

A rider in full protective gear, including a helmet and goggles, is shown in motion on a white Zero motorcycle. The rider is leaning forward, and the background is a blurred landscape of dry grass and trees, suggesting speed. The motorcycle has a white body with black accents and a prominent headlight.

2012 **OWNER'S MANUAL**

**ZERO X™**  
**ZERO MX™**  
**ZERO XU™**



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## This image shows a blank sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

## An Important Message To You From Zero Motorcycles

Congratulations and thank you for purchasing the 2012 Zero electric motorcycle; we welcome you to the community of Zero Motorcycles riders. This manual is designed to provide you with a better understanding of the operation, inspection, and basic maintenance requirements of this motorcycle. Zero continually seeks advancements in product design and quality. Therefore, this manual contains the most current product information available at the time of printing. Because of this, your motorcycle may differ from the information supplied in this owner's manual. No legal claims can be made on the basis of data in this manual. When it comes time to sell your Zero, please remember to hand over this manual; it is, by law, an important part of the vehicle. If you have any questions concerning the operation or maintenance of your motorcycle, please contact Zero at [support@zeromotorcycles.com](mailto:support@zeromotorcycles.com).

For 24 hour updates and additional information about your motorcycle, visit the owners resources section of the Zero Motorcycles website:

[www.zeromotorcycles.com/owner-resources/](http://www.zeromotorcycles.com/owner-resources/)

## Introduction

This manual covers the following motorcycles:

- Zero MX Dirt
  - Chain Drive
  - Off Road Tires
  - Stand-alone Charger
- Zero X Street Legal
  - Chain Drive
  - Dual Sport Tires
  - Stand-alone Charger
  - Lights
- Zero XU Street Legal
  - Belt Drive
  - Street Tires
  - Integrated Charger
  - Lights
  - Regenerative Braking

## Index

A good place to locate information about the motorcycle is in the index in the back of the manual. The terms “right” or “left” refer to the rider’s right or left, when sitting on the motorcycle.

## Useful Information For Safe Riding

This manual contains the word CAUTION to tell about something that could hurt you or others. It also contains the word WARNING to tell about things that could damage your motorcycle.

**CAUTION:** Please read this manual carefully and completely before operating this motorcycle. Do not attempt to operate this motorcycle until you have attained adequate knowledge of its controls and operating features, and until you have been trained in safe and proper riding techniques. Regular inspections and careful maintenance, along with good riding skills, will help you to safely enjoy the capabilities and the reliability of this motorcycle. Disregarding the above may render the warranty invalid.



This symbol is located in various locations on the motorcycle to inform you that exposure to high voltage can cause shock, burns and even death.

The high voltage components on the motorcycle should be serviced by technicians with special training.

High voltage cable or wiring has an orange covering. Do not probe, tamper with cut or modify high voltage cable or wiring.

## Plug In Your Z-Force Power Pack™

**WARNING:** Proper care of the motorcycle's power pack is essential! When not in use, the power pack should be left on the charger, even if fully charged. Failure to do so could damage the power pack and therefore void your power pack warranty. See page 4-6 for other important information about the power pack.

## Owner Information

Record important information pertaining to your motorcycle here. When contacting your dealer, you may need to provide this information.

### Dealer Information

Name \_\_\_\_\_

Address \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Telephone No. \_\_\_\_\_

E-mail \_\_\_\_\_

Date of Purchase \_\_\_\_\_

### Motorcycle Information

VIN (X/XU) \_\_\_\_\_

PIN (MX) \_\_\_\_\_

Model \_\_\_\_\_

\_\_\_\_\_

Power Pack Serial Number \_\_\_\_\_

\_\_\_\_\_

Key Code \_\_\_\_\_



## Power Pack Serial Number

The power pack serial number is located on top of the power pack next to the connector housing.

## Key Code Number

The key code is a 5 digit number used to create duplicate keys. This number is located on a tag that accompanies the original keys.

## Motor Serial Number

The motor serial number is stamped on the silver metal cooling cover that wraps around the Agni motor or on the casting band for the Motenergy brushless motor.

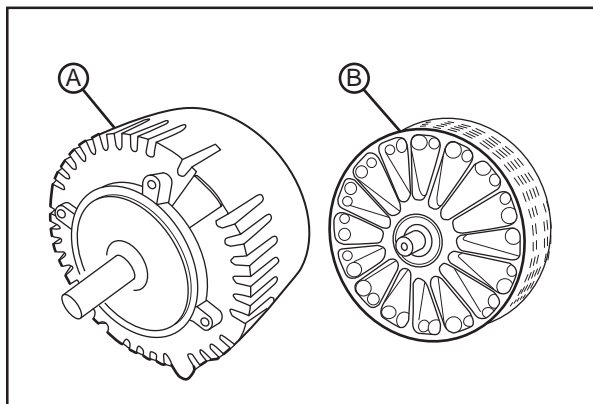
## Motor Identification

### A. Motenergy Brushless Motor

- XU - Street Legal

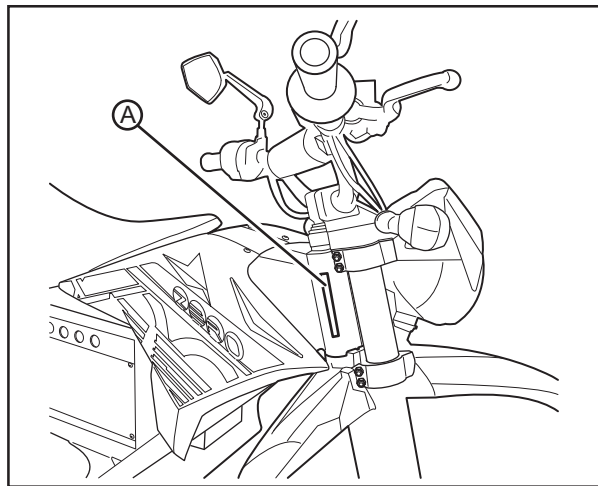
### B. Agni

- MX - Dirt
- X - Street Legal



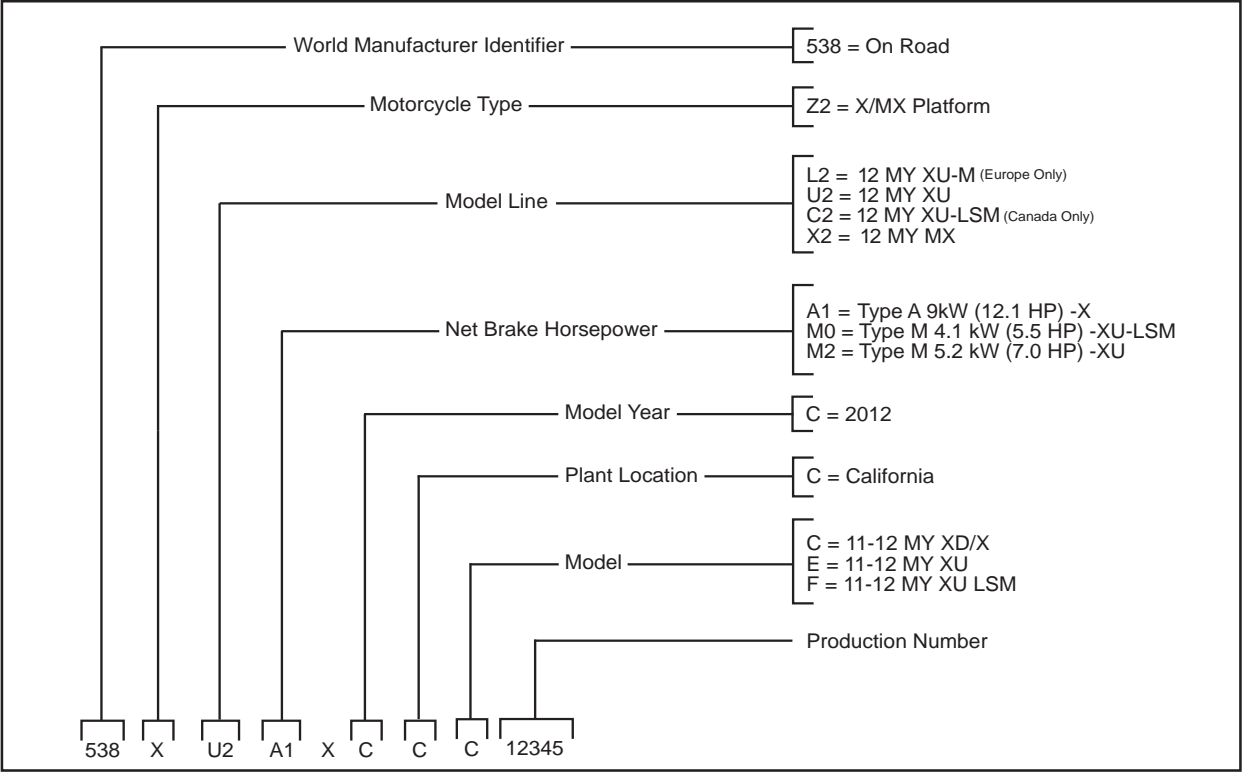
## Identification Numbers

The Vehicle Identification Number (VIN) is found on the X/XU Street Legal. The Production Identification Number (PIN) is found on the MX Dirt. This is a 17-digit number (A) stamped on the head tube of the frame. Do not alter or remove this as it is the legal identifier for your motorcycle.



See Location Of Important Labels on page 2-3.

# VIN/PIN Breakdown



# General Information

## Zero X Street Legal Technical Specifications

| MOTOR                          |  |
|--------------------------------|--|
| Type                           | High Efficiency, Forced Air Cooled, Axial Flux Permanent Magnet, Brushed Motor                               |
| Controller                     | High Efficiency, 400 amp, Programmable Brushed DC Controller   |
| Estimated Top Speed            | 90 km/h (56 mph)   |
| POWER SYSTEM                   |  |
| Type                           | ZF3 Z-Force™ Patented Li-Ion Portable Intelligent Power Pack   |
| Maximum Capacity               | 3 kWh  |
| Nominal Capacity               | 2.6 kWh  |
| Recharge Time (standard)       | <ul style="list-style-type: none"><li>• 3.1 hours (100% charged)</li><li>• 2.7 hours (95% charged)</li></ul> |
| Quick Recharge Time (optional) | <ul style="list-style-type: none"><li>• 2.0 hours (100% charged)</li><li>• 1.3 hours (95% charged)</li></ul> |

| POWER SYSTEM                       |   |
|------------------------------------|---|
| Input**                            | Standard 120 V AC or 240 V AC                       |
| Charger Type                       | 1 kW Stand-alone                                    |
| Estimated Pack Life (to 80%) City  | 165,000 Km (103,000 miles)                          |
| Estimated Pack Life (to 80%) Trail | 4,000 hours   |
| DRIVETRAIN                         |   |
| Transmission                       | Clutchless one speed                                |
| Drive System                       | 13T/61T Sprockets, 420 Chain                        |
| CHASSIS/SUSPENSION/BRAKES          |   |
| Front Suspension Travel            | 240 mm (9.4 in)                                     |
| Rear Suspension Travel             | 221 mm (8.7 in)                                     |
| Front Brakes                       | 2 Piston Hydraulic, 220 x 4 mm Rotor, Hand Actuated |
| Rear Brakes                        | 1 Piston Hydraulic, 220 x 4 mm Rotor, Foot Actuated |
| Brake Rotor                        | Minimum Thickness 3.85 mm (0.15 in)                 |

\*\*Zero chargers typically draw as much as 10 amps at 120 volts.

| CHASSIS/SUSPENSION/BRAKES |   |
|---------------------------|---|
| Front Tire                | 100/70-19 in  |
| Rear Tire                 | 100/80-16 in  |
| Front Wheel               | 19 x 1.85 in  |
| Rear Wheel                | 16 x 2.15 in  |
| Front Suspension          | 38 mm (1.5 in) inverted fork with adjustable compression and rebound damping      |
| Rear Suspension           | Direct-Link shock with adjustable spring preload, compression and rebound damping |
| DIMENSIONS                |   |
| Wheel Base                | 141 cm (55.5 in)  |
| Seat Height (standard)    | 87 cm (34.3 in)   |
| Rake                      | 26.4 degrees  |
| Trail                     | 89 mm (3.5 in)  |
| RANGE                     |   |
| Trail                     | 60-120 minutes  |
| City (EPA UDDS)*          | 61 km (38 miles)  |

| WEIGHT                         |   |
|--------------------------------|---|
| Frame                          | 6.6 kg (14.5 pounds)                                      |
| GVWR                           | 211 kg (465 pounds)                                       |
| Curb Weight                    | 98 kg (215 pounds)  |
| Carrying Capacity              | 113 kg (250 pounds)                                       |
| ECONOMY                        |   |
| Typical Cost to Recharge       | \$0.32  |
| Equivalent Fuel Economy (City) | 487 MPGe<br>0.48 liters/100 km<br>(0.13 gallons/62 miles) |

\*Environmental Protection Agency (EPA) Urban Dynamometer Driving Schedule (UDDS)

## Zero MX Dirt Technical Specifications

| MOTOR               |  |
|---------------------|--|
| Type                | High Efficiency, Forced Air Cooled, Axial Flux Permanent Magnet, Brushed Motor |
| Estimated Top Speed | 86 km/h (54 mph)   |
| Controller          | High Efficiency, 400 amp, programmable brushed DC Controller                   |
| POWER SYSTEM        |  |
| Type                | ZF3 Z-Force™ Patented Li-Ion Intelligent Portable Power Pack                   |
| Maximum Capacity    | 3 kWh  |
| Nominal Capacity    | 2.6 kWh  |
| RANGE               |  |
| MX Track            | 40-90 minutes  |
| Trail               | 60-120 minutes   |
| DRIVETRAIN          |  |
| Transmission        | Clutchless one speed   |
| Drive System        | 13T/71T Sprockets, 420 Chain   |

| POWER SYSTEM                   |   |
|--------------------------------|---|
| Recharge Time (standard)       | <ul style="list-style-type: none"> <li>• 3.1 hours (100% charged)</li> <li>• 2.7 hours (95% charged)</li> </ul> |
| Quick Recharge Time (optional) | <ul style="list-style-type: none"> <li>• 2 hours (100% charged)</li> <li>• 1.3 hours (95% charged)</li> </ul>   |
| Input**                        | Standard 120 V AC or 240 V AC   |
| Charger Type                   | 1 kW Stand-alone  |
| Estimated Pack Life (to 80%)   | <ul style="list-style-type: none"> <li>• MX Track-3,000 hours</li> <li>• Trail-4,000 hours</li> </ul>           |
| DIMENSIONS                     |   |
| Wheel Base                     | 141 cm (55.5 in)  |
| Seat Height (standard)         | 87 cm (34.3 in)   |
| Rake                           | 26.4 degrees  |
| Trail                          | 89 mm (3.5 in)  |

\*\*Zero chargers typically draw as much as 10 amps at 120 volts.

| <b>CHASSIS/SUSPENSION/BRAKES</b> |   |
|----------------------------------|---|
| Front Suspension Travel          | 240 mm (9.4 in)   |
| Rear Suspension Travel           | 221 mm (8.7 in)   |
| Front Suspension                 | 38 mm inverted fork with adjustable compression and rebound damping               |
| Rear Suspension                  | Direct-Link shock with adjustable spring preload, compression and rebound damping |
| Front Brakes                     | 2 Piston Hydraulic, 220 x 4 mm Rotor, Foot Actuated                               |
| Rear Brakes                      | 1 Piston Hydraulic, 220 x 4 mm Rotor, Foot Actuated                               |
| Brake Rotor                      | Minimum Thickness 3.85 mm (0.15 in)   |
| Front Tire                       | 100/70-19 in  |
| Rear Tire                        | 100/90-16 in  |
| Front Wheel                      | 19 x 1.85 in  |
| Rear Wheel                       | 16 x 2.15 in  |

| <b>WEIGHT</b>            |                      |
|--------------------------|----------------------|
| Frame                    | 6.6 kg (14.5 pounds) |
| GVWR                     | 204 kg (450 pounds)  |
| Curb Weight              | 91 kg (200 pounds)   |
| Carrying Capacity        | 113 kg (250 pounds)  |
| <b>ECONOMY</b>           |                      |
| Typical Cost to Recharge | \$0.32               |

## Zero XU Street Legal Technical Specifications

| POWER SYSTEM                   |   |
|--------------------------------|---|
| Type                           | ZF3 Z-Force™ Patented Li-Ion Intelligent Portable Power Pack  |
| Maximum Capacity               | 3 kWh   |
| Nominal Capacity               | 2.6 kWh   |
| Maximum Range                  | Up to 48 km (30 miles)  |
| EPA UDDS* Range (city)         | 58 km (42 miles)  |
| Recharge Time (standard)       | <ul style="list-style-type: none"> <li>• 3.1 hours (100% charged)</li> <li>• 2.7 hours (95% charged)</li> </ul> |
| Quick Recharge Time (optional) | <ul style="list-style-type: none"> <li>• 2 hours (100% charged)</li> <li>• 1.3 hours (95% charged)</li> </ul>   |
| Charger Type                   | 1 kW Integrated   |
| Estimated Pack Life (to 80%)   | 182,000 Km (113,000 miles)  |
| Input**                        | Standard 120 V AC or 240 V AC   |

\*Environmental Protection Agency (EPA) Urban Dynamometer Driving Schedule (UDDS)

\*\*Zero chargers typically draw as much as 10 amps at 120 volts.

| MOTOR                           |   |
|---------------------------------|---|
| Type                            | High Efficiency, Axial Flux Permanent Magnet Brushless Motor with Integrated Forced Air Cooling |
| Controller                      | High Efficiency, 220 amps, 3-phase Brushless Controller with Re-Generative Deceleration         |
| Estimated Top Speed (max)       | 105 km/h (65 mph)   |
| Estimated Top Speed (sustained) | 88 km/h (55 mph)  |
| DRIVETRAIN                      |   |
| Transmission                    | Clutchless one speed  |
| Drive System                    | 25T/132T Sprockets, Poly Chain® GT® Carbon™ Belt  |



| CHASSIS/SUSPENSION/BRAKES |  |
|---------------------------|--|
| Front Suspension Travel   | 135 mm (5.3 in)  |
| Rear Suspension Travel    | 141 mm (5.5 in)  |
| Front Suspension          | 38 mm (1.5 in) inverted fork with adjustable compression and rebound damping |
| Rear Suspension           | Direct-Link shock with adjustable spring preload, and rebound damping        |
| Front Brakes              | 2 Piston Hydraulic, 220 x 4 mm Rotor, Hand Actuated                          |
| Rear Brakes               | 1 Piston Hydraulic, 220 x 4 mm Rotor, Foot Actuated                          |
| Brake Rotor               | Minimum Thickness 3.85 mm (0.15 in)  |
| Front Wheel               | 19 x 1.85 in   |
| Rear Wheel                | 16 x 2.15 in   |
| Front Tire                | 90/90-19 in  |
| Rear Tire                 | 90/110-16 in   |

| DIMENSIONS                        |   |
|-----------------------------------|---|
| Wheel Base                        | 138 cm (55 in)  |
| Seat Height (standard)            | 80 cm (31.5 in)   |
| Low Seat Height (option)          | 77 cm (30.5 in)   |
| Rake                              | 24.7 degrees  |
| Trail                             | 86 mm (3.4 in)  |
| WEIGHT                            |   |
| Frame                             | 6.6 kg (14.5 pounds)                                      |
| Curb Weight                       | 100 kg (221 pounds)                                       |
| GVWR                              | 214 kg (471 pounds)                                       |
| Carrying Capacity                 | 115 kg (250 pounds)                                       |
| ECONOMY                           |   |
| Typical Cost to Recharge          | \$0.32  |
| Equivalent Fuel Economy (City)    | 539 MPGe<br>0.44 liters/100 km<br>(0.11 gallons/62 miles) |
| Equivalent Fuel Economy (Highway) | 359 MPGe<br>0.66 liters/100 km<br>(0.17 gallons/62 miles) |

## Vehicle Range

The range of an electric vehicle is defined as the distance the vehicle will travel on a single full charge of the power pack. Just like EPA mileage estimates on an automobile, “your mileage may vary.” Your range results are a direct reflection of your riding habits and conditions. The more conservatively you ride, the better range you can expect from your Zero motorcycle.

Some of the factors which affect range include speed, acceleration, number of starts and stops, terrain, as well as changes in elevation. The combination of these factors, as you travel from one point to another, defines your trip profile. In addition, tire pressure and payload are important considerations.

We suggest that you ride conservatively when you first get your Zero motorcycle and get to know your motorcycle. Once you become familiar with the range versus performance of your motorcycle, then you can adjust your riding characteristics if you so desire.

Average motorcycle range is calculated using industry standardized formulas. These ranges are separated into four categories: City, Highway, Trail, and Track.

- “City (EPA UDDS)” Environmental Protection Agency (EPA) Universal Dynamometer Driving Schedule (UDDS). The City (EPA UDDS) range is a U.S. federal test procedure to give an estimate on how many miles an electric vehicle will go on a single charge (X/XU).
- “Highway” range is to provide the rider an estimate of what you can expect to achieve when using the motorcycle for highway commuting. This range takes into account the distanced traveled on city roads getting to and from the highway as well as the distance spend in highway congestion. The average highway commute is made up of 50% steady highway speed riding and 50% city like riding (XU).
- “Trail” is an off road range that represents the riding time that most riders can expect to achieve while riding trails. The lower range represents a more aggressive pace, while the upper range is a more conservative rider (X/MX).
- “Track” range represents the riding time that most riders can achieve while riding tracks. The lower range represents a more aggressive pace, while the upper range is a more conservative rider (MX).

See technical specification charts on page 1-7 through 1-12 for these ranges.

## Optimizing Your Range By Adapting Your Riding Style

- Apply the throttle slowly and try to match the motorcycle's acceleration with your throttle position.
- Hard acceleration will decrease your range.
- Coasting whenever possible makes a significant difference; the motorcycle will coast for a long distance (take advantage of this).
- The regenerative braking system on deceleration (XU only) takes some of the energy from the motor and turns it back into electrical energy. This energy is then stored back into the power pack.

## Public Charging Stations

There are more public charging stations coming on-line every day and there may be some in your area. You can charge from a public charging station with the optional J1772 Zero motorcycle accessory. These stations are often available at a variety of locations including shopping centers, city parking lots, airports, hotels, government offices, and other businesses. We recommend that you search the internet for locations in your area. For example, search for "charging stations."

## Emissions Information

The Zero electric motorcycle is a zero emissions vehicle under California Air Resources Board (CARB), U.S. Federal (EPA), and European Union standards. It uses no gasoline or other liquid fuel. It has no tailpipe and therefore no tailpipe emissions. It also has no exhaust or evaporative emissions. Because the Zero runs solely on electricity, it is the only kind of vehicle which actually gets cleaner in terms of air pollution each year, as the electricity grid gets cleaner and more renewable.

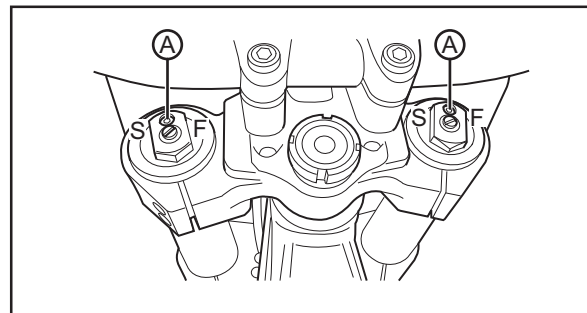
Zero Emissions Vehicles (ZEVs) offer greater efficiency, and can help solve the serious air pollution, global warming, and energy security problems facing the country and the world.

**WARNING!** Please use only Zero approved parts and accessories for your Zero motorcycle. Parts and accessories for your Zero motorcycle have been checked and tested for safety and suitability. Zero is unable to accept any liability whatsoever for parts and accessories which have not been approved.

## Transporting

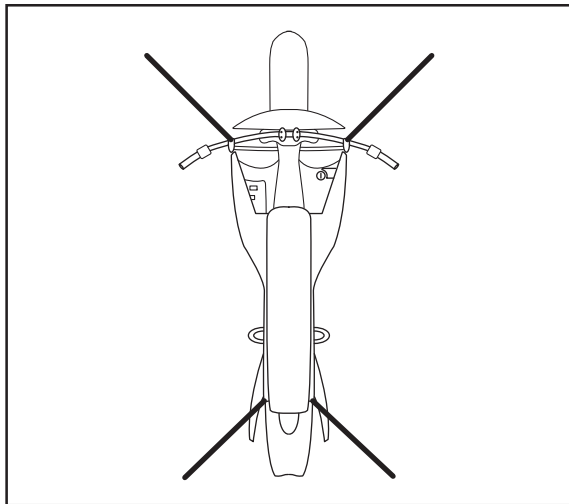
When the front fork is compressed, the built up pressure must be released to help prevent fork seal leaks. There is a 3 mm Allen “bleed” screw located just in front of the rebound adjuster on each fork leg. This “bleed” screw (A) is used to release the built up pressure. Loosen the screw slowly, but do not remove. Once all the air is out, tighten the bleed screw.

When the fork is released, with no weight on the front tire, the screw must be opened again to allow for stabilization. Ensure that the screw is tightened before riding.



It is recommended that the motorcycle be tied-down using ratchet straps. Place the ratchet straps around a frame contact point. Soft straps must be used to prevent scratches or other damage.

Use two ratchet straps in the front and two in the rear. The tie down straps should be at a 45° angle from the motorcycle. Follow the manufacturer's instructions for the ratchet straps you are using.



---

## General Safety Precautions

1. This is a performance motorcycle and should be treated with extreme caution.
2. Proper safety gear, including a regionally approved helmet, riding boots, gloves, and protective clothing, should be worn while riding to reduce the risk of potential injury. We highly recommend the use of full height riding boots since the vast majority of motorcycle injuries are leg and foot injuries. It is not recommended to ride without the correct protective clothing; this applies to even short journeys, and to every season of the year.
3. Read all additional warnings and product instructions in this owner's manual, as well as safety labels, before operating your electric motorcycle.
4. Never carry a passenger. This motorcycle is designed for a **SINGLE RIDER ONLY**.
5. Never permit a guest to ride your electric motorcycle without proper instruction.
6. Never use alcohol or mind-altering drugs before operating your electric motorcycle.
7. Persons unwilling or unable to take responsibility for their actions should not use this motorcycle. You assume all responsibility while operating your motorcycle. The seller will assume no liability for misuse or operator negligence.
8. Prior to each use the rider must check everything in the "every ride" column of the maintenance schedules on pages 5-23 through 5-28, and the charge level of the power pack as indicated on the instrument panel charge indicator.
9. Your safety depends in part on the good mechanical condition of the motorcycle. Be sure to follow the maintenance schedule and adjustment requirements contained in this manual. Be sure you understand the importance of checking all items thoroughly before riding.

10. Modifications to the motorcycle may render the vehicle unsafe and may cause severe personal injury. Zero Motorcycles cannot be held liable for non-approved modifications.
11. Be very careful when loading or adding accessories to your motorcycle. Large, bulky, or heavy items may adversely affect the handling and performance of your motorcycle.

## Important Operating Information

1. Always turn the key switch and motor stop switch to the OFF position when not actively riding. It is very easy to forget that the motorcycle is powered up because it is silent. An accident can occur if the motorcycle is left powered up while getting on or off the motorcycle.
2. Turn the motor stop switch OFF when backing up or pushing the motorcycle while dismounted.
3. Use the rear brake when you are stopped on an incline. **Do not hold the motorcycle using partial throttle or damage to the motor may occur.**
4. The power pack should be plugged in when storing the motorcycle for extended periods of time.

5. Keep your Zero connected to the charger when your motorcycle is sitting in storage or if it will be sitting unused for more than 7 days.

The power pack must be charged within 24 hours if fully discharged, and must be charged within 60 days if stored fully charged. Zero recommends you plug in your power pack after 7 days even if it is fully charged. Please leave your power pack plugged in whenever possible.

**WARNING:** Charge the Zero power pack with the Zero charger.

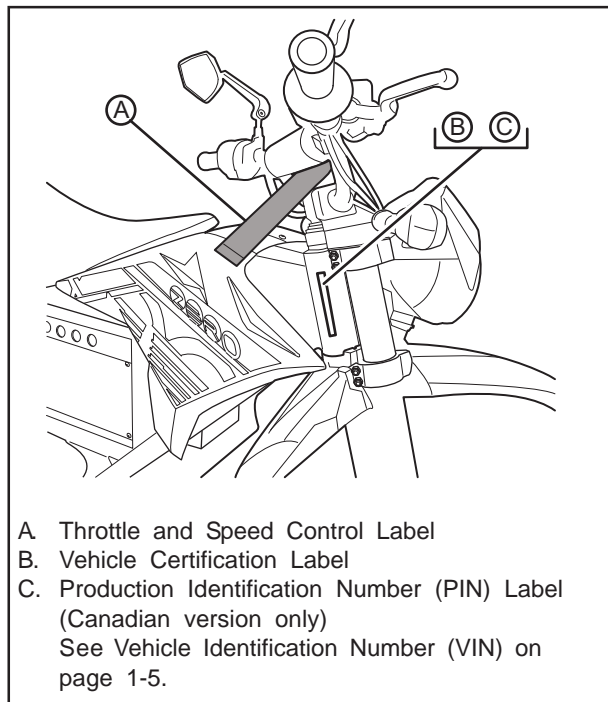
6. The power pack does not require, or tolerate, deep discharging. To get the most power pack life, recharge each power pack immediately after each ride. Leaving a power pack in a discharged state will cause damage. See Charging The Power Pack on page 4-13.

7. Failure to follow power pack storage and charging instructions as described in this Zero Motorcycles Owner's Manual may void the warranty of your Zero motorcycle. These guidelines have been rigorously tested to ensure maximum power pack efficiency and service.

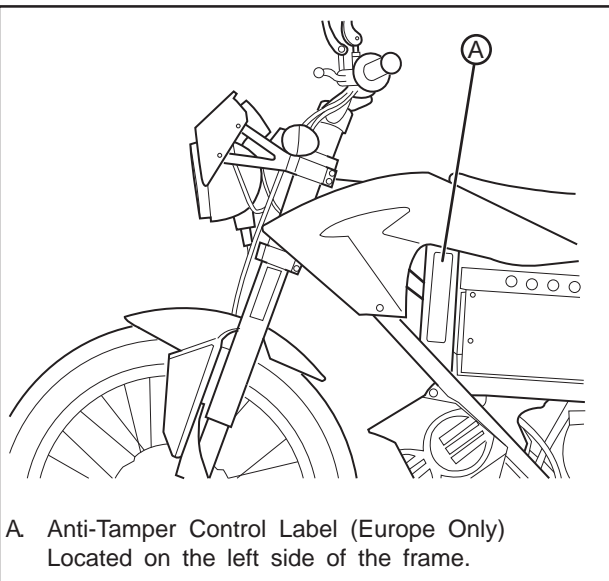
## Location Of Important Labels

The vehicle could contain the following information:

- Gross Vehicle Weight Rating (GVWR)
- Gross Axle Weight Rating (GAWR) Front and Rear
- Production Identification Number (PIN)
- Rim Size
- Tire Pressure
- Date of Manufacture







## Throttle And Speed Control Label



### IMPORTANT

#### THROTTLE AND SPEED CONTROL

The fully electric drivetrain of this motorcycle is different than any gas counterpart:

- When going into corners or coming to a stop you will be fully dependent on your brakes
- It is easy to find yourself speeding due to the absence of engine noise
- Passersby will not hear your approach - be extra cautious when making turns, entering intersections or when people are likely to cross your path

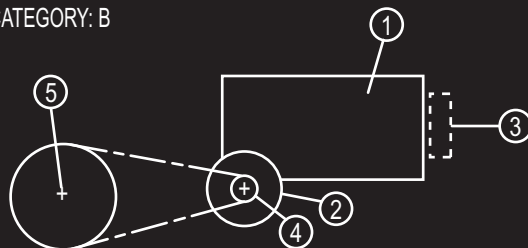
***Be aware that your motorcycle is still ON during stops and while at an "idle". Accidentally twisting the throttle can cause serious harm.***

Please read the user manual for more information prior to operating the motorcycle.

### IMPORTANT

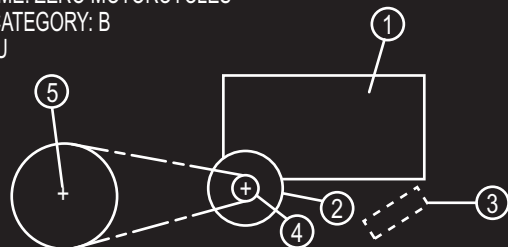
## Anti-Tamper Control Label (Europe Only)

TRADE NAME: ZERO MOTORCYCLES  
VEHICLE CATEGORY: B  
MODEL: X



- ① B05 - BATTERY
- ② M02 - MOTOR
- ③ C06 - CONTROLLER
- ④ 41BS13 - 13T FR. SPROCKET
- ⑤ RS61T - 61T RR. SPROCKET

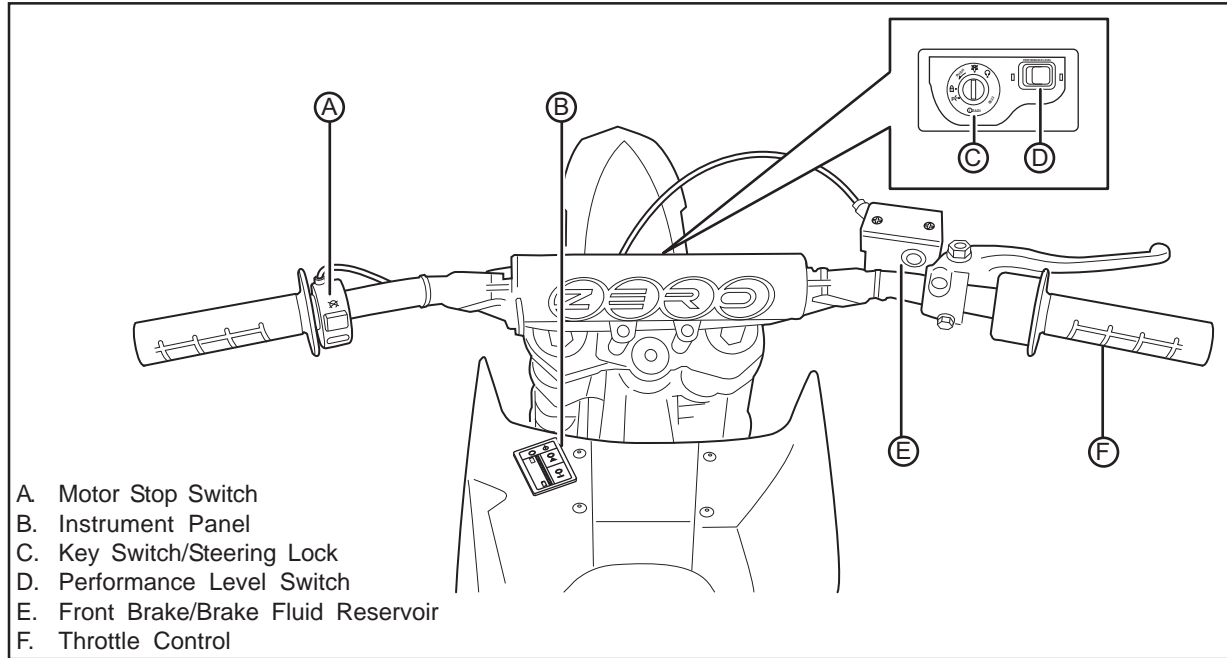
TRADE NAME: ZERO MOTORCYCLES  
VEHICLE CATEGORY: B  
MODEL: XU



- ① B05 - BATTERY
- ② M05 - MOTOR
- ③ C05 - CONTROLLER
- ④ FS-25T - 25T FR. SPROCKET
- ⑤ RS132T - 132T RR. SPROCKET

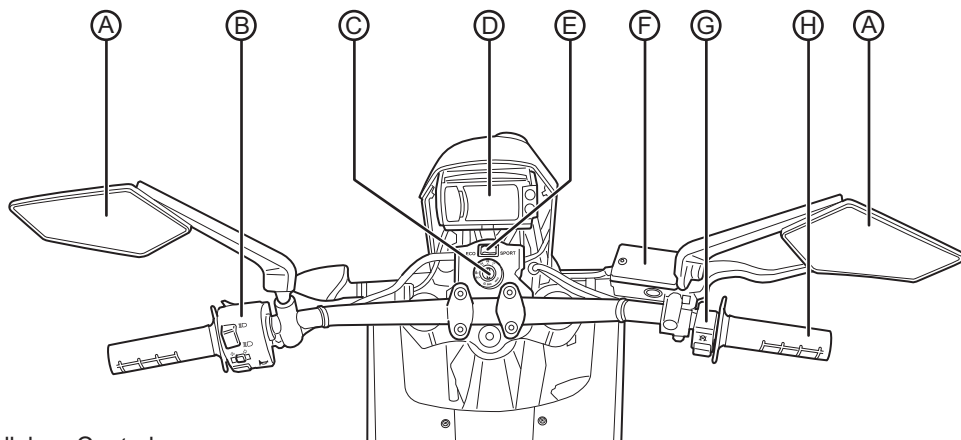
## This image shows a blank sheet of white paper with horizontal ruling lines. The lines are evenly spaced and extend across the width of the page. There are no margins, text, or other markings on the paper.

## Motorcycle Controls (MX Dirt)



- A. Motor Stop Switch  
For description and operation see page 3-18.
- B. Instrument Panel  
For description and operation see pages 3-11 and 3-12.
- C. Key Switch/Steering Lock  
For description and operation see page 4-5.
- D. Performance Level Switch  
For description and operation see page 3-12.
- E. Front Brake Fluid Reservoir  
For description and operation see Brakes on page 5-6.
- F. Throttle Control  
For description and operation see page 3-18.

## Motorcycle Controls (X/XU Street Legal\*)

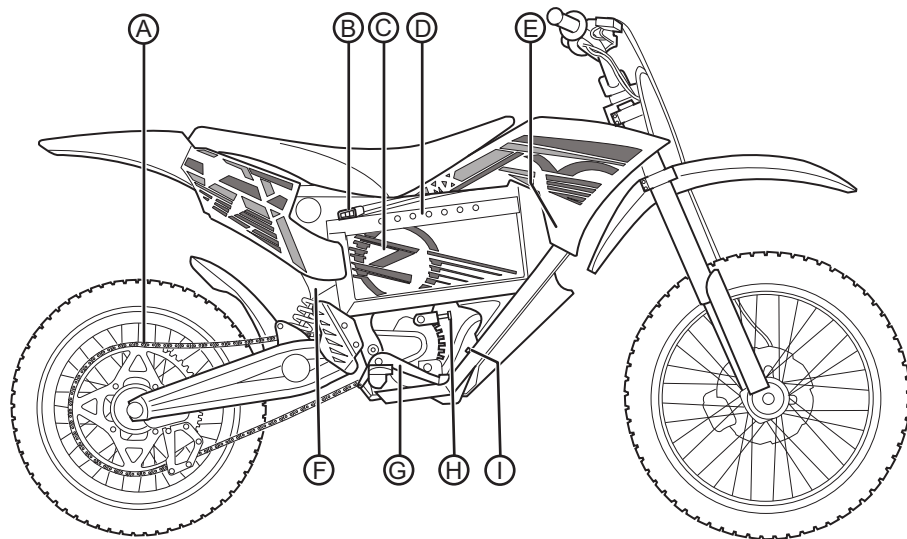


- A. Mirrors
- B. Left Handlebar Control
- C. Key Switch/Steering Lock
- D. Instrument Panel
- E. Performance Level Switch
- F. Front Brake/Brake Fluid Reservoir
- G. Motor Stop Switch
- H. Throttle Control

\*XU Shown, X Similar

- A. Mirrors  
This motorcycle is equipped with convex mirrors. A convex mirror has a curved surface. Convex mirrors offer a greater field of view than a similar flat mirror. However, the greater field of view makes objects seem further away than they really are. Care must be used when judging the distance of objects seen in these mirrors.
- B. Left Handlebar Control  
For description and operation see pages 3-19 through 3-21.
- C. Key Switch/Steering Lock  
For description and operation see page 4-5.
- D. Instrument Panel  
For description and operation see pages 3-13 and 3-14.
- E. Performance Level Switch  
For description and operation see pages 3-15 and 3-16.
- F. Front Brake Fluid Reservoir Cylinder  
For description and operation see Brakes on page 5-6.
- G. Motor Stop Switch  
For description and operation see page 3-21.
- H. Throttle Control  
For description and operation see page 3-20.

## Right Side View (MX Dirt)



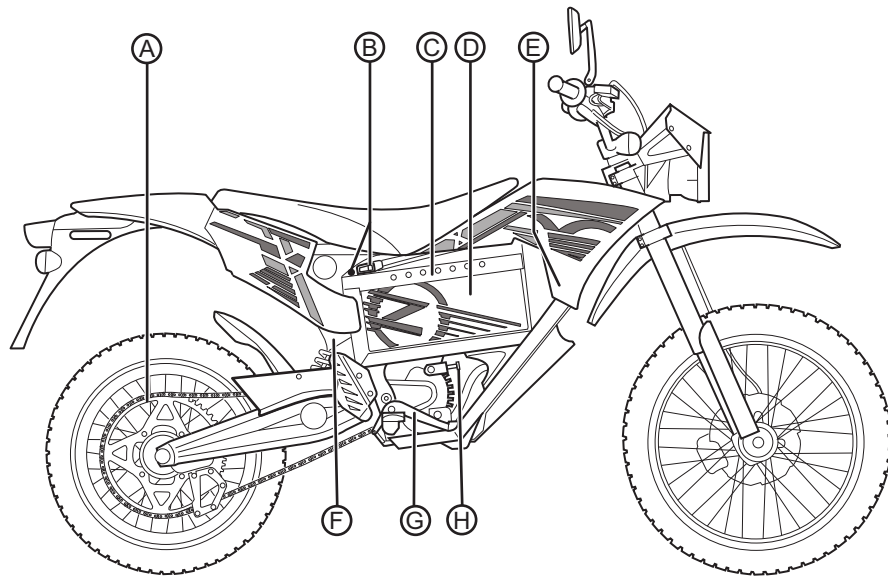
- A. Drive Chain
- B. Power Pack Rail Knob
- C. Power Pack
- D. Power Pack Rail

- E. Fuse Center (Behind Trim Panel)
- F. Rear Brake Fluid Reservoir (Behind Trim Panel)
- G. Rear Brake Pedal
- H. Drive Chain Tension Adjuster
- I. Cooling Fan Fuse



- A. Drive Chain  
For description and operation see Drive Chain on page 5-12.
- B. Power Pack Rail Knob  
For description and operation see Power Pack Swapping on page 4-8.
- C. Power Pack  
For description and operation see page 4-6.
- D. Power Pack Rail  
The power pack rail when used in conjunction with the power pack rail knob secures the power pack in place. Do not operate the motorcycle without this rail in place.
- E. Fuse Center  
For description and operation see Fuses on page 5-29.
- F. Rear Brake Fluid Reservoir  
See Rear Brake on page 5-7.
- G. Rear Brake Pedal  
The rear brake pedal controls the rear brake when the pedal is pressed. When braking, the throttle should be in the closed position.
- H. Drive Chain Tension Adjuster  
See Drive Chain Adjustment Procedure on page 5-14.
- I. Cooling Fan Fuse  
For description and operation see Fuses on page 5-29.

## Right Side View (X Street Legal)

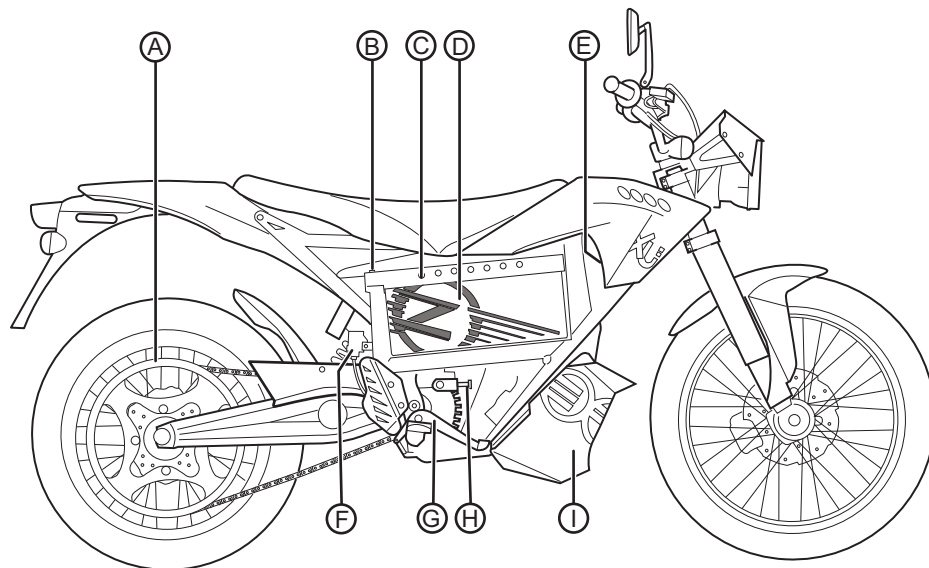


- A. Drive Chain
- B. Power Pack Rail Security Bolt
- C. Power Pack Rail
- D. Power Pack

- E. Fuse Center and I/P Inline Fuse
- F. Rear Brake Fluid Reservoir
- G. Rear Brake Pedal
- H. Drive Chain Tension Adjuster

- A. Drive Chain  
For description and operation see Drive Chain on page 5-12.
- B. Power Pack Rail Security Bolt  
For description and operation see Power Pack Swapping on page 4-8.
- C. Power Pack  
For description and operation see page 4-6.
- D. Power Pack Rail  
The power pack rail when used in conjunction with the power pack rail security bolt secures the power pack in place. Do not operate the motorcycle without this rail in place.
- E. Fuse Center  
For description and operation see Fuses on page 5-29.
- F. Rear Brake Fluid Reservoir  
See Rear Brake on page 5-7.
- G. Rear Brake Pedal  
The rear brake pedal controls the rear brake when the pedal is pressed. When braking, the throttle should be in the closed position. The brake light will illuminate when the rear brake pedal is applied.
- H. Drive Chain Tension Adjuster  
See Drive Chain Adjustment Procedure on page 5-14.

## Right Side View (XU Street Legal)

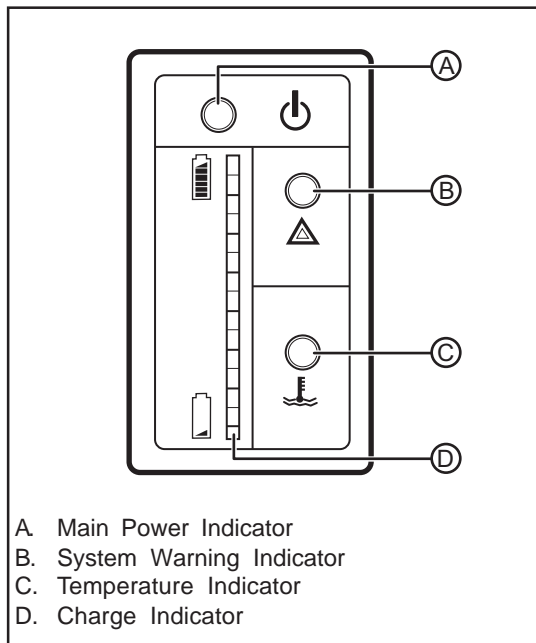


- A. Drive Belt
- B. Power Pack Rail Security Bolt
- C. Power Pack Rail
- D. Power Pack
- E. Fuse Center (Behind Trim Panel)

- F. Rear Brake Fluid Reservoir
- G. Rear Brake Pedal
- H. Drive Belt Tension Adjuster
- I. Power Pack Charger

- A. Drive Belt  
For description and operation see Drive Belt on page 5-9.
- B. Power Pack Security Bolt  
For description and operation see Power Pack Swapping on page 4-8.
- C. Power Pack Rail  
The power pack rail when used in conjunction with the power pack security bolt secures the power pack in place. Do not operate the motorcycle without this rail in place.
- D. Power Pack  
For description and operation see page 4-6.
- E. Fuse Center  
For description and operation see Fuses on page 5-29.
- F. Rear Brake Fluid Reservoir  
See Rear Brake on page 5-7.
- G. Rear Brake Pedal  
The rear brake pedal controls the rear brake when the pedal is pressed. When braking, the throttle should be in the closed position. The brake light will illuminate when the rear brake pedal is applied.
- H. Drive Belt Tension Adjuster  
See Drive Belt Adjustment Procedure on page 5-11.
- I. Power Pack Charger  
See Power Pack Charging XU only on page 4-16.

## Instrument Panel (MX Dirt)



### A. Main Power Indicator

The main power indicator is on any time the key is in the ON position.

### B. System Warning Indicator

In the unlikely event you exceed the motorcycle's performance capabilities, the indicator will flash and gently oscillate the motor output to notify the rider. Back off of the throttle to reduce heat and eliminate the oscillation. Doing so will also eliminate the indicator flashing. If the red LED is flashing, the system has detected a fault. For troubleshooting, see section 6.

### C. Temperature Lamp

This will flash in the event that you exceed the motorcycle's performance capabilities. The temperature warning lamp indicates the temperature of the motor and power pack. See Temperature Indicator on page 6-14 for more information.

#### D. Charge Indicator

The charge indicator on the motorcycle is used to inform you of the amount of remaining energy in the power pack. The charge indicator is segmented into 3 colors, the colors indicate the following:

- Green indicates a full power pack.
- Amber indicates that the state of charge of the power pack is getting low.
- Red indicates that the state of charge of the power pack is very low and that the power pack should be recharged as soon as possible. The motorcycle will soon cease to operate due to a critically low charge level.

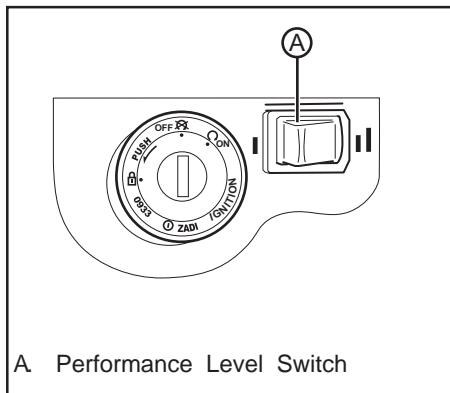
## Performance Level Switch (MX Dirt)

The performance level is a two position switch that toggles between “I” and “II”. To select either of the switch positions, the motorcycle must be stopped and the key switch in the OFF position.

The “I” position reduces the acceleration and top speed of the motorcycle. It is an ideal position to use for times when you want softer acceleration. This position is also good for newer riders and for extending range.

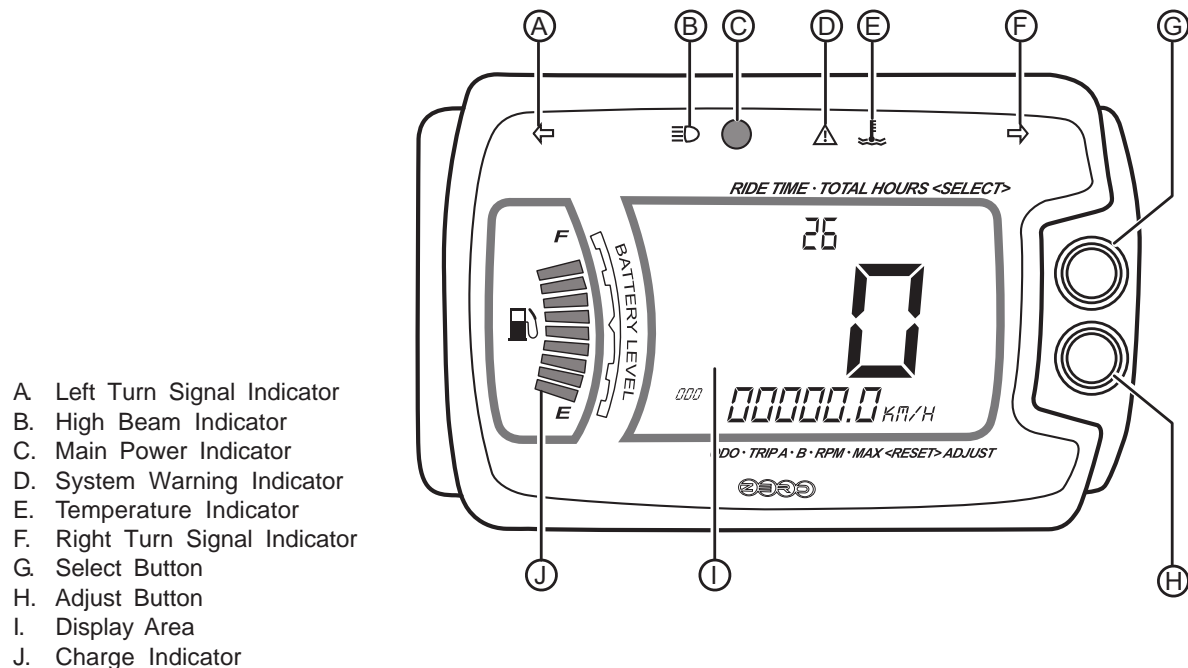
The “II” position causes the motorcycle to accelerate at a significantly faster rate. This position is recommended for advanced riders.

Those who take advantage of the “I” position are likely to see a slight increase in range.



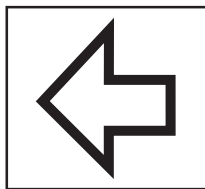
A. Performance Level Switch

## Instrument Panel (X/XU Street Legal)

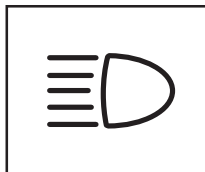




## Indicators



A. and F. Turn Signals  
An arrow on the instrument panel will flash green in the same direction as selected by the turn signal switch. This will remain on until the turn signal request has been canceled.



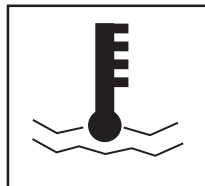
B. High Beam Indicator  
When the headlight high beam is on, this indicator will illuminate blue and will remain on until the high beam is turned off.

### C. Main Power Indicator

The main power indicator is ON any time the key is in the ON position.



D. System Warning Indicator  
This indicator will blink when a system error has been detected. See System Warning Indicator on page 6-11 for more information.



Temperature Indicator on page 6-14 for more information.

### E. Temperature Lamp

This will flash in the event that you exceed the motorcycle's performance capabilities. The temperature warning lamp indicates the temperature of the motor and power pack. See

### G. Select Button

By pressing the select button you can toggle between Ride Time and Total Hours displayed.

### H. Adjust Button

By pressing the adjust button you can toggle between the odometer, trip odometer setting A, trip odometer setting B, RPM, and Max. Holding it down will clear the trip odometer resetting it back to zero.

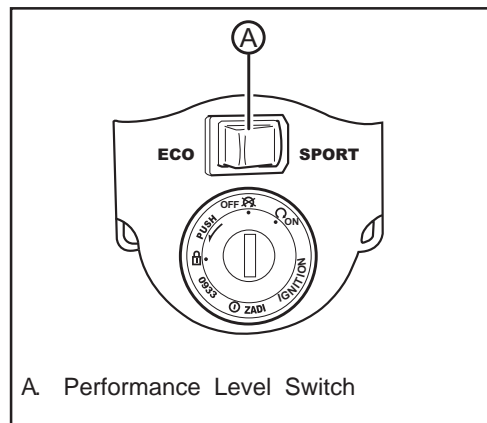
### I. Display Area

The backlit digital display displays the following: Ride Time, Total Hours, Odometer, Trip Odometer, RPM, and Motorcycle Speed.

### J. Charge Indicator

This displays the amount of energy remaining in the power pack, similar to the fuel gauge on a gasoline powered vehicle.

## Performance Level Switch (XU Street Legal)



The performance level is a two position switch that toggles between Eco and Sport. To select either of the switch positions, the motorcycle must be stopped and the key switch in the OFF position.

The Eco position reduces the acceleration and top speed of the motorcycle. It is an ideal position to use for times when you want softer acceleration. This position is also good for newer riders and for extending range.

The Sport position causes the motorcycle to accelerate at a significantly faster rate. This position is recommended for advanced riders.

Those who take advantage of the Eco position are likely to see a slight increase in range and experience greater regenerative braking.

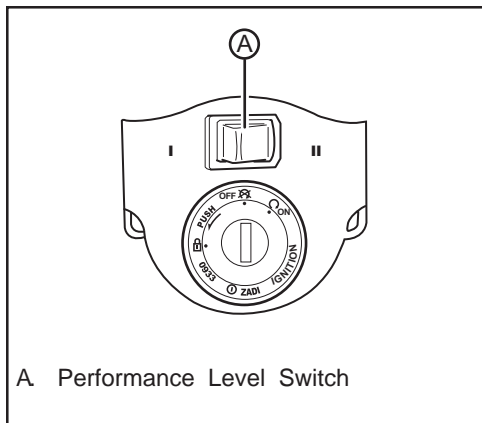
## (X Street Legal)

The performance level is a two position switch that toggles between “I” and “II”. To select either of the switch positions, the motorcycle must be stopped and the key switch in the OFF position.

The “I” position reduces the acceleration and top speed of the motorcycle. It is an ideal position to use for times when you want softer acceleration. This position is also good for newer riders and for extending range.

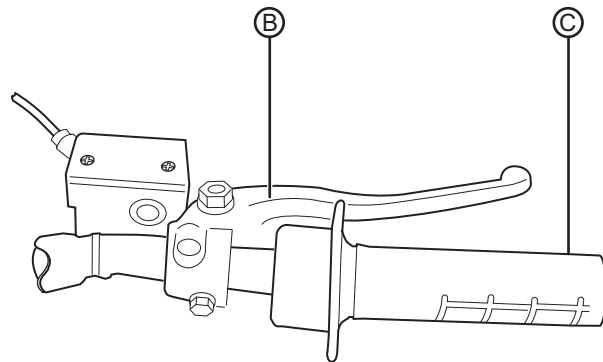
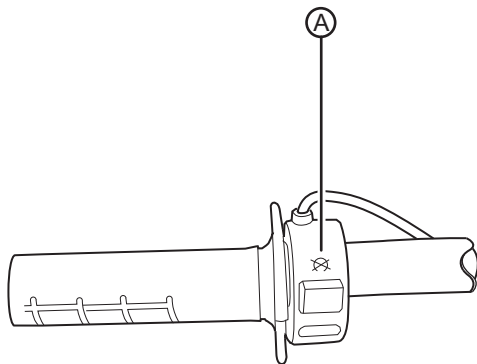
The “II” position causes the motorcycle to accelerate at a significantly faster rate. This position is recommended for advanced riders.

Those who take advantage of the “I” position are likely to see a slight increase in range.



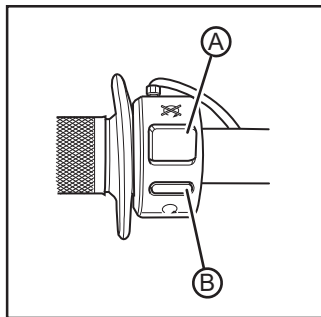
A. Performance Level Switch

## Handlebar Controls (MX Dirt)



- A. Motor Stop Switch
- B. Front Brake Lever
- C. Throttle Control

### A. Motor Stop Switch



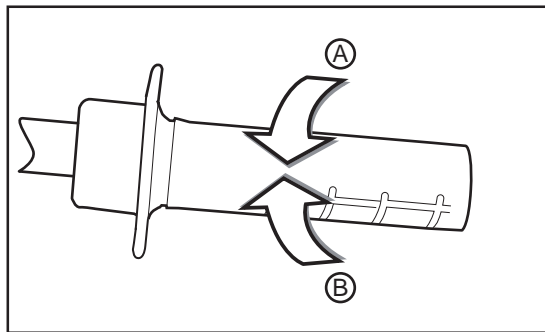
When the button (A) is pressed, it will stop power to the motor controller. The motor controller will remain in this state until the ON (B) button is pressed. The switch does not turn off all electrical circuits, just the operation of the motor.

### B. Front Brake Lever

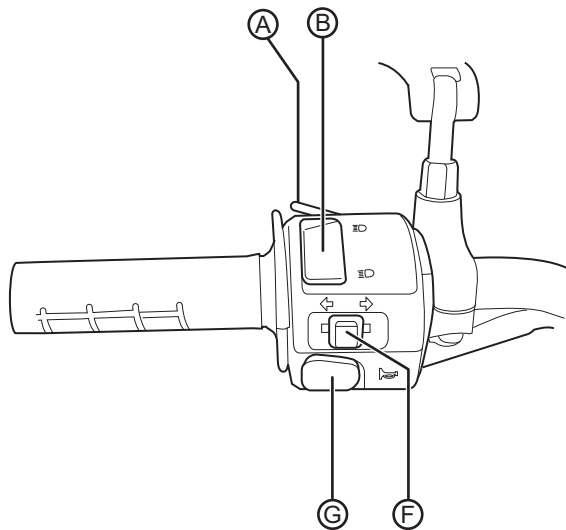
The front brake lever engages the front brake when the lever is squeezed. When braking, the throttle should be in the closed position.

### C. Throttle Control

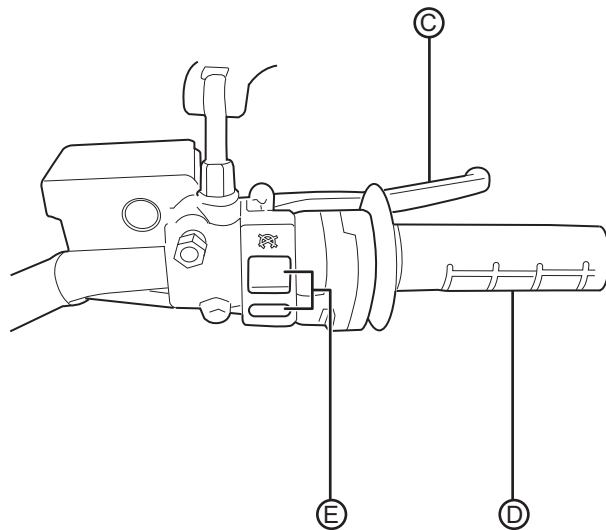
Twist the throttle in a counter-clockwise rotation (A) to accelerate the motor and start the motorcycle in a forward direction. Release the throttle and it will return to the closed position (B), decelerating the motor.



## Handlebar Controls (X/XU Street Legal)



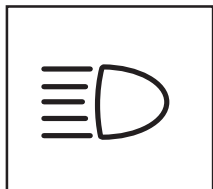
- A. High Beam Flash-to-Pass
- B. Headlight High/Low Beam Switch
- G. Horn Button
- F. Turn Signal Switch



- C. Front Brake Lever
- E. Motor Stop Switch
- D. Throttle Control

### A. High Beam Flash-to-Pass

When the headlight is in the low beam position, push the flash-to-pass switch and the high beam will illuminate and will stay illuminated until the switch is released. When released, this switch will default back to the low beam position. The high beam indicator will also illuminate.



### B. Headlight High/Low Beam Switch

When the switch is pushed, the headlight will change from low beam to high beam. It will stay in the selected position until it is switched back. When in high

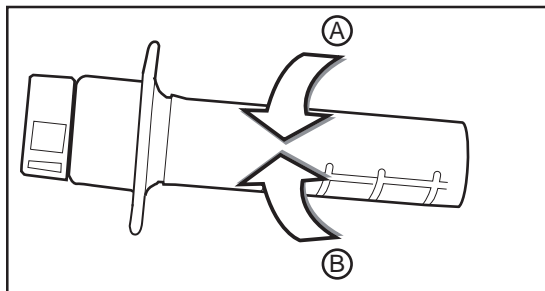
beam position, the high beam indicator on the instrument panel will illuminate.

### C. Front Brake Lever

The front brake lever controls the front brake when the lever is squeezed. When braking, the throttle should be in the closed position. The brake light will also illuminate.

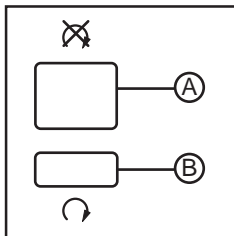
### D. Throttle Control

Twist the throttle in a counter-clockwise rotation (A) to energize the motor and start the motorcycle in a forward direction. Release the throttle and it will snap back to the closed position (B), de-energizing the motor.

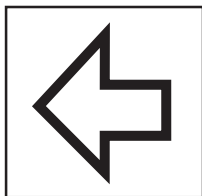


XU Only

When the motorcycle is moving and the throttle control is in the fully closed position it will activate the regenerative braking feature. Regenerative braking takes some of the energy from the moving motorcycle and turns it back into electrical energy. This energy is then stored back into the power pack, contributing to increased energy efficiency. A slight drag is felt when the regenerative braking is activated, if you want to coast without the regenerative braking hold the throttle just off of the fully closed position.



**E. Motor Stop Switch**  
When the switch (A) is pressed, it will stop power to the motor controller. The motor controller will remain in this state until the ON (B) button is pressed. The switch does not turn off all electrical circuits, just the operation of the motor.



**F. Turn Signal Switch**  
When the turn signal switch is pushed in the left or right position, the corresponding front and rear turn signals will flash. When the turn signal switch is ON, the corresponding turn signal indicator on the instrument panel will illuminate.

Always signal your turns and other maneuvers as required by law. Unlike an automobile, the turn signals must always be cancelled manually on the motorcycle. Push in on the switch and it will return to the center or OFF position.

**G. Horn Button**

When the key is in the ON position, the horn will sound when the button is pressed. Electric vehicles run quietly; the horn can be used to warn pedestrians or other motorists of your presence.



[illegible]

## First Time Set-Up

If your motorcycle was direct-shipped you will need to perform the following:

1. Remove the motorcycle from its shipping crate. See Unpacking Your New Zero Motorcycle on page 4-2.
2. You must charge the power pack before riding the motorcycle. See Charging The Power Pack on page 4-13.
3. Install the power pack. See Power Pack Swapping on page 4-8.
4. Identify and inspect the wheels for spoke tension and/or damage.
5. Check the tire pressure and adjust to proper specifications. See Tire Inflation on page 5-9.
6. Inspect the hydraulic brake system. Follow the hydraulic lines from the reservoirs to the calipers and verify that there are no leaks or damage to the brake lines. Verify that the brakes function properly.
7. Make sure the motorcycle key switch is OFF, then twist the throttle to make sure it's rotation is smooth and returns correctly.
8. Inspect bolts and make sure they are tight. See Bolt Torque Table on page 5-2. Double check the fork, wheel, and brake bolts.
9. Insert the key in the key switch, and turn the key to the ON position. The charge indicator should read fully charged. It may take up to 30 seconds before displaying a full charge.

## Unpacking Your Zero Motorcycle

Although unpacking your Zero motorcycle can be done by a single person, it's recommended to have a second person to help lift and remove your motorcycle from the crate base.

### Outer Box Cover

- Cut and remove the two outer box retention straps.
- Unscrew stabilizer bar bolts, one on each side of outer box.
- Open box top and remove inner cardboard end reinforcement sleeves.
- Unscrew stabilizer bar from handlebar end and remove. (X/MX only)
- Unscrew lower crate cover retaining screws and washers.
- Lift or cut outer box away from motorcycle.

### Inner Assembly

- Carefully remove plastic cover from motorcycle.
- Locate small parts box below motorcycle and put to the side. (This box contains important documentation, owner's manual, keys, etc.)
- Cut cable ties holding handlebar to motorcycle. (MX only)
- Position and center handlebar in riser and mount using handlebar clamps and bolts located in the small parts box. Torque handlebar clamp bolts to 26 N•m (19 ft lb). (MX only)
- Remove the retaining fastener from power pack rail.
- Remove the power pack rail.
- Remove the power pack.
- Remove the tie down straps from crate base.

- Carefully lift rear portion of the motorcycle over the swingarm standoff and off crate base.
- Carefully lift front wheel out of crate base
- Deploy kickstand (if equipped), lean motorcycle and inspect in accordance with delivery inspection sheet.

## **Recycling**

Your Zero Motorcycle's shipping crate and packaging materials were designed to be completely recycled. Please cut down and recycle all cardboard, plastic, and metal materials in appropriate receptacles.

The tie down straps that accompanied your motorcycle can be reused as regular tie down straps for transporting your motorcycle.

# General Operation

## Pre-Ride Inspection

Before operating the Zero motorcycle, check the following to make sure the motorcycle is secure and intact:

- **Power Pack**

Make sure the onboard charge indicator is green, indicating a charged power pack. If the charge indicator reads below: MX Dirt - 3 bars (1/2), or X/XU Street Legal - 5 bars (1/2), we suggest you recharge before use.

- **Drive Chain (X/MX)**

Check chain slack and condition. Adjust and lubricate if necessary. The drive chain must be cleaned and lubricated at the intervals specified in the maintenance schedule. Otherwise, it will quickly wear out, especially when riding in dusty or wet areas. See Drive Chain on page 5-12.

- **Drive Belt (XU)**

Check the belt tension and condition. See Drive Belt on page 5-9.

- **Brakes**

Squeeze the brake lever and press the brake pedal individually and push the motorcycle to see if it rolls. You should be able to completely lock-up the wheels by applying the brakes.

- **Throttle**

With the key switch in the OFF position, twist the throttle and release to verify that the throttle is smooth and returns correctly.

- **Tires**

Check both tires for condition and tread depth. Check cold tire pressure frequently. Check for damage and alignment. Maintain correct tire pressure as specified on page 5-9. Replace the tires when the tread height is 2 mm (0.08 in) or less.

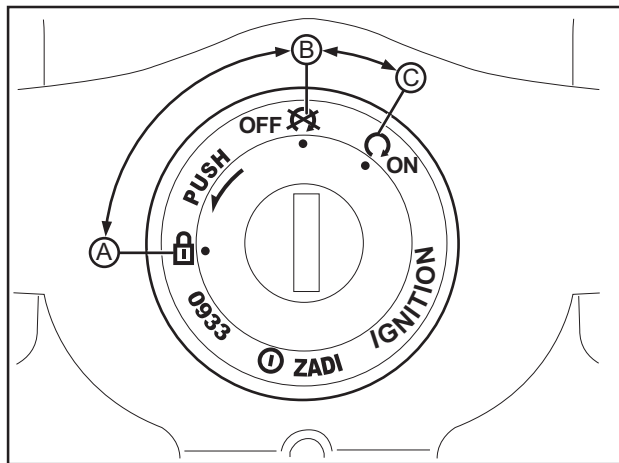
**CAUTION:** Under-inflation is the most common cause of tire failure and may result in severe tire cracking, tread separation, “blowout,” or unexpected loss of motorcycle control causing personal injury and possible death.

- **Electrical System**

X/XU Street Legal

Check for correct function of the headlight, turn signals, and the brake/tail lights.

## Key Switch/Steering Lock Positions



This is a three-position switch that is located on the fork in front of the handlebar. The switch positions are as follows:

- A. Steering Lock
- B. OFF
- C. ON

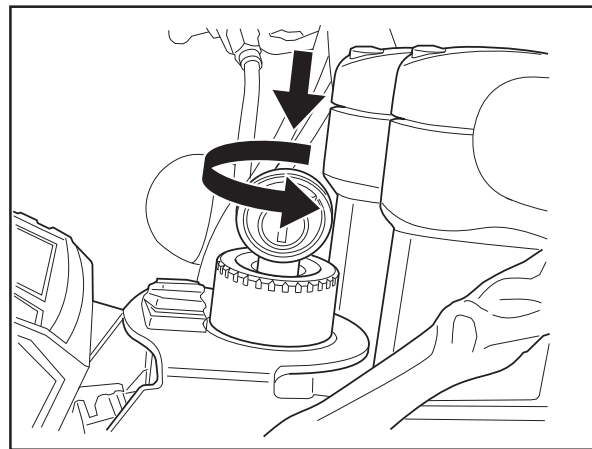
The key should be removed from the motorcycle when parked to prevent theft. The key can be removed in either the OFF or Steering Lock Position.

### A. Steering Lock

Using the steering lock when parked will prevent unauthorized use and help prevent theft.

To Lock:

1. Turn the handlebar all the way to the left.
2. Push the key down from the OFF position and turn the key counter-clockwise while still pushing it down.



3. Remove the key.

To Unlock:

1. Insert the key and turn clockwise.
2. Remove the key.

#### B. OFF

This position is used to turn the motorcycle OFF.

#### C. ON

This position is used for operating the motorcycle. With the motor stop switch in the OFF position the following will occur:

- Lights turn ON - X/XU - Street Legal
- Cooling Fan turns on briefly - MX - Dirt
- Instrument Panel displays turn ON - X/XU - Street Legal

## Power Pack

The 2012 Zero X/XU/MX leverage a completely new battery cell chemistry and configuration. Not only do the Zero XU and the Zero X have a 42 and 38 mile UDDS range respectively, but the power pack is designed to last the life of the motorcycle. The integrated onboard charger on the XU and the stand-alone charger on the X/MX minimize charge time.

The MX is capable of going 90 minutes on the track or 120 minutes on the trail. The X/XU/MX charging systems can work in parallel with Zero's quick charge accessories to cut charge times by 50%.

The battery is located within the ZF3 power pack and requires no special break-in period. The charging time is the same if connected to 120 V AC or 240 V AC. The charger output will be the same. The normal recharging time of the power pack to 100% is usually less than 3 hours in ambient temperatures. Out of the normal temperature range charging and run-time times will vary. The batteries should not be used outside of the range of -7°C - 71°C (20°F - 160°F); the Battery Management System (BMS) will turn off the motor controller outside of this range.

It is required that you leave the motorcycle on the charger if you expect it to sit in storage or unused for over 7 days.

The power pack must be charged within 24 hours if fully discharged, and charged within 60 days if stored fully charged. Zero recommends you plug in your Zero motorcycle after 7 days, even if fully charged. Please leave your Zero motorcycle plugged in whenever possible.

The power pack should maintain up to 80% of its capacity for approximately:

- 3,000 hours MX - Track\*
- 4,000 hours MX - Trail
- 182,000 km (113,000 miles) XU
- 165,000 km (103,000 miles) X - City
- 4,000 hours X - Trail\*\*

\*Track range represents the riding time that most riders can expect to achieve while riding on tracks. The track rating is a more aggressive pace when compared to trail riding.

\*\*When the motorcycle is ridden with average aggressiveness on average trails/tracks.

**WARNING:** Opening of the power pack is for trained Zero Motorcycles' technicians. Please be aware that incorrect handling of a Zero power pack can be dangerous. DO NOT OPEN!

### Add On Electrical Equipment

**WARNING:** Do not add anything electrical to your motorcycle unless approved by your dealer. Some electrical components can damage your motorcycle. Some add on electrical equipment can keep other components from working as they should or can dramatically reduce the range and/or life expectancy of the power pack.

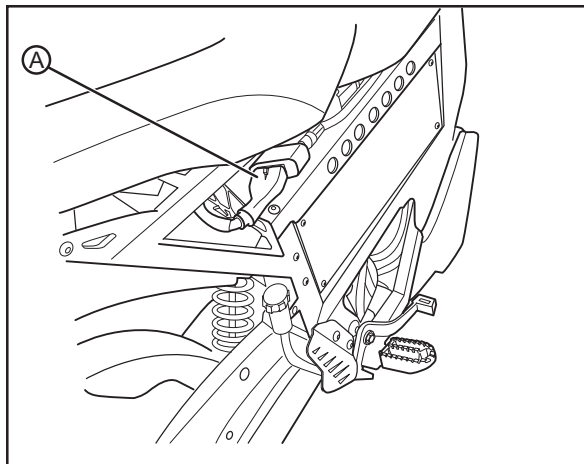


## Power Pack Swapping

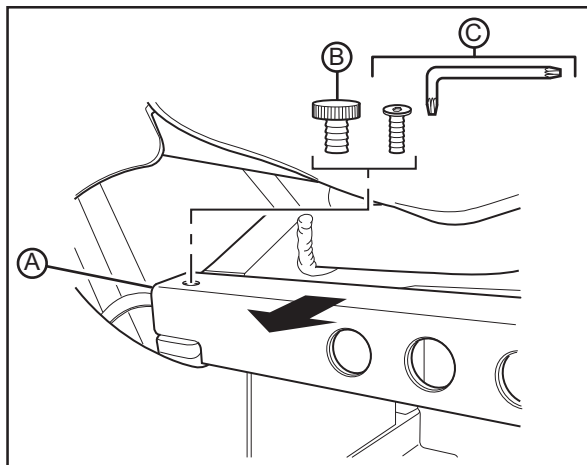
The motorcycles feature a quick change power pack. This allows the rider to charge one power pack while using another. Do not operate the motorcycle without the power rail or rail fastener in place. To change the power pack, perform the following:

### Removal

1. Remove the key from the key switch and safely support the motorcycle.
2. Disconnect the power pack charging connector (A) (XU only).



3. Locate the thumb screw (B) (MX Dirt) or T-40 security bolt (C) (X/XU Street Legal). The security bolt requires the supplied tool (located under the seat) to remove and install. The security bolt can be replaced with the thumb screw available from Zero Motorcycles Accessories. See image on page 4-9.
4. Pull the power pack rail (A) away from the motorcycle, unhooking it at the front. See image on page 4-9.

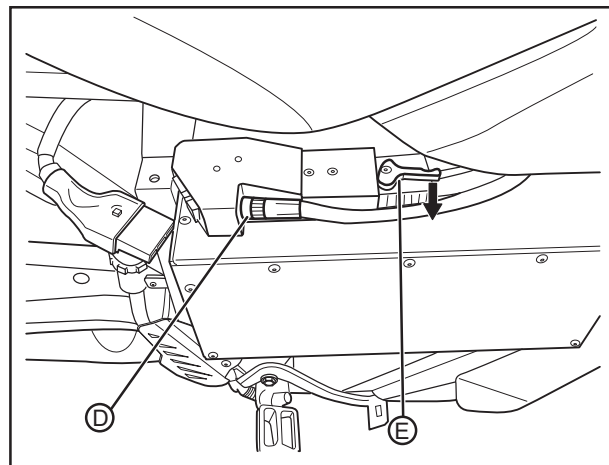


5. Disconnect the power pack low voltage connector (D) by turning the ribbed collar counter-clockwise.

6. Using the ejection lever (E) remove the power pack connector.

**Note:** The power pack weighs 24 kg (53 pounds).

7. Using a firm grip, slide the power pack out of the frame. DO NOT lift the power pack by the plastic connector housing.



#### Installation

1. Slide the power pack into the frame.
2. Connect the power pack connectors.
3. Install the power pack rail into the front slot first, then push the rear side into the frame.
4. Install and securely tighten the thumb screw/security bolt.

## Battery Management System (BMS)

Every power pack contains a Battery Management System (BMS) which monitors the condition of the cells and optimizes the charging process to provide the highest-performance, longest-range, and longest-life for the power pack.

The BMS safeguards the power pack by means of safety interlocks. These interlocks turn off or control certain operations that could damage the power pack. See Safety Interlocks on page 6-10 for more information.

The BMS also monitors the power pack for a host of predefined conditions, and then takes actions according to these conditions. Some of these conditions are listed below. Also see Understanding BMS Flash Code Patterns on page 6-4.

- **Dangerously Low Voltage**

Action: If the voltage drops to the point that may damage the battery cells, the power pack sends a signal to disable the motor controller and the motorcycle will not run until the voltage returns to an acceptable level.

- **High or Low Temperature**

Action: If the BMS senses that the power pack is too hot, above 71°C (160°F), or too cold, below -7°C (20°F), it sends a signal to disable the motor controller and the motorcycle will not run until the temperature returns to an acceptable level. The charger will also be disabled in this condition.

- **High Voltage**

Action: If the BMS detects a voltage that is too high, it shuts down the charger to prevent over-charging.

The BMS is sealed inside the power pack. As a rider, you don't need to think much about the BMS - it just silently does its job as you charge, ride, and store your motorcycle.

## Power Pack Charger

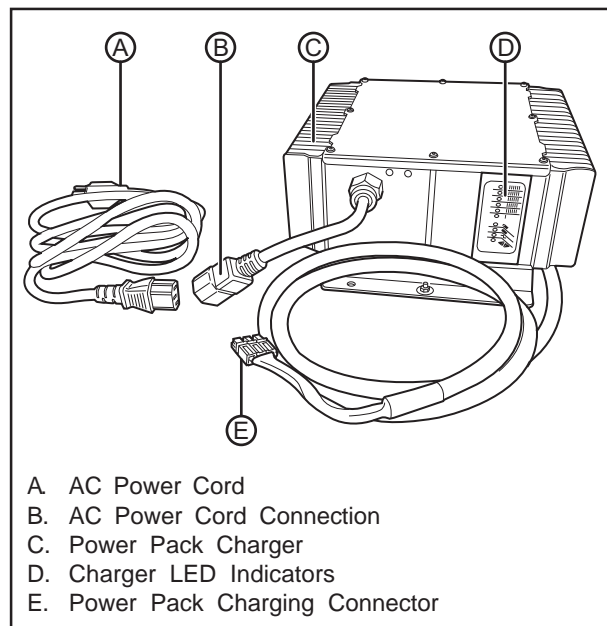
Keep your power pack connected to the charger when your motorcycle is sitting in storage or if it will be sitting unused for more than 7 days. The power pack must be charged within 24 hours if fully discharged, and charged within 60 days if stored fully charged. Zero recommends you plug in your Zero motorcycle after 7 days, even if fully charged. Please leave your Zero motorcycle plugged in whenever possible.

**WARNING:** Charge the Zero power pack with the Zero charger.

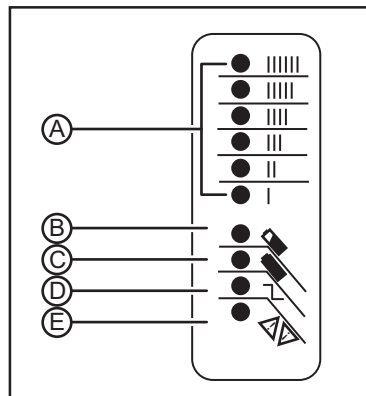
When charging the motorcycle's power pack the charger can be left on, even after the power pack is fully charged. There are two possible cases that can occur:

- When left on the charger, the power pack will receive a full charge. Once fully charged, the charger will check the status of the power pack once every 72 hours to ensure that it maintains a full charge. When fully charged, a green light will illuminate on the charger. Should the charger not read that the power pack is full, it will continue to attempt to fully charge the power pack. In this event the green light may not illuminate; however, the power pack may be fully charged. To ensure that the power pack is charged, check the charge indicator on the instrument panel prior to riding.

- If the power pack terminates the charge before the charger reaches the state previously mentioned, then the charger will continue to cycle and will top off the power pack until the power pack is removed from the charger, or the charger reaches the complete state previously noted.



## Charger LED Indicators



### A. Ammeter

The Ammeter LED is an amber indicator that indicates the amount of current output, and should gradually ramp down from “VIII” to “I”.

### B. 80% Charge

The 80% Charge LED is an amber indicator. If it is on solid, the bulk

charge phase is complete, 80% charged. Charger is now in absorption phase. If the indicator is flashing, there are two issues that can cause this:

- The charger and BMS are balancing
- The BMS is stopping the charge because one or more cells have reached maximum voltage.

### C. 100% Charge

The 100% Charge LED is a green indicator. If it is on solid, the charging is complete and the charger will enter maintenance mode. If it is flashing, the absorption phase is complete and the charger is in finish phase.

### D. AC ON

The AC ON LED is an amber indicator. If it is on solid, the AC power is good. If it is flashing, the AC voltage is low. Check for proper voltage, and if an extension cord is being used, verify that it is of the correct length. Maximum length is 7.6 m (25 ft.) 12-AWG.

### E. Fault

The Fault LED is a red indicator indicating a charger error. If it is flashing, reset the charger and see section 6, Troubleshooting.

## Charging The Power Pack

**Note:** When the motorcycle's charge indicator is on the third bar (1/2) MX Dirt or fifth bar (1/2) X/XU Street Legal, when not under load, the power pack needs to be charged. Frequent top off charging is good for the power pack's life span, so do not hesitate to charge frequently.

**WARNING:** Charge the Zero power pack with the Zero charger. It is possible for lithium ion cells to overheat and fail.

It is recommended to charge in a location that is away from combustible materials and in a well-ventilated area. Avoid outdoor charging of your power pack in the rain.

The minimum charge temperature is 0°C (32°F).

The maximum power pack internal charging temperature is 65°C (149°F). If the power pack is kept in an environment over 65°C (149°F), it will not accept a charge until it is moved to a cooler location. Also if the pack has just been run hard, it may internally be above 65°C (149°F) even if the ambient temperature is lower. If you experience a pack that will not take a charge, ensure the internal temperature is below 65°C (149°F). If the power pack was recently run and it will not take a charge, the power pack should cool and begin taking a charge in around 30 minutes or less.

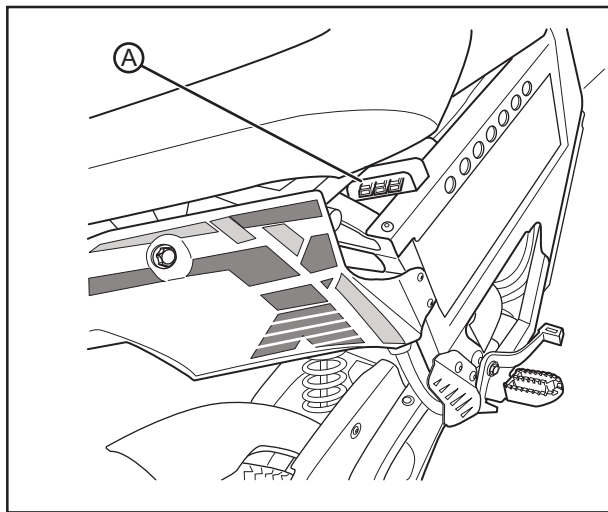
The max charging temperature cutoff is a power pack longevity feature. Charging at higher temperatures can shorten the life of the power pack.

## Standard Charging

(Installed in Motorcycle)

Does not apply to XU

1. Ensure the key switch is in the OFF position.
2. Connect the power pack charger harness to the power pack connector (A).



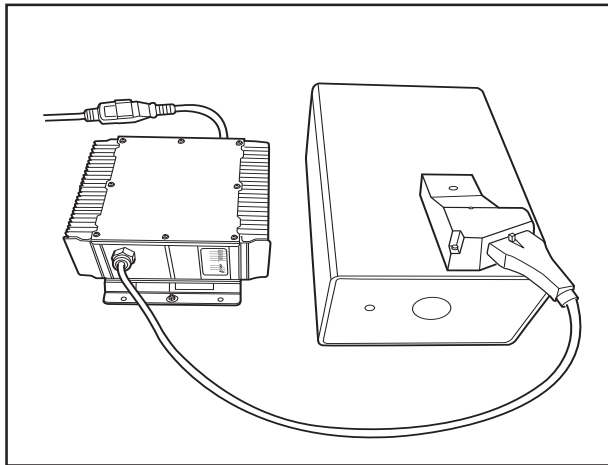
3. Always connect the charger to a GROUNDED outlet. When using an extension cord, avoid excessive voltage drops by using a grounded, 3-wire, 12-AWG cord no longer than 7.6 m (25 ft). The charger can be used on 120 V AC or 240 V AC current. The voltage does not change the amount of time that the motorcycle takes to charge.

Note: AVOID connecting the Zero charger and another device to a single 120 V AC 15A/20A circuit, as it may become overloaded. Zero chargers draw as much as 10 amps from the 120 V AC circuit when charging.

4. Charging a fully discharged power pack to 100% takes about 3.1 hours.

(Not Installed in Motorcycle)

1. Remove the power pack from the motorcycle. See Power Pack Swapping on page 4-8.
2. Connect the charger to the power pack.



3. Always connect the charger to a GROUNDED outlet. When using an extension cord, avoid excessive voltage drops by using a grounded, 3-wire, 12-AWG cord no longer than 7.6 m (25 ft).

The charger can be used on 120 V AC or 240 V AC current. The voltage does not change the amount of time that the motorcycle takes to charge.

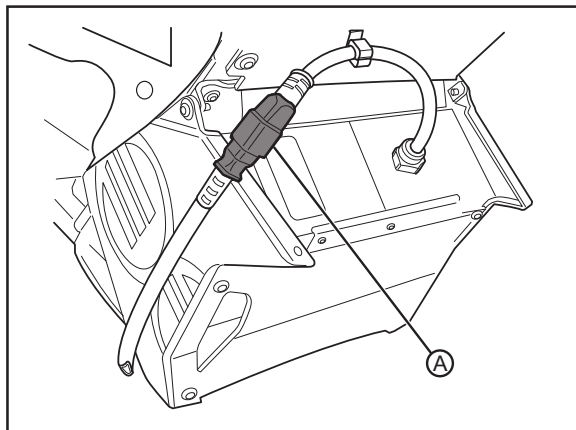
Note: AVOID connecting the Zero charger and another device to a single 120 V AC 15A/20A circuit, as it may become overloaded. Zero chargers draw as much as 10 amps from the 120 V AC circuit when charging.

4. Charging a fully discharged Zero power pack to 100% takes about 3.1 hours. When the power pack is fully charged, disconnect the charger from the power pack.
5. Install the power pack into the motorcycle. See Power Pack Swapping on page 4-8.



## XU Only

1. Ensure that the key switch is in the OFF position.
2. Plug the supplied power cord (A) into the integrated charger connector. Always keep the power cord with the motorcycle.



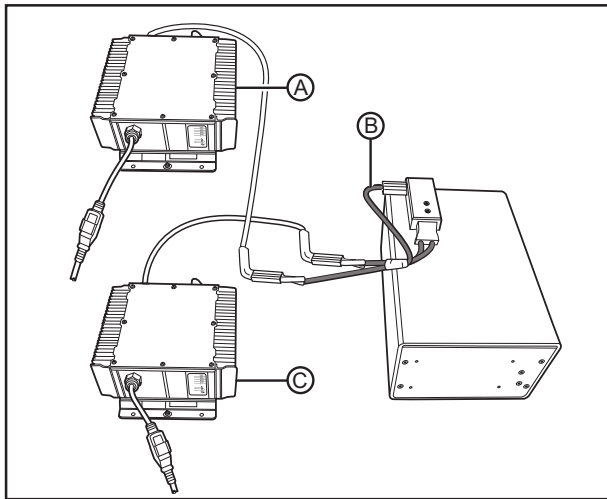
3. Always connect the charger to a GROUNDED outlet. When using an extension cord, avoid excessive voltage drops by using a grounded, 3-wire, 12-AWG cord no longer than 7.6 m (25 ft). The charger can be used on 120 V AC or 240 V AC current. The voltage does not change the amount of time that the motorcycle takes to charge.

Note: AVOID connecting the Zero charger and another device to a single 120 V AC 15A/20A circuit, as it may become overloaded. Zero chargers draw as much as 10 amps from the 120 V AC circuit when charging.

4. Charging a fully discharged power pack to 100% takes about 3.1 hours. When the power pack is fully charged, disconnect the charger power cord.
5. Snap the charger power cord back into the clip to protect it from the elements.

## Quick Charging

Quick charging is an option that contains a stand-alone charger (A) and dual charger harness (B). It is used in conjunction with the charger supplied with the motorcycle (C) or the XU's integrated charger. The XU requires a dealer installed quick charge harness. Using two chargers and the quick charging harness to charge the power pack shortens the charging time to about 2 hours for a 100% charge.



(Not Installed in Motorcycle)

1. Remove the power pack from the motorcycle. See Power Pack Swapping on page 4-8.
2. Connect the quick charger harness and both chargers to the power pack.
3. Always connect the chargers to a GROUNDED outlet. When using an extension cord, avoid excessive voltage drops by using a grounded, 3-wire, 12-AWG cord no longer than 7.6 m (25 ft). The charger can be used on 120 V AC or 240 V AC current. The voltage does not change the amount of time that the motorcycle takes to charge.

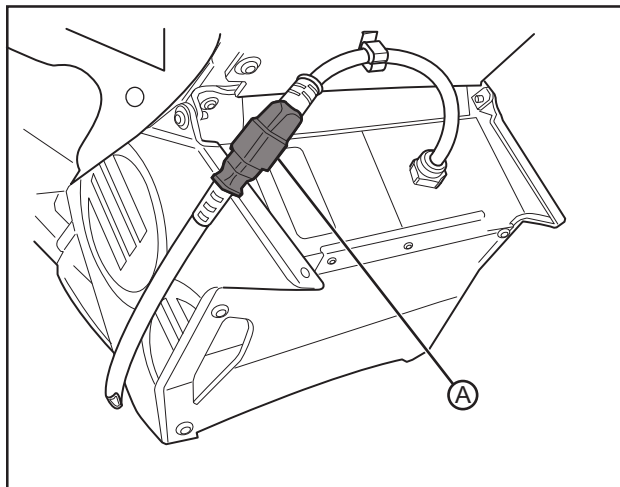
Note: AVOID connecting the Zero charger and another device to a single 120 V AC 15A/20A circuit, as it may become overloaded. Zero chargers draw as much as 10 amps from the 120 V AC circuit when charging.

4. Quick charging to 100% from a fully discharged power pack takes about 2 hours of quick charging.
5. When the power pack is fully charged, disconnect the chargers.
6. Install the power pack into the motorcycle. See Power Pack Swapping on page 4-8.

XU only (if equipped)

1. Ensure that the key switch is in the OFF position.
2. Remove the quick charge connector protective cover. This is located under the seat on the right side of the motorcycle.

3. Connect the stand-alone charger to this connector.
4. Plug the supplied power cord (A) into the integrated charger connector.



5. Always connect the charger(s) to a GROUNDED outlet. When using an extension cord, avoid excessive voltage drops by using a grounded, 3-wire, 12-AWG cord no longer than 7.6 m (25 ft). The charger can be used on 120 V AC or 240 V AC current. The voltage does not change the amount of time that the motorcycle takes to charge.
6. Quick charging to 100% from a fully discharged power pack takes about 2 hours. When the power pack is fully charged, disconnect the power cord from the chargers. Disconnect the stand-alone charger connector and install the protective cover.
7. Snap the charger power cord back into the clip to protect it from the elements.

Note: AVOID connecting the Zero charger and another device to a single 120 V AC 15A/20A circuit, as it may become overloaded. Zero chargers draw as much as 10 amps from the 120 V AC circuit when charging.

# Operating Your Motorcycle

## Starting

1. Turn the key switch to the ON position.
2. Verify that the charge indicator reads fully charged.
3. Press the motor stop switch to the ON position.
4. With the kickstand up (if equipped), twist the throttle towards you (counter-clockwise) to increase speed. When the throttle is twisted away from you (clockwise), the speed will decrease.

## Braking

On the right side of the handlebar is a hand operated brake lever. This brake lever controls the front brake when the lever is squeezed. On the right lower side, next to the foot peg, is the foot operated brake pedal. This pedal controls the rear brake. When braking, the throttle should be in the closed position.

The front and rear brakes should be applied together, with a slight amount more braking on the front.

**CAUTION:** If you apply the front or rear brakes hard enough, it is possible to lock the wheels. This could cause you to lose control of the motorcycle. We suggest progressive use of the brakes to bring the Zero motorcycle to a complete stop without locking the wheels. Your Zero motorcycle is a light-weight performance product and therefore practice is recommended to safely perfect emergency stops.

## Stopping

1. With the throttle in the closed position and the brake applied, press the motor stop switch to the OFF position. This switch can also be used in an emergency to shut the motor off.
2. Turn the key switch to the OFF position and remove the key. To prevent theft, the key should be removed anytime the motorcycle is left unattended.
3. Be sure to charge the power pack after each ride. See Charging The Power Pack on page 4-13.

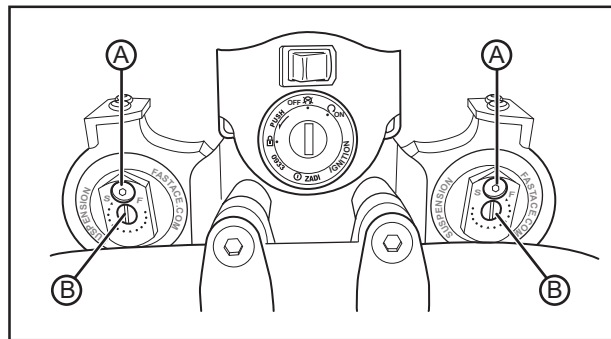
# Suspension Adjustment

## Front Fork Adjustment

A shock has two main actions: compression when the shock gets loaded, and rebound when the shock returns back to full length. Compression damping is the adjustment that determines how fast or slow the fork compresses. Rebound damping is the adjustment that determines how fast or slow the fork rebounds.

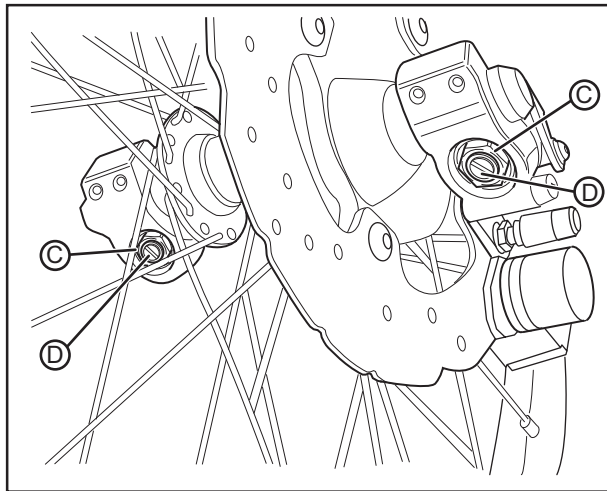
1. **Bleed Screw** - The Allen screw (A) at the top of the fork leg is the “bleed” screw. The bleed screw serves two purposes:
  - Transporting your motorcycle. See Transporting on page 1-15.
  - Bleeding the fork: Bleed the fork regularly, let any excess air out after each ride.
2. **Rebound Damping** - The rebound damping is adjusted by turning the slotted brass adjuster screw (B) on the top of both fork legs. Next to it will be the writing S-F, meaning Slow and Fast.

The adjuster has 18 stages of adjustment. This determines how quickly the fork returns to its extended position after being compressed. Turning the rebound adjuster screw clockwise will slow the rebound speed down making it better for larger, rolling terrain or bumps. Turning the rebound adjuster screw counter-clockwise will increase the rebound speed making it better for smaller, rougher bumps. Adjust each fork leg evenly.



3. **Compression Damping** - The compression damping is adjusted by turning a screw on the bottom of each fork leg. There is a rubber dust cover protecting the screw and a jam nut (C) securing the screw (D). The adjuster has 12 stages of adjustment. Turn the adjuster clockwise for slower compression. To speed up compression, turn the adjuster counter-clockwise. Start with a middle setting and fine tune the compression from there. Proper compression will allow the tire to track the ground over consecutive bumps. Compression that is set too slow will pack-up (feel harsh over consecutive bumps) while compression that is set too fast will cause the fork to bottom out harshly. If the fork is bottoming out, turn the adjuster one click at a time until the bottoming-out stops. Adjust each fork leg evenly. Replace the rubber dust cover after the adjustment.

**Note:** Adjusters should never be forced completely “Fast” or “Slow”; always leave one click of adjustment in either direction.



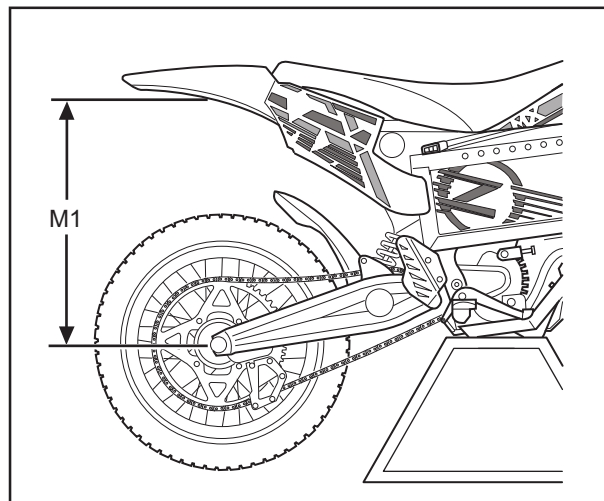
## Rear Shock Adjustment

### Spring Adjustment:

Obtaining the correct rear spring preload is critical for proper handling. The spring rate must be set to match the weight of the rider. The spring is preloaded for an 82 kg (180 lb) rider. Heavier riders require stiffer spring rates. A good approximation of your rear spring requirements can be found by measuring the rear suspension's sag. This measurement will quickly determine if your rear spring is approximately correct for your weight. This adjustment is a recommended guideline; personal riding preference may vary from the specifications given.

- Checking Sag

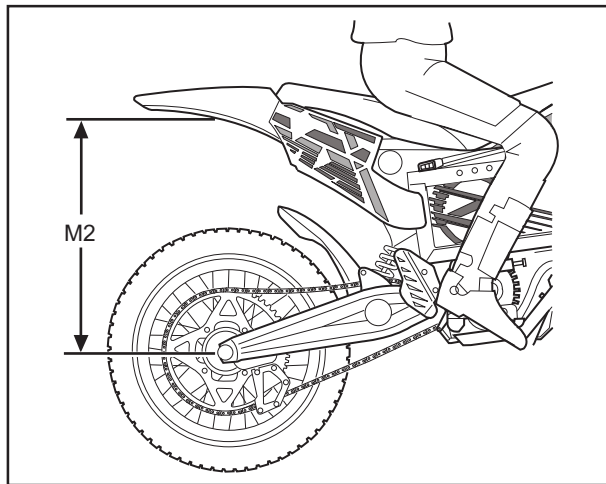
1. Support your motorcycle on a stand with the rear wheel off the ground.
2. Measure vertically from the rear axle to the rear fender; mark this spot as it will be used for other measurements.
3. Record this measurement; this will be measurement M1.



4. Remove the motorcycle from the stand.
5. Wearing your normal riding apparel, sit on the motorcycle.
6. Have an assistant hold the motorcycle up, your feet should be on both pegs.
7. Bounce the suspension a couple of times.



8. Have a second assistant take a measurement using the same locations as in step 2.
9. Record this measurement; this will be measurement M2.



10. Subtract the second measurement (M2) from the first measurement (M1).

#### Example:

|     |   |                   |
|-----|---|-------------------|
| M1  |   | 600 mm<br>(24 in) |
| M2  | - | 500 mm<br>(28 in) |
| Sag | = | 100 mm<br>(4 in)  |

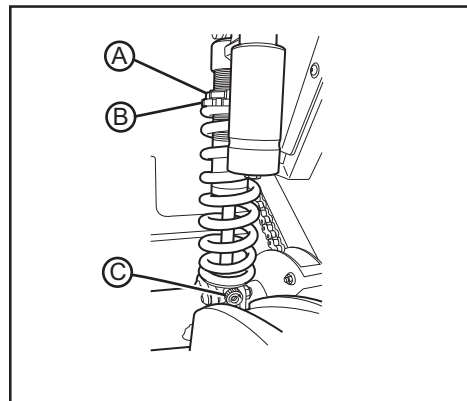
The total sag is 100 mm (4.0 in). Refer to the chart below for the correct sag. If the sag is not correct, the spring pre-load should be adjusted. See Spring Pre-load Adjustment.

| MODEL             | SAG             |
|-------------------|-----------------|
| X - Street Legal  | 74 mm (2.91 in) |
| MX - Dirt         | 74 mm (2.91 in) |
| XU - Street Legal | 46 mm (1.81 in) |

- Spring Pre-load Adjustment

1. Clean any dirt or debris from the threads of the shock near the lock ring (A).
2. Using a lock ring wrench loosen the lock nut (A).
3. For measurements less than the specified value, decrease the pre-load on the spring by turning the spring nut (B) counter-clockwise on the shock. If more than specified value, increase the pre-load on the spring by turning the spring nut (B) clockwise on the shock.
4. Recheck the sag. If the sag is correct, tighten the lock nut (A).

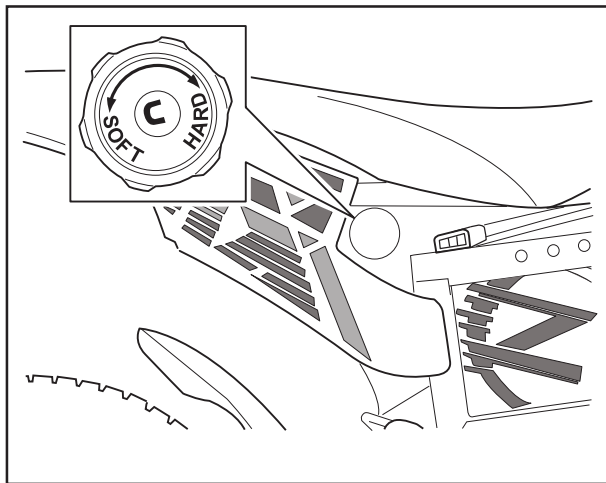
- Rebound Adjustment - The rebound adjuster knob (C) is at the bottom of the shock. It has 8 stages of adjustment. Printed on the knob is S-F, meaning Slow and Fast. The rebound adjuster knob controls how slow or fast the shock returns to its extended position after being compressed. Turning the knob clockwise, or S direction, is good for big impacts. Turning the knob counter-clockwise, or F direction, is good for many smaller and more frequent impacts.



## (X Street Legal and MX Dirt)

- **Compression Adjustment** - The compression adjustment knob is under the rear of the seat. It has 21 stages of adjustment. The knob has HARD (slower compression) and SOFT (faster compression). Turn the adjuster clockwise for slower compression. To speed up compression, turn the adjuster counter-clockwise. Start with a middle setting and fine tune the compression from there. Proper compression will allow the tire to track the ground over consecutive bumps. Compression that is set too slow will pack-up (feel harsh over consecutive bumps) while compression that is set too fast will cause the shock to bottom out harshly. If the shock is bottoming out, turn the adjuster one click at a time until the bottom out stops.

Note: Adjusters should never be forced completely "Soft" or "Hard"; always leave one click of adjustment in either direction.



## Owner's Responsibilities

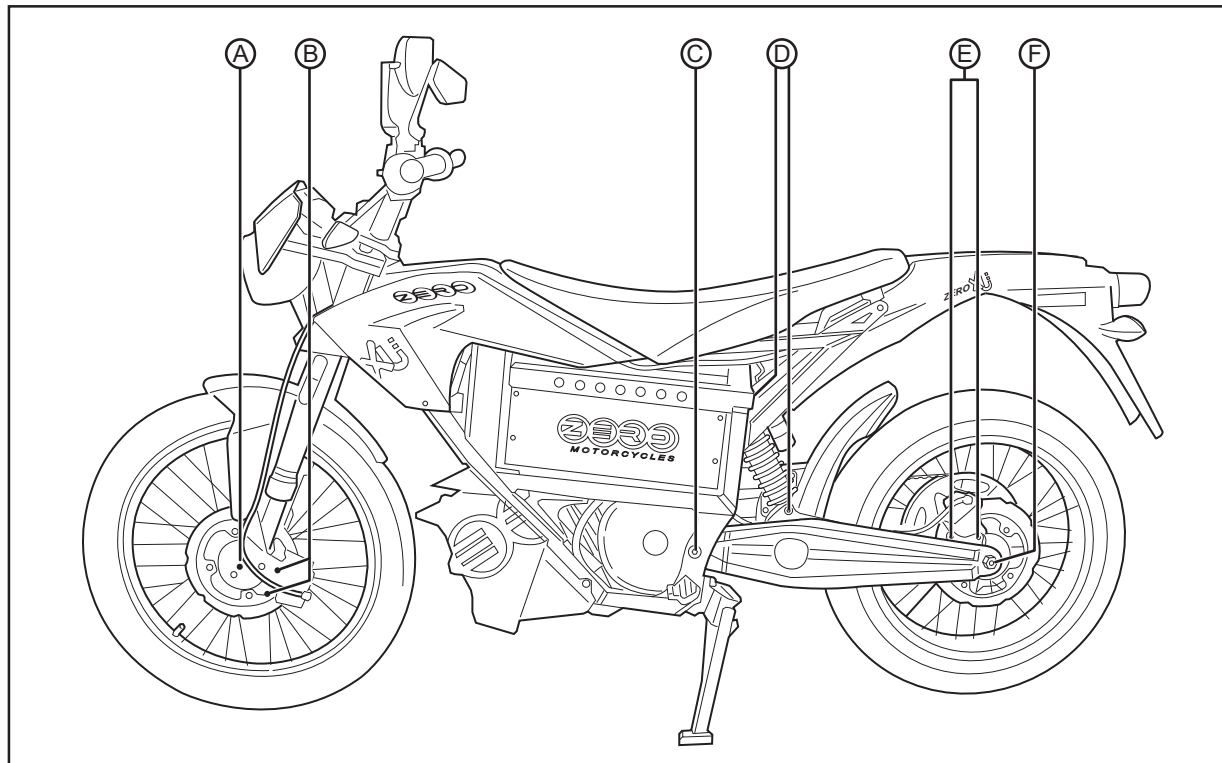
1. This owner's manual should be considered a permanent part of this motorcycle and should remain with it even if the motorcycle is subsequently sold.
2. Perform routine care and maintenance on your electric motorcycle as detailed in this owner's manual.
3. Use only Zero approved parts and Zero Motorcycle Accessories.
4. The operator is responsible for learning and obeying all country, federal, state, and local laws governing the operation of an electric motorcycle.
5. Always wear a regionally approved helmet, goggles, appropriate boots, and all other appropriate safety equipment when operating an electric motorcycle.

## Bolt Torque Table

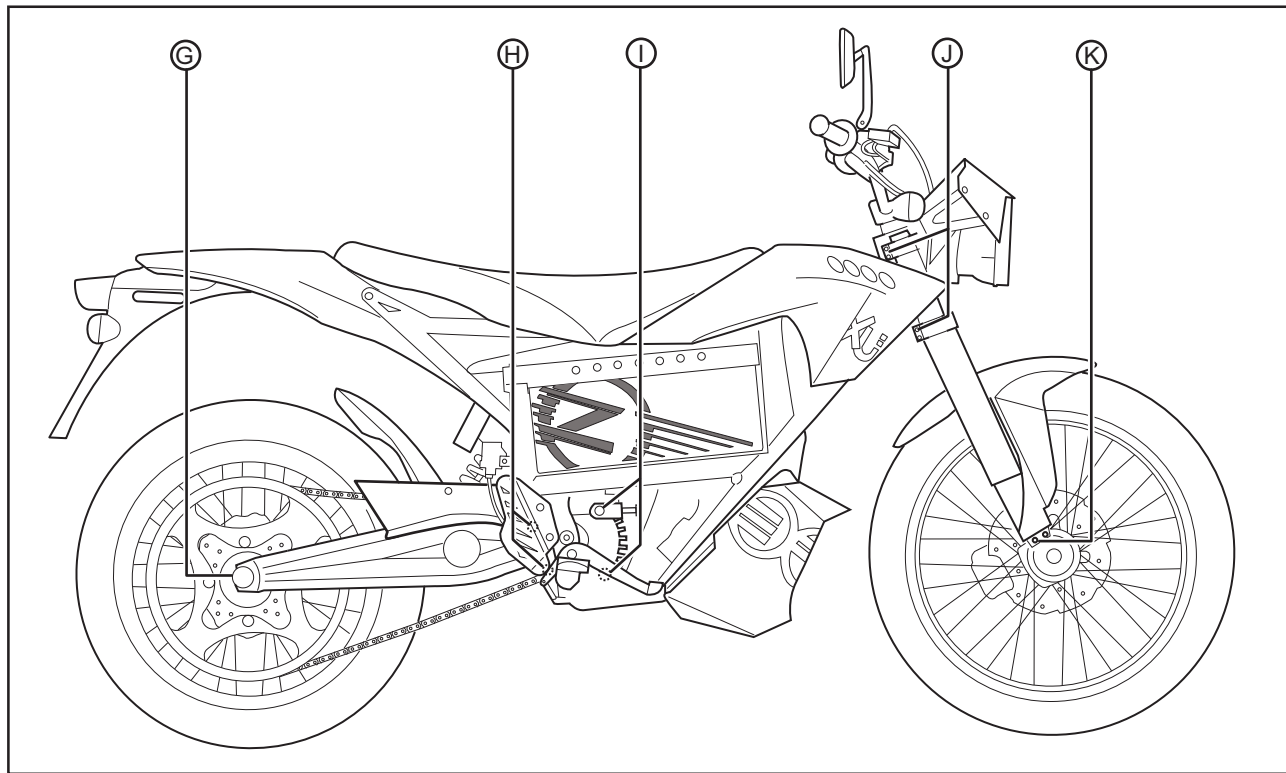
| LOCATION | ITEM                           | TORQUE            | NOTES              |
|----------|--------------------------------|-------------------|--------------------|
| A        | Front axle end bolt            | 26 N·m (19 lb ft) | Use LOCTITE® 242®* |
| B        | Front caliper mount bolts      | 20 N·m (15 lb ft) | Use LOCTITE® 242®* |
| C        | Main pivot bolt/nut (swingarm) | 75 N·m (55 lb ft) | Use LOCTITE® 262™* |
| D        | Shock mount bolts              | 52 N·m (38 lb ft) | -                  |
| E        | Rear caliper mount bolts       | 20 N·m (15 lb ft) | Use LOCTITE® 242®* |
| F        | Rear axle end bolt             | 26 N·m (19 lb ft) | Use LOCTITE® 242®* |
| G        | Rear axle pinch bolts          | 26 N·m (19 lb ft) | Use LOCTITE® 242®* |
| H        | Motor mount bolts (rear)       | 24 N·m (18 lb ft) | -                  |
| I        | Motor mount bolts (front)      | 30 N·m (22 lb ft) | -                  |
| J        | Triple tree pinch bolts        | 15 N·m (11 lb ft) | Use LOCTITE® 242®* |
| K        | Front axle pinch bolts         | 18 N·m (13 lb ft) | Use LOCTITE® 244®* |
| L        | Handlebar clamp mount bolts    | 26 N·m (19 lb ft) | -                  |

\* or equivalent

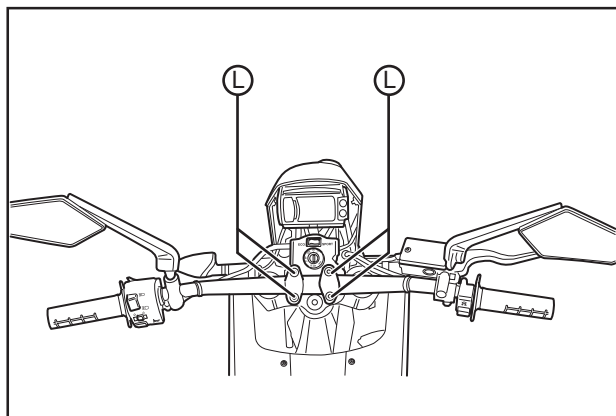
See Bolt Torque Table on page 5-2.



See Bolt Torque Table on page 5-2.



See Bolt Torque Table on page 5-2.



## Power Pack

**WARNING:** You must leave your motorcycle on the charger if you expect it to sit in storage or unused for over 7 days.

The power pack must be charged within 24 hours if fully discharged, and charged within 60 days if stored fully charged.

Zero recommends you plug in your Zero motorcycle after 7 days, even if fully charged. Please leave your Zero motorcycle plugged in whenever possible.

1. The power pack is a lithium ion power system. While it does require charging, it does not require maintenance.
2. The power pack should be kept away from excessive heat. The lithium ion cells should not get above 71°C (160°F). Do not store in a hot car or trailer or leave the power pack in direct sunlight.
3. Only an authorized service agent is qualified to have access to and troubleshoot the power pack.
4. Dispose of the power pack according to your state and local laws. It is encouraged that the power pack be recycled rather than disposed of in landfills. Please contact Zero at [support@zeromotorcycles.com](mailto:support@zeromotorcycles.com) or locate a recycling center in your area.



# General Maintenance

## Motor (MX)

**CAUTION:** Wear safety glasses when using compressed air to avoid eye injuries.

The motor requires little maintenance, but dust can collect inside the motor and can cause premature brush wear. If you ride in dusty conditions, it is important to blow the dust out of the motor with compressed air. Do this only in a well-ventilated area.

## Brakes

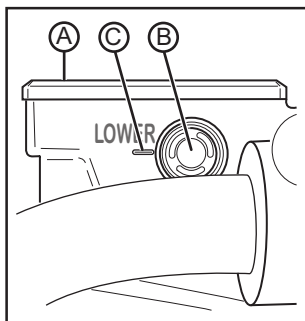
### Brake Fluid Level Inspection

**WARNING:** Do not spill brake fluid on painted surfaces; the finish could be damaged. Spilling brake fluid on the ABS body plastic will cause them to crack. Clean off any brake fluid spills immediately.

Always place a shop towel under the master cylinder reservoir prior to removing the cap/cover.

Low fluid levels may indicate worn brake pads or a leak in the hydraulic system. Inspect the brake pads for wear and/or the hydraulic system for leaks. Use only new DOT 4 brake fluid from a sealed container.

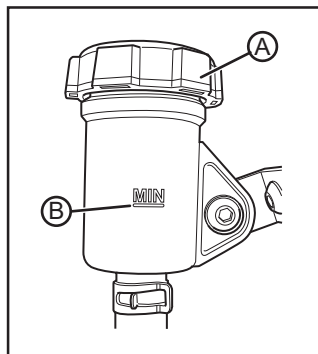
### Front Brake



Inspect the level of the front brake fluid through the sight glass (B). If the fluid level is visibly below the low level indicator (C), brake fluid must be added. Clean any dirt or debris from the cover (A) before opening the reservoir.

1. Remove the two Phillips screws that secure the cover onto the reservoir.
2. Add new DOT 4 brake fluid.
3. Inspect the cover seal, ensuring that it is free of any wear or damage and that it is positioned correctly.
4. Install the cover and tighten the Phillips screws.

## Rear Brake



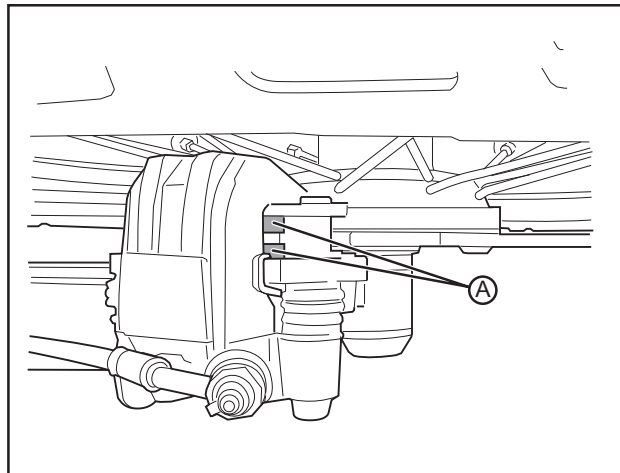
Inspect the level of the rear brake fluid by inspecting the level through the reservoir housing. If the fluid level is visibly below the low minimum "MIN" indicator (B), brake fluid must be added. Clean any dirt or debris from the cap and reservoir opening

(A) before opening the reservoir. Unscrew the cap and add new DOT 4 brake fluid. Inspect the cap seal ensuring that it is free of any wear or damage then reinstall the cap.

## Brake Pad Inspection

The brake pads must be inspected when specified in the maintenance schedule. See Maintenance Schedule on pages 5-23 through 5-28. Visually inspect the brakes by looking at the remaining brake pad material through the sides of the brake caliper.

Replace the brake pads if either pad's thickness is 1.35 mm (0.05 in) or less. If the brake pads (A) are worn, replace both brake pads immediately.



The brake rotor should be checked for thickness. The minimum thickness is 3.85 mm (0.15 in).

## Suspension

### Front

For maintenance, see Maintenance Schedule on pages 5-23 through 5-28.

To adjust the fork, see Suspension Adjustment on page 4-21.

### Rear

**CAUTION:** The shock absorber assembly contains highly pressurized gas.

- Do not attempt to tamper with or open the cylinder or shock.
- Do not subject the shock to high temperature or open flame.

**Doing either of these can cause the cylinder or shock to explode causing personal injury or death.**

For maintenance, see Maintenance Schedule on pages 5-23 through 5-28.

To adjust the shock, see Suspension Adjustment on page 4-23.

## Wheels And Tires

Inspect both wheels for the following:

- Bent, loose, or missing spokes
- Bent or cracked rims
- Impact marks on the rims

Inspect both tires for the following:

- Cuts, cracks, splits, or missing tread lugs in the tread or sidewall area
- Bumps or bulges within the tire body
- Uneven tire tread wear. Wear on one side of the tire tread or flat spots in the tire tread indicate a problem with the tire or motorcycle.
- Exposed tire thread or cords

If either of the wheels or tires are found to have any of these conditions, replace the wheel and/or tire immediately.

## Tire Inflation

**CAUTION:** Under-inflation is the most common cause of tire failure and may result in severe tire cracking, tread separation, “blowout,” or unexpected loss of motorcycle control causing personal injury and possible death.

The tire inflation pressure should be checked and adjusted before each ride. The tire pressure is checked using an accurate gauge when the tires are cold. This means that the tires have not been ridden on for 3 hours. Always replace the valve stem cap when finished.

| MODEL           | FRONT               | REAR                |
|-----------------|---------------------|---------------------|
| MX Dirt         | 103 kpa<br>(15 psi) | 103 kpa<br>(15 psi) |
| X Street Legal  | 172 kpa<br>(25 psi) | 207 kpa<br>(30 psi) |
| XU Street Legal | 221 kpa<br>(32 psi) | 241 kpa<br>(35 psi) |

## Drive Belt

The belt drive provides low maintenance and quiet operation with minimal stretch. Keep dirt, grease, oil, and debris off the belt and sprockets.

The drive belt tension should be checked and adjusted at the intervals specified in the Maintenance Schedule. See Maintenance Schedule on pages 5-26 through 5-28.

Clean the belt with mild soap and water when washing you motorcycle. Towel dry and inspect for the following:

- Cuts or unusual wear patterns.
- Damage to the center of the belt.
- Outside edge beveling. Some beveling is common but it indicates that sprockets are misaligned.
- Outside ribbed surface for signs of stone puncture.

- Inside (tooth portion) of belt for exposed tensile cords normally covered by nylon layer and polyethylene layer. This condition will result in belt failure and indicates worn sprocket teeth.
- Signs of puncture or cracking at the base of the belt teeth.

If any of the above conditions are found, the belt should be replaced.

### Checking Drive Belt Tension

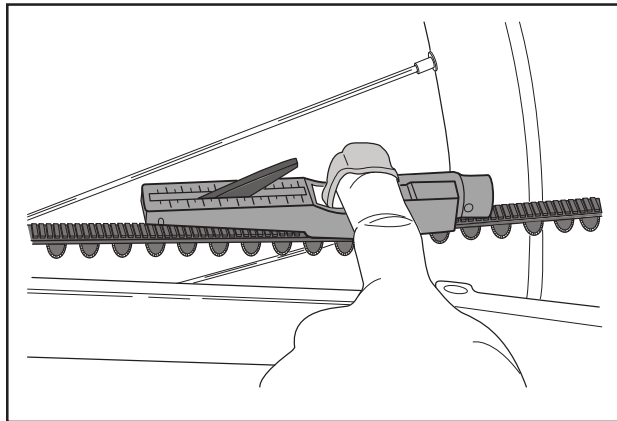
Proper belt tension is essential for optimum operation of the drive system.

Lack of belt tension can lead to so-called “ratcheting”. The teeth of the belt will slide over the teeth of the rear sprocket. This causes not only an unpleasant sound; the ratcheting can also cause damage to the carbon tensile cords. If ratcheting has occurred you should replace the belt before the next time you ride.

Too much tension can increase the wear of your drive system and the system can drag.

The tension is checked by using a Tension Tester.

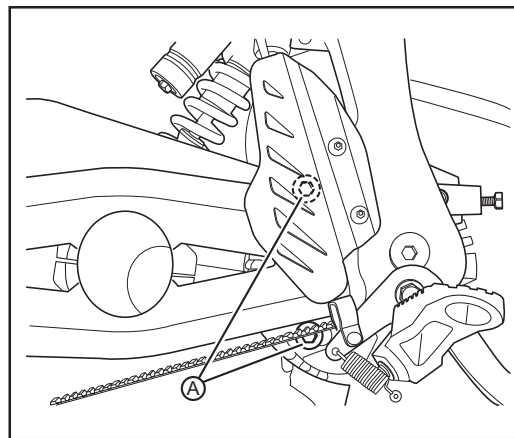
The Tension Tester has a plastic measurement arm, located in a slot. Along this slot there is a measuring scale. The point of intersection of the measurement arm and the measuring scale shows the tension of the belt. There is a button (clicking pad) on the upper side of the Tension Tester, where you can secure your finger with a rubber band holder. A spring is located underneath this clicking pad. If a certain pressure is applied to the spring, it makes a clicking sound.



1. Remove the key from the key switch.
2. Press the Tension Tester steadily to the middle of the upper side of the belt. The “lip” will lead the tester on to the belt.
3. Slowly increase the pressure on the tester, until you hear a clicking sound. Do not increase the pressure after the tester has clicked.
4. Remove the tester carefully from the belt. Avoid rough movements of the tester, as this would change the results of the measurement. The measurement should be in the range of 20-30 kg.

### Drive Belt Adjustment Procedure

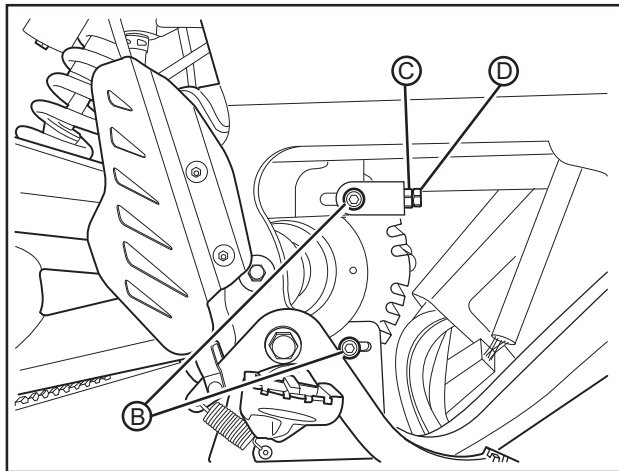
1. Remove the key from the key switch.
2. Loosen both rear motor mount bolts (A) using a 5 mm Allen/Hex wrench.



3. Loosen both front motor mount bolts (B) using a 6 mm Allen/Hex wrench. Loosen the 13 mm jam nut (C) on the belt tensioner (see image on next page).

**Note:** Belt tension will increase slightly when motor mounts bolts are fully torqued.

- Turn the adjuster bolt (D) a 1/4 turn at a time until the belt adjustment is within specification.



- Tighten all motor mount Allen bolts. See Bolt Torque Table on page 5-2.
- Tighten the 13 mm jam nut on the belt tensioner.
- Test ride the motorcycle.
- Recheck the belt for proper adjustment after the test ride and readjust if necessary.

## Drive Chain

### Cleaning The Drive Chain

#### CAUTION:

- Wear safety glasses when cleaning the chain to prevent eye injuries.
- Never have the motor spinning the wheel. Turn the wheel only by hand. Failure to do so could result in serious personal injury.
- Never place your hand or any other body part between the chain and sprockets. Work with the chain only in the middle between the two sprockets. Failure to do so could result in serious personal injury.
- Do not allow any of the cleaner to get on the brake rotors or brake pads. If the brake rotors or brake pads are contaminated with cleaner, it will impair the motorcycle's ability to stop. This could result in serious personal injury.

Follow the manufacturer's instructions for the chain cleaner you are using; page 5-13 contains general guidelines.

1. Remove the key from the key switch.
  2. Set the motorcycle on a stand or lift so the rear wheel is free to spin. While turning the wheel by HAND, spray the inside of your entire chain with a good coating of chain cleaner and let it sit for a few minutes.
  3. Using a brush, fill the bristles with spray from the chain cleaner. Begin gently scrubbing the chain on the top of your swingarm using the brush.
  4. Do this for the entire length of the chain. Now do the same thing for the inside/bottom of the chain.
  5. Using the brush, clean both sides of the rear sprocket. Let this soak for 5 minutes.
  6. Using a water hose, rinse the entire chain and using a clean rag wipe any residual moisture from the chain.
- Never have the motor spinning the wheel. Turn the wheel only by hand. Failure to do so could result in serious personal injury.
  - Never place your hand between the chain and sprockets. Work with the chain only in the middle between the two sprockets. Failure to do so could result in serious personal injury.
  - Do not allow any of the lubricant to get on the brake rotors or brake pads. If the brake rotors or brake pads are contaminated with lubricant, it will impair the motorcycle's ability to stop. This could result in serious personal injury.

Follow the manufacturer's instructions for the chain lubricant you are using; below are the general guidelines.

1. Turn the wheel backwards slowly and spray the inside of the chain on the inside of the links.
2. Turn the wheel backwards slowly and spray the outside of the chain on the outside of the links.
3. Let the motorcycle stand for 30 minutes to allow the lubricant to penetrate the link rollers.

## **Lubricating The Drive Chain**

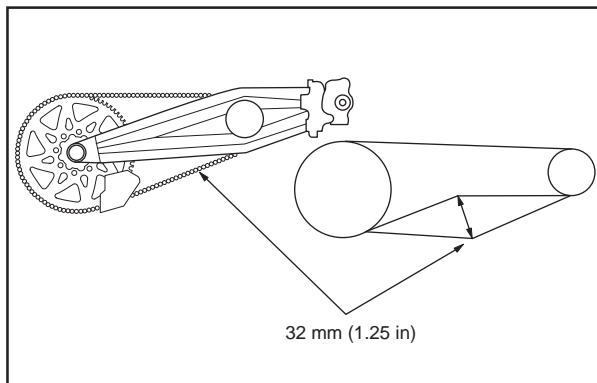
### **CAUTION:**

- Wear safety glasses when lubricating the chain to prevent eye injuries.



## Checking The Drive Chain

1. Remove the key from the key switch.
2. Using a ruler, grasp the chain halfway between the front and rear sprockets.
3. The chain should move 16 mm (.63 in) in either direction, so 32 mm (1.25 in) of total free play.
4. If the chain's free play is not within specifications it will need to be adjusted. See the Drive Chain Adjustment Procedure.

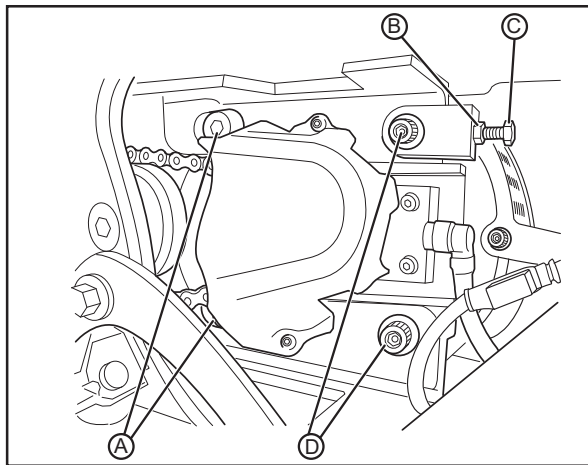


## Drive Chain Adjustment Procedure

1. Remove the key from the key switch.
2. Loosen both front motor mount 5/16" hex bolts (D). See image on next page.
3. Loosen both rear motor mount 7/32" hex bolts (A).
4. Loosen the 10 mm jam nut (B) on the chain tensioner.

**Note:** Chain tension will increase slightly when motor mount bolts are fully torqued.

5. Turn the tensioner bolt (C) a 1/4 turn at a time until the chain adjustment is within specification.
6. Tighten all motor mount Allen bolts. See Bolt Torque Table on page 5-2.
7. Tighten the 10 mm jam nut on the chain tensioner.
8. Test ride the motorcycle.
9. Recheck the chain for proper adjustment after the test ride and readjust if necessary.

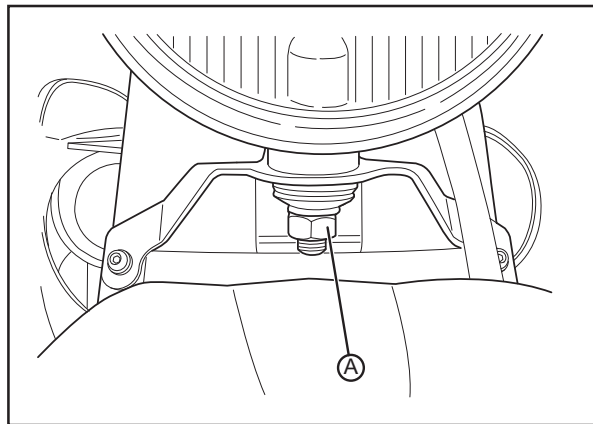


## Headlight Alignment

The headlight should periodically be checked for correct alignment. It must be aligned any time the suspension sag is adjusted because this will affect the headlight alignment. Before the headlight can be aligned, the suspension and tire pressure must be correctly adjusted. The headlight can be adjusted horizontally and vertically. If the horizontal adjustment is off, the beam will point too far off to one side.

If the vertical adjustment is off, it will cause the beam to point too closely to or too far ahead of the motorcycle. With the headlight on the low beam position, the motorcycle perpendicular to the ground, and the operator sitting on the motorcycle, verify the beam alignment. The headlight is adjusted at the factory with a 0.5-2.5% dip.

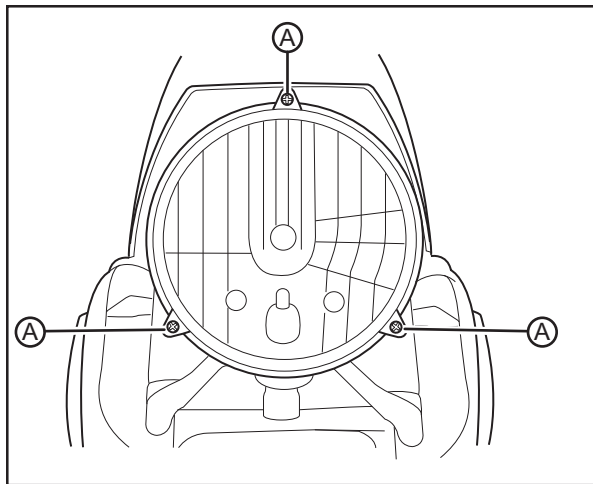
To adjust the headlight, remove the adjustment nut cover. Loosen the nut (A) and move the headlight until the correct beam alignment is achieved. Tighten the bolt. Install the adjustment nut cover.



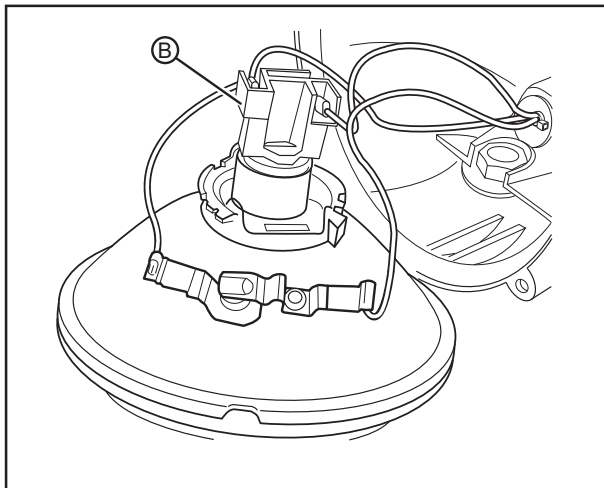
## Headlight Bulb Replacement

**CAUTION:** Halogen bulbs contain gas under pressure. Handling a bulb improperly could cause it to shatter into flying glass fragments. To help avoid personal injury:

- Turn the key switch OFF and allow the bulb to cool before changing the bulb.
  - Leave the key switch OFF until the bulb change is complete.
  - Always wear eye protection when changing a halogen bulb.
  - Avoid touching the glass.
1. Remove the three screws (A) from the headlight trim ring.

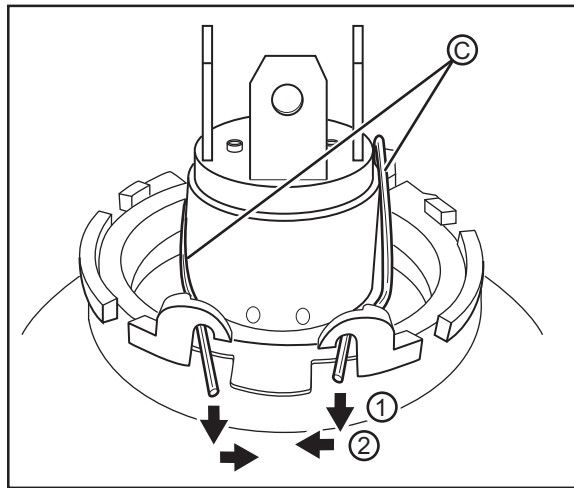


2. Disconnect the headlight bulb connector (B).



3. Unhook the headlight bulb spring clip (C) by (1) pushing down then (2) pushing to the side.

4. Lift up on the spring clip and remove the headlight bulb.



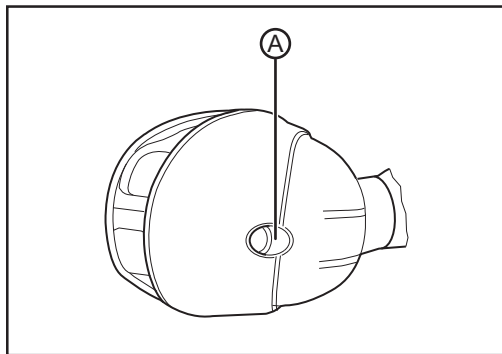
**WARNING:** Do not touch the glass portion of the headlight bulb. Keep the headlight bulb free of contaminants. Oil from your fingers or contaminants will shorten the life of the bulb. Thoroughly clean any fingerprints or contaminants from the bulb using a clean cloth moistened with alcohol.

5. Install the headlight bulb into the lens.
6. Install the headlight spring clip.
7. Connect the headlight connector and install the headlight into the housing.
8. Install the headlight trim ring with gasket and install the trim ring screws.

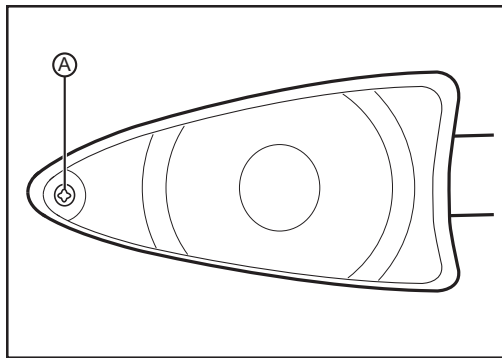
## Turn Signal Light Bulb Replacement

1. Remove the turn signal lens screw (A) and remove the lens.
2. Push in on the bulb, turn the bulb counter-clockwise, and then pull the bulb out.
3. Insert the new bulb into the socket, push in and turn clockwise until it stops.
4. Install the lens and screw; tighten the screw. Do not over-tighten the screw.

X:

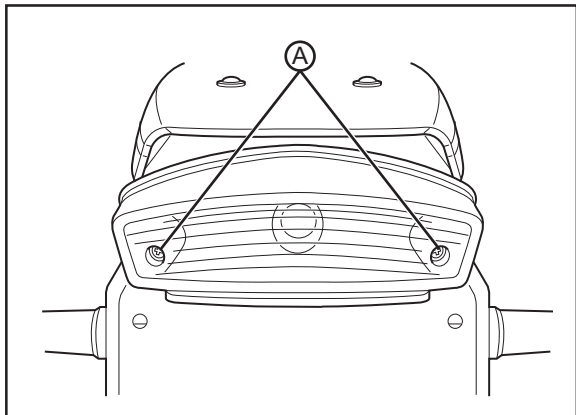


XU:



## Brake/Tail Light Bulb Replacement

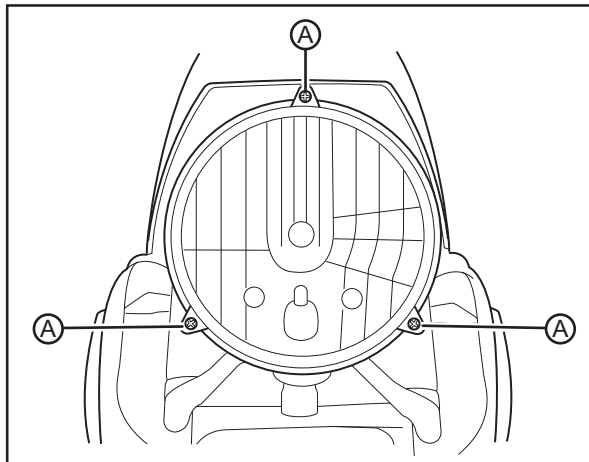
1. Remove the brake/tail light lens screws (A) and remove the lens.



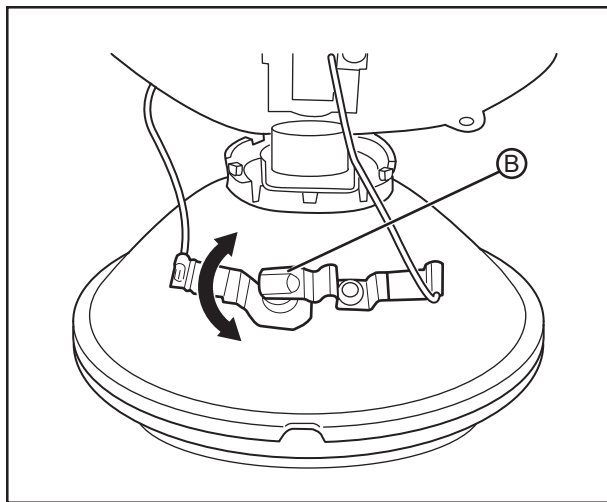
2. Push in on the bulb and turn the bulb counter-clockwise then pull the bulb out.
3. Insert the new bulb into the socket, push in and turn clockwise until it stops.
4. Install the brake/tail light lens and screws; tighten the screws. Do not over-tighten the screws.

## Running Light Bulb Replacement

1. Remove the three screws (A) from the headlight trim ring.



2. Pivot the bulb contact (B) to either side of the bulb and remove the bulb.



3. Install the bulb and pivot the contact back onto the bulb.
4. Install the headlight into the housing, install the trim ring with gasket and install the trim ring screws.

## Cleaning

To prolong the life of your motorcycle, it should be washed periodically. Regular cleaning, using correct methods, is an important factor in maintaining the value of your Zero motorcycle. It also ensures that safety-relevant parts remain in full working order.

**CAUTION:** After cleaning and before starting on your journey, always test the brakes.

If tar, bugs, or other similar deposits have accumulated, wash them off as soon as possible. Do not use steam cleaners; they can cause water intrusion of bearing, seals and electrical components. When using pressure washers, avoid spraying water of great force around the instrument panel, power pack or controller. Avoid using strong acidic wheel cleaners, especially on spoked wheels. If such products are used on hard to remove dirt, do not leave the cleaner on the affected area any longer than instructed. Thoroughly rinse the area off with water, immediately dry it, and then apply a corrosion protection spray.

**WARNING:** Improper cleaning can damage electrical components, cowlings, panels and other plastic parts. Use only a soft, clean cloth or sponge with mild detergent and water to clean plastic.

Do not use any harsh chemical products on plastic parts. Be sure to avoid using cloths or sponges which have been in contact with strong abrasive cleaning products, solvents or thinner, fuel (gasoline), rust removers or inhibitors, brake fluid, antifreeze or electrolyte.

After gently washing the motorcycle be sure to allow all of the electrical components to dry prior to operation. If the motorcycle is ridden immediately after being washed, apply both brakes several times in order to remove any moisture from the brake pads. Do not use products such as tire dressings on tires as this will deteriorate traction.



## Parking And Long Term Storage

1. It is required to always leave the power pack plugged in when the Zero is not in use. The Zero charger is designed to maintain a balanced and complete charge at all times without wasting any electricity.
2. Over extended periods of time, the power pack is checked every 72 hours to ensure that the cells are balanced and that the power pack is full. Once the power pack has reached a complete charge it is checked every 72 hours, remove over extended periods of time.
3. To prolong the life of your power pack you should store your motorcycle in a cool area. Storing your motorcycle in a hot area will cause your power pack's life to be shortened.
4. If, for some reason, your motorcycle was not plugged in for several days you should always charge it up before operation.

For more information on the power pack and the electrical system see Battery Management System (BMS) on page 4-10.

**WARNING:** Opening of the power pack is for trained Zero Motorcycles' technicians. Please be aware that incorrect handling of a Zero power pack can be dangerous. **DO NOT OPEN!**

# Maintenance Schedule

The scheduled maintenance must be performed in accordance with this chart to keep the Zero motorcycle in top running condition. The initial maintenance is vitally important and must not be neglected.

## MX - Dirt

| NO. | ITEM        | ROUTINE   | EVERY RIDE | INITIAL | TIME INTERVALS |           |           |           |           |  |
|-----|-------------|---|------------|---------|----------------|-----------|-----------|-----------|-----------|--|
|     |             |   |            | 1 month | 6 months       | 12 months | 18 months | 24 months | 30 months |  |
| 1   | Front Brake | <ul style="list-style-type: none"><li>• Check operation, and for fluid leakage.</li><li>• Replace brake pads if necessary.</li></ul>  | ✓          | ✓       | ✓              | ✓         | ✓         | ✓         | ✓         |  |
| 2   | Rear Brake  | <ul style="list-style-type: none"><li>• Check operation, and for fluid leakage.</li><li>• Replace brake pads if necessary.</li></ul>  | ✓          | ✓       | ✓              | ✓         | ✓         | ✓         | ✓         |  |
| 3   | Brake Hoses | <ul style="list-style-type: none"><li>• Check for cracks or damage. Replace if necessary.</li></ul>   | ✓          |         | ✓              | ✓         | ✓         | ✓         | ✓         |  |
| 4   | Wheels      | <ul style="list-style-type: none"><li>• Check runout, and for damage. Replace if necessary.</li></ul>   |            |         | ✓              | ✓         | ✓         | ✓         | ✓         |  |
| 5   | Tires       | <ul style="list-style-type: none"><li>• Check tread depth and for damage. Replace if necessary.</li><li>• Check air pressure. See page 5-9. Correct if necessary.</li></ul> | ✓          |         | ✓              | ✓         | ✓         | ✓         | ✓         |  |

| NO. | ITEM                 | ROUTINE  | EVERY<br>RIDE | INITIAL  | TIME INTERVALS |           |           |           |           |  |
|-----|----------------------|--|---------------|--|----------------|-----------|-----------|-----------|-----------|--|
|     |                      |  |               | 1 month  | 6 months       | 12 months | 18 months | 24 months | 30 months |  |
| 6   | Wheel Bearings       | <ul style="list-style-type: none"><li>• Check bearings for smooth operation. Replace if necessary.</li></ul>   |               |  | ✓              | ✓         | ✓         | ✓         | ✓         |  |
| 7   | Motor Brush Assembly | <ul style="list-style-type: none"><li>• Blow out with a high pressure air hose.</li><li>• Brush inspection/replacement.</li></ul>  |               |  |                | ✓         |           |           |           |  |
| 8   | Drive Chain          | <ul style="list-style-type: none"><li>• Check chain slack/alignment and condition.</li><li>• Adjust and lubricate chain with chain lubricant thoroughly.</li><li>• Replace worn chain and sprockets.</li></ul> | ✓             | Every month and after washing the motorcycle or riding in the rain |                |           |           |           |           |  |
| 9   | Steering Bearings    | <ul style="list-style-type: none"><li>• Check bearing assembly for looseness.</li><li>• Moderately repack with Teflon® grease every 24 months.</li></ul>   |               | ✓  | ✓              | ✓         | ✓         | Repack    | ✓         |  |
| 10  | Chassis Fasteners    | <ul style="list-style-type: none"><li>• Check all chassis fittings and fasteners. Correct if necessary.</li></ul>  |               |  | ✓              | ✓         | ✓         | ✓         | ✓         |  |

| NO. | ITEM                          | ROUTINE  | EVERY<br>RIDE | INITIAL | TIME INTERVALS |           |           |           |           |  |
|-----|-------------------------------|--|---------------|---------|----------------|-----------|-----------|-----------|-----------|--|
|     |                               |  |               | 1 month | 6 months       | 12 months | 18 months | 24 months | 30 months |  |
| 11  | Front Fork                    | <ul style="list-style-type: none"> <li>• Check operation, and for oil leakage.</li> <li>• Service/Rebuild if necessary.</li> </ul> | ✓             |         | ✓              | ✓         | ✓         | ✓         | ✓         |  |
| 12  | Rear Shock Absorber Assembly  | <ul style="list-style-type: none"> <li>• Check operation, and for oil leakage.</li> <li>Replace if necessary.</li> </ul>           | ✓             |         | ✓              | ✓         | ✓         | ✓         | ✓         |  |
| 13  | Throttle Grip                 | <ul style="list-style-type: none"> <li>• Check operation and free play.</li> </ul>   | ✓             |         | ✓              | ✓         | ✓         | ✓         | ✓         |  |
| 14  | Front Brake Lever Pivot Shaft | <ul style="list-style-type: none"> <li>• Apply silicon grease lightly.</li> </ul>  |               |         | ✓              | ✓         | ✓         | ✓         | ✓         |  |

## X/XU - Street Legal

Where time and mileage are listed, follow the interval that occurs first.

| NO. | ITEM                 | ROUTINE  | EVERY<br>RIDE | INITIAL                               | ODOMETER MILEAGE READINGS                |  |   |   |   |  |
|-----|----------------------|--|---------------|---------------------------------------|--|--|---|---|---|--|
|     |                      |  |               | 1,000 km<br>(600 mi)<br>or<br>1 month | 7,000 km<br>(4,000 mi)<br>or<br>6 months | 13,000 km<br>(8,000 mi)<br>or<br>12 months | 19,000 km<br>(12,000 mi)<br>or<br>18 months | 25,000 km<br>(16,000 mi)<br>or<br>24 months | 31,000 km<br>(20,000 mi)<br>or<br>30 months |  |
| 1   | Front Brake          | • Check operation, and for fluid leakage.<br>• Replace brake pads if necessary.  | ✓             | ✓                                     | ✓  | ✓  | ✓   | ✓   | ✓   |  |
| 2   | Rear Brake           | • Check operation, and for fluid leakage.<br>• Replace brake pads if necessary.  | ✓             | ✓                                     | ✓  | ✓  | ✓   | ✓   | ✓   |  |
| 3   | Brake Hoses          | • Check for cracks or damage. Replace if necessary.  | ✓             |                                       | ✓  | ✓  | ✓   | ✓   | ✓   |  |
| 4   | Wheels               | • Check runout and for damage. Replace if necessary.   |               |                                       | ✓  | ✓  | ✓   | ✓   | ✓   |  |
| 5   | Tires                | • Check tread depth and for damage. Replace if necessary.<br>• Check air pressure. See page 5-9. Correct if necessary. | ✓             |                                       | ✓  | ✓  | ✓   | ✓   | ✓   |  |
| 6   | Drive Belt (XU only) | • Check belt slack and condition.<br>• Replace a worn/damaged belt.  | ✓             |                                       |  |  |   |   |   |  |

| NO. | ITEM                          | ROUTINE  | EVERY RIDE | INITIAL  | ODOMETER MILEAGE READINGS                |  |   |   |   |  |
|-----|-------------------------------|--|------------|--|--|--|---|---|---|--|
|     |                               |  |            | 1,000 km<br>(600 mi)<br>or<br>1 month  | 7,000 km<br>(4,000 mi)<br>or<br>6 months | 13,000 km<br>(8,000 mi)<br>or<br>12 months | 19,000 km<br>(12,000 mi)<br>or<br>18 months | 25,000 km<br>(16,000 mi)<br>or<br>24 months | 31,000 km<br>(20,000 mi)<br>or<br>30 months |  |
| 7   | Wheel Bearings                | • Check bearings for smooth operation.<br>Replace if necessary.  |            |  | ✓  | ✓  | ✓   | ✓   | ✓   |  |
| 8   | Motor Brush Assembly (X only) | • Blow out with a high pressure air hose.<br>• Brush inspection/replacement.   |            |  |  | ✓  |   |   |   |  |
| 9   | Drive Chain                   | • Check chain slack/alignment and condition.<br>• Adjust and lubricate chain with chain lubricant thoroughly.<br>• Replace worn chain and sprockets. | ✓          | Every 1,000 km (600 mi) and after washing the motorcycle or riding in the rain |  |  |   |   |   |  |
| 10  | Steering Bearings             | • Check bearing assembly for looseness.<br>• Moderately repack with Teflon® grease every 25,000 km (16,000 mi) or 24 months.                         |            | ✓  | ✓  | ✓  | ✓   | Repack                                      | ✓   |  |
| 11  | Chassis Fasteners             | • Check all chassis fittings and fasteners. Correct if necessary.  |            |  | ✓  | ✓  | ✓   | ✓   | ✓   |  |

| NO. | ITEM                          | ROUTINE  | EVERY RIDE | INITIAL                               | ODOMETER MILEAGE READINGS                |  |   |   |   |
|-----|-------------------------------|--|------------|---------------------------------------|--|--|---|---|---|
|     |                               |  |            | 1,000 km<br>(600 mi)<br>or<br>1 month | 7,000 km<br>(4,000 mi)<br>or<br>6 months | 13,000 km<br>(8,000 mi)<br>or<br>12 months | 19,000 km<br>(12,000 mi)<br>or<br>18 months | 25,000 km<br>(16,000 mi)<br>or<br>24 months | 31,000 km<br>(20,000 mi)<br>or<br>30 months |
| 12  | Front Fork                    | <ul style="list-style-type: none"> <li>• Check operation, and for oil leakage.</li> <li>• Service/rebuild if necessary.</li> </ul> | ✓          |                                       | ✓  | ✓  | ✓   | ✓   | ✓   |
| 13  | Rear Shock Absorber Assembly  | <ul style="list-style-type: none"> <li>• Check operation, and for oil leakage. Replace if necessary.</li> </ul>                    | ✓          |                                       | ✓  | ✓  | ✓   | ✓   | ✓   |
| 14  | Throttle Grip                 | <ul style="list-style-type: none"> <li>• Check operation and free play.</li> </ul>   | ✓          |                                       | ✓  | ✓  | ✓   | ✓   | ✓   |
| 15  | Kickstand Pivots              | <ul style="list-style-type: none"> <li>• Check operation.</li> <li>• Apply silicon grease lightly.</li> </ul>                      |            |                                       | ✓  | ✓  | ✓   | ✓   | ✓   |
| 16  | Kickstand Switch              | <ul style="list-style-type: none"> <li>• Check operation and replace if necessary.</li> </ul>                                      |            | ✓                                     | ✓  | ✓  | ✓   | ✓   | ✓   |
| 17  | Front Brake Lever Pivot Shaft | <ul style="list-style-type: none"> <li>• Apply silicon grease lightly.</li> </ul>  |            |                                       | ✓  | ✓  | ✓   | ✓   | ✓   |

**NOTE:** From 37,000 km (24,000 mi) or 36 months, repeat the maintenance intervals starting from 13,000 km (8,000 mi) or 12 months.

## Parts/Maintenance Items

The proper replacement parts, fluids, and lubricants to use are listed in the chart below.

| PART                     | NUMBER          |
|--------------------------|-----------------|
| Headlight Bulb           | H4 (55/60 watt) |
| Turn Signal Bulb - MX    | P21W (21 watt)  |
| Turn Signal Bulb (amber) | RY10W (10 watt) |
| Brake/Tail Light Bulb    | 1157 (5 watt)   |
| Front Running Light Bulb | T4W (4 watt)    |
| Brake Fluid              | DOT 4           |

## Zero Motorcycle Accessories

Zero accessories are designed to complement and function with other systems on your motorcycle. Your dealer can accessorize the motorcycle using genuine Zero accessories.

A full line of parts, accessories, and apparel can be found on the Zero Motorcycles website.

## Fuses

Whenever there is an excessive amount of current flowing through a circuit, the fusible element will melt and create an open or incomplete circuit.

Fuses are a one-time protection device and must be replaced each time the circuit is overloaded. Replace the fuse with one of equal current and voltage rating. Do NOT interchange 12 volt and 80 volt fuses. If the fuse melts repeatedly, have the electrical system inspected by your dealer.

### Fuse Center Locations

12 Volt\*

X/XU - Street Legal

The 12 volt fuse center is located behind the right front trim panel. The fuse center has a protective cover that must first be removed to gain access to the fuses. To remove the cover, squeeze the tabs (A) together and lift off the cover.

| FUSE # | AMP | CIRCUITS CONTROLLED                   |
|--------|-----|---------------------------------------|
| 1      | 10  | Turn Signals, Horn, Brake/Tail Lights |
| 2      | 10  | Accessory Port                        |
| 3      | 10  | Headlight, Flash to Pass              |
| 4      | -   | Not Used                              |

\* Do NOT interchange 12 volt and 80 volt fuses

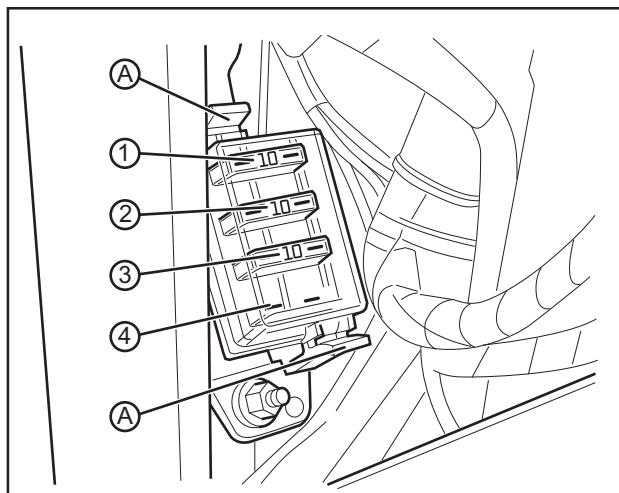
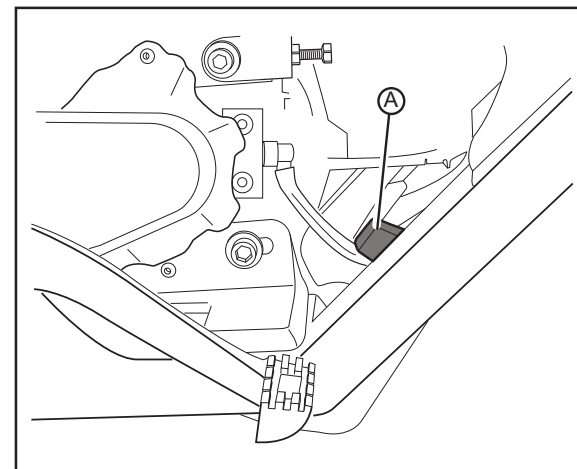
See image on page 5-30.



## X Street Legal and MX Dirt

The cooling fan inline fuse (A) is located between the front right lower frame rail, in front of the motor.

| FUSE # | AMP | CIRCUITS CONTROLLED |
|--------|-----|---------------------|
| -      | 5   | Cooling Fan         |



**Note:** Trim panel removed for clarity

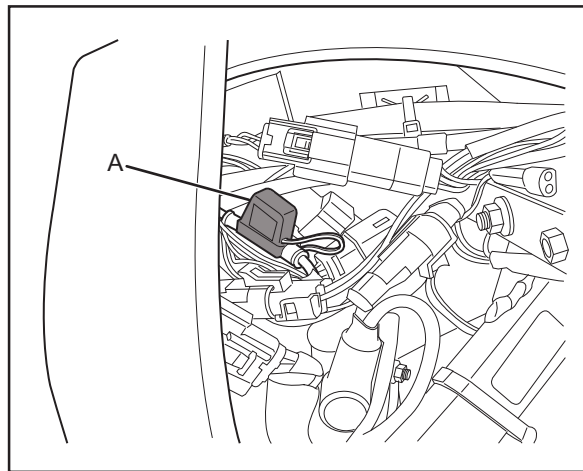
### Inline Fuse:

There are 2 inline 12 volt fuses, one controls the cooling fan and the other controls the instrument panel. Remove the cover to access the fuses.

## X Street Legal

The instrument panel inline fuse (A) is located behind the right trim panel, above the fuse center.

| FUSE # | AMP | CIRCUITS CONTROLLED |
|--------|-----|---------------------|
| -      | 5   | Instrument Panel    |



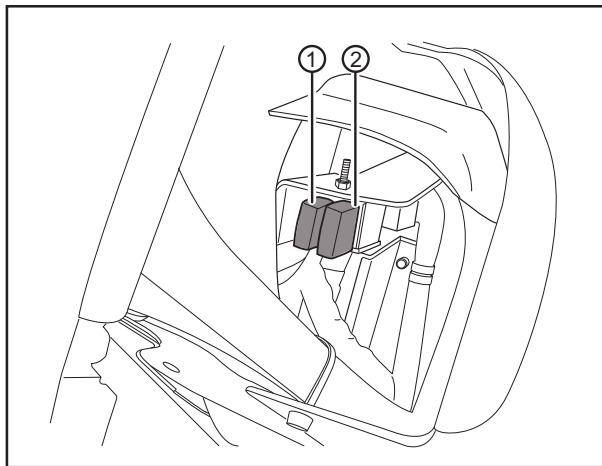
**Note:** Trim panel removed for clarity

## 80 Volt\*

The 80 volt fuse center is located behind the frame fork tube on the left side of the frame. Remove the cover to access the fuse. See image on page 5-32.

| FUSE # | AMP | CIRCUITS CONTROLLED       |
|--------|-----|---------------------------|
| 1      | 7.5 | Main Bike Board/Converter |
| 2      | 7.5 | DC/DC Converter           |

\* Do NOT interchange 12 volt and 80 volt fuses.



If your XU is equipped with the quick charge option, there is an 80 volt 25 amp fuse. This fuse is located under the seat.

Follow the maintenance schedules on pages 5-23 through 5-28. After a scheduled service or routine is performed, record the information on the chart below.

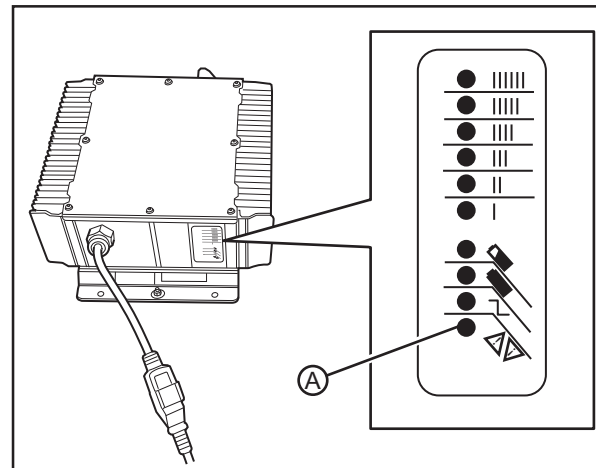
| DATE | ITEM | SERVICE/ROUTINE DESCRIPTION |
|------|------|-----------------------------|
|      |      |                             |
|      |      |                             |
|      |      |                             |
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|      |      |                             |
|      |      |                             |

## This image shows a single sheet of white paper with horizontal blue or grey ruling lines. The lines are evenly spaced and run across the width of the page. There are approximately 20 lines visible. The paper has a slight shadow on the right side, suggesting it's resting on a surface.

All of the motorcycles are carefully inspected before they are delivered. Even after the motorcycles are inspected, some technical issues can occur. The following information offers a guide to help you to identify an issue, and if possible, repair it yourself. If you are unable to solve an issue with your Zero electric motorcycle, take it to an authorized dealer at your convenience. If there is no dealer in your area call Zero Motorcycles customer service.

## Power Pack And Charger

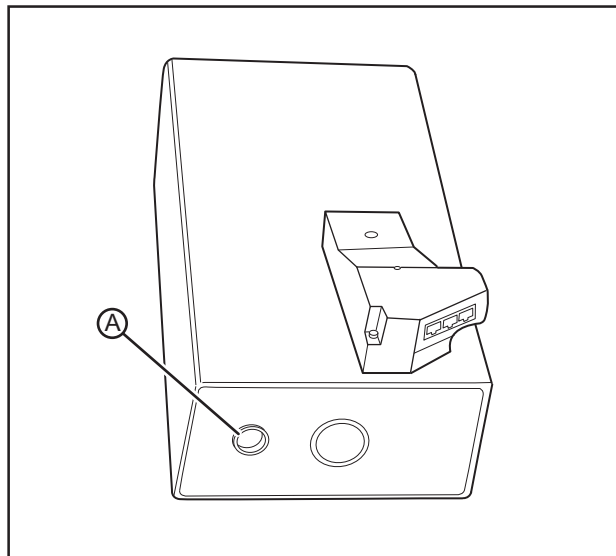
If a fault occurs during charging, count the number of times the red LED (A) flashes on the charger in between pauses. See the table on page 6-2 for the possible cause and solution to the issue.



| NUMBER OF RED FLASHES |        | CAUSE  | SOLUTION  |
|-----------------------|--------|--|---|
| 1                     | ✱      | Power pack high voltage  | Reset charger (interrupt AC power for 15 seconds).  |
| 2                     | ✱✱     | Power pack low voltage   | Reset charger (interrupt AC power for 15 seconds).  |
| 3                     | ✱✱✱    | Charge timeout: caused by power pack not reaching required voltage. Charger output was reduced due to high temperatures. | Check connections.<br>Operate charger at a lower ambient temperature.                     |
| 4                     | ✱✱✱✱   | Check power pack: power pack could not be trickle charged up to minimum voltage.   | Contact your dealer.  |
| 5                     | ✱✱✱✱✱  | Over-temperature: charger shut down due to high internal temperature.  | Ensure sufficient cooling air flow and reset charger (interrupt AC power for 15 seconds). |
| 6                     | ✱✱✱✱✱✱ | Charger internal fault   | Reset charger (interrupt AC power for 15 seconds). Contact your dealer if fault persists. |

## Battery Management System

The Battery Management System (BMS) is located inside the power pack and is fitted with a window (A) to provide visual notification about the status of the power pack. There are four LED lamps, one red and three green, that will blink. The window is located on the end of the power pack, below the charger connector. See Understanding BMS Light Patterns for the meanings of these patterns.





## Understanding BMS Flash Code Patterns

### Idle Mode

In this mode the key is OFF and the power pack is not being charged; the BMS is only monitoring the battery.

| 1<br>Red | 2<br>Green | 3<br>Green | 4<br>Green | ON    | OFF    | MEANING                      | SOLUTION                   |
|----------|------------|------------|------------|-------|--------|------------------------------|----------------------------|
|          |            |            | ✓          | 50 ms | 5 sec  | Healthy                      | BMS OK                     |
| ✓        |            |            |            | 50 ms | 60 sec | Pack Low                     | Charge power pack          |
| ✓        |            |            |            | 50 ms | 1 sec  | Number of Cell Packs Not Set | Contact Zero or the Dealer |
| ✓        |            |            |            | 50 ms | 1 sec  | Self-Test Failed             | Contact Zero or the Dealer |
|          |            |            | ✓          | 50 ms | 250 ms | Waiting for UART Input       | Contact Zero or the Dealer |

## Charge Mode

This mode is with the charging cord plugged into the AC power, and the key in the OFF position. During the charging process, first all lights will blink, then 1 through 4 will blink depending on the power pack's state of charge.

| 1<br>Red | 2<br>Green | 3<br>Green | 4<br>Green | ON     | OFF   | MEANING         | SOLUTION          |
|----------|------------|------------|------------|--------|-------|-----------------|-------------------|
| ✓        | ✓          | ✓          | ✓          | 1 sec  | 5 sec | Charge Complete | Unplug Charger    |
| Charging |            |            |            |        |       |                 |                   |
| ✓        |            |            |            | 250 ms |       | 25%             | Continue Charging |
| ✓        | ✓          |            |            | 250 ms |       | 50%             | Continue Charging |
| ✓        | ✓          | ✓          |            | 250 ms |       | 75%             | Continue Charging |
| ✓        | ✓          | ✓          | ✓          | 250 ms |       | 100%            | Charging Complete |

## Charge Mode cont'd

| 1<br>Red            | 2<br>Green | 3<br>Green | 4<br>Green | ON     | OFF    | MEANING                  | SOLUTION                         |
|---------------------|------------|------------|------------|--------|--------|--------------------------|----------------------------------|
| Balancing           |            |            |            |        |        |                          |                                  |
|                     |            | ✓          |            | 500 ms |        | Power Pack<br>Unbalanced | Leave on Charger for<br>72 Hours |
|                     | ✓          |            | ✓          | 500 ms |        |                          |                                  |
| Temperature Disable |            |            |            |        |        |                          |                                  |
| ✓                   |            |            | ✓          | 100 ms | 500 ms | Too Hot                  | Let the Power Pack<br>Cool Down  |

## Run Mode

In this mode, the key is in the ON position.

| 1<br>Red | 2<br>Green | 3<br>Green | 4<br>Green | ON    | OFF   | MEANING                 | SOLUTION    |
|----------|------------|------------|------------|-------|-------|-------------------------|-------------|
| ✓        |            |            |            | 5 sec | 1 sec | 25% of Power Remaining  | Charge Soon |
| ✓        | ✓          |            |            | 5 sec | 1 sec | 50% of Power Remaining  | Charge Soon |
| ✓        | ✓          | ✓          |            | 5 sec | 1 sec | 75% of Power Remaining  | Charge Soon |
| ✓        | ✓          | ✓          | ✓          | 5 sec | 1 sec | 100% of Power Remaining | OK          |

## **Power Pack Empty**

If the power pack is completely empty, an error-beep will sound and the BMS will disable the throttle. You cannot ride the motorcycle until you recharge the power pack. If the Power Pack Empty error-beep still sounds after two hours of charging time, contact your dealer. Your power pack may need to be repaired or replaced.

## **Too Hot**

The power pack contains internal temperature sensors. If the BMS measures excessive internal temperatures, it will flash an error code and disable the throttle. You cannot ride the motorcycle until the power pack cools down. Place the motorcycle in a cool, well-ventilated location and wait a few minutes before riding again. If the Too Hot error code still flashes after the power pack has had time to cool down, contact your dealer. Your power pack may need to be repaired or replaced.

## **Power Pack Unbalanced**

The power pack contains many individual cells. The BMS continuously monitors the cells and tries to keep them all “in balance” (at the same level-of-charge). If any of the cells are grossly out-of-balance, the BMS will flash a Power Pack Unbalanced error code and disable the throttle. You cannot ride the motorcycle until the problem is resolved.

The solution to the problem is to plug in the charger and allow the power pack to charge for 72 hours. This will allow the BMS to re-balance the cells in the power pack. If the Power Pack Unbalanced error code still flashes after the power pack has spent more than 72 hours charging, contact your dealer. Your power pack may need to be repaired or replaced.

## **Low Power Pack Warning**

When in the run mode, the BMS provides a Low Power Pack red warning flash code telling the operator that the remaining range is limited, and the power pack should be recharged soon. This is equivalent to a “low fuel” warning-light on a gasoline-powered vehicle.

The Low Power Pack warning will flash continuously until either (1) the motorcycle is turned off, or (2) the throttle control is disabled for any reason, which includes the power pack being completely empty. The Low Power Pack warning will flash and you can still ride the motorcycle, but the remaining range is limited. It means: “Stop at a destination and charge-up.”


The solution is to recharge the power pack. If the Low Power Pack warning beep still sounds after the power pack has charged for two hours, contact your dealer. Your power pack may need to be repaired or replaced.

### Other Error-Flash Patterns

If the BMS in your power pack produces an error-code which is not described in Understanding BMS Flash Code Patterns, then the power pack has encountered a serious internal hardware problem and must be repaired or replaced by a dealer.

### BMS Error Beep Pattern

It is possible to encounter the power ON self-test result error-beeps from a badly malfunctioning or damaged power pack. If so, the user should return the power pack to Zero for repair or replacement.

| PATTERN |  | WHEN            | MEANING                                    |
|---------|--|-----------------|--|
| 3 Long  |  | Pwr-on<br>M-cmd | Fail<br>Power ON<br>self-test/<br>Mfg.test |

## Safety Interlocks

If the BMS detects a serious internal fault, it can take either or both of two actions to prevent damage to the power pack:

1. **Throttle Disable** The BMS will disable the throttle if the power pack is empty, or if the BMS detects certain serious internal problems. You cannot ride the motorcycle until the problem is resolved.
2. **Charger Disable** The BMS will prevent charging if it detects certain serious internal problems, even if the power pack is connected to a charger and plugged in to AC power. The power pack cannot be charged until the problem is resolved.

### The Throttle Disable Interlock

The BMS communicates with the main motorcycle control module. The BMS can send a signal to the main motorcycle controller requesting that the throttle control on the motorcycle be disabled. When the throttle control is disabled, the motor will not deliver power to the rear wheel, and the motorcycle cannot be ridden.

If the throttle is disabled while riding, the motorcycle will cease to provide power, and the operator must pull over to a safe location.

All conditions which would cause the BMS to disable the throttle are also signaled by a flash code pattern at self-test. If you suspect that the BMS has disabled the throttle control on your motorcycle, turn the key switch OFF and back ON again to enter self-test mode. The flash code pattern from the BMS will report any of the error conditions which would cause the BMS to disable the throttle.

Each of these conditions, the associated self-test flash code pattern, and the suggested remedies, are discussed in Understanding BMS Flash Code Patterns on page 6-4.

- Power Pack Empty
- Too Hot
- Power Pack Unbalanced

## **The Charger Disable Interlock**

When the charger is attached and plugged in to AC power, the BMS communicates with the charger. The BMS can send a signal to the charger requesting that charging terminate immediately. When the charger is disabled, the indicator lights on the charger will show that charging has stopped.

There are two conditions that will cause the BMS to disable charging. One of these conditions is also reported by a self-test result beep pattern; the other is not.

### **Too Hot**

If the BMS detects high internal power pack temperatures, it will both disable the throttle and prevent charging. This condition is also reported by a flash code pattern after BMS self-test when the motorcycle is turned ON. See Understanding BMS Flash Code Patterns on page 6-4 for a description of the Too Hot error beep and the solutions.

## **Power Pack Full (High Pack Voltage)**

If the BMS detects that the power pack is already full, it will disable further charging to prevent damage to the power pack.

This is not an error-condition; it is the result of a successful charging cycle. There is no self-test error beep which reports this condition.











During an ordinary charging cycle, when the cells are balanced, the charger (not the BMS) will sense that the power pack is full and terminate the charging cycle with a “green light.” The BMS does have a redundant back-up mechanism to prevent overcharging of the power pack. If the charger fails to terminate a charging cycle when the power pack is full, the BMS will terminate charging itself to prevent damage.

## **Instrument Panel**

### **System Warning Indicator**

If a fault has been detected, count the number of times the red LED flashes. See the tables on pages 6-12 and 6-13 for possible causes and solutions to the issue.



| NUMBER OF RED FLASHES |   | CAUSE  | SOLUTION  |
|-----------------------|---|--|---|
| 1                     |  | Motorcycle disabled due to motor stop switch or kickstand switch | Motor stop switch is in the OFF position. Press the motor stop switch ON button, or kickstand is down. Raise kickstand. |
| 2                     |  | Self-Test Failed   | Contact Zero or your dealer.  |
| 3                     |  | Charger Connected  | Unplug charger.   |
| 4                     |  | High Throttle Disable  | Throttle is ON or throttle/connection is bad<br>Verify throttle action and/or check connection.                         |
| 5                     |  | Pre-Charge Failed  | Could not pre-charge motor controller.<br>Contact your dealer.  |
| 6                     |  | Low Power Pack Disable   | Charge power pack before riding.  |
| 7                     |  | Contactor Error  | Contact Zero or your dealer.  |
| 8                     |  | Controller Area Network (CAN) Error                              | Contact Zero or your dealer.  |
| 9                     |  | Battery Management System (BMS)<br>Throttle Disable              | Contact Zero or your dealer.  |
| 10                    |  | Throttle Out of Range  | Bad throttle or connections. Verify throttle action and/or check connection.  |

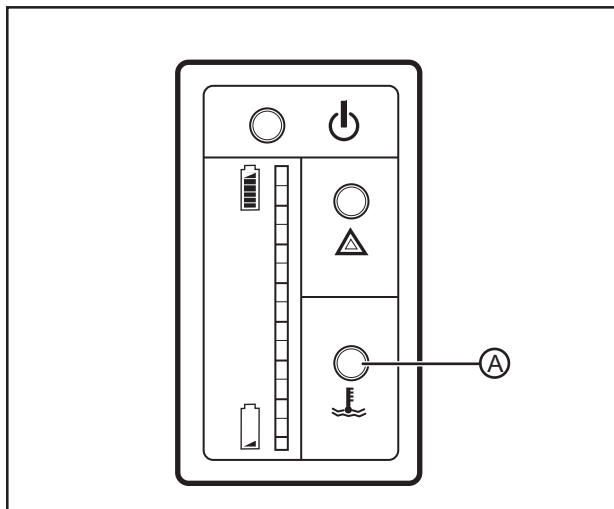
| NUMBER OF RED FLASHES |                     | CAUSE                                 | SOLUTION  |
|-----------------------|---------------------|---------------------------------------|---|
| 11                    | ■ ■ ■ ■             | Motor Temperature Sensor Out of Range | Bad motor temperature sensor or connections. Replace temperature sensor and/or check connections.             |
| 12                    | ■ ■ ■ ■ ■ ■         | MBB Voltage Error                     | Contact Zero or your dealer.  |
| 13                    | ■ ■ ■ ■ ■ ■ ■ ■     | Board Temperature Warning             | Board may have overheated. Let the motorcycle cool down.  |
| 14                    | ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ | Current Sensor Error                  | Problem with current sensor or connection. Contact your dealer.   |
| 15                    | ■ ■ ■ ■ ■ ■         | Board Temperature Sensor Out of Range | Problem sensing temperature of board. Contact your dealer.  |
| 16                    | ■ ■ ■ ■ ■ ■ ■ ■     | High Current Disable                  | Turn the key switch OFF and ON. If the problem persists contact Zero or your dealer.                          |
| 17                    | ■ ■ ■ ■ ■ ■ ■ ■     | Temperature Protection Error          | Turn the key switch OFF and allow to cool off. Then restart, if problem persists contact Zero or your dealer. |
| 18                    | ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ | Throttle Output Error                 | Turn the key switch OFF and ON. If the problem persists contact Zero or your dealer.                          |
| 19                    | ■ ■ ■ ■ ■ ■ ■       | Kickstand Error                       | Bad kickstand switch or connection. Replace the kickstand switch and/or check connections.                    |
| 20                    | ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ | Miscellaneous Error                   | Contact Zero or your dealer.  |

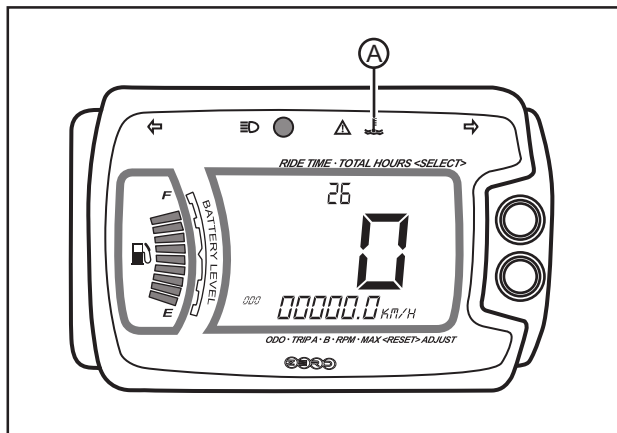
## Temperature Indicator

| PATTERN             | MEANING   |
|---------------------|---|
| Slow Constant Flash | <ul style="list-style-type: none"><li>• Motor Temperature Warning Stage 1</li><li>• Power Pack Temperature Warning Stage 1</li><li>• Motor Controller Temperature Warning Stage 1</li></ul> |
| Indicator Always ON | <ul style="list-style-type: none"><li>• Motor Temperature Warning Stage 2</li><li>• Power Pack Temperature Warning Stage 2</li><li>• Motor Controller Temperature Warning Stage 2</li></ul> |

The Zero is equipped with temperature sensors that sense the temperature of the motor, power pack, and motor controller. The temperature indicator will flash in the unlikely event that you exceed the motorcycle's performance capabilities; it will provide you with an instrument panel illumination warning indicator (A).

MX - Dirt





### Stage 1

The motor, power pack, or motor controller begins to reach an undesirable temperature:

- A slow flash is clearly seen on the warning indicator.

- You can continue to ride without performance interruptions.
- You should reduce speed - this will lower power output and the motor temperature to eliminate the flashing warning indicator.

### Stage 2

If the motor, power pack, or motor controller continues to heat up:

- A fast blink is clearly seen on the warning indicator.
- The power to the motor begins to drop off, resulting in a noticeable reduction in available torque. This provides tactile feedback to the rider and also helps prevent the component from heating further. As the component cools again, full-power will be restored.
- At this point it is strongly recommended that you reduce your speed and consider finding a safe area to stop.
- You may still have time to back off the throttle to reduce heat. This will restore full power to the motor and eliminate the warning indicator.

## **Motor Temperature Disabled**

This warning indicator is on solid. This is an indication that the motor temperature sensor is not detected. Check the connections to the temperature sensor. The connection is located near the top of the motor. If a problem is not found, contact your dealer.

## **High Power Pack Temperature**

If you see two fast blinks followed by two fast blinks this indicates you need to let the power pack cool in a well-ventilated location. If the high power pack temperature still exists after the power pack has had time to cool off, contact your dealer.

The next stage is the temperature warning indicator is blinking rapidly, please pull over and allow the power pack to cool off.

## General Troubleshooting

| SYMPTOM                     | POTENTIAL CAUSE  | POTENTIAL SOLUTION  |
|-----------------------------|--|---|
| Motorcycle does not turn on | Power pack not charged<br>Key not properly engaged<br>Motor Stop Switch turned OFF<br>Power pack not connected<br>Fault code set | Charge power pack.<br>Recheck key in ignition, turn OFF/ON again.<br>Press the motor stop switch ON button.<br>Connect power pack.<br>See Charger Fault Code chart on page 6-12 and 6-13 or see Understanding BMS Flash Code Patterns on pages 6-4 through 6-7. |
| Charger not working         | A/C power missing<br>Fault code set  | Check A/C outlet for power, A/C source check fuse/voltage.<br>See Charger Fault Code chart on pages 6-12 and 6-13 or see Understanding BMS Flash Code Patterns on pages 6-4 through 6-7.  |
| Handlebars wobbly (shimmy)  | Incorrect tire pressure  | Inflate to correct tire pressure. See page 5-9.   |
|                             | Deformed front tire  | Replace/balance front tire with the same tire supplied from Zero.   |
|                             | Bald tire (excess wear)  | Replace/balance tire with the same tire supplied from Zero.   |
|                             | Loose headset bearings   | Inspect the headset for wear or damage. Tighten the headset bearing pre-load.   |

## NOTES

This image shows a blank sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

## Customer Assistance

Zero Motorcycles Inc. can be contacted via the contact methods listed below. Please have available the following, as they are essential to effectively and efficiently answer your questions or resolve your concerns.

- Owner's name and address
- Owner's telephone number
- Production Identification Number (PIN) or Vehicle Identification Number (VIN)
- Date of purchase
- Power pack serial number

An owner information chart is provided on page 1-3 to record this information.

Zero Motorcycles  
170 Technology Circle  
Scotts Valley, California 95066  
USA

Phone:  
(888) 786-9376  
Monday-Friday  
8am to 5pm Pacific Time

E-mail:  
[support@zeromotorcycles.com](mailto:support@zeromotorcycles.com)  
24 hours

For 24 hour updates and additional information about your motorcycle, visit the Owners Resources section of the Zero motorcycles website:  
[www.zeromotorcycles.com/owner-resources/](http://www.zeromotorcycles.com/owner-resources/)



## Warranty Information

### Zero Motorcycles Warranties

#### XU:

Zero Motorcycles Inc. expressly warrants all 2012 Zero manufactured XU models from defects in material and workmanship to the original owner, under normal operating conditions and according to proper use, for 2 years (unlimited miles) from the "In Service Date," which is the date your Zero Motorcycle dealer performed a Pre-Delivery Inspection (P.D.I.) on the Zero.

These warranties are transferrable subject to a \$50 processing fee and a new registration card to subsequent owners.

#### Standard Warranty

The standard warranty covers parts, standard shipping and labor for all major components, defined herein as including the motor, motor controller, power pack, frame, swingarm, fork, rear shock, brake assemblies, wheels, and electrical sub-assemblies.

This warranty covers Zero manufactured accessories installed at the time of purchase.

#### MX/X:

Zero Motorcycles Inc. expressly warrants all 2012 MX and X models from defects in material and workmanship to the original owner under normal operating conditions and according to proper use for 1 year (unlimited miles) from the "In Service Date," which is the date your Zero Motorcycle dealer performed a Pre-Delivery Inspection (P.D.I.) on the Zero. The power pack warranty is 2 years (unlimited miles).

These warranties are transferrable subject to a \$50 processing fee and a new registration card to subsequent owners.

#### Standard Warranty

The standard warranty covers parts, standard shipping, and labor for all major components defined herein as including the motor, motor controller, power pack (2 years - unlimited miles), frame, swingarm, fork, rear shock, brake assemblies, wheels, and electrical sub-assemblies. This warranty covers Zero manufactured accessories installed at the time of purchase.

## Standard Warranty Exclusions

This warranty does not apply to tire wear, chain or sprocket condition, brake pads or rotors, fork seals, grips, foot pegs, the seat, or any other parts subject to normal wear and tear. Wheels are excluded from this standard warranty on off-road bikes once they have been ridden.

This standard warranty excludes aftermarket accessory kits which may be subject to their own warranties.

This standard warranty excludes parts and components damaged by use or operation under abnormal circumstances or contrary to the requirements described in the owner's manual, or damaged by improper use or accidents.

Racing or competitive use voids this warranty.

Modifications or alterations to major components of the manufacturer's original product or its sub-components void all warranties. Zero Motorcycles Inc. assumes no liability for any misuse or improper operation of Zero motorcycles.

Under this limited warranty and liability agreement, Zero Motorcycles Inc. shall have no obligation and the purchaser shall have no remedy against Zero Motorcycles Inc. and its officers and/or agents for any damages, including but not limited to incidental, consequential, special, punitive damages arising from direct or indirect injury to person or property, or any other loss, whether or not occasioned by negligence or otherwise on the part of Zero Motorcycles Inc.

## Disclaimers Applicable to Standard Warranty

The purchaser acknowledges that there is an inherent risk in the operation of Zero motorcycles and all other Zero Motorcycles Inc. products, and herewith assumes liability for any injury arising from all operation of any Zero Motorcycles Inc. product. The original registered owner or subsequent registered transferee as documented on the Zero motorcycle warranty registration form will indemnify and hold Zero Motorcycles Inc. harmless and take full responsibility for conveying all safety warnings, instructions and limited warranty if the unit is sold, loaned or otherwise transferred to other persons, and will indemnify Zero Motorcycles Inc. from any claims against it for original owner's failure to do so.

Zero Motorcycles Inc. does not assume or authorize anyone to assume for them any other obligation. Some states, provinces, or countries do not allow limitations on how long an implied warranty lasts, so the above limitation may not apply to you.

Zero Motorcycles Inc. assumes no responsibility for incidental, consequential or other damages including

but not limited to: expense of returning the Zero product to a certified service center, expense of delivering it back to the owner, mechanic's travel, time, communication charges, rental of a like product during the time the warranty service is being performed, travel, loss or damage to personal property, loss of revenue, loss of use of the product, loss of time, or inconvenience. Some states, provinces, or countries do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you.

Zero Motorcycles Inc. reserves the right to change or improve the design of any electric motorcycle product without assuming any obligation to modify any product previously manufactured.

These warranties give you specific legal rights, and you also have other rights, which vary from state to state, province to province, and country to country. These warranties apply to all Zero products manufactured by Zero Motorcycles Inc.

Normal operating conditions ***require routine care and maintenance by the purchaser*** of the Zero Motorcycles Inc. electric motorcycle and power pack.

## Proper Use

For the purposes of these warranties, “proper use” means only the use of a motorcycle in the manner intended for a single rider with proper safety equipment as described in the Owner’s Manual on safe and dry surfaces in accordance with local regulations. “Proper use” also means charging the Power Pack after each use and storing it in a fully charged state, or recharging it every 15 days or keeping it on the charger when in storage or out of regular use.

## Purchaser’s Responsibilities

Read and understand the Owner’s Manual and all product warnings before operating your Zero Motorcycles Inc. electric motorcycle. Serious injury or death may result from improper operation or failure to observe warnings and safety instructions on any motorized motorcycle or vehicle.

Submit the warranty registration card for your Zero motorcycle within the required time period as printed on the registration card.

Perform routine care and maintenance of your Zero Motorcycles Inc. electric motorcycle and power pack as detailed in the Owner’s Manual.

The rider is responsible for learning and obeying all federal, state, province, country, and local laws governing the operations of an electric motorcycle.

Always wear a helmet, goggles, appropriate boots and all other appropriate safety equipment when operating a motorcycle.

## Warranty Procedures

Warranty services may be obtained by contacting Zero Motorcycles Inc. at (888) 786-9376 or via e-mail at [support@zeromotorcycles.com](mailto:support@zeromotorcycles.com).

Service may also be available from a local Zero Motorcycles Certified Service Center please see the locator on [www.zeromotorcycles.com](http://www.zeromotorcycles.com) for the nearest location.

In any written or telephonic communication, please state the specific nature of and any circumstances leading to the problem. A service technician will contact you with specific instructions to ensure that you receive the best service for your motorcycle.

North America and Canada:

Zero Motorcycles Inc.  
170 Technology Circle  
Scotts Valley, CA 95066  
USA

Europe:

Zero Motorcycles BV  
Fluorietweg 12D  
Alkmaar, 1812 RR  
NL

(U.S. and International Patents and Trademarks  
Pending)

## Transfer Of Ownership And Warranty

When it comes time to sell your Zero motorcycle, please visit the Zero Motorcycles website and access the Owner Resources section to fill out the on-line transfer of ownership and warranty form. This must be performed to allow Zero Motorcycles the ability to contact the new owner in the unlikely event of a safety related issue. Use the URL address below or feel free to contact the Zero Motorcycles Customer Service department for assistance.

Phone:  
(888) 786-9376  
Monday-Friday  
8am to 5pm Pacific Time

E-mail:  
[support@zeromotorcycles.com](mailto:support@zeromotorcycles.com)

For 24 hour updates and additional information about your motorcycle, visit the Owner Resources section of Zero Motorcycles' website at:  
<http://www.zeromotorcycles.com/owner-resources/>

U.S. Manufacture:

Zero Motorcycles  
170 Technology Circle  
Scotts Valley, CA 95066.

All illustrations and specifications contained in this Owner's Manual are based on the latest product information available at the time of printing. Zero reserves the right to make changes at any time, without notice, in colors, materials, equipment, specifications and models.

Zero may, subject to legal requirements, determine the Model Year designations of its vehicles. The Model Year designation on any particular model may be longer or shorter than 12 months.

Some vehicles pictured may contain non-U.S. equipment. Some models may be shown with optional equipment.

While Zero Motorcycles makes all reasonable efforts to provide accurate information in this Owner's Manual, there is no guarantee or warranty of accuracy. Furthermore, we do not assume any liability for the accuracy of completeness of information presented.

This Owner's Manual shall not be used or relied upon as a substitute for information that is available from your Zero Motorcycles dealer. Further information can be obtained from your authorized Zero dealer or [Zeromotorcycles.com](http://Zeromotorcycles.com).

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## This image shows a blank sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

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