



SBU

The Electric Self-Balancing Unicycle

OWNER'S MANUAL

1st Edition, 2009



IMPORTANT:

This manual contains important safety, performance and service information. Read it before you take the first ride on your new SBU and keep it for reference.

For Your Records:

Congratulations on the purchase of your new Focus Designs SBU! This manual is designed to give you the information you need for the safe operation and maintenance of your new SBU. Please read it thoroughly before riding your SBU.

Please take this opportunity to record important information about your new SBU. Record the serial number here in the event that your SBU is lost or stolen. On most models, the serial number is printed on the main front label of the SBU. Consult your retailer if necessary. You may also want to register your serial number with your local police department.

Model

Serial Number

Color

Date of Purchase

Place of Purchase

Please register your SBU online at focusdesigns.com.

Focus Designs Inc.

SBU

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focusdesigns.com

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This manual contains important safety, performance and service information. Read it before you take the first ride on your new SBU and keep it for reference.

A SPECIAL NOTE FOR PARENTS:

As a parent or guardian, you are responsible for the activities and safety of your minor child, and that includes making sure that the SBU is properly fitted to the child; that it is in good repair and safe operating condition; that you and your child have learned and understand the safe operation of the SBU; and that you and your child have learned, understand and obey not only the applicable local motor vehicle, unicycle and traffic laws, but also the common sense rules of safe and responsible unicycling. As a parent, you should read this manual, as well as review its warnings and the SBU's functions and operating procedures with your child, before letting your child ride the SBU.

Printed in the United States of America

General Warning:

Like any sport, unicycling involves risk of injury and damage. By choosing to ride the SBU, you assume the responsibility for that risk, so you need to know, and to practice, the rules of safe and responsible riding and of proper use and maintenance. Proper use and maintenance of your SBU reduces risk of injury. This Manual contains many “Warnings” and “Cautions” concerning the consequences of failure to maintain or inspect your SBU and of failure to follow safe cycling practices.

The combination of the safety alert symbol and the word **WARNING** indicates a potentially hazardous situation which, if not avoided, could result in serious injury or death.

The combination of the safety alert symbol and the word **CAUTION** indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury, or is an alert against unsafe practices.

The word **CAUTION** used without the safety alert symbol indicates a situation which, if not avoided, could result in serious damage to the SBU or the voiding of your warranty. Many of the Warnings and Cautions say “you may lose control and fall.” Because any fall can result in serious injury or even death, we do not always repeat the warning of possible injury or death. Because it is impossible to anticipate every situation or condition which can occur while riding, this Manual makes no representation about the safe use of the SBU under all conditions. There are risks associated with the use of any unicycle which cannot be predicted or avoided, and which are the sole responsibility of the rider.

1. SBU Fit

a. Does your SBU fit you?

Correct fit is an essential element of SBU safety, performance and comfort - it will result in the correct fit for your body. The SBU is designed for riders over 5'5" tall, although it is possible for riders of any height to ride the SBU, it will require assistance from another person while learning how to ride the SBU for the first time. The SBU is easy to adjust to fit your body; there is simply one item that addresses fit, the seat height.





WARNING: If your SBU does not fit properly, you may lose control and fall. Adjust the SBU for proper fit, have someone assist you during the learning to ride process.

b. Is the seat at the right height?

If you are a beginner, we recommend you set the seat height at a level that allows you to place both feet flat on the ground while straddling the SBU's seat. This is important when learning to balance left and right on the SBU. After you have mastered left right balance, we recommend you raise the seat for a higher level of riding comfort.


The seat is adjusted using the 4mm hex wrench, which is provided with your SBU and located in the small pocket of the battery bag, loosen (do not remove) the two screws on the seat clamp in order to move the seat up and down. Make sure to observe the Minimum Insertion requirements of the seat post. The seat post should be inserted into the SBU frame **AT LEAST THREE INCHES**. Once your seat is at the desired height, tighten the screws slightly, and align the seat with the wheel, making sure they are in line with each other, and then tighten so that the seat post does not have movement in any direction.

 **WARNING:** Always make sure that your seat post does not extend from the frame beyond the Minimum Insertion requirements of three inches; the seat post may break, or separate from the frame, which could cause you to lose control and fall.

 **WARNING:** After any seat adjustment, be sure that the seat clamp is properly tightened before riding. A loose seat clamp can cause damage to the seat post, or can cause you to lose control and fall. A correctly tightened seat clamp will allow no seat movement in any direction. Periodically check to make sure that the seat clamp is properly tightened.

2. Safety First

- a. **Always wear an approved helmet when riding your SBU,** attach chin strap, and follow the helmet manufacturer's instructions for fit, use and care of your helmet.
- b. **Also wear other required and recommended safety equipment** such as: elbow pads, knee pads, shin guards and wrist guards.
- c. **Attach Safety Lanyard to yourself when riding.** See section 4b for more information.
- d. **See Appendix A** for more Safety Information.

 **WARNING:** Many states require specific safety devices. It is your responsibility to familiarize yourself with the laws of the state where you ride and to comply with all applicable laws, including properly equipping yourself and your SBU as the law requires.

3. Mechanical Safety Check

Routinely check the condition of your SBU before every ride.

Some service and maintenance can and should be performed by the owner, and requires no special tools or knowledge beyond what is presented in this manual. The following are examples of the type of service you should perform yourself. All other service, maintenance and repair should be performed in a properly equipped facility by a qualified mechanic using the correct tools and procedures specified by Focus Designs.



WARNING: Before performing any work on the SBU disconnect the Battery Pack. To connect / disconnect the Battery Pack, open the top flap of the battery bag, just under the rear of the seat, to gain access to the red and black connectors, simply pull the SBU connector from the Battery Pack connector but holding the plastic connector housings firmly and pulling them apart.

- a. **Nuts, bolts, straps, chain, chain guard, wires, battery, battery bag, etc.** Make sure nothing is loose or damaged. Check all bolts and nuts to make sure they are tight. Check wiring for damage. Check battery bag for rips or tears. With the SBU turned off, lift it off the ground by two or three inches, while holding it let it bounce on the ground. Anything sound, feel or look loose? Do a quick visual and tactile inspection of the whole SBU. Any loose parts or accessories? If so, secure them. If you're not sure, ask someone with experience to check.

- b. **Frame:** Check the frame, particularly in the area around tube joints; the seat post and clamp for any deep scratches, cracks or discoloration. These are signs of stress-caused fatigue and indicate that a part is at the end of its useful life and needs to be replaced.

- c. **Tire:** Make sure the tire is correctly inflated to the recommended pressure that is printed on the sidewall of the tire. The best way to inflate a tire to the correct pressure is with a bicycle pump which has a built-in pressure gauge. Check the tire and look for any cuts in the tread and sidewall. Check to make sure the tire bead is seated evenly on the rim. Replace a damaged tire before riding.



WARNING: Make sure not to ride the SBU with a flat or underinflated tire, this will void your warranty.



WARNING: Never inflate a tire beyond the maximum pressure marked on the tire's sidewall. Exceeding the recommended maximum pressure may blow the tire off the rim, which could cause damage to the SBU and injury to the rider and bystanders – it will also void your warranty.



CAUTION: Pencil type automotive tire gauges can be inaccurate and should not be relied upon for consistent accurate pressure readings. Instead use a quality dial gauge.

- d. **Tire Tube:** If the tube is damaged or punctured we recommend replacing the tube, patches should only be used for an emergency repair and the patched tube should be replaced as soon as possible. To replace the tube:
 - i. Disconnect Battery Pack.

- ii. Loosen the chain tension (see Section 3f for more details)
 - iii. With chain loose remove it from the wheel sprocket.
 - iv. Remove bolts holding wheel bearings, the bearing caps.
 - v. At this point the wheel should slide freely from the frame fork, remove the tire using a bicycle tire remover, and remove the damaged tube.
 - vi. Place a new tube in the tire, place tire onto the wheel making sure the tire bead is seated evenly on the rim.
 - vii. Inflate the tire to recommended pressure that is printed on the sidewall of the tire (see Section 3c for more details).
 - viii. Place wheel back onto frame fork, with wheel bearings seated in the proper position.
 - ix. Place bearing caps over the wheel bearings, start wheel bearing cap bolts by hand, screw them in evenly and tighten the bolts to 45 inch pounds. Do not over tighten; this will damage the wheel bearings. Spin the wheel to make sure it is secure and spins freely.
 - x. Place chain onto wheel sprocket and rotate the wheel to “thread” the chain all the way around.
 - xi. Tighten the chain tension (see Section 3f for more details)
 - xii. Check to make sure everything is secure, and you are ready to ride again.
- e. **Wheel:** Check the wheel by spinning it to make sure it is true (no side to side wobble). If the wheel wobbles side to side, take the SBU to a qualified bike shop to have the wheel trued. Squeeze each adjoining pair of spokes on either side of each wheel between your thumb and index finger. Do they all feel about the same? If any feel loose,

take the SBU to a qualified bike shop to check wheel tension and trueness. Also check the wheel for any damage – replace any damaged parts before riding.

- f. **Chain:** Check the drive chain tension by squeezing both sides of the chain towards each other, chain should deflect about $\frac{1}{2}$ ". If the chain is too tight the chain drive will create much more noise, stress the motor, and wear the sprockets at an accelerated rate. If the chain is too loose, it will rub the chain guard, cause the SBU to behave erratically, or it could come off of the sprockets. To tighten the chain, locate the chain adjustment set screw coming off of the drive assembly pushing on the top of the unicycle fork. Use the supplied $\frac{1}{8}$ " hex wrench, located in the small pocket of the battery bag, tighten until chain deflection is about $\frac{1}{2}$ " – clockwise to tighten, counter-clockwise to loosen the chain tension.



WARNING: If the chain is too loose it could come off of the motor drive sprocket or the wheel sprocket which may result in damage to the SBU, serious injury or death.



CAUTION: Riding the SBU while damaged will void your warranty; inspect your SBU before each ride to make sure it is in good running condition. Doing so will prolong the life of your SBU and possibly your own life.



WARNING: The SBU is technologically advanced and complex. The only serviceable parts on the SBU are the wheel, tire, tube, chain tension and seat. All electronic and drive components need to be serviced by Focus Designs.



WARNING: Many service and repair tasks require special knowledge and tools. Do not begin any adjustments or service on your SBU until you have learned how to properly complete them. Improper adjustment or service may result in damage to the SBU or an accident which can cause serious injury or death.

4. Operation

It's important to your safety, performance and enjoyment to understand how things work on your SBU. We urge you to read and understand the operation of your SBU. If you have even the slightest doubt as to whether you understand something in this section of the Manual, contact Focus Designs.

- a. **Key Switch:** The SBU is powered on and off by the key switch on top of the control enclosure. Always make sure the SBU is firmly on the ground in the upright, ready to ride position, before turning the SBU on. Once the key switch is rotated clockwise to the on position the SBU will self-balance in about 2-3 seconds and the status LED will light. Never leave the SBU switch in the on position when charging or storing.



WARNING: The SBU's motor starts automatically at power up, keep all hands and feet away from moving parts.

- b. **Safety Kill Switch:** The Safety Kill Switch is located on the top of the control enclosure. The kill switch interrupts power between the battery and the motor in case of emergencies. We recommend that the 50" lanyard clip be attached to the rider's clothing at all times. In case of a fall or separation between the SBU and the rider, the SBU will cut power to the motor preventing damage to the rider and

the SBU. If the safety key is removed at any time while the SBU is powered up, the SBU goes into fall detection mode disabling the SBU. To power the SBU up again, turn the key switch to the off position, slide the safety kill switch key back into place, and turn the key switch to the on position. The SBU should be ready to ride again.

- c. **Automatic Fall Detection:** If the SBU detects a fall it will cut power to the motor automatically. If this happens the SBU remains in fall detection mode disabling the SBU. To power the SBU up again, turn the key switch to the off position, and turn the key switch to the on position. The SBU should be ready to ride again.

- d. **Status LED:** The multi color Status LED on the top of the control enclosure indicates when the SBU is powered on; it also indicates the battery level. A fully charged SBU's LED will be completely green. As the battery is depleted the color will shift to red. Charge the SBU when the LED is completely red or when a two-toned beep is heard.

- e. **Status Tone:** The SBU will emit a tone when the rider is getting close to exceeding the SBU's capabilities. Scale back on accelerating / decelerating, reduce speed or requested torque when this tone is heard. When the battery pack is getting low, the SBU will emit a two-toned beep indicating that it's time to charge. A solid beep indicates that the SBU is about to shut down to protect its battery pack; switch off the SBU immediately when this occurs and recharge the Battery Pack.



WARNING: Do not overpower the balancing capabilities of the SBU by aggressively leaning forward or

backward and/or ignoring the limitation indicator tones. Loss of control, serious injury or death may occur from ignoring safety warnings.

- f. **Battery Pack:** The SBU utilizes the latest technology in high power battery packs. This pack is capable of very high power, long life, and is inherently safer than standard battery technology. Although the technology is much safer than standard battery technology, care must be taken to never overcharge, undercharge or damage the battery in any way. The Battery Pack is located in the soft battery bag just under the rear of the seat. The battery will run the SBU for at least an hour, and up to two hours under normal operating conditions. At idle, the SBU's battery will last somewhere around 20 hours. The Battery Pack is fitted with black and red high current connectors. To remove or disconnect the battery, simply pull the SBU connector from the Battery Pack connector but holding the plastic connector housings firmly and pulling them apart. Always unplug the Battery Pack from the SBU when storing the SBU for an extended period of time.



WARNING: Never overcharge, undercharge or physically damage the Battery Pack. If the Battery Pack appears to be damaged, DO NOT USE IT!

- g. **Folding Pedals:** Your SBU is equipped with folding pedals; make sure you take time to understand how they work. These pedals can be folded in order to make the SBU more compact. This is done by pressing on the end of the pedal and folding the pedal up or down. To unfold the pedals simply place your foot on the pedal and it will fold back into place, with a click sound.

- h. **Battery Charger:** Only use the charger supplied by Focus Designs. The high power battery pack must only be charged by the supplied charger. Do not attempt to charge by any other means. The Battery Charger has a connector that plugs into the Battery Pack of the SBU, located in the battery bag. Simply plug the Battery Charger connector into the Battery Pack first. Then connect AC power to the charger. The LED on the charger indicates charging (red) and fully charged (green). The charger automatically stops charging when the battery pack is full. Charge time depends on discharge state of the battery pack and may take up to three hours. Once charged, disconnect the charger from the battery; do not leave the charger connected for extended periods of time.

5. First ride

- a. **Read Section 1** – SBU Fit.
- b. **Perform the Mechanical Safety Check** in Section 3.
- c. **Read Section 2** – Safety.
- d. **Pick a controlled environment, away from cars, people (other than your assistant), obstacles or other hazards.** Ride to become familiar with the controls, features and performance of your new SBU.
- e. **Do not lift the SBU off the ground while powered on.** The SBU will attempt to balance and spin the wheel at a rapid rate in the air. If the SBU is (accidentally) lifted up

while powered, turn it off, place it firmly on the ground and turn it back on.

- f. **Always power on the SBU in the upright (ready to ride) position with the safety lanyard plugged into the SBU.** If the safety lanyard is not plugged in, the SBU will not power up.
- g. **Attach the Safety Lanyard to your clothing.** See Section 4b for more information.
 - a. **Do not hold onto the seat,** this is the number one mistake made by new riders. If you push, pull or hold onto the seat the SBU thinks you are either leaning forward or backward. Use your arms for balance, not seat holding.
 - b. **First thing to learn is the speed control:** lean forward to accelerate, lean back slow down or stop.
 - c. **Again: lean back to slow down.** Start by skating along with one foot dragging the ground to get a feel for the speed control. Speed up, slow down and stop several times until you are comfortable with the speed control.
 - d. **Once you're comfortable with the speed control you can try putting both feet on the pedals.** To balance left and right you twist your lower body to steer the SBU in the direction you're falling. The balls of your feet should be on the pedals so you can also use your ankles to twist the SBU for minor balancing adjustments. Just like a bike, it's easier to balance with some speed. But don't forget to lean back if you're going too fast!

- e. **Again twist your lower body to steer**, do not try to lean or shift your weight, use those hips, and the hips don't lie.
- f. **Use a handrail or a friend's shoulder to support you**, this can be very helpful when learning.
- g. **Your goal is to balance with very small movements** – baby steps. First time riders tend to over correct when trying to balance left and right.
- h. **To turn, you twist your lower body (and the SBU)** in the direction you'd like to go. It's all in the hips.
- i. **Practice, practice, practice.** It takes about an hour to get going forward and stopping with your feet on the pedals. It takes about another 2-5 hours to feel fully confident riding. Don't lose heart, keep practicing, you will get it.
- h. **After an hour of moderate riding on your SBU, the chain will need to be checked and possibly tightened.** See the Mechanical Safety Check section, Section 3e.

6. Changing / Modifying the SBU, or Adding Accessories

There are many components and accessories available to enhance the comfort, performance and appearance of your SBU. However, if you add accessories, you do so at your own risk. Focus Designs has most likely not tested that accessory for compatibility, reliability or safety for the SBU. Check with Focus Designs before adding any accessories to your SBU.



WARNING: Failure to confirm compatibility, properly install, operate and maintain any component or accessory can result in serious injury or death and will void your warranty.



CAUTION: Changing or modifying any factory components of your SBU will void your warranty.

Appendix A - Safety

- i. Always wear a cycling helmet which meets the latest certification standards and is appropriate for the type of riding you do. Always follow the helmet manufacturer's instructions for fit, use and care of your helmet. Most serious injuries involve head injuries which might have been avoided if the rider had worn an appropriate helmet.



WARNING: Failure to wear a helmet when riding may result in serious injury or death.

- ii. Always perform the Mechanical Safety Check before you get on the SBU.
- iii. Always attach the safety kill switch lanyard to your clothing.
- iv. Be thoroughly familiar with the controls of your SBU: key switch, safety kill switch, pedals, etc.
- v. Be very careful to keep body parts and other objects away from the sharp teeth on sprockets; the moving chain; the motor; and the spinning wheel of your SBU.
- vi. Always wear:
 1. Shoes that stay on your feet and will grip the pedals well. Never ride barefoot or while wearing sandals.
 2. Bright visible clothing that is not so loose that it can be tangled in the SBU or snagged by objects at the side of the road, sidewalk or trail.

3. Protective eyewear, to protect against airborne dirt, dust and bugs – tinted when the sun is bright, clear when it's not.
- vii. Ride at a speed appropriate for conditions. Increased speed equals higher risk.
- viii. Do not ride at night or when visibility is obscured, fog, at dawn, dusk or in the dark.



CAUTION: Do not ride the SBU on steep inclines or declines. This may cause the motor and/or battery to overheat. This will void your warranty.



CAUTION: Do not attempt to jump or do stunt riding with your SBU. This will void your warranty.



CAUTION: Do not ride in wet weather, either in rain or on wet surfaces. This will void your warranty.

a. Riding Safety

- ix. Observe all local laws and regulations. Observe regulations about licensing, riding on sidewalks, laws regulating path and trail use, and so on. Observe helmet laws and special traffic laws. It's your responsibility to know and obey the laws.
- x. You are sharing the road or the path with others – motorists, pedestrians and other cyclists. Respect their rights.
- xi. Ride defensively. Always assume others do not see you.
- xii. Look ahead, and be ready to avoid or yield to:
 1. Vehicles slowing or turning, entering the road or your lane ahead of you, or coming up behind you.
 2. Parked cars or car doors opening.
 3. Pedestrians stepping out.
 4. Children or pets playing near the road.

5. Pot holes, sewer grating, railroad tracks, expansion joints, road or sidewalk construction, debris and other obstructions that could cause you to swerve into traffic, catch your wheel or otherwise cause you to lose control and have an accident.
 6. There are many other hazards and distractions which can occur on an SBU ride.
- xiii. Ride in designated lanes or designated paths or as close to the edge of the road as possible, in the direction of traffic flow or as directed by local governing laws.
 - xiv. Stop at stop signs and traffic lights; slow down and look both ways at street intersections. Remember that an SBU always loses in a collision with a motor vehicle, so be prepared to yield even if you have the right of way.
 - xv. Use approved hand signals for turning and stopping.
 - xvi. Never ride with headphones or on your cellular phone. They mask traffic sounds and emergency vehicle sirens, distract you from concentrating on what's going on around you, and their wires can tangle in the moving parts of the SBU, causing you to lose control.
 - xvii. Never carry a passenger.
 - xviii. Never carry anything which obstructs your vision or your complete control of the SBU, or which could cause you to become entangled in the moving parts of the SBU.
 - xix. Never hitch a ride holding on to another moving vehicle or object.
 - xx. Don't weave through traffic or make and moves that may surprise people with whom you are sharing the road.
 - xxi. Observe and yield the right of way.
 - xxii. Never ride your SBU while under the influence of alcohol or drugs, only under the influence of God.

- xxiii. Do not ride in bad weather, when visibility is obscured, at dawn, dusk or in the dark, or when extremely tired. Each of these conditions increases the risk of accident.
- xxiv. Do not ride the SBU off road, only ride on smooth stable paths, such as concrete and asphalt.
- xxv. Don't ride alone in remote areas. Even when riding with others, make sure that someone knows where you're going and when you expect to be back.
- xxvi. Learn to obey the local laws regulating where and how you can ride.
- xxvii. Yield right of way to pedestrians and animals. Ride in a way that does not frighten or endanger them, and stay far enough away so that their unexpected moves don't endanger you. Play dead if approached by a large animal.



WARNING: This Manual contains important safety information. For your child's safety, it is your responsibility to review this information with your child and make sure that your child understands all warnings, cautions, instructions and safety topics. We recommend that you periodically review and reinforce the information in this Manual with younger riders.



WARNING: Failure to follow any of these rules may result in serious injury or death.

Appendix B – Specifications

Performance Specifications

- Style: 1-seat, open-top, single-wheel-drive electric self balancing unicycle.
- Drivetrain: Direct drive, single speed fixed gear with electronic motor control.

- Motor: Permanent magnet electric DC motor with variable drive.
- Chassis: Chromoly steel frame, precision bearings, on an alloy 48-spoke wheel.
- Brakes: Electronically operated direct drive motor to wheel control with regenerative braking.
- Acceleration: 0 to 10 mph in 1 second
- Top Speed: About 10 mph (depending on the rider's weight)
- Range: At least 10 miles (depending on the terrain)
- Battery Life: Over 700 cycles.
- Battery: Custom high quality 36 volt battery.
- Full Charge Time: About 2 hours.

Technical Specifications

- Motor: Permanent magnet electric DC motor.
- Max Net Power: .581 HP (432.88 W) @ 2599 rpm
- Max rotational speed of motor: 3,514 rpm
- Efficiency: 82.7% average, 79.6% at peak power
- Transmission: Direct drive, single speed fixed gear with electronic motor control.
- Reverse: Reverse direction of motor, no speed limit.
- Suspension: Your body.
- Seat: Imitation leather, adjustable height.
- Brakes: Regenerative braking via the motor.
- Wheel: Heavy duty alloy, 48-spoke. Size: 20"x1.75
- Tire: Nylon knobby tread. Min. 40 psi - Max 65 psi. Size: 20x2.125
- Dimensions:
 - Overall length (in. / mm) 20.0 / 508.0
 - Overall width - pedals folded: (in. / mm) 13.5 / 342.9
 - Overall width - pedals ready to ride: (in. / mm) 17.0 / 431.8
 - Overall height: (in. / mm) 34.5 / 876.3

- Curb weight (lbs/kgs) 25.00 /11.34
- Leg Room (in./mm) unlimited / unlimited
- Front Head Room (in./mm) unlimited / unlimited
- Front Shoulder Room (in./mm) unlimited / unlimited

Warranty:

Focus Designs Inc. of 110 W 13th Street, Vancouver, WA 98660 ("Focus Designs") provides a one full year limited warranty from the date of purchase against defects in material and workmanship, to original purchasers of new Self Balancing Unicycles ("SBUs"), separately purchased Focus Designs authorized parts, accessories, and service repair. During this period Focus Designs will repair or replace, at our discretion, the defective component.

This warranty does not apply to improperly installed, handled, abused, damaged in crash, nor to any unit which has been repaired or altered by anyone except Focus Designs. Under no circumstances will the buyer be entitled to consequential or incidental damages.



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