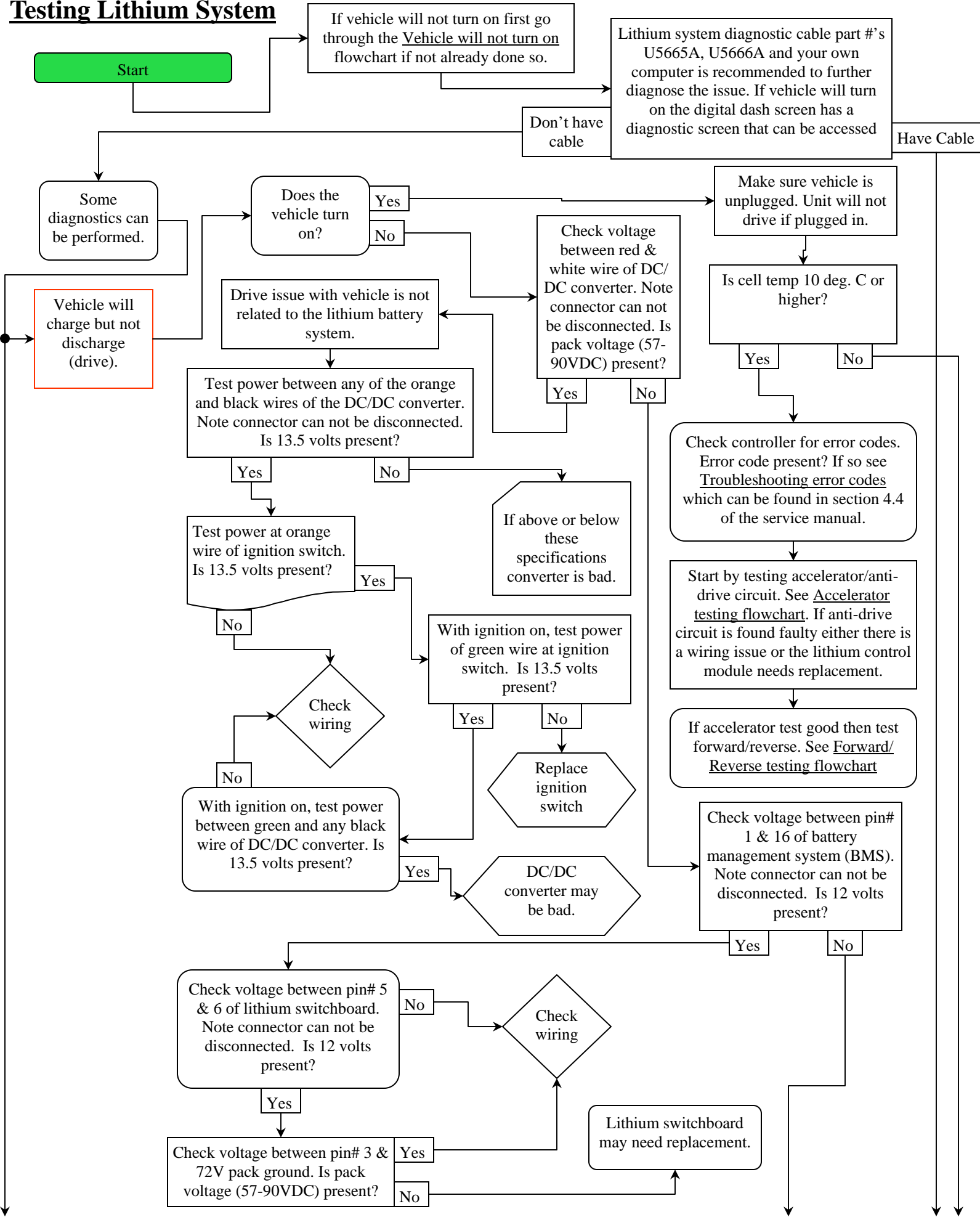
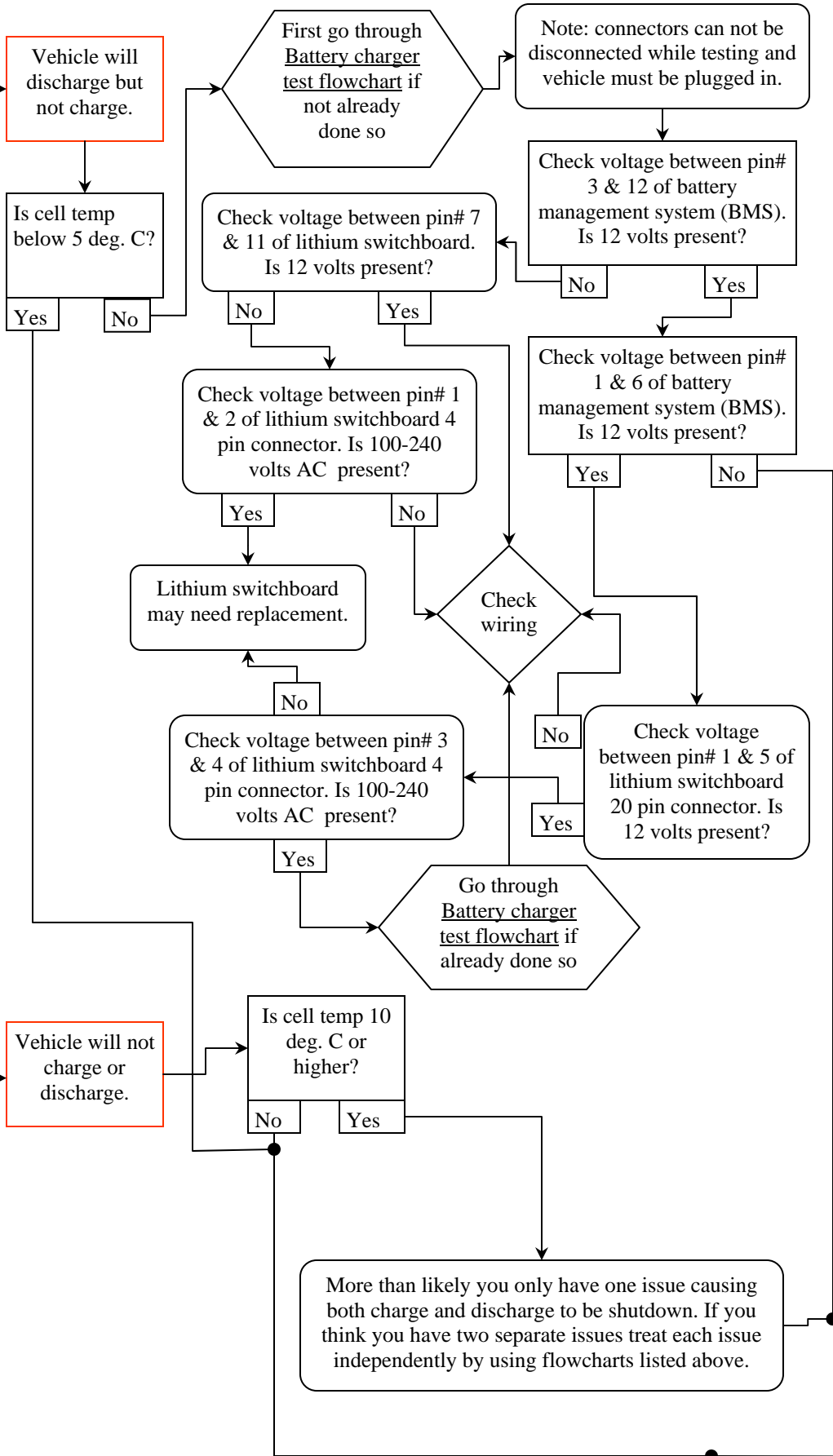


Testing Lithium System





Note that if any cell connections need to be disconnected/tightened/ repaired or modified in anyway the main battery disconnect must be turned off and the lower front 36 pin connector or the BMS must be disconnected! If not done the BMS has a extremely high chance of developing an internal issue.

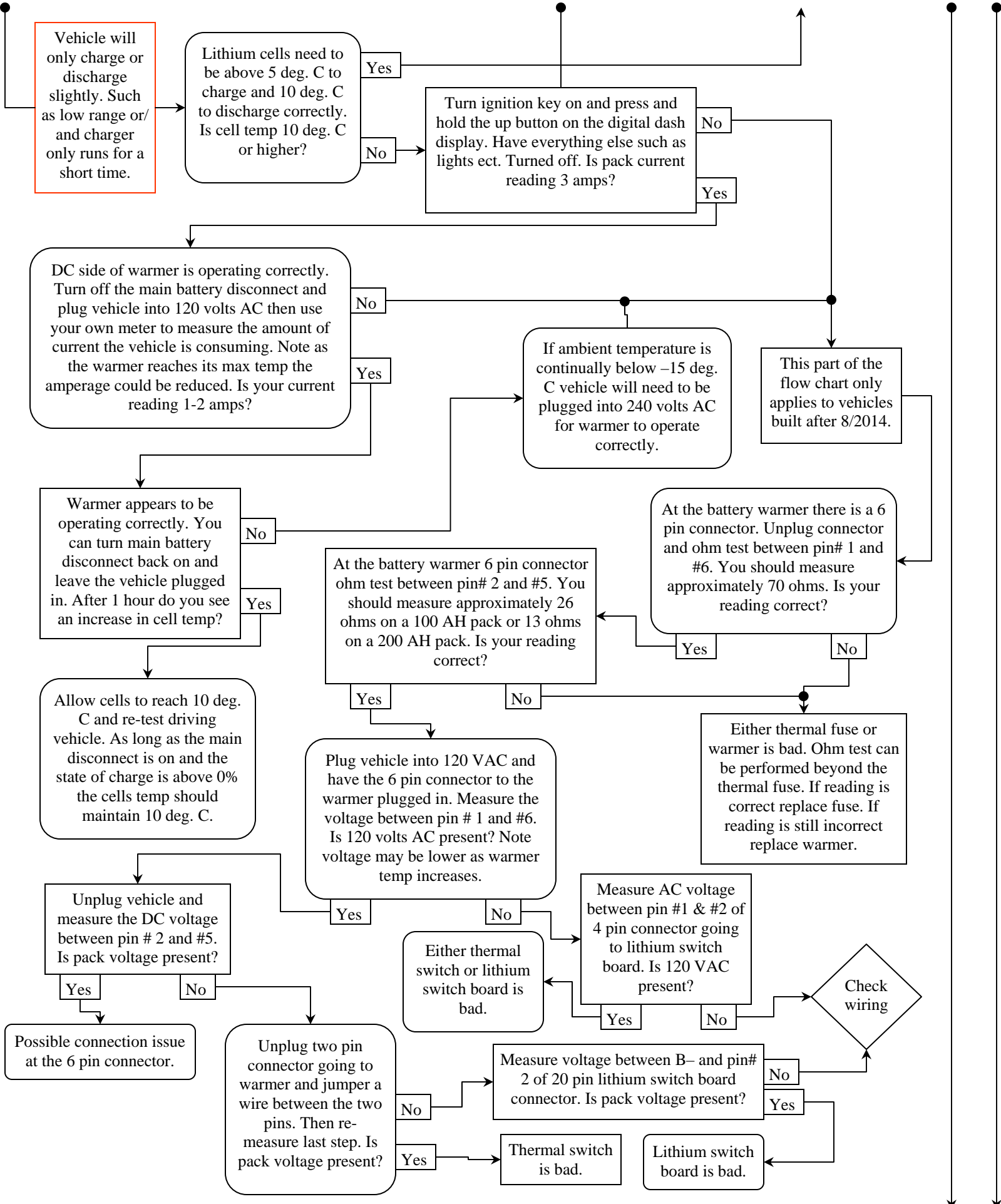
BMS has shut down the vehicle. It works best to have the diagnostic cable at this point. The most you could do with out it is test the voltage of the battery pack and each of the individual lithium cells.

Pack voltage readings unloaded
 Note cell voltage overrides pack voltage.

- Above 89 (BMS shuts down charging)
- 81-89(Charging or just off charge).
- 72-81 (Normal)
- 67-72 (Below 20% SOC)
- 67 (0% SOC)
- Below 67 (BMS shuts down discharging)

Cell voltage readings unloaded

- Above 3.8 (BMS shuts down charging)
- 3.4-3.8(Charging or just off charge).
- 3.0-3.4 (Normal)
- 2.8-3.0 (Below 20% SOC)
- 2.8 (0% SOC)
- Below 2.8 (BMS shuts down discharging)
- Under .5 (BMS thinks its disconnected from the cell. Both discharge and charge will be shut down. In this case and any cell this low needs to be charged)



Vehicle will only charge or discharge slightly. Such as low range or/ and charger only runs for a short time.

Lithium cells need to be above 5 deg. C to charge and 10 deg. C to discharge correctly. Is cell temp 10 deg. C or higher?

Turn ignition key on and press and hold the up button on the digital dash display. Have everything else such as lights ect. Turned off. Is pack current reading 3 amps?

DC side of warmer is operating correctly. Turn off the main battery disconnect and plug vehicle into 120 volts AC then use your own meter to measure the amount of current the vehicle is consuming. Note as the warmer reaches its max temp the amperage could be reduced. Is your current reading 1-2 amps?

If ambient temperature is continually below -15 deg. C vehicle will need to be plugged into 240 volts AC for warmer to operate correctly.

This part of the flow chart only applies to vehicles built after 8/2014.

Warmer appears to be operating correctly. You can turn main battery disconnect back on and leave the vehicle plugged in. After 1 hour do you see an increase in cell temp?

At the battery warmer 6 pin connector ohm test between pin# 2 and #5. You should measure approximately 26 ohms on a 100 AH pack or 13 ohms on a 200 AH pack. Is your reading correct?

At the battery warmer there is a 6 pin connector. Unplug connector and ohm test between pin# 1 and #6. You should measure approximately 70 ohms. Is your reading correct?

Allow cells to reach 10 deg. C and re-test driving vehicle. As long as the main disconnect is on and the state of charge is above 0% the cells temp should maintain 10 deg. C.

Plug vehicle into 120 VAC and have the 6 pin connector to the warmer plugged in. Measure the voltage between pin # 1 and #6. Is 120 volts AC present? Note voltage may be lower as warmer temp increases.

Either thermal fuse or warmer is bad. Ohm test can be performed beyond the thermal fuse. If reading is correct replace fuse. If reading is still incorrect replace warmer.

Unplug vehicle and measure the DC voltage between pin # 2 and #5. Is pack voltage present?

Either thermal switch or lithium switch board is bad.

Measure AC voltage between pin #1 & #2 of 4 pin connector going to lithium switch board. Is 120 VAC present?

Check wiring

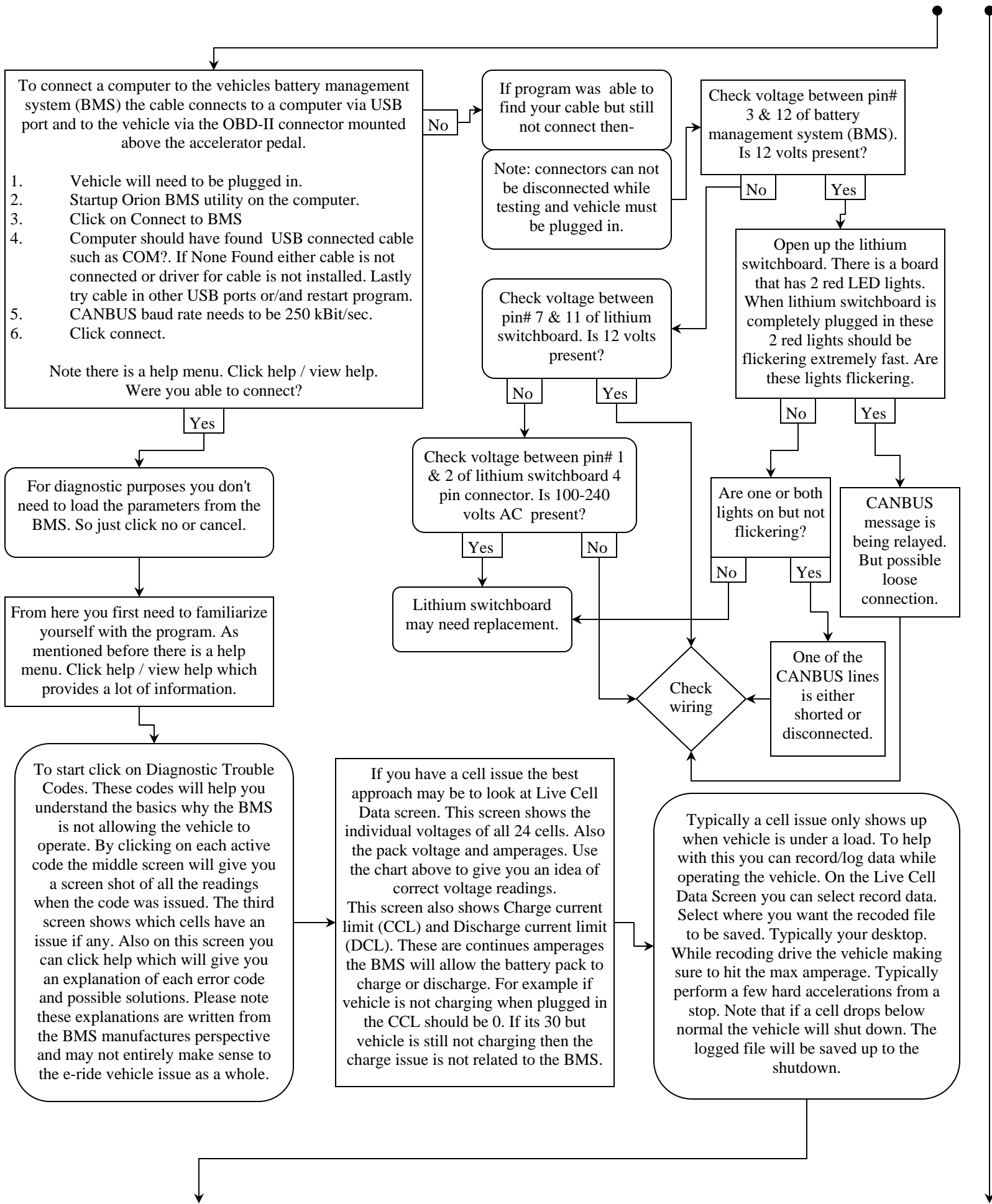
Possible connection issue at the 6 pin connector.

Unplug two pin connector going to warmer and jumper a wire between the two pins. Then re-measure last step. Is pack voltage present?

Measure voltage between B- and pin# 2 of 20 pin lithium switch board connector. Is pack voltage present?

Thermal switch is bad.

Lithium switch board is bad.



To connect a computer to the vehicles battery management system (BMS) the cable connects to a computer via USB port and to the vehicle via the OBD-II connector mounted above the accelerator pedal.

1. Vehicle will need to be plugged in.
2. Startup Orion BMS utility on the computer.
3. Click on Connect to BMS
4. Computer should have found USB connected cable such as COM?. If None Found either cable is not connected or driver for cable is not installed. Lastly try cable in other USB ports or/and restart program.
5. CANBUS baud rate needs to be 250 kBit/sec.
6. Click connect.

Note there is a help menu. Click help / view help.
Were you able to connect?

For diagnostic purposes you don't need to load the parameters from the BMS. So just click no or cancel.

From here you first need to familiarize yourself with the program. As mentioned before there is a help menu. Click help / view help which provides a lot of information.

To start click on Diagnostic Trouble Codes. These codes will help you understand the basics why the BMS is not allowing the vehicle to operate. By clicking on each active code the middle screen will give you a screen shot of all the readings when the code was issued. The third screen shows which cells have an issue if any. Also on this screen you can click help which will give you an explanation of each error code and possible solutions. Please note these explanations are written from the BMS manufactures perspective and may not entirely make sense to the e-ride vehicle issue as a whole.

If program was able to find your cable but still not connect then-

Note: connectors can not be disconnected while testing and vehicle must be plugged in.

Check voltage between pin# 7 & 11 of lithium switchboard. Is 12 volts present?

Check voltage between pin# 1 & 2 of lithium switchboard 4 pin connector. Is 100-240 volts AC present?

Lithium switchboard may need replacement.

If you have a cell issue the best approach may be to look at Live Cell Data screen. This screen shows the individual voltages of all 24 cells. Also the pack voltage and amperages. Use the chart above to give you an idea of correct voltage readings. This screen also shows Charge current limit (CCL) and Discharge current limit (DCL). These are continues amperages the BMS will allow the battery pack to charge or discharge. For example if vehicle is not charging when plugged in the CCL should be 0. If its 30 but vehicle is still not charging then the charge issue is not related to the BMS.

Check voltage between pin# 3 & 12 of battery management system (BMS). Is 12 volts present?

Open up the lithium switchboard. There is a board that has 2 red LED lights. When lithium switchboard is completely plugged in these 2 red lights should be flickering extremely fast. Are these lights flickering.

Are one or both lights on but not flickering?

One of the CANBUS lines is either shorted or disconnected.

CANBUS message is being relayed. But possible loose connection.

Typically a cell issue only shows up when vehicle is under a load. To help with this you can record/log data while operating the vehicle. On the Live Cell Data Screen you can select record data. Select where you want the recoded file to be saved. Typically your desktop. While recoding drive the vehicle making sure to hit the max amperage. Typically perform a few hard accelerations from a stop. Note that if a cell drops below normal the vehicle will shut down. The logged file will be saved up to the shutdown.

After logging data click stop recording. Then at the top of the screen is Data Logging. Click on Data Logging then Chart Recorded Logfile. A Import Data Log screen will popup. Use the screen to find your saved recorded file and click Import. The logfile will load. Speed of computer and size of file will affect time to load. A Log Viewer screen will popup. On the left of the screen you can select what was logged individually. For this instance you will want to check Cell Voltage 1 then hit shift key and check Cell Voltage 24. This will check all cells 1 thru 24. The viewer will graph all selected cells. From this data you should see that all cells are close to each other. Meaning the pack is balanced. If you see one or multiple cells drifting away from the rest of the cells this might indicate an issue.

Also note you can e-mail this saved file to info@e-ride.com if needed help deciphering if there is an issue.

Note that if any cell connections need to be disconnected/tightened/ repaired or modified in anyway the main battery disconnect must be turned off and the lower front 36 pin connector or the BMS must be disconnected! If not done the BMS has a extremely high chance of developing an internal issue.

For example if a cell was in question. Some of the issues that could be causing this is:

Loose connection at cell with bus bar or BMS wire connection.

Bad wire or connection between cell and BMS.

Uneven balancing of cell/s

Bad/weak cell

Open up to the battery pack, locate the cell in question. Use a separate volt meter to measure the voltage right at the cell and compare this reading to what the BMS is showing it to be. Typically the issue will only show up when the vehicle is under a load. So you may need to re-log data while measuring the voltage with your meter to compare accurate comparison data. If voltage readings are different than its likely a connection issue. If voltage readings are the same then likely have either a balancing issue or a bad/weak cell.