



Z ELECTRIC VEHICLE Corporation
ELECTRIC MOTOR SCOOTER AND
MOTOR CYCLE
OPERATING MANUAL

THANK YOU FOR PURCHASING A ZEV!!

VEHICLE IDENTIFICATION AND EPA AND DOT COMPLIANCE LABELS

The VIN number plate is located on the battery box rear above the rear wheel in a tamper resistant area. This is also stamped into the frame on the right side.

The EPA and DOT information labels are located on the side of the battery box at the back of the bike.



INITIAL CARE

Your scooter paint cannot be waxed when it is fresh at the factory. The paint has to “breathe and cure” a little. But you must take the time to wax your scooter with a good hard coat wax on every part. This is especially true of the wheels and motor (the aluminum parts) and the chrome legs of the forks and or shocks more than the painted surfaces. Get a good coat of wax on everything. Then you will not risk the corrosion of the polished aluminum or chrome surfaces. In some areas this is critical as salty air near the sea will increase the speed of corrosion. Failure to wax the bike can allow corrosion on the metal components.

We strongly urge you to purchase a surge protector for your bike power supply. Just as lightning strikes can wreck your computer, TV, etc., it can harm your charging system for your electric vehicle. The ZEV warranty does not cover such damage to charging units.

GETTING READY TO RIDE FOR THE FIRST TIME

Before riding the bike at all, put it on charge. The bikes are not shipped with a charged battery. There may be enough power in them to make the bike move, but it is not adequately charged.

Next, make sure that the tire pressure is correct. Tire pressure on a motor scooter is critical. Make sure it is right or risk a crash. Tire pressure should be 225 Kpa (___38_psi)

WARNING – There is nothing to stop the bike from moving when it is parked. There is no parking brake. You cannot put an electric motor “in gear” to stop the bike from rolling. You must take the responsibility of parking the vehicle on either level ground or with the back wheel against something to prevent it rolling (like the curb). You can in the alternative use the center stand to hold the bike. If you park the bike facing down a hill the bike will roll and fold up the side kickstand and drop the bike on its side with serious damage. If the grade is steep enough, even the center stand will fold up if the bike is pointed down the hill. Turning the front wheel and locking it with the key with the tire against the curb will help stop the bike from rolling.

WARNING – New motor scooter and motor cycle riders are often surprised to find their new parked bike laying on its side seriously damaged after leaving it parked on a hot day. On a hot day the asphalt road will soften allowing the side or center stand to sink into the road until the bike falls over. Experienced riders generally carry a thin “foot” of aluminum or wood to place under the side stand when parking – or they park on concrete.

CHARGING

Do not plug in your expensive electric bike charging system without a Lightning Strike Surge Protector. You would not hook your computer to your wall socket without a surge protector. Treat your bike to the same. The better surge protectors also offer insurance policies with them for free that if your equipment is damaged, the surge protector manufacturer will pay. (Belkin SurgeCube has \$50,000 insurance).



Check the circuit breaker off under the seat before hooking up the charger and beginning to charge. This breaker is located either in the luggage box or just in front of it as shown below. Check the red fault light on the charger. If the charger will not charge, flip the circuit breaker to the opposite position as some models charge with the breaker on, some in the off position.



Never fail to first hook up the charger to the battery before plugging the charger in.

When the charger is plugged into both the bike and the power source, the lights will come on at the charger end. If a red light comes on and stays on bright then you are not connected properly or the circuit breaker is in the no charge position. After a few minutes the charger fan should start to run. It is quiet and you may need to get within a foot or two of the fan to hear it. As the charger charges the battery the level of charge indicated by the green LEDs will rise from 20% and go up to 100%. When the bike is

fully charged, the fan will shut off, the green lights will be lit. For the heavy finned aluminum charger, the display will continue to show a reading, flashing first peak voltage and then a 0 if charged.

If the bike is fully or near fully charged, the charger will not run.

If you get a red light and no blinking green lights you are not charging. The heavy finned aluminum charger will show “no bat”.

Do not assume that the charger will act exactly the same every time you charge. Its behavior will depend on the amount of charge on the battery.

If your home is on an unconditioned power source where the power does not hold 60 cycles per minute, the charger will not operate properly.

Unplug your charger from both the bike and the power source when it is not being used and use a surge protector. Lightning strikes and power surges that may occur in your area power lines can injure or destroy the charger..

Charge your bike one time every two or three months whether you use it or not to get the maximum life from your batteries. The battery will hold +90% of its charge for 3 months.

Do not leave the charger plugged into the bike after it is unplugged from the power source. It will absolutely drain the battery and ruin them.

FIRST TIME RIDE

CHARGE THE BIKE BEFORE YOU RIDE! It is not fully charged when delivered.

Double check the tire pressure.

Do not ride a bike without shoes, a helmet, and gloves.

You are far better off taking a riding course. These are sponsored by and made available through your State DMV.

Remember that the vast majority of all serious accidents occur in the first weeks of ownership while a rider is getting used to the new bike or getting used to riding a two wheeled vehicle at all.

If the bike does not run, check that the circuit breaker under the seat is turned on

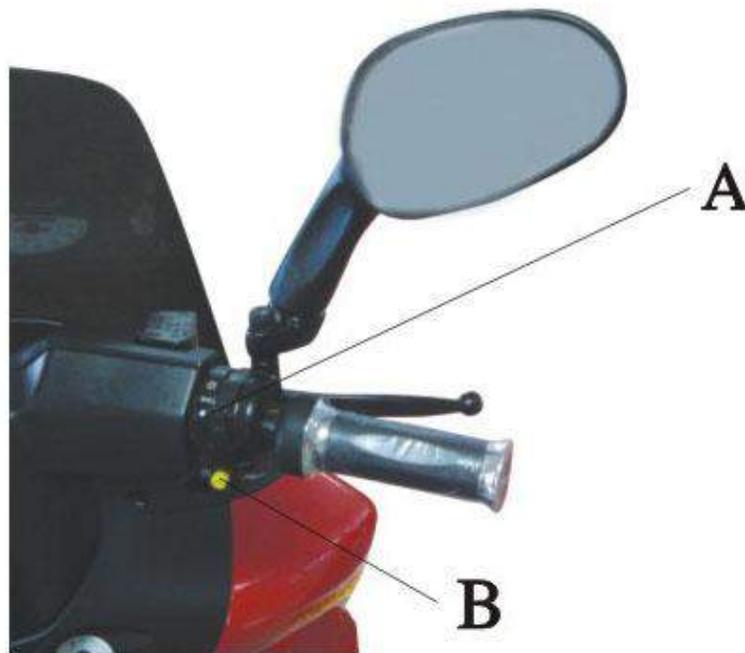
There is a kill switch on the right hand light switch control. If this is in the X off position the brake light will come on and the bike will not run.

If the side kickstand is not in a full up position the bike will not run. The brake light will come on.

Unless the brakes are not on at all, the bike will not move. A slight touch on the brakes cut out the motor power. So when you are sitting on a hill holding the brakes, you must fully release the brakes as you roll on the throttle or the bike will not move.

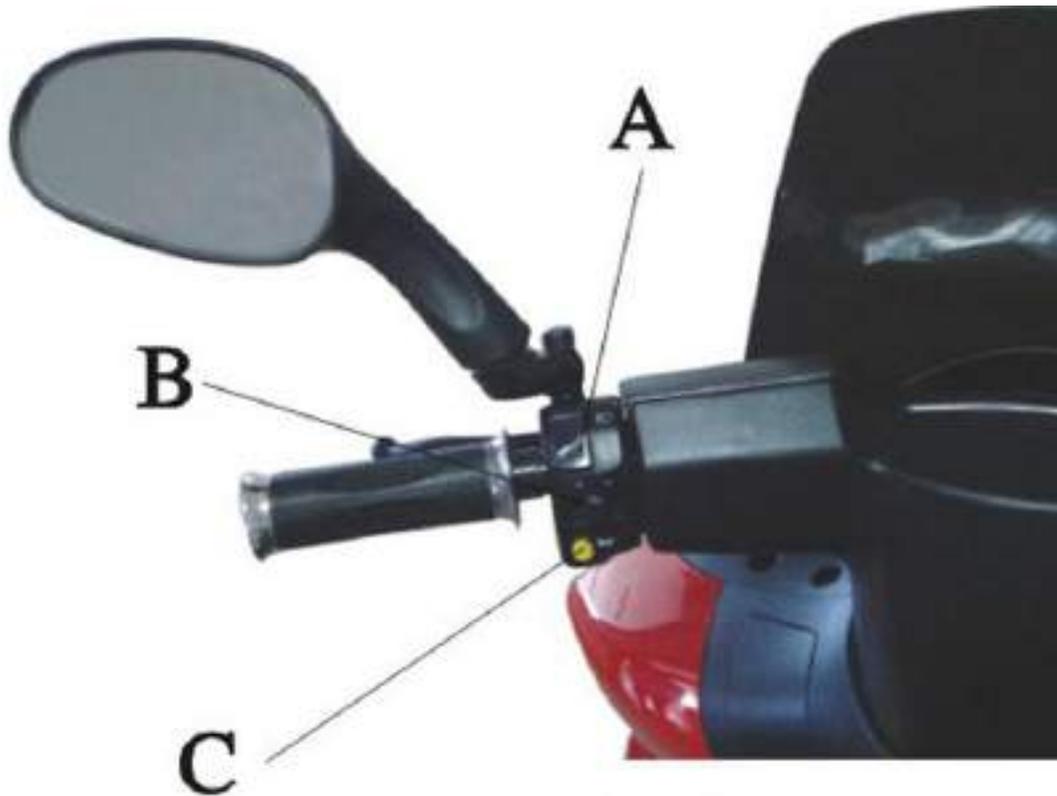
***Never be tempted to hold the bike on a hill with the throttle, use the brakes. holding the bike on a hill with the throttle will virtually guarantee motor damage which can be spotted and will not be covered by warranty claims.

On your right handgrip is switch for daytime running lights, and headlights on. Switch A. Daylight running lights are required in some areas so the center light on your bike may be set so it cannot be shut off.



Switch B is a switch to raise or lower the amperage and volts that the motor gets. There are three positions. Use the lowest power setting that you can to maintain the desired speed. You will feel the difference when pushing the button.

On the left handgrip is a rocker switch for high and low beam. Switch A



Switch B is the turn signal switch. Push it with your thumb to the right to turn right, to the left to turn left. You must put the switch back to the neutral position after making your turn.

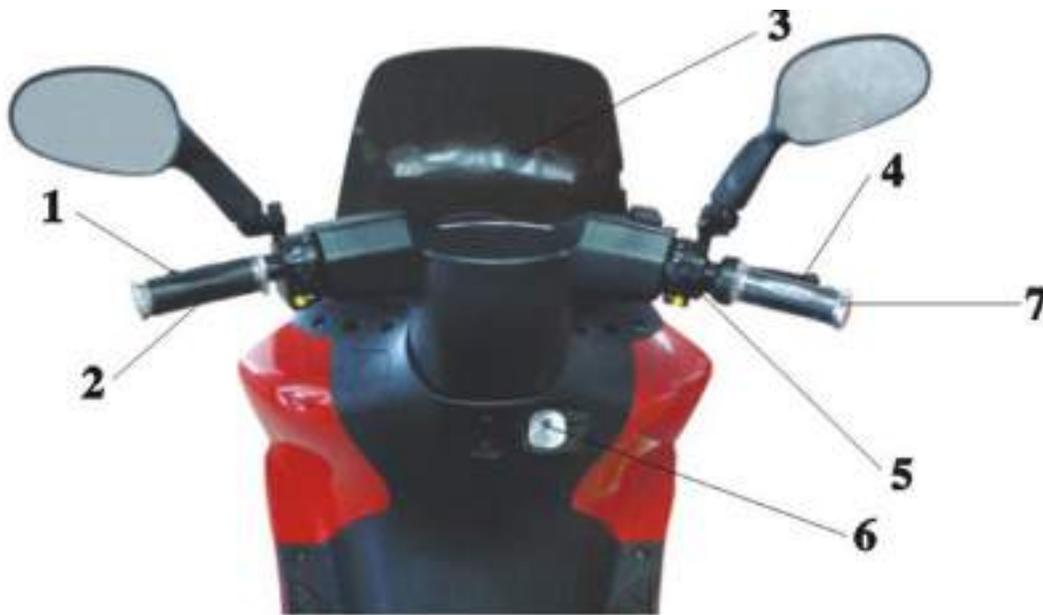
The horn is the button (Button C) on the left grip and marked with the symbol of a horn.

Some models of the bike use the switches in the same positions for the same functions, but they look differently. Added on some models is a kill switch on the right hand grip, above the lights switch (not shown)



Brakes – you should always use both brakes simultaneously. Do not just use only one brake. Experienced riders know they must use the front brake as the main brake (4). It is the most powerful brake on all production bikes. A ZEV electric does not brake like a common motorcycle. Since the weight CG is near the axle center line it does not lift up the back wheel in hard braking so you can use both brakes in hard application.

To use the brakes, squeeze the hand levers. The right lever is the front brake (4). The left lever is for the left brake. (1). The throttle is (7). Turn the throttle top toward you to accelerate.



The power on key and steering lock is shown as (6) in the above photo.

Instruments and Gauges. (3)



Power Meter – On the right side of the instrument panel (A) is a power gauge (B). Only when the needle is at the top of the arc is the bike charged for good road use. When it enters the broad band arc areas the bike is in danger of running out of power. When it reaches the bottom arc it will shut off to protect itself. A clock is in the center bottom and can be set by the two buttons to the right.

Volt Meter – On the left of all newer model bikes is a voltmeter gauge. This is your most accurate indication of power available. 13 volts is maximum charge, At 11 volts the battery is dead and the bike cannot move.

Just below the power meter is the indicator light for the high beams of the headlights.

While the speed is indicated in both miles per hour and kilometers per hour, the odometer reads only in kilometers per hour.

Some new owners note that there is oil around the top of the front fork boots or which may have drooled down the fork leg. This is the corrosion protection placed on the leg and under the boots while the bikes are in storage or shipping. It is not an indication of some seal problem. Just wipe off the excess and it will shortly dry up. Some bikes have a light “Vaseline” on the upper fork leg also.

WARNING CUSTOMERS ON THE FIRST DRIVE ARE PRONE TO DRIVING THE BIKE TO MAXIMUM ACCELERATION AND SPEED AND WILL CUT THE RANGE IN HALF IN THEIR EXUBERANCE. PLAN AHEAD AND DO NOT RUN THE BIKE DEAD.

DAILY USE OF THE VEHICLE

The throttle on the bike is equipped with an extremely light return spring in comparison with gas powered vehicles. It is therefore easy to “grab a big hand full of throttle”. Easy does it. The road racer habit of riding with your thumb around the part of the throttle

that does not turn acts as a friction brake for the throttle on rough roads helps to prevent your body from giving unnecessary inputs to the throttle.

Gas bike riders are sometimes prone to try to “rev” the bike as they do on a gas bike zipping the throttle when they feather the clutch to smooth out their throttle movements. An electric bike does not have a clutch. You need to not oscillate the throttle as on a gas bike, but to move it in steady smooth operation.

Every time you get ready to ride:

Look at your tires for signs of low pressure. (check them with a gauge monthly)
Tire pressure should be 225 Kpa (__38_psi)

Look at your tires for signs of cuts, road trash (nails etc).

Make sure your headlight and all other lights are working

Make sure your horn works

Inspect for brake fluid leaks.

Check all brakes before pulling away from your driveway

Inspect the brake fluid level through the sight window on the side of the reservoir for each brake. Make sure the level is visible.



Charging – A lithium battery bike will 70% charge in about ½ hour. If you need to use your bike frequently during the day you can keep it easily charged. A several hour charge will bring you to maximum charge. **WARNING** – If your bike is fully charged, do not disconnect the charger and then immediately connect again. The start charge system will think this is a lightning strike surge. Ride the bike before charging again.

***Note – batteries will last longer if they are charged after more than a light discharge.

The Center and Side stands are there to hold the vehicle in an upright position.



The side stand is the best for holding the bike so it will not fall over in normal use.

***Note - Setting yourself on the vehicle while it is parked and on the stands may bend the stands and ruin them. If you want to just sit on your bike, let the bike rest on its tires and suspension as it was designed to do.

The side stand is designed to shut off the power when it is down. Make sure both the side and center stands are in their full up position before attempting to ride. Never bypass this shut off safety feature.

On hot days the bike may be in danger from the stands sinking into the soft asphalt and dumping the bike on its side. To prevent this, use the side stand on blistering days and place a piece of metal or wood under the stand foot to stop the asphalt from giving way. A small piece of thin plywood or even a flattened aluminum drink can works just fine.

Do not hold the bike on a hill with the throttle (IE-setting at stop light) Use the brakes. Use of the motor and throttle to hold the bike on a steep hill can cause an overheating situation that can damage the motor.

Charge the bike before you store it.

Turn off the under the seat circuit breaker anytime you do not use the bike for more than a few hours. If you do not turn off the circuit breaker you are draining the battery slightly as the electronics and some wiring is “armed” and ready for the key to initiate driving. If you are not going to drive soon, turn the circuit breaker off unless you are charging.

UNDERSTANDING RANGE

The range of your electric vehicle is primarily determined by how and where you drive. Just as “lead footing” your car will radically decrease the range by increasing gas consumption, strong acceleration and high speeds will sharply decrease the range of your ZEV. Add hilly terrain or an extra passenger and the range drops again. A rider in

the mountains who drives with nothing but full throttle can drop the bike power to 65% in as little as 10 km. Full power consumes energy at a horrific rate, no matter what the source of the energy is- gasoline, diesel, or electric.

STRONG ACCELERATION REDUCES THE RANGE

EXTRA LOAD REDUCES THE RANGE

HILLY TERRAIN REDUCES THE RANGE

NON STEADY THROTTLE REDUCES THE RANGE

Additionally, on those bikes that have the three power setting switch, you have very direct control of your range by how you “shift” the motor. Failing to take advantage of this power reduction feature is the equivalent to driving your car around stuck in low gear.

The ranges listed for our bikes in our specifications are based on flat land running at near steady throttle at the speeds listed with one rider of 165 lbs., no extra cargo.

When you first purchase your ZEV, drive conservatively until you get a better feel of the range in your driving environment.

Your ZEV will give warning signs of reduced available energy.

First – Pay attention to the power gauge on the right side of your instrument panel. When the needle reaches or drops below the top single line and into the broad bar area, you are approaching “empty”. Note – that the reading of this gauge is done when the bike is accelerated by a throttle roll on, not when it is coasting or driving at steady speed.

Second – The bike will give you a physical warning. When you strongly accelerate with a low battery you may experience the warning signal of a “cut out” of power. What you feel is a sharp drop in power. Simply rolling the throttle back to zero and back on will restore the power. But that sudden drop was a warning that the battery does not have enough energy left to maintain all out maximum power. Drive accordingly. Once you feel this cut out, you will know you must drive more conservatively with less strong acceleration or maximum speed.

WARNING. DO NOT RUN THE BIKE UNTIL IT DIES. WHEN YOU FEEL IT GETTING WEAK FROM THE LOW BATTERY, GET TO A CHARGER, OR PARK IT. IF YOU TRICK THE CONTROLLER BY PUSHING WITH YOUR FEET TO GET THE BIKE ROLLING OR CONTINUE TO GRIND ALONG IN LOW GEAR UNTIL THE BIKE STOPS YOU RUN THE RISK OF RUINING THE BATTERY AND THE CONTROLLER.

Once the battery have been drained below the safety cutoff point, the charger will not charge the bike again. A special charging procedure must then be used on each battery cell group of 4 which means taking the bike apart. DO NOT IGNORE THE WARNING SIGNS. WHEN THE BIKE CANNOT RUN IN 3RD GEAR AT SPEED AND SHIFTS TO 2ND, FIND A CHARGING POINT.

POWER LEVEL GUAGE

On the right side of your instrument panel is a power level gauge to give you some idea of the amount of battery capacity left in the battery.

On your car, the amount of fuel left in the tank is not a direct mileage obtainable indication due to the fact that different driving conditions consumes the fuel left and radically different rates.

Equally, on your car, you cannot trust the computer that tells you how many miles you can go on the gasoline left in the car. The reason is that it has an averaging factor in it. If you drove 10 miles in stop and go traffic before you pulled onto the Interstate and looked at your range, the calculation would be radically less than the car can really go as the computer has only seen very bad fuel consumption. Conversely, range calculated at steady highway speeds will be wrong if entering a city. Far greater distortions occur if the vehicle has been coming down a long grade. The computer will see you are using virtually no fuel and will calculate you can “drive around the world” on the gas left.

In the same manner, the battery capacity gauge will read very optimistically if read when sitting still or driving at a steady less than maximum speed. It is the equivalent of drifting down hill. To read the gauge, roll the throttle on to the maximum briefly (2-3 seconds) and look at the needle position. At this point, while under acceleration, the gauge will be more correct.

VARIABLE POWER MODEL CONTROL

Those models of ZEV which have the three power settings button can be operated to maximize range and extend it about 25% compared to letting the bike in one power setting. The button on your right hand grip gives the bike 100% power, 80% power, and 45% power. This is done by limiting the amperage to the motor.

If you are either on flat land or not driving at maximum speed there is no reason to have the bike consuming high power. Use the button and shift the bike to the lowest power consumption that will still maintain the speed that you need. You can feel the power difference on hard acceleration to get a feel for what gear you are in. The bike will slow its acceleration as you shift down in power.



Driving around at the maximum power setting will drain your battery much faster than using the variable settings. For maximum range, stay out of the 100% power setting, and use the minimum power to achieve the speed and hill climbing that you need.

STEERING LOCK AND POWER / "IGNITION" KEY

The key when turned off turns off all power to every component of the vehicle.

Turn the steering head to the extreme point of travel, then turn the ignition key to the extreme counterclockwise position. You can lock the steering to cause theft to be more difficult. A protective slide can be moved over the key hole to prevent water and dirt intrusion.



ZEV recommends that all owners further lock their bikes using a chain or wheel lock style of their choice to further prevent theft.

STORAGE COMPARTMENT AND ACCESS TO THE CURCUIT BREAKERS

On the left side of the bike is a key access to open the compartment under the seat.



Push down on the seat while turning the lock. Do not let the seat fly up or it may cause damage.

SHUTDOWN WHILE KEY IS ON

The controller of the ZEV has several protection features to prevent abuse or damage.

- 1) If you set the bike with the key and power in the armed position it will shut off after 5 minutes of no driving on some models.
- 2) You can trick the bike into shutting down by toggling the kill switch while driving. Turning it back on will do nothing. The bike will have to be stopped, the key turned off and then back on.
- 3) A very slow small throttle opening and an immediate rollback may result in the controller shutdown. The controller sees this as if the bike is against a wall and unable to move. When you decide to drive, give the bike throttle and hold it steady.

In all cases, if a shut down occurs, simply turning the key off, then back on again will reset the controller.

MAINTENANCE AND SERVICE

Periodically test your brakes in a hard stop.

As your brake pads wear the travel lever will change. When the pads become worn replace them.

Two times each year, check all battery and main power connections for loosening.

Oil the pivot point on the rear suspension every month (steady riding assumed). Regular motor oil works fine. Motorcycle chain lube is sticky and does not drip like the oil may. Only a drop or two on each side of each bushing is needed.

WARNING

Do not attempt to work around the battery terminals with any tools or your bare hands. They are buried in the bodywork for a reason. The amperage can rise to 300 amps and voltage on some ZEV bikes is 120 volts. There is no way that you can touch these in normal operations unless you deliberately stick a tool through an opening or remove body parts or covers. Even then, you cannot get easily to the two opposite ends of the battery pack so the voltage is very low at any given point. You do not need to be afraid, only cautious.

Turn off the circuit breaker and the key before working on the electrical system.

If you want to disconnect the motor or controller, wait 15 minutes after shutting off the power for the capacitors in the controller to discharge.

If you drop a wrench on top of the battery while tightening, it is not possible that the short wrench can contact more than 12 volts. So just pick up the wrench as fast as possible and ignore the sparks. The voltage and amps at this point are too low to injure.

Unlike other vehicles, your ZEV does not use the frame of the bike as a grounding circuit for the wiring. All circuits use a dedicated ground wire. This makes it virtually impossible for a short to occur.

WASHING AND CLEANING YOUR ZEV

Do not use a high pressure hose to wash your bike! High pressure water can possibly force its way into areas that will cause serious problems. At most, use only a garden hose set on light spray, never a blasting jet.

Cleaning the bike with any alkaline cleaner such as engine cleaner will ruin the polished aluminum immediately.

Clean the windshield with a good aircraft type windshield polish for best results.

Use an automotive washing soap (not dishwashing or laundry soap) to clean your bike.

WORKING ON THE FRONT WHEEL

To raise the front wheel off the ground for service, the easy way is to simply balance the bike to the rear by placing a sandbag or similar weight on the rear luggage rack. 35-40 lbs will be enough. Make sure that the bike is on a hard surface, not asphalt in the sun so that the center stand does not sink into the ground and dump the bike.

A second way to raise the front wheel is by placing an automotive type floor jack under the battery box and lifting until the front wheel is not in contact. Caution – if you raise the bike too much, then the bike will only be balanced on the back wheel and the jack and will topple off. Stop raising the front as soon as there is a fraction of an inch space under the front wheel.



TRANSPORTING YOUR ZEV

You can transport your ZEV on a trailer or in a truck bed using tie down ratcheting straps. You will need 10 straps.

The bike wants to set down at the rear as that is the battery weight area. Place the bike on the center stand. The front wheel will set up off of the deck. Place a broad board under the wheel to make the front wheel set on the board.

If you are transporting on a wooden deck trailer, take advantage and drywall screw the board under the front wheel to the wooden trailer deck if possible. Drywall screw 2X4 block sections in front, behind, and to the sides of each wheel if possible for any long hauls.

Turn the steering head to the lock position, lock the steering, and remove the key.

Place one strap over the seat with a piece of cloth under it to prevent chafing of the seat.



Place one strap on each side of the bike from the luggage rack to the tie down point, This is your primary side to side bracing. Use a piece of cloth under the hook to prevent paint damage to the rack or body.



Place one strap on each side of the bike on the swing arm rear by the shock pulling backward at least 45 degrees or more. This is to prevent the bike from moving forward on braking of the transport vehicle.



Place one strap on each side of the bike wrapped around the swing arm at the forward most position and angling forward at 45 degrees or more. This is to stop the bike from going backward. (shown here without cloth paint protection under hook merely for clarity)



With the above listed straps pulled tight, the front wheel will be off of the deck. Place a broad board under the wheel to eliminate the gap. Place one strap through the front wheel, around the tire, to stop wheel hoop or bounce



Place a second strap through the front wheel at the midpoint on the front (1/2 way up wheel) and pull this strap at a 45 degree angle toward the vehicle front to two tie down points

Use plastic ratcheting tie wrap straps to make a loop to fit over each handgrip and brake. Pulling the straps tight pulls on the brakes and locks the brakes to further limit

the bikes ability to move. Putting a cloth under the strap will stop the strap from cutting a groove in the soft rubber handgrip.



TROUBLE SHOOTING

Customers may call to say there bike is broken and will not run. However, usually,

- 1) The battery needs charging.
- 2) The side kickstand is not up. (most common)
- 3) They forgot to turn the circuit breaker back on after charging the battery or after uncrating a new bike.

If the key is to the power on position and the side stand is not in the up position, the brake light will come on. This is not a defect. Your switch is not malfunctioning. This is to aid you in safely parking your vehicle. As soon as your vehicle is safely parked, turn off the power key to stop energy consumption.

DESTRUCTION OF THE BATTERY

If you run the battery down to the point that you have to push the bike, you will not be able to charge the bike again.

The bike gives you ample warning.

- 1) When you take the bike off of the charger, if there is a red light, you are not charged.
- 2) If the fan is not shut off and all of the green lights are not on, the bike is not fully charged.
- 3).When you are driving the bike do not ignore the battery level gauge on the right side of the instrument panel.

4) After you have depleted the battery about 50% you will not be able to pull 3rd gear. The bike will shut down to 2nd.

5) When you are in serious trouble, the bike will shut back to 1st and you will not be able to drive in 2nd or 3rd. Stop driving at that point and get off of the bike and park it and charge it. This is just like you ran a gas bike out of gas and it is now sputtering on the last in the tank.

Continuing to drive or to trick the bike to run at a low grinding speed will destroy components.

FUSES

There are 2 fuses on your ZEV.

1) Main circuit breaker under the seat.

2) 15 amp fuse in a holder under the windshield area that controls the lights and horn. If the motor runs but the lights are out, the fuse is blown. Standard auto 15 amp glass fuse next to the step down voltage transformer.

FRAME PAINT TOUCHUP

No matter how good the paint is on a motorcycle kickstand and lower frame, it will get scratched and marked promoting rust. Harder paints cannot eliminate the problem. So the answer is to make the paint extremely easy to touch up. The frames on the ZEV bikes use a baked on hard enamel. To touch up this paint use automotive ENGINE PAINT. This is a self etching paint that will match with no visual evidence.

POSSIBLE SAFETY DEFECTS

Contact the chief engineer for ZEV at the hot line 304 291 3843 from 9-5 EST and notify him of any problems that you deem to effect safety as to accident, injury, or death so they can be corrected immediately.