

Q: What voltage does the generator produce?

A: *The generator is producing a “wild” A.C. voltage that varies between 0 and 30 Volts. The rectifier (grey/blue box on the front wheel strut) converts this to a D.C. voltage of 12—24 Volts. Inside the desk, electronic circuitry is used to further smooth and “condition” the power to a constant 5V D.C. to meet the USB charging standards. This circuit includes the ultra capacitors which store a small amount of electrical energy inside the desk, allowing us to stop pedaling / switch riders without interrupting the supply of power to the outlets.*

Q: Where did we get the bike?

A: *The bike was purchased from Rock the Bike www.rockthebike.com in California.*

Q: How much did it cost?

A: *A basic recharge station (what we purchased) is currently listed on Rock the Bike’s website for \$3,150.*

More questions about the bike?

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PEDAL-POWERED CHARGING STATION



GENERATOR BIKE EVENTS

The generator bike offers people a place to recharge their phones & other devices while stretching their legs for an exercise break during events. The bike creates opportunities for discussion on many topics, including: renewable energy, energy usage / consumption, the science of electricity generation, and many more.

When pedaled the Recharge Station enclosure glows green for clean energy! The glow is visible from across the room, or in daylight, generating curiosity and interest. Volunteering as a bike “coach” is a fun way to share your knowledge and enthusiasm for powering the north.

EQUIPMENT

- Generator bike
 - Charging desk
 - “Pedal-Powered” sign
 - Accessories box:
 - USB Fan
 - USB Speaker
 - USB connector cables
 - Allen keys
 - Adjustable wrench
 - Instruction booklet
- Safety Rules sign
 - “No riding” sign
 - Shaker Generator
 - Copper pipe section (can be used to help operate the seat clamp)

FREQUENTLY ASKED QUESTIONS...

Q: How much power does the bike produce?

A: *A strong rider on the bike can produce a peak output of 600—700 Watts for short periods of time. Most adults generate about 50—75 Watts at a comfortable “cruising” pace. Actual power output depends on the devices being charged.*

Q: How much energy does the charging desk store?

A: *The charging desk uses capacitors to store a small amount of energy. With 4 devices connected, the desk will go from fully charged to empty in 2-3 minutes. This represents approximately 20 Watts of load, so if the stored energy lasts 3 minutes, the desk holds ~ 1 Wh of energy.*

NOTE: the GNWT subsidizes the first 600 kWh monthly for residential customers during the summer. 1 kWh = 1,000 Wh. So the energy stored in the desk is 1/600,000th of an average summer month’s consumption. In winter terms, the bike desk would need to be charged a MILLION times to match the TPSP subsidized amount of 1,000 kWh/month.

ENERGY CONSERVATION cont'd...

Since there are only 720 hours in 30 days, it would take 23 bikes pedaling around the clock to generate 1,000 kWh in a month. Of course, power demand isn't evenly distributed—so it would take many more bikes at peak times (like while we are cooking or doing laundry), and some of our bike riders could take a break at 2 a.m.

Energy-friendly habits:

- Turn off/unplug lights & appliances when not in use.
- Switch to products that use less power, such as Energy Star appliances and LED lights.
- Choose activities that don't require electricity, such as board games instead of video games, or walking outside instead of using a treadmill.
- Shift “high demand” activities such as plugging in vehicles or using electric clothes dryers to off-peak times. Peak electrical usage in the Northwest Territories normally falls between 11 a.m. and 8 p.m.
- Visit www.powerwisewt.com for more energy-saving tips!

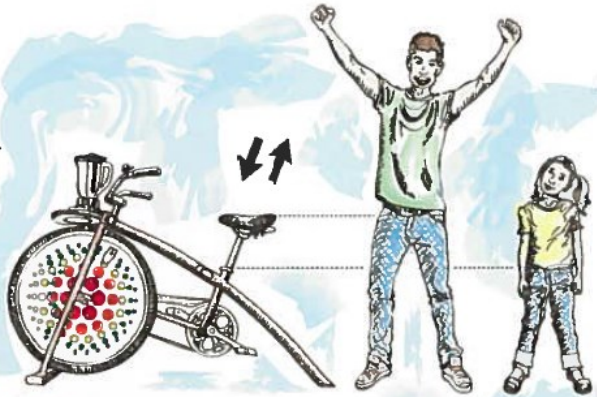
SET-UP

1. Place the bike on a stable surface. Adjust the front levelling feet if necessary.
2. Mount the desk: Use the Velcro straps to attach the desk to the handlebars.
3. If the desk isn't level, loosen the handlebar stem bolts with a hex key and adjust the bars.
4. **Make sure the bolts are tightened so the desk is stable when leaned on.**
5. Insert the round blue and grey plug from the rectifier into the black socket on the bottom of the desk. It locks with a push and twist motion.
6. Test the set-up: Adjust the seat, hop on, and pedal! It is normal for pedaling to feel really hard, and to see no lights for the first 10-20 seconds on the first use of the day. After this the lights should start to glow.
7. Stop pedaling if the “indicator bar” built into the desk flashes white—this means the desk has reached its charging capacity.
8. Connect some devices—a small speaker and USB-powered fan are provided in the accessories box. Add an iPod for music!



COACHING TIPS FOR EVENTS

Raise or lower the saddle for each rider. Align the height of the saddle to the rider's hip.



Check the fit after the rider is seated and pedaling. Their leg should be angled at the bottom of the pedal stroke.



Open lever, align clamp and seat tube gaps, tighten nut, then close lever until firm.



SAFETY TIP: Staff at a generator bike event should keep a close watch on small children in the “audience” to keep their fingers away from the spinning wheel. Younger riders may also try to touch the wheel with their feet. This should be discouraged.

ENERGY CONSERVATION

The generator bike provides an excellent introduction to the topic of energy conservation. When people are riding the bike, they can see the stored energy bar increase as they pedal—unless their effort does not match the consumption from the connected devices!

Encourage riders to try and find a “balance point” where their pedaling speed is producing exactly the amount of power needed by the connected devices (energy bar is not going up or down). To fully charge their cell phone, etc. they would have to maintain this pace for several hours because we can't force power into any electronic device too quickly without frying it. Don't worry! The charging desk has some fancy circuitry that prevents this from happening.

To produce enough electricity for one month of typical residential use, the bike would have to be charged/discharged **a million times!**

Brendan Green fully charged the desk in 19 seconds, but it takes most of us at least one minute. To generate one million charges, we would have to pedal for 16,666 hours!

More science...

Did you know? Almost all electrical generators used by utilities produce electricity in exactly the same way as this bike—by spinning magnets inside coils of wire.

They are just much bigger! The only sources of electricity that do not use magnetism are photovoltaic (solar) panels, fuel cells, and batteries.

Mini Demo: Show kids the “shaker generator” from the accessories box. Demonstrate how the LED lights up when the canister is shaken rapidly. Let them try it too. Then open the container to show them that there are no batteries—just a strong magnet, moving inside a coil of wire.

This is exactly what is happening inside the generator on the bike (black hub in the middle of the wheel). It is also what happens in the generators at power plants.

Ask kids what the energy source is for the generator bike (our bodies / the food we eat), and for power plants (diesel, water, natural gas).

Caution: *The magnets inside the shaker generator are very strong. Avoid opening the container near metal objects, as they are difficult to remove. Do not set the shaker generator on top of electronic devices (phones, iPads, computers, etc.) as the magnets may damage screens or memory circuits.*

GENERATOR BIKE SAFETY RULES

NO unattended riding!

1. Only one rider at a time. No climbing on the back, or other parts of the bike while someone else is riding.
2. Riders must be able to reach the pedals from a seated position. No standing pedaling.
3. Riders must hold the handlebars while pedaling.
4. Keep hands, feet, and loose clothing away from the front wheel.
5. Riders must wear shoes. No bare feet or flip-flops.
6. No drinks or other liquids on the charging desk.
7. Riders must stop pedaling when the bike attendant tells them to (charge indicator lights show white / flash)

OPERATING THE RECHARGE STATION

1. Use charge cables to connect phones or other devices to the USB jacks. All the jacks are equal. When one is connected and charging, they all are.
2. Watch the lights: The green lights on the underside of the desk are decorative. They glow more brightly as the desk fills up with stored energy.
3. There is a strip of red-blue lights in a line next to the USB outlets. As the bike is pedaled, more blue lights will show, indicating how much energy is stored. When all lights are blue, the desk has reached its maximum storage capacity.
4. If you ever see white lights or flashing white lights, **stop pedaling**—you are approaching the safety circuit.
5. **NOTE:** Pedaling too hard (really fast) will activate the safety circuit, causing the bike to suddenly feel like there is no resistance. Wait a few moments and pedaling will feel normal again.

6. Always adjust the seat so riders can use the bike safely. Check the tightness of the clamp connection throughout the day —it may need to be retightened with a wrench periodically.
7. Use the Closed / No riding sign if the bike must be left unattended.

GENERATOR SCIENCE

