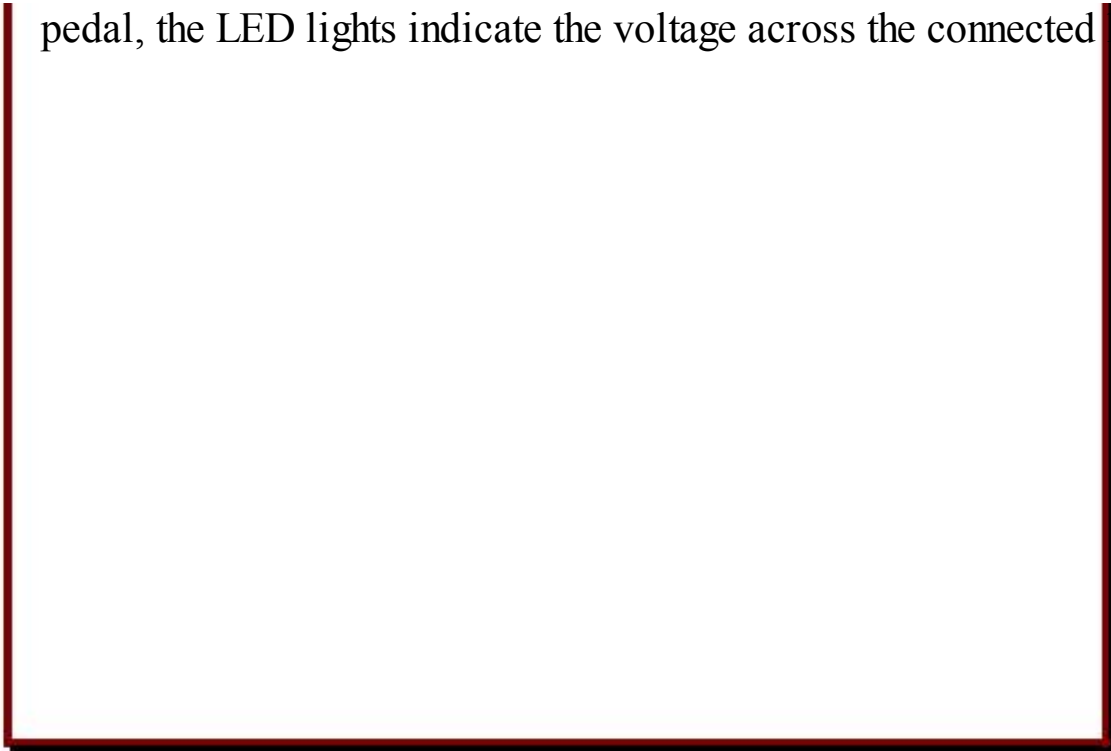
Red2: 10.82 V

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.



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## 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.

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## 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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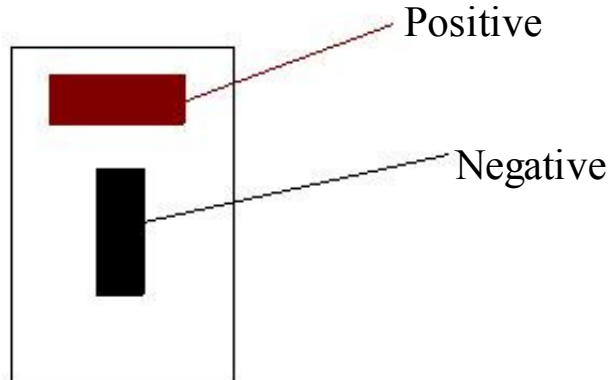
## Flywheel

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

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## 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.





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### 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. Dont 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.

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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 generation is mph and light with the chain is 12.7 to 13 mm tall  
(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

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## 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 and should be used only if you can do without it. part

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.

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### **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

to pedal or charge 2-3 days. If more a (Full charge to how many Amps) have 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 isn't 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.

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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.





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## 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

alternator, which has only to deliver electricity sufficient to guarantee the 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.

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## **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.

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## **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

Shallower of the battery discharge, the % of the battery available.  
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,

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## **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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**Rashron Energy and Auto Pvt Ltd.**

603, GIDC, Makarpura, Vadodara, 390010, Gujarat, India

PHONE :- 0091-265-643224, 643289.

FAX :- 0091-265-638778.

E-MAIL :- [info@ecozen.com](mailto:info@ecozen.com)

Web Site :- <http://www.ecozen.com>

As our models get better, forecasts have improved dramatically. The average lead time for tornado warnings in this country has gone from one minute to 12 minutes, says former NWS director Elbert W. Joe, who presided over the upgrade. That may not sound like much until you realize that the extra 11 minutes is enough to get a family to the relative safety of a basement.

At the same time, the rise of digital communications and the development of simple, sturdy measuring equipment allow weather data to be collected around the globe automatically and reliably; and inexpensive receivers and computers allow people around the globe to access the data. This is how weather is most useful -- supplying low-cost technology that helps global models and local forecasts at the same time.

To see what a little money can do about advance warnings, consider Hurricane Mitch.

Before Mitch, Honduras and Nicaragua got most of their weather reports from volunteers at scattered points who were supposed to take daily observations of temperature, humidity, pressure, rainfall, winds and the height of streams and rivers, and report the observations by phone. This is typical for most poor countries.

Unfortunately, Even in good weather, such networks are inadequate because there aren't enough stations and they don't always report, says Curtis B. Barrett, the U.S. Commerce Department's project director for Mitch reconstruction. (NOAA is part of Commerce.) Worse, the networks don't work at all in major storms. Major storms: volunteers take the readings, the phone lines are usually down.

After Mitch, about \$10 million of the \$621 million that Congress appropriated in disaster relief for the most-hit nations went to weather and water projects. One example: There are now 40 observation posts, most automatic stations that beam readings directly to U.S. satellites and work in fair weather or foul. They cost \$10,000 each and require no human help except some maintenance. Other examples: Sixty streams that automatically report rising water levels, and hard-wired communications links connecting

nations meteorological, hydrological and emergency offices so they can interact quickly and respond better in  
Barrett expects that where these improvements have been installed, warnings will be better and -- in with better roads that allow evacuation of vulnerable areas -- lives will be saved. But they are just a Barrett says. Funds are needed for expanding and maintaining these pilot systems: The legislation that authorized the Mitch aid also cuts it off as of Dec. 31, 2001.

On the other side of the world, an amazing pilot project shows how weather aid can help the poor works like this: Weather stations across Africa send information to U.S.-managed databanks. At the Office of Global Programs in Silver Spring, programmer Kelly Sponberg combines these reports from the U.S. trove to create texts, charts and maps concerning African weather that are updated hourly. That information is broadcast in a simple data stream that can be accessed by the older-model computers available in Africa; it is beamed across the continent by an all-digital satellite called AfriStar run by Washington firm WorldSpace Corp.

Then comes the amazing part: In 200 villages in the west African nation of Niger, local operators provided with small, solar-powered receivers no harder to operate than a sewing machine. Villagers Sponbergs broadcasts and translate relevant parts into audio broadcasts in one or more of the local languages. As a result, nomads who used to have to drive their herds into villages to learn where rains had fallen or dried up can now get this information on common \$20 windup radios -- and move their animals accordingly. Local farmers can use these first-ever scientific seasonal forecasts to make better decisions about what and when to plant.

And the cost. With other donors involved, the U.S. share is just \$834,000.

When extraordinary floods swamped Mozambique in early 2000, Congress voted \$160 million in disaster aid. A small fraction went for weather and water programs. Workers on the scene got access to regional water data stored in U.S. databanks, including images of where the floods would be in 72 hours. Their computer model of the countrys complex river systems -- along with programs to warn ordinary people -- is credited with helping Mozambicans manage this years floods better.

In 1994, China asked our weather service to take the sophisticated flood models we use to make about the Mississippi River and adapt them to the Huai, one of Chinas most complex and treacherous rivers. China paid just \$590,000 to have us adapt our model, train their engineers and link the model to their gauge network. The new system was so successful in fending off damage from major floods in 1996 that its operators won an award.

According to the Worldwatch Institute, every dollar spent on prevention before a natural disaster hits saves dollars in economic losses afterward. Most disaster aid will continue to go to road building, housing and relocating people out of harms predictable way. The small portion that goes for weather aid could be a very cost-effective part of U.S. foreign policy, says Worldwatches Janet N. Abramovitz, but it is not at present. She compares it to Third World debt relief, as a diffuse issue that lacked focus before Secretary General Kofi Annan put it on the worlds front burner.

Today, weather aid programs at NOAA and the State Department are slated to stay at their present funding levels -- or, like the Mitch aid, are scheduled to expire. We would help greatly if we could increase by five to 10 the amount of aid we are currently providing for assisting developing countries with their water and climate programs, says former NWS chief Friday.

It could happen. In a little-noticed part of President Bushs remarks on the Kyoto Protocol on climate change, he directed the Commerce Department to provide resources to build climate observation systems in developing countries, and encourage other developed nations to match our American commitment.

But what will that level of commitment be. As Barrett, who runs the Mitch aid program, says, The question with this kind of aid in general is, how do you keep it going.

Contrary to the old adage that everybody talks about the weather but nobody does anything about it, there's a lot that we already do. But we can do more.

--Deborah Shapley writes on telecommunications, science and international affairs.

stream only 4Mb. Mr Sponbergs job is to transmit each of the 5,000 files at different times of the day and week. Im like the disc jockey playing African climates greatest hits, he says.

The means of transmission are novel. Mr Sponbergs feed goes by fibre optic sea cable to a WorldSpace Corporation digital satellite dish in Johannesburg and from there to its Afristar satellite, which beams it all over Africa. Anyone with a WorldSpace receiver hitched to a computer can use Ranet multimedia graphics, maps and text.

However, the broadcasts can also be received on the ground by receivertransmitters, built for desert use by Wantok Enterprises of Canada and connected to computers powered by solar batteries. Mr Boulahya says he insisted that the receiver-transmitters had to be as simple to operate as sewing machines, one of the few mechanical devices familiar to those in remote parts of Africa.

At receiving stations, villagers translate information into local languages to create local broadcasts. They beam it to people who hear it on wind-up radios up to 25km away from towns.

Mr Boulahya says when he demonstrated how simple the radios were in one village, within a few minutes 25 ladies asked me if they could use it.

Using the radios, which are made by the FreePlay Foundation of London, herders can learn where to find water without having to bring their herds to a village every day or so. That can double the radius of their forage. Farmers can stay on their plots and receive news and planting information.

The potential for reversing the rise in population movement and land stress is huge. Niger is being overrun by an avalanche of sand, according to Barbro Owens-Kirkpatrick, US ambassador to the country. She says Nigers government supports Ranet because it realises that rural development is



crucial to hold people on the land, get them to plant effectively, retain plant cover and hold back the sand.

Niger has the worlds highest birth rate and highest infant mortality rate. The UN Food and Agriculture Organisation has issued early warnings for famine, even as everyone waits, anxiously, for the start of the rainy season. The US government plans more support, Ms Owens-Kirkpatrick says. Ranet will add 15 more village receiving stations, some in the hardest hit areas. The radios are receiving health and agriculture programmes, as well as weather. The radios long-term effects are important, says Ms Owens-Kirkpatrick. This country is at the edge of human civilisation.

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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



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## **Weathering Disasters**

**Lets give poor countries the data they need to save lives.**

*Deborah Shapley*

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The people of Central America just got grim news from the weather mavens at the National Oceanic and Atmospheric Administration: The path known as Hurricane Alley -- the typical route for tropical storms that form in the Atlantic every summer and fall and sweep across the Caribbean -- is likely to blow big-time for the next 10 to 40 years. The notorious 1998 Hurricane Mitch, which devastated the economies of Honduras and Nicaragua and left 10,000 dead, fits the pattern of the coming decades, said Stanley Goldenberg, lead author of a NOAA study that appeared in the July 20 issue of Science magazine.

More hurricanes are also bad news for the people of the United States, of course. But the impact on Americans is cushioned by round-the-clock TV and radio warnings and an infrastructure of emergency services and insurance that limits death and damage. That's not the case with the millions of poor people in Central America who crowd along coastlines or live in mountainside shantytowns that are mudslides waiting to happen. They will be at very great risk from repeated storms for at least another decade, possibly for several decades, in a recent interview.

Worsening weather always hits the poor hardest.  Around the globe, millions of people -- from

Highly vulnerable African nomads to Chinese peasants -- are being hurt by weather extremes, often related to global warming, that are new in their lifetimes. America already helps to mitigate the effects after the fact; Congress invests tens or hundreds of millions of dollars in foreign aid when natural disasters strike, mostly to rebuild roads.

But that's after people have died and whole communities have lost their livelihoods. If the United States were to present small investment in weather aid -- helping poor nations take meteorological observations, make forecasts and get warnings out to people -- it could lessen weather-related damage, reduce the expense of rebuilding and, most importantly, save lives.

Better weather infrastructure would also help people in vulnerable areas on a daily basis, since the most depend on water resources and rainfall for survival. And some benefit would return to the United States. More data from remote sites around the globe means the U.S. domestic weather forecasts will improve, as will our understanding of climate change. In the words of Martin C. Yerg, chief of international activities at the National Weather Service (NWS), "It's a symbiotic relationship."

In the mid-1980s, U.S. meteorologists told Congress that they could make a dramatic leap in the quality of their immediate, mid-term and long-range forecasts if they could take full advantage of the information revolution. Since then, Congress has appropriated some \$4 billion for satellites, ground stations and supercomputers that manage databanks in Asheville, N.C., and suburban Maryland. The supercomputers gobble up readings on atmospheric temperature, pressure, humidity and upper air conditions, as well as readings from the ocean and the land. With that, data scientists create models that show new geographic connections, such as how U.S. weather is affected by that in Indonesia or the Sahel; these models update rapidly, some in real time. In all, it is the most sophisticated weather data network in the world. The United States also manages a databank for the World Meteorological Organization, an agency of the United Nations.