

RESISTANCE UNIT

Owner's Guide and Manual

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Date and Revision

November

Contact Information

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About This Guide

Purpose

The purpose of this manual is to provide explanations and procedures for installing, operating, maintaining, and troubleshooting the Resistance Unit. The Guide provides safety guidelines, detailed planning and setup information, as well as information about operating and troubleshooting the unit.

Conventions Used



WARNING

Warnings identify conditions that could result in personal injury or loss of life.



CAUTION

Cautions identify conditions or practices that could result in damage to the product or to other equipment.

Important: These notes describe an important action item or an item that you must pay attention to.

Note: These notes describe additional information, which may add to your understanding of how to use The Resistance Unit.

Important Safety Instructions

The Resistance Unit generates a type of AC power similar to a normal household wall outlet. Operating the Resistance Unit incorrectly or misusing it may damage equipment or create hazardous conditions for the user.

Important: Before using your Resistance Unit, be sure to read and save these safety instructions.

Warnings and Cautions



WARNING: Shock hazard. Keep away from children.

The Resistance Unit generates the same potentially lethal AC power as a normal household wall outlet. Do not insert foreign objects into the AC Outlet, the DC Power Socket, or the ventilation holes. Do not expose this product to water, rain, snow, or spray.



WARNING: Heated surface

Ensure at least 2" (5 cm) air space is maintained on all sides of the Resistance Unit. During operation, keep away from materials that may be affected by high temperatures such as blankets, pillows and sleeping bags.



CAUTION Do not expose The Resistance Unit to temperatures over 40 °C.

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CHAPTER 1

Introduction

What is the Resistance Unit?

Resistance Unit is a micro-power generation system that links up with almost any road bicycle. Resistance Unit harnesses the energy produced by you (when pedaling) to generate 12V DC or 240V AC electricity to power a range of appliances such as a laptop, mobile phone charger or a stereo.

What can I use it for?

- **POWER GENERATOR** - It can power lights, laptops, and charge mobile phones in off grid areas or where power grids may be unreliable.
- **EDUCATION** - As real-time power generation system, when you stop pedaling so does the power, which is invaluable for illustrative and educational purposes. Resistance Unit is fun and participatory energy education tool and combines many aspects of the curriculum such as PE, Citizenship, Geography and Science. The Resistance Unit is a great introduction to micro-power generation and renewable technologies.
- **BATTERY CHARGING** The Resistance Unit can be connected to a 12V battery to store the power you produce to use later.
- **ADDITION TO SOLAR PANELS** The Resistance Unit can be attached to 12V solar panels (up to 180W) to provide power if the weather's nice.
- **CAMPAIGNING** It is an ideal tool for campaigning and in the promotion of renewable energy sources, micro-power generation and sustainable living.
- **HEALTH AND FITNESS SYSTEM** You can harness the energy you produce when exercising on your bicycle training stand.
- **EMERGENCY POWER BACK UP** It can be used as an emergency power generation and for battery charging on land and on boats.
- **ART PROJECTS** As a great way to make small art projects sustainable and participatory

How much power can I make?

The best Tour De France riders can sustain 300 to 500W over longer periods with short peaks in excess of 1000W. How much power cyclist produces is dependent upon ones strength and fitness. With this in mind, the average cyclist can produce around 50W of power over longer periods with short bursts over 100W.

What is the power consumption of typical appliances?

Generally, the power consumption can be found on manufacturing labels of electrical appliances, however this may be the maximum power consumed. For best results, always test the average power consumption of the appliance you want to power using a plug-through energy meter.

Laptop charging 15W

Laptop running 30 – 70W

TV 50 to 200W

Sound system with mixer 20W - 50W

LED (light emitting diodes) Projector 20W

LED Stage Light 7W

Turntable 15 W

Mixer 8W

Mobile Phone Charger 5W

What's a Watt?

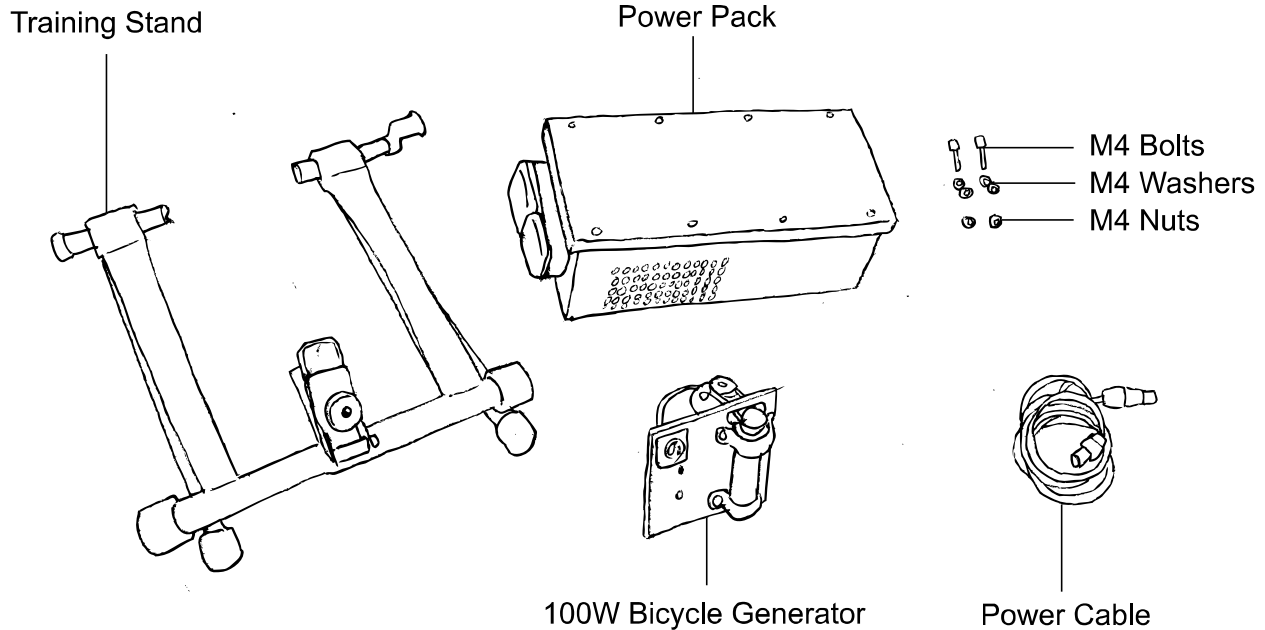
A **watt** is a the measurement of power and has a symbol W. The unit measures the rate of energy production or consumption. It is defined as one joule per second, $W = J/s$

As an example, when a 100W light bulb is turned on for one hour, the energy used is 100 watt-hours (Wh), 0.1 kilowatt-hour, or 360 kJ. The same amount of energy would light a 40-watt bulb for 2.5 hours, or a 50-watt bulb for 2 hours.

CHAPTER 2

Features

This section describes the main features of the Resistance Unit. We recommend that you familiarize yourself with these features before operating the unit.



Resistance Unit - Materials List

- 1 x Training Stand
- 1 x 100W Bicycle Generator Unit
- 1 x Power Pack
- 1 x Power Cable
- 2 x M4 Nuts
- 2 x M4 Bolts
- 4 x M4 Washers
- 1 x 1.6A 240V AC fuse (inside 240V fuse holder)

Power Pack

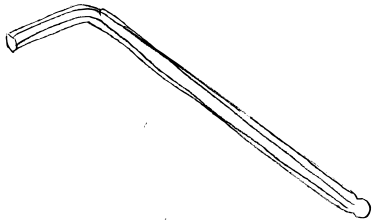
The Power Pack is a self-contained unit that allows the user to power AC and DC appliances or charge a battery using a bicycle generator unit or solar panel. The Power Pack is equipped with plug sockets to connect DC and AC appliances, the bicycle generator unit, solar panel or a battery. The Power Pack is protected by a fuse on the AC output and two 15A circuit breakers on the DC input/output to prevent electrical surges.

If any of these materials are missing or are unsatisfactory in any way, please contact us at support@magnificentrevolution.org

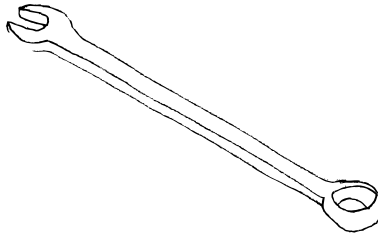
CHAPTER 3 Assembly

Follow these steps to assemble your Resistance Unit.

You will need:

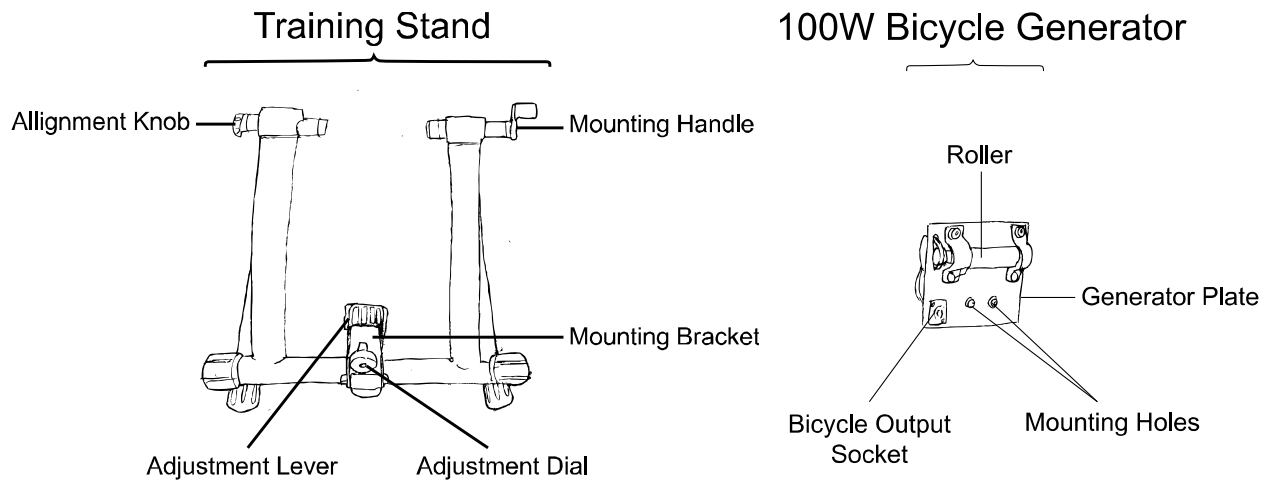


5mm Allen Key

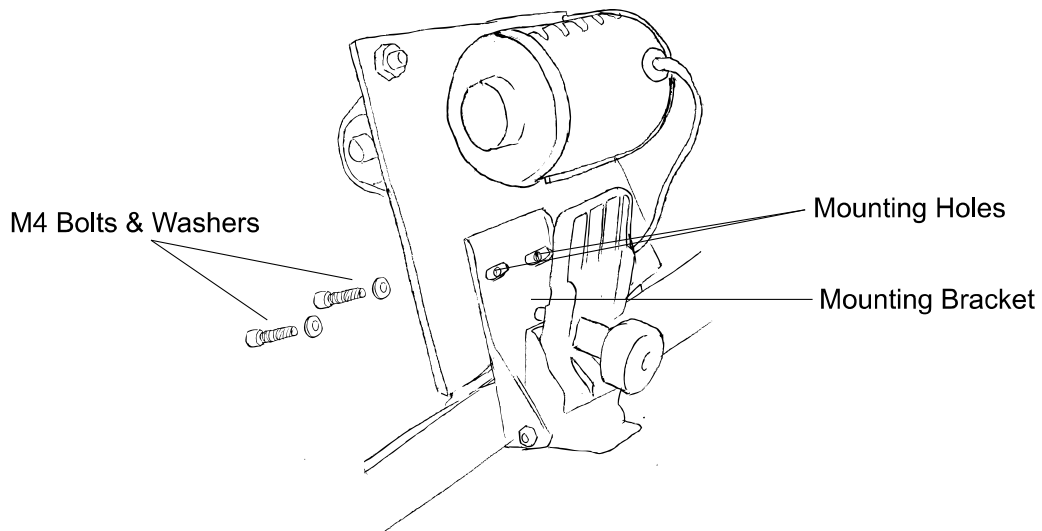


12mm Spanner

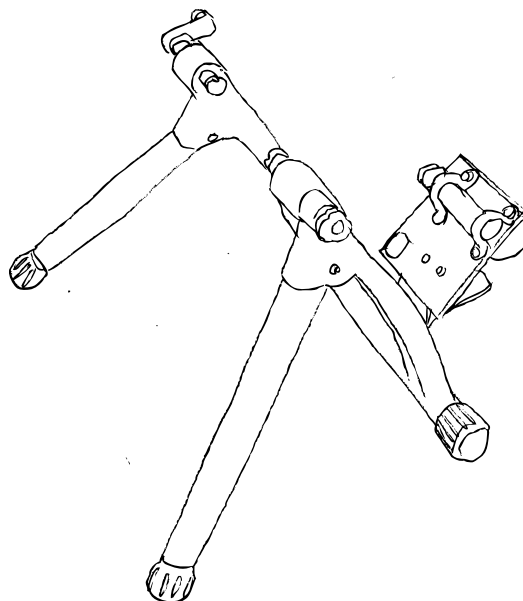
Attaching the Bicycle Generator Unit to the Training Stand



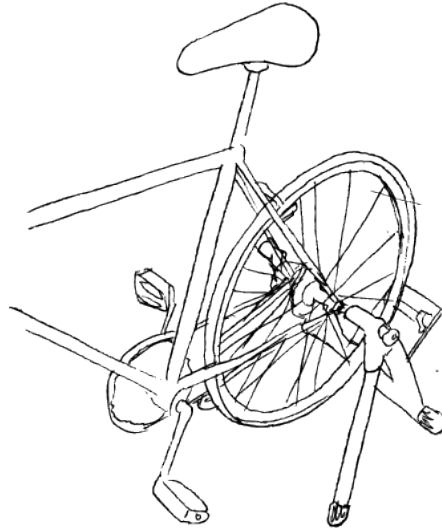
1. Remove the generator unit from the packing.
2. Unscrew the M4 nuts, bolts and washers (attached to the mounting holes of the bicycle generator unit) and put to one side (you'll need them to attach the generator to the stand).
3. Place the training frame so that it is lying flat on a level surface with the mounting bracket facing up.



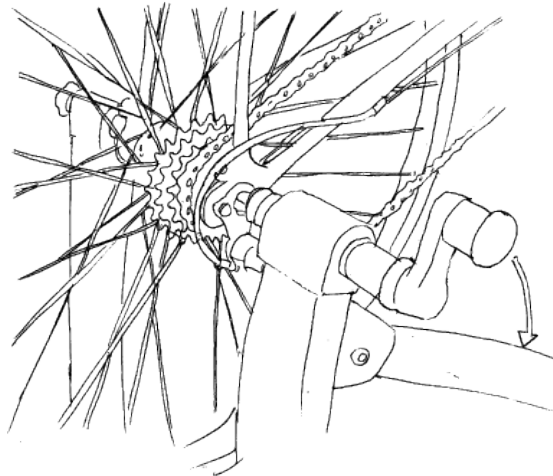
4. Holding the generator unit and the mounting bracket on the stand carefully align the mounting holes so that the generator roller is facing away from you. You may need someone to help you do this.
5. Insert the bolts and washers through both sets of holes.
6. Tighten the nuts with your hand.
7. Use the 5mm Allen key and 12mm spanner to tighten the nuts.
8. Stand the frame upright, taking care to support the generator while you reposition the frame.
9. Unfold the legs, allowing the frame to stand on its own.



Mounting your bicycle into the Generator Stand

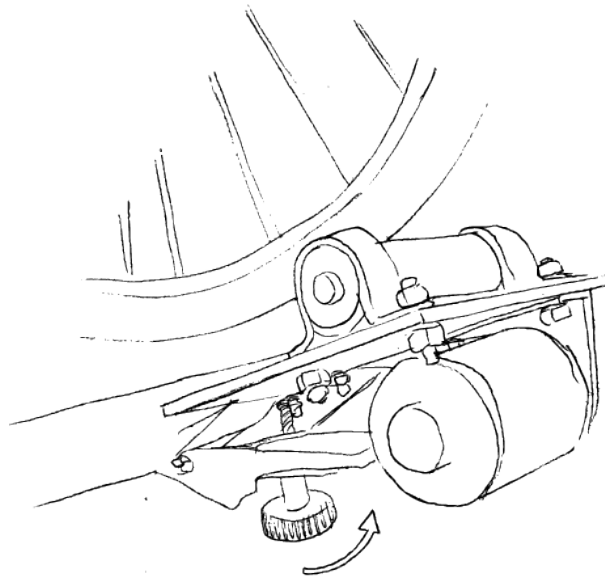


1. For the best results, select a bicycle that is well maintained. You will have better results if the tyres are well inflated and have a smoother tyre tread.



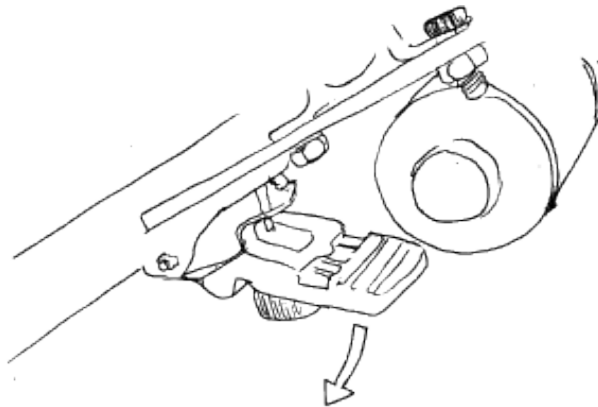
2. Place the rear wheel of the bicycle in the frame and turn the mounting handle clockwise to tighten against the wheel nuts.

3. The tyre should be roughly centred on the generator roller. If you need to adjust the alignment of the bicycle use the alignment knob located opposite the mounting handle. Turn the alignment knob clockwise to tighten and counter-clockwise to loosen.



4. Hold the generator unit up so the roller contacts the tyre. Turn the adjustment dial, located under the adjustment lever clockwise so that the adjustment screw pushes the generator plate towards the tyre.

5. Use your hand to press the tyre and roller together. Continue tightening the adjustment dial.



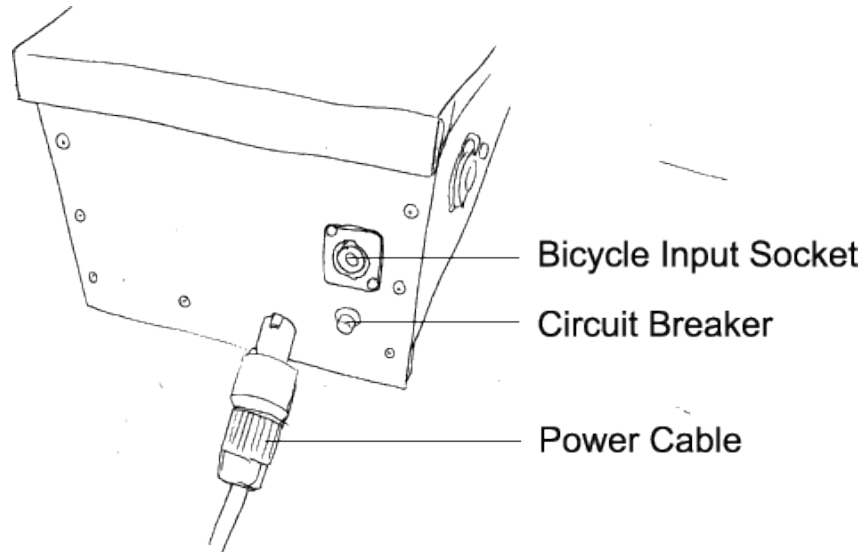
6. Push the adjustment lever down until it locks into position to complete the adjustment. Ensure that the generator roller is pressed against the back tyre.

7. The lever is now locked into position

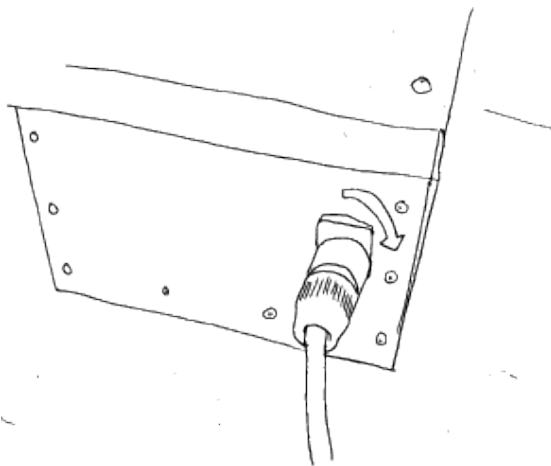
Connect the Generator Unit to the Power Pack



CAUTION ONCE THE BICYCLE GENERATOR IS CONNECTED TO THE POWER PACK, ENSURE THAT **YOUR CYCLIST DOES NOT PEDAL CONTINUOUSLY** WITHOUT PLUGGING IN AN APPLIANCE (APPLYING LOAD) AS THIS MAY CAUSE DAMAGE TO GENERATOR COMPONENTS.



1. Remove the Power Pack and Power Cable from its packaging.
2. Align the tabs on the plug at either end of the Power Cable with the grooves of the bicycle input on the Power Pack.



3. Holding the blue part of the plug, insert it and gently turn it clockwise.

4. The grey collar will click into place to lock the plug.
5. Hold the plug the other end of the power cord and insert into the Bicycle Output Socket (repeat steps 3-4).
6. To test the system, pedal the bicycle for a few seconds until you hear a beep to confirm it is working properly.
7. To disconnect the cable, gently pull back on the grey collar until you can rotate it counter-clockwise, then pull the connector out to remove the cable.

CHAPTER 4

Operation

Chapter 4 explains how to operate the Resistance Unit efficiently.

Operating Conditions and Guidelines



CAUTION Read all instructions before operating Resistance Unit.

Choosing a Location

The Resistance Unit should be operated only in locations that meet these requirements:

:

Dry Do not allow water or other liquids to drop or splash on Resistance Unit.

Cool Ambient air temperature should be between 0 and 40°C, the cooler the better within this range.

Well Ventilated Leave at least 2" (5 cm) clearance around the Resistance Unit for air flow. Ensure that the ventilation openings are not obstructed.

Operation AC Appliances

Understanding AC Appliances

AC appliances are rated by how much electrical power (in watts) they consume. The Resistance Unit can power most appliances within its continuous rating of 200W as long as the cyclist can generate enough power. Be aware that some appliances may be difficult or impossible to operate with Resistance Unit as they may have high surge requirements.

High Surge Appliances

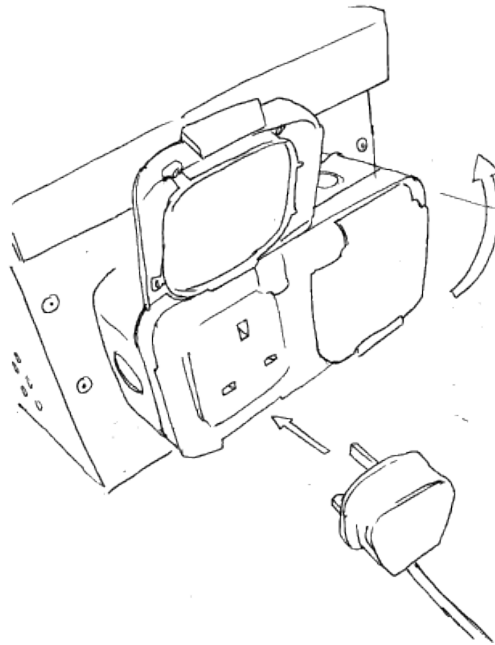
The wattage rating of AC appliances is generally the maximum power used by the appliance.

Although Resistance Unit can supply momentary power surges (or peaks) of up to 275W for 30 minutes / 450W for 5 seconds, some appliances may exceed the capabilities of the equipment and trip the fuses.

Operating Several Appliances at Once

You can potentially run several AC appliances if the total power consumption of all the appliances does not exceed 200W continuous with peaks of up to 275W for 30 minutes / 450W for 5 seconds.

Operating an AC Appliance

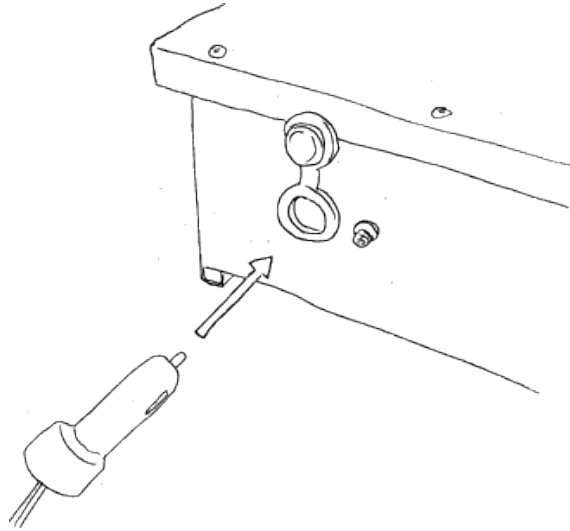


1. Lift up the grey cover of the AC socket at the end of the power pack and you will see a plug socket.
2. Insert a suitable appliance into the plug socket.
3. Ensure the appliance is switched on.
4. Pedal slowly at first until the power pack beeps.
5. The appliance should come on immediately as long as the cyclist is pedaling hard enough. The more power the appliance consumes, the harder it will be for him or her to pedal.

NOTE You will only be able to power appliances that the cyclist can generate enough power for. Always make sure that you check the power consumption (W) of the appliances you plug into the power pack. Appliances should not exceed 200W continuous.

Operating 12V DC Appliances

NOTE The Resistance Unit is designed to work with 12V DC auto, RV, marine, or other portable appliances that draw 15A or less.



1. Open the protective cover on the 12V outlet
2. Plug the 12 V DC appliance into the DC power socket of the unit, and turn the 12 V DC appliance on (if required).
3. Pedal slowly at first until the power pack beeps.
4. The appliance should come on immediately as long as the cyclist is pedaling hard enough. The more power the appliance consumes, the harder it will be for him or her to pedal.

If the 12 V DC appliance draws more than 15A (or has a short-circuit defect), the internal circuit breaker of the Resistance Unit will shut off the power to the 12 V DC appliance. If this occurs, unplug the DC appliance, and press the DC Circuit Breaker button to reset the system.

Connecting a 12V battery to the Resistance Unit



CAUTION To connect a 12V battery to the Resistance Unit you will need a Battery Adapter (sold separately). Connecting a battery without a suitable adapter may cause damage to the equipment and user. Please contact Magnificent Revolution for details.

Connecting a solar panel to the Resistance Unit

To connect a solar panel to your Resistance Unit you will need a plug adapter (sold separately). Please contact Magnificent Revolution for details.

CHAPTER 6

Maintenance / Troubleshooting



WARNING: ELECTRIC SHOCK HAZARD Disconnect all appliances, bicycle/solar inputs and batteries. Wait for 5 minutes for the capacitor to fully discharge before performing any type of maintenance or troubleshooting.

Do not remove the cover of Resistance Unit or disassemble any part with the exception of replacing the 1.6A fuse. Attempting to service the unit yourself will invalidate the product warranty and could result in electrical shock or burn.

Maintenance

Routine maintenance is required to keep the Resistance Unit operating properly. Occasionally clean the exterior of the unit with a dry cloth to remove accumulated dust and dirt. Ensure all external fixings are tightened properly.

Troubleshooting

Troubleshooting will help you identify the common problems that can occur with The Resistance Unit.

1. My appliance isn't turning on?

1.1 Restart the Power Pack

Wait for 30 seconds (no pedaling) before restarting. This allows the internal inverter to re-set itself.

1.2 Check power consumption of the appliance(s) you're trying to power

Ensure that power consumption of the appliance does not exceed 200W, which is the operating limit for the Power Pack.

Try and power a lower power appliance such as an energy-saving lightbulb (15W). If this works then your appliance may simply be too powerful for your cyclist.

If the appliance power consumption is really small e.g. a 2W mobile phone charger, then the internal inverter may not recognise it as a load and won't turn itself on. You may have to increase the load by plugging in another appliance.

1.3 Check 15A circuit breakers and AC fuse

- a. Ensure that the circuit breaker(s) haven't been activated. If the circuit breaker(s) has popped, you must press down the white button to allow the circuit to be complete again.
- b. To check the fuse, locate the fuse holder above the 240V AC plug socket. Gently turn the black fuse cap counter-clockwise and remove the cap and fuse. If the fuse has blown, you will have to buy a replacement anti-surge fuse, (1.6A 250V 5x20mm) available from most electric equipment retailers.
- c. To replace the fuse, place it back into the fuse cap, insert into the fuseholder and turn clockwise to lock in place.

NOTE Sometimes faulty appliances (old extensions and outdated equipment) can cause surges and blow fuses. Make sure that the equipment you're using with the Resistance Unit is in good condition.

1.4 Connections

Make sure that there are no loose connection and that the plugs connecting the generator and power pack are correctly inserted.

2. The power to the appliance is intermittent while pedaling i.e. keeps going on and off

A loose contact between the roller and the bicycle can cause power transmission to be discontinuous.

2.1 Tensioning the generator roller

Ensure that the roller is well tensioned (not too tight and not too hard) against the back wheel of the bicycle by turning the adjustment dial.

2.2 Check the power consumption of your appliance

The appliance you are trying to power may be too powerful for the cyclist. Try and power a low power appliance such as an energy-saving lightbulb (15W).

2.3 Check your bicycle

Ensure your bicycle is in good condition i.e. fully inflated tyres, well oiled chain/gears, etc. A bad bicycle will not generate much power. Put your bicycle into the lowest gear and try pedalling slowly at first, building up pace gradually.

If the above steps do not solve your problem then please contact Magnificent Revolution

CHAPTER 7

Warranty and Return Information

Warranty and Return Information

Warranty

What does this warranty cover? Warranty is provided by Magnificent Revolution and covers defects in workmanship and materials in your Resistance Unit. This warranty period lasts for 12 months from the date of purchase at the point of sale to you, the original end user customer. You require proof of purchase to make warranty claims.

What will Magnificent Revolution do? Magnificent Revolution will, at its option, repair or replace the defective product free of charge, provided that you notify Magnificent Revolution of the product defect within the Warranty Period, and provided that Magnificent Revolution through inspection establishes the existence of such a defect.

Magnificent Revolution will, at its option, use new and/or reconditioned parts in performing warranty repair and building replacement products. Magnificent Revolution reserves the right to use parts or products of original or improved design in the repair or replacement. If Magnificent Revolution repairs or replaces a product, its warranty continues for the remaining portion of the original Warranty Period or 90 days from the date of the return shipment to the customer, whichever is greater. All replaced products and all parts removed from repaired products become the property of Magnificent Revolution.

Magnificent Revolution covers both parts and labour necessary to repair the product, and return shipment to the customer within the United Kingdom. Contact Magnificent Revolution on support@magnificentrevolution.org for details on freight policy for return shipments outside of the contiguous United Kingdom

If your product requires troubleshooting or warranty service, contact your dealer.

Magnificent Revolution
3 St Saviour's Rd
Brixton
London
SW2 5HP

T: +44(0)7736327958
E: support@magnificentrevolution.org

What proof of purchase is required? In any warranty claim, dated proof of purchase must accompany the product and the product must not have been disassembled or modified without prior written authorization by Magnificent Revolution.

Proof of purchase may be in any one of the following forms:

- The dated purchase receipt from the original purchase of the product at point of sale to the end user, or
- The dated invoice or purchase receipt showing the product exchanged under warranty

What does this warranty not cover? The Warranty does not cover normal wear and tear of the product or costs related to the removal, installation, or troubleshooting of the customer's electrical systems. This warranty does not apply to and Magnificent Revolution will not be responsible for any defect in or damage to:

- a) the product if it has been misused, neglected, improperly installed, physically damaged or altered, either internally or externally, or damaged from improper use or use in an unsuitable environment;
- b) the product if it has been subjected to fire, water, generalized corrosion, biological infestations, or operating conditions beyond the maximum or minimum limits listed in the Magnificent Revolution product specifications
- c) the product if repairs have been done to it other than by Magnificent Revolution
- d) the product if it is used as a component part of a product expressly warranted by another manufacturer;
- e) the product if its original identification (trade-mark, serial number) markings have been defaced, altered, or removed.

Returns Procedure

1. Package the unit safely, preferably using the original box and packing materials. Please ensure that your product is shipped fully insured in the original packaging or equivalent. This warranty will not apply where the product is damaged due to improper packaging.

2. Include the following:

- A return address where the unit can be shipped. Post office boxes are not acceptable.
- A contact telephone number where you can be reached during work hours.
- A brief description of the problem.

3. Ship the unit prepaid to Magnificent Revolution at an agreed address.

If you are returning a product from outside of the UK In addition to the above, you **MUST** include return freight funds and are fully responsible for all documents, duties, tariffs, and deposits.

Out of Warranty Service

If the warranty period for your Resistance Unit has expired, if the unit was damaged by misuse or incorrect installation, if other conditions of the warranty have not been met, or if no dated proof of purchase is available, your unit may be serviced or replaced for a flat fee.

To return your Resistance Unit for out of warranty service, please contact Magnificent Revolution.

Payment options such as credit card or money order will be explained by Magnificent Revolution. In cases where the minimum flat fee does not apply, as with incomplete units or units with excessive damage, an additional fee will be charged. If applicable, you will be contacted by Magnificent Revolution once your unit has been received.