

ELECTRICAL TROUBLE SHOOTING

DO NOT EVEN BEGIN to try to trouble shoot a problem you think you have until you have confirmed with a voltmeter that the battery are fully charged by checking at the charger plug or across the main terminal block.

DO NOT try to read the battery level gauge to determine if the battery is charged. These only read right under when driving and when the throttle is rolled on hard. Without a load, they will read very optimistic.

If you see the OD red light lit on the BMS, the battery is too low to run the bike.

If you see that the brake light is on, either you have the kill switch on, the side stand down, or a brake lever kill switch is stuck so the bike will not run.

99.9% of all problems are in the connections to the battery or to the controller. People always jump to the conclusion that the motor or the controller is bad. No motor has ever failed. Two controllers in 963 did not turn on at all. .0002 failure rate. Not a major factor.

DO not assume that your voltmeter is correct. Check it before starting against a flashlight battery or similar known source. Many times owner voltmeters are junk reading very far off.

To trouble shoot the ZEV Lithium bikes follow these steps:

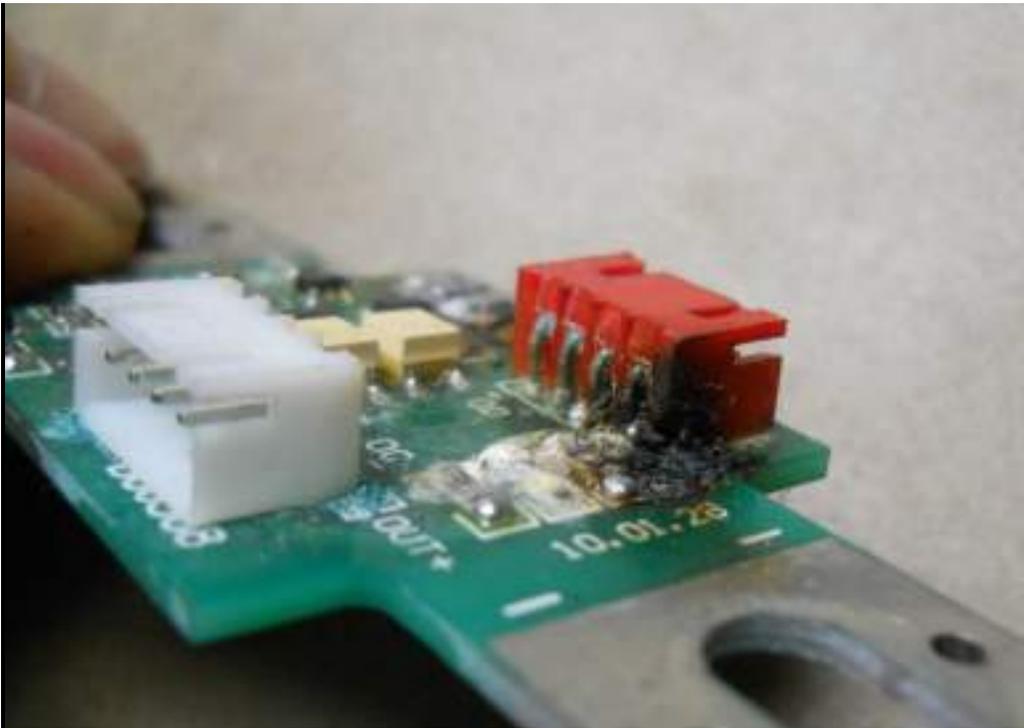
- 1) Make sure that all battery connections are tight and that there are no burned BMS boards on top of the battery.



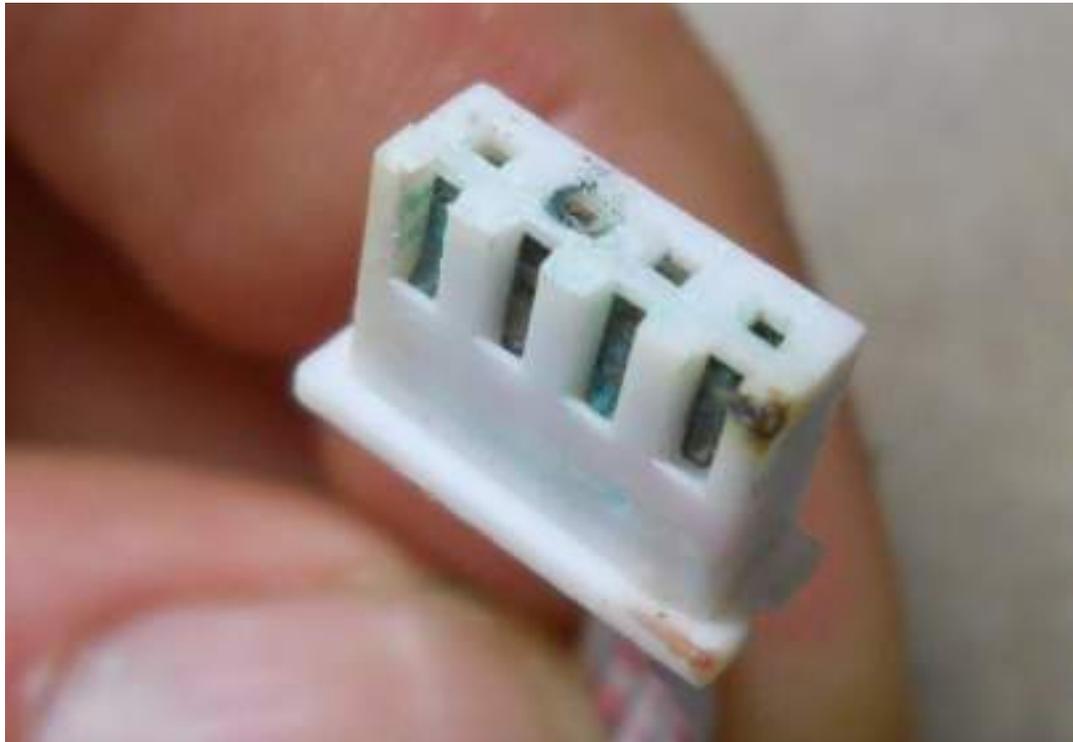
The BMS board can also be damaged or burnt at the flat white cable connector area.



If there is a light lit on the BMS board, either a connection is loose or the board has failed.



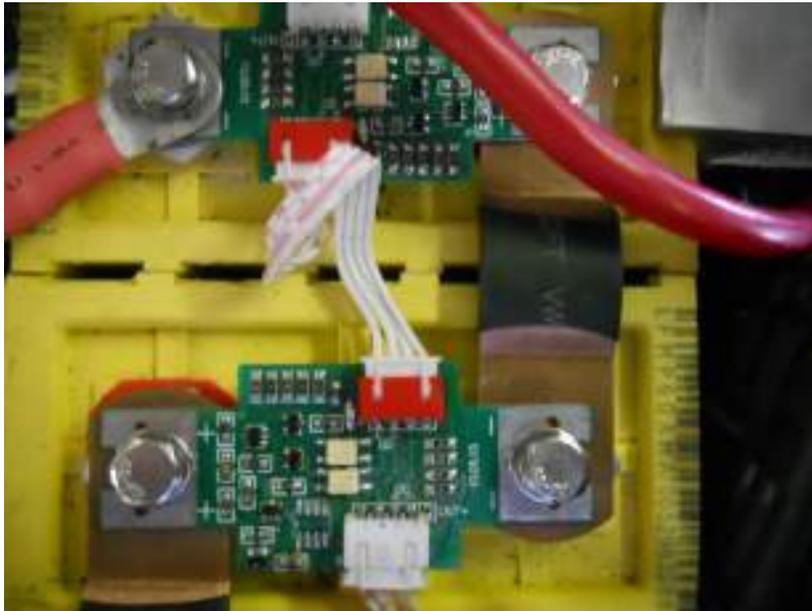
When you see a board like this, inspect the flat white BMS cable for damage like this:

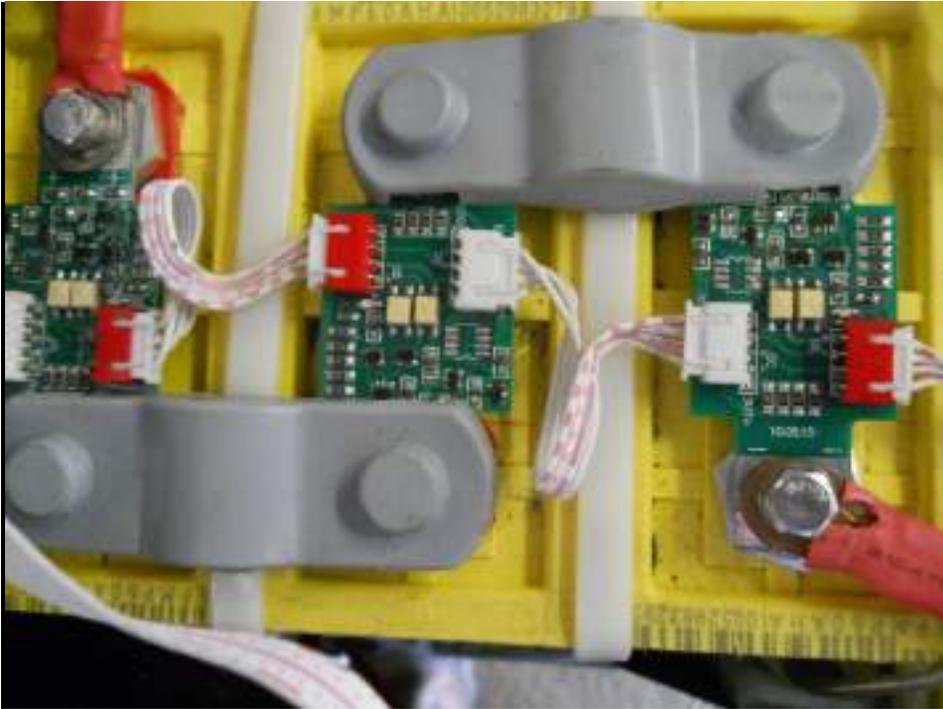


2. Look for any melted plastic both on the clear plastic covers on the main terminal block under the seat and on the battery covers. Look for discolored bolts.



3. Make sure that all of the white computer type cables are plugged into the chips on the top of the battery. These run in a string from one end of the battery pack to the far end where they run to the BMS box.
4. Note that each chip board has a + and a - end. Check to make sure that each BMS board is arranged on the battery top with the + end of the board to the + end of the battery.
5. Make sure that the BMS boards are color code connected. The white cables run from white connector to white connector and red to red for the full length of the battery pack.





This string ends in a connector to the black wire coming out of the BMS box.





On the side of the BMS box are two lights. One for overcharge OC, one for over discharge. OD

If a cell is bad, the OC light will come on during charging (or if the white cables are not plugged in properly as in white to white, red to red, or not plugged in as the same sequence of cables and connection bars or there is a bad battery connection.

6. Use a voltmeter and check each cell in the system. Write down the numbers. At full charge, the battery will be in the area of 3.3-3.35 volts. A weak cell will trigger a BMS shutoff. Also write down the total voltage of the pack measured at the charging port. The voltage should be about 4 or 5 volts under the maximum voltage applied by the charger or 3.35 or more volts per cell. Your bike will have 20/24/or 28 cells.

7. Carefully check that each cell is linked to the next as + to – to + , etc. Make sure that there are no + to + or – to – connections. The bike will actually run with some battery installed backwards, but it will act sick.

Now you are ready to find the end solution.

ISSUE – THE BIKE STUTTERS / BUCKS OR SHUTS DOWN

First find the connection from the white cable to the BMS black cable. Know where this connection is and how you can get to it easily. See photo above.

Next, Charge the bike, then run it in back to back high load acceleration runs until it stutters or shuts off. Pull to the road side and unplug the BMS connection.

If the problem stops then you have a connection problem on the BMS boards. If the problem does not stop completely, you have a battery connection problem. If the problem stops for a little while but comes back in another few miles of running, a cell is bad.

When the bike is bucking or shutting off, check the battery cells again with the voltmeter. The weak cells will stand out.

ISSUE- THE BIKE KICKS THE MOTOR ON, BUT IT STOPS IN SECONDS.



Coming out of the controller and connected to the motor is a 5 wire connector shown on the left.. One of the wires in this connector has backed out of the connector and or is not making good contact. Tug on each wire until you find the loose wire. Look into the connector end and see if all of the pins are setting level and even with each other. Using a small probe, you can push the pin in until it locks.

ISSUE – THE BIKE DOES NOT RUN AT ALL

1. Make sure you have the kill switch on the right hand grip turned to the run position.
2. Check that the kickstand is up and fully retracted.

3. Look to see if the brake light is on. If it is, then the kill switch or the kickstand switch is engaged – OR – one of the small switches on the hand brakes is stuck in the closed position. Test for the latter by moving the brake handle. If you do not hear the clicking, then the switch may be stuck. To test or disable, use a needle nose pliers to reach in under the plastic over the handlebars to the push on pin connectors. You can see them from the end of the bar. Pull off any one of these. A sharp rap on the lever assembly with a soft face hammer will generally free the grit that has stuck it. A little oil will generally fix the situation. The bike does not need these to run. They are there to keep people from doing brake and throttle at the same time and injuring the bike.

Check if the kick stand switch is sticking in the in position. There is a T head on the switch that the side stand pushes in. Check that this T head can move in and out.

If the brake switch keeps the brake light on, disconnect the connector. The bike does not need it to run.

4. Next Check if the lights will come on, turn signals, horn, etc. If they do not come on, check the large cables into the circuit breaker under the seat to make sure they have not disconnected or are loose. Use a small Phillips head screwdriver to tighten.

There is a fuse under the front windshield section on the power convertor on all standard scooters. This is under the back load platform on all Trail models. Check for a blown fuse.

On the Trail bike, there are two fuses in the system as shown here.



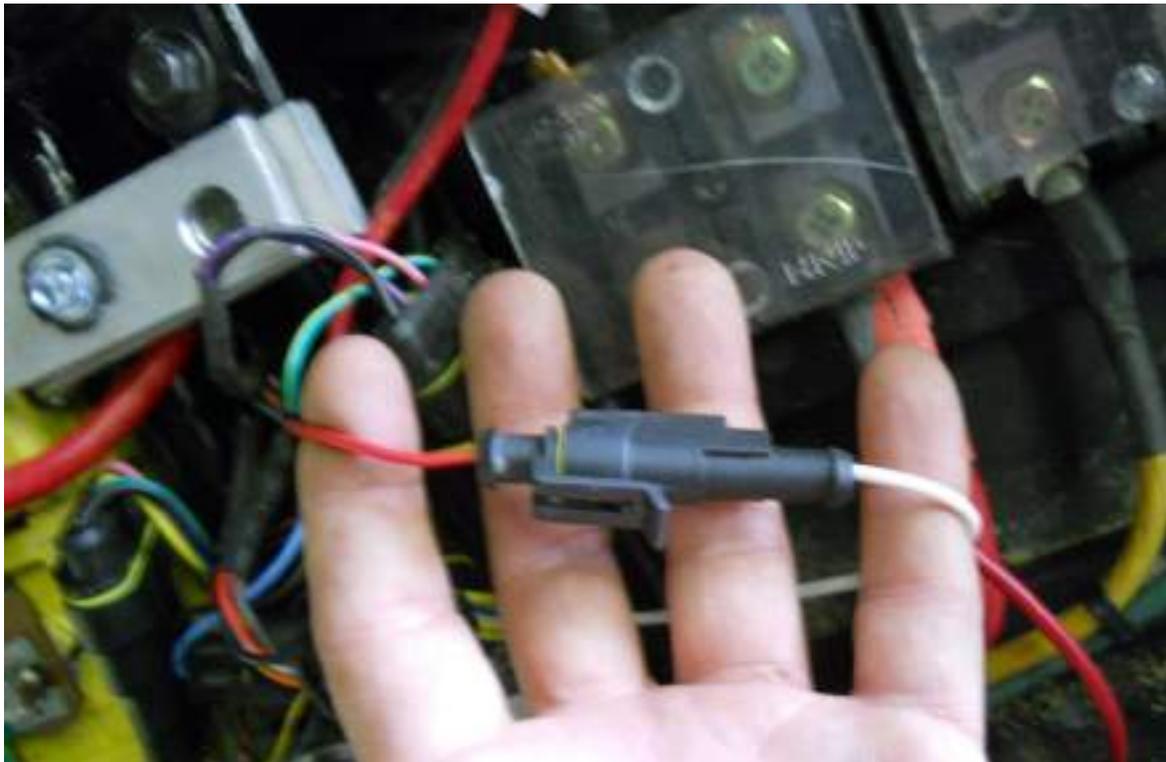
5. Make sure all cables on the main junction box are bolted tightly. Same with the battery connection cables.

6. Check the state of the battery. Measure with a voltmeter the total voltage across the pins at the charging plug socket. It should be +65 volts for a 4100 and 5100 bike, +77 for a 6100 bike, +89 for an 84 volt bike. If there is zero or very low, either the circuit breaker is not on, a battery connection is loose, or a cell is dead.

7. Remove the luggage box by taking out the last 4 most rearward bolts to access the wiring. Cut the plastic ties and examine the push together connectors. Pull on each pin in each connector to see if it has become loose or backed out. Push it back in and check again. If one is loose and will not lock in place, use a bit of glue to prevent it from backing out.

When plugging the connectors back together, look into the end of the connectors to make sure the pins are not bent to the side.

8. Check if the controller is getting power. Coming out of the controller in a black plastic tube are a red wire and a yellow/green stripe wire. The red wire is connected to a white wire from the BMS. (note – there are 2 red wires connected to white wires. One comes out of the controller, one out of the chassis wiring and runs to the key switch). You want the one to the controller.



Disconnect the connector on the red to white wire and with the key on – measure the voltage between the two. It should be +65 volts on 4100 and 5100 bikes, +77 for 6100 bikes, +89 for 84 volt bikes.

If it is not showing a voltage reading, then the BMS is suspect. Run a jumper wire from the main cable junction box hot red cable directly to the red wire into the controller (not the red wire into the chassis). This bypasses the BMS.



9. Check if the throttle is connected or defective. Refer to the wiring connectors chart. There is a 3 pin connector coming out of the controller. This has a pink/purple/black set of wires shown as the 2nd from the left in the photo of the connectors above. Unplug the connector and stick a thin jumper wire into various combinations of two of the holes.



If the motor kicks and runs, then there is a bad connection between the throttle and the wires which run to the back of the bike and the connector or the throttle is broken.

ISSUE – THE BIKE DOES NOT CHARGE

1. Make sure that the circuit breaker is in the on position.
2. Measure the voltage across the pins on the charging plug socket on the bike. If it is down more than 15 volts from the nominal rating of your bike, the charger will not work. The bike has been run down to far. You can use an automotive type charger with over 30 amp rating to charge 4 of the cells at a time (do not dare try to charge the entire string of battery with a car charger) Use the car charger and stand by it as it charges checking with the voltmeter until you reach over 12 volts per 4. This will only take a few minutes.
3. A loose battery connection, a loose white flat BMS connection to a BMS board, a bad cell, a shut off main circuit breaker, a flat white BMS cable incorrectly plugged into the wrong color matched BMS, all will make the bike not charge to full value. Check these as per the sections above.
4. Make sure that the fuses are all good on the charger and on the bike.
5. Is your house wired for the charger draw? The big chargers pull 15 amps, the same as many house breakers. It is possible to cause the house breaker to trip. If the charger trips the circuit, you will need to install a 20 amp breaker in the breaker box of your house.
6. When house circuit breakers trip, the power spike can cause the fuse in the charger to blow. Check it.