

Electric Bicycle Hub Motor Conversion Home Assembly Guide

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Overview

This guide will take you from the boxes to your first ride. We assume your dealer has not performed any pre-assembly, but some dealers do much of the work for you. They may have packaged your system differently, might have performed part of the assembly, and might have included accessories such as a third-party speedometer or light set. Those items should have their own documentation. This guide covers installation and assembly of the equipment supplied by EV Depot with your hub motor system.

Your safety

If you are not confident of your ability to assemble a safe, properly adjusted bike, please take it to a bike shop now along with these instructions. The charge is minimal (\$35-\$60) and it will take a professional less than an hour to do the job correctly. If you cannot assemble a battery pack per these instructions, you must order a pre-wired kit.

We have prepared these instructions to make the installation of your hub motor conversion kit as fast and worry-free as possible. If you are not confident in your ability to assemble a safe, properly adjusted bike, please take it to a bike shop now, along with these instructions.

Required tools

- Scissors or wire snips
- Crescent or 17mm wrench
- 11/32" wrench
- Phillips-head screwdriver
- 3mm hex wrench



Unpack

Open the boxes and identify all the parts with the Kit Contents list below.

Kit Contents

Hub Motor laced to Wheel
Throttle

Wire Set with Charger Port and Key
Switch

Fuse Holder with Fuse

Battery Charger

Bag

Controller

Cruise Control with Brake Inhibits
(Standard with Phoenix, optional on
RoadRunner and Sparrow)

Jumper wires

Batteries

Rack or Basket

Zip Ties

Install the Tire

1. Remove the original front wheel from your bike.
2. From this wheel remove the tire and tube for use on your new Electric Wheel.
3. Push the tire and tube, starting with the valve, onto the rim, one side at a time, being careful not to pinch the tube.
4. Inflate to about 5 lbs pressure and check to see that the tire is evenly seated all the way around the rim on both sides. Inflate to 20 lbs pressure and repeat.
5. Inflate to the full pressure specified on the sidewall of your tire.



About 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.

Install the Wheel

6. If you don't have a bike stand, turn the bike upside down and rest it on the seat and handlebars. Use wood blocks or other material to protect the seat and any accessories on the handlebars.
7. Make sure the front brake arms are out of the way so the tire on your new wheel will mount bypass them easily. Some brakes require that you loosen the cable. Others have a quick-release for the cable.

8. When correctly mounted, the wires coming from a brushless (RoadRunner and Phoenix) motor will exit on the left-hand side of the bike. For Sparrow, the wires will exit on the right-hand side of the bike.
9. Before mounting the wheel on the frame, observe these two dimensions:
 - a. Fork width
 - b. Dropout Diameter

About Fork Width

We have successfully installed hub motors on many bike frames. If you do not have front suspension, you can use a tool as simple as a threaded stud and bolts to spread the forks. Turn the bolts on each side evenly, switching from left to right, spreading the fork to the necessary width. Do NOT try to bend a front suspension fork, and do NOT try to bend aluminum! For Phoenix systems, we recommend steel forks with large dropouts, usually found on less expensive bikes.

About Dropout Diameter

If necessary, use a die grinder to enlarge dropouts to the 10mm diameter of the axle. Any means of filing can be employed. The fit should be snug. For Phoenix systems, we recommend steel forks with large dropouts, usually found on less expensive bikes.

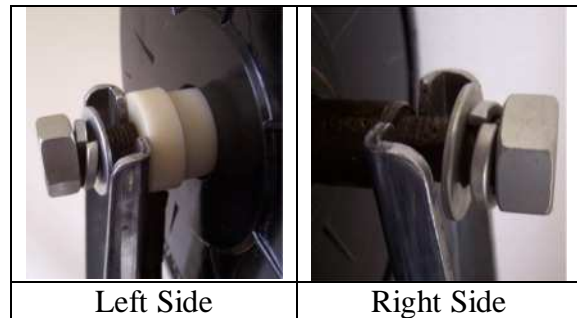
10. Put the wheel onto the frame, making sure that the channel through which the wires run faces downward (when the bike is upright.) This will help protect it from rain.



The channel of the axle should face downward to help keep water out. Make a loop of wire that extends below the axle so water will drop off the wire rather than into the channel.

11. If you have a rear motor, we supply two extra washers. One or both of these can be used as a spacer between the dropout and freewheel (gears) if the frame rubs the gears.

12. Observe the positions of the washers and nut on each side of the motor. The sequence, regardless of the motor type, is dropout, flat washer, lock washer, then nut as shown.
13. Tighten the axle bolts with the crescent or 17mm wrench. They need to be tight enough to prevent the motor from spinning the axle with it. Please note that damaged caused by the bolts not being tight enough is not a manufacturing defect and is not covered by your warranty. Please tighten the bolts!

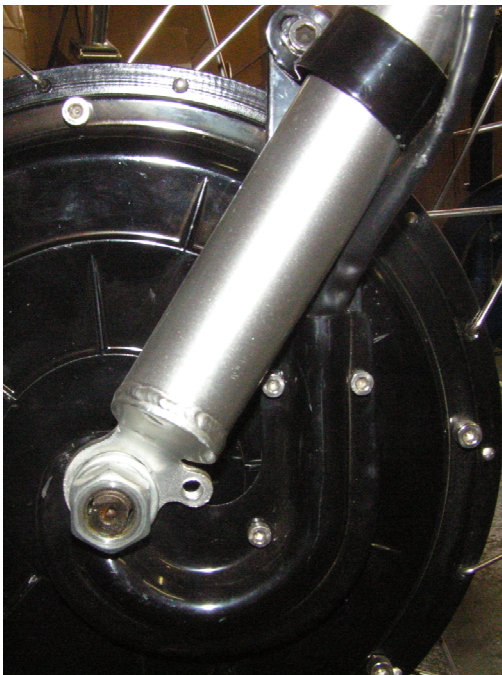


About Torque

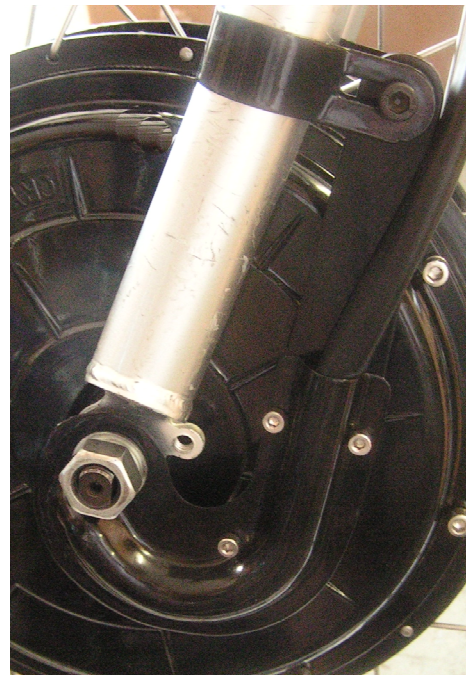
Torque is twisting motion. If you apply throttle without first securely tightening the axle bolts, the motor will try to turn inside the dropouts, permanently damaging the wires coming out of the motor. Be sure the axle is very tightly secured to the dropouts. Phoenix front wheel motors also have a torque arm.

Phoenix Front Wheel Torque Arm

The Phoenix R1 motor torque arm is attached to the motor and goes inside the front fork. The R2 motor torque arm is a separate piece and goes outside the fork.



Phoenix R1 Torque Arm



Phoenix R2 Torque Arm

14. Re-install and adjust the brakes. Chances are good that the new rim and the old one aren't exactly the same, so adjust the shoes so that they engage the rim with full contact. Adjust the cable for just enough free-play to keep the shoes off the

wheel during rotation. Remember, you will be asking more from your brakes when riding at electric bike speeds.

Install the Rack

15. Install the rack. It's a little different for each bike, but generally you will use the axle for the lower support and the seat clamp for the upper support. It may be necessary to bend or grind a little off the upper supports of the rack to fit some bikes. For the rack you will need a Phillips-head screwdriver and an 11/32" or crescent wrench.



Mount the Controller

16. Most controllers will operate just fine if stored in the cargo bag with the batteries. However, the larger systems such as the Phoenix may need air flow to stay cool. If your controller shuts down from thermal overload, let it cool for a few minutes. For external mounting you can secure the controller to your bike frame using zip-ties, or secure it on top of your cargo bag using the attached bungee.
TIP: If you want to remove your battery pack for charging, it is best to mount the controller on the bike frame. Doing this will allow you to leave throttle, motor, and optional cruise control with inhibits connected to the controller as a part of the bike. To remove the battery pack, you only have to disconnect one connector from controller to batteries.

Mount the Throttle

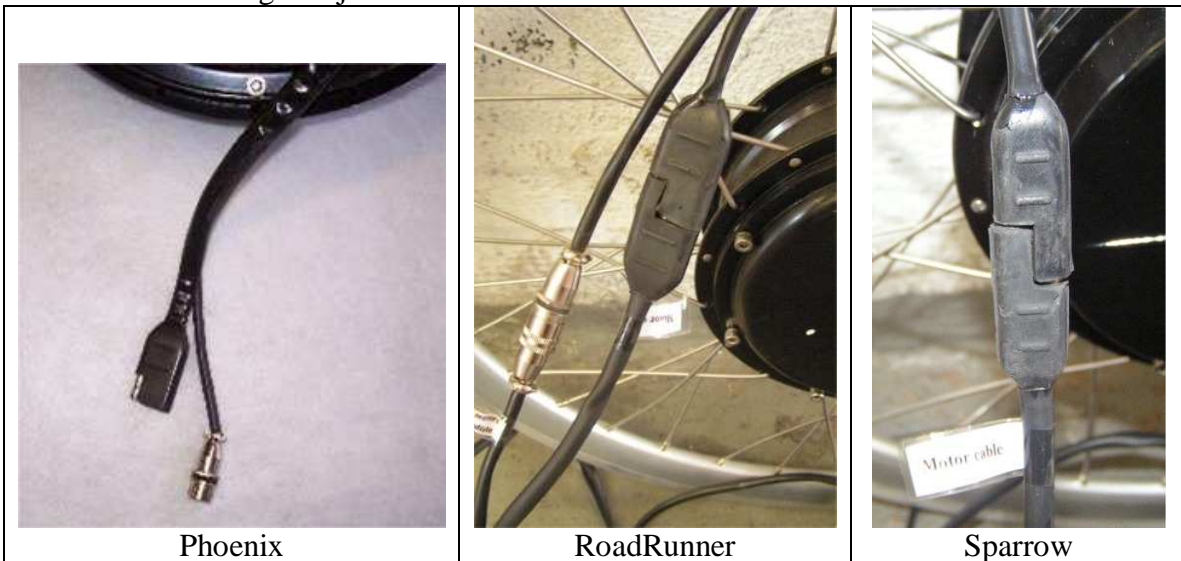
17. Remove the right handlebar grip and shifter if there is one present. Push the throttle onto the handlebar, and tighten using a 3mm hex wrench. You may need to move the brake handle and shifter, or cut off part of the grip to make it all fit

nicely. There is a way on every bike; some just take a bit more creativity than others.



Run the Wire

18. Connect the wires on the motor to the corresponding wires on the controller. Connectors will only fit with the correct mate. For Phoenix motors, observe the color coding and join the same color wires.



Connect the throttle wire to the controller. There is only one plug on the controller that fits the throttle connector. All of our throttles fit all of our controllers.



19. Connect Cruise Control and Brake Inhibits (standard with Phoenix; optional for RoadRunner and Sparrow) to the controller.



Cruise Control to Controller



Brake Inhibit to Controller

20. Run all of these wires neatly along the frame where the movement of open brake and shifter cables will not rub through the insulation. Zip-ties make for a tidy installation. It is best to first install the zip-ties very loose. Once you make sure you have adequate slack for full left-and-right movement of your handlebars and bike suspension components, tighten the zips-ties until they are just snug. Over-tightening the zip-ties can cause your wiring to overheat, insulation to melt, and permanent damage to components.

Wire the Batteries

21. If you purchased a complete kit, the wiring may already be done for you. You will need this information when it is time to replace your batteries, so hang on to it.
22. There are two types of battery packs supplied with EV Depot hub systems: 36-volt (3 batteries) and 48-volt (4 batteries). Please see the detailed instructions for how to wire your batteries.

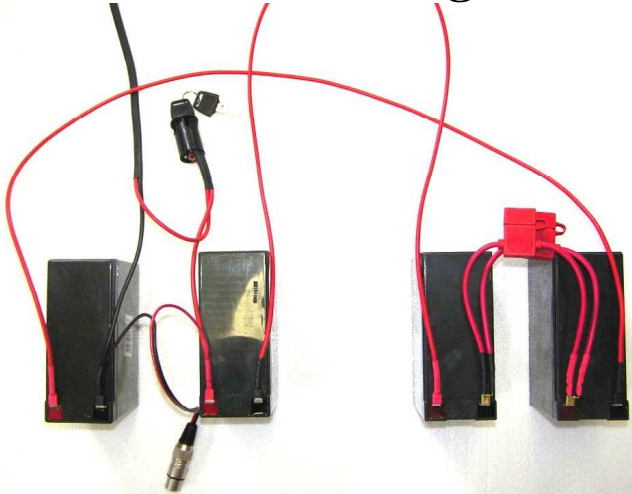
Note: Sparrow Controllers use a flat two-prong connector to the battery pack. From the controller, positive is visible and negative is recessed. From the batteries they will be opposite: negative is visible and recessed is positive. RoadRunner and Phoenix wiring is visible, so you can see red for positive, black for negative.

Batteries contain a lot of energy! You can vaporize light metal with a single battery!

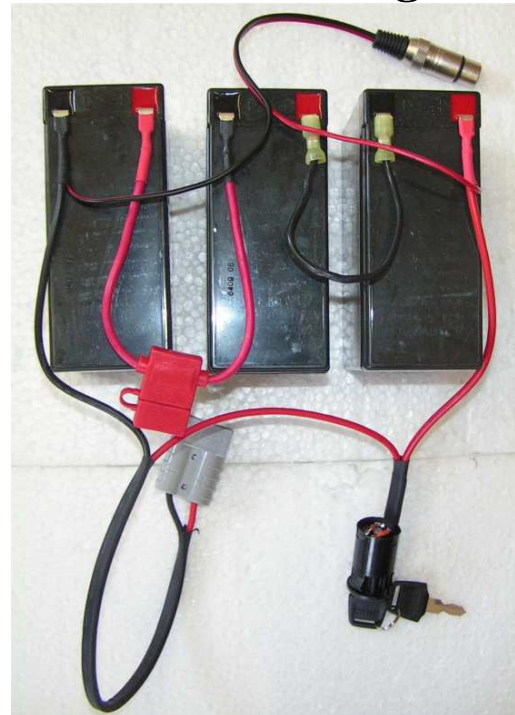
About Batteries

Your hub motor system uses sealed lead acid (SLA) batteries. The acid is fully absorbed into a glass mat and the batteries are totally 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: these batteries produce enough energy to melt metal. Be very careful not to short any leads. If you are at all unsure about wiring your batteries please consult a professional.

48 volt wiring



36 volt wiring



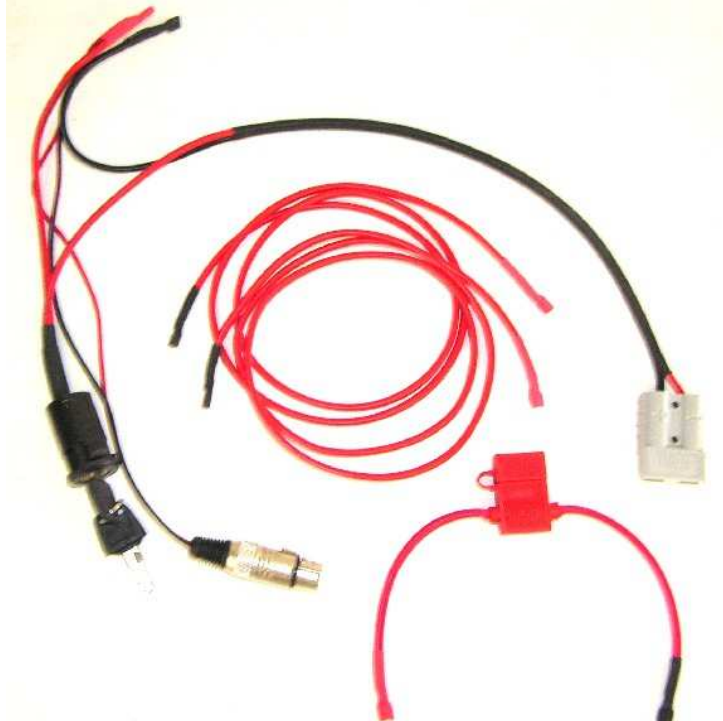
Wired battery packs. This is what we'll end up with at the end of this procedure. We spend a lot of time describing battery wiring because mistakes can cause component failure. Particularly susceptible to failure is the charger. If you have your pack wired incorrectly, your charger is likely to blow. If you have a Soneil charger, the fuse will blow, but the charger will survive.

1



Set your batteries on a non-metallic workbench as shown.

2



Familiarize yourself with the wiring. There is a segment with a key switch, charger port, terminals that go to the batteries, and a large connector that goes to the control unit. There are also two long wires and a fuse holder with wires.

3



Using scissors or wire cutters, cut the shrink tubing into 8 pieces.

4



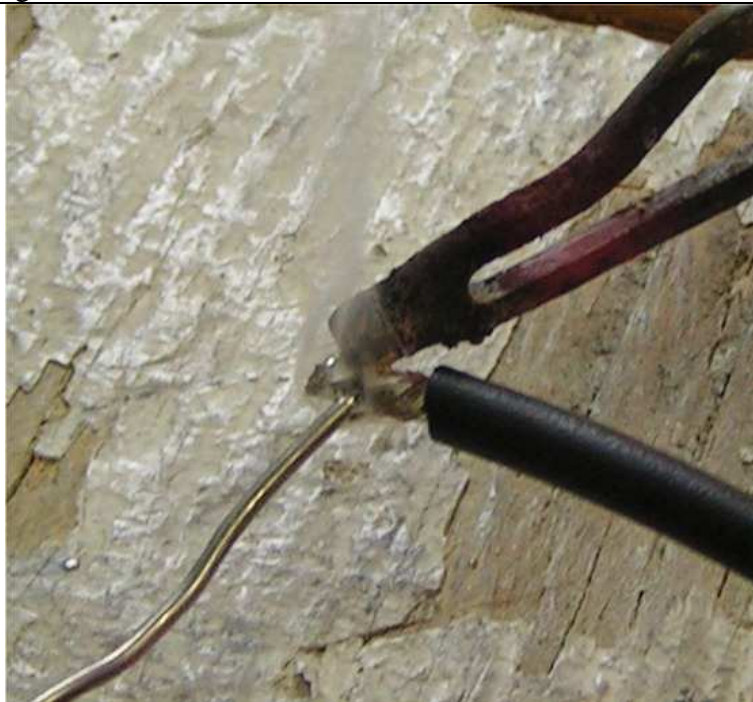
Using a wire stripper's 10 gauge wire size, remove about 3/8" of insulation from the end of each wire before soldering to the battery terminal.

5



Push one piece of heat shrink tubing up the wire a few inches – far enough to prevent being heated.

6



Load the wire with solder. Overloading the wire with solder will help keep the heat in the wire rather than the battery terminal in the next step.

7



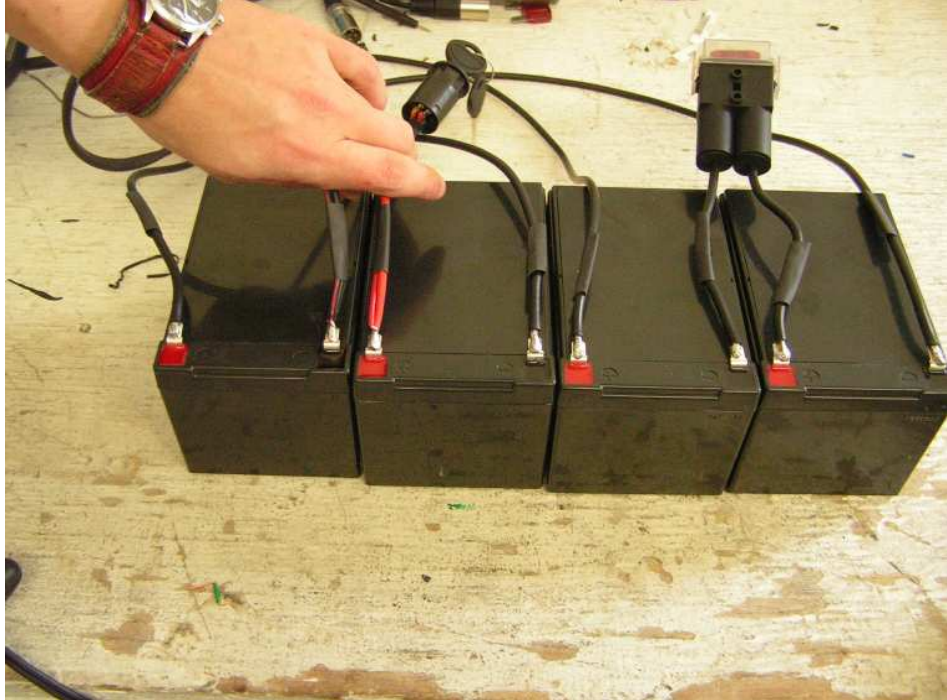
Load the soldering iron tip with a drop of solder. Place the solder-laden wire onto the battery terminal. Touch the soldering iron to the wire. The drop of solder on the tip will facilitate rapid heat transfer into the wire then onto the battery terminal. As soon as the solder begins to flow on the terminal, remove the iron. Too much heat on a terminal will destroy your batteries!

8



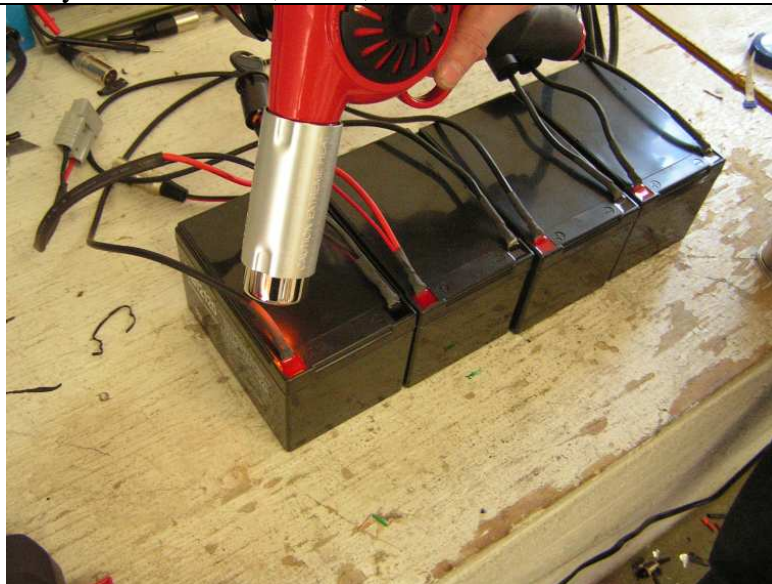
The resulting solder joint should be shiny and strong. If it is dull or there are fractures, apply a drop of solder to the soldering iron tip and repeat previous step. NEVER apply heat directly to the battery terminal.

9



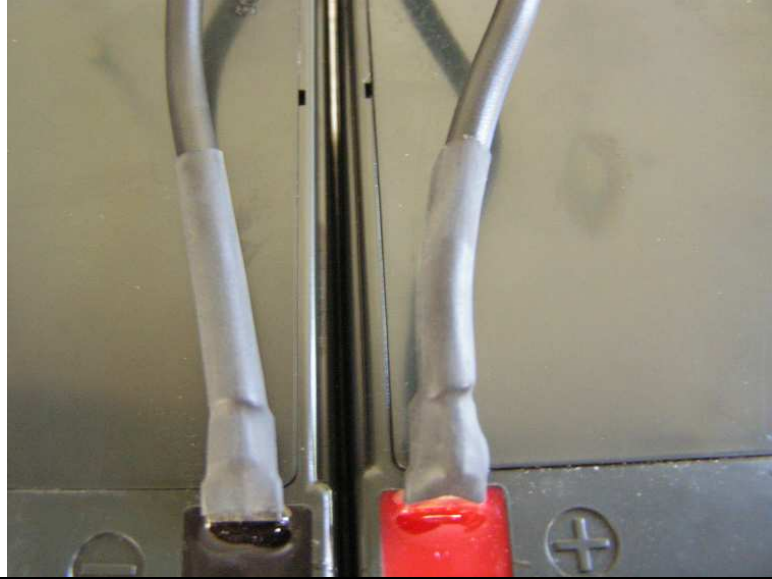
Continue to solder (or use push-on tabs) until your battery pack looks like the picture above. If you number the battery terminals 1 to 8, here is where they connect: 1 to 8, 2 to negative (black) side of key switch harness, 3 to positive (red) side of key switch harness, 4 to 5, 6 to 7

10



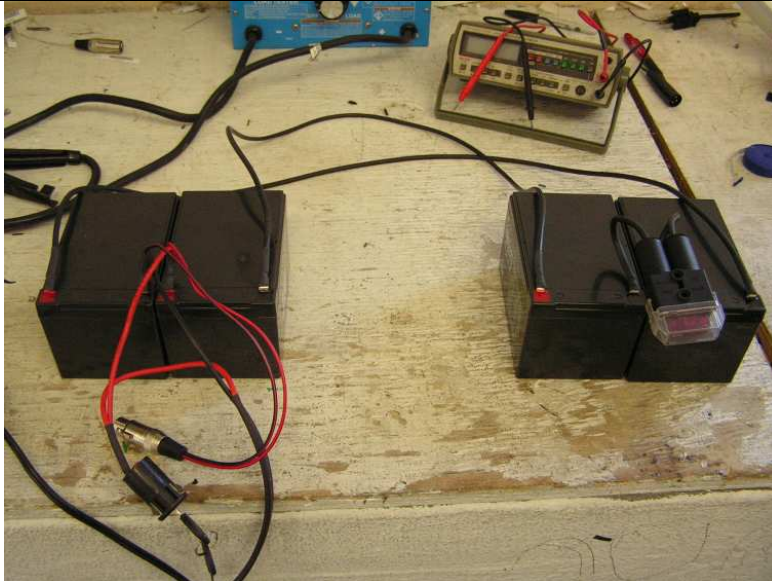
Slide the heat shrink tubing as far as it will go on to the battery terminals and apply heat. What you see in the picture is a professional heat tool. The appearance of red-hot on the battery surface around the wire is a reflection of light – not heat! It doesn't take much to shrink the tubing. A match or lighter will work very well.

11



This is what solder joints should look like when complete.

12



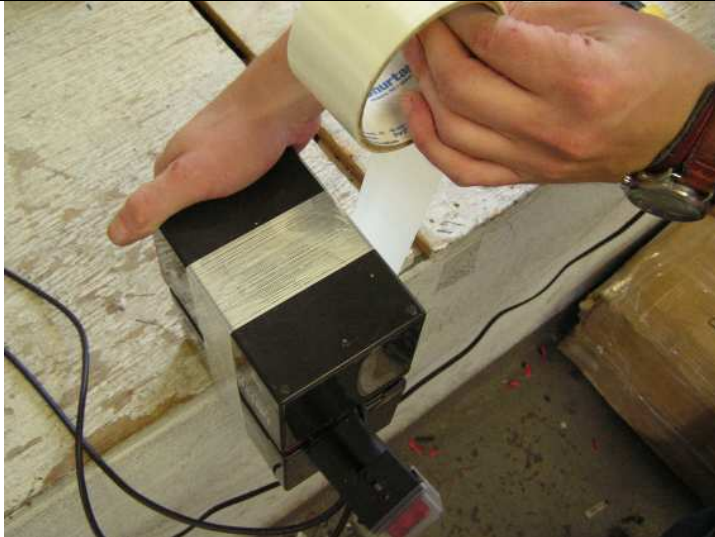
Separate the batteries into pairs, left and right.

13



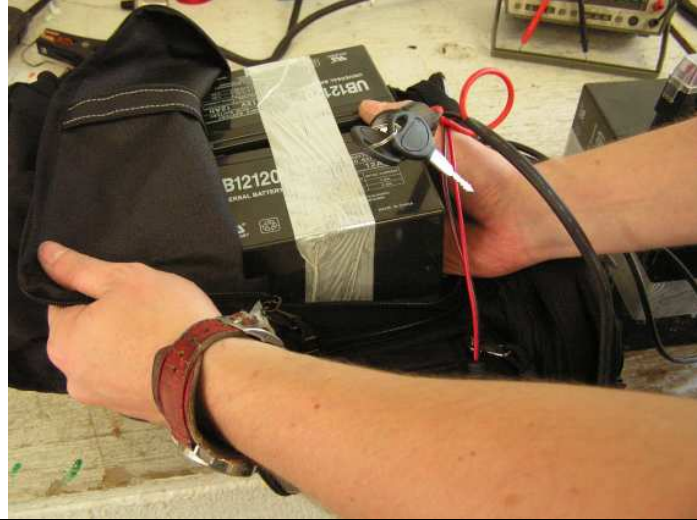
For each pair, turn one battery so the leads are opposite the other, then set them top-to-top on each other.

14



Using filament tape (strapping tape), tightly secure the batteries to each other. Be sure to run the wires so that they do not cross each others' paths or touch a battery terminal. If they cross paths, vibration may, over time, cause the insulation to wear. The result could smoke from melting insulation, severely degraded performance, and one or more ruined batteries.

15



Put each pair of batteries in a side of the pannier bag. The key switch and charger port normally go on the left side. Close the zippers with the cross-connect wires that run to the opposite side pannier to the front of the bag.

16



Left side.

17



Right side.

Connect the Battery Pack to the Controller

23. Connect the battery pack to the. If your keyswitch is on when you make the connection, you will hear a “pop” and maybe see a spark. This is normal behavior. It will not hurt you or the system.



Enjoy your first E-Ride!

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 bicyclists. 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.

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 Authorized Dealer.

Warranty

We have engineered our systems for maintenance and trouble-free operation. We also realize manufacturing defects still 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 very 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. Driven responsibly, you can expect years of use from your system.

For 90 days from date of purchase, we will replace any defective part of your power system purchased from an EV Depot authorized dealer. The warranty extends to 180 days for the motor. Here's how it works: Contact your dealer. He will listen to the symptoms you describe and contact EV Depot for a replacement part. If your dealer cannot be reached, call EV Depot at 785-749-0949. EV Depot's policy is to give you a choice of:

- Secure the return of the bad part with your credit card so your replacement will ship immediately. Put the defective part in the box we send and ship it back to us. There will be no charge made to your credit card as long as the defective part is returned within 2 weeks.

Exchange the defective part without using a credit card. Ship the defect to us and we will ship your replacement as soon as the defect arrives.

Upgrades, Parts, and Accessories

Your Phoenix Authorized Dealer stocks a number of parts and accessories for electric and pedal bikes. They also offer upgrades and accessories to make your bike go faster and/or farther. From faster chargers to batteries to beefed-up motors, they will try to satisfy your electric transportation needs.

Crystalyte Phoenix, RoadRunner, and Sparrow are distributed in the US by EV Depot and are sold at EV specialty stores, bike shops, and a several online stores.