

BOUNDER

Power Wheelchair Owner's Manual



REGISTRATION INFORMATION

Take a moment to fill in the information below. In addition, visit <u>www.wheelchairs.com/registration</u> and complete the registration process to ensure that your warranty is properly put into effect plus allow us to mail to you important notices regarding your new BOUNDER wheelchair.

Company contact info: 21st Century SCIENTIFIC, Inc. 4931 N Manufacturing Way Coeur d'Alene, ID 83815

Customer Service phones: (208) 667-8800 (800) 448-3680

FAX: (208) 667-6600 Email: 21st@wheelchairs.com

BOUNDER Model		
Chair Purchased From:	Date Purchased:	
Chair Frame Serial Number:		

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THE INFORMATION CONTAINED IN THIS DOCUMENT IS SUBJECT TO CHANGE WITHOUT NOTICE

1. INTRODUCTION

Manufactured by:

21st Century SCIENTIFIC, Inc.

4931 N Manufacturing Way Coeur d'Alene, ID 83815

Customer Service phones: (208) 667-8800 (800) 448-3680

1.1 General

Thank you for choosing a Bounder Power Wheelchair.

This owner's manual contains important information about the handling of the product. In order to ensure safety when using the product, read the user manual carefully and follow the safety instructions. If you find that the font size in the print version of the user manual is difficult to read, you can download the pdf from the website. Go to the following webpage: http://www.wheelchairs.com/newbounderinfo.htm. The pdf can then be scaled on screen to a font size that is more comfortable for you. Your BOUNDER may be equipped with any of several different type of electronics. Please verify that the electronics you ordered are installed and that you received the proper manuals. Contact your dealer and/or the factory if an error has occurred.

As a manufacturer of wheelchairs, 21st endeavors to supply a wide variety of wheelchairs to meet many needs of the end user. However, final selection of the type of wheelchair to be used by an individual rests solely with the user and his/her healthcare professional capable of making such a selection. 21st recommends working with a qualified rehab technology provider, such as an ATP (Assistive Technology Professional).

- > Improper setup, service, adjustment or programming may cause injury, damage or death
- > A Qualified technician should setup, service and program the wheelchair
- > DO NOT allow non-qualified individuals to perform any work or adjustments on the wheelchair
- > DO NOT setup or service the wheelchair while occupied except for programming or unless otherwise noted
- > Turn off power BEFORE manually adjusting or servicing the wheelchair
- Ensure all hardware is securely tightened after setup, service or adjustments
- > Warranty may become void if non-qualified individuals perform any work on this product

1.2 Product Description

Your BOUNDER is a superior quality high performance mobility device. For more information about the key features as well as photographs of the product, please refer to the brochure(s) and Retail Order/Quote Form & Price List included with this manual. You may also want to visit our website, <u>www.wheelchairs.com</u>. We recommend you keep all documents regarding your BOUNDER mobility device in a safe place for future reference.

Your BOUNDER may have custom features that are not described in the brochures. The ATP Professional normally describes these custom features to the user. If you do not understand some aspect of your new BOUNDER mobility device, do not hesitate to call our customer service department at (208) 667-8800 or (800) 448-3680.

<u>1.3 Intended Use</u>

The intended use of the device is to provide mobility to persons limited to a sitting position.

<u>1.4 Indication for Use</u>

The indication for use of the BOUNDER Power Wheelchair is to provide mobility to persons limited to a sitting position.

1.5 Regulation

The Bounder Power Wheelchair was successfully tested in accordance to ANSI/RESNA 2009 Wheelchair Standards and satisfies the requirements of these standards.

1.6 Why Your New BOUNDER May Have Dirty Tires!

Every new BOUNDER mobility device is road tested outside for several minutes. The tires may show wear marks. The battery box may show signs that batteries were installed in it. We test every chair as a complete system after it is fully assembled. We think this burn in and road test are important ways we can increase the reliability of your mobility device.

BEFORE DRIVING YOUR WHEELCHAIR

MAKE SURE YOU HAVE READ AND UNDERSTOOD ALL OF THE SAFETY PRECAUTIONS AND OPERATING INSTRUCTIONS CONTAINED IN THIS MANUAL

POWER WHEELCHAIRS ARE INHERENTLY DANGEROUS AND HAVE BEEN KNOWN TO CAUSE SERIOUS INJURY AND EVEN DEATH IF IMPROPERLY OPERATED!

21st Century SCIENTIFIC, Inc. specifically disclaims responsibility for any bodily injury or property damage resulting from any use which does not comply with applicable Federal, state or local laws or which is inconsistent with the safety precautions described throughout this manual.

2.1 Safety & Warning Labels

Your new Bounder Power Wheelchair will have several warning and instructional labels attached to the chair. Make sure you read and understand these labels before operating your wheelchair. Many of the labels below may be attached at various locations on the wheelchair. Your specific configuration may not have all the labels shown. If a label is permanently attached to your wheelchair, do not remove it. If it becomes hard to read or falls off replacement labels can be ordered from the factory.









N 8046 Batteries installed shall be sealed non-spillable and shall meet DOT CFR 173.159 (d), IATA Packing Instructions 806 and IATA Provision A67 Figure 2-14. 24V Gel-cell Circuit Breaker Battery Cable Installation Instructions Label

(See Figure 5-2L & 5-2R in Chapter 5 for more label detail)



Figure 2-15. Manual Brake Release Lever Labels (Left and Right)

Left Handle Label Right Handle Label 2.2 Driving & Operation Safety

It is of the utmost importance that you devote sufficient time to become acquainted with the different buttons, the function and steering controls, the different adjustment possibilities of the seat, etc. of your wheelchair and its accessories before you begin using it. Do not undertake your own first test drive without making sure that you have assistance in the immediate vicinity if you should need help.

Your wheelchair and seat was configured specifically for your needs as prescribed by your healthcare provider. Some adjustments may reduce your wheelchair's performance or safety or may not be appropriate for your needs. Consult your healthcare provider or dealer to obtain proper training for your chair, and before changing the seat positioning or making any other adjustments.

2.2.1 DO NOT Operate Your Wheelchair If Your Judgement or Ability Is Impaired:

Use of the wheelchair while judgement or ability is impaired may result in injury, damage or death. DO NOT operate the wheelchair under the influence of alcohol, medications or other substances or situations that impair judgement or function. DO NOT operate the wheelchair if you are sleepy or your vision is impaired.

2.2.2 DO NOT Drive Your Wheelchair Faster Than It Is Safe to Do So

Drive your wheelchair slowly in confined spaces, when you are near pedestrians or if visibility is poor, too dark or foggy to see clearly. Do not drive your wheelchair faster than you feel comfortable doing so. If you feel your chair is too fast, have your dealer reprogram it to slow it down or change the drive sprockets.

2.2.3 Allow More Room for Stopping as Your Speed Increases

This is especially important at speeds in excess of 7 MPH.

IMPORTANT: TO STOP RAPIDLY, REVERSE THE CONTROL STICK. While this may seem awkward at first, usually after a few minutes of practice, reversing the control stick will seem natural.

WARNING:

NEVER OPERATE YOUR WHEELCHAIR WITH THE ELECTRIC BRAKES REMOVED.

In bad weather, your chair may be very difficult to stop, especially on downgrades due to tire slippage. ALLOW THREE TO FIVE TIMES THE NORMAL AMOUNT OF STOPPING DISTANCE IN EVEN MODERATELY WET WEATHER. DO NOT DRIVE ON GRADES IN ICE OR SNOW AS BRAKING ABILITY MAY BE VIRTUALLY ELIMINATED.

2.2.4 Keep Your Eyes on the Road and Always Be on the Lookout for Trouble Ahead

This is especially important at speeds in excess of 7 MPH. As speed increases, small bumps in the road have greater effect on the wheelchair, and in order to have time as well as maneuvering room to avoid road bumps you must see, identify and respond to them at greater distances.

2.2.5 When Driving at Night or Near Public Rights of Way, Use Your Lights (If Your Wheelchair Is So Equipped)

When driving near public rights of way, at night or in situations with low or poor visibility, increase your ability to see and be seen by others by turning on your headlights. If your chair does not have headlights, avoid driving after dark. Do not remove or cover any safety reflectors mounted on your chair.

If your chair does not have a lighting package installed on it, one can be ordered and installed. Contact your dealer or *21st Century* SCIENTIFIC, **Inc.** for more information.

DO NOT DRIVE AT NIGHT IF YOU HAVE NEITHER LIGHTS NOR SAFETY REFLECTORS.

2.2.6 Use Lap and/or Chest Positioning Straps

If you lack the necessary upper body support to maintain yourself in the proper position when operating your wheelchair, use a lap and/or chest positioning straps. Your BOUNDER comes standard with a seat positioning strap. Seat positioning strap helps reduce the possibility of a fall from the wheelchair especially if your chair comes to a stop quickly. If positioning straps are not present on your chair and you need them, immediately contact your dealer. Have them install the proper positioning strap or straps required for your safe operation of the chair. IMMEDIATELY replace positioning belts that are damaged, worn or frayed.

IMPORTANT: Lap and shoulder positioning belts that are normally sold for use with wheelchairs are *NOT DESIGNED TO BE USED AS* SEAT BELTS (SAFETY CONSTRAINTS) IN LICENSED VEHICLES. In an impact situation, the positioning belts, wheelchair tubing, upholstery, etc., will likely fail, possibly causing serious injury or death.

Seat positioning straps can introduce risks such as strangulation if the user slips down in the chair and can be tightened too much, placing pressure on joints and organs.

CAUTION: Make sure you know how to correctly use each positioning strap, and keep them from dangling into any moveable components, component pathways or dragging along the ground to avoid damage or injury.

2.2.7 Never Defeat or Remove the Built-In Items of Safety Equipment on Your Wheelchair:

Specifically;

- Do not remove the electric parking brakes. They are there to stop you in an emergency. While you may not need them when your chair is operating normally, if the electronics or some other component should fail, the electric brakes will likely be the fastest way for you to stop the chair. They may prevent you from being injured in such a situation.
- Do not defeat the charger interlock. It is there to prevent you from driving away with the charger plugged into the chair, possibly preventing damage to the charger or even injury from occurring.
- Do not remove or defeat the wheelie wheels (anti-tipping devices) from the wheelchair. They prevent the chair from flipping over backwards, especially on up-grades.
- Do not remove or bypass any circuit breakers or fuses that are installed on your chair.
- Do not remove any chain covers that may be installed on your chair (unless performing maintenance or in an emergency).

2.2.8 Keep Fingers and Clothing Away From Drive Mechanism, Wheels, Tires and Other Moving Parts

Do not operate your wheelchair with the electric brakes or chain covers removed as this will increase the likelihood of tangling clothing or body parts in the drive chains or sprockets. Do not change clothes in your chair. Robes, skirts and long loose arm or leg sleeves can be dangerous. Avoid engaging the Brake Release Switch with clothing or a backpack.

NEVER WEAR ANY TYPE OF CLOTHING THAT CAN HANG OUTSIDE OF THE SEATING AREA OF YOUR WHEELCHAIR. SUCH CLOTHING MAY BECOME ENTANGLED IN MOVING PARTS AND PULL PART OF YOUR BODY INTO THE MECHANISM, POTENTIALLY CAUSING SERIOUS INJURY.

2.2.9 Never Operate Your Wheelchair with the Wheelie Wheels Removed or Defeated

They prevent your wheelchair from flipping over backwards, possibly causing serious injury or death.

2.2.10 Avoid Terrain or Grades (Slopes) Steeper Than Those Outlined for Your Configuration

Avoid terrain or grades (slopes) steeper than those specified. It make cause your chair to tip possibly causing serious injury. Travel at a reduced constant speed. Always observe a good safety distance when driving near edges and precipices.

DO NOT:

- Make sudden stops or direction changes
- Use on inclines where line-of-sight is impaired
- Use on inclines or ramps where the surface is uncertain or compromised
- Travel down inclines in reverse. Doing so could cause the wheelchair to tip over resulting in serious injury or death.

A raised seat elevator, tilted seat or reclined back changes the center of gravity and increases the risk of tipping. Therefore, use these seat functions only on flat surfaces and always drive with great caution and at slow speed.

To determine and establish your particular safety limits, practice use of this product on various sloping surfaces in the presence of a qualified healthcare provider before attempting active use of this wheelchair. Always have at least one but preferably two strong able-bodied individuals are present with you at all times to assist you in the event your chair loses power or suddenly goes out of control.

Verify that the hand-grips on the back of your chair are tight on the tubing so that people assisting you could easily grab your chair to stop you in an emergency.

IF YOU DO OPERATE YOUR WHEELCHAIR ON GRADES STEEPER THAN SPECIFIED, YOU DO SO AT YOUR OWN RISK.



Maximum Uphill Slope

Figure 2-15. Traversing Inclines

2.2.11 DO NOT Use Your Wheelchair on Stairs or Escalators

Using your wheelchair on stairs or escalators can lead to serious injury or death. Always use an elevator. Do not lift or move the wheelchair by any of its removable parts such as armrests or footrests. Doing so could lead to personal injury and property damage, including damage to the wheelchair. Never carry the occupant in a wheelchair up or down stairs or an escalator. Doing so may cause serious injury or death to the user.

2.2.12 Use Caution When Driving Up, Over or Off Curbs, Edges or Other Obstacles More Than Specified for Your Wheelchair

Your chair is designed to drive up a curb or other step transition or obstacle up 2.4" (61 mm) high or down at 2.9" (74 mm). Do not attempt to climb or descend curbs, transitions or obstacles higher than what is specified. Doing so can result in a fall or tip over with:

- damage to the wheelchair, or
- even worse, serious injury or death.

Climbing or descending curbs or step transitions or obstacles should be done with an attendant to assist where needed. If you do climb or descend curbs or step transitions or obstacles by yourself, you do so at your own risk.

Use the methods shown in Figure 2-16 to ascend curbs or step transitions or obstacles in the order listed.

 Straight path backwards over obstacle
 Straight path forwards over obstacle
 Angled path forwards over obstacle

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Figure 2-16. Obstacle Negotiation

Move

the backrest into an upright position and lower the seat to the lowest position using the powered seating functions, if equipped. Approach the obstacle and stop the wheelchair 2" to 4" before the obstacle. Approach the obstacle by deflecting the joystick, once the wheels are over the obstacle or on top of the curb or step transition, return the joystick to neutral.

2.2.13 DO NOT Drive Your Wheelchair on City Streets or Near Moving Motor Vehicles

It is difficult to see a wheelchair from an automobile and most drivers do not expect to encounter a wheelchair, especially in the street. If you must temporarily drive on a city street, do so with extreme caution and always turn on your lights (if your chair is so equipped). Keep as far to the side of the road as possible. ALWAYS GIVE THE RIGHT OF WAY TO LICENSED MOTOR VEHICLES. Use your rear view mirror (if your chair is so equipped) to watch traffic behind you. Use your horn (if your chair is so equipped) to avoid an accident. If your wheelchair does not have these safety devices, they can be ordered and installed. Contact your dealer or 21st Century Scientific, Inc. for more information.

2.2.14 Use Caution When Operating Your Wheelchair on Irregular and Unpaved Surfaces

There are times when you may need to take your wheelchair off the pavement. Use caution when operating your wheelchair in irregular and unpaved surfaces. Go slow and be careful. It is recommended that you have someone able-bodied with you. Always observe a safety distance when driving near edges and precipices.

2.2.15 Avoid Operating Your Wheelchair in Mud, Snow, or Other Loose or Soft Surfaces

Your wheelchair is not an ATV! Driving in/near snow, mud, soft or sandy soil should be avoided, even if your chair is equipped with offroad tires, *you can become stuck*. Ensure there is a solid base under any soft, unstable material. If you do have to traverse these conditions only do so with your power seating lowered to its safest position. **ALWAYS** have an able-bodied person with you that can assist if you get stuck or become unstable. Good judgement is essential. Use proper care and cleaning should your chair become dirty after driving in these conditions.

2.2.16 Avoid Crossing Railroad Tracks

This is especially true if the temperature is very hot or very cold. If you become stuck and no one is around to help, this could result in serious injury or death.

2.2.17 Limit Exposure of the Wheelchair to Rain, Snow, Ice and Dampness

The Bounder Power Wheelchair can handle exposure to these conditions, but salt water and high humidity can quickly rust/corrode parts and damage upholstery. Over time, this could cause electrical/mechanical problems and increase the need for maintenance on your chair.

DON'T: Take your wheelchair too close to the edge of rivers, lakes, pools or other bodies of water. Your wheelchair doesn't FLOAT.

DON'T: Take a shower with your wheelchair!

- **DON'T:** Leave your wheelchair in a **damp environment or out in the rain or snow**!
- **DON'T**: Use your wheelchair if the joystick boot is torn or cracked. Replace the boot immediately.
- **DON'T:** Leave you wheelchair outdoors if the temperature is over 120° F or under 35° F.
- **DON'T:** Drive the wheelchair onto frozen lakes or other frozen body of water for any reason.

2.2.18 Keep Hot Objects Away From the Wheelchair

Do not let your chair sit stationary near open flames, electric radiant heaters, or other intense heat sources. DO NOT allow any hot objects (cigarettes, cigars or other hot objects) around your chair to get nearer than 2 inches to your upholstery.

2.2.19 DO NOT Let Others Drive Your Wheelchair

Your wheelchair is specifically fitted to you and allowing another person to drive the wheelchair could result in dimensions being adjusted or damaged such that it could cause harm to the device or the user.

2.2.20 DO NOT Attempt to Carry Another Occupant

Your wheelchair is designed to carry one individual only. Someone could get injured, block the operator's vision, cause loss-of-control of the wheelchair and exceed the weight capacity of the chair.

Avoid carrying extra bags, gear or extra weight on your wheelchair. Also, gaining user-weight over time can also become problematic as the components can fail from fatigue and cause serious injury to the user or anyone nearby.

2.2.21 DO NOT Use Your Power Wheelchair to Injure Yourself, Others or Damage Property

Your wheelchair is powerful. *IF YOU ARE AROUND OBJECTS, OR OTHER PERSONS SLOW DOWN*. Always use good judgement, drive slowly and avoid running into people or objects as this can cause property damage or serious injury to another person and/or yourself. **DRIVE CAREFULLY!**

2.2.22 Ensure You Have Adequate Ground Clearance Under Your Chair

Damage to the wheelchair or injury to yourself can occur with low ground clearance under your footplates or footboard, specifically when traveling over obstacles or up inclines. Always maintain clearance of at least 2.5" between the ground/driving surface and the bottom of the footplates/footboard.

2.2.23 Use Caution When Transferring Into and Out of Your Wheelchair

Improper transfer techniques may cause serious injury or damage. Before attempting transfers, consult a healthcare professional to determine proper transfer techniques. Always turn the power off before transferring. Never push off the footplates or footboard when transferring. Never stand on the footplates or footboard.

2.2.24 Avoid Contact With Pinch Points

Pinch points can cause major or serious injury. Be mindful of potential pinch points and use caution when using your wheelchair.

To avoid injury, use caution when adjusting/using the following items (if your chair is so equipped):

- Power Tilt and Seat Elevate systems
- Self-supporting arm pivots
- Footboard pivot
- Legrest and footrest latches and pivots
- Clutch levers

2.2.25 Use Caution When Freewheeling the Wheelchair

In order to prevent the wheelchair from rolling away, ensure the wheelchair is on a level surface before releasing the brakes. Do not put your wheelchair in freewheel mode while on an incline. This could cause the wheelchair to roll on its own causing injury and property damage, including damage to the wheelchair.

Never attempt to freewheel the wheelchair yourself always have an attendant do so. Do not attempt to put the chair into freewheel mode by yourself.

2.2.26 Use Extreme Caution When Around Bodies of Water Such as, Lakes, Rivers or the Ocean

Do not get too close to the edge of a body of water. Surfaces around bodies of water can be unstable. If you approach an unfamiliar surface and feel uneasy about driving on that surface, avoid that surface. If your wheelchair ends up going into the water, it can cause damage to wheelchair and potentially cause death to the operator.

Salt water is very corrosive and can cause damage to electrical connections and many other components on your wheelchair.

2.2.27 Use Caution When Weight Training

Use of the device while weight training can result in the device tipping over, causing injury or death.

2.2.28 DO NOT Disengage the Manual Brake Release Levers While Chair is on an Incline!

Disengaging the brakes on an incline may allow the chair to roll down the incline uncontrollably. The electronics will not allow chair operations until the manual brake release levers are returned to their normal, lowered, engaged position.

2.3 Electrical System Safety

2.3.1 Be Prepared for Failures in the Electrical System at Any Time

Electronic components, whether supplied by 21st Century SCIENTIFIC, Inc. or others are in general very reliable but, failures can occur at any time WITHOUT WARNING and can cause injury to yourself or others.

Accordingly, when you operate your wheelchair, plan for that possibility. Generally, your chair will come to a stop quickly when the electronics enter an error state and show an error code on the hand control. In some cases, the hand control display could turn off. This could result from many things from a unplugged or pinched cable to a bad wheelchair component.

PLAN for the possibility that turning the power off may be necessary rather than just releasing the joystick. Turning the chair power off will normally set the electric brakes and prevent chair movement. Practice this maneuver to ensure that you could do it efficiently in an emergency.

Do not operate your wheelchair until it has been inspected by and/or serviced by your dealer.

2.3.2 Do not Let Your Hand Fall Off the Hand Control

If using a hand control, ensure that your hand and arm are stable and secure and that you can deflect the joystick in its full travel in all directions. If your hand slips off the joystick it could inadvertently cause loss of control of the wheelchair, resulting in serious injury or death.

2.3.3 Avoid Stalling Your Wheelchair on Obstacles, Inclines or Soft Surfaces

A stall condition occurs when you deflect the joystick all the way in any direction and your wheelchair cannot climb the grade, overcome the obstacle or will not move through the soft surface (i.e., it remains stationary). If your chair can only barely move, it is being strained. Continuing to hold the joystick deflected will only cause the motors and electrical system to overheat and shorten the battery life.

Your wheelchair electronics are equipped with thermal protection. As the electronics heat up, they will limit the power delivered to the motor. It may be necessary to let the chair set idle for several minutes to allow the electronics to cool down.

2.3.4 DON'T Operate Your Wheelchair if the Battery Charge Is Nearly Depleted and DON'T Completely Discharge Your Batteries

As the batteries near full discharge, the top speed of the chair as well as the power available will rapidly decrease. Avoid driving your chair in this condition, especially on grades, as it is unsafe and will greatly shorten the life of your batteries.

Operating your wheelchair until the batteries become depleted could leave you stranded. Never start out on a long trip if your batteries are not fully charged and in good condition.

If your batteries do become completely discharged, charge them immediately. Leaving them in a discharged state will cause permanent damage to the batteries.

2.3.5 Recharge Your Wheelchair Batteries Only in a Well Ventilated Room

Gases issuing from a recharging battery are explosive and can cause serious injury and damage. Do not smoke, light a match or create sparks near a battery that is being recharged. Read the battery manufacturer's warning on the top of your batteries and the charger manual that accompanied your charger.

2.3.6 DO NOT Plug Your Battery Charger into a Household Type Extension Cord

Use of extension cords can cause the charger to not function properly. Using one that is not rated for the correct voltage/amperage can result in a fire or other unforeseen damage.

2.3.7 Limit Exposure to Rain, Snow and Other Liquids

- **DON'T** Expose electrical connections or components to sources of liquid or dampness
- **DON'T** expose the battery charger to sources of liquid or dampness

Wheelchairs that are used by incontinent users and/or are frequently exposed to water/liquids may require replacement and inspection of electrical components more frequently than the normal maintenance schedule dictates. Electrical components damaged by corrosion MUST be replaced immediately. Corroded electrical components due to water and/or liquid exposure, or incontinent users can result in death, serious injury, or damage.

Check:

- To ensure that the battery covers are secured in place
- The joystick boot is NOT torn or cracked where water can enter
- That all electrical connections are secured

2.3.8 Cut or Frayed Wires Can Cause Electrical Shock

Electric shock can cause serious injury or death. To avoid electric shock, inspect plugs and cords for cuts and/or frayed wires. Have cut or frayed wires repaired or replaced immediately.

2.4 Electromagnetic Interference (EMI) (EMC)

EMI from radio wave sources may affect powered wheelchairs, resulting in unintended brake release and/or powered wheelchair movement. *This could lead to serious injury, death, or property damage.* The US Food and Drug Administration (FDA) requires that the following information accompany all power wheelchairs sold after December 2, 1994.

CAUTION: IT IS VERY IMPORTANT THAT YOU READ THIS INFORMATION REGARDING THE POSSIBLE EFFECTS OF ELECTROMAGNETIC INTERFERENCE ON YOUR POWERED WHEELCHAIR

Electromagnetic Interference (EMI) From Radio Wave Sources

Powered wheelchairs and motorized scooters (in this text, both will be referred to as powered wheelchairs) may be susceptible to electromagnetic energy (EM) emitted from sources such as radio stations, TV stations, amateur radio (HAM) transmitters, two-way radios, and cellular phones. The interference (from radio wave sources) can cause the powered wheelchair to release its brakes, move by itself, or move in unintended directions. It can also permanently damage the powered wheelchair's control system. The intensity of the interfering EM energy can be measured in volts per meter (V/m). Each powered wheelchair can resist EMI up to a certain intensity. This is called its "immunity level". The higher the immunity level, the greater the protection. At this time, current technology is capable of achieving at least a 20 V/m immunity level, which would provide useful protection from the more common sources of radiated EMI. The immunity level of this powered wheelchair model is not known.

There are a number of sources of relatively intense electromagnetic fields in the everyday environment. Some of these sources are obvious and easy to avoid. Others are not apparent and exposure is unavoidable. However, we believe that by following the warnings listed below, your risk to EMI will be minimized.

The sources of radiated EMI can be broadly classified into three types:

<u>Hand-held portable transceivers</u> (transmitters-receivers) with the antenna mounted directly on the transmitting unit. Examples include: citizen band (CB) radios, "walkie-talkie," security, fire, and police transceivers, cellular telephones, and other personal communication devices.

**NOTE: Some cellular telephones and similar devices transmit signals while they are ON, even when not being used.

- 2) <u>Medium-range mobile transceivers</u> such as those used in police cars, fire trucks, ambulances, and taxis. These usually have the antenna mounted on the outside of the vehicle.
- 3) **Long-range transmitters and transceivers** such as commercial broadcast transmitters (radio and TV broadcast antenna towers) and amateur (HAM) radios.

NOTE: Other types of hand-held devices, such as cordless phones, laptop computers, AM/FM radios, TV sets, CD players, and small appliances, such as electric shavers and hair dryers, so far as we know, are not likely to cause EMI problems to your powered wheelchair.

2.4 Electromagnetic Interference (EMI) (EMC) (continued)

Powered Wheelchair Electromagnetic Interference (EMI)

Because EM energy rapidly becomes more intense as one moves closer to the transmitting antenna (source), the EM fields from hand-held radio wave sources (transceivers) are of special concern. It is possible to unintentionally bring high levels of EM energy very close to the powered wheelchair's control system while using these devices. This can affect powered wheelchair movement and braking. Therefore, the warnings listed below are recommended to prevent possible interference with the control system of the powered wheelchair.

WARNINGS

Electromagnetic interference (EMI) from sources such as radio and TV stations, amateur radio (HAM) transmitters, two-way radios, and cellular phones can affect powered wheelchairs and motorized scooters. Following the warnings listed below should reduce the chance of unintended brake release or powered wheelchair movement which could result in serious injury.

Other Sources of EMI:

<u>Radio-Frequency Identification (RFID)</u> - RFID is commonly used on product labels. Exposure is common, but the potential risk of minimal. Use caution when exposed to items that emit RFID.

Surveillance Systems (e.g., electromagnetic anti-theft systems, metal detectors) - This product has not been tested for radio frequencies used in surveillance systems. Avoid surveillance systems such as anti-theft systems and metal detectors. Always transfer out of your wheelchair if it has to go through a surveillance system. Never drive your wheelchair through a medical detector or surveillance system.

<u>Diathermy</u> - Diathermy frequencies are often used in physical therapy and surgical procedures. This product has not been tested for diathermy radio frequencies. Always transfer out of the wheelchair prior to exposure from devices that emit diathermy radio frequencies. Ensure that your BOUNDER Power Wheelchair is not in the same room as the device emitting diathermy radio frequencies.

<u>Electrocautery</u> - Devices that emit electrocautery frequencies are often used in the surgical setting. This product has not been tested for electrocautery radio frequencies. Always transfer out of the wheelchair prior to exposure from devices that emit electrocautery radio frequencies. Ensure that your BOUNDER Power Wheelchair is not in the same room as the device emitting electrocautery radio frequencies.

- a) Do not operate hand-held transceivers (transmitters-receivers), such as citizens band (CB) radios, or turn ON personal communication devices, such as cellular phones, while the powered wheelchair is turned ON
- b) Be aware of nearby transmitters, such as radio or TV stations, and try to avoid coming close to them
- c) If unintended movement or brake release occurs, turn the powered wheelchair OFF as soon as it is safe
- d) Be aware that adding accessories or components, or modifying the powered wheelchair may make it more susceptible to EMI (Note: There is no easy way to evaluate their effect on the overall immunity of the powered wheelchair)
- e) Report all incidents of unintended movement or brake release to the powered wheelchair manufacturer, and note whether there is a source of EMI nearby

Important Information

- 20 volts per meter (V/M) is a generally achievable and useful immunity level against EMI (as of May 1994) (the higher the level, the greater the protection)
- EMI affecting other products may result in injury or damage.
- To avoid impacting the operation and function of other products:
- Products on or near the mobility device may be impacted by emissions from this product if they have a sensitivity level that is lower than the recognized standard and provided by this mobility device.
- Refer to the manufacturer specifications for any electronic device BEFORE use near this product to determine its level of immunity and potential risk.
- Wheelchairs are known to be not MR compatible or safe as presence in an MR environment could lead to serious injury or death.

2.5 Mechanical System Safety

2.5.1 DO NOT Operate Your Power Wheelchair If It Is Unsafe

21st Century SCIENTIFIC considers your chair to be unsafe if ANY OF THE FOLLOWING ARE TRUE:

- Your dealer has determined that the chair is unsafe when you are driving it.
- You (the user of the chair) feel out of control or unsafe when operating the chair.
- The factory has determined that the chair is unsafe when you are driving it.

Since the driver of a wheelchair assumes much of the liability for operating the chair, if you feel unsafe when you drive your wheelchair, do not operate the chair. Contact your dealer or the factory for advice. Many times deterioration of your chair with use, or a change in your physical, mental or psychological condition may turn what was once a safe condition into an unsafe one. Often, a minor change in your power wheelchair or an electronics adjustment may restore safe operation for you. Other times extensive changes or the use of a different chair may be necessary. You are still liable for driving your wheelchair if you cannot do it safely.

DO NOT CONTINUE TO OPERATE IN AN UNSAFE MANNER. THERE IS NO EXCUSE FOR OPERATING AN UNSAFE WHEELCHAIR.

2.5.2 Avoid Sharp Edges

There may be components that may have sharp edges on your wheelchair that can cause serious injury. Be mindful of these items and use caution when encountering them.

2.5.3 DO NOT Drive the Wheelchair With Worn or Damaged Components

There is a maintenance schedule in Chapter 6; use it. Letting the chair lapse into disrepair or poor maintenance practices not keeping up with the schedule could cause an unsafe situation or injury to the user or others nearby.

Ensure all fasteners are tight by checking them regularly.

2.5.4 Use Only OEM Replacement Parts and Fasteners

Some people may try to repair their chair using fasteners that are not of the high-strength quality originally provided with the chair. When in doubt of the correct replacement hardware or components to use, call the factory or dealer for guidance. Using the wrong type of fastener or part can cause serious injury to yourself or others.

2.5.5 Make Sure That the Electric Brakes on Your Wheelchair Do Not Drag

Do not drive your wheelchair if:

- The brakes make any scraping noises
- The chair cannot be pushed when the brakes are released
- The brakes get too hot to touch

If you drive your chair with dragging brakes, you can rapidly overheat your motors, necessitating a costly motor replacement. The exposed metal surfaces of the brake might also burn you. *DON'T DO IT!*

2.5.6 Guard Against Your Body, Clothing, or Any Combustible Object From Coming Into Contact With Hot Objects on the Chair

Motors and electronic components can get very hot if severely strained. Electric brakes usually will be quite warm, but can get very hot if one of the brakes drags. Headlights use LED technology and are generally only warm to the touch, prolonged physical contact with a headlight could cause serious burns. Covering a headlight with fabric will cause it to become very hot and will increase the likelihood of becoming burned if contacted. Be extra careful if you do not possess normal thermal sensitivity as you might get burned and not know it immediately. Be mindful of hot surfaces on your chair and avoid touching them.

2.5.7 Wheelchair Backs Can Cause Poor Weight Distribution

Many dealers install aftermarket rehab backs. Ensure that the wheelchair back is installed correctly and that it is not allowing you to go too far back causing a tipping hazard or pushing you too far forward causing poor performance.

2.6 Power Seating Safety

2.6.1 Keep Everything Clear of Pinch Points Before Operating Any of the Controls

If your power wheelchair is equipped with any type of power actuated system, you can severely injure yourself or others if body parts, clothing or other objects are caught in the pinch points.

2.6.2 If Your Power Wheelchair Is Equipped With a Power Recline System

The backrest position can cause poor weight distribution and change the center-of-gravity. Carrying bags or extra items on the back of the chair can also cause instability. ALWAYS return the reclining back to the full upright position before driving the wheelchair on slopes or uneven terrain. If you do not, the chair may tip over backwards, possibly causing serious injury.

Never recline the back away from the upright position if the anti-tippers (wheelie wheels) have been removed or defeated. If you do, the chair may tip over backward, possibly causing serious injury.

2.6.3 If Your Power Wheelchair Is Equipped With a Power Tilt System

If your wheelchair allows you to drive with the seat tilted do so only at slow speeds on smooth and level surfaces.

Never tilt the seat back away from the upright position if the wheelchair is facing up-hill on an incline. Return the tilted seat and back to the full upright position before driving the wheelchair on any uphill slope or uneven terrain.

Never tilt the seat and back away from the upright position if the anti-tippers (wheelie wheels) have been removed or defeated.

Do not operate the tilt mechanism if your legs, arms or other body parts are under an obstacle. This includes tables and desks.

If you do any of the above, the chair may tip over backwards possibly causing serious injury or death.

2.6.4 If Your Power Wheelchair Is Equipped With a Power Seat Elevator

You may be able to drive your wheelchair at slow speeds when elevated on smooth level surfaces only if you are under 400 lb. The wheelchair is prevented from driving when elevated for users over 400 lb.

Never elevate the seat if the wheelchair is on an incline. Always return the seat elevator to the fully lowered position before driving the wheelchair on any incline or uneven terrain. If you do not, the chair may tip over, possibly causing injury.

Never elevate the seat if the anti-tippers (wheelie wheels) have been removed or defeated.

If you do any of the above, the chair may tip over backwards possibly causing serious injury or death.

Do not operate the seat elevator if your legs, arms or other body parts are under an obstacle. This includes tables and desks. If you do, you may injure yourself and/or damage the seat elevator.

2.6.5 If Your Power Wheelchair Is Equipped With Manual or Power Elevating Legrests or Power Footboard

Remember to return the legrests/footboard to the fully lowered position before driving the wheelchair. If you do not, your legs and the legrests will stick out to the front, making leg injuries and/or legrest component damage likely.

Do not elevate legrests/footboard if your legs are under an obstacle. This includes table and desks. If you do, you may injure your legs and/or damage the legrests or footboard.

<u>2.7 Transport Safety</u>

2.7.1 DO NOT Use Your Wheelchair as a Seat in a Licensed Motor Vehicle

Your Wheelchair has not been crash tested to WC-19 Standards. Doing so could result in serious injury and/or death. Instead, transfer the wheelchair user to an automotive seat.

IMPORTANT: IF YOU DO USE YOUR POWER WHEELCHAIR AS A SEAT IN A LICENSED VEHICLE, YOU DO SO AT YOUR OWN RISK. YOU MAY VOID YOUR ENTIRE WHEELCHAIR WARRANTY, AND YOU COMPLETELY ASSUME ALL LIABILITY FOR ANY AND ALL DAMAGES.

2.7.2 Use Caution When Transporting the Wheelchair in a Motor Vehicle

When transporting your wheelchair, remember the following:

- Never let anyone sit in the wheelchair while the motor vehicle is moving.
- Always secure the wheelchair in the vehicle when transporting.
- The power must be turned off.
- All power seating actuators should be moved to their "home/lowered" positions.

2.7.3 Use Extreme Caution When Using Vehicle Lifts

Failure to observe the following could result in serious injury or death:

- Verify that the vehicle is in PARK and the parking brake set BEFORE using the lift.
- When driving the wheelchair on the lift platform, select a slow drive program. Only deflect the control stick (joystick) as far as necessary to maneuver as needed.

There are two reasons for this:

- 1) The raised front rollstop (aka outboard rollstop) prevents slow and unintentional rolling off of the platform. It is **NOT** intended to stop a fast-moving wheelchair, which might tip upward on the rollstop (or even worse, roll up and over the rollstop) if the small front wheels collide with the rollstop.
- 2) If anything causes the wheelchair control stick to deflect unintentionally (such as reaching for something and accidently hitting the control stick), the resulting movement of the wheelchair will be greatly reduced if the chair is set to a slow speed program rather than a fast one.
- When using a lift, the wheelchair occupant <u>must</u> be FACING OUTWARD on the platform when entering (or exiting) the vehicle (see Figure 2-17 on the next page).
- If you are in the wheelchair on the lift platform and ready to move the platform up or down, MAKE SURE YOU TURN OFF THE CHAIR POWER BEFORE YOUR MOVE THE LIFT!
- If for some reason the electric brakes on your wheelchair are not working or have been defeated, do not operate the lift until the electric brakes are restored to operation.
- Never attempt to carry loose items with you while sitting in the chair on the platform of the lift.

This includes placing items:

- on the platform of the lift
- on the seat of the wheelchair
- on your lap
- in your hand
- under your arm
- on your legs or front rigging
- in your teeth or mouth while operating the lift or the wheelchair. Especially, don't attempt this with groceries or other items.

These items may shift, fall, strike the controls of the wheelchair or lift, or otherwise cause you to lose control of the chair or lift. A loose object striking the control stick of the wheelchair can cause the wheelchair to shoot off the end of the lift platform. *If you need to move anything that is large, heavy, awkward or loose, GET HELP first!*

- Avoid using a wheelchair lift in bad environmental conditions. This includes harsh temperatures, stormy weather, poor lighting, etc. When temperatures increase above 100 °F or drop below freezing, there is an increased probability that the wheelchair, lift or vehicle may fail.
- Never overload the lift. Bounder Wheelchairs are typically heavier than most power wheelchair as they have larger batteries, motors, electric brakes and most components are stronger. Lifts rated at 800 lbs or more are often needed, especially if the user is bariatric.
- Most lifts are designed for **ONE wheelchair and its occupant**. Don't overload the lift or stack other items on the lift.
- Be certain the wheelchair fits safely on platform. It must not extend beyond the edges of the platform or interfere with operation of the rollstop(s).
- Keep arms, legs, fingers, toes, and clothing away from moving lift parts.
- Make certain that no one is standing in front of the lift while deploying the platform. Keep other people and pets clear of the lift while it is in operation.
- Do not allow an untrained person to operate the lift.
- Careful supervision is necessary if the lift is used by or near children.
- Do not allow anyone to stand on the bridgeplate (aka rear rollstop. This is the plate that bridges the gap between the platform and the lift baseplate when the platform is at the vehicle floor level. It also acts as a rear rollstop when the platform is in motion).
- Never leave the platform outside of the vehicle. Return the lift to its stowed position when not in use.
- Do not place a wheelchair on the lift if it is too large for the vehicle. The wheelchair must be able to pivot freely inside the vehicle to comply with the lift instructions for entering and exiting the vehicle.
- Many lifts allow manual operation if the electrical operation of the lift fails. Read and be familiar with how to operate your lift manually. Practice doing it occasionally so that you know to do it if the need arises.

2.8 Wheelchair Lifts

2.8.1 Wheelchair Lift Safety Guidelines

Wheelchair lifts are inherently dangerous! Be extremely careful when using a wheelchair lift.

- NEVER OPERATE A LIFT (ESPECIALLY ALONE) IF:
 - YOUR CHAIR IS NOT OPERATING PROPERLY
 - YOUR VISION IS IMPAIRED
 - YOU ARE SLEEPY
 - YOU ARE INTOXICATED
 - YOU ARE UNDER THE INFLUENCE OF DRUGS
 - YOU ARE TAKING MEDICATION WHICH MAKES YOU DROWSY
 - OR FOR ANY OTHER REASON LACKING THE NECESSARY ALERTNESS OF MIND, DEXTERITY OF BODY OR SOUNDNESS OF JUDGMENT

LIFT ACCIDENTS ARE ALMOST ALWAYS SERIOUS OR FATAL.

Refer to Figure 2-17 as you read this section. They are referred to as "guidelines" because some of the items may need to be eliminated or modified to be compatible with the particular lift you are using.

2.8.2 Before Using a Wheelchair Lift

Before using a wheelchair lift remember:

- 1) Inspect the lift before use. **DO NOT** use the lift if an unsafe condition exists or unusual noises or movements are detected. If such problems are found, contact a wheelchair lift dealer for service before using the lift.
- 2) Read and comply with all warning labels and symbols affixed to wheelchair lift, and with any other safety information that was provided with the lift at the time of delivery.
- 3) Wheelchair lifts can and do vary from model to model. If the safety precautions herein seem to be in conflict with those provided by your lift manufacturer or dealer, follow the instructions supplied with your lift.
- 4) Do not place large equipment, furniture or other objects in the vehicle in such a manner that it prevents the proper maneuvering of your wheelchair in the vehicle. You must be able to turn the chair around so that you can safely exit facing outward when on the lift platform.



Figure 2-17. Orientation on Lift

5) **21st Century SCIENTIFIC, Inc.** recommends that you always carry a cell phone with you on your power wheelchair. If necessary, get a phone that has voice recognition dialing so that you can rapidly summon aid when needed.

A cell phone is essential if you do any of the following activities by yourself:

- Drive outside in your power wheelchair
- Drive a licensed vehicle
- Operate a wheelchair lift

Also, a loud horn on your wheelchair can often be used to rapidly summon nearby aid in certain situations.

6) Maintain your vehicle, lift and wheelchair in good condition. Follow the manufacturer's maintenance and service recommendations.

2.8.3 General Safety Precautions When Using a Wheelchair Lift

General precautions to keep in mind when using a wheelchair lift:

- Verify that the vehicle is in PARK and the parking brake set BEFORE using the lift.
- When driving the wheelchair on the lift platform, select a slow drive program. Only deflect the control stick (joystick) as far as necessary to maneuver as needed.

There are two reasons for this:

- 1) The raised front rollstop (aka outboard rollstop) prevents slow and unintentional rolling off of the platform. It is **NOT** intended to stop a fast-moving wheelchair, which might tip upward on the rollstop (or even worse, roll up and over the rollstop) if the small front wheels collide with the rollstop.
- 2) If anything causes the wheelchair control stick to deflect unintentionally (such as reaching for something and accidently hitting the control stick), the resulting movement of the wheelchair will be greatly reduced if the chair is set to a slow speed program rather than a fast one.

2.8.3 General Safety Precautions When Using a Wheelchair Lift (continued)

- When using a lift, the wheelchair occupant <u>must</u> be FACING OUTWARD (see Figure 2-17) on the platform when entering (or exiting) the vehicle.
- If you are in the wheelchair on the lift platform and ready to move the platform up or down, MAKE SURE YOU TURN OFF THE CHAIR POWER BEFORE YOUR MOVE THE LIFT!
- If for some reason the electric brakes on your wheelchair are not working or have been defeated, do not operate the lift until the electric brakes are restored to operation.
- Never attempt to carry loose items with you while sitting in the chair on the platform of the lift.

This includes placing items:

- on the platform of the lift
- on the seat of the wheelchair
- on your lap
- in your hand
- under your arm
- on your legs or front rigging
- in your teeth or mouth while operating the lift or the wheelchair. Especially, don't attempt this with groceries or other items.

These items may shift, fall, strike the controls of the wheelchair or lift, or otherwise cause you to lose control of the chair or lift. A loose object striking the control stick of the wheelchair can cause the wheelchair to shoot off the end of the lift platform. *If you need to move anything that is large, heavy, awkward or loose, get help.*

- Avoid using a wheelchair lift in bad environmental conditions. This includes harsh temperatures, stormy weather, poor lighting, etc. When temperatures increase above 100 °F or drop below freezing, there is an increased probability that the wheelchair, lift or vehicle may fail.
- Never overload the lift. Bounder Wheelchairs are typically heavier than most power wheelchair as they have larger batteries, motors, electric brakes and most components are stronger. Lifts rated at 800 lbs. or more are often needed, especially if the user is bariatric.
- Most lifts are designed for ONE wheelchair and its occupant. Do not overload the lift. Do not stack other items on lift.
- Be certain the wheelchair fits safely on platform. It must not extend beyond edges or interfere with operation of rollstop(s).
- Keep arms, legs, fingers, toes, and clothing away from moving lift parts.
- Make certain that no one in standing in front of the lift while deploying the platform. Keep other people and pets clear of lift while it is in operation.
- Do not allow an untrained person to operate the lift.
- Careful supervision is necessary if used by or near children.
- Do not allow anyone to stand on the bridgeplate (aka rear rollstop. This is the plate that bridges the gap between platform and lift baseplate when platform is at the vehicle floor level. It also acts as a rear rollstop when platform is in motion).
- Never leave platform outside of vehicle. Return lift to stowed position after use.
- Do not place a wheelchair on the lift if it is too large for the vehicle. The wheelchair must be able to pivot freely inside the vehicle to comply with the lift instructions for entering and exiting the vehicle.
- Many lifts allow manual operation if the electrical operation of the lift fails. Read and be familiar with how to operate your lift manually. Practice doing it occasionally so that you know to do it if the need arises.

2.8.4 Using the Wheelchair Lift to Enter the Vehicle

Points to remember/follow:

- Level Ground. Verify that the vehicle to be entered is parked on level ground. Also, verify that there is adequate room to operate the lift. If not, have someone move the vehicle to a more suitable parking place or move the vehicle that is in the way.
- Set Brakes. Verify that the vehicle is in park and the parking brakes set.
- **Deploy and Lower.** Deploy the lift and LOWER it to the ground. Approach the vehicle and use the remote control or external switches to open the doors and unfold the lift from the stowed position. This is called deploying the lift and often there is a button or switch labeled "DEPLOY". Next, lower the lift to the ground. There may be a switch or button labeled DOWN or LOWER. Verify that the platform is securely on the ground and in a reasonably level position. If public transportation or if a driver or attendant is helping you, they may do these operations for you. But always be aware of what is going on. Double checking never hurts.
- Verify Platform Position. Verify that the front (outboard) rollstop of the platform is lowered and contacting the ground so as to allow easy entry of the wheelchair. This typically automatically occurs when the platform contacts the ground.
- Move onto the Platform. Select a slow speed, then back the wheelchair onto the platform. Note that the wheelchair occupant <u>must</u> be FACING OUTWARD (see Figure 2-17) on the platform when entering (or exiting) the vehicle. This is because the large rear drive wheels tend to more easily roll over a raised front rollstop than do the smaller caster wheels.
- **Proper Location.** Position the wheelchair in the proper location on the platform of the lift. If applicable, verify that the rear rollstop (aka inboard rollstop) is present and in the raised position. Slowly, roll back against it. If there is no rear rollstop, position the wheelchair so that is securely on the platform with a few inches between the front of the front rollstop and the front wheels of the chair, and likewise, a few inches between the rear wheels of the wheelchairs and the edge of the platform that is nearest to the vehicle. Some users prefer to pull the wheelchair forward until the front wheels are touching the front rollstop. This assures that the rear of the wheelchair is clear of the rear of the vehicle while the lift is in motion. If this is your own lift, perhaps a better way is to mark the platform at the preferred position for the front wheels. Then the wheelchair is easy to position so that the front casters are centered on the line.
- **Turn off the chair power.** This should automatically set the brakes. This prevents any inadvertent bumps or movement of the wheelchair control stick from releasing the wheelchair brakes and possibly causing it to roll. Even worse, it is possible that the chair could move under its own power up and over the front rollstop and off the platform.
- Verify Outboard Rollstop. Verify that the front rollstop is up. This usually involves starting to raise the lift, which will unweight the platform but still leave it touching the ground. In this process, the front rollstop should move up. In some cases, the platform must leave the ground for the front rollstop to move up.
- **Raise the Platform.** Raise the lift platform all the way up until it retracts back slightly into the position for entering the vehicle. There is typically a switch or button labeled UP or RAISE that does this. Keep that button activated until the lift quits moving.
- Verify Inboard Rollstop. Verify that the rear (inboard) rollstop (if any) is lowered. This normally automatically occurs when the lift is fully raised.
- Verify Platform Height. Verify that the rear of the lift platform is level with the floor of the vehicle.
- Turn ON the Wheelchair Power. Verify that a slow speed drive program with a short brake delay is selected.
- **Back Slowly Into the Vehicle.** Slowly, back the wheelchair into the vehicle to a position where you will be clear of the lift as it folds into the vehicle (this is called stowing the lift). Once you are clear, turn off the wheelchair power so you cannot inadvertently move the chair. Now you can "stow" the lift. There is often a button or switch labeled STOW to do this. This may automatically close the vehicle doors after the lift is stowed. If necessary, operate switch to close the doors.
- **Tie-down the wheelchair**. Maneuver the wheelchair as needed so that it is positioned to be fastened securely for transport in the vehicle. Make sure the elevate feature (if applicable) is completely down in the lowered position. The tie-down process may be done by winching down various straps or harnesses. Sometimes the tie-down is accomplished by simply driving the wheelchair into a special tie-down mounted on the floor of the vehicle which then automatically latches the chair in place. Other tie-downs may require a separate switch be operated to latch the tie-downs.
- (If applicable) Mate the Wheelchair to the Vehicle. To enable in-vehicle charging as well as communications between the chair and vehicle.
- **Turn OFF the Wheelchair Power**. Before transporting, make sure the power to the wheelchair is turned off. This should also set the wheelchair brakes.
- Transport Ready. The vehicle is now ready for driving.

2.8.5 Using the Lift to Exit (Egress) the Vehicle

- Level Ground. Verify that the vehicle is parked on level ground. Also verify that there is adequate room to operate the lift. If not, find a more suitable parking place.
- Set Brakes. Verify that the vehicle is in park and the parking brakes set.
- **Turn On the Wheelchair Power.** Turn on the wheelchair power and verify that a slow speed drive program with a short brake delay is selected.
- **Release the Wheelchair Tie-down.** Release the wheelchair from the tie-down and any other mating provisions between vehicle and chair.
- Maneuver Wheelchair Position. Maneuver the wheelchair so that it is in position to deploy the lift, while remaining clear of it as it unfolds. Turn off the wheelchair power so inadvertent movement can take place.
- **Deploy the lift**. Open the vehicle doors and unfold the platform. There is often a switch or button labeled DEPLOY to do this.
- Verify Platform. Verify that the platform is ready to accept the wheelchair. Verify that the platform is at the same height as vehicle floor, that the rear rollstop (if any) is down and level with the vehicle floor, and that the front rollstop is up and locked.
- Verify Orientation. At this point, the wheelchair occupant <u>must</u> be FACING OUTWARD (see Figure 2-17) on the platform when exiting the vehicle. Turn on the wheelchair power, and slowly drive the wheelchair forward onto the platform.
- **Proper Position.** Verify the wheelchair in the proper location on the platform of the lift. If applicable, raise the rear rollstop (aka inboard rollstop) and slowly roll back against it. If there is no rear rollstop, position the wheelchair so that is securely on the platform with a few inches between the front of the front rollstop and the front wheels of the chair, and likewise, a few inches between the rear wheels of the wheelchairs and the edge of the platform that is nearest to the vehicle. Some users prefer to pull the wheelchair forward until the front wheels are touching the front rollstop. This assures that the rear of the wheelchair is clear of the rear of the vehicle while the lift is in motion. If this is your own lift, perhaps a better way is to mark the platform at the preferred position for the front wheels. Then the wheelchair is easy to position so that the front casters are centered on the line.
- **Turn Off the Wheelchair Power.** This should automatically set the brakes. This prevents any inadvertent bumps or movement of the wheelchair control stick from releasing the wheelchair brakes and possibly causing it to roll. Even worse, it is possible that the chair could move under its own power up and over the front rollstop and off the platform.
- Lower the Platform. Lower the lift platform all the way to the ground. There is typically a switch or button labeled DOWN or LOWER that does this. Keep that button activated until the lift quits moving. Verify that the lift platform is securely contacting the ground and likewise that the front rollstop is contacting the ground from left to right. Do not attempt to drive off the lift if the front rollstop is more than 1" off the ground on either end.
- Turn On the Wheelchair Power. Turn the wheelchair power on and verify that a slow speed with a short brake delay is selected.
- Move Off of the Platform. Slowly and carefully drive off of the lift platform.
- **Raise the Empty Platform.** Raise the empty lift platform all the way up until it retracts back slightly into the vehicle. There is typically a switch or button labeled UP or RAISE that does this. Keep that button activated until the lift quits moving.
- **Stow the lift**. Use the remote control or external switches to raise the lift, fold it back into the vehicle and close and lock the vehicle doors. This process is called stowing the lift and there may be a button or switch labeled STOW. This often automatically closes the vehicle doors after the lift is stowed. If necessary, operate a separate switch to close the doors.
- Vehicle Checks. Before driving the wheelchair away from the vehicle, verify that you have it in park, the parking brakes are set, the ignition (engine) is turned off, the lights are all off, the doors are all locked, and any other items that may drain the vehicle batteries are turned off.
- You are now ready to drive the wheelchair away from the vehicle.

3. COMPONENT ADJUSTMENT

3.1 Overview

- 1. Back
- 2. Push Handle
- 3. Armrest
- 4. Batteries
- 5. Drive Wheel
- 6. Motors and Brakes
- 7. Caster Wheel
- 8. Footboard (Front Rigging)
- 9. Chassis Frame
- 10. Seat
- 11. Hand Control



Figure 3-1. General Components of a BOUNDER Power Wheelchair

<u>3.2 Common Tool List</u> (for performing adjustments and maintenance on BOUNDER wheelchairs)

Wrenches: 3/8", 7/16", 1/2", 9/16", 5/8", 3/4"

Ratchet/Socket: 1/2" deep-well socket, 15/16", 1-1/16"

Hex Wrench (Allen): 1/8", 5/32", 3/16", 7/32", 1/4", 2mm, 5mm

Screwdrivers: #2 Cross-tip (Phillips), 1/4" flat-tip screwdriver

Miscellaneous: Needle nose pliers, small flush-cut wire cutters

3.3 Common Component Adjustment

3.3.1 Armrests

Arms are offered in varying styles: Self-supporting, Self-supporting articulating, articulating, dual-post detachable (with flip-up options) and sliding arms. Desk and full length versions are available for each style.



Self-supporting

Self-supporting arms can be adjusted in height by loosening the fasteners (using 1/2" & 9/16" wrenches and 3/16" & 7/32" Allen wrenches) where the arm attaches to the backpost. Reposition the arm to the desired height and re-tighten the fasters to lock in place. To move the arm out of the way, pivot it up and back.

Figure 3-2. Self-supporting Arms



Dual Post

Adjustable, detachable dual post arms are height adjustable by turning the pin latch located near the front and under the arm pad 90° . Once the pin latch has been turned, the arm can be lifted to another positioning hole (drilled in 1"increments), when adjusted to the desired height, re-seat the pin latch 90° in the opposite direction to lock the arm height to the new location.

To remove the arm, turn the pin latch located on the front arm mount 90° , use two hands to grip the arm near the front and near the rear, and pull straight up removing the arm from the arm mounts.

Figure 3-3. Standard Dual Post Arms

Articulating

Articulating arms attach to the backpost, and are adjusted similarly to selfsupporting arms. A vertical post under articulating arms near the front can also be adjusted in height on 1" increments using a 3/16" Allen wrench and a 7/16" wrench. To position the arm out of the way, turn the pin latch at the bottom of the vertical post mount to unlock and then pivot the arm up and



Figure 3-4. Articulating Arms

back.



Self-supporting Articulating

This arm style keeps the arm in a comfortable position while reclining just like standard articulating arms, but has linkage attached to the base of the arm tube & seat rail leaving the area underneath the arm obstruction-free. To move the arm out of the way, just flip it up.

Figure 3-5. Self-supporting Articulating Arms

Sliding

Sliding arms have three sections, the upper arm, the slide and the arm base. The arm attaches to the backpost and glides along the slide tube as the back is reclined. The center section has two vertical posts for height adjustment and latch in the same manner



Figure 3-6. Sliding Arms

as adjustable, detachable dual post arms. The upper arm tube clamps to the backpost and is adjusted in height by using 3/16" & 7/32" Allen wrenches and 1/2" & 9/16" wrenches.

3.3.2 Control Settings

Matching your abilities with your controller settings is very important.

It is highly recommended to discuss/consult with your healthcare professional to determine the best settings for your wheelchair and controller. When the user's abilities change, the wheelchair and controller settings need to be adjusted to match as soon as possible.

3.3.3 Hand Control Positioning

The hand control is attached to an extension slide using a mount which is normally attached to the wheelchair under the upper arm tube and armrest pad. Fore-aft positioning can be made by loosening the ratchet handle, and moving the extension slide to the newly desired position. The handle is spring loaded to engage the actual screw, but can be pulled "away" (downward) from the mount to turn the handle only (in case it cannot be turned because of an obstruction). Pull the handle down away from the mount and turn it to a better position, release the handle letting it spring back onto the inner splines so the actual screw can be loosened or tightened. Take care to adjust the wiring if needed. Re-tighten the ratchet handle once the controller is in the desired position. The mount that holds the extension slide on the arm tube can be



Figure 3-7. Hand Control Mount and Extension Slide

adjusted fore-aft as well, (using a 3/16" Allen wrench) if needed. Height adjustment of the joystick controller can be achieved by adjusting the height of the arm it is attached to.

Swing-away Extension Slide

Your wheelchair may be equipped with a swing-away hand control extension slide. To move it out-of-the way push outward and to the rear on the side of the hand control. Be aware that pinch points are accessible and should be avoided. To tighten or loosen tension on the swing-away mechanism adjust the screws on the underside of the swing-away extension slide with locking nuts holding the adjusting screws in place. Loosen the locking nut (with a 1/2" wrench), bottom-out the adjusting screw and then back it off 1/4 turn (with a flat-tip screwdriver), re-tighten the locking nut and test the new setting.







Figure 3-8. Swing-away Hand Control Extension Slide

3.3.4 Front Rigging: Footrests, Center Mount Footboard, Elevating Legrests



Figure 3-11. Footplate Extension Fastener

Footrests

the chair.

wheels.

Center Mount Footboard

Many footboards are height and angle adjustable.

To change a manually adjusting footboard height, remove the fastening hardware on the vertical support (using a 3/16" Allen wrench and a 1/2" wrench), adjust the footboard to the new position and reinstall the fasteners.

To adjust the angle of the footboard;

- pivot the footboard up
- loosen the adjustment locking nut that is on the adjustment bolt (located as shown in Figures 3-13 & 3-14)
- screw-out or screw-in the bolt (using a 3/4" wrench) to adjust the footboard angle up or down
- re-tighten the locking nut
- lower the footboard down onto the stop for normal operation

Vertical support Fasteners

Footrests and legrests incorporate a swing-away design to reposition the hardware out-of-the way when needed.

To remove a footrest, push in on the latch from the outside of the chair. The footrest or legrest will pivot to the side on two supporting pins. Lift up on the footrest/legrest to detach from

To adjust the footplate height, use a 3/16" Allen wrench and a

7/16" wrench to remove the nut and bolt (shown in Figure 3-

11) from the footplate extension. Move the footplate extension to the new position. Re-insert the bolt & nut and check that the new position is not in the pivoting pathways of the front caster

Figure 3-12. Manually Adjusted Footboard



Figure 3-13. Footboard



Figure 3-14. Footboard angle adjustment hardware

Powered Elevating Legrests

To raise or lower powered legrests, use the electronics to adjust the legrest position. Dual Independent

Power Elevating Legrests move each leg independently for adjusting as needed.

To remove powered elevating legrests do the following to each legrest in turn:

- lift up on the legrest until the rod-end shaft is free of the legrest actuator
- open the latch
- pivot the legrest to the outside of the chair
- lift the legrest assembly off of the pivot pins



Figure 3-15. Dual Independent Powered Legrest (DIPLR)



Figure 3-16. Dual Independent Powered Legrest (DIPLR) linkage



Figure 3-17. Manually Elevating Legrest

To adjust the distance of the footplate to the seat, use a 3/16" Allen wrench and a 7/16" wrench to remove the nut and bolt (Figure 3-11 & 3-17) for the legrest extension. Move the legrest extension to the new position. Re-insert the bolt & nut and check that the new position is not in the pivoting pathways of the front caster wheels.

levating Legrests

legrest height, lift the legrest to the desired position. When pressure is applied downward the ightens to constrict movement.

legrest, pull the adjusting handle and lower the legrest to the desired position (lighten the load st downward pressure if binding occurs), then release the adjusting handle to set the legrest

nanual elevating legrests do the following to each legrest in turn: the legrest enough so that the manual legrest adjustment rod will not collide with anything when pting the legrest to the outside of the chair

n the legrest latch

of the legrest to the outside of the chair

the legrest assembly off of the pivot pins



Figure 3-18. Manually Elevating Legrest Detail

3.3.5 Headrest

If equipped, the headrest is adjustable fore & aft and left & right (using a 5 mm Allen wrench) by screws located on the linkages and back of the headrest pad. There is a handle lever on the headrest mount that secures the headrest in the receiver and allows for height adjustments. The height collar can be locked in place (with a 2 mm Allen wrench) to help with repeatable positioning when the headrest is removed.



Figure 3-19. Headrest

3.3.6 Optional Safety Illumination Package

Two reflectors are mounted at the rear of the wheelchair base, standard. An optional taillight or headlamp/taillight accessory is available.

Taillights help to be seen by others while a headlamp not only helps to be seen by others, but also improves your ability to see while driving in low ambient light conditions.



Figure 3-21. Optional Dual Headlamps



Figure 3-20. Headrest Detail



Figure 3-22. Optional Taillights

3.4 Checkout

After the wheelchair components have been adjusted, ensure there is no interference with other components such as casters. Run each power seating system (if equipped) to its full travel to ensure there is no interference with other components and ensure cabling is routed correctly. Double check that all hardware is tight. Ensure the user can operate all controls safely. Readjust or reprogram as needed prior to allowing the user to operate the wheelchair.

18 button head bolts and a 3/16"

Allen wrench can be used to adjust or reposition the aim of the

Turning the headlamps ON or OFF is achieved by pressing the

button* on the drive control

*Refer to the manual for your particular

light

control

headlamp if needed.

corresponding

drive control for details.

device.

4. OPERATION

CAUTION! DO NOT ATTEMPT TO DRIVE YOUR POWER WHEELCHAIR UNTIL YOU HAVE READ AND UNDERSTAND ALL OF THE SAFETY PRECAUTIONS OF THIS MANUAL

4.1 Check Your Wheelchair

Before transferring into your chair, verify that:

- The batteries are fully charged (if batteries need charging, do so before operating the chair)
- The charger is unplugged from the wheelchair
- The electric brakes are set
- The wheelchair POWER switch is "OFF"
- The clutches are engaged

4.2 Transfers

WARNING!

- Always verify that the power is OFF before entering or exiting your wheelchair
- Keep the transfer distance at a minimum to reduce the risk of falling, balance issues and strain
- 21st recommends transferring in the presence of or with the assistance of a caregiver or healthcare professional
- DO NOT use the hand control, footplates or armrests as supports during transfers
- Swing leg/footrests out of the way or flip-up footboards
- Always verify both brakes are engaged before transferring
- Caster wheels should be aligned with drive wheels for added stability during transfer

Transfer Into Chair Procedure:

- 1. Once the wheelchair is positioned close enough for a transfer, turn OFF the wheelchair power
- 2. Pivot near armrest up and out of the way (or remove it)
- 3. Shift body weight onto the wheelchair seat and transfer
- 4. Lower armrest
- 5. Secure yourself with positioning straps (if applicable)
- 6. Verify nothing is dangling into any parts or components that may/will move on the wheelchair
- 7. Turn power ON when ready to move the wheelchair

Transferring Out of Chair Procedure:

- 1. Position the wheelchair close to the object to be transferring into
- 2. Verify it is stable and within reach
- 3. Turn OFF the wheelchair power
- 4. Raise the armrest out of the way (or remove it) on the side of the transfer
- 5. Release your positioning straps (if applicable)
- 6. Transfer out of the wheelchair

4.3 Turn Power On

Turn the Wheelchair power on. Select a SLOW speed drive program if indoors or in a confined area; otherwise, select a drive program speed you feel comfortable with.

4.4 Speed and Direction Control

The position of the control stick determines both speed and direction. By moving the control stick in the direction that you want to travel, the chair will respond accordingly. The farther you push the control stick from the center (neutral) position, the faster you will go. The top speed in a particular drive program is usually a function of the particular drive train configuration of the chair (e.g., motor type, sprocket ratios, rear wheel size, etc.) as well as the settings of the electronics. Chairs equipped with different drive programs usually have several different top speeds.



Figure 4-1. Transfers

4.5 Selecting Different Programs (Modes)

Different wheelchair electronic systems have different control interfaces. The method of selecting programs on one system may be different than on another control system (one may employ swiping a touch screen to change settings on one, while another may utilize toggle switches to accomplish the same thing).

Learn how your control system works and make certain you know the effects of each program on the operation of your chair. Verify that you can rapidly change from one program to another if you were to find yourself in the wrong program.

The greater the difference between the programs the more important this becomes. You may also want to set your electronics to skip over some programs if you use fewer programs than your electronics are capable of providing.

4.6 Stopping the Wheelchair

The normal way to slow or stop the wheelchair is by moving the control stick toward neutral. To slow more rapidly (i.e., brake harder), move the control stick in the direction opposite from which you are traveling until the chair slows sufficiently, then return the control stick to the position corresponding to the direction and speed desired. In most cases, the distance travelled that occurs when the control stick is released can be varied over a great range.

4.7 Stopping on Hills

If you are on a hill or incline and release the control stick, the chair may tend to roll down the hill slightly before the brakes set. The steeper the hill and the heavier the chair and driver and the faster you are travelling, the greater this tendency will be. The electronics can usually be set so this does not occur. For all chairs, the POWER switch can be turned "OFF" to rapidly set the brakes on hills.

4.8 Emergency Stopping

If for some reason your chair should lose power or fail to stop when you pull the joystick to reverse, as fast as possible place press the POWER switch down. This will set the electric parking brakes.

4.9 Reducing Battery Drain

To reduce battery drain and increase operating time per charge cycle, do not deflect the control stick from neutral unless you wish to move the wheelchair. Also, accelerate and decelerate slowly and do not continually move about without reason. If your chair is equipped with lights, do not turn them on except when necessary. The brakes consume energy when they are released. Consider having larger rear sprockets or smaller motor sprockets installed (i.e., increase torque by reducing top speed). Make sure you have not added back cushions or seating systems that move you forward in the chair unless your chair was ordered with special construction options to compensate for this.

4.10 When Finished Driving

When you are finished driving the chair, turn the POWER switch to "OFF", then transfer out of the chair. Turning the chair off before you transfer is necessary to prevent movement due to accidental control stick deflection during your transfer.

4.11 Battery Charging

Plug the charger into the charging socket on your wheelchair (usually on the front of the hand control) and set the charger (if any settings are user-adjustable) as required to properly recharge your batteries. The charger LED should start flashing, indicating that the batteries are being charged. Read the battery charger manual that came with your charger for more information.

4.12 Special Controls

Your particular wheelchair may include features or controls not described in this general set of Operating Instructions. If so, please refer to the pertinent Owner's Manuals accompanying your chair as well as special instructions you may have received from your wheelchair dealer or the factory. If you do not understand a particular feature or control on your chair, please contact your dealer or the factory for more information before using your chair.

4.13 Freewheeling the Chair

For varying reasons, there may be a need to move your powered wheelchair manually. Two options available are:

- 1. Disengage Brakes with the Manual Levers. If the chair needs to be pushed or positioned without the joystick, disengaging the brakes manually will also allow the wheelchair to be "free-wheeled". Note that when the park brakes are disengaged, the joystick remote will no longer function. If the chair is turned on when the park brakes are disengaged, an error will appear on the joystick remote or remote display. The steps to achieve this are outlined as follows:
 - a. Turn the power to the chair "OFF".
 - b. Locate the manual brake release lever (Figure 4-4).
 - c. Lift the lever up and forward to its released position (Figures 4-5).
 - d. Repeat steps "c" and "d" on the opposite side of the chair. The chair can now be maneuvered as needed.



Figure 4-4. Manual Brake Release Lever location



Figure 4-5. Lifting a Manual Brake Release Lever

Returning the brakes to the drive position.

- a. Lower the Manual Brake Release Lever to the (engaged) drive position. This will set the brakes and allow for joystick operation of the wheelchair.
- b. Repeat step "a" on the opposite side of the chair.
- 2. Brake Release Switch (Optional). A switch can be located on the back of the chair near the push handles to allow the brakes to be disengaged and the chair to be manually pushed. This option is the easiest to accomplish and works if the wheelchair batteries are not depleted.



Figure 4-2. Brake Release Switch

- a) Power off the wheelchair
- b) Press and hold the Brake Release Switch
- c) Push the chair
- d) Release the Brake Release Switch when stopped to set the brakes



Figure 4-3. Pushing the Wheelchair with the Brakes Released

4.14 LiNX Electronics

A LiNX remote module is a user input that controls and interacts with a LiNX wheelchair system. It connects to a LiNX power module via a LiNX communications bus cable.

A LiNX remote module offers an industry-standard XLR connector that is used for connecting to a battery charger, and a LiNX Access Key for programming, diagnosing and upgrading the system using a Bluetooth connection.



Buttons







Figure 4-13. Power ON

Figure 4-14. Fault Indicator To switch **ON** the LiNX remote module, press the power button. The power button is the only user input that can activate the system.

If there is no fault with the system, the status indicator (through the power button) will light up green, and the battery gauge will display the current battery status.

If there is a fault with the system when powering up, the status indicator will indicate the fault with a series of red flashes (see LiNX System Manual for more information on fault indication).

To switch **OFF** the system, press the power button; the system will power down and the status indicator will switch off.

4.14 LiNX Electronics (continued)



Figure 4-15. LiNX REM400 Components

Figure 4-16. LiNX REM400

Power button	Use to power up and down the system; includes a built-in status indicator.
Infrared detector	Used for learning infrared.
Light sensor	Used for detecting ambient light.
Multipurpose buttons I & II	These buttons can be configured to perform common operations, based on the user's needs.
Touch display	3.5" color capacitive touch screen with customizable contextual menus. Use swipe or tap actions to
	navigate through drive, seating and connectivity cards.
Stereo jack sockets	2 x stereo jack sockets that can connect to an external power switch and other multi-way switches.
LiNX bus socket	A single cable connects to the LiNX bus for both communications and power.
Joystick	A user input to control the speed and direction of driving and seating motions.
Infrared transmitter	Use in place of a remote control for consumer goods such as a television.
Speaker	Horn.
Location markers	Three location markers are placed on either side of the REM400's back plate to guide the user's
	hand.
XLR socket	The XLR socket can be connected to a battery charger or the LiNX Access Key.
Mounting holes	Standard-spaced LiNX mounting holes.

Table 4-1. LiNX REM400 Overview

4.14 LiNX Electronics

(continued)



Table 4-2. LiNX REM500 Overview

Buttons











To switch **ON** the LiNX complex remote module, press the power button.

If there is no fault with the system, the touch screen will display the power up splash screen, the status indicator (through the power button) will light up green, and then a function card will be displayed along with the status and battery bars.

If there is a fault with the system when powering up, the status indicator will indicate the fault with a series of red flashes (see LiNX System Manual for more information on fault indication).

To switch **OFF** the system, press the power button; the touch screen will display the power down screen, the system will power down and the status indicator will switch off.

<u>4.14 LiNX Electronics</u> (continued) <u>REM400 / REM500 Display Operation</u>

Touch Display Components

Typically, the user will interact with the REM400 and REM500 through a function card. With a function card active, the touch display comprises the following components:

- battery bar
- status bar
- function card (with header)
- navigation button
- function information

These components are described further in the table below.

The Battery Bar



Figure 4-22. Typical Screen Components of REM400 & REM500

Figure 4-23. The Battery Bar for the REM400 & REM500

The battery bar provides information about the state of the charge of the batteries.

The Status Bar



Figure 4-24. The Status Bar for the REM400 & REM500

The status bar displays:

- the current profile name
- the time
- icons indicating drive and seating status information

Navigation Button



The Navigation Button:

- displays the current interaction mode;
- opens the function card preview (short press)
- opens the status and settings menu (long press)

Figure 4-26. The Navigation Button for the REM400 & REM500



Function information display icons relating to:

- gyro status
- latched driving status
- ignore drive lockout

Figure 4-27. Function Display Icons for the REM400 & REM500

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Figure 4-25. The Function Card Headers for the REM400 & REM500

Function Card Header Displays:

- Function type:
 - Green for drive
 - Orange for
 - seating
 - Blue for
 - connectivity
- Primary input indicator
- Function card name



Figure 4-28. R-net JSM-LED-L



JJ JJ

Battery Gauge

Battery Gauge

The battery gauge shows you that the wheelchair is switched on. It also indicates the operating status of the wheelchair.

If the battery gauge shows red, yellow and green, the batteries are charged. (LEDs 1 - 10)

If the battery gauge shows just red and yellow, then you should charge the batteries as soon as you can. (LEDs 1-7)

If the battery gauge shows just red, either steady or flashing slowly, then you should charge the batteries immediately. (LEDs 1-3)

Do not operate the control system if the battery is nearly discharged. Failure to comply with this condition may leave the user stranded in an unsafe location.



Actuator Indicator

This LED set displays which Actuator channel is currently being controlled when the Control System is in Actuator Mode. The actuators can be programmed to work in multiple ways. Actuator selection and operation is achieved using the Joystick. Motions to the Left or Right select different actuator channels. Motions Forward and Backwards move the actuator(s) selected.

Actuator Indicator

Figure 4-30. R-net JSM-LED-L Symbols

4.15 R-net Electronics (continued)





Speed / Profile Buttons Decrease / Increase



Mode Button

Horn Button



Hazard Button & LED



Lights Button & LED



Left Indicator Button & LED



Right Indicator Button & LED

Figure 4-31. R-net JSM-LED-L Symbols

Buttons

On/Off

The On/Off button applies power to the control system electronics, which in turn supply power to the wheelchair's motors. Do not use the On/Off button to stop the wheelchair unless there is an emergency. (If you do, you may shorten the life of the wheelchair drive components).

Maximum Speed / Profile Indicator

This button increases or decreases the maximum speed setting or, if the control system is programmed for drive profile operation, selects a higher or lower drive profile. It is possible to program the control system so this button has no effect while the wheelchair is being driven.

Mode

The Mode button allows the user to navigate through the available operating Modes for the control system. The available modes are dependent on programming and the range of auxiliary output devices connected to the control system.

Horn

The Horn will sound while this button is depressed.

Hazard Warning and LED

This button activates and de-activates the wheelchair's hazard lights. Depress the button to turn the hazards on and depress the button again to turn them off. When activated the hazard LED and the indicator LEDs will flash in sync with the wheelchair's indicators.

Lights and LED

This button activates and de-activates the wheelchair's lights. Depress the button to turn the lights on and depress the button again to turn them off. When activated the lights LED will illuminate.

Left Indicator and LED

This button activates and de-activates the wheelchair's left indicator. Depress the button to turn the indicator on and depress the button again to turn it off. When activated the left indicator LED will flash in sync with the wheelchair's indicator(s).

Right Indicator and LED

This button activates and de-activates the wheelchair's right indicator. Depress the button to turn the indicator on and depress the button again to turn it off. When activated the right indicator LED will flash in sync with the wheelchair's indicator(s).

4.15 R-net Electronics (continued)



Figure 4-33. R-net CJSM Overview

Buttons

system.



On/Off: The On/Off button applies power to the control system electronics, which in turn supplies power to the wheelchair's motors. Do not use the On/Off button to stop the wheelchair unless there is an emergency. If you do, you may shorten the life of the wheelchair drive components).

Speed Increase / Decrease: This button increases or decreases the maximum speed setting depending on how

Mode Button: This button allows the user to navigate through the available operating modes for the control system.

The available modes are dependent on programming and the range of auxiliary output devices connected to the control





Horn Button: The horn will sound while this button is depressed.

Speed Buttons Decrease / Increase





Profile Button: This button allows the user to navigate through the available profiles for the control system. The number of available profiles is dependent on how the control system is programmed. Depending on the way the control system has been programmed, a momentary screen may be displayed when the button is pressed.

Figure 4-34. R-net CJSM Button Symbols



Hazard Button & LED



Lights Button & LED



Left Indicator Button & LED



Right Indicator Button & LED

Figure 4-35. R-net CJSM **Button Symbols**



Hazard Warning and LED

Right Indicator and LED

will flash in sync with the wheelchair's indicator(s).

Lights and LED



indicator LEDs will flash in sync with the wheelchair's indicators.

This button activates and de-activates the wheelchair's hazard lights. Depress the button to turn the hazards on and depress the button again to turn them off. When activated the hazard LED and the

This button activates and de-activates the wheelchair's lights. Depress the button to turn the lights on and depress the button again to turn them off. When activated the lights LED will illuminate.

This button activates and de-activates the wheelchair's right indicator. Depress the button to turn the indicator on and depress the button again to turn it off. When activated the right indicator LED



Figure 4-37. R-net CJSM2



Figure 4-36. R-net CJSM2 Overview



Figure 4-38. R-net CJSM2 Button Overview

Profile / Mode Paddle Switch (5 down)

The Profile/Mode paddle switch allows the user to select the available drive Profiles and operating Modes for the control system. The selection sequence is through each of the available Profiles and then each of the available Modes. Depending on the way the control system has been programmed a momentary screen may be displayed when a new Profile is selected. The available Profiles and Modes are dependent on how the control system has been programmed and the output devices that are connected. The Profile/Mode paddle switch is operated via reverse deflections of the left paddle.

Speed Paddle Switch (6 up & down)

The Speed Paddle allows adjustment of the control system's speed setting. Depending on the way the control system has been programmed a momentary screen may be displayed when the paddle is operated. The default operation of the Speed paddle is momentary, i.e. the speed setting will be increased upon forward deflections of the paddle and decreased upon reverse deflections of the paddle.

Alternative programming to set the timing and operation of the Speed paddle, as well as changing it to operate continuously, i.e. in a similar way to a rotary potentiometer, is available.

Horn Button (8)

The Horn will sound while this button is depressed.

Profile Button (9)

The Profile button allows the user to navigate through the available Profiles for the control system. The number of available Profiles is dependent on how the control system is programmed. Depending on the way the control system has been programmed a momentary screen may be displayed when the button is pressed.

Mode Button (7)

The Mode button allows the user to navigate through the available Modes for the control system. The number of available Modes is dependent on how the control system is programmed.

Screen Buttons (1-4)

These buttons operate the lighting functions: Hazards, Lights, Left Indicator and Right Indicator. The function of each button is illustrated by an icon displayed on the LCD screen next to the button. Pressing the relative button activates and deactivates its function. Once the function is activated, the icon on the LCD will illuminate or flash depending on the function.

- If no lighting system is fitted to the wheelchair, these buttons will be inactive.
- In all instances, the top left button, when held for a short time, will open the Settings Menu.



Figure 4-39. R-net CJSM2 Drive Mode Screen Areas

Figure 4-40. R-net CJSM2 Battery Indicator

This displays the charge available in the battery and can be used to alert the user to the status of the battery.

Information Bar

(Refer to Figure 4-39) This area contains information and warning symbols, as well as clock.

Main Screen Area

(Refer to Figure 4-39) This area will contain different information dependent on the current operating Mode of the control system. The area is also used to display general system information, when necessary.

Text Bar

(Refer to Figure 4-39) This area of the screen displays text relevant to the operating condition of the control system. Example text strings would be Profile Name, Mode Name or Axis Name. These text strings are programmable.

This gives a graphical display of the wheelchairs speed. As the speed increases, the needle will move around the arc, covering the

Current Profile

(Refer to Figure 4-39 & 4-41) This denotes the currently selected Profile, shown in numeric form.

background with the white highlight.



Figure 4-41. R-net CJSM2 Current

Profile Indicator



Figure 4-42. R-net CJSM2 Speed Indicator



Figure 4-43. R-net CJSM2 Max Speed Indicator

This displays the current maximum speed setting.

Max Speed Indicator

Speed Indicator

When the left-hand segment is illuminated, then the speed setting corresponds to the programmed minimum forward, reverse and turning speeds. The indicator will never show a lower setting, i.e. the left-hand segment will always be fully illuminated.

When all segments are fully illuminated, then the speed setting corresponds to the programmed maximum forward, reverse and turning speeds.

Seating Mode Screen

Displays symbols relevant to the seating control of the wheelchair. Displays the sections of the chair currently selected for movement, the name given to the selection and a direction arrow showing what sort of movement is available.

Seating adjustment is achieved as follows.

- Move the joystick left or right to select the desired axis.
- Move the joystick forwards or backwards to move the seat.



Figure 4-44. R-net CJSM2 Seating Mode Screen

To connect the Communication Cables:



• Holding the connector housing, firmly push the connector into its mate until you can no longer see the yellow plastic.

The connectors are secured using a friction system.

To disconnect the Communication Cables:

• Holding the connector housing firmly, pull the connectors apart.

Do not hold or pull on the cable. Always grip the connector when connecting and disconnecting.

When the control system is first switched on after a connection or system component change, the Timer will be displayed whilst the system checks itself and then the Re-start icon will be displayed. Switch the control system off and on again to operate.

Figure 4-45. R-net Communications Cable Connections

The control system uses industrial-grade components throughout, ensuring reliable operation in a wide range of conditions. However, you will improve the reliability of the control system if you keep exposure to extreme conditions to a minimum.

Do not expose your control system or its components to damp conditions for prolonged periods.

If the control system becomes contaminated with food or drink clean it off as soon as possible.

Clean the control system and the joystick with a cloth dampened with diluted detergent. Be careful when cleaning the joystick and screen.

Never use abrasive or spirit-based cleaners.

5. BATTERIES

5.1 General Information

All new batteries should be fully charged before use. Verify that your batteries have been charged before you use them for the first time. If in doubt, charge them. The life expectancy of your batteries may be increased by keeping them fully charged. Never completely discharge your batteries by overusing your chair. It will result in shorter battery life and you may become stranded.

5.2 Battery Selection

Most BOUNDER wheelchairs are designed to use two Group 24 batteries.

Group 24 Gel-cell Batteries

These batteries are sealed, do not require the periodic addition of water and are sometimes referred to as maintenance-free. Gel-cell batteries require the use of a Dual Mode 8A charger or other similar gel-cell charger. If you use a liquid electrolyte charger instead of a gel-cell charger, gel-cell batteries will be severely overcharged and will only last a few weeks.

If having trouble finding a battery that performs properly in your chair, 21st recommends that you contact:

MK Battery at: (714) 937-1033 OR (800) 372-9253 or FAX: (714) 937-0818 and on the web at: <u>www.mkbattery.com</u> for assistance in choosing batteries.

For safety reasons, only sealed non-spillable batteries that meet DOT CFR 173.159 (d), IATA Packing Instructions 806, and IATA Provision A67 shall be installed in this wheelchair.

21st Century SCIENTIFIC recommends and performs tests using two MK Battery Group 24 12V model no. 8G24 (63 Ah, 5-hour rating) batteries.

5.3 Battery Handling Notes

- Keep batteries in the upright position.
- Batteries are heavy (50-65 lb each). Use care when lifting or moving batteries to avoid injuries.
- Remove any personal metal items (rings, bracelets, watches, etc.) that may come in contact with battery terminals to avoid shocks and causing a short.
- Always wear safety equipment (rubber gloves, safety glasses/shield, apron) when handling batteries.

5.4 Battery Installation





Battery box strap





from drive module

- 1. Place the POWER SWITCH in the "OFF" position.
- 2. Make sure the charger is not connected.
- 3. Locate the battery box at the rear of the chair.
- 4. Push forward on the rear of the battery box while pulling up on the battery box latch. Slide the battery box all the way to the rear.

- 5. If the battery cable connector set from the drive module is visible, disconnect it now (if not, do this on step 7). Loosen the battery box strap and lay it to the left side, clear of the battery box cover.
- 6. Remove the battery box cover. Do not remove the plastic battery box from the metal tray.
- 7. Disconnect the battery cable set from the drive module.
- Refer to and follow the battery installation instructions (depicted in this section as Figures 5-2L & 5-2R) that are affixed to the inside of your battery box cover.
- 9. BATTERY HANDLES (OR STRAPS) AND SEPARATE BATTERY LIFT STRAPS. Lift the front battery into the battery box and orient it as shown in the diagram affixed to your battery box cover. Next, lift the rear battery into the battery box as indicated. Group 24 batteries normally have built in handles or straps to facilitate lifting them. If your batteries do not have such handles or the handles have broken, a battery lift strap can be used. Lift straps can be obtained from your local auto parts store or possibly your battery supplier.
- CONNECTION OF JUMPER WIRE. Connect one end of the white battery jumper cable to the negative (-) lead of the rear battery. Tighten the jumper securely. Connect the other end of the white battery jumper cable to the positive (+) terminal



Figure 5-2L. CBBC 24-2 24V Gel-cell Circuit Breaker Battery Cable Installation Instructions Label (left portion).

of the front battery. If 12V accessories are to be installed on the chair we recommend purchasing our 24V-12V converter. This will discharge both batteries equally. We do not recommend installing 12 volt accessories to only one battery as it can result in discharging one battery more than the other resulting in poor performance and greatly reduced battery life. DO NOT CONNECT RESPIRATORS TO YOUR WHEELCHAIR BATTERIES.

CAUTION: Always install a circuit breaker or fuse, of appropriate voltage and current rating, with any accessory that does not have one. 21st is not responsible for accessories that injure you or damage your chair due to improper circuit protection.

Care should be taken to avoid contacting adjacent terminals with the wrench as serious personal injury and damage to the batteries can occur!

- 11. CONNECTIONS TO POSITIVE (+) TERMINAL OF REAR BATTERY. Connect the red leads of the battery cable set to the positive (+) terminal of the rear battery. At the same time, connect any other 24V accessory leads such as lights, leg bag emptier, etc. to the same terminal. DO NOT CONNECT ANY 12V ACCESSORY TO THIS TERMINAL AS THE 12V ACCESSORY WILL BE DAMAGED. Tighten the battery terminal connections securely using two wrenches.
- 12. CONNECTIONS TO NEGATIVE (-) TERMINAL OF FRONT BATTERY. Connect the black leads of the battery cable set to the negative (-) terminal of the front battery. At the same time, connect all negative leads from 24V accessories such as lights, leg bag emptier, electric horn, etc. to the same terminal. Tighten the battery terminal connections securely using a wrench.
- 13. Double check to make sure that all connections have been correctly made.
- 14. Place the battery box cover in position, being careful to route all cables through the notch in the cover edge toward the right front of the battery box cover. Ensure all excess cabling is tucked inside the battery box.
- 15. Secure the cover to the battery box and battery tray using the tie-down strap.

FOR MOST GRP 24 BATTERIES, DEPENDING ON YOUR BATTERY BOX SIZE. IF YOU ARE INSTALLING SMALLER BATTERIES THAN YOUR BATTERY BOX IS DESIGNED FOR, BE SURE TO INSTALL SPACERS AROUND BATTERIES AS NEEDED TO PREVENT BATTERY MOVEMENT.

CBBC 24-2 24V CIRCUIT BREAKER BATTERY CABLE INSTALLATION INSTRUCTIONS

- 1. RELEASE THE BATTERY TRAY LATCH AND SLIDE THE BATTERY BOX TO THE REARMOST POSITION. RELEASE THE BATTERY BOX STRAP, THEN REMOVE THE BATTERY BOX COVER.
- 2. IF OLD BATTERIES ARE IN THE BATTERY BOX, UNDO ALL CONNECTIONS TO THE BATTERIES, THEN REMOVE THE BATTERIES FROM THE BATTERY BOX. IF THERE ARE NO BATTERIES IN THE BATTERY BOX, SKIP THIS STEP.
- 3. IF THE BATTERY BOX IS DIRTY OR CONTAINS ANY LIQUID, REMOVE IT FROM THE TRAY AND THOROUGHLY CLEAN IT OUT. LET IT DRY, THEN REINSTALL IT ONTO THE BATTERY TRAY.
- 4. INSTALL THE NEW BATTERIES IN THE BATTERY BOX ORIENTED AS SHOWN.
- 5. CONNECT THE CIRCUIT BREAKER BATTERY CABLE AND JUMPER TO CREATE A 24V BATTERY PACK (TWO 12V BATTERIES IN SERIES) AS DESCRIBED IN STEPS 6, 7 AND 8.
- 6. CONNECT THE RING TERMINALS WITH RED WIRES TO THE POSITIVE BATTERY TERMINAL OF THE REAR BATTERY.
- CONNECT THE RING TERMINALS WITH BLACK WIRES TO THE NEGATIVE BATTERY TERMINAL OF THE FRONT BATTERY.
 CONNECT THE JUMPER CABLE (ONE #8 WHITE WIRE) BETWEEN THE POSITIVE TERMINAL OF THE FRONT BATTERY AND THE NEGATIVE TERMINAL OF THE REAR BATTERY.
- 9. IMPORTANT: USE TWO WEENCHES TO TIGHTEN ALL BATTERY CONNECTIONS SECURED WITH A NUT AND A BOLT. USE CARE TO AVOID SHORTING ACROSS BATTERY TERMINALS WITH TOOLS, SERIOUS INJURY OR DAMAGE COULD RESULT. DO NOT USE YOUR FINGERS TO TIGHTEN THE CONNECTIONS AS THIS WILL RESULT IN INTERMITTENT OPERATION, CHARGING PROBLEMS, AND OVERHEATING OF CABLES AND BATTERIES NEAR BATTERY POSTS. COSTLY DAMAGE TO THE CIRCUIT BREAKER BATTERY CABLE AND BATTERIES THAT IS NOT COVERED UNDER WARRANTY MIGHT OCCUR.
- 10.PLUG THE RED CONNECTOR ON THE END OF THE POWER CABLE FROM THE DRIVE MODULE INTO THE CORRESPONDING RED CONNECTOR OF THE CIRCUIT BREAKER BATTERY CABLE.
- 11.ROUTE THE POWER CABLE FROM THE DRIVE MODULE THROUGH THE RIGHT FRONT SLOT OF THE BATTERY BOX COVER, THEN PUSH THE COVER DOWN IN POSITION OVER THE BATTERIES. FASTEN THE RETAINING STRAP. PUSH THE BATTERY TRAY TOWARD THE FRONT OF THE CHAIR UNTIL IT LATCHES.

shall meet DOT CFR 173.159 (d), IATA Packing Instructions 806 and IATA Provision A67

Figure 5-2R. CBBC 24-2 24V Gel-cell Circuit Breaker Battery Cable Installation Instructions Label (right portion).

- 16. Slide the battery tray forward until it latches in position underneath the seat. Be careful not to catch or pinch any cables in the battery tray slides. Make sure that no cables dangle in the moving parts such as wheels, drive chains or sprockets. Also, make sure that cables do not drag on the ground or hang down so far that they might catch on something.
 - IF NECESSARY, USE ADDITONAL CABLE TIES TO SECURE CABLES TO THE WHEELCHAIR FRAME TO PREVENT CABLES FROM BEING DAMAGED.
 - Do not tie cables in such a manner that the cables might be damaged when the battery box is pulled out.
- 17. Do not attempt to operate the chair unless the batteries are installed as outlined in this section.
- 18. Do not attempt to operate the chair until the batteries have been fully charged. New batteries should be charged through a complete charge cycle before using the chair to ensure a full charge. Follow the charging instructions outlined in Section 5.5.

5.5 Battery Charging

Before charging your batteries, be sure to read the information supplied by the charger manufacturer as well as the information printed on the case of the charger.

WARNING: RECHARGE YOUR WHEELCHAIR BATTERIES ONLY IN A WELL VENTILATED ROOM. Gases issuing from a recharging battery are explosive and can cause serious injury and damage. Do not smoke, light a match or

create sparks near a battery that is being recharged.

Generally, the following procedure should be followed:

- 1. If possible, plug the battery charger directly into a 115-volt, 60-Hertz outlet. If an extension cord is necessary, use only a Heavy-Duty Industrial grounded type extension cord. Do not use a household type extension cord if the charger plug will not reach the outlet.
- 2. Connect the cable from the battery charger to the charging receptacle on the chair.
- 3. Observe that after a one or two second delay, the charger LED lights should turn on and indicate that the batteries are being charged.
- 4. Allow adequate time for the batteries to be charged. Several hours will normally be required. Most users start the charging cycle when they get out of their chairs in the evening before going to bed. The actual time required to recharge depends upon the state of discharge of the batteries, the capacity of the charger and the capacity of the batteries. The charger is fully automatic and will shut off when the batteries are fully charged.
- 5. When charging is complete or when you get into your chair in the morning, disconnect the charger from the chair. *Note: The BOUNDER has charger interlock circuitry that prevents wheelchair operation whenever the charger is plugged into the chair.* **Do not defeat this safety feature.**
- 6. If your battery charger does not appear to be working properly, read the information supplied by the battery charger manufacturer. If you cannot locate the problem, take the charger to your authorized *21st Century* SCIENTIFIC, Inc. dealer.

5.6 Battery Problems, Inspection and Testing

The most common user battery related complaint is that the batteries won't hold a sufficient charge to run the chair for a whole day. Often complaints come from users whose batteries are only a few weeks old. A common scenario is a user who has used his chair without problems for several months or more. He then decides to install new batteries. A few days to weeks later, problems are encountered.

The possible causes (or bad components), in order of decreasing likelihood, are:

a) Batteries

c) Bad cables

d) Charger

- b) Improperly tightened battery terminals
- e) Improper weight balancef) Under inflated tires
- g) Bad or incorrect sproch
 - Bad or incorrect sprockets
- h) Binding rear wheels
- i) Binding front wheels

- j) Electric brakes
- k) Motors
- l) Drive module
- m) Hand control

WARNING: CHARGE, MAINTAIN AND TEST YOUR WHEELCHAIR BATTERIES ONLY IN AN AREA WHERE POSSIBLE SPILLS OR OVERTURNING WILL NOT CAUSE DAMAGE TO FLOORS OR CARPETS. 21st Century SCIENTIFIC, Inc. is not responsible for any damages that result from acid spills.

CHECK FOR IMPROPERLY TIGHTENED BATTERY TERMINALS.

If the battery related complaint is new and the batteries have recently been replaced, check the battery connections. Do not believe that the terminals are tight because someone told you so. Check all terminals and use a wrench to check that they're tight. Loose connections may also lead to complaints of intermittent operation, with users saying the chair may work fine again after they pause for a few minutes or to allow things to cool down. More likely, they are jiggling the chair enough for the connection to re-establish again until a bump causes it to no longer make sufficient contact. Still worse, the bad connection may cause the batteries to not be properly charged during the next charge cycle. After a few days, chronically discharged batteries occur along with intermittent operation.

6. SERVICE AND MAINTENANCE

21st Century SCIENTIFIC, Inc. urges you to protect your BOUNDER Power Wheelchair by having it serviced regularly as described below. Regular maintenance will improve reliability, increase safety, reduce operating cost and ensure you meet your warranty requirements. NEVER operate your BOUNDER wheelchair if a component or part does not function properly.

Periodic inspection, adjustment and replacement of worn parts will lead to many years of outstanding performance. Many of the maintenance procedures described herein may best be performed by your 21st Century SCIENTIFIC, Inc. Servicing Dealer. Contact your dealer or the factory if you need assistance.

The table below shows the recommended BOUNDER inspection, adjustment and maintenance schedule. The "User" column in Table 6-1 is for items that are User Serviceable. Service and maintenance items not marked as serviceable by the user should only be performed by an authorized servicing dealer.

User	No.	Procedure Description	Perform The Procedure						
			Every Every Every 3		Every 6	Every	Every 5		
			Day	Week	Month	Months	Months	Year	Years
Х	6.1	Charge batteries	Х						
Х	6.2	Verify operation of hand control & drive module	Х						
Х	6.3	Verify operation of brakes	Х						
Х	6.4	Inspect your chair for problems	Х						
Х	6.5	Check electrical connections		Х					
Х	6.6	Adjust tire pressure		Х					
Х	6.7	Verify operation of brake release levers and/or switch (if equipped)			Х				
Х	6.8	Inspect/adjust drive chains			Х				
	6.9	Check batteries			Х				
Х	6.10	Inspect positioning straps			Х				
Х	6.11	Inspect anti-tip devices (wheelie wheels)			Х				
Х	6.12	Clean/inspect upholstery			Х				
Х	6.13	Inspect front rigging			Х				
Х	6.14	Inspect hand control			Х				
	6.15	Check wires, cables and connections				Х			
	6.16	Inspect/lubricate battery tray slides				Х			
Х	6.17	Clean the batteries				Х			
Х	6.18	Clean frame members				Х			
Х	6.19	Check all moving parts				Х			
Х	6.20	Check wheels and casters				Х			
Х	6.21	Clean and lubricate arms and footplates				Х			
	6.22	Check all nuts, bolts and fasteners					Х		
	6.23	Inspect/change caster barrel bearings					Х		
	6.24	Inspect/change caster wheel bearings					Х		
	6.25	Inspect/change drive wheel bearings					Х		
	6.26	Clean/inspect brakes					Х		
	6.27	Inspect suspension swing-arms					Х		
	6.28	Inspect drive wheel sprockets, wheels & mounts						Х	
	6.29	Inspect power seating components (if chair is so equipped)						Х	
	6.30	Have chair inspected/serviced by an authorized supplier/dealer						Х	
	6.31	Inspect/change motor sprockets						Х	
	6.32	Inspect motor bearings						Х	
	6.33	Inspect/rebuild motors and inspect/replace brakes							Х

Table 6-1. Maintenance Schedule

6.1 Charge Batteries

Most users prefer to charge their batteries every night while they sleep. When charging, be sure that the wheelchair power is switched "OFF". Charge the batteries according to the instructions of this manual as well as the instructions printed on the case of the charger and in the manual that accompanied the charger.

6.2 Verify Operation of Hand Control and Drive (Power) Module

As you use the wheelchair, verify that <u>all</u> switches function properly. If any switches feel broken or become intermittent, have them replaced. Confirm that the joystick operates smoothly, does not stick, always returns to neutral if released, and does not have "dead spots" or other erratic operation at certain positions.

If the chair seems to always have one or both motors cut out at certain joystick positions, the joystick may need replacement. If such problems are noted, have the equipment serviced by your dealer. Joysticks usually give you some warning as they most often grow slowly worse with time. Nonetheless, immediate servicing is always recommended to prevent a dangerous situation from occurring.

6.3 Verify Operation of the Brakes and Related Control Switches

Verify that the chair comes to a stop and the electric parking brakes set when the joystick is returned to neutral or powered off. If your chair does not respond as indicated, immediately get it serviced.

6.4 Inspect Your Chair for Problems

Look at the wheels as they rotate to verify that tires are properly inflated, wheels run true, no foreign objects are in the tires, etc. Drive in a quiet area and listen for any new noises from your chair and determine the cause. Contact your dealer or the factory if you notice that something on your wheelchair needs servicing.

6.5 Check Electrical Connections

Inspect all visible cable connections, such as the hand control cable, to be sure they are firmly mated. A visual inspection is usually adequate.

<u>6.6 Adjust Tire Pressure</u>

This applies only to air-filled tires, not foam-filled tires. Check tire pressure at least once a month using an automotive or bicycle tire pressure gauge. Refer to Table 6-2 for correct inflation pressures.

Туре	Drive Wheels			
Size	13" x 5" (Kenda)	14" x 5.4" (Nanco)		
PSI / kPa	18 / 124	BOUNDER 300: 14 / 97		
		BOUNDER 450: 18 / 124		

Table 6-2. Tire Size and Inflation Pressure Chart.

6.7 Verify Operation of the Brake Release Levers and/or Switch

On a flat level surface, operate both brake release levers and ensure the chair can be pushed by an attendant. If equipped with a Brake Release Switch, verify that when the Brake Release Switch is operated that the parking brakes release and that the chair can be easily pushed by an attendant.

6.8 Inspect/Adjust Drive Chains

Clean and lubricate the drive chains when they become contaminated with dirt or are in need of lubrication. 21st recommends Lucas Oil Products Chain Lube or Tri-Flow Superior Lubricant.

Verify Chain Tension Is Correct: New chains will stretch and may need to be adjusted periodically over the first few weeks after installation. Chains need only to be tight enough so they do not have excess movement or derail while driving.

DO NOT over-tighten the chains. If the chains are over-tightened, they will stretch and no longer fit into the teeth of the chain drive sprocket, thus causing premature wear and failure. Depending on the chair configuration chains should have about 1/4" to 3/8" deflection.

Chain deflection can be measured by placing a straight edge on top of the chain and pressing down on the chain.

Also, examine the sprockets installed on the motor shafts and drive wheels for wear. If the teeth of the sprocket show visible signs of wear, they should be replaced.

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June 28, 2023

every month

every week

every month

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every day

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every day

every day

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6.14 Inspect Hand Control

every month If your joystick does not seem to offer the precision control it did when it was new, do not continue driving your chair until repaired or replaced by your dealer. To lengthen joystick life, avoid moving the joystick when it's not necessary.

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If Your Chains Need to Be Tightened, Do the Following: (Refer to Figure 6-1)

- To tighten the chain use a ¹/₂" deep socket (or open end wrench) to tighten the spring nut (clockwise) until the top of the washer face is between 1-1/8" to 1-1/4" distance to the spring plate.
- Drive the chair to make sure the chain tension is correct.
- Repeat this process if necessary.

6.9 Check Batteries

Open your battery box and check to make sure the battery connections are tight on each of the battery terminals. Check that the connection to the drive module is fully seated, wiring is in good condition and no leaks or cracks are visible on each battery.

Care should be taken to avoid contacting adjacent terminals with the wrench as serious personal injury and damage to the batteries can occur!

6.10 Inspect Positioning Straps

Inspect any positioning straps that are included with your wheelchair for signs of wear, cuts, abrasions, fraying and fit. Repair or replace as necessary.

6.11 Inspect Anti-tip Devices (Wheelie Wheels)

Verify the anti-tipper devices are in good working order. If not in good working order or they are damaged, immediately have your antitippers repaired or replaced by your servicing dealer. Do not use your wheelchair until repaired.

6.12 Clean and Inspect Upholstery

Inspect your upholstery seating, cushions, armrests, calf pads, headrest, knee buttons, and any positioning bolsters for signs of wear, cuts, abrasions, rips & tears. Repair or replace as necessary. Clean the upholstery or seating cushions with mild soap and water, then wipe dry. If your upholstery or seating is covered with Naugahyde, leatherette conditioner can be used to make the Naugahyde more soft and pliable. Tighten all sling upholstery mounting screws or seating hardware.

6.13 Inspect Front Rigging

Check front rigging pivot points and that the latches secure the footrests in position. Check that footboards flip-up correctly and are not loose. Contact your servicing dealer to have them make any repairs or adjustments.

every month

every month

every month

every month

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Tensioner Exploded View

Figure 6-1. Chain Tensioner Components with Installed and Exploded Views





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6.15 Check Wires, Cables and Connections

Inspect all cables and connections for signs of wear or damage. Verify that each and every connector plugs securely into one another and is not damaged.

Also, avoid applying severe force to it, limit exposure to heavy rain or snow, do not take a shower with it or submerge it in water, and do not spill any food or drink on it. If the rubber boot becomes damaged, promptly replace the boot. If you do spill something into the joystick, promptly clean it thoroughly, then have it serviced. If the joystick needs replacing, do not use the chair until it is replaced.

- Inspect the battery cable for any sign of damage. •
 - Check cables for accessories such as lights, horns, electric leg-bag emptiers, etc.
 - Check for any damage to the fuse holders.
 - Check the connection between your battery charger and the charging connection on your chair.
 - Check the Hand Control bus cable for signs of damage.
 - Verify the cable is properly retained to the drive module and the driver hand control.

If any cables or connectors are damaged, repair or replace them.

DO NOT DRIVE YOUR WHEELCHAIR IF ANY CABLES OR CONNECTORS ARE DAMAGED.

6.16 Inspect/Lubricate Battery Tray Slides

When the batteries are cleaned, slide the battery tray in and out. If it does not slide freely, clean any part of the slides that are dirty. Have your servicing dealer apply silicon spray lube (as grease can attract dust and dirt) to the metal ball guides of each slide. Also, confirm that the latch properly engages when the tray is in the forward position.

6.17 Clean Batteries

It is important to keep the batteries clean. If they are dirty, disconnect all battery cables and move the batteries to an area where they will not damage the floor or carpets. Clean the terminals with a wire brush, wash the batteries using a mild soap and water solution, and then rinse them with clear water. Dry the batteries, re-install them in the battery box and apply dielectric grease to the terminals and wire connectors at the batteries. Reconnect the cables. Refer to section 5.4 of this manual on "Battery Installation" when you reinstall the batteries.

6.18 Clean Frame Members

Clean all powder coated metal parts with a wax that contains a cleaner (auto wax). Do not use abrasive cleaners such as chrome cleaner or scouring cleaners on powder coated surfaces as they might scratch the finish. Clean anodized metal surfaces with a damp but wrungout rag using a mild soap and water solution. Do not drip water into the electronic assemblies.

6.19 Check All Moving Parts

Check all moving parts of the wheelchair for signs of wear, binding issues, and that the fasteners are intact and properly tightened. Clean any debris, dust or lint if present. Verify any power seating installed functions properly and travel to the limits of their pathways. Check arms and their moveable parts. Pivot points can be lubricated with silicon spray lube. Contact your servicing dealer to correct any item that needs assessed, adjusted, repaired or replaced. Ensure that all cables are secured and not dangling into moving parts pathways. Have your servicing dealer replace wire ties that are missing or broken. Do not operate your chair until cables are secured.

6.20 Check Wheels and Casters

Check all wheels and casters to make sure they rotate freely. Check the caster forks to make sure they rotate smoothly throughout all 360 degrees of rotation. Check the drive wheels by releasing (or removing) the drive chains and verifying that the rear wheels have no side play (i.e., are not loose) and that they rotate freely.

6.21 Clean and Lubricate Arms and Footplates

Clean off and then lubricate all telescoping tubing such as adjustable height arms with a silicone spray. Footplates should be similarly lubricated.

6.22 Check All Nuts, Bolts and Fasteners

Start on one side and work your way around the chair checking all the bolts and nuts along the way. Verify each is secure, replace missing or broken hardware as needed. Some fasteners may only be accessible when the power seating is moved out of the way.

every 3 months

every 3 months

every 3 months

every 3 months

every 3 months

every 3 months

every 3 months

every 3 months

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6.23 Inspect/Change Caster Barrel Bearings

Inspect the caster barrel bearings for signs of wear. To do this, put a wood block under one caster wheel and check the bearings in the opposite caster barrel. The wheel should caster smoothly but not wiggle up, down or sideways. Up and down wiggle is adjusted by tightening the stem nut. Sideways wiggle indicates excessive bearing play and new bearings should be installed. Wear can also be indicated by noise in the bearings or binding rather than smooth rotation. Adjust or replace the bearings as required.

IMPORTANT: Replace bearings with exact replacements.

6.24 Inspect/Change Caster Wheel Bearings

Inspect the caster wheel bearings for signs of wear. Wear is indicated by noise in the bearings, excessive wheel wobble, or binding rather than smooth rotation. Adjust or replace the bearings as required.

IMPORTANT: Replace bearings with exact replacements.

6.25 Inspect/Change Drive Wheel Bearings

Inspect the drive wheel bearings for signs of wear. Wear is indicated by noise in the bearings, excessive wheel wobble, or binding rather than smooth rotation. Adjust or replace the bearings as required.

IMPORTANT: Replace bearings with exact replacements.

6.26 Clean/Inspect Brakes

When the motor bearings are inspected, but more frequently if you drive in dirt or mud, clean all debris from the brakes. Also, if any scraping noises are heard from the brakes or binding in the brakes is felt, immediately clean them. Verify the brakes operate correctly.

CAUTION: Do not lubricate or grease the brakes as these are designed to operate dry.

6.27 Inspect Suspension Swingarms (if chair is so equipped)

Verify the rod-ends are secured and pivot freely. Check that the suspension shocks are properly retained and clean any dirt or debris from the springs. Check that the anti-tip devices are installed and the pin latches are intact and secure the anti-tip devices in the working position. Verify that the bolts holding the motors are tight. Verify the clutch is secure, and yet still allows clutch movement when operating the handle.

6.28 Inspect Drive Wheel Sprockets, Wheels & Mounts

Annually (or whenever damage has occurred), check each drive wheel sprocket to make sure that all teeth are undamaged, that nothing is bent or worn.

- Verify that the chain rides properly on the sprockets, and that noise is not excessive.
- Check that the drive wheels themselves are not bent and run true.
- Verify that the drive wheel mounts are not bent or otherwise damaged.

Replace any faulty components as needed.

6.29 Inspect Power Seating Components (if chair is so equipped)

If any power seating system component fails to work properly, have your dealer inspect the system immediately. At least once a year, have your dealer verify that each and every power seating actuator is operating properly. Replace any faulty components.

Note that some noise in actuators is normal, and some actuators are quieter than others.

6.30 Overall Safety Check by an Authorized Supplier/Servicing Dealer

A complete inspection, safety check and service should be performed annually by an authorized servicing dealer or the factory.

6.31 Inspect/Change Motor Sprockets

Inspect the drive sprockets to be sure that they are not excessively worn, that they are tight on the motor shaft and that they are in proper alignment with the drive wheel sprockets. Adjust or replace as needed.

every 6 months

every 6 months

every 6 months

every 6 months ares. Also. if any

every 6 months

every year

every year

every year

every year

6.32 Inspect Motor Bearings

Every six months, inspect the motor bearings for excessive play. To do this, use an Allen wrench to remove the four flat socket head screws that attach each electric brake to the motor hex standoffs. Remove both electric brake assemblies, release both clutches, and remove both drive chains. Grab a motor sprocket firmly in your hand and attempt to push the sprocket sideways (towards the front and rear of the wheelchair, then up and down). If any movement is felt, have the motor rebuilt or replaced.

CAUTION: Ignoring motor bearing play may damage the armature shaft, necessitating complete motor replacement that is not covered under warranty.

If the motors emit any noises, check the motor bearings more frequently. Some motor bearings make a high pitch sound only at very slow speeds. The motor should be serviced if this occurs.

6.33 Insp	ect/Rebuild Motors and Inspec	t/Replace Brakes	every 5 year			
Approximately every five years, depending on usage, the motors may need to be rebuilt. A motor should also be rebuilt if:						
a.	its bearings are bad	d.	it has cracked or bent parts			
b.	it does not run smoothly	e.	it has been submerged			
c.	it is intermittent	f.	it makes unusual noises			
	CAUTION: DO NOT LUBRICAT	E OR SPRAY WD40 OR OTHE	ER LUBRICANTS INTO THE MOTORS.			
Motor #	abuilding requires that the motors had	normound from the wheelsheir h	w on authorized dealer and returned to 218t Ca			

Motor rebuilding requires that the motors be removed from the wheelchair by an authorized dealer and returned to 21st Century SCIENTIFIC, Inc. Never try to rebuild a motor yourself.

Approximately every five years, if brake friction discs are worn or the brakes fail to properly hold the chair on grades, replace the brakes. Contact the factory if your need further assistance or information.

<u>6.34 Common Tool List</u> (for performing adjustments and maintenance on BOUNDER wheelchairs)

Wrenches: 3/8", 7/16", 1/2", 9/16", 5/8", 3/4" Ratchet/Socket: 1/2" deep-well socket, 15/16", 1-1/16" Hex Wrench (Allen): 1/8", 5/32", 3/16", 7/32", 1/4" Screwdrivers: #2 Cross-tip (Phillips), 1/4" flat-tip screwdriver Miscellaneous: Needle nose pliers, small flush-cut wire cutters

Contact information for service or repairs:

21st Century SCIENTIFIC, Inc. 4931 N Manufacturing Way Coeur d'Alene, ID 83815 Customer Service phones: (208) 667-8800 & (800) 448-3680

Service Manuals are not available at this time.

7. TROUBLESHOOTING GUIDE

7.1 Troubleshooting Tips

If you experience any of these problems, please do the following:

If chair is too sensitive, refer to the Owner's Manual describing the electronics supplied with your chair.

If chains derail, refer to sections 4.13, and 6.8 for adjusting chain tension.

If batteries don't hold a charge, refer to section 2.3.5, 2.3.6, 4.9, 4.11 and chapter 5 of this manual.

If chair veers to one side, see the following:

- Check that all wheel and caster barrel bearings spin freely and do not drag (see sections 6.20, 6.23, 6.24, 6.25 and 6.28).
- Check that all tires are inflated to the same levels (see sections 6.7).
- Check that both chains are tightened the same amount (see section 6.8).
- Check that neither brake drags or binds (see sections 2.5.5, 6.3, 6.26, and 6.33).
- Check that neither fork is bent. Check that neither drive wheel nor drive wheel mount is bent (see section 6.20 and 6.28).
- If you have recently changed motor sprockets, verify that both left and right are the same size. If the chair still veers, correct by doing a veer adjustment (if your electronics includes this provision). Motors and electronics problems can also cause veering, but it is unlikely unless a motor or the electronics has recently been replaced and the problem simultaneously occurred.
- Contact the factory if veering problems cannot be resolved by the above procedures.

7.2 Normal vs. Excessive Use of Your Wheelchair

Your power wheelchair circuit breaker cable is designed to not trip under any normal driving condition, including prolonged hill climbs. In fact, it is designed to allow you to strain components to the limit for as long as possible in case you are in trouble and to do anything possible to get out of it. You must learn to judge when you are asking too much from your equipment.

7.3 If You Trip a Circuit Breaker

The circuit breaker battery cable on your wheelchair is NOT designed to protect the motors or drive module from overheating. Rather, it is designed to trip ONLY IN THE EVENT OF CATASTROPHIC FAILURES, such as direct shorts in the module power cable or internal wiring, or drive module failures leading to very high current drains.

IF ANY BREAKER ON YOUR WHEELCHAIR TRIPS, DO THE FOLLOWING:

- 1) Check to see if anything obvious is shorting, such as bare wires or a damaged cable. If so, correct the problem.
- 2) Attempt to reset the breaker. If it trips in less than 5 seconds, do not attempt to reset it until you find the problem. Take the chair to a qualified repair dealer for servicing if you cannot find the problem. If you attempt to reset the breaker more than a few times, the breaker will be damaged and will require replacement.
- 3) If the breaker trips only after you drive the chair for more than five seconds, avoid driving the chair until you can find the cause and make repairs.

YOUR WHEELCHAIR IS EQUIPPED WITH CIRCUIT BREAKERS.

7.4 Blown Fuses

Check all cables and connectors. Have a servicing dealer check for shorts to the frame of the wheelchair. Unplug all 24VDC connections to the batteries and plug them in one at a time to test.

7.5 Thermal Roll-Back

Within the wheelchair electronics is a thermal roll-back circuit which protects the controller from damage due to overheating. When conditions cause the controller to overheat (repetitive hill climbs, high-speed and/or long duration trips) the circuitry will decrease the power to the motors. This allows the chair to be used at a reduced speed and when the controller cools enough, normal speed will be available for use again.

8. WARRANTY

LIMITED WARRANTY - BOUNDER POWER WHEELCHAIR

21st Century SCIENTIFIC, Inc. (hereinafter 21st) warrants all BOUNDER Power Wheelchairs that it manufactures to be free from defect in workmanship and material for a period of ONE YEAR (TWO YEARS for BOUNDER Plus models) from the date of original shipment from the factory. Customers who file a warranty registration card with the factory along with proof of purchase such as a sales slip or an invoice can have the warranty period beginning date changed to the date that the BOUNDER was actually purchased from their dealer. Depending upon the particular BOUNDER model that you have received, frame warranties may be as little as 1 year or as great as 10 years. Likewise, motor and brake drive train warranties may be as little as 1 year or as great as 5 years. Drive train warranties include motors, brakes, drive wheels, drive wheel sprockets (chains, tires, motor sprockets, inner tubes and bearings not included). Your exact frame and drive train warranty periods are printed on the invoice for your wheelchair. Extended warranties up to 3 years in duration are also available but must be purchased at the same time as the equipment. Extended warranties are not available on used units. If you recently purchased a BOUNDER wheelchair and did not purchase an extended warranty but wish to do so, call the factory within 10 days of receipt at (208) 667-8800.

All BOUNDER Basic and Extended Warranties exclude damage incurred after the user takes possession of the chair such as: 1) bent, deformed or broken electronics sheet metal; 2) bent or broken extension slides; 3) bent or deformed tubing or other metal parts; 4) physically damaged cables; 5) acid, urine or water damage; 6) connection to incorrect power sources; 7) deterioration with time of powder coating, chrome or other surface finishes; 8) fading, sagging or stretching of upholstery; 9) damage to footrests or arms; and 10) wear and tear on tires, inner tubes or any other rubber component. BOUNDER Basic and Extended Warranties do not cover damage arising from collision, rough handling, damage while being transported by air, truck, car, ship or boat, or from exposure to the elements. **21st** specifically limits its responsibility to repair or replacement of the BOUNDER wheelchair or portions thereof only. **21st** agrees to repair or replace at its factory in Coeur d'Alene, ID, without charge, all defective parts in BOUNDER wheelchairs which are returned for inspection to said factory within the applicable warranty period; provided such inspection discloses that the defects are as specified above, and provided further that the equipment has not been altered or repaired other than with authorization in writing from **21st** and by **21st**'s approved procedures, not been subject to misuse, improper power sources or otherwise had its serial number or any part thereof altered, defaced or removed.

IMPORTANT! LABOR, PARTS OR MILEAGE COSTS ARE NOT REIMBURSED BY **21st** UNLESS PREAUTHORIZED IN WRITING BY **21st**. ANY SHIPPING CHARGES TO AND FROM THE FACTORY ARE NOT INCLUDED IN THE WARRANTY AND ARE TO BE AT THE EXPENSE OF THE CUSTOMER. All defective items released hereunder shall become the property of **21st**. THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED. Note that some components of BOUNDER wheelchairs that were sold or manufactured by **21st** may be covered under other warranties for those specific components. Products not of **21st**'s manufacture carry the warranty of the original manufacturer.

LIMITED WARRANTY - BATTERIES

21st does not warrant against any adverse effects that its wheelchair products may have upon batteries not sold by **21st**. a user's wheelchair batteries. Batteries not sold by **21st** are in no way warranted by **21st**. Nearly all batteries in deep cycle operation that fail prematurely do so because they: 1) have been discharged completely or too deeply one or more times, or 2) have been subject to chronic overcharging or undercharging. **21st** does not warrant against any such battery abuse by the user. Examples of severe discharge conditions not warranted by **21st** include driving the wheelchair until insufficient battery charge remains for operation, abandoning the chair for longer than 24 hours with the lights on or allowing any other condition to exist which will severely discharge the batteries. Also, it is the user's responsibility to properly charge the batteries. All batteries sold by **21st** is returned to **21st** for warranty replacement and/or adjustment, it must be shipped freight prepaid. **21st** will inspect the battery and if diagnosed to have been mechanically, electrically or in any other manner abused, it will not be covered under warranty. It will be returned to the customer at his expense only if **21st** is requested to do so. Any battery sold by **21st** that is received by **21st** after 90 days from the date of original shipment and that is defective will be replaced on a 12 month prorated basis. All defective batteries released hereunder shall become the property of **21st**, and all unclaimed batteries shall become the property of **21st** 14 days from the date of receipt by **21st**.

OUT-OF-WARRANTY SERVICE

Out-of-warranty service is provided on a fixed fee basis. There is a minimum charge of \$50.00 plus shipping and handling. Equipment sent to **21st** must have "OUT-OF-WARRANTY SERVICE" plainly marked on the mailing label. EQUIPMENT NOT SO MARKED MAY BE REFUSED BY OUR RECEIVING DEPARTMENT. A list of the equipment sent, a description of the problem and a return name, address and phone number must accompany all equipment to be repaired. Equipment not so identified may be subject to an additional \$20.00 processing fee, if **21st** can locate the owner.

LIMITED LIABILITY

21st accepts no liability for users who are injured or cause injury to others when using our products in a manner inconsistent with the safety precautions outlined in this manual, our "Power Wheelchair Safety And Operation" manual and all other manuals related to this product. Do not operate the chair until you read and understand the manuals.

CHANGES TO THE PRODUCT LINE

Illustrations and specifications contained in our literature are based upon the latest product information available at the time of publication. **21st** reserves the right to change prices and specifications and to discontinue the manufacture of any product without notice and without incurring any obligation, written quotations excepted.

RETURN OF MERCHANDISE

A Return Authorization (RA) number from Customer Service must be obtained before returning any merchandise, and this RA number must be clearly marked on the shipping label. RETURN MERCHANDISE NOT MARKED WITH AN RA NUMBER MAY BE REFUSED BY OUR RECEIVING DEPARTMENT. All standard returned merchandise is subject to a 15% restocking charge. Standard BOUNDER Power wheelchairs are subject to a 30% restocking charge. No merchandise may be returned after 90 days from the date originally shipped. Authorized returns must be received by **21st** within 30 days after the RA number is issued. No credit is given for shipping costs. Return merchandise credit, if issued, is for application against new orders. No cash refunds will be given unless such refunds were preauthorized in writing by **21st** as a condition of sale. Customized BOUNDER Power Wheelchairs and other custom merchandise are not returnable.