

Calibrating BMS State of Charge

It has been shown that in some cases, the State of Charge (SOC) reported by the Battery Management System (BMS) for JEMS 4/6 vehicles is incorrect, especially during shore power charging. In particular, the BMS may report 100% SOC when the actual battery SOC may be significantly lower. As a result, low cell voltages may occur when the batteries are under load, resulting in degraded vehicle performance. In these cases, there is typically nothing physically wrong with the batteries; there is simply a significant mismatch between reported versus actual SOC.

The following procedure is intended to be performed when the vehicle is charging via shore power to verify and (if necessary) recalibrate the SOC.

1. Connect the vehicle to shore power and monitor the SOC on the Idle Mitigation System (IMS) display. When the vehicle is connected to shore power, the IMS will automatically charge the lead-acid chassis battery for 30 minutes and then switch the charger over to the Li-ion batteries. Note that when SOC reaches 99%, the IMS will continue to charge the Li-ion batteries for one additional hour. Near the end of that hour (e.g. 50 minutes after SOC reaches 99%) check the following parameters on the IMS display to verify that the end-of-charge criteria have been met:

- a. SOC $\geq$ 99%
- b. B2 voltage $\geq$ 14.0V
- c. B2 amps $\leq$ 20A (JEMS 4) or 30A (JEMS 6)

NOTICE: B1 amps must be shown above B2 amps on the IMS display. If B0 amps are shown above B2 amps, the IMS is charging the lead-acid chassis battery, not the Li-ion batteries.



- d. All cell voltages $\geq$ 3.45V
2. If SOC $\geq$ 99% but conditions b), c) and d) are not met within minor tolerances, the SOC reported by the BMS is incorrect and must be recalibrated. To recalibrate the BMS SOC, disconnect shore power, wait 5 – 10 seconds, and reconnect shore power. Wait 80 minutes, then recheck parameters a), b), c), and d) in Step 1. Repeat Step 1 until the end-of-charge criteria have been met.
3. If the procedure for moving the 12V supply wire (for example, 4807-00133 applies to the AC 100.100-24) has not been implemented, any vehicle left plugged in for more than three days should have its SOC checked and recalibrated if necessary via the above procedure.



February 20, 2018

Alternative Field SOC Calibration

If the SOC indicates 100% but the end-of-charge criteria listed above are not met, and shore power is not available, perform the following steps:

Start the vehicle and engage brake override mode. When the engine is running, the IMS will automatically charge the lead-acid chassis battery for five minutes and then switch the alternator output over to charge the Li-ion batteries. Allow the alternator to charge the Li-ion batteries until the end-of-charge criteria have been met.