

Phoenix II Power System Owner's Manual

Welcome to the growing family of people who have discovered electric transportation! We care about you. When enjoying your vehicle powered by one of our Phoenix II power systems, be sure to ride safely, defensively, and within the limits of the law and your abilities. Always wear a helmet and eye protection, clothing and other safety gear as appropriate for the ride. Never ride while under the influence of alcohol or other medication. Know your bike, and know your personal limits.

Phoenix II owners: High-speed biking is similar to motorcycling. For your safety and enjoyment, we suggest you take a motorcycle safety course, either online or in a classroom. A web search will reveal a number of good choices of free material if you want a self-paced course. These classes teach awareness and defensive skills that could possibly save your life.

Your electric power system is designed and manufactured to be the best value in its class. We believe quality improvement is an ongoing process, so we continue to make investments in new and better technologies to broaden the appeal of electric alternatives. This also means that the specifications in this manual may be changed without notice.

This manual is designed to acquaint you with the operation, care, and maintenance of your power system, and to provide you with important safety information. Follow these instructions carefully for maximum performance and for your personal cycling safety and pleasure.

CUSTOMER SERVICE

Most sales or service issues should be resolved by the dealer from whom you purchased your system. If your problem is not resolved, call our service center at 325-227-6903.

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The History of Phoenix

In 2002, I was vacationing in Idaho and wanted to ride the new rails to trails paths and the Hiawatha trail in Montana. I didn't have a bike, and didn't have much interest in pedaling. Most of the people I saw on the trail were wearing special clothes, armed with water bottles and a variety of specialized bicycling equipment. Being more engineer than athlete, I decided there must be a way to see the sights without having to dawn a new set of clothes and depend on perspiration for survival. I decided to build an electric bike. To my surprise, when I started researching candidate parts, I discovered electric bikes already existed. I chose a Currie e-ride mountain bike and the fun began. In jeans and without any special equipment (except a basket for my dog), I was able to enjoy the views of Idaho and Montana without breaking a sweat.

After riding the trails – a lot – I discovered that a run to the grocery or restaurant could be made on my e-bike more easily than in my car. I wanted to share my discovery with as many people as I could, so I became an e-bike dealer and started an online retail operation. As time passed, I found my electric bike more and more useful and enjoyable, but as my reach extended into more populous towns, I discovered the displeasure of having cars whiz by my left shoulder as I rode along the right-hand edge of the road at bicycle speed. I could have bought a motorcycle and been done with it, but that's not what engineers do.. I decided again to build an electric bike. This time I borrowed from a marvelous machine I rode that blew me away – the Jackal, designed and built by Thunderstruck EV. I used a LashOut bike frame and spent 2 months designing, welding, breaking things – finding the weak spots the hard way and strengthening them. The resulting bike did 53 MPH in about 7 seconds, and appropriately became known as the Insane-a-cycle. With this electric bike – the only one of its kind in the world – I could traverse the entire town at the highest speed limits. I could ride with traffic at last.

I began trying to find a way to share this newfound freedom from the pump. After several false starts with a number of US importers of light electric vehicles, I gave up on US companies and began contacting Chinese manufacturers. Most were interested only in selling a product they already made – typically 180-250 watt hub motors on flimsy plastic bodies that look like small motorscooters. I finally found Crystalyte. They had designed a motor that would do the job, but our testing resulted in controller failures. In 2005, we finally arrived at dependable, powerful 36 volt 40 amp and 48 volt 40 amp controllers. We called these systems the Phoenix I 3640 and Phoenix I 4840, to which we have made improvements ever since. Some of our first customers have reported back, some with over 35,000 miles on their Phoenix I system, and counting! One customer reported that he sold his Phoenix I with 18,000 miles on it for more than what he paid new. Crystalyte systems seem to last forever when used as intended, which has been our goal since day 1. The Phoenix I system was unmatched in the industry, but we did NOT stop there. **Phoenix II** was born in late 2010, which now includes a much lighter weight motor, sensorless technology, and our Active Power Management Display - All with the same reliability and high power as Phoenix I! We are working with battery manufacturers to produce batteries with greater range and less weight. We are working with frame

designers and builders to produce the coolest, safest, most reliable electric bike ever built for the consumer market. We want you to be sold on electric power as a regular means of transportation, not a replacement for exercise. While you “can” pedal with **Phoenix II** systems, they are NOT pedal-assist. Most **Phoenix II** systems will power themselves without help from the rider, even up hills. Crystalyte systems we sell are designed to be a real alternative to your gas vehicle, the more miles you ride your Phoenix II, the more money you save!

Dave

How it Works

The major components of the system consist of a **battery pack**, a **controller with APM-Display**, a **throttle**, and a **hub motor**. The battery pack can be any type of battery that can supply the correct voltage and current required by **Phoenix II** system. All major components are connected to the controller, the “brain” of the system. The controller’s basic operation is similar to an electric light dimmer. It adjusts the amount of power going to the motor based on the throttle setting. *Brushless* hub motors are very efficient. Inside, there are three separate windings. Each winding is responsible for turning the wheel one-third of the way around. While there used to be sensors inside the motor to tell the controller which winding to apply power to, now the controller does all the work! Since there are no longer sensors inside the motor, there is nothing inside the motor that can be damaged, other than bearings! This allows the energy to be more focused, and changing windings is all electronic – done completely by the controller. There is no physical connection between the stationary part of the motor and the moving part of the motor, so there is no theoretical limit to their life. Brushed motors work differently - Power is transferred to the motor by brushes making contact with the moving part of the motor. This means that brushes must be replaced periodically, which can be expensive and can cause down-time. All **Phoenix II** motors are brushless, so the only fixed cost of owning one is battery replacement, and the occasional tire, tube, and brake replacement. Yes, you will go through more brake pads with a power system installed on a bike with rim brakes, but all **Phoenix II** motors are disc brake compatible as well! Disc brakes require less adjustment, and less brake pad replacements.

Kit Components

Hub Motor

Your **Phoenix II** motor is one of two types: Cruiser (5304), or Brute (5305). The decal on the motor indicates the model. **Phoenix II** motors are available in front and rear, on 20”, 24”, 26”, and 700C rims. Front **Phoenix II** motors weigh 10lbs, while rear **Phoenix II** motors weigh 16.25lbs. Rear **Phoenix II** motors are wider than the front **Phoenix II** motors, which adds weight, but also adds torque. For example, a rear **Phoenix II** Cruiser will have torque similar to a front **Phoenix II** Brute, but will still have the top speed of a Cruiser. **Phoenix II** motors can be powered from 36 volts to 72 volts. If you choose to experiment with other controller technologies, you must assure the motor does not overheat. A 4840 controller with 12AH SLA batteries barely tasks the **Phoenix II** motor under heavy load until the battery pack is dead. Heat has never been an issue with Phoenix or **Phoenix II** motors when using the controller we supply with them, and would only be an issue if using a controller that is not within the limits of the motor. We have a hard time believing anybody would need a



Phoenix II Rear Motor

more powerful system than a **Phoenix II**, but we know there are others like ourselves that like to push the limits.

Phoenix II motors are three-phase brushless motors with NO hall effect sensors, and must be powered by a controller designed for this type of “sensorless” motor. The controllers we offer have proven themselves to be the best and most reliable performers.

Controller

You have a choice of five controllers to power the **Phoenix II** motor, which you want to choose based on your performance requirements. As a general rule, voltage effects mainly your speed while current (amps) effects mainly your torque/acceleration. The higher your voltage, the faster you will go. A higher current will offer more torque or hill climbing capabilities. Something else to consider is that when you increase voltage, you increase range....assuming the other variables stay the same. Think about it as if you are increasing the size of your “gas tank” when you add batteries. So where a 4840 **Phoenix II** might travel 10 miles per charge, a 7240 **Phoenix II** would travel closer to 13 miles per charge.

Power Switch

Controllers have undergone revisions for type and position of switches. Early models had a tiny key switch for power, which we knew was one of the first things we had to improve. The next revision changed the tiny key switch to a large red button. In either case, turning the system off at the controller still allows a tiny amount of current to be drawn from the batteries. We then decided not only **would adding a keyswitch to the battery pack** circuit solve the small current draw issue, but it would also allow the customer some security when parking their vehicle. We have used the battery pack keyswitch ever since, and they work very well. Keep in mind that taking the key with you will NOT necessarily prevent someone from stealing your vehicle, but they would have a hard time getting away without any power to help carry all that weight!

Each component has undergone several revisions due to the improvements that we have made over the years. You may notice the motor and controller part numbers have a suffix identified by a letter. The very first revision had no suffix, and the 2nd revision suffix is “B”. Some revisions may have no visible differences externally, although you can be sure they are internally. The first revision controller for **Phoenix II** systems uses the suffix “E”, which indicates they are for “sensorless” motors. This information will be important if you ever need to order new parts. Your sensorless controller options are:

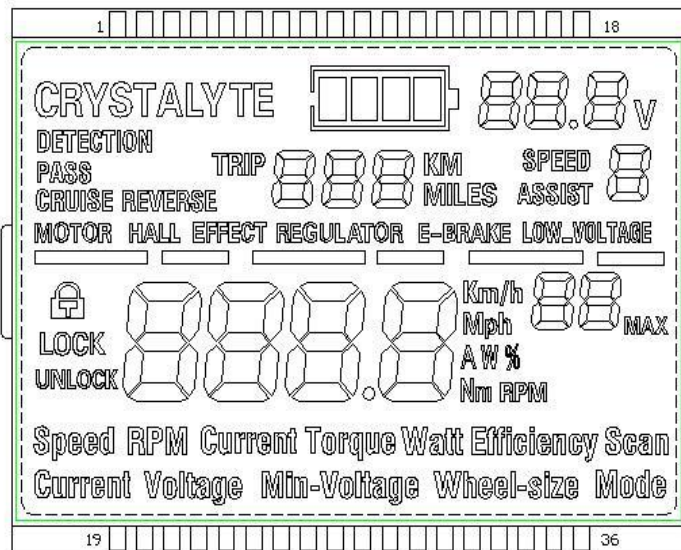
| <u>Part #</u> | <u>Volts</u> | <u>Amps</u> | <u>Watts</u> |
|---------------|--------------|-------------|--------------|
| X-CT3625E | 36V | 25A | 900W |
| X-CT3640E | 36V | 40A | 1440W |
| X-CT4825E | 48V | 25A | 1200W |
| X-CT4840E | 48V | 40A | 1920W |
| X-CT7240E | 72V | 40A | 2880W |



Battery Requirements for each controller:

1. The **3625** requires a **36 volt** power source that can produce **30A peak current** and **25A continuous current**.
2. The **3640** requires a **36 volt** power source that can produce **50A peak current** and **30A continuous current**.
3. The **4825** requires a **48 volt** power source that can produce **30A peak current** and **25A continuous current**.
4. The **4840** requires a **48 volt** power source that can produce **50A peak current** and **30A continuous current**.
5. The **7240** requires a **72 volt** power source that can produce **50A peak current** and **30A continuous current**.

APM-Display (Active Power Management Display)



Phoenix II kits come with an **APM-Display** unit, a very exciting feature! When purchased with a Phoenix II power system, your APM-Display will arrive already set with the proper parameters for your system. If any of these settings look incorrect based on your system, consult your vendor! **DO NOT change the following parameters** as it can cause permanent damage to your battery and other major components: **Voltage, Low Voltage Cutoff, and Current.**

Please read your separate APM-Display Owner's Manual for instructions, warnings, and other information.

Forward/Reverse Switch

All **Phoenix II** controllers include a **reverse plug** for trikes and four-wheelers. You must also have a **reverse switch** in order to use the reverse feature. Change of direction must be made when the wheel is stopped. **Phoenix II** controllers are “intelligent” enough to know when you are still moving, or stopped and able to switch to reverse. If reverse is activated while moving forward, your vehicle will NOT reverse until it has come to a complete stop. This prevents injury to the rider, and damage to the controllers.

Throttle

We offer a number of throttles. They are all compatible with our entire product line. If your throttle has a gauge, however, it must be the same voltage as your system to give a correct reading. When using the APM-Display unit, a non-lighted throttle
 If you have twist shifters on your bike, you will need to choose a thumb throttle.
 Otherwise, a half-twist or full twist may be used.



Thumb Throttle – Most commonly used, fits most vehicles. If using twist grip shifters, you must use the thumb throttle due to lack of space on your handlebars. Requires 1 inch of handlebar space.



Half-Twist Throttle – Twists like a motorcycle throttle, but only uses half the space of your handlebar, which leaves a stationary part of the handlebar to rest your hand on. The half twist throttle is great for bumpy terrain, where you need something stationary to rest your hand on so every bump doesn't turn into a twist of the throttle! This is recommended for those who do NOT have twist grip shifters. **Requires 2.8 inches of handlebar space.**

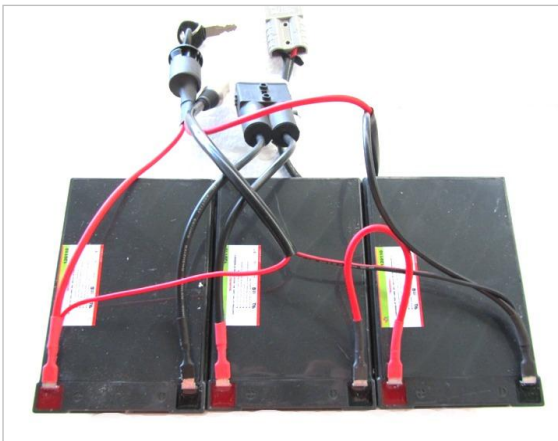


Full-Twist Throttle – Most like a motorcycle throttle, where it covers the entire right-handlebar. **Requires 4.5 inches of handlebar space.**

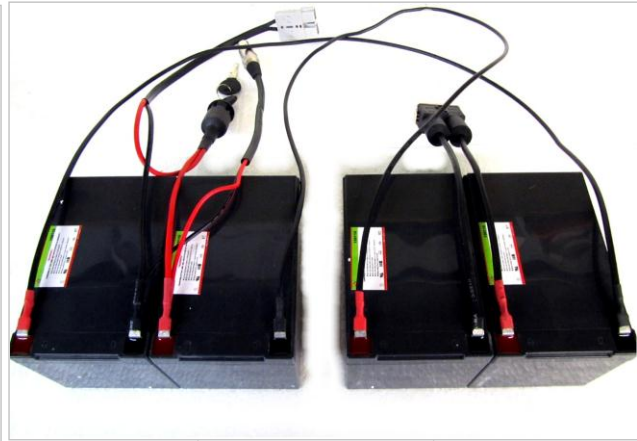
SLA Battery Wiring

Wire Set with Charger Port and Key Switch

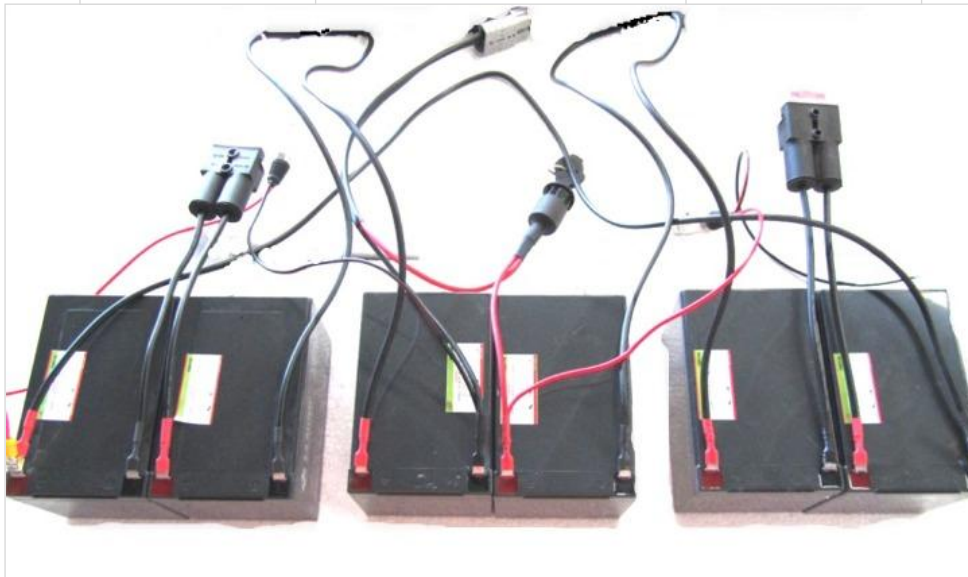
Depending on the store from which you purchase your system, your battery pack may already be wired for you. If not, you should use a voltmeter to make sure your connections are correct BEFORE plugging in the charger or controller. Permanent damage can result to wiring and other components if wired incorrectly. Components that are damaged due to incorrect wiring are not warranty related. Wire sets include a heavy-duty key switch, fuse holder, jumper wires, XLR charger port, and 50A Anderson connector to controller.



**36 Volt Series
Wiring**



**48 Volt Series
Wiring**



72 Volt Series Wiring – For use with Two 36 Volt Chargers

Mounting your Batteries

Different voltages require a different number of 12V batteries wired in series, which also means a different way to carry them for each voltage of kit. The following are the standard battery mounting systems we offer for each kit:

36V Kits – Include a Topeak slide-on bag and rack. Three batteries fit in the top of the bag, while fold-out panniers remain empty for other storage. Battery brackets “can” be used for 36V kits, but having 2 batteries on one side and 1 on the other can be unstable and unbalanced.



36V Standard Topeak Rack and Pannier Bag

48V Kits – Include our battery brackets and Topeak rack. Two batteries fit in each battery bracket on each side. Attaching the battery brackets to your rack and rear axle will keep the center of gravity low, and the center of balance favorable. If you prefer a bag and rack setup, just let us know.



48V Standard/72V Option B Battery brackets and Rack

72V Kits – We encourage you to research options, we have several options to offer ourselves. The weight and size of a 72V battery pack requires a little more of its mounting system. Here are the options we offer:



72V Option A Basket and Pannier Bag

- A. **Basket and bag with panniers** – This is the default mounting system you would receive with a 72V system. This is a typical one-size-fits-all mounting system, but is not the most visually appealing. This setup is somewhat bulky and top-heavy, but it works on about every frame out there.
- B. **Battery brackets and Rack** - This can be an even exchange for those who prefer this setup over option “A”. You mount the Topeak rack to your bike, and mount the battery brackets to the Topeak rack. You then put 2 batteries on each side, and 2 on top of the rack. You may add-on a pannier bag, and/or the semu-leather bags to contain the batteries and wiring, making a very clean installation, appearance, and well balanced ride!

Battery Brackets

The Battery Brackets are a one-size-fits-all mounting system when installed using our Topeak rack as the verticle support. However, the battery brackets can also be customized to fit anywhere on your frame! Just drill a couple holes in each bracket relative to where you want to attach them to your frame, it can be simple. This allows you to get creative without the help of a machine shop or welder. If your frame allows for it, you can install them in the triangular part of your frame, along the top bar, etc. The following are pictures of the battery brackets and semu-leather bags that fit into the battery brackets. The bags are an add-on item available with all kits using the battery bracket setup. The semu-leather bags do a great job of concealing all the batteries, wiring, etc.



Cruise Control with Brake Inhibit

If you purchase the cruise control option, you will have the ability to set a speed and release the throttle. Our cruise control works just like the one in your car. Turning the unit off by pressing the CRUISE button or engaging either brake will shut off the unit. The brake inhibit also prevents the throttle from operating.



Cruise Control



Brake Inhibits

Chargers

Complete kits include a battery charger of the correct type and voltage for the battery included with your system. All chargers we provide use XLR connectors, or more commonly known as “microphone plugs/jacks”. If you have more than one system, be sure to use the correct charger for that system. Use of a 48V charger on a 36V battery pack will “cook” the batteries, distorting their shape and destroying their capability to store power. Use of a 36V charger on a 48V battery pack will leave the batteries uncharged and could result in damage to the charger.

Charging times depend on the battery capacity (AH) and the current (Amp) rating of the charger. As a general rule, you can determine the amount of time it will take to charge a set of batteries by dividing the Amp Hour rating of your battery by the Amp rating of your charger, which equals your charge time (in hours). For example, to charge a 12AH battery pack with a 3A charger it should take approx. 4 hours ($12\text{AH} / 3\text{A} = 4$ hours).

The following SLA chargers are available either standard or as upgrades to the complete kits:

36V Complete Kits:

Part # - JJ36030 - 36V 3A Joule Charger – Standard with 36V complete kits. 4 hour recharge time.

Part # - 3610SRF - 36V 5A Soneil Charger – Available as upgrade by request. 2 hour recharge time.

48V Complete Kits:

Part # - JJ48020 - 48V 2A Joule Charger – Standard. 5-6 hour recharge time.

Part # - 48040SR - 48V 2A Soneil Charger – Available as upgrade by request. 5-6 hour recharge time.

Part # - JJ48040 - 48V 4A Joule Charger – Available as upgrade by request. 3 hour recharge time.

Part # - 4808SRF - 48V 3.5A Soneil Charger – Available as upgrade by request. 3 hour recharge time.

72V Complete Kits:

Part # - JJ36030 – Two of the 36V 3A Joule chargers – Standard. 4 hour recharge time. Recommended.

Part # - 7203SR - 72V 1.2A Soneil Charger – Available by request for 72V kits. 11 hour recharge time. Not recommended.

Available Chargers:

| | |
|--|--|
|  A black rectangular Joule Charger with a label that reads "Joule Charger" and "36 Volt 3 Amp". | <p>JJ36030 – Joule 36 Volt 3 Amp JJ48020 – Joule 48 Volt 2 Amp</p> |
|  A black rectangular Soneil Charger with a label that reads "Soneil" and "36 Volt 5 Amp". | <p>3610SRF – Soneil 36 Volt 5 Amp 4808SRF – Soneil 48 Volt 3.5 Amp</p> |
|  A black rectangular Soneil Charger with a label that reads "Soneil" and "36 Volt 2 Amp". | <p>3605S – Soneil 36 Volt 2 Amp 4804SR – Soneil 48 Volt 2 Amp 7203SR – Soneil 72 Volt 1.2 Amp</p> |
|  A black rectangular Joule Charger with a label that reads "Joule Charger" and "48 Volt 4 Amp". | <p>JJ48040 – 48 Volt 4 Amp</p> |
|  A cylindrical PlugXLR with a label that reads "PlugXLR" and "XLR Plug". | <p>PlugXLR - XLR Plug (Supplied with all chargers)</p> |

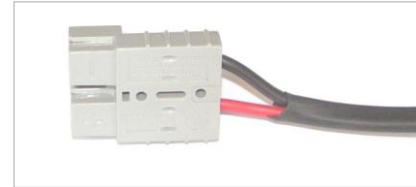
Connections

General

We have designed our systems so that it is easy to tell which connectors go together. Small connectors on the throttle, cruise control, and brake inhibits are indexed so that they will only go in to the correct mate, and only in the correct direction. The motor connection is the same. All components connect to the controller.

Battery pack

The battery pack uses an Anderson 50 Amp connector that mates with the same on the controller.



**Battery Connector – 50A
Anderson**

Motor

There are 3 wires leading to one connector on the motor. These wires are used by the controller to select the motor winding that will receive the power. Remember, the controller also senses the timing for **Phoenix II** motors, NOT hall effect sensors. All the work is done inside the controller, they are very intelligent devices!



Motor Power Plug



**Phoenix II 4840
Controller for
Sensorless Motors**

Controller

The “front” of the controller has all the matching connectors for the components. The “back” of the controller has an ON/OFF switch that can be used, but is unnecessary when using a battery pack wired with our wireset and keyswitch.

Tips

Tires

The higher the pressure, the less rolling resistance. Tires capable of higher pressure will give you better range and speed. The smoother the tire, the less rolling resistance. Slicks give you better range and speed than knobbies. Kevlar lining is a great feature to have on tires for your new Phoenix II system, anything that will lower the risk of a flat tire is recommended.

Fork Width

We have successfully installed Crystalyte motors on many bike frames. Dropout width for front motors is 100mm. Do NOT try to bend a front suspension fork, and do NOT try to bend aluminum or other alloys! We recommend steel forks with plenty of support around the dropouts, usually found on less expensive bikes. If you decide to use suspension forks, make sure you know the forks are durable. While Phoenix I motors were a little wide for suspension forks, we've had a **Phoenix II** motor on a front suspension front fork for about 300 miles with no problem, and no signs of stress or weakening. We still recommend non-suspension steal forks, but the risk seems to have decreased with using suspension. The risk of using aluminum is still the same...very high!

Torque

Torque is how we measure the force of twisting motion. Phoenix II systems have a lot of torque. If you apply throttle without first securely tightening the axle bolts, the motor will try to turn inside the dropouts, permanently damaging the wires coming out of the motor. Be sure the axle is secured very tightly to the dropouts. Always start your first ride slowly, watching the axle for any motion. If any motion occurs, stop immediately and fix it! Make sure you find the cause, don't just fix the result!

Batteries

Sealed lead acid batteries have remained the most reliable of all battery chemistries in high power applications. The acid is fully absorbed into a glass mat and the batteries are completely sealed. There is no maintenance to be done. You can, however, form habits that will greatly extend the life of your batteries. Always plug in the charger right after use. SLA batteries do not develop a memory, so you can charge them anytime, charge them fully, or charge them partially and ride again. But if you let them sit for weeks in a discharged state, they may never take a charge again. Take note: **your batteries produce enough energy to weld steel.** Be very careful not to short any leads. If you are at all unsure about wiring your batteries please consult a professional. You must always test with a voltmeter BEFORE connecting the controller or charger to the battery pack after wiring.

Lithium Batteries

When we have lithium batteries that pass our testing, there will be a separate manual with information specific to that battery. Although we've been testing for several years, until

recently we had not found a battery that would power **Phoenix II** systems without rapid failure. We now have a battery that is being field tested, and will be available soon after that is complete.

Controller Placement / Battery Portability

If you must take your batteries off your bike on a regular basis, it may make sense to mount your controller on the bike frame itself. The throttle, cruise, brake inhibits, and motor can remain wired to the controller. The only connection you will have to mess with is the one from the batteries to the controller. We use a heavy-duty, durable, large, easy-to-use connector from battery pack to controller that you will find much easier to deal with than the small ones.

Using other types of batteries

There are a number of battery chemistries available to choose from. Be sure your battery pack can produce a peak of 60 amps at the voltage of your controller (36V, 48V, or 72V), and continuous current of 40 amps. NiMH battery packs need to be temperature-regulated by some type of battery management system. High temperatures will result in damage to the batteries, therefore we do not recommend NiMH for **Phoenix II** systems.

Wheel Maintenance

Your Phoenix II kit includes a spoke wrench for 12g spokes. The 12g spokes we use are much thicker than regular bike spokes, and require a 12g spoke wrench for adjustment. While your new Phoenix II motor will be completely laced and trued when you receive it, new spokes do have a break-in period in which they loosen a bit. You'll need to check your spoke tension periodically throughout the first 200 miles, more frequently in the beginning and less frequently as you go. Eventually the spokes will stop loosening, and should stay where you put them. NOTE: Keeping your spokes tight is



**Spoke Wrench for
12g Spokes**

very important. As spokes get loose, they begin to move. Once they begin to move, they take quite a beating. You WILL break spokes if you do not keep them tight. Most bike shops charge an average of \$30-\$40 to true a wheel, which is worth every penny in prevention. If you are not comfortable truing your own wheel, we recommend you take it to your local bike shop to make sure it's done right.

Troubleshooting

| | |
|--|---|
| No power light on controller | Batteries supply the power. A fuse is installed during final assembly. Never bypass the fuse! The fuse is there to protect the batteries and the wiring. It will NOT protect the controller. A blown fuse is almost always an indicator of a bad controller or something wrong with the wiring. If you blow a fuse, check the wiring for missing insulation. If the wiring is correct, replace the fuse with one the same size and rating. If the replacement fuse blows immediately upon turning on power, the controller is probably bad and must be repaired or replaced. |
| Axle turns in dropout | Axle nuts not tight enough, or dropouts were not steal, and not able to support the torque of the axle. If this happens, it will happen on your first ride, and most likely upon your first start from a dead stop. Note: Damage from this problem is NOT a manufacturing defect covered by your warranty, so please start slowly until you are confident! If going slow enough when it happens, you can quickly release the throttle without having done any damage to the wires. Make sure the dropouts have not bent out or damaged, as the axle will spin again regardless of how tight the nuts are. |
| Short range | Batteries not fully charged, batteries weak. Test batteries individually with voltmeter. If one is more than 1V different than the others, replace it. A more thorough test is to use a load tester. Most battery shops will test your batteries. |
| Low power | Batteries not charged. If using a chemistry other than SLA, your battery may have an issue. Please contact your battery supplier. |
| Stops then restarts 5-10 minutes later | Controller overheating. Be sure batteries are good and that the controller is positioned where it can get air for cooling. |
| Controller overheats | Revision E and above controllers will even run a shorted motor without destroying themselves. To test for a shorted winding, use an ohmmeter or continuity tester. You should show a short from each of the three motor windings to the others, and you should see an open from each motor winding to the axle. If your results are any different, call us. |

Safety Checklist

For the safest and best performance of your Crystalyte conversion kit, these steps should be taken before each ride when new, and periodically thereafter:

- Check battery mounting system to make sure it is tightly secured to the vehicle.
- Check bag for tears or rips. Potholes, or other rough terrain can lead to bag damage due to the weight of the batteries and friction.
- Check ALL nuts and bolts on the bike. This includes both wheels, the battery rack, brake system, etc. If the nuts are not tight on the electric wheel, the axle can spin in the dropouts leaving broken wires and damaged forks. These nuts must be very tight to assure the proper performance. However, please use judgement and do not over-tighten, as that could cause damage to the threads which could render your motor useless. Damage to axle threads is not covered under your manufacturer's defect warranty.
- **Check spokes on both wheels.** The electric wheel requires more attention due to the torque and weight of the motor. Spoke and wheel maintenance is part of normal bicycle maintenance procedure. If you think the spokes are not tight enough, you are probably right. Please do not take chances. The spokes should all have the same tension. To check the tension, you can "pluck" the spoke like a guitar string, and you should hear very close to the same tone on each spoke.
- Check the adjustments of your brakes. Traveling at electric-powered speeds, properly adjusted brakes are a MUST! Consult your bike owner's manual or a professional for proper adjustment procedure.
- Check the pressure in your tires. The required pressure can be found on the sidewall of the tire. Tires lose an average of 2-3 PSI per week. Low pressure will cause sidewalls to collapse, and that is how most blowouts occur. When filling a tire with little pressure in it, make sure it is seated properly on the rim. There is a bead, or line, that goes around the edge of the tire's sidewall just above where it meets the rim. That line must be even with the rim for its entire circumference on both sides. If the tire is not seated properly, the tube will blow itself out between the rim and the sidewall of the tire and burst. Tires aired to their full recommended pressure create less rolling resistance, increasing speed and range.
- When riding at night, we strongly recommend the use of a headlight and rear light. A bike is much harder to see at night than a car, so extra precautions are necessary. One way to reduce your chances of being cut off, or side clipped by a vehicle is to use either an air horn, or a loud enough device that will make drivers aware of your presence. We recommend a motorcycle safety course. They teach very useful skills and tips that can be applied when riding a high speed bike.
- Examine welds and frame members for cracks or evidence of tearing.

Periodic Electrical Checks

- Check all electrical connections making sure that they are all tight. Bad contact means energy is wasted as heat, which can cause a breakdown of wire insulation. Any wire with melted insulation indicates a poor connection nearby. Disconnect the batteries and do not operate if insulation is melted or wire is exposed. Replace with 10 gauge wire and .25 terminals or call our service center for replacement wiring.
- Make sure the battery terminals are not exposed. Things like charger ports can end up across both terminals creating a short circuit, which may ruin 1 or more batteries.

FAQ's

Q. Is my Phoenix II system “steet legal”?

A. In most states, anything over 750W is considered an off-road vehicle. It is very unfortunate, as 750W is NOT going to be a real replacement for your gas vehicle! We believe these laws will become more electric-friendly as time goes on, and as electric transportation becomes more and more popular. Just like with dirt bikes or ATV's, it is the rider's responsibility to practice safe riding skills and to be aware of their state laws.

Q. How long will my Phoenix II system last?

A. Theoretically...Forever! When used as intended, Phoenix II systems should last forever, with the obvious exception of battery replacement. We have Phoenix I systems with over 35,000 miles on them and counting! One customer called to order his Phoenix II after selling his Phoenix I with 18,000 miles on it....He sold it for more than he paid new! We wouldn't expect that to happen every time, although it is possible.

Q. What are the benefits of a Phoenix II system over a gas vehicle?

A. There are many benefits to riding an electric bike over driving your gas vehicle. Some of these benefits include paying about a penny per mile to recharge, free parking at your downtown office building, riding through traffic jams (safely), and just enjoying the wind in your face without the noise or smell of fumes to go with it! There's almost nothing more satisfying than powering past an avid cyclist on your Phoenix II without pedaling, and without breaking a sweat! Curious watchers will want to know what you are riding, so don't be surprised when you attract a crowd!

Q. If I start with one battery chemistry, can I switch to another battery chemistry later without having to purchase a new power system?

A. Yes! Any battery that is the correct voltage, and can supply 40A continuous will work with your Phoenix II system. You can be sure if we supply a battery for Phoenix II, it will be capable. If sourcing your battery elsewhere, we recommend doing research on forums to find reputable sources.

Q. What if I'm not happy with the system I purchased?

A. We want you to be satisfied with your purchase, even 10 years from now. If you receive your system and find that it is too powerful, not powerful enough, or just not what you had expected, contact the dealer from whom you purchased your system in order to make an exchange, return, etc. Please note that each distributor may have their own exchange/return policies, so please read the exchange/return policies from whom you purchase your system. Nobody likes surprises, so we encourage all customers to do thorough research and ask any questions they may have prior to their purchase.

Etcetera

Disclaimers

This publication is **not** a substitute for a bicycle mechanic. **If you have any doubt about the safety of your bike, or if you doubt your ability to assemble it safely, take it to a bicycle shop now.** Charges are usually minimal to assemble and adjust a new bike, and your safety is well worth the money.

Truing wheels (keeping wobble out of wheels) is usually the most difficult maintenance challenge for cyclists. There are a number of good online "How To" resources for every type of bicycle maintenance, but many prefer to have their bike tuned up periodically by a professional. The electrical system and motor require no maintenance. *See: How To Video for "Wheel Truing" on www.electricrider.com.*

We have tried to be 100% accurate in the development of this guide, but we are human, subject to making mistakes, and cannot guarantee the absolute correctness or completeness of this guide. If you have any questions or concerns not covered by this guide, you should contact your Dealer.

Warranty

We have engineered our systems for maintenance and trouble-free operation. We test every system we ship, so we know it works before it gets into your hands. We also realize manufacturing defects do occur. Electronic component defects usually show up within the first two weeks of use. We stand behind our systems and will cover all manufacturing defects by replacing failed parts. We will not cover abuse. That is, we expect our customers to realize their light electric vehicles have limits. Most of the same kinds of rules apply to electric vehicles as gas-powered vehicles. You can't hold the throttle and brake at the same time for long or something is going to break. In the case of a car, it will probably be the transmission. In the case of an electric vehicle, it will probably be the controller. Several of our customers have over 30,000 miles on their Phoenix I systems. Driven responsibly, you can expect the same from your **Phoenix II** system!

For 90 days from date of purchase, we will replace any defective part of your Crystalyte power system. The warranty extends to 180 days for the motor, batteries and APM-Display. It extends to 1 year for the throttle, cruise control, and most chargers. Here's how it works: Contact your dealer or call EV Depot at 325-227-6903. Our technicians will listen to the symptoms you describe and ask you to ship the defect to us. We will repair or replace your unit and ship it back to you. Be sure to save your tracking number or postal confirmation number in case it doesn't arrive at EV Depot.

As you would expect, abuse of the system is not a manufacturing defect and is not covered under warranty. That includes increasing the voltage over the specification of the controller or motor. Over-volting a controller WILL blow it. Every time. Don't do it. Running the motor without it being securely tightened to the frame will cause the axle to turn in the dropouts, permanently damaging the wires coming out of the motor. This type of failure is not the result of a manufacturing defect and is not covered by warranty. Batteries that are equally worn are also not a manufacturing defect. If you recharge twice each day, you can expect to deplete a set of SLA batteries in approximately 6 months. That's equal to about 3,000 miles with our standard **Phoenix II** 4840 system with 12AH batteries, as a general reference.

Upgrades, Parts, and Accessories

Many of our Authorized Dealers stock a number of parts and accessories for electric and pedal bikes. Many offer upgrades and accessories to make your ride more comfortable. From faster chargers to speedometers to lights, they will try to satisfy your electric transportation needs.

Phoenix II systems are manufactured for and distributed in the U.S. by EV Depot. EV Depot supplies Independent Bike Dealers (Bike Shops), EV specialty stores, and online resellers. Consumers should contact their local bike shop or other retail outlet to purchase, if one is available.