

TO: LFEV-ESCM Team
FROM: Naing Htet
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SUBJECT: PacMan Program Errata Memo

ABSTRACT:

The PacMan program is designed to monitor the state of the battery pack and perform charging algorithm. However, there are still improvements that need to be done for the software.

QA TESTING:

While most of the major functions such as charging and discharging were tested, an extensive QA testing hasn't be done for the software. A test plan has not been created as well. Therefore, it should be the first task for next year to QA test the software. Unit testing is advised.

SERIAL COMMUNICATION:

While there is code for serial communication, it was not finished and tested since the isolator chip for RS485. After the isolator chip is replaced, it would be useful to test whether the program works in sending and receiving through the serial communication. After that, the team might find it necessary to implement new commands such getting temperatures of each cell.

EFFECTIVENESS OF CELL BALANCING ALGORITHM:

While a cell balancing algorithm has been in place, its effectiveness hasn't been tested. It is recommended that next year logs the status of the battery pack over many charge cycles and determine whether the current cell balancing algorithm is effective in balancing all the cells. A new and better cell balancing algorithm can also be thought up and implemented instead.

CONFIGURATION PARAMETERS:

Currently, there are not a lot of configurable parameters in place. The software could make more system parameters configurable such as where the output file for logging goes and watchdog

timing intervals. Important and necessary parameters are already configurable but having more parameters configurable will generally improve the software. Furthermore, the program is currently very strict with the config file. It will refuse to start if the config file is missing or corrupted. It is recommended that the program creates a new config file with default values or correct certain missing parameters with default values. Moreover, current SOC is only written to the config file when the program stopped. If the program encounters an unexpected shutdown (for eg-loss of power), SOC information is lost. It is advised that the program saves SOC information once every few minutes.

TEMPERATURE CORRECTION ON CURRENT:

Currently, the current sensor depends on the temperature of its environment. If it is hot, it will display more current than the actual current. A calibration plan was devised to derive the actual current from current reading and temperature reading. However, the relationship between the current and temperature hasn't been derived and the calibration plan not implemented.

AMS FIRMWARE BUG:

A firmware bug exists from 2013. More information about this can be read from 2013 BMS firmware analysis memo. Due to this bug, the AMS returns all zero values or some random numbers mostly on the first reading. A patch was implemented to discard the first reading and all zero reading. However, this means that the bug in the firmware is not completely fixed but only circumvented. It is advised that next year tries to find the bug in the AMS firmware.

GENERAL QUALITY OF LIFE IMPROVEMENTS:

It could be noted that the program could use more functionalities that could improve the ease of use for the program. One example is a much cleaner way to monitor the status of the battery pack. Right now, only ASCII monitoring is available. It was advised to have the program run a web server that could display the current status of the battery pack and users would be able to access it through ethernet. Other improvements include more information available on LCD, better and more informative logging and temperature calibrations.