

ZX-1 OPERATOR'S MANUAL

Z100080 REV 6

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**1914 Palomar Oaks Way
Suite 100
Carlsbad, CA 92008
U.S.A.**

**WWW.SPINERGY.COM
Local: 760.496.2121**

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I. ZX-1 INTRODUCTION

Congratulations on the purchase of your new ZX-1 power add-on. The ZX-1 combines cutting edge technology with an attractive design that is highly functional in modern society. Spinergy, Inc understands you have chosen the premier power mobility device able to provide years of dependable operation and enhance quality of life by providing daily mobility to enjoy an active and exciting

lifestyle.

Even though your new ZX-1 is designed to be both user-friendly and provide maximum maneuverability in the tightest spaces, it is important that every ZX-1 operator read, understand, and follow this manual in its entirety before operating the ZX-1.

INDICATIONS FOR USE

The ZX-1 is intended to provide enhanced mobility to disabled persons who are capable of operating a powered and manual wheelchair, by providing powered mobility to manual wheelchairs.

HOW TO USE THIS OPERATOR'S MANUAL

Read and follow all instructions, warnings, cautions, and notes in this manual before operating the ZX-1. If there is any information in this manual that you do not understand, or if you require additional assistance for setup or operation, please contact Spinergy. Failure to follow the instructions in this manual may void the warranty, cause damage to the ZX-1 or cause personal injury.

Cautions are followed.



WARNING

- Indicates a potentially hazardous condition or situation. Failure to comply with a warning may cause injury to operator.

CAUTION

- Indicates a condition or situation that could cause damage to equipment. Failure to comply with a caution may cause equipment damage.

WARNINGS, CAUTIONS AND NOTES

Warnings, Cautions and Notes are used throughout this manual to identify potential conditions where the operator could be injured, the ZX-1 could be damaged, or just simply to make your experience with the ZX-1 a little better. It is crucial that all Warnings and

NOTE

Indicates a helpful condition or situation. A note can make operating your ZX-1 more enjoyable and typically provide helpful tips.

Failure to comply with a note will not result in any equipment damage or injury to operator.

**WARNING**

- Read and understand the product manual before operating the ZX-1.
- Use extreme caution and avoid sudden stops or turns when traveling up or down inclines.
- Reduce speed when traversing down inclines, traveling over obstacles or rough terrain.
- Do not attempt to stop a moving wheelchair using wheel locks.
- Keep hands, fingers and any other body parts clear of moving parts to avoid injury.
- Always turn power OFF before transferring in/out of wheelchair.
- Maximum safe incline is 6 degrees.

CAUTION

- Fuse rating is 50 Amps. Do not replace with a lower rated, higher rated or slow blow fuse. (Fuse is located above batteries attached to frame).
- Maximum weight of user not to exceed 250 lbs.
- Maximum curb height 2"

NOTE

- Minimum distance on fully charged battery is 5 miles for Lead Batteries and 9 miles for Lithium Batteries based on the max occupant weight rating of 250lbs.

- Breaking distance is approximately 1 ft.

Disclaimer: Minimum distance can be effected by occupant weight, terrain, weather, tire inflation, tire type, as well as several other specific factors.

PRODUCT INFORMATION

Product Name and Model: ZX-1 Power Add On.

Common Name: Manual Wheelchair Power Add On.

Rx Use Only: Federal law restricts this device to sale by or on the order of a physician.

FLAMMABILITY/SELF EXTINGUISHING PROPERTIES

All components contained in the ZX-1 pass the self-extinguishing flame retardancy tested to the Class 1 Flame Spread per ASTM E-84 specification.

SHIPPING AND DELIVERY

Using packing slip, verify all items are included in shipment before operating your ZX-1.

If you suspect an incomplete shipment, contact Spinerger immediately.

Also, if your shipment was damaged during transport, save all packaging and contact responsible delivery company immediately.

OPERATOR'S AGREEMENT

DISCLAIMER

By operating the ZX-1, each operator agrees to refrain from altering the ZX-1 in any way. Operator must not modify the ZX-1, nor remove or alter any guards, shields, or other safety equipment on the ZX-1. As Spinerger continues to further improve products and designs, retrofit kits or accessory kits may become available to enhance and preserve continued safe use of the ZX-1. Operator must also agree to install (or arrange professional installation) any retrofit kits provided by Spinerger as necessary.

Make certain to read this manual completely before operating the ZX-1. Spinerger is not responsible for damage or injury due to improper or unsafe use of the Spinerger ZX-1. Spinerger specifically disclaims responsibility for bodily injury and property damage that occurs during any use that does not comply with this manual or any federal, state, local laws or ordinances.

If you do not understand the instructions, warnings, cautions or notes presented in this owner's manual, or if you do not feel comfortable performing any tasks necessary to adjust, assemble, disassemble, operate, or

maintain your ZX-1, please contact Spinerger.

Spinerger will not be held responsible for personal injury or property damage resulting from a failure to follow this operator's manual.

ZX-1 FUTURE UPDATES AND MODIFICATIONS

Our Research and Development, Quality Control, and Engineering Teams have used the most current product specifications and product design information available to manufacture the ZX-1. Spinerger reserves the right to implement improvement or safety changes into our product lines when changes become necessary. If future changes are implemented into our product lines, there may be differences between the product you are using and instructions, tables and graphics in this operator's manual.

CONTACT SPINERGY

For more information about our products and services or to send us your valuable comments, contact:

Visit Our Website: www.Spinergy.com

Mailing Address:

1914 Palomar Oaks Way, Suite 100
Carlsbad, CA 92008
U.S.A.

II. COMPONENTS AND SPECIFICATIONS

The Main Components of the ZX-1 consist of:

- Arm Rests (Left and Right)
- Power Module
- Batteries (2)
- Caster Wheels (2)
- Motors (2)
- Armrest Brackets (2)
- Anti-Tilt Assembly
- Joystick Module
- Clamshell/Actuator
- Wheels (2)

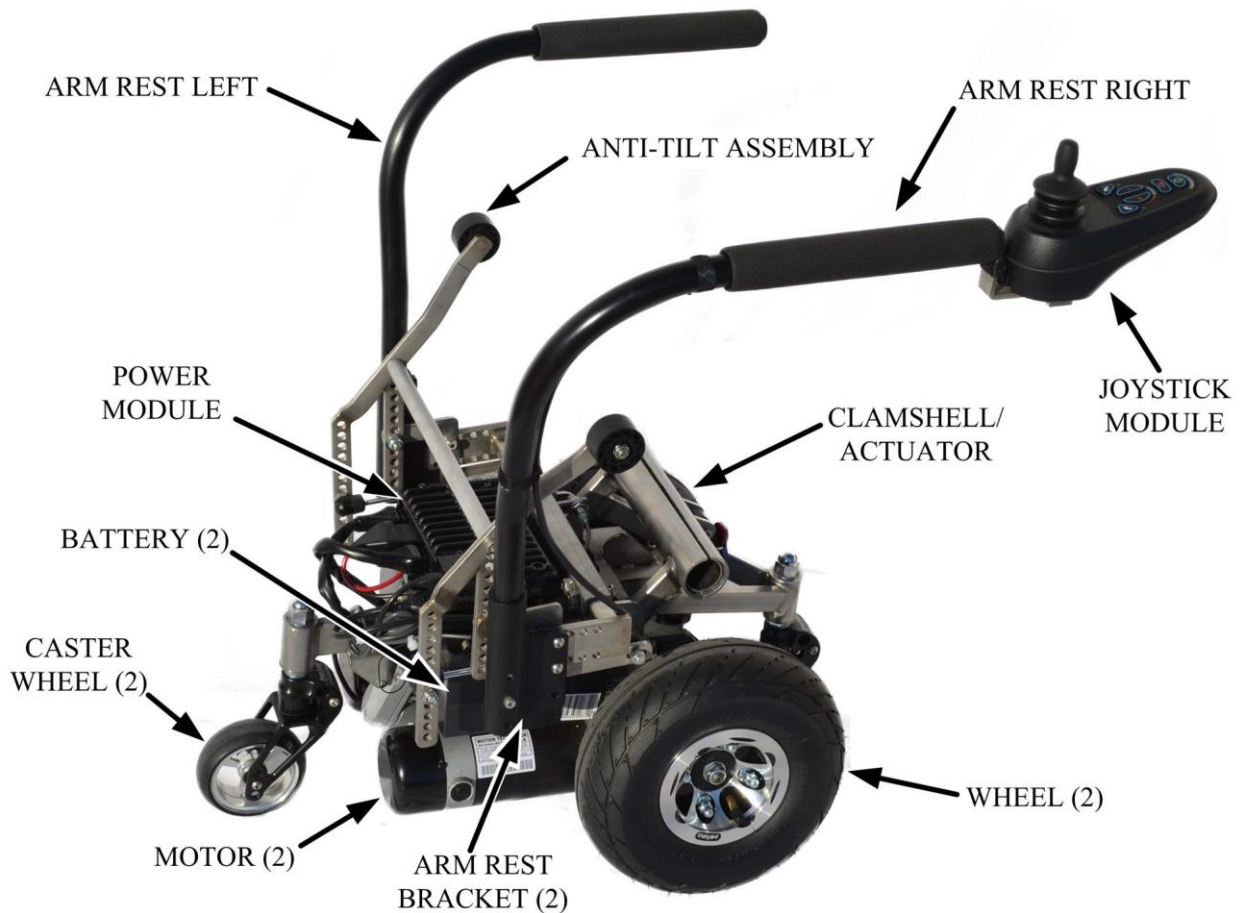


Figure 1.

Physical Properties of Compatible Wheelchair

The ZX-1 can be used with any manual wheelchair with the following characteristics:

- Rigid frame with a horizontal, round camber tube. Folding Chair Compatible with Swing Arm Attachment.
- Camber tube must be mounted level with wheelchair rear wheel axles.
- No obstructions under camber tube
- 24", 25", 26" wheelchair rear wheels
- 14"-20" rear seat frame width

- Minimum of 6" between camber tube and front caster wheels and footplate.

Control System

The ZX-1 control system consists of a joystick module and power module. The joystick module can be mounted on either armrest and the power module is mounted on the power base (Figure 2). The Joystick can be unplugged from the device by depressing the tab on the two piece connector cable.



POWER MODULE

The power module provides an interface between the joystick module, motors, batteries, and clamshell/actuator (Figure 1). The power module is connected to the joystick through the communications cable. It is also connected directly to each motor and connected to the batteries through the battery harness (Figure 12). The battery harness has a 50 amp circuit breaker which protects the control system electronics from power surges.

JOYSTICK MODULE

The joystick module provides operator interface for the control system. The joystick module consists of a joystick, control panel, and programming/charger port.

The joystick controls speed and direction of the ZX-1. Move joystick in the direction you wish to travel. The further away from center you move the joystick, the faster the ZX-1 will travel. The joystick also controls engagement/ disengagement of the clamshell/actuator while in actuator control



Figure 2.

JOYSTICK

mode.

NOTE

- The ZX-1 will only travel as fast as the limit set with the Speed Increase button.

CONTROL PANEL

The Control Panel consists of:

- Battery LED Indicator
- Power Button
- Horn Button
- Speed/Crawl LED Indicator
- Speed Decrease Toggle Button
- Speed Increase Toggle Button

- Mode Select Indicators
- Mode Select Buttons



Figure 3.

BATTERY LED INDICATOR

The battery LED indicator displays control system status, indicates the ZX-1 is powered on, and also indicates remaining battery charge.

NOTE

- The ZX-1 operates on two 12-volt batteries and the battery LED indicator displays charge level of both batteries combined.

POWER BUTTON

The power button applies power to the control system electronics, which supplies power to the motors and clamshell/actuator.

CAUTION

- Do not use the power Button to stop the ZX-1 unless there is an emergency. Failure to comply could result in damage to the control system electronics.

HORN BUTTON

The horn button will provide a “beep” sound while depressed.

SPEED /CRAWL LED INDICATOR

The speed/crawl indicator displays maximum speed and crawl mode indication for the ZX-1. There are five speed settings: 1 illuminated LED is the lowest speed, and 5 illuminated LEDs is the highest speed. This gauge also indicates if ZX-1 speed is being limited or if control system is locked.

SPEED DECREASE BUTTON

The speed decrease button decreases maximum speed setting.

SPEED INCREASE BUTTON

The speed increase button increases maximum speed setting.

WARNING

New operators must operate ZX-1 on lowest speed setting (1 or 2 LEDs illuminated). Failure to comply could result injury to operator or damage to equipment.

MODE SELECT BUTTONS AND LEDS**NOTE**

- After depressing either mode select button, mode select indicator will illuminate indicating ZX-1 is in engagement mode.

Pressing either mode select button will place ZX-1 into actuator adjustment mode or drive mode. ZX-1 is in actuator adjustment mode when mode select indicator is illuminated (Figure 3). Clamshell/actuator adjustment can be opened/closed by deflecting joystick forward or aft. To re-enter drive mode, press either mode select button and joystick becomes the operator control stick.

NOTE

- Once in actuator adjustment mode and clamshell/actuator completely closes around wheelchair camber tube, only allow aft wheelchair wheels to slightly raise off the ground. Failure to comply will cause ZX-1 to operate in crawl mode.

PROGRAMING/CHARGER PORT

The programming/charging port provides an interface for the battery charger. The charging port is found on forward lower section of joystick control module (Figure 2).

Table 1: COMPONENT SPECIFICATIONS

Length	24 in.
Width	17.5 in.
Tires	Solid/Pneumatic
Max Tire Pressure	Shown on Tire Sidewall
Tire Diameter	10 in.
Maximum Rider Weight Capacity	250 lbs.
Ground Clearance (frame/transaxle)	1.75 in./2 in.
Maximum Speed	3.5 mph (250lbs. Operator)
Battery Range Using 2 12-Volt Batteries at 250lbs.	5 miles Minimum w/ Lead and 9 miles Minimum with Lithium Batteries.
Maximum Slope	6 degrees
Highest Curb Clearance	2 inches (50mm)
Batteries	Lead: 12 volt, 15 Ah (2). AGM. 5-hr. capacity = 12.75 ah. Lithium: LiFePO4 12 volt 15 Ah
Battery Weight	17lbs. w/ Lead, 10lbs. w/ Lithium
Weight (Without Batteries)	65 lbs.
Weight (With Batteries)	82 lbs. w/ Lead, 75 lbs. w/ Lithium
Freewheel Mode Equipped	Yes
Electronic Speed Control Equipped	Yes
Brake Type	Electromechanical Park Brake
Charger Type	Off-board
Drivetrain	24 VDC Brushed Gear Motors (2)

III. INITIAL SETUP AND ADJUSTMENTS

INITIAL SETUP

FIRST TIME USE ZX-1 SETUP

The ZX-1 contains an anti-tilt feature. Before using the ZX-1 for the first time, ensure anti-tilt wheels and arm rest brackets are set up and adjusted correctly.



WARNING

- Do not operate ZX-1 without first adjusting anti-tilt feature to suit your wheelchair. Failure to comply will cause wheelchair to tilt and injury to operator.
- Do not adjust your manual wheelchair to suit ZX-1. ZX-1 must be adjusted to suit wheelchair. Failure to comply may cause wheelchair to tilt when disconnected from ZX-1.

CENTER OF GRAVITY FOR ZX-1

Center of gravity (CG) for ZX-1 is directly correlated to the position of armrest brackets. The distance from center of wheelchair rear axle to front edge of backrest vertical posts is the CG point (Figure 4).



Figure 4.



WARNING

- Do not operate ZX-1 equipped wheelchair with a CG greater than five inches. Failure to comply will cause wheelchair to tilt and injury to operator.

Use Table 2 and Figure 5/6 to determine CG for the ZX-1:

ARM REST BRACKET ADJUSTMENT

Adjust arm rest brackets as follows:

Table 2:

CG level (Measurement)	Position of Adjustment Hole (1 = forward hole)
< -2 inche(s)	2 w/ extension (See Figure 5)
< -1 inch(es)	3 w/ extension (See Figure 5)
< 0 inch(es)	4 w/ extension (See Figure 5)
< 1 inch(es)	1
< 2 inch(es)	2
< 3 inch(es)	3
< 4 inch(es)	4
< 5 inche(s)	5

1. Remove two nuts, washers, and screws on each arm rest bracket (Figure 6).

NOTE

- It will help to have left and right armrests, and cover removed during arm rest bracket positioning.

2. Place arm rest bracket in proper CG position determined in Table 2.
3. Secure both arm rest brackets to width bracket and anti-tilt bracket using two nuts, washers, and bolts (Figure 7).

Anti Tilt Bracket Extension

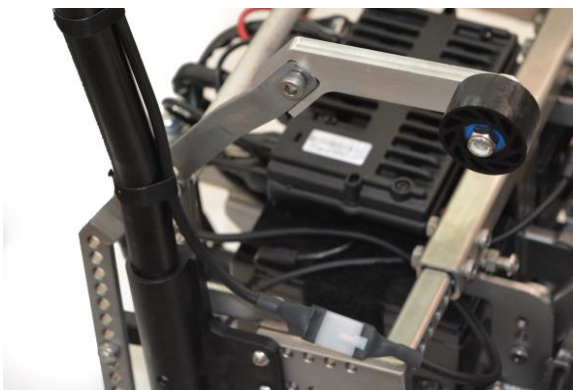


Figure 5.

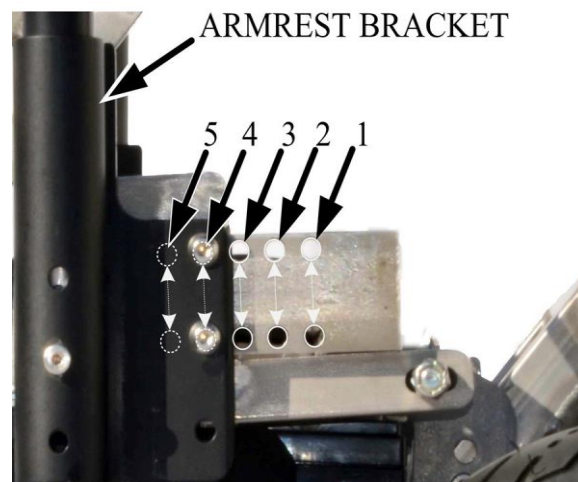


Figure 6.

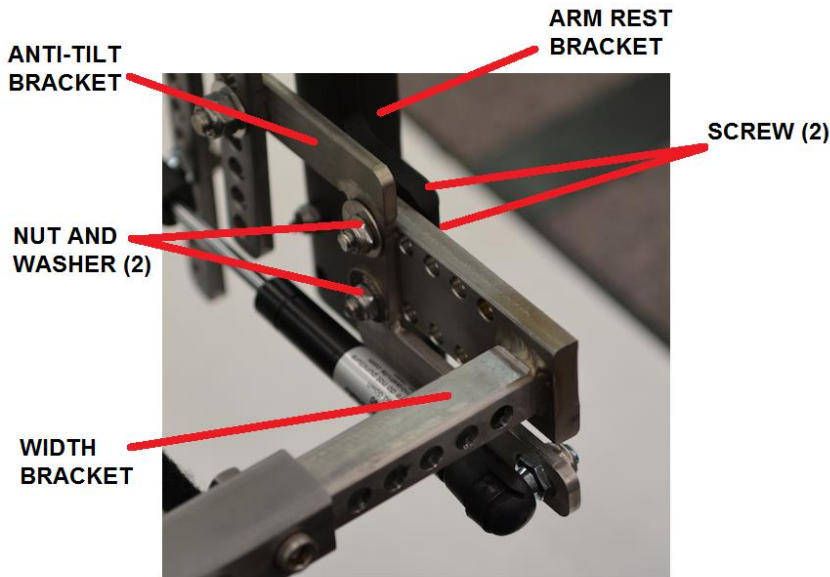


Figure 7. Anti-Tilt Bolts.

ANTI-TILT WHEEL HEIGHT ADJUSTMENT

Adjust anti-tilt wheels height as follows:

NOTE

- This procedure only needs to be accomplished if anti-tilt wheels are more than two inches below backrest rigidizer bar. This procedure also must be accomplished if anti-tilt wheels are closer than 1 inch below the backrest rigidizer bar.

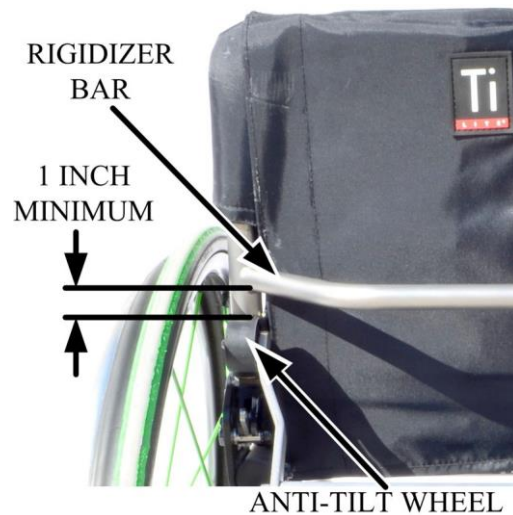


Figure 8.

1. Completely open ZX-1 clamshell/actuator by selecting mode select button on control panel and pushing joystick forward until clamshell/actuator completely opens.

NOTE

- It will help to have left and right armrests, and cover removed during anti-tilt wheels height positioning.



Figure 9.

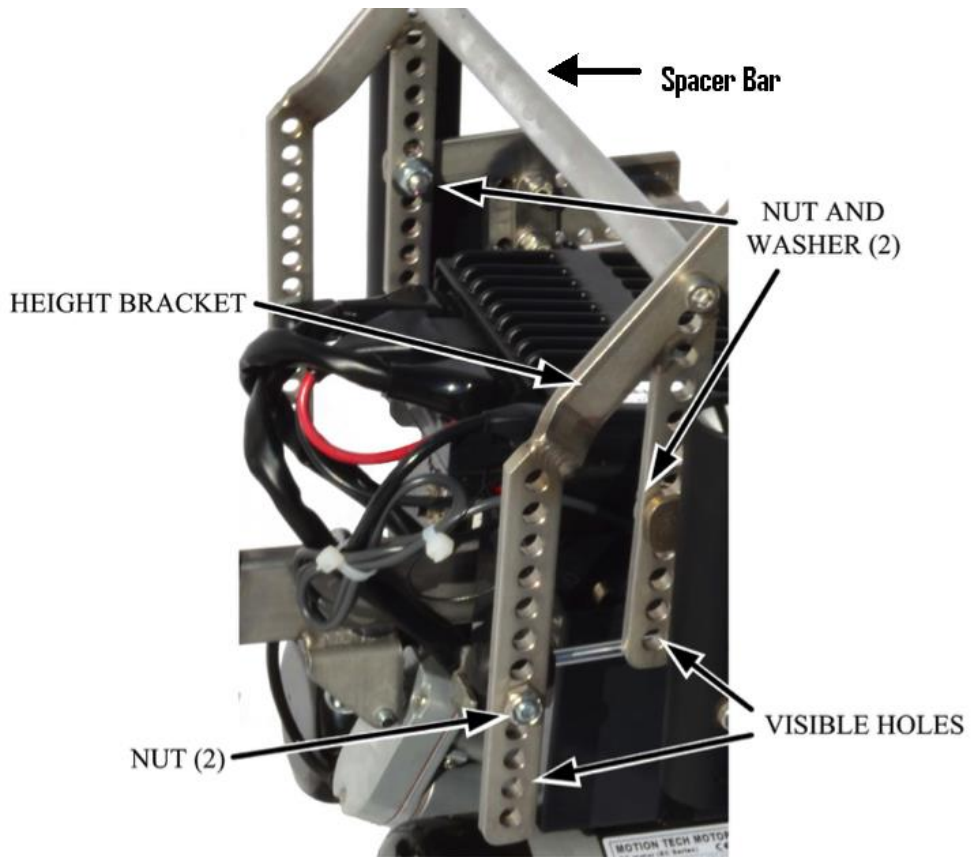


Figure 10.

2. Remove rear gas spring bolt.
3. Reposition anti-tilt height adjustment bracket so that anti-tilt wheels are between 1 and 2 inches below backrest spacer bar (Figure 7).
4. Install two nuts and washers securing anti-tilt height bracket (Figure 7).
5. Remove two anti-tilt shock nuts.
6. Re-install gas spring.
7. Install two anti-tilt shock nuts.
8. Perform anti-tilt width adjustment.

ANTI-TILT WHEEL WIDTH ADJUSTMENT

Adjust anti-tilt wheels width as follows:

CAUTION

Anti-tilt wheel width adjustment procedure must be performed before ZX-1 use. Failure to comply may cause damage to equipment.

1. Completely open ZX-1 clamshell/actuator by selecting mode select button on control panel and pushing joystick forward until clamshell/actuator completely opens (Figure 3).

2. Remove cover
 - It will help to have left and right armrests removed during anti-tilt wheels width positioning.
3. Remove four cross member allen bolts. (Figure 9).
4. Remove spacer bar by removing bolts at each end of bar (Figure 10).
5. Widen adjustable cross member as necessary to fit width of wheelchair.
6. Manually back wheelchair centered into ZX-1 base with clamshell/actuator still in open position.
7. Align ZX-1 anti-tilt wheels with wheelchair backrest vertical posts (Figure 11).

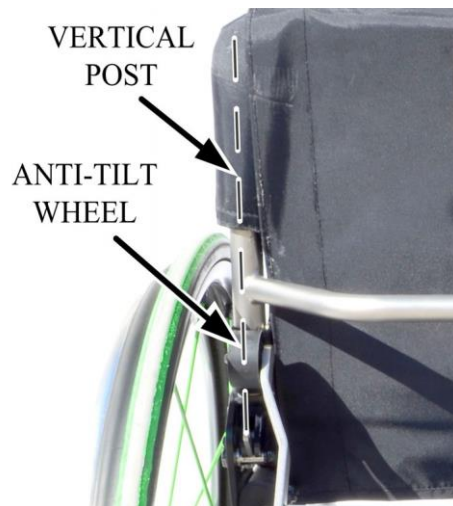


Figure 11.

8. Once desired width is achieved, tighten four cross member allen bolts (Figure 8).

JOYSTICK MODULE PLACEMENT

The joystick module comes pre installed on right armrest, but may be configured on either the left or right armrest.

Remove and Install joystick on opposite side as follows:

1. Remove cover from ZX-1 base.
2. Disconnect joystick module cable from power module (Figure 12).
3. Remove Velcro straps securing joystick module cable to armrest (Figure 12).
4. Loosen bolt securing joystick module bracket clamp in armrest and slide clamp out of armrest (Figure 12).
5. Remove cap from opposite armrest and re-install on armrest without joystick module installed (Figure 12).
6. Attach joystick module to joystick module bracket using two bracket screws (Figure 12).
7. Secure cable to armrest using Velcro straps (Figure 12).
8. Connect joystick module cable connector to power module (Figure 12).
9. Install cover to ZX-1 base.

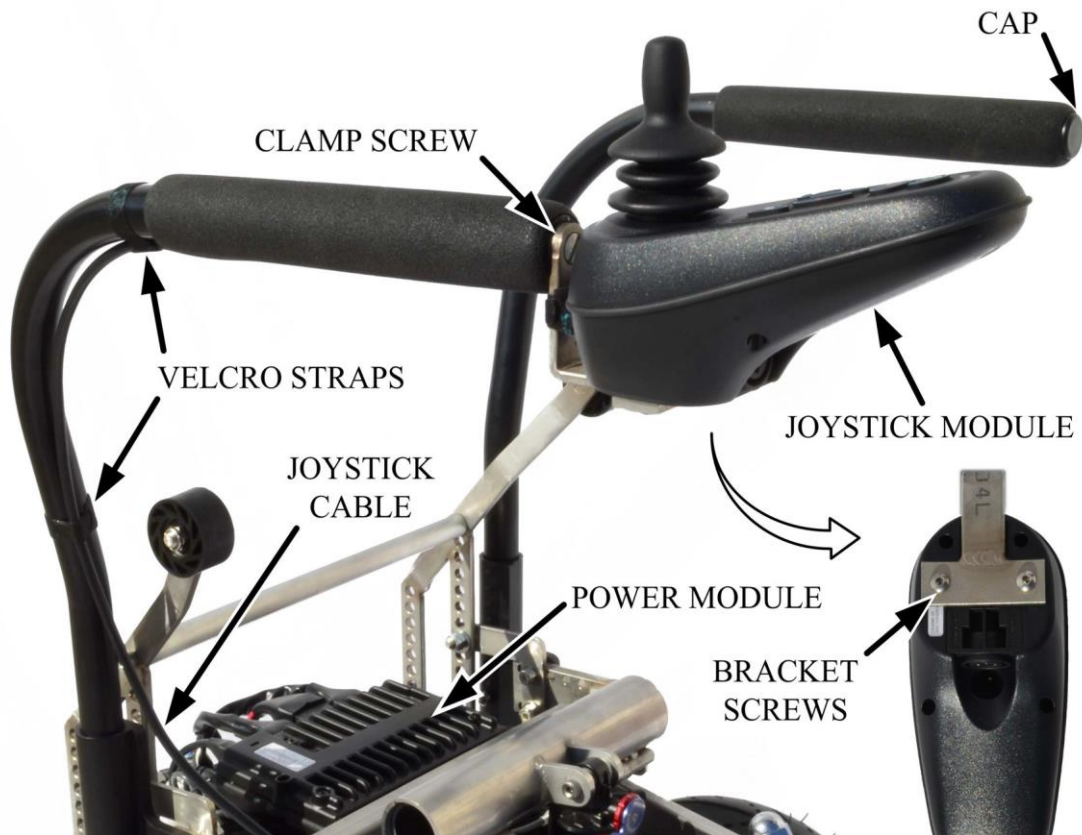


Figure 12.

IV. OPERATING AND SAFETY

PRE-RIDE SAFETY INFORMATION AND INSPECTIONS

GENERAL SAFETY

Follow manual provided by your wheelchair manufacturer. In addition to wheelchair operator's guidelines, Spinergy recommends the following guidelines for safe operation of a ZX-1 equipped wheelchair:

1. Study and obey all local pedestrian traffic rules.
2. Verify a path clear of traffic, and always proceed with extreme caution.
3. Always remember that wheelchair-height pedestrians are difficult for vehicles to see and operate the ZX-1 accordingly.



WARNING

- The following safety checks must be read and performed before operating the ZX-1 power add-on. Failure to comply may result in injury to operator and damage to equipment.

PRE-RIDE SAFETY CHECK / DAILY INSPECTION

1. Check tires and solid caster wheels: verify tires and wheels do not contain flat spots and are properly seated on rims.



WARNING

- Maintain proper air pressure as shown on tire sidewall in PSI/BAR/kPa at all times. Do not under or overinflate ZX-1 tires. Failure to comply could result in injury to operator or damage to tires.
 - Inflate ZX-1 drive tires using regulated air source with attached pressure gauge. Failure to comply may cause tire to explode and injury to operator.
2. Verify pneumatic tires are properly inflated as shown on tire sidewall.
 3. Verify ZX-1 power-up and battery level displays green. If battery level displays yellow or red, charge ZX-1 as necessary before use.

WEIGHT LIMITATIONS

The ZX-1 operator weight limit is 250-lbs. The wheelchair to be used in conjunction with ZX-1 is also rated for a maximum weight capacity as determined by the manufacturer.

CAUTION

- Do not exceed maximum weight capacity including operator and any accessories mounted to wheelchair and ZX-1 power add-on. Failure to comply may cause damage to ZX-1 power add-on.

PERIODIC CHECKS**Inspect/Adjust Weekly**

1. Check tires and ensure they are between 32-36 psi for the Standard tires and between 36-40 for the Off Road tires.
2. Clamshell/actuator is secured to wheelchair camber tube.
3. Inspect tires for flat spots and wear.
4. Ensure clamshell/actuator and caster wheels are secure. Tighten or replace if necessary.
5. Ensure wheels and casters are free of debris.

Inspect/Adjust Monthly

1. Ensure wheel nuts and hardware are secure on all wheels.

2. Ensure no excessive side movement or binding occurs when chair wheels are lifted.
3. Ensure hardware securing crossmember and all other adjustment hardware are secure.
4. Inspect for any loose hardware on the wheelchair and ZX-1.
5. Ensure all wheels are free of debris.

Inspect/Adjust Periodically

1. Ensure wheelchair rolls straight (no excessive drag or pull to one side).
2. Ensure arms are secure but easy to release and adjustment levers engage properly.
3. Ensure arms operate and lock in securely.
4. Inspect charger AC power cord for damage. Replace if necessary.
5. Ensure all wheels are free of debris.
6. Inspect electrical components for signs of corrosion. Replace if corroded or damaged.
7. Verify all labels are present and legible. Replace if necessary.

OPERATING ZX-1**WARNINGS**

- DO NOT attempt to stop a moving wheelchair with wheel locks. Wheel locks are not brakes.

- DO NOT stand on any part of the ZX-1, including the frame.

- DO NOT over-inflate tires.

- ALWAYS use caution when transferring in or out of wheelchair when connected or not connected to ZX-1. Every precaution should be taken to reduce transfer distance. Be certain wheel locks are engaged and ZX-1 power is turned off to prevent wheels from moving.

ZX-1 WHEELCHAIR COMPATIBILITY

NOTE

- The ZX-1 was designed to be compatible with a variety of ultra-light rigid frame wheelchairs and folding manual wheelchairs with a moveable swing arm camber tube from different manufactures.

The ZX-1 increases mobility and versatility of a manual wheelchair. The ZX-1 selection and purchase is the responsibility of the wheelchair operator and/or healthcare provider. If you would like additional assistance determining wheelchair compatibility, please contact Spinergy.

PRESCRIPTION MEDICATION AND PHYSICAL LIMITATIONS

ZX-1 operators must exercise extreme care when operating the ZX-1. ZX-1 operators should be aware of safety issues when taking prescribed or over-the-counter medication or when ZX-1 operator has specific physical limitations.



WARNING

- If operator is taking medication, consult a physician before operating ZX-1. Some medications may impair ability to operate ZX-1 safely. Failure to comply may result in injury to operator or damage to equipment.

ALCOHOL

The ZX-1 user must exercise care and common sense when operating his/her ZX-1. This includes awareness of safety issues while under the influence of alcohol.



WARNING

- Do not operate ZX-1 while under influence of alcohol. Failure may cause injury to operator and damage to equipment.

CONNECTING ZX-1 TO WHEELCHAIR

CAUTION

- ZX-1 can only be connected to a fixed camber tube rigid frame wheelchair. ZX-1 can only be connected to a folding-style wheelchair with the optional ZX-1 Swing Arm Attachment. Failure to comply may cause damage to ZX-1.

Connect to wheelchair as follows:

1. Completely open ZX-1 clamshell/actuator by selecting mode select button on control panel and position joystick forward until clamshell/actuator completely lowers.
2. Back wheelchair up flush against ZX-1 clamshell/actuator.

NOTE

- Wheelchair should be within one inch of open ZX-1 clamshell/actuator to connect.
3. Place ZX-1 into actuator control mode by pressing mode select button on control panel.
 4. Position joystick aft until clamshell/actuator closes completely and rear wheels of

manual chair are just slightly off the ground.

5. Press mode select button again to place ZX-1 back into drive mode.
6. On control panel, toggle mode select button back to operational mode.
7. ZX-1 equipped wheelchair is ready for use.

DISCONNECTING ZX-1 FROM WHEELCHAIR



WARNING

- Do not disconnect wheelchair from ZX-1 on an incline. Failure to comply may cause injury to operator.

Disconnect ZX-1 from wheelchair as follows:

1. Completely open ZX-1 clamshell/actuator by selecting mode select button on control panel and position joystick forward until clamshell/actuator completely lowers.
2. Power-off ZX-1.
3. Manually operate wheelchair forward away from ZX-1.

BRAKING

The ZX-1 is equipped with two brake systems: The first one is electromagnetic. When the joystick returns to the center position, the ZX-1 slows down. When the ZX-1 comes to a stop, a disc park brake is automatically activated.

FREEWHEEL MODE

Each motor on the ZX-1 is equipped with a freewheel lever that can set the ZX-1 into freewheel mode. The freewheel lever disengages the motor from the gearbox and enables the drive wheel to roll freely.



WARNING

Never sit on ZX-1 equipped wheelchair in freewheel mode. Never disengage motor from gearbox while operating ZX-1. Always make certain ZX-1 is not in freewheel mode before turning on the ZX-1. Failure to comply could cause damage to equipment and injury to operator.

To disengage the motor from the gearbox: Turn the freewheel lever outward.

To engage the motor to the gearbox and exit freewheel mode: Turn the freewheel lever inward.

CORNERING



WARNING

- When cornering sharply, reduce speed and maintain stable center of gravity. Failure to comply could cause injury to operator and ZX-1 to tilt.

MANUALLY RELEASING

If the ZX-1 completely runs out of battery power the actuator pin (Figure 13) must be pulled to mechanically release the clamp from holding the camber tube. (If lithium batteries see page 34)



"Figure 13.

While the ZX-1 is equipped with front and rear caster wheels, excessively high cornering speeds can still create tilting hazard. Factors which create tilting conditions include, but are not limited to:

1. Cornering speed
2. Steering angle (how sharply ZX-1 is turned)
3. Uneven road surfaces
4. Inclined road surfaces
5. Operating from an area of low traction to an area of high traction (such as passing from a grassy area to a paved area – especially at high speed while turning)
6. Abrupt direction changes or swerving.

High cornering speeds are not recommended. If while operating the ZX-1, operator senses a tilting condition, simply reduce speed and steering angle or lessen the sharpness of the turn).

LOCKING ZX-1 (ELECTRONICALLY)

Lock ZX-1 as follows:

1. While the control system is powered on, depress and hold the power button.
2. After 1 second, control system will beep.
3. Release the power button.
4. Position joystick forward until control system beeps.
5. Position joystick backward until control system beeps.
6. Release joystick, listen for long beep.
7. ZX-1 is now locked.

UNLOCKING ZX-1 (ELECTRONICALLY)

Unlock ZX-1 as follows:

1. Using power button, toggle control system on (maximum speed /crawl indicator ripples up and down).
2. Position joystick forward until control system beeps.
3. Position joystick backward until control system beeps.
4. Release joystick, listen for long beep.
5. ZX-1 is now unlocked

ENVIRONMENTAL FACTORS

SAFETY FIRST

When operating ZX-1 during daily activities, operator may encounter situations which require practice to master. It is helpful to take ample time to successfully maneuver through doorways, elevators, wheelchair ramps, and over moderate unpaved terrain. The more the ZX-1 is used, the more skill the operator will develop.

Below are some precautions, tips, and other safety considerations to familiarize ZX-1 operators on the safest operation methods.



WARNING

- Do not modify ZX-1 without prior authorization from Spinerger. Do not use accessories with the ZX-1 unless accessories have been pre-approved by Spinerger for use specifically with ZX-1. Failure to comply could cause injury to operator and damage to equipment.
- Do not place ZX-1 into free-wheel mode while ZX-1 is in use; ensure ZX-1 is in a safe location on flat ground before entering free-wheel mode. Failure to comply could cause injury to operator.
- Do not operate ZX-1 on public streets or roadways. Failure to comply could cause injury to operator, damage to equipment or traffic citation from local law enforcement.

OUTDOOR DRIVING SURFACES

The ZX-1 is designed to provide optimum stability under normal operating conditions. Normal operating conditions are considered dry, level surfaces composed of concrete, blacktop, or asphalt.

However, Spinerger recognizes there are also times when ZX-1 operators will encounter alternative surface types. For this reason, the ZX-1 can also handle packed soil, grass, and gravel as well. The ZX-1 may be used safely on lawns and in park areas.

Whenever possible, try to avoid the following terrain and situations:

- Avoid driving on uneven terrain and/or soft surfaces.
- Avoid tall grass that may become lodged in ZX-1 running gear.
- Avoid loosely packed gravel and sand.

- Avoid operating ZX-1 in fresh or salt water.
- Avoid using ZX-1 at the edge of a stream, lake, or ocean.

A safe rule to stand by is...If you feel unsure about a driving surface, avoid it.

INCLEMENT WEATHER PRECAUTIONS

The ZX-1 control system uses industrial-grade components throughout, ensuring reliable operation in a wide range of conditions. ZX-1 operators can further improve control system reliability by keeping extreme exposure to a minimum.

CAUTION

- Do not expose control system or other ZX-1 components to damp conditions for prolonged periods. Failure to comply could cause damage to components.

Avoid exposing ZX-1 to inclement weather conditions. If operator is caught in rain, snow, severe cold, or heat while operating ZX-1, calmly proceed to shelter at earliest opportunity. Once at adequate shelter, thoroughly dry and clean ZX-1 before storing, charging, or operating again.

**WARNING**

- Store ZX-1 in a dry and clean location. Failure to comply could cause injury to operator and damage to equipment.

- Never sit on ZX-1 equipped wheelchair in freewheel mode. Never disengage motor from gearbox while operating ZX-1. Always make certain ZX-1 is not in free-wheel mode before turning on the ZX-1. Failure to comply could cause damage to equipment and injury to operator.

CAUTION

Use caution while operating ZX-1 in rain, snow, salt, mist, on icy/slippery surfaces. Failure to comply could cause damage to equipment.

GRASS AND GRAVEL

The ZX-1 performs well on grass, gravel, and hills. However, the operator must follow parameters presented in this manual for success. Common sense is always your best protection.



WARNING

- Avoid loose gravel. Failure to comply could cause ZX-1 to become unstable and cause injury to operator or damage to equipment

CAUTION

- Avoid long or high grass. Failure to comply could wrap around ZX-1 axles and cause damage to equipment.

OPERATIONAL SKILL DEVELOPMENT

STEPS AND CURBS

Proceed with extreme caution when operating ZX-1 near raised surfaces, unprotected ledges, and drop-offs such as curbs, porches, and stairs. Always approach any obstacle straight toward the obstacle (perpendicular) to be conquered.

Riding over curbs or obstacles can cause tipping and serious bodily harm. If you have any doubt that you can safely cross any curb or obstacle, ALWAYS ASK FOR HELP. Be aware of your riding skills and personal limitations. Develop new skills only with the help of a companion.

Navigate Over Curb or Obstacle as follows:

1. Approach curb or obstacle slowly, ensuring

ZX-1 is traveling straight toward (perpendicular) the obstacle.

2. Increase forward speed just before the front wheelchair wheels contact obstacle.
3. Reduce forward speed after rear wheels clear obstacle.

Navigate Down Curb or Obstacle as follows:

1. Approach curb or obstacle slowly, ensuring ZX-1 is traveling straight toward (perpendicular) the obstacle.
2. Reduce forward speed just before front wheelchair wheels contact obstacle.
3. Increase forward speed only after rear wheels have cleared obstacle and ZX-1 is on level ground.



WARNING

- Do not attempt to conquer a curb with a height greater than 2in. (5cm.). Failure to comply could cause ZX-1 to tilt and injury to operator.
- Do not operate ZX-1 backward down any step, curb, or other obstacle. Failure to comply may cause ZX-1 to tilt and injury to operator.

INCLINES



WARNING

- Do not place ZX-1 in freewheel mode while on an incline or decline.
- Do not operate ZX-1 backward down an incline.
- Do not operate ZX-1 in a “zig zag” pattern up or down slopes.

Do not operate ZX-1 on hazardous inclines such as snow, ice, wet leaves, etc.

- Do not operate ZX-1 on any slopes (regardless of surface type) of greater than 6°.
- Failure to comply with any of the above warnings could cause injury to operator and damage to equipment.

The ZX-1 is capable of navigating up and around most wheelchair access building ramps. When operating the ZX-1 on wheelchair building access ramps, slow ZX-1 operation during tight turns which require keen cornering skills. Use caution when approaching any ramps or steep grades.

Reduce ZX-1 to lowest speed setting during ramp operations, and perform wide turns around tight corners.

While operating ZX-1 on inclines, keep ZX-1 moving if possible. Operate ZX-1 pointed straight up or down any hills; the ZX-1 is most stable pointed straight up or straight down hills. If stopping becomes necessary, slowly resume operation and accelerate cautiously. On decline, operate ZX-1 in a forward direction only. If ZX-1 begins to accelerate faster than desired, release joystick and allow ZX-1 to completely stop. Once ZX-1 is at rest, gently push joystick forward to complete controlled descent.

RAMPS

Perform the following steps when operating ZX-1 UP any ramp, curb, or incline:

1. Lean forward in ZX-1 seat to move your center of gravity forward for maximum stability and safety.

NOTE

- If the ramp has a switchback, good cornering ability is required.

- 2. Maneuver ZX-1 so wheels take a wide swing around corners of ramp
- 3. If you must stop your ZX-1 while driving up a ramp: apply gentle and steady forward power pressure to the joystick.
- 4. Accelerate gently after stopping on any incline.

Perform the following when proceeding DOWN any ramp, curb, or incline:

- 1. Keep ZX-1 speed setting to the slowest speed.
- 2. When coming to a stop, release joystick lever slowly and smoothly.



WARNING

- Do not drive down an incline in reverse. Failure to comply may cause injury to operator.

STAIRS AND ESCALATORS

The ZX-1 is not designed to travel up or down stairs or escalators. Always use an elevator.



WARNING

- Do not operate ZX-1 on steps or escalators. Failure to comply may cause injury to operator and damage to equipment.

DOORS

Pass through doors as follows:

Determine whether door opens toward or away from ZX-1 operator. Gently operate ZX-1 forward and push door open.

If door opens toward ZX-1 operator, slowly operate ZX-1 backward to pull door open.

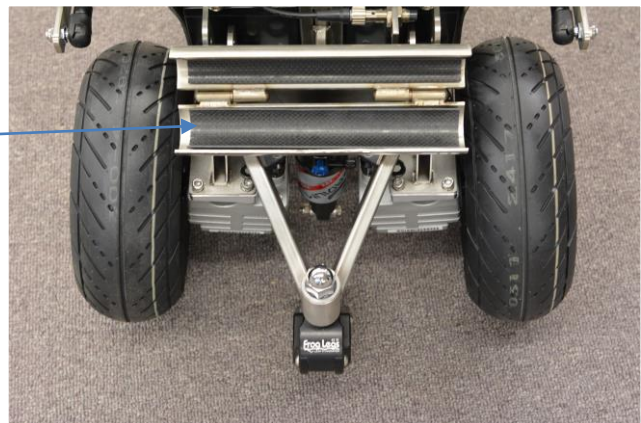
ELEVATORS

Most modern elevators are equipped with door edge safety mechanisms which, reopen elevator doors in case of obstruction.

TIGHT SPACES

While using the ZX-1, operators will encounter obstacles requiring practice to negotiate smoothly and safely. After maneuvering the ZX-1 through doors, up and down ramps, up and over curbs, through grass and gravel, and up and down inclines, operators should soon be proficient.

When operating the ZX-1 be sure that nobody has any hands or feet in or around the clamp in order to prevent potential injury from occurring.



ELECTROMAGNETIC AND RADIO FREQUENCY INTERFERENCE

EMI AND RFI FACTORS

All electrically powered vehicles, including the ZX-1 are susceptible to Electromagnetic Interference/Radio Frequency Interference (EMI/RFI). This interference could result in abnormal, unintended ZX-1 movement. 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. The sources of radiated EMI can be broadly classified into three types:

1. Hand-held portable transceivers (transmitters-receivers) with the antenna mounted directly on the transmitting unit. Examples include: citizens 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. Medium-range mobile transceivers such as those used in police cars, fire trucks, ambulance and taxis. These usually have the antenna mounted on the outside of the vehicles.
3. Long-range transmitters and transceivers such as commercial broadcast transmitters (radio and TV broadcast antennas 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, cassette 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 ZX-1. Every power wheelchair or power-assist device can resist EMI up to a certain level, also known as its "immunity level". The higher the immunity level, the less the device is at risk of interference. An immunity level of 20V/m is understood to provide sufficient protection from the sources encountered on a daily basis."

In some cases, these waves can cause unintended movement or damage to the control system. Every ZX-1 has a built-in immunity (or resistance) to EMI. The higher the immunity level, the greater the protection against EMI. The ZX-1 has an immunity level of 20 V/m.



WARNING

- Avoid close proximity to EMI-prone radio and TV stations. Failure to comply could cause injury to operator during inadvertent movement.
- Do not modify ZX-1 without express authorization from Spinergy. Failure to comply can cause injury to operator and increase susceptibility of the ZX-1 to EMI.
- Do not situate ZX-1 in a position of danger where possible EMI could cause unintended movement. Failure to comply could cause injury to operator or damage to equipment during unintended movement or brake release.

CAUTION

- Avoid close proximity to other electrical and alarm systems. Failure to comply can cause damage to equipment in the event the ZX-1 disturbs performance of electrical devices or alarm systems.

EMI/RFI RECOMMENDATIONS

1. Do not turn on or use hand-held personal electronic communication devices such as cellular phones, 2-way radios, and CB radios while ZX-1 is powered on.
2. Be aware of any nearby transmitters (radio, television, microwave, etc.) on ZX-1 travel route and avoid operating ZX-1 close to any of those transmitters.
3. Power-off ZX-1 if unit will be stationary for an extended time period.
4. Do not modify or add accessories or components to ZX-1 making the ZX-1 more susceptible to EMI/RFI.

During unintended movement or unintended park brake release, power-off ZX-1 as soon as it is safe.

- Report all unintended movement incidents and unintended parking brake movements to Spinergy.

**WARNING**

- Power-off ZX-1 as soon as it is safe during unintended or uncontrollable motion occurs or if unintended park brake release occurs. Failure to comply could result in injury to operator.
- Power off ZX-1 if operator anticipates being seated for extended period of time. This will prevent unexpected motion from inadvertent joystick contact and also eliminate unintended EMI movement possibilities.

TRANSPORTING ZX-1**TRANSPORTATION****WARNING**

- Properly and securely stow ZX-1 during transportation. Failure to comply could cause injury to persons or damage to equipment.

Avoid damage to cables during transportation and connection process.

When transporting ZX-1 equipped wheelchair, make certain control system is well protected.

LIFTS FOR ZX-1 AND WHEELCHAIRS

During travel, some ZX-1 operators may choose to use a vehicle-equipped lift to transport the ZX-1. Spinergy recommends understanding lift manufacturer's instructions before operating the lift with ZX-1 attached.



WARNING

- Do not sit in ZX-1 equipped wheelchair while in a moving vehicle. Failure to comply could cause injury to ZX-1 operator.

HANDLING

Avoid bumping or knocking ZX-1 control system, especially the joystick. Use care not to strike obstacles with the control system or joy-stick while operating the ZX-1. Do not drop the control system.

WHEELCHAIR TRANSFERRING

Undock ZX-1 from wheelchair and follow wheelchair manufacturer instructions for transferring from your wheelchair.

AIRLINE TRAVEL

It is recommended when traveling with your ZX-1 that you disconnect the battery cables (See Figure 14).

Travel restrictions vary for lithium batteries based on the country that you are traveling in and the airline that you are using. Please check with your local authorities on the required lithium battery air travel restrictions.

Steps to disconnect:

1. Remove carbon fiber cover.
2. Move controller and BMS away from the top of the batteries. (Figure 14)
3. Disconnect all four (4) battery tab connectors shown in Figure 14.
4. Place tab covers on battery tabs. (Figure 14)
5. Replace controller with BMS on top of the velcro strap. (Figure 14)
6. Replace carbon fiber cover.

Figure 14



V. BATTERY CHARGING AND MAINTENANCE

BATTERY CHARGING

Battery maintenance is the most important part of maintaining your ZX-1. Keeping batteries fully charged extends battery life. Use the following guidelines to help keep ZX-1 batteries in optimum condition.

LEAD BATTERY BREAK-IN:

To “break-in” ZX-1 batteries, run down the batteries to half-charge 4-5 times. This will increase battery life and help the batteries retain their maximum charge.

Fully depleting your batteries will result in a shortened life span.

For daily use, keep batteries fully charged. For optimum performance, plug in the off-board charger after each use and charge 6-8 hours (or overnight).

If operator will not use ZX-1 for more than a week, fully charge the batteries, then disconnect batteries from ZX-1.

CHARGE THE BATTERIES:

The charger for all ZX-1 models is an off-board charger. To charge batteries, connect charger to charger port just beneath joystick module (Figure 2).

BATTERY MAINTENANCE

AGM batteries are used to operate the ZX-1. The batteries are maintenance free. See page 31 for battery replacement instructions.

BATTERY LED INDICATOR

The battery LED indicator displays remaining battery charge and control system status. It indicates the ZX-1 is powered on.

READING BATTERY LED INDICATOR

Monitor and charge batteries as follows:

- Battery LED indicator shows green/yellow/red: batteries are charged.
- Battery LED indicator shows only yellow/red: charge batteries as soon as possible.
- Battery LED indicator shows only red (steady flashing or flashing slowly): charge batteries immediately.



WARNING

- Do not operate control system when battery is nearly discharged. Failure to comply may leave operator stranded in an unsafe position without power.

NOTE

- The ZX-1 operates on two 12-volt batteries and the battery LED indicator displays charge level of both batteries combined.
- ZX-1 power capacity will take time to learn based on use habits of each operator. Much like the fuel gauge on a car, the battery LED indicator will give the operator a great indication of how much power is remaining.

When powering on the control system, battery LED indicator displays estimated remaining

battery charge. The battery will give a more accurate reading about a minute after operating the ZX-1.

The charge capacity of ZX-1 batteries will vary based on the following:

- Terrain, Slopes and Mileage during operation
- Battery Temperature
- Battery Age

The above factors affect travel distance of the ZX-1. All batteries gradually lose capacity as

Lithium Ion Battery Option

If your ZX-1 is equipped with the Lithium Battery Option, All of the same conditions apply for the LEAD Batteries except for:

Note: The Initial charging of the Batteries should be Charged for a minimum of 24 hours continuously. This allows the two Batteries to Properly Balance.

The Lithium Battery option's Battery Management System includes a feature that keeps enough reserve power in the case that you continue to use your ZX-1 until it runs out of power. If this feature isn't working, to release clamshell, see page 26 for the manual method.



they age.

The best way to prolong ZX-1 batteries is by proper charging technique. Battery life is shortened each time charge/discharge takes place.

Do not allow batteries to sit without charge after discharging. Always recharge ZX-1 batteries promptly after they are discharged. If ZX-1 battery LED indicator reading seems to fall more quickly than usual, ZX-1 batteries may be reaching the life cycle end

READING BATTERY LED INDICATOR

Monitor and charge batteries as follows:

- Battery LED indicator shows green/yellow/red: batteries are charged.
- Battery LED indicator shows only yellow/red: charge batteries as soon as possible.
- Battery LED indicator shows only red (steady flashing or flashing slowly): charge batteries immediately.
- When the LED Indicator is showing one or two red lights, the ZX-1 will issue an audible warning with five beeping sounds indicating that the Batteries will soon run out of Power.
- If the ZX-1 Lithium Batteries are too low to operate the device, there is enough Battery Backup Supply to De-Clamp from the Manual Wheelchair.

MAINTENANCE

CLEANING

Clean joystick module and joystick with a cloth dampened with diluted detergent. Use care when cleaning joystick.

CAUTION

- Never use abrasive or spirit-based cleaners. Failure to comply may cause damage to components.

If control system becomes contaminated with food or drink, clean off immediately.

TIRES



WARNINGS

- The wheel rims are split rims and will come apart if nuts are loosened or removed. Do not loosen or remove any of the five nuts securing two halves of rims together. Failure to comply may result in injury or death.
- DO NOT over-inflate tires

Clean tires with ordinary kitchen cleaners and a damp cloth. Do not use solvents on tires. Solvents can cause the tire material to break down or become too soft.

STORAGE INSTRUCTIONS

Proper storage habits should be routinely exercised to prevent damage and avoidable wear & tear to your ZX-1. Sensitive electronics are used in the construction of the Spinergy/SMP

wear & tear to your ZX-1. Sensitive electronics are used in the construction of the

ZX-1 that can be damaged due to improper storage. Follow good judgment, and the following instructions:

- Do not place heavy objects on top of the ZX-1



WARNING

- Failure to store the unit properly will cause damage to the electronics.

SHORT TERM STORAGE

If the ZX-1 is being stored for a short period of time, it should be stored in a clean, dry and warm location. Care should be taken to keep the ZX-1 covered from direct moisture. If the ZX-1 does get wet, remove cover and allow to dry thoroughly before turning on power.

Never store where extreme temperatures are possible. Never attempt to charge a frozen battery. A cold or frozen battery should be warmed for several days prior to charging.

- Turn power off
- Store in location safe from theft or vandalism
- Do not store where heavy objects could potentially fall on top of or against the ZX-1.

LONG TERM STORAGE

Follow all instructions for Short Term Storage, and the following:

- When storing for one week or more, fully charge batteries and then disconnect batteries by disconnecting battery harnesses from both batteries.
- When storing for extended periods of time, it is recommended that you charge the batteries periodically to ensure proper performance.

BATTERY REPLACEMENT INSTRUCTIONS

A battery wiring diagram is included in this manual, pages 42 for Lead and 43 for Lithium.



WARNINGS

- Batteries are heavy (see Specifications table). If unable to lift that much weight, be sure to get help. Use proper lifting techniques and avoid lifting beyond your capacity.
- Do not mix old and new batteries. Always replace both batteries at the same time.
- For safety reasons, only sealed AGM non-spillable batteries that meet DOT CFR 173.159 (d), IATA Packing Instructions 806, and IATA Provision A67 shall be installed in the ZX-1.

TO REPLACE BATTERIES:

1. Turn off power to controller.
2. Remove carbon fiber cover.
3. Unplug battery harnesses from both batteries (can be difficult).
4. Remove strap that secures batteries to frame compartment.
5. Remove both batteries from frame compartment.

6. Place new batteries in frame compartment. (use only sealed AGM non-spillable batteries that meet DOT CFR 173.159 (d), IATA Packing Instructions 806, and IATA Provision A67).
7. Fasten strap tightly around both batteries ensuring batteries stay properly seated in frame compartment.

BATTERY RECYCLING (DIRECTIVE 91/157/EEC)

Return used batteries to authorized battery recycling center for disposal in accordance with Battery Directive 91/157/EEC.



WARNINGS:

- Make sure to tighten strap so batteries are secure.
- Connect battery harnesses to both batteries. Match red cable to red battery tab and black cable to black tab.
- Reinstall carbon fiber cover.
- Charge batteries before use. See “Battery Charging” on page 33.

VI. TROUBLESHOOTING

TROUBLESHOOTING YOUR ZX-1

MAIN CIRCUIT BREAKER

A 50-amp main circuit breaker reset button is located on the power base. Check the 50-amp breaker and reset if ZX-1 stops operating.

If the main circuit breaker has tripped, some causes might be:

- Driving up a long, steep hill
- Driving over a curb
- Run-down batteries
- Wet batteries or Electronics
- ZX-1 or components become too hot
- Low tire pressure

When operating the ZX-1, battery voltages are reduced and battery current must increase to satisfy the motors demand. This effect can cause a heavy current draw that may also trip the main circuit breaker.

RESETTING MAIN CIRCUIT BREAKER

If the main circuit breaker trips as a result of low batteries or because of a temporary overload, it is acceptable to reset the circuit breaker as follows:

1. Wait at least ten minutes for the control system electronics to return to normal operating temperature.

2. Power-off ZX-1.
3. Press main circuit breaker to reset.
4. Power-on ZX-1

CAUTION

- If the main circuit breaker continues to trip, there is probably an underlying electrical fault that needs attention. Do not continue to reset the main circuit breaker without correcting the underlying electrical issue.

If the lithium batteries are low in voltage and the operator is traveling up a grade, the system will automatically go into “Crawl mode” until a level ground is attained.

BATTERY LED CODES

If a system trip occurs, operator may count number of bars on battery LED indicator that flash. Refer to the battery bar code troubleshooting chart for a list of self diagnostic actions (Table 3).

If malfunction still remains after performing possible solution, contact authorized Spinergy representative for repair.

NOTE

- Left and right component positions are identified with operator seated in wheelchair connected to ZX-1.

Table 3: Battery LED Codes

Number of Battery LEDs Displayed	Corresponding Malfunction and Possible Solution
1	Malfunction: Battery requires charging, or poor connection exists to battery. Possible Solution: Verify cable connections to battery are secure, undamaged and/or charge ZX-1 battery.
2	Malfunction: Left motor has poor connection. Possible Solution: Verify cable connections to left motor are secure and undamaged.
3	Malfunction: Left motor has short circuit to battery condition. Possible Solution: Contact authorized Spinergy representative for repair.
4	Malfunction: Right motor has poor connection. Possible Solution: Verify cables connections to right motor are secure and undamaged.
5	Malfunction: Right motor has short circuit to a battery condition. Possible Solution: Contact authorized Spinergy representative for repair.
6	Malfunction: ZX-1 will not drive. Possible Solution: Verify charger is not still connected and cable is undamaged.
7	Malfunction: Joystick fault. Possible Solution: Verify joystick is in center position before powering on control system.
8	Malfunction: Control system fault indicated. Possible Solution: Verify cable connections at control system are secure and undamaged.
9	Malfunction: Parking brakes have poor connection. Possible Solution: Verify parking brake and motor cable connections are secure and undamaged. Verify control system cable connections are secure and undamaged.
10	Malfunction: Excessive voltage has been applied to control system. Possible Solution: A poor battery connection may exist. Verify battery cable connections are secure and undamaged.
7 + S	Malfunction: Communication fault indicated. Possible Solution: Verify joystick cable connections are secure and undamaged.

ZX-1 INOPERATIVE

(ZX-1 will not operate)

Possible Solution:

1. Verify freewheel levers are set to engaged positions.
2. Verify main circuit breaker is engaged. Reset circuit breaker as necessary.
3. Verify speed adjustment is at desired setting.
4. Verify power is on.
5. If malfunction remains, contact authorized Spinergy representative for repair.

ZX-1 OPERATES SLOW

(ZX-1 will not travel at full speed or does not respond quickly enough) (Please also see page 38)

Possible Solutions:

1. Verify aft wheelchair wheels are just slightly above ground level; if aft wheelchair wheels are too high, ZX-1 will operate slowly.
2. Verify battery condition is acceptable.
3. Verify maximum speed setting.
4. If adjusting speed setting does not repair the malfunction, contact authorized Spinergy representative for repair.

SPEED / CRAWL INDICATOR IS STEADY

(Speed/Crawl indicator shows steady)

Possible Solution:

1. Normal condition, display may vary slightly based on control system programming.

SPEED / CRAWL INDICATOR RIPPLES UP AND DOWN

(Indicates control system is locked)

Possible Solution:

1. Set power to "on" (maximum speed / crawl indicator will be rippling up and down).
2. Position joystick forward until control system beeps.
3. Position joystick reverse until control system beeps.
4. Release joystick, and listen for a long beep.
5. ZX-1 is now unlocked.

SPEED / CRAWL INDICATOR FLASHES

(Indicates speed of ZX-1 in crawl mode).

Possible Solution:

1. See section "ZX-1 Operates Slow"
2. Seat is in elevated position.
3. Contact authorized Spinergy representative for repair.

MODE SELECT LED FLASHES

(Indicates actuator(s) inhibited in one or both directions)

Possible Solution:

1. Reset power to ZX-1, try again.
2. Contact authorized Spinergy representative for repair.

CIRCUIT BREAKER TRIPPING

(ZX-1 circuit breaker continues to trip)

Possible Solution:

1. Recharge ZX-1's batteries.
2. If issue continues, load test ZX-1 batteries.
3. If batteries test good, battery charger may be the issue.
4. Contact authorized Spinergy representative for repair.

SPEED/CRAWL MODE WITH LITHIUM BATTERIESPossible Solution

1. If the lithium batteries are low in voltage and the operator is traveling up a grade, the system will automatically go into "Crawl mode" until a level ground is attained.

LEAD BATTERY WIRING SCHEMATIC

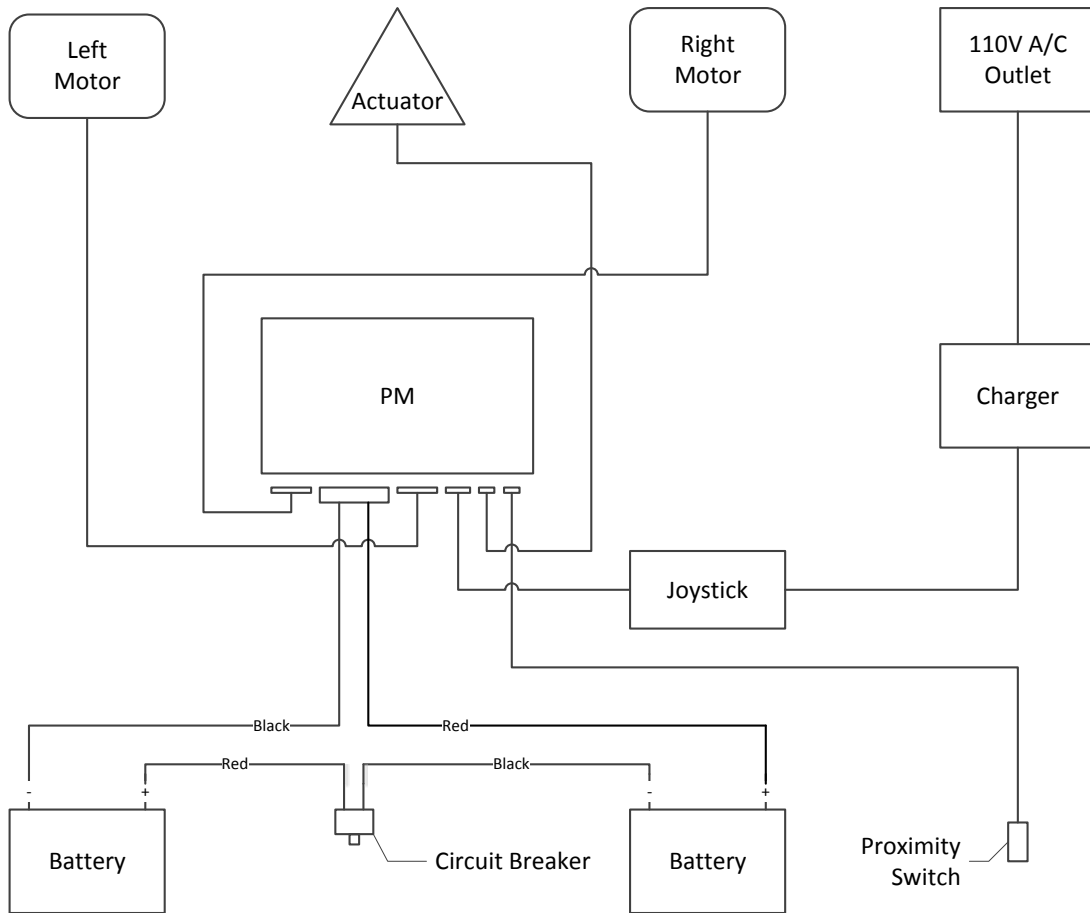


Figure 15.

LITHIUM BATTERY WIRING SCHEMATIC

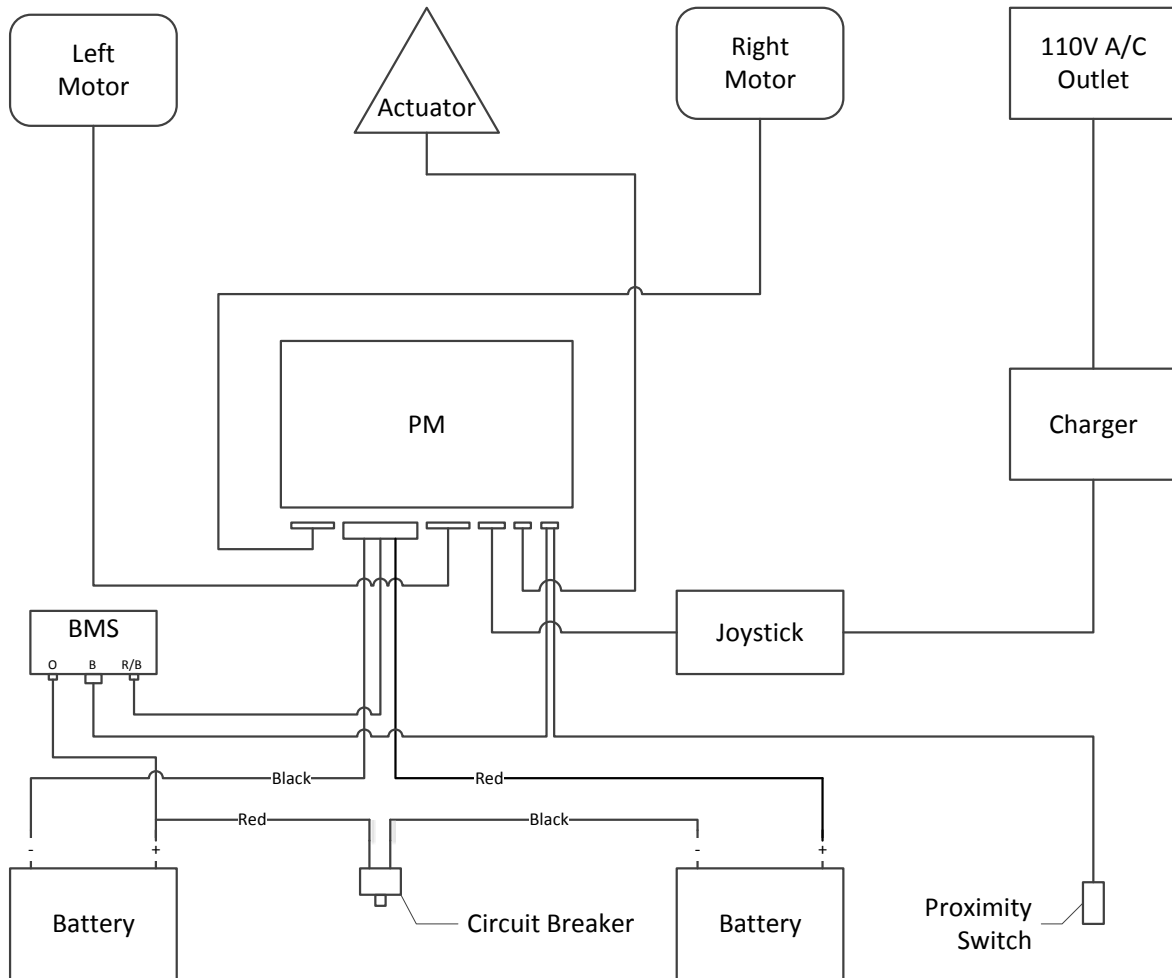


Figure 16.

WARRANTY

ZX-1 WARRANTY POLICY

LIMITED LIFETIME WARRANTY

For the lifetime of your ZX-1 Power Add-On from the date of purchase, Spinergy will repair or replace at our option to the original purchaser, free of charge, any of the following parts found upon examination by an authorized representative of Spinergy to be defective in material and/or workmanship:

- Main Frame

ONE YEAR LIMITED WARRANTY

For one year from the date of purchase, Spinergy will repair or replace at our option to the original purchaser, free of charge, any of the following parts found upon examination by an authorized representative of Spinergy to be defective in material and/or workmanship:

- Electronic Components
- Joystick
- Battery Charger
- Air springs
- Wheels
- Motor Gearbox Assembly
- Controller
- Shocks, castor assemblies
- Proximity switch

Note

- The LEAD Battery is covered by a separate six- month warranty, provided by the battery manufacturer. The Lithium Batteries are covered by a three year Battery Warranty provided by Spinergy Inc. The LEAD batteries are not warranted by Spinergy

WARRANTY EXCLUSIONS

This warranty does not extend to those items which may require replacement due to normal wear and tear:

- Motor brushes
- Abuse, misuse, accident, or negligence
- Battery fluid spillage or leakage
- Tires and Tubes
- Improper operation, maintenance, or storage
- Commercial use, or use other than normal

Note

- Gradual deterioration in performance because the battery has been left in a discharged state, left in cold conditions for an extended period of time, or worn out through heavy use is not covered.

Spinergy ZX-1 Warranty Registration Card	
Model Number	
ZX-1 Serial Number	
Date of Purchase	
BMS SN (If applicable)	
Dealer	
Customer Name	
Customer Address	

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**1914 Palomar Oaks Way
Suite 100
Carlsbad, CA 92008
U.S.A.**



EC REP

MediTech Strategic Consultants B.V.
Maastrichterlaan 127
6291 EN Vaals
THE NETHERLANDS
Ph +31 43 306 3320
Fax +31 43 306 3338