

RE-WORK / REPAIRS

Date: 21st March 2020
Revision: 1.0
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Product: Electric Skateboard
Company: Globe Brand

1 CONTENTS

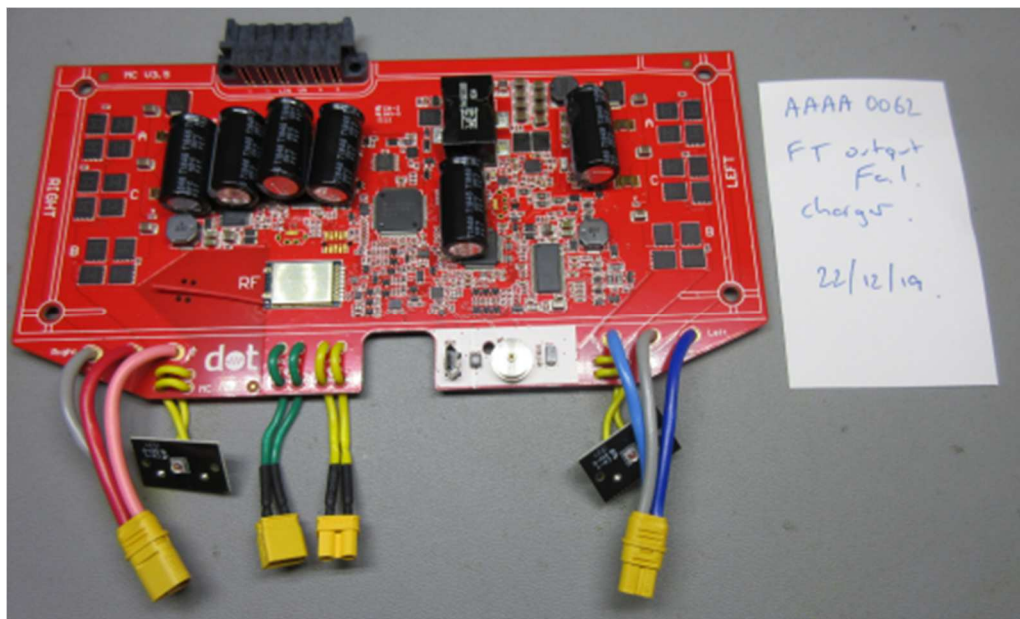
2	Main Controller	3
2.1	AAAA0062.....	3
2.2	No Serial	4
2.3	AAAA005B.....	5
2.4	AAAA0028.....	6
2.5	AAAA0031.....	7
2.6	AAAA0027.....	8
2.7	AAAA0060.....	9
2.8	AAAA0068.....	10
2.9	AAAA008B.....	11
2.10	AAAA0095.....	12
2.11	AAAA0083.....	14
2.12	AAAA0084.....	15
2.13	AAAA007B.....	16
2.14	AAAA007F.....	17
2.15	AAAA0008.....	19
3	Battery Modules.....	21
3.1	BBBB0106	21
3.2	BBBB0125	24
3.3	BBBB01A4.....	25

3.4	BBBB0181	26
3.5	BBBB01F7	28
3.6	BBBB0200	30
3.7	BBBB01FC	32
3.8	BBBB0104	34
3.9	BBBB01A4	36
3.10	BBBB01AF	38
3.11	BBBB0217	40
4	Remotes	42
4.1	DDDD0060	42
4.2	DDDD001C	44
4.3	DDDD003D	45
4.4	DDDD008A	47
5	Tail Lights	48
6	Summary	49
6.1	Battery Modules	49
6.2	Remotes	49
6.3	Tail lights	50

2 MAIN CONTROLLER

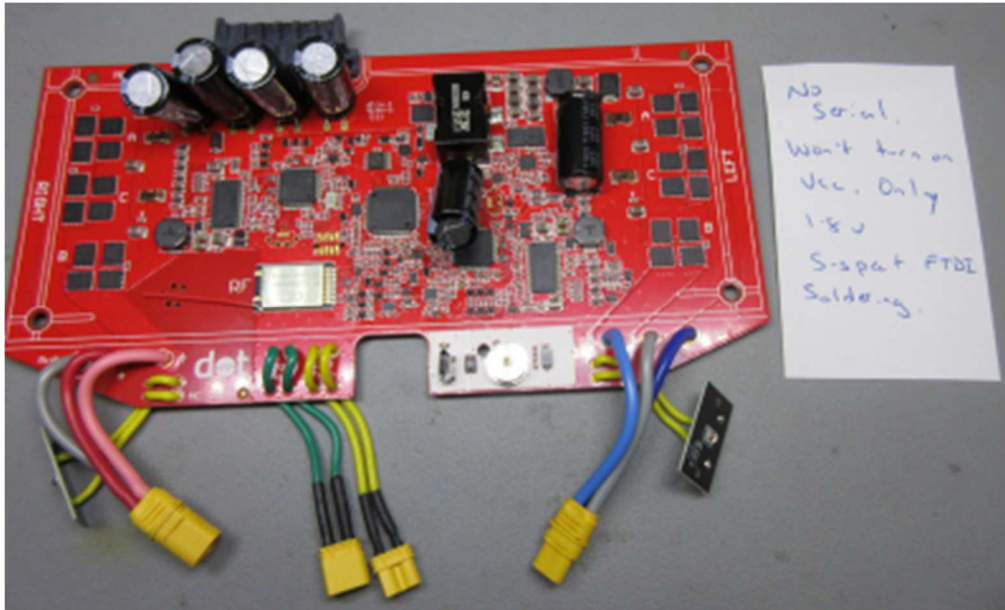
2.1 AAAA0062

Repair attempted. Charger IC not functioning correctly. Possible FET or PCB issue. Time consuming to solve. No action planned.



2.2 NO SERIAL

MC not powering up. Consuming too much power.

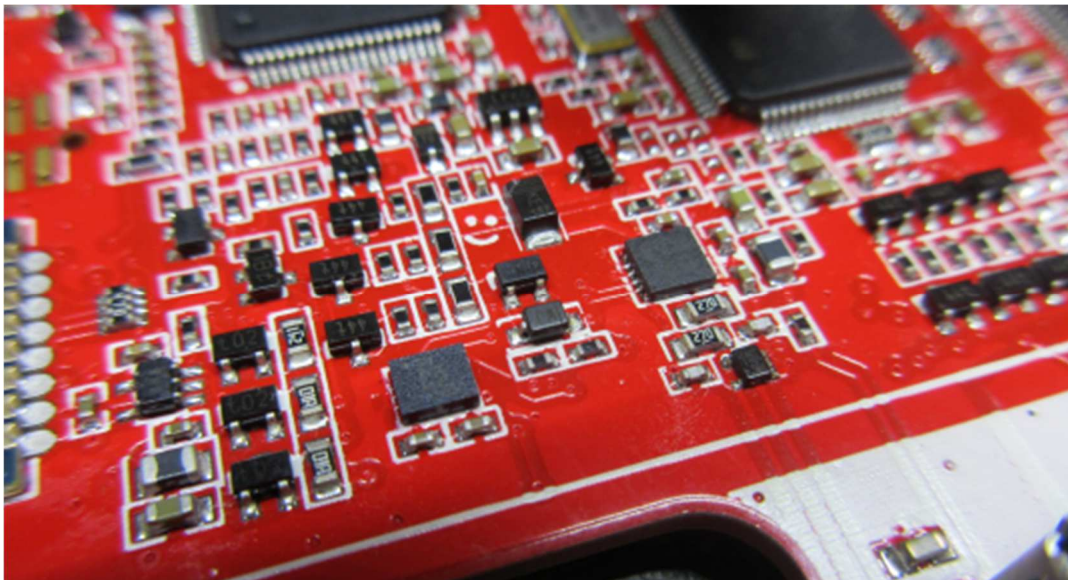


FTDI had bad placement. Removed. No change.

Found accelerometer had shorted VCC power. Removed, MC not consuming power.

Programmed MC and it powered up.

Replaced FTDI and accelerometer.

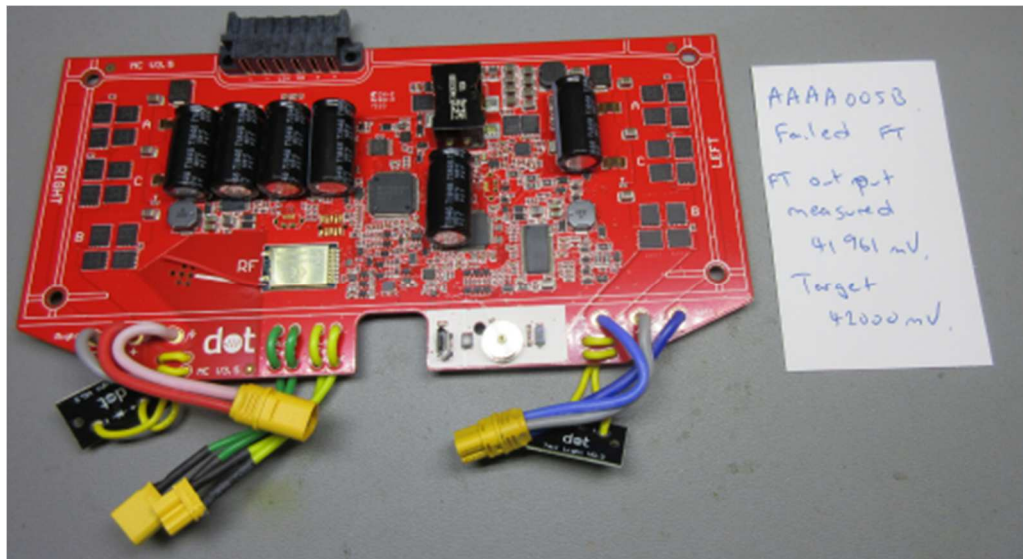


Accelerometer did not work. Reflow, did not work. Replaced again, did not work. Inspected all signals, found no issue. Possible track damage... not taken further with repair.

2.3 AAAA005B

Charger output capability too low. Tolerance issue. Added 1.6Mohm in parallel to R26 to extend range. Reaches 42V.

Repaired. Requires factory function testing.



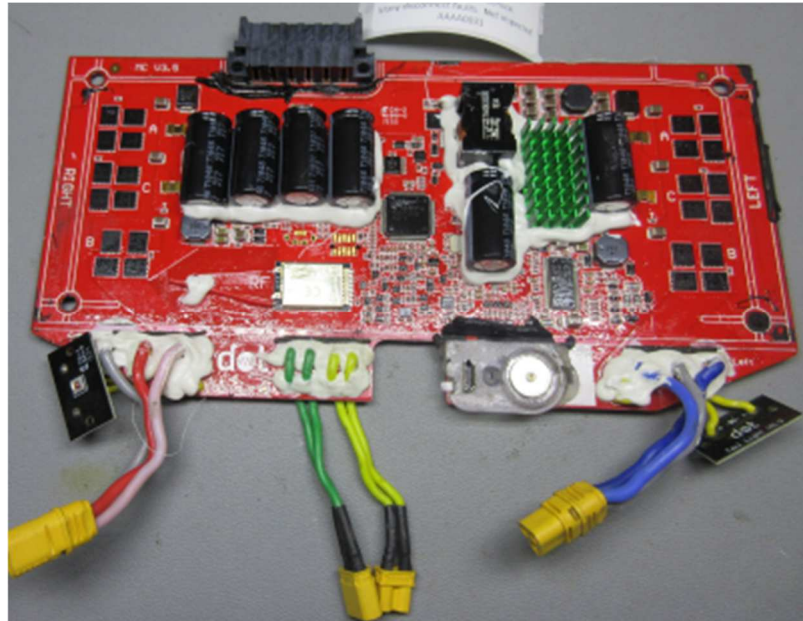
2.4 AAAA0028

Blown VESC bridge. Time consuming to repair. Not deemed

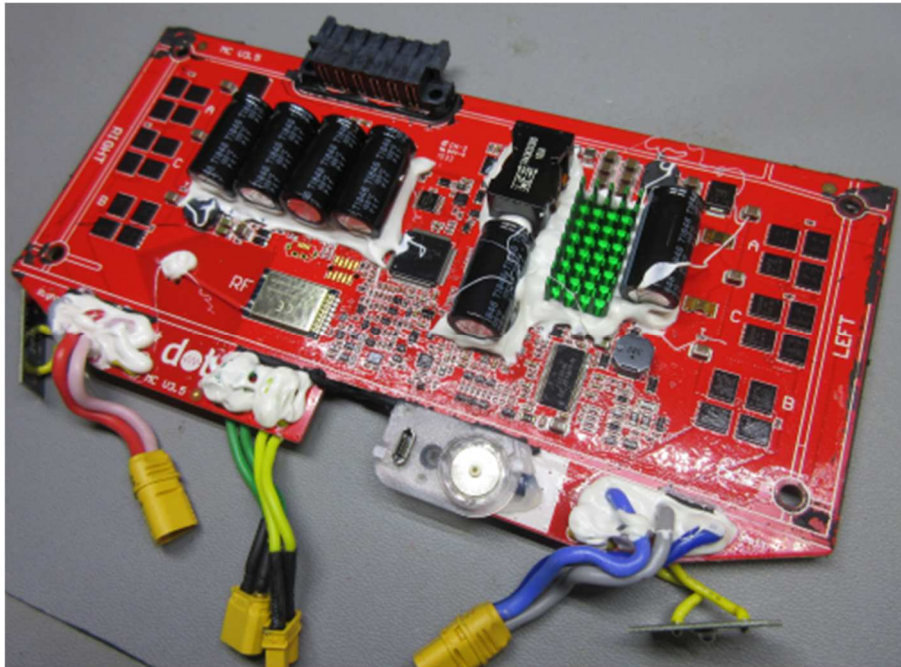


2.5 AAAA0031

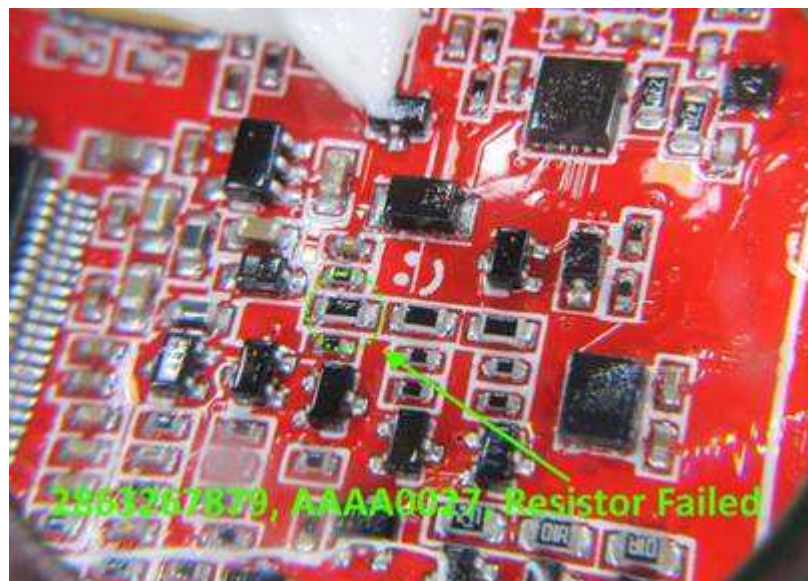
Grey history. Lot of disconnect issues with various board builds and firmware version. Not current considered beneficial to investigate.



MC not recognizing charger connection.



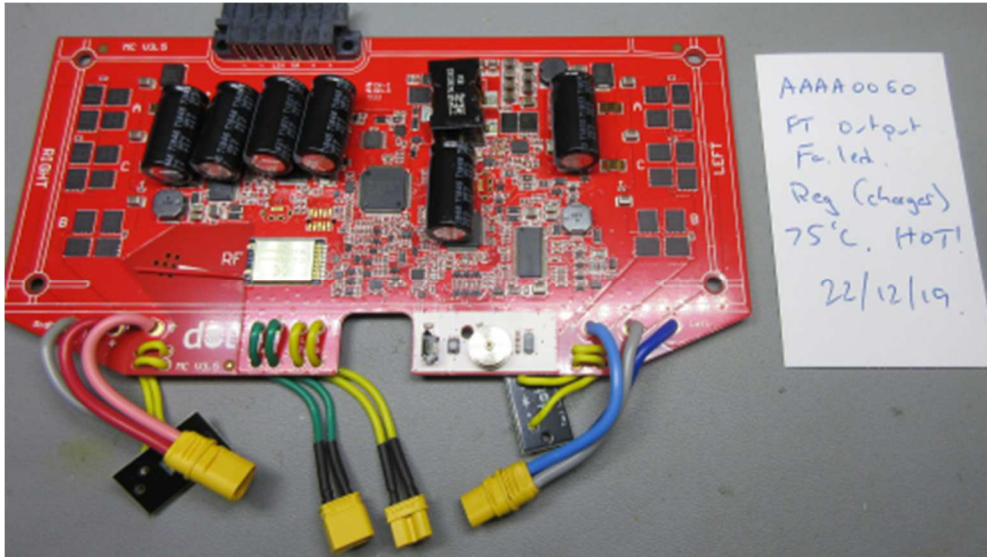
The cause was a resistor used for voltage sensing the chargers presence. The resistor had unexpectedly failed. The main controller had registered a full pass on factory tests (this is recorded internally on the unit), 29-10-2019. There is no technical explanation for this failure post-production, other than a rare occurrence. The production testing is as recommended. It may only be by a pre-delivery check that this type of unexpected fault can be detected.



2.7 AAAA0060

Production Note:

Charging Regulator at 75'C FT Output missed target. Underside to regulator on PCB is very hot.



2020-02-20 - Replaced charger regulator chipset. R26 +||1.6M. Charged BM at 2.2A, ok.

2.8 AAAA0068

Production Note:

Right VESC Confirm programmed, but not activating. Not shown in Remote, Left side works.

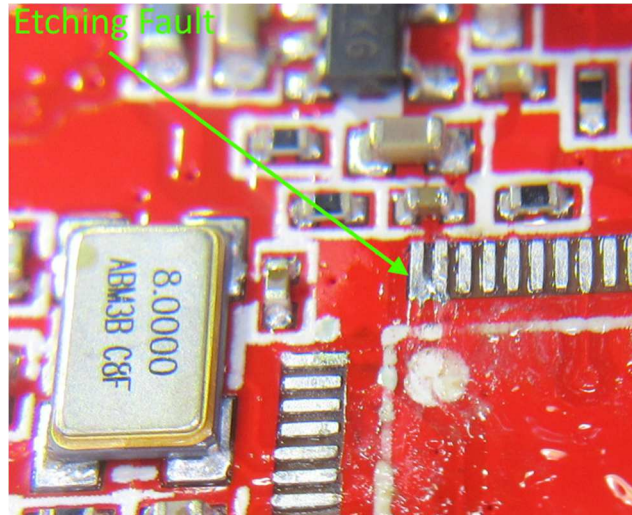
Right VESC was disabled via remote tools. Re-enabled. Cleared fault codes

2.9 AAAA008B

Production Note:

LHS VESC - STM32 wont connect to ST link. Pad clean and components checked with no response.

Fault not apparent. While replacing ST MCU, etching fault found underneath.



Repaired. Passed FT

```
VESC Left
- Module           : Present      --
- Battery Online   : 41333mV      --
- Firmware         : V3.54        --
- Fault Code       : None         --
- Input Voltage    : 41400mV      --
- AD_Phase_B_Avg   : 1790         --
- RPM x10          : 19073        --
- Current          : 210mA        --
- Duty Cycle       : 949          --
- Temperature      : 31.8'C       --
- Left Motor Temp  : 25.3'C       --
```

```
VESC Right
- Module           : Present      --
- Battery Online   : 41336mV      --
- Firmware         : V3.54        --
- Fault Code       : None         --
- Input Voltage    : 41500mV      --
- AD_Phase_B_Avg   : 1801         --
- RPM x10          : 18934        --
- Current          : 210mA        --
- Duty Cycle       : 949          --
- Temperature      : 29.0'C       --
- Right Motor Temp : 25.3'C       --
```

```
Fault Codes
- Not Implemented
```

TEST SUMMARY

```
- Factory Test History : PASS
- Current Testing      : PASS
```

2.10 AAAA0095

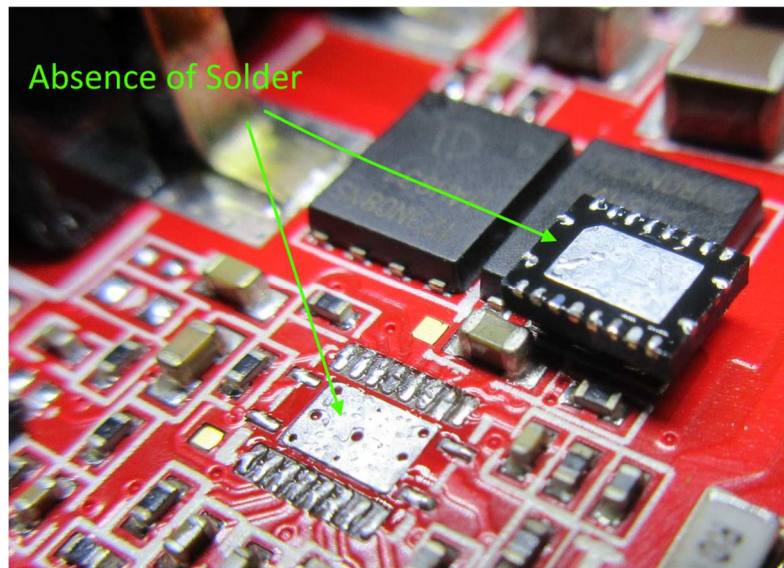
Production Note:

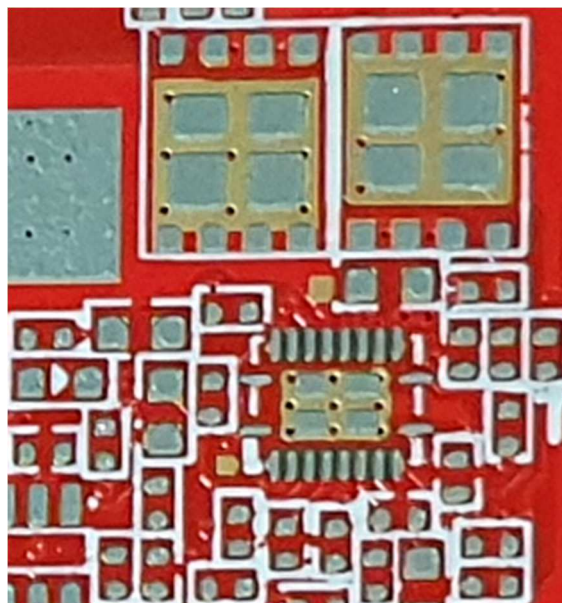
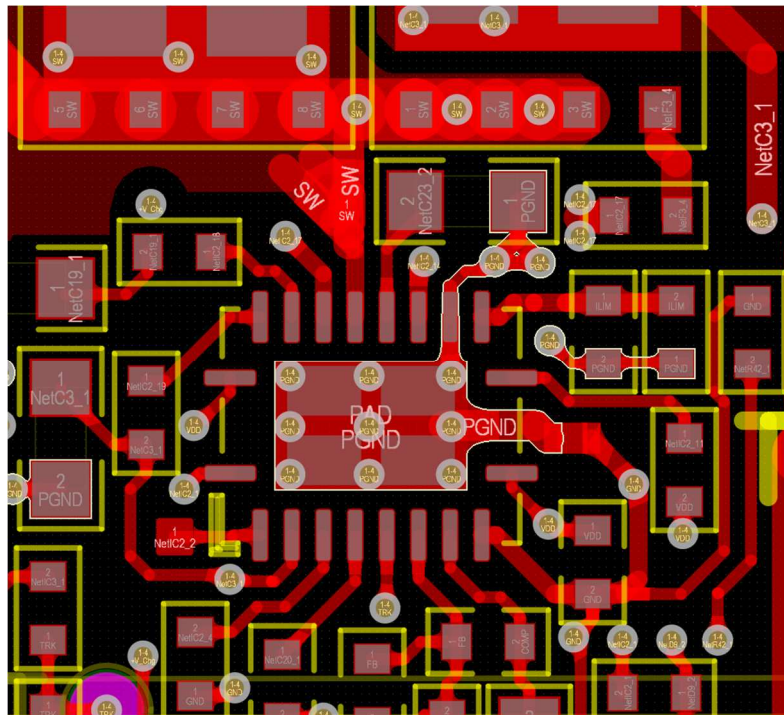
FT Output Fault - Measured 41914mV-----Visual Magic Smoke when charger connected

WH, Visual inspection, clean and examine - no change.

Damage to the chipset was advised near pin 1.

When replacing the charger IC, the center pad on the PCB and component didn't seem to have much solder.





Replacing the IC did not fix the issue. The two main switching FETs were replaced to restore function.

R26 needed adjustment for FT to reach 42V target.

Board passed FT.

2.11 AAAA0083

Production Note:

FT Output Fault - Measured 41838mV - Temp over 80'C

FT output 41838mV & over 80'C temp.

Added 1.6M || R26. Passed FT.

No over temp observed.

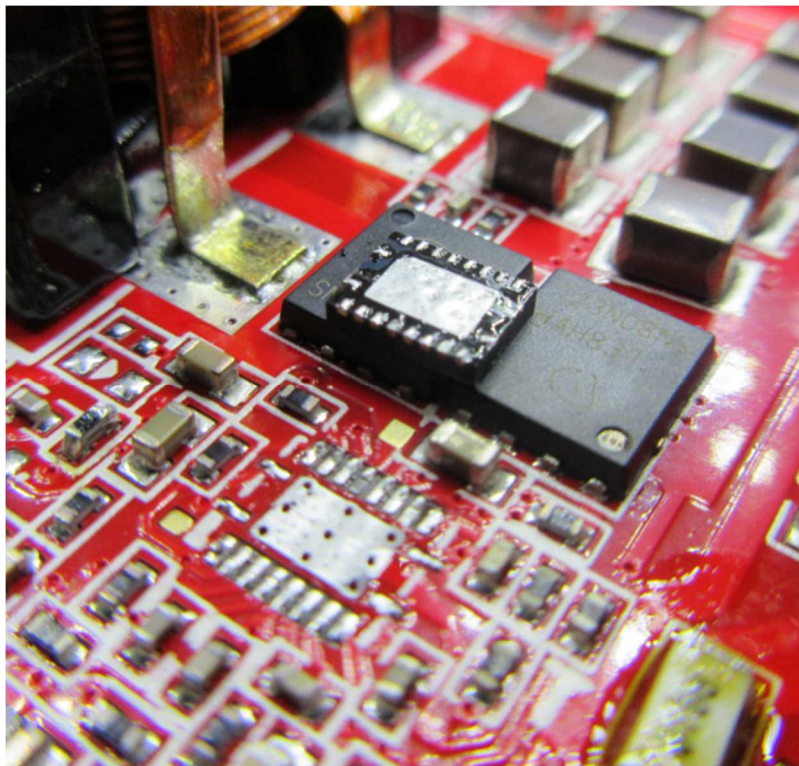
2.12 AAAA0084

Production Note:

FT Output Fault - Measured 41983mV - Temp over 75'C

Replaced charger regulator chipset. R26 +||1.6M.

Passed FT



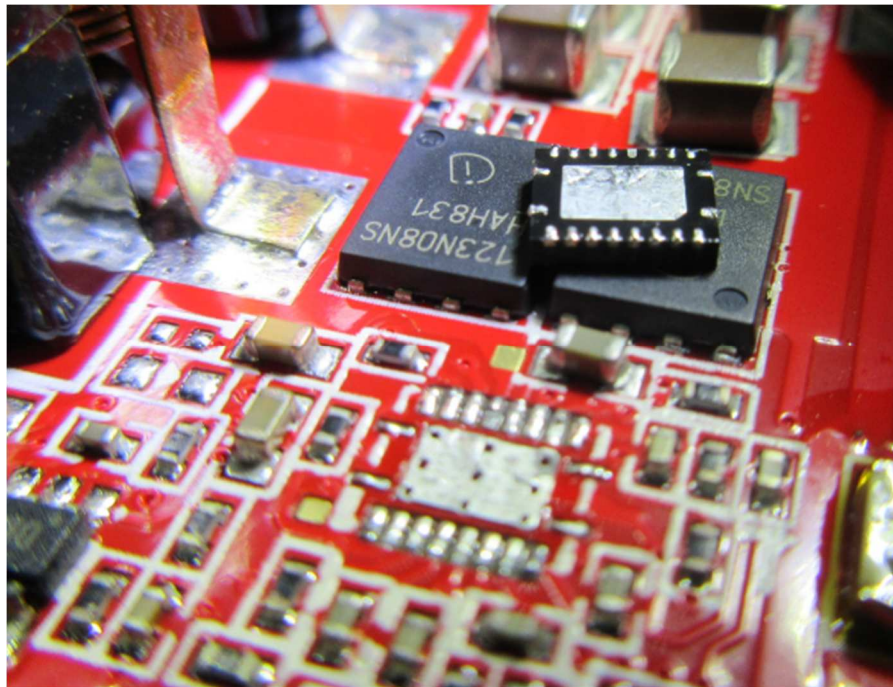
2.13 AAAA007B

Production Note:

FT Output Fault - Measured 41837mV Temp over 80'C

Replaced charger regulator chipset. R26 +||1.6M.

Passed FT

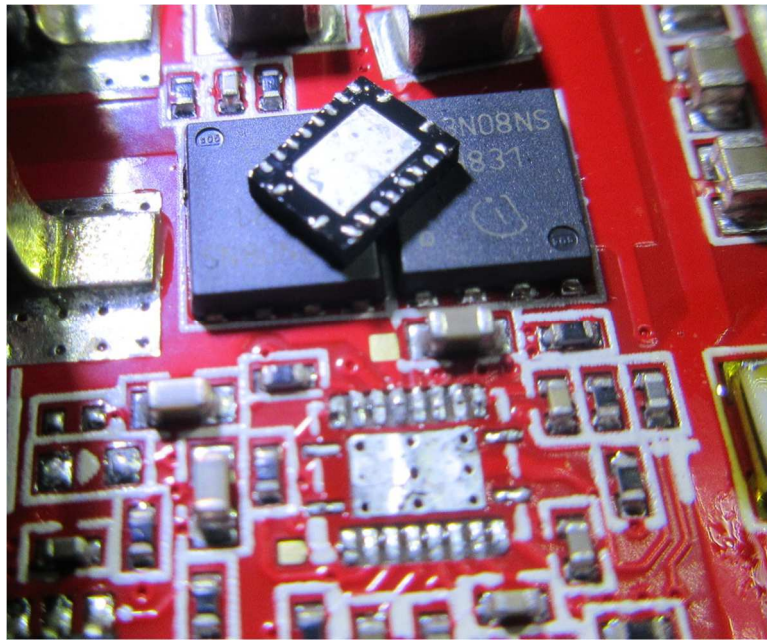


2.14 AAAA007F

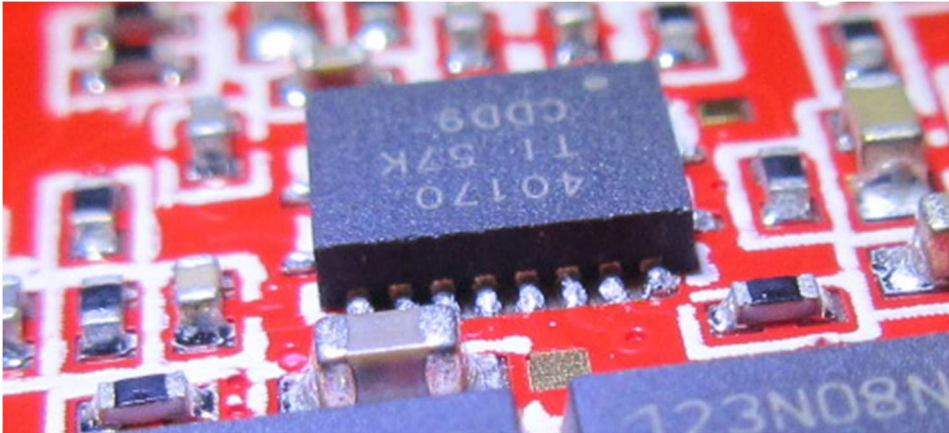
Production Note:

FT Output Fault - Measured 41885mV Temp over 80'C

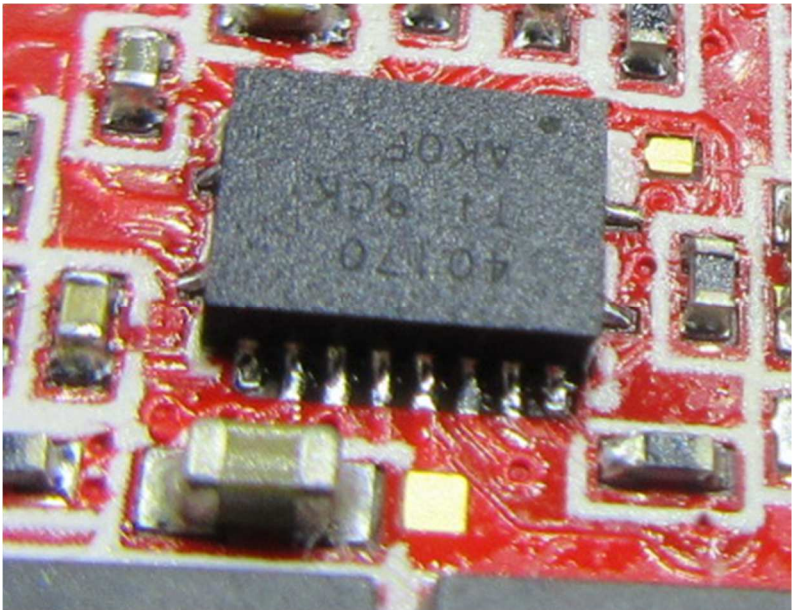
Replaced charger regulator chipset. R26 +||1.6M.



There is some suspicion that the soldering and/or surface contamination on the chipset may be resulting in some dry joints. The contact points on the side of the chipset are too small to probe separately to the corresponding solder. However it is evident on some examples that the solder has not filleted to the edge of the contacts.



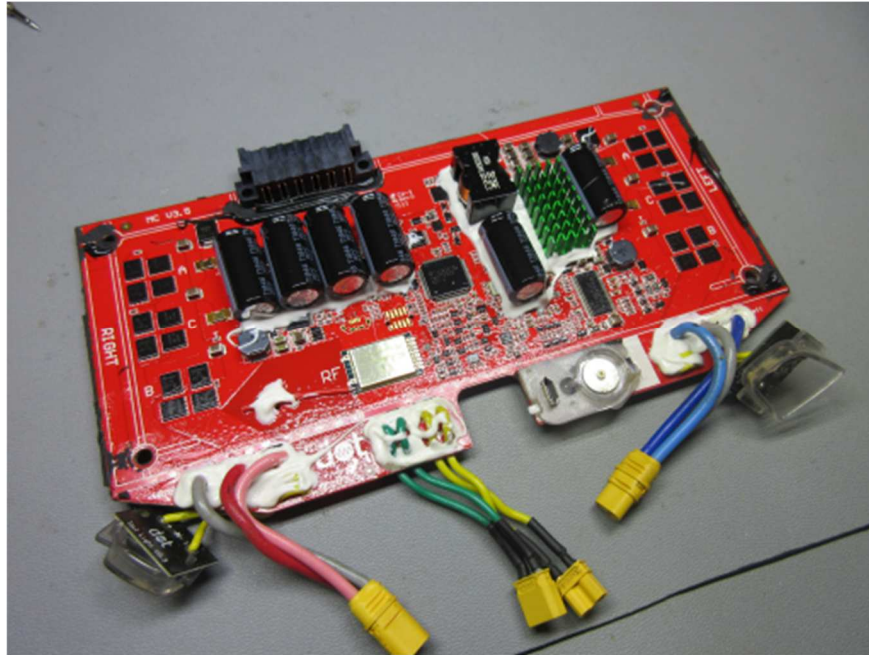
In comparison, after the chipset has been replaced, the filleting of the solder up the sides gives good confidence the joints are not dry.



2.15 AAAA0008

Production Note:

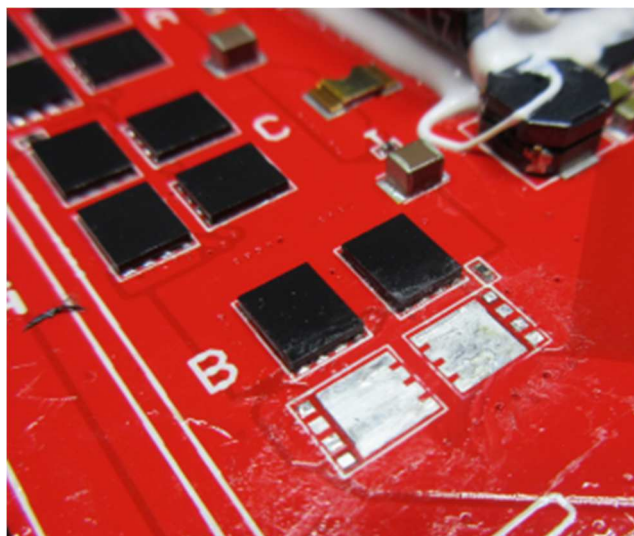
RH VESC Possible damage from wiring issue. VBus off.



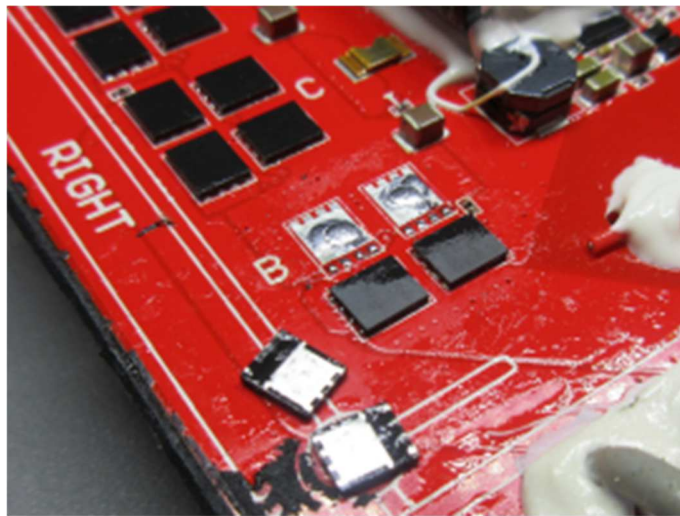
PCBA extracted from enclosure.

VBus has power drain, preventing normal startup. Dot-hub registers data. RHS wheel has restriction.

Removed RHS VESC low side phase-B FETs. One was internally shorted, Rds. Motor spins.



VBus drain still evident. High side has low resistance (1 to 2kohm, not shorted). Removed high side FETs, one was damaged, low Rds.



Board is now functional. Passes FT.

This main controller is not fit for re-sale.

```
VESC Left
- Module           : Present      --
- Battery Online   : 41487mV      --
- Firmware         : V3.54       --
- Fault Code       : None         --
- Input Voltage    : 41600mV     --
- AD_Phase_B_Avg   : 1826         --
- RPM x10          : 19105       --
- Current          : 200mA        --
- Duty Cycle       : 950          --
- Temperature      : 31.1'C      --
- Left Motor Temp  : 24.1'C      --
```

```
VESC Right
- Module           : Present      --
- Battery Online   : 41498mV     --
- Firmware         : V3.54       --
- Fault Code       : None         --
- Input Voltage    : 41600mV     --
- AD_Phase_B_Avg   : 1818         --
- RPM x10          : 18970       --
- Current          : 240mA        --
- Duty Cycle       : 949          --
- Temperature      : 35.2'C      --
- Right Motor Temp : 24.0'C      --
```

```
Fault Codes
- Not Implemented
```

```
TEST SUMMARY
- Factory Test History : PASS
- Current Testing      : PASS
```

3 BATTERY MODULES

3.1 BBBB0106

Production notes:

- Diagnostic data sent to Tony for evaluation - Unsealed - not charging on board.
- Unit is damaged by corrosion, taken out of production.

Production log:

```
-----  
Battery Position: 1  
Model : BM100  
Hardware Version : 22  
Software Version : 18  
Serial Number : BBBB0106  
Batch Number : 0  
Production Date : 9-11-2019  
Factory Tested : Yes  
  
Battery Metrics  
- State of Charge : 1.5%  
- Current Capacity : 1.08Wh >  
- Full Capacity : 72.00Wh --  
- #Charge Cycles x32 : 0 --  
- Cell Resistance 25C : 0mohm >  
-----
```

Upgraded to V019 firmware to ensure compatibility wasn't the cause of the issue.

```
-----  
Battery Position: 0  
Model : BM100  
Hardware Version : 22  
Software Version : 19  
Serial Number : BBBB0106  
Batch Number : 0  
Production Date : 9-11-2019  
Factory Tested : No  
  
Battery Metrics  
- State of Charge : 0.0%  
- Current Capacity : 0.00Wh >  
- Full Capacity : 72.00Wh --  
- #Charge Cycles x32 : 0 --  
- Cell Resistance 25C : 0mohm >  
-----
```

Firmware in V084 has additional detection for current calibration routine....

```

-----
Battery Accepted      : BBBB0106

- Calibration at 0V   : 8           --
- V_Switch           : 45mV
- I_Current_Sense    : -10mA        --

FT Output Fault      :                * FAIL *
- Target             : 8000mV
- Measured           : 8002mV
- V_Switch           : 533mV        * FAIL * ←
- Battery Status     : On           --

TEST SUMMARY
- Testing            :                * FAIL *
- Calibration        :                * FAIL *

Battery Pack Removed

```

Switch driver replaced. Not change. Main power switch FETs were deemed failed.

Replaced F1, F11. Shorted.

Voltage calibration now passes.

```

-----
Battery Accepted      : BBBB0106

Reference Connected   :                --
- Cell 0             : 4178mV
- Cell 9             : 41861mV

Calibration in Range :                --
- Voltage Offset     : 7           --
- Voltage Gain       : 13166      --

Calibration Verified  :                --
- Cell 0             : 4198mV
- Cell 9             : 41999mV

Power Switch         :                --
- V_Switch_Off       : 148mV

TEST SUMMARY
- Voltage Calibration :                PASS
- Power Switch       :                PASS

```

Current calibration failed.

```

-----
Battery Accepted      : BBBB0106

- Calibration at 0V   : 8           --
- V_Switch           : 32mV
- I_Current_Sense    : 0mA        --

FT Output Fault      :                * FAIL *
- Target             : 8000mV
- Measured           : 8056mV
- V_Switch           : 5463mV        * FAIL *
- Battery Status     : On           --

```

```

TEST SUMMARY
- Testing           :           * FAIL *
- Calibration       :           * FAIL *

```

Removed F2, F12. Basic FET testing fault no issue.

Replaced F2, F12 and IC9, LTC4368IMS-1

Voltage and Current calibration passes.

```

-----
Battery Accepted      : BBBB0106

- Calibration at 0V   : 247           --
- V_Switch           : 37mV            --
- I_Current_Sense    : 0mA             --

- Negative Reference :                --
- Cell 0             : 752mV           --
- Cell 1             : 1485mV          --
- Cell 9             : 7991mV          --

- Cell Balancing     :                --
- Cell 9             : 25001mV         --

- Cell Measurement   :                --

- Calibration at 25V : 249             --
- V_Switch           : 24978mV         --
- I_Current_Sense    : 10mA            --

- Calibration at 36V : 246             --
- V_Switch           : 35998mV         --
- I_Current_Sense    : 0mA             --
- Calibration at 41V : 247             --
- V_Switch           : 40970mV         --
- I_Current_Sense    : -10mA           --

- Calibration at 42V : 245             --
- V_Switch           : 41984mV         --
- I_Current_Sense    : 0mA             --

- Calibration Verified :                --

TEST SUMMARY
- Testing           :           PASS
- Calibration       :           PASS

```

Passes final FT, charges and drives motors.

Not fit for re-sale.

3.2 BBBB0125

Production Note:

Passes test but won't charge cells. Tried new cell pack. Only charging issue.

Battery voltage calibration now identifies power switch fault.

```
-----  
Battery Accepted           : BBBB0125  
  
Reference Connected       :           --  
- Cell 0                  : 4204mV  
- Cell 9                  : 41912mV  
  
Calibration in Range     :           --  
- Voltage Offset         : -11      --  
- Voltage Gain           : 13156   --  
  
Calibration Verified     :           --  
- Cell 0                  : 4203mV  
- Cell 9                  : 42000mV  
  
TEST SUMMARY  
- Voltage Calibration    :           PASS  
- Power Switch           :           > FAIL
```

FT was reporting green light for success. This is picked up on final FT, however V084 revised to correct light registration and to report switch voltage.

Replaced IC9, LTC4368IMS-1. Passed Voltage Calibration.

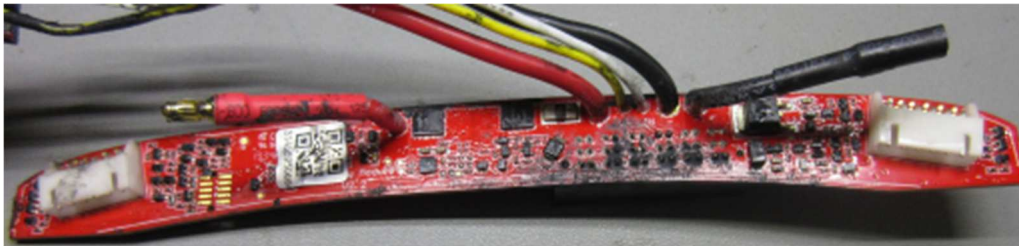
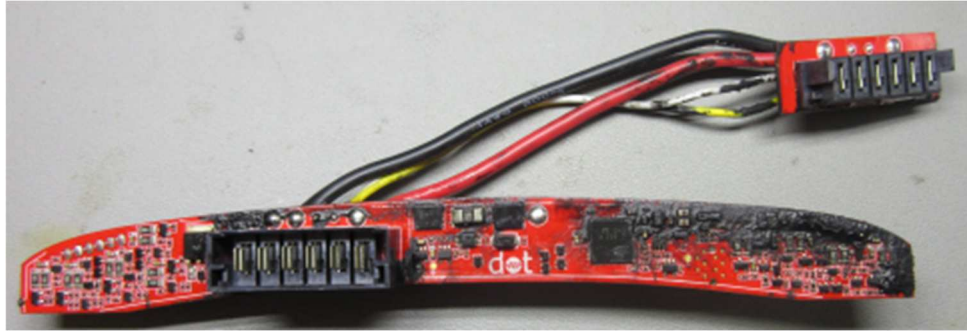
```
-----  
Battery Accepted           : BBBB0125  
  
Reference Connected       :           --  
- Cell 0                  : 4191mV  
- Cell 9                  : 41912mV  
  
Calibration in Range     :           --  
- Voltage Offset         : 0        --  
- Voltage Gain           : 13152   --  
  
Calibration Verified     :           --  
- Cell 0                  : 4199mV  
- Cell 9                  : 41999mV  
  
Power Switch             :           --  
- V_Switch_Off           : 51mV  
  
TEST SUMMARY  
- Voltage Calibration    :           PASS  
- Power Switch           :           PASS
```

Pass all FT testing. Charged and ran motors.

3.3 BBBB01A4

Production Note:

Failed FT. Current Cal @ 36V, 41V.



```
-----  
Battery Accepted          : BBBB01A4  
  
- Calibration at 0V      : 9          --  
- V_Switch              : 36mV  
- I_Current_Sense       : 0mA        --  
  
FT Output Fault          :           * FAIL *  
- Target                 : 8000mV  
- Measured                : 8065mV  
- V_Switch                : 5479mV    * FAIL *  
- Battery Status         : On          --  
  
TEST SUMMARY  
- Testing                 :           * FAIL *  
- Calibration              :           * FAIL *
```

3.4 BBBB0181

Production Note:

Unit failed final Charging test once assembled. Intermittent LIN error or power. PCBA removed and bagged for Inspection

```
-----  
Battery Accepted          : BBBB0181  
  
- Calibration at 0V       : 14          --  
- V_Switch               : 24mV         --  
- I_Current_Sense        : 0mA          --  
  
- Negative Reference     :              --  
- Cell 0                 : 757mV        --  
- Cell 1                 : 1491mV       --  
- Cell 9                 : 8015mV       --  
  
- Cell Balancing         :              --  
- Cell 9                 : 25053mV      --  
  
- Cell Measurement      :              --  
  
- Calibration at 25V     : 19          --  
- V_Switch               : 25048mV      --  
- I_Current_Sense        : 0mA          --  
  
- Calibration at 36V     : 21          --  
- V_Switch               : 36081mV      --  
- I_Current_Sense        : 10mA         --  
  
- Calibration at 41V     : 22          --  
- V_Switch               : 41066mV      --  
- I_Current_Sense        : 10mA         --  
  
- Calibration at 42V     : 22          --  
- V_Switch               : 42050mV      --  
- I_Current_Sense        : 10mA         --  
  
- Calibration Verified   :              --  
  
TEST SUMMARY  
- Testing                :              PASS  
- Calibration             :              PASS  
-----
```

[DIAG] [TEST] [30] \r -->

```
Battery Position: 0  
Model              : BM100  
Hardware Version   : 22  
Software Version   : 19  
Serial Number      : BBBB0181  
Batch Number       : 6  
Production Date    : 6-12-2019  
Factory Tested     : No
```

```
Battery Metrics  
- State of Charge   : 0.0%  
- Current Capacity  : 0.00Wh  
- Full Capacity     : 72.00Wh  --  
- #Charge Cycles x32 : 0          --  
- Cell Resistance 25C : 0mohm
```

[DIAG] [TEST] [10]\r -->

```
-----  
Battery Position: 0  
Model : BM100  
Hardware Version : 22  
Software Version : 19  
Serial Number : BBBB0181  
Batch Number : 6  
Production Date : 6-12-2019  
Factory Tested : No  
  
Measurements  
- V_Bus : 34297mV --  
- Battery : 34301mV --  
- V_Switch : 34301mV --  
- V_Switch_Off : 63mV --  
- VCC : 3308mV --  
- V_Offset : 3001mV --  
- V_Current_Sense : 1483mV --  
- I_Current_Sense : 20mA --  
  
Cell Voltages  
- Cell 0 : 3421mV --  
- Cell 1 : 3424mV --  
- Cell 2 : 3423mV --  
- Cell 3 : 3436mV --  
- Cell 4 : 3435mV --  
- Cell 5 : 3423mV --  
- Cell 6 : 3433mV --  
- Cell 7 : 3414mV --  
- Cell 8 : 3437mV --  
- Cell 9 : 3436mV --  
  
Temperature Sensors  
- PCB : 25.1'C --  
- Cells 0-4 : 24.0'C --  
- Cells 5-9 : 24.1'C --  
  
Calibration  
- Voltage Offset : -27 --  
- Voltage Gain : 13177 --  
- Current Offset 0V : 14 --  
- Current Offset 25V : 19 --  
- Current Offset 36V : 21 --  
- Current Offset 41V : 22 --  
- Current Offset 42V : 22 --  
- Voltage Calibrated : Yes --  
- Current Calibrated : Yes --  
  
Factory Tested  
- Power Switch : --  
- Cell Balancing : --  
- Cell Measurement : --  
- Negative Reference : --  
  
TEST SUMMARY  
- Factory Test History : PASS  
- Current Testing : PASS  
-----
```

3.5 BBBB01F7

Production Note

I_Current_Sense : -160mA > FAIL

```
-----  
Battery Accepted           : BBBB01F7  
  
- Calibration at 0V       : 5           --  
- V_Switch               : 44mV          --  
- I_Current_Sense        : -20mA         --  
  
- Negative Reference     :              --  
- Cell 0                 : 764mV         --  
- Cell 1                 : 1496mV        --  
- Cell 9                 : 8009mV        --  
  
- Cell Balancing         :              --  
- Cell 9                 : 25042mV       --  
  
- Cell Measurement      :              --  
  
- Calibration at 25V     : 18           --  
- V_Switch               : 25028mV       --  
- I_Current_Sense        : 20mA          --  
  
- Calibration at 36V     : 19           --  
- V_Switch               : 36029mV       --  
- I_Current_Sense        : 0mA           --  
  
- Calibration at 41V     : 20           --  
- V_Switch               : 41074mV       --  
- I_Current_Sense        : 0mA           --  
  
- Calibration at 42V     : 20           --  
- V_Switch               : 42055mV       --  
- I_Current_Sense        : 0mA           --  
  
- Calibration Verified   :              --  
  
TEST SUMMARY  
- Testing                 :              PASS  
- Calibration             :              PASS  
  
-----
```

```
Battery Position: 0  
Model                   : BM100  
Hardware Version        : 22  
Software Version        : 19  
Serial Number           : BBBB01F7  
Batch Number            : 9  
Production Date         : 2-2-2020  
Factory Tested          : No  
  
Measurements  
- V_Bus                 : 34457mV       --  
- Battery               : 34445mV       --  
- V_Switch              : 34445mV       --  
- V_Switch_Off          : 122mV         --  
- VCC                   : 3285mV        --
```

```

- V_Offset           : 2990mV      --
- V_Current_Sense    : 1482mV      --
- I_Current_Sense    : 20mA        --

Cell Voltages
- Cell 0             : 3448mV      --
- Cell 1             : 3443mV      --
- Cell 2             : 3442mV      --
- Cell 3             : 3442mV      --
- Cell 4             : 3443mV      --
- Cell 5             : 3443mV      --
- Cell 6             : 3443mV      --
- Cell 7             : 3423mV      --
- Cell 8             : 3456mV      --
- Cell 9             : 3444mV      --

Temperature Sensors
- PCB                : 25.8'C      --
- Cells 0-4          : 24.3'C      --
- Cells 5-9          : 24.6'C      --

Calibration
- Voltage Offset     : 32          --
- Voltage Gain       : 13154       --
- Current Offset 0V  : 8          --
- Current Offset 25V : 18         --
- Current Offset 36V : 19         --
- Current Offset 41V : 20         --
- Current Offset 42V : 20         --
- Voltage Calibrated : Yes        --
- Current Calibrated : Yes        --

Factory Tested
- Power Switch       :             --
- Cell Balancing     :             --
- Cell Measurement   :             --
- Negative Reference :             --

TEST SUMMARY
- Factory Test History :             PASS
- Current Testing      :             PASS

```

Charge tested, 2.2A

Powered motors.

Deemed functional.

3.6 BBBB0200

Production Note

I_Current_Sense : -90mA > FAIL

```
-----  
Battery Accepted           : BBBB0200  
  
- Calibration at 0V       : 2           --  
- V_Switch                : 36mV          --  
- I_Current_Sense        : 0mA           --  
  
- Negative Reference     :              --  
- Cell 0                  : 744mV         --  
- Cell 1                  : 1490mV        --  
- Cell 9                  : 8004mV        --  
  
- Cell Balancing         :              --  
- Cell 9                  : 25046mV       --  
  
- Cell Measurement       :              --  
  
- Calibration at 25V     : 9           --  
- V_Switch                : 25044mV       --  
- I_Current_Sense        : 0mA           --  
  
- Calibration at 36V     : 10          --  
- V_Switch                : 36078mV       --  
- I_Current_Sense        : 0mA           --  
  
- Calibration at 41V     : 10          --  
- V_Switch                : 41080mV       --  
- I_Current_Sense        : 0mA           --  
  
- Calibration at 42V     : 11          --  
- V_Switch                : 42063mV       --  
- I_Current_Sense        : 0mA           --  
  
- Calibration Verified   :              --  
  
TEST SUMMARY  
- Testing                 :              PASS  
- Calibration             :              PASS  
  
-----
```

```
Battery Position: 0  
Model                   : BM100  
Hardware Version        : 22  
Software Version        : 19  
Serial Number           : BBBB0200  
Batch Number            : 9  
Production Date         : 2-2-2020  
Factory Tested          : No
```

```
Measurements  
- V_Bus                  : 34616mV       --  
- Battery                : 34612mV       --  
- V_Switch               : 34623mV       --  
- V_Switch_Off           : 74mV          --  
- VCC                    : 3295mV        --  
- V_Offset               : 2994mV        --
```

```

- V_Current_Sense      : 1492mV    --
- I_Current_Sense     : 20mA      --

Cell Voltages
- Cell 0               : 3460mV    --
- Cell 1               : 3462mV    --
- Cell 2               : 3460mV    --
- Cell 3               : 3463mV    --
- Cell 4               : 3462mV    --
- Cell 5               : 3462mV    --
- Cell 6               : 3452mV    --
- Cell 7               : 3464mV    --
- Cell 8               : 3450mV    --
- Cell 9               : 3463mV    --

Temperature Sensors
- PCB                  : 26.0'C    --
- Cells 0-4           : 24.7'C    --
- Cells 5-9           : 25.0'C    --

Calibration
- Voltage Offset      : -28      --
- Voltage Gain        : 13181     --
- Current Offset 0V   : 2        --
- Current Offset 25V  : 9        --
- Current Offset 36V  : 10       --
- Current Offset 41V  : 10       --
- Current Offset 42V  : 11       --
- Voltage Calibrated  : Yes       --
- Current Calibrated  : Yes       --

Factory Tested
- Power Switch        :          --
- Cell Balancing      :          --
- Cell Measurement    :          --
- Negative Reference  :          --

TEST SUMMARY
- Factory Test History :          PASS
- Current Testing      :          PASS

```

Charge tested, 2.2A

Powered motors.

Deemed functional.

3.7 BBBB01FC

Production Note:

V_Switch_Off : 26133mV > FAIL

Diagnostic...

```
-----
Battery Accepted          : BBBB01FC

- Calibration at 0V      : 13          --
- V_Switch               : 37mV         --
- I_Current_Sense       : 0mA          --

FT Output Fault          :                * FAIL *
- Target                 : 8000mV        --
- Measured                : 8000mV        --
- V_Switch               : 6062mV        * FAIL *
- Battery Status         : On           --

TEST SUMMARY
- Testing                 :                * FAIL *
- Calibration             :                * FAIL *

-----

Battery Position: 0
Model                    : BM100
Hardware Version         : 22
Software Version         : 19
Serial Number            : BBBB01FC
Batch Number             : 9
Production Date          : 2-2-2020
Factory Tested           : No

Measurements
- V_Bus                  : 33561mV       --
- Battery                 : 34870mV       --
- V_Switch               : 31850mV       --
- V_Switch_Off           : 23521mV      * FAIL *
- VCC                     : 3304mV        --
- V_Offset               : 2998mV        --
- V_Current_Sense        : 1489mV        --
- I_Current_Sense        : -20mA         --
```

This board has previously been glued in a housing. Appears conformal coating has been mostly removed.

Body diodes intact. F2, F12 reverse bias on board is low, <2kohm. Gate voltage slightly below drain voltage.

Removed. Basic FETs test ok.

Removed F1, F11. Basic FET tests ok.

Replaced F1, F2, F11, F12. Results in same failure mode.

Replaced direct parts associated with switch off path. Bi-directional current sense and F13, F14. Still faulty.

Replaced LTC4368. Issue resolved. Although the gate was previously checked for causing switch leakage, this wasn't the path. The gate control itself had loss of isolation.

Battery module passed calibrations and FT. Due to the amount of re-work and prior assembly, this PCBA is not fit for re-sale.

```
-----  
Battery Position: 0  
Model : BM100  
Hardware Version : 22  
Software Version : 19  
Serial Number : BBBB01FC  
Batch Number : 9  
Production Date : 2-2-2020  
Factory Tested : No  
  
Measurements  
- V_Bus : 34987mV --  
- Battery : 34987mV --  
- V_Switch : 34987mV --  
- V_Switch_Off : 91mV --  
- VCC : 3304mV --  
- V_Offset : 3000mV --  
- V_Current_Sense : 1511mV --  
- I_Current_Sense : 40mA --  
  
Cell Voltages  
- Cell 0 : 3488mV --  
- Cell 1 : 3490mV --  
- Cell 2 : 3500mV --  
- Cell 3 : 3500mV --  
- Cell 4 : 3500mV --  
- Cell 5 : 3499mV --  
- Cell 6 : 3500mV --  
- Cell 7 : 3500mV --  
- Cell 8 : 3500mV --  
- Cell 9 : 3500mV --  
  
Temperature Sensors  
- PCB : 29.9'C --  
- Cells 0-4 : 27.3'C --  
- Cells 5-9 : 27.7'C --  
  
Calibration  
- Voltage Offset : -37 --  
- Voltage Gain : 13176 --  
- Current Offset 0V : -3 --  
- Current Offset 25V : -8 --  
- Current Offset 36V : -9 --  
- Current Offset 41V : -9 --  
- Current Offset 42V : -9 --  
- Voltage Calibrated : Yes --  
- Current Calibrated : Yes --  
  
Factory Tested  
- Power Switch : --  
- Cell Balancing : --  
- Cell Measurement : --  
- Negative Reference : --  
  
TEST SUMMARY  
- Factory Test History : PASS  
- Current Testing : PASS  
-----
```

3.8 BBBB0104

Production Notes

Has failed the power switch test on voltage calibration. Log updated

```
-----  
Battery Accepted           : BBBB0104  
  
Reference Connected       :           --  
- Cell 0                  : 4204mV  
- Cell 9                  : 41887mV  
  
Calibration in Range     :           --  
- Voltage Offset          : -13           --  
- Voltage Gain            : 13164        --  
  
Calibration Verified     :           --  
- Cell 0                  : 4203mV  
- Cell 9                  : 41998mV  
  
TEST SUMMARY  
- Voltage Calibration     :           PASS  
- Power Switch            :           PASS  
  
Battery Pack Removed
```

```
-----  
Battery Accepted           : BBBB0104  
  
- Calibration at 0V       : 247           --  
- V_Switch                : 59mV  
- I_Current_Sense        : -10mA        --  
  
- Negative Reference     :           --  
- Cell 0                  : 771mV  
- Cell 1                  : 1491mV  
- Cell 9                  : 8008mV  
  
- Cell Balancing         :           --  
- Cell 9                  : 25016mV  
  
- Cell Measurement       :           --  
  
- Calibration at 25V     : 249           --  
- V_Switch                : 25003mV  
- I_Current_Sense        : 0mA          --  
  
- Calibration at 36V     : 249           --  
- V_Switch                : 36008mV  
- I_Current_Sense        : 0mA          --  
  
- Calibration at 41V     : 250           --  
- V_Switch                : 41034mV  
- I_Current_Sense        : 10mA         --  
  
- Calibration at 42V     : 250           --  
- V_Switch                : 42024mV  
- I_Current_Sense        : 0mA          --  
  
- Calibration Verified   :           --  
  
TEST SUMMARY  
- Testing                 :           PASS  
- Calibration             :           PASS
```

```

-----
Battery Position: 0
Model                : BM100
Hardware Version     : 22
Software Version     : 19
Serial Number        : BBBB0104
Batch Number         : 1
Production Date      : 16-12-2019
Factory Tested       : No

Measurements
- V_Bus              : 34797mV    --
- Battery            : 34799mV    --
- V_Switch           : 34786mV    --
- V_Switch_Off       : 989mV      --
- VCC                 : 3297mV    --
- V_Offset           : 2999mV    --
- V_Current_Sense    : 1510mV    --
- I_Current_Sense    : 30mA      --

Cell Voltages
- Cell 0             : 3483mV    --
- Cell 1             : 3471mV    --
- Cell 2             : 3484mV    --
- Cell 3             : 3484mV    --
- Cell 4             : 3471mV    --
- Cell 5             : 3484mV    --
- Cell 6             : 3482mV    --
- Cell 7             : 3471mV    --
- Cell 8             : 3475mV    --
- Cell 9             : 3485mV    --

Temperature Sensors
- PCB                : 28.6'C    --
- Cells 0-4          : 26.3'C    --
- Cells 5-9          : 26.6'C    --

Calibration
- Voltage Offset     : -13      --
- Voltage Gain       : 13164    --
- Current Offset 0V  : -9       --
- Current Offset 25V : -7       --
- Current Offset 36V : -7       --
- Current Offset 41V : -6       --
- Current Offset 42V : -6       --
- Voltage Calibrated : Yes     --
- Current Calibrated : Yes     --

Factory Tested
- Power Switch       :          --
- Cell Balancing     :          --
- Cell Measurement   :          --
- Negative Reference :          --

TEST SUMMARY
- Factory Test History :          PASS
- Current Testing      :          PASS
-----

```

Passed all testing.

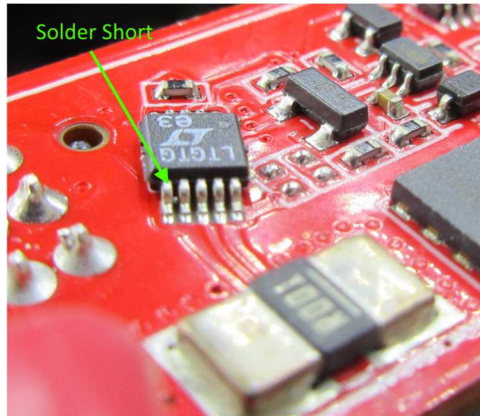
Charged at 2.2A. Ran motors.

Unit functioning as expected.

3.9 BBBB01A4

Production Note:

- Calibration at 41V : 0 > FAIL



Solder short removed. Battery passed FT.

```
-----  
Battery Position: 0  
Model : BM100  
Hardware Version : 22  
Software Version : 19  
Serial Number : BBBB01A4  
Batch Number : 6  
Production Date : 6-12-2019  
Factory Tested : No  
  
Measurements  
- V_Bus : 35064mV --  
- Battery : 35041mV --  
- V_Switch : 35039mV --  
- V_Switch_Off : 170mV --  
- VCC : 3294mV --  
- V_Offset : 3002mV --  
- V_Current_Sense : 1466mV --  
- I_Current_Sense : 40mA --  
  
Cell Voltages  
- Cell 0 : 3512mV --  
- Cell 1 : 3499mV --  
- Cell 2 : 3499mV --  
- Cell 3 : 3511mV --  
- Cell 4 : 3499mV --  
- Cell 5 : 3503mV --  
- Cell 6 : 3499mV --  
- Cell 7 : 3498mV --  
- Cell 8 : 3499mV --  
- Cell 9 : 3512mV --  
  
Temperature Sensors  
- PCB : 28.6'C --  
- Cells 0-4 : 26.2'C --  
- Cells 5-9 : 26.5'C --
```

Calibration
- Voltage Offset : -36 --
- Voltage Gain : 13171 --
- Current Offset 0V : 10 --
- Current Offset 25V : 31 --
- Current Offset 36V : 38 --
- Current Offset 41V : 40 --
- Current Offset 42V : 40 --
- Voltage Calibrated : Yes --
- Current Calibrated : Yes --

Factory Tested
- Power Switch : --
- Cell Balancing : --
- Cell Measurement : --
- Negative Reference : --

TEST SUMMARY
- Factory Test History : PASS
- Current Testing : PASS

3.10 BBBB01AF

Production Note:

Calibration at 41V : 0 > FAIL

Calibrated twice, successful.
All FT passed.
Ran motors and charged.

```
-----  
Battery Accepted           : BBBB01AF  
  
- Calibration at 0V       : 18           --  
- V_Switch                : 66mV         --  
- I_Current_Sense        : 0mA          --  
  
- Negative Reference      :              --  
- Cell 0                  : 770mV        --  
- Cell 1                  : 1504mV       --  
- Cell 9                  : 8067mV       --  
  
- Cell Balancing          :              --  
- Cell 9                  : 25065mV      --  
  
- Cell Measurement        :              --  
  
- Calibration at 25V      : 32           --  
- V_Switch                : 25065mV      --  
- I_Current_Sense        : 0mA          --  
  
- Calibration at 36V      : 36           --  
- V_Switch                : 36075mV      --  
- I_Current_Sense        : -10mA        --  
  
- Calibration at 41V      : 37           --  
- V_Switch                : 41079mV      --  
- I_Current_Sense        : 0mA          --  
  
- Calibration at 42V      : 37           --  
- V_Switch                : 42084mV      --  
- I_Current_Sense        : 0mA          --  
  
- Calibration Verified    :              --  
  
TEST SUMMARY  
- Testing                 :              PASS  
- Calibration              :              PASS
```

Battery Pack Removed

[DIAG][TEST][40][0][15040]\r -->

```
-----  
  
-----  
  
Battery Position: 0  
Model                 : BM100  
Hardware Version      : 22  
Software Version      : 19  
Serial Number         : BBBB01AF  
Batch Number         : 7  
Production Date       : 21-12-2019  
Factory Tested        : No
```

```
Measurements  
- V_Bus                : 34987mV      --  
- Battery              : 34974mV      --
```

- V_Switch : 34984mV --
- V_Switch_Off : 88mV --
- VCC : 3297mV --
- V_Offset : 2988mV --
- V_Current_Sense : 1468mV --
- I_Current_Sense : 40mA --

Cell Voltages

- Cell 0 : 3498mV --
- Cell 1 : 3500mV --
- Cell 2 : 3490mV --
- Cell 3 : 3495mV --
- Cell 4 : 3497mV --
- Cell 5 : 3500mV --
- Cell 6 : 3500mV --
- Cell 7 : 3498mV --
- Cell 8 : 3493mV --
- Cell 9 : 3500mV --

Temperature Sensors

- PCB : 27.9'C --
- Cells 0-4 : 27.2'C --
- Cells 5-9 : 27.5'C --

Calibration

- Voltage Offset : -27 --
- Voltage Gain : 13177 --
- Current Offset 0V : 18 --
- Current Offset 25V : 32 --
- Current Offset 36V : 36 --
- Current Offset 41V : 37 --
- Current Offset 42V : 37 --
- Voltage Calibrated : Yes --
- Current Calibrated : Yes --

Factory Tested

- Power Switch : --
- Cell Balancing : --
- Cell Measurement : --
- Negative Reference : --

TEST SUMMARY

- Factory Test History : PASS
- Current Testing : PASS

3.11 BBBB0217

Production Note:

*Failed post assembly charging test. Seems to disconnect, remote not showing any voltage levels on cells.
Intermittant fault*



```
Battery Position: 0
Model              : BM100
Hardware Version   : 22
Software Version   : 19
Serial Number      : BBBB0217
Batch Number       : 10
Production Date    : 17-2-2020
Factory Tested     : Yes

Battery Metrics
- State of Charge   : 46.0%
- Current Capacity  : 33.14Wh    --
- Full Capacity     : 72.00Wh    --
- #Charge Cycles x32 : 0
- Cell Resistance 25C : 0mohm    * FAIL *
```

```
Temperature Sensors
- PCB               : 24.8'C    --
- Cells 0-4         : 23.5'C    --
- Cells 5-9        : 23.7'C    --

Measurements
- V_Bus             : 36688mV   --
- Battery           : 36688mV   --
- V_Switch          : 36688mV   --
- V_Switch_Off      : 62mV     --
- VCC               : 3313mV    --
- V_Offset          : 3015mV    --
- V_Current_Sense   : 1509mV    --
- I_Current_Sense   : 20mA      --
```



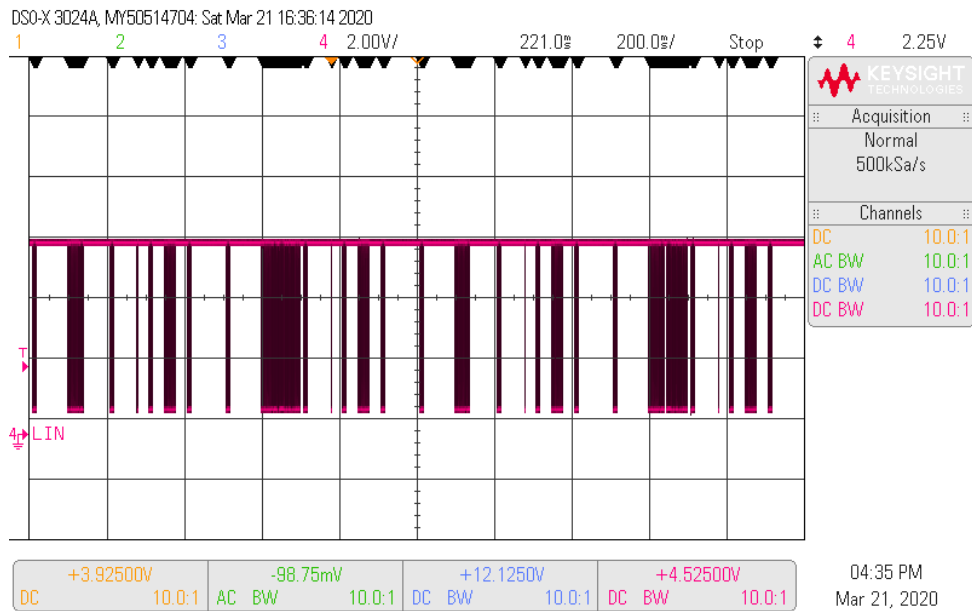
```

Cell Voltages
- Cell 0      : 3650mV    --
- Cell 1      : 3667mV    --
- Cell 2      : 3665mV    --
- Cell 3      : 3667mV    --
- Cell 4      : 3652mV    --
- Cell 5      : 3678mV    --
- Cell 6      : 3669mV    --
- Cell 7      : 3666mV    --
- Cell 8      : 3678mV    --
- Cell 9      : 3665mV    --

```

Charged and ran motors fine.

LIN bus comms inspected. Looks good.



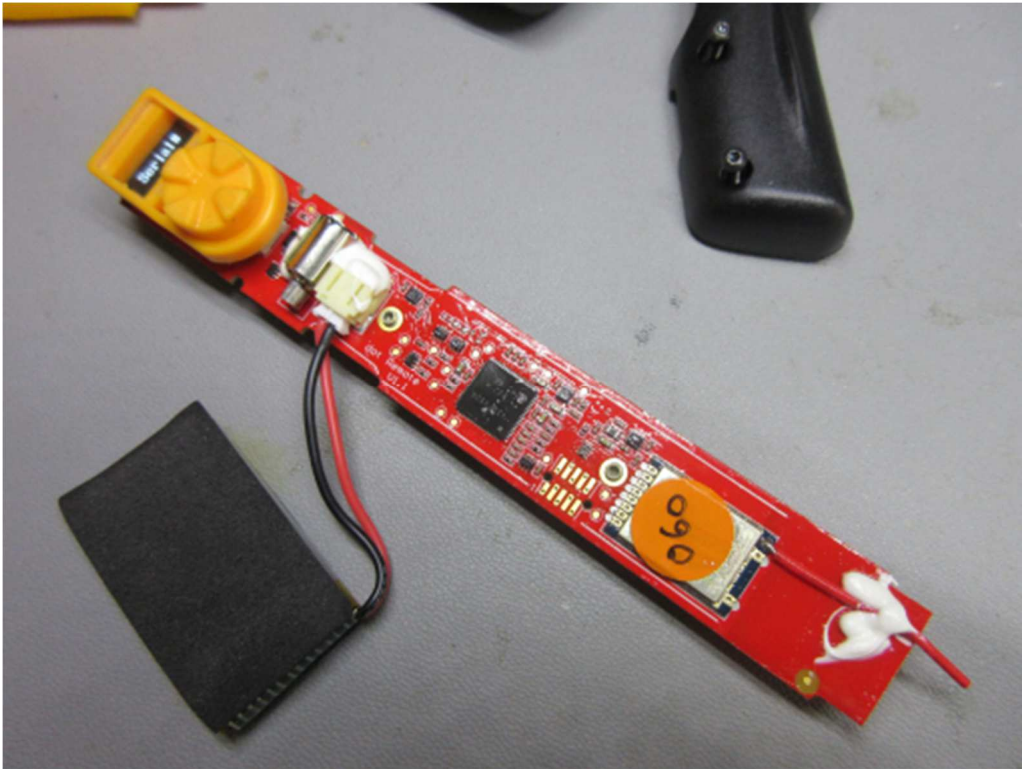
Could not find fault.

Suggest to use internally. Not fit for sale.

4 REMOTES

4.1 DDDD0060

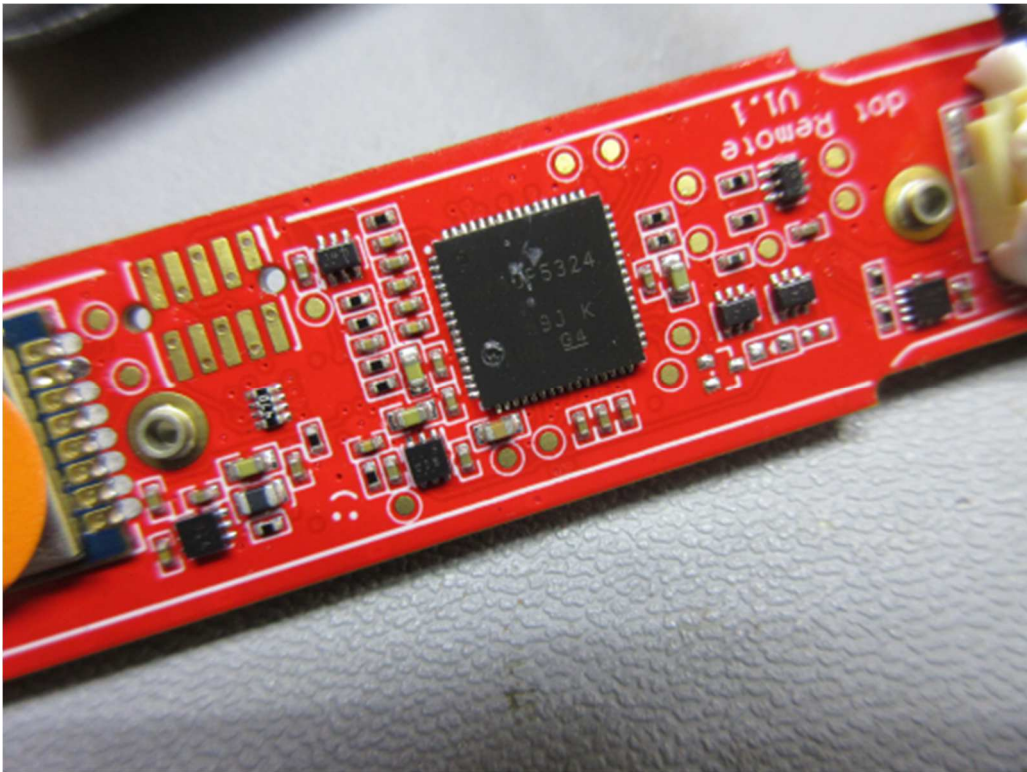
John Sherwood reported remote display blackouts and synchronising issues.



Inspection found no defects.

Remote turning off while in hand may be related to an existing recent issue with V042 (and likely a few prior revisions). The current internally released V043 is specifically targeted to fix an identified cause the black out condition, as well as provide a backup rapid self-recovery.

Had some issue with pairing, however signal strength once paired was good. Possible the wireless module is not operating within tolerance.



4.2 DDDD001C

Production Note.

Unit failure - LH Button is stuck down, free, but not operating correctly.

Replaced LH button. Programmed unit. Working ok.

4.3 DDDD003D

Production Note:

No USB communication. Reprogrammed via header to V043

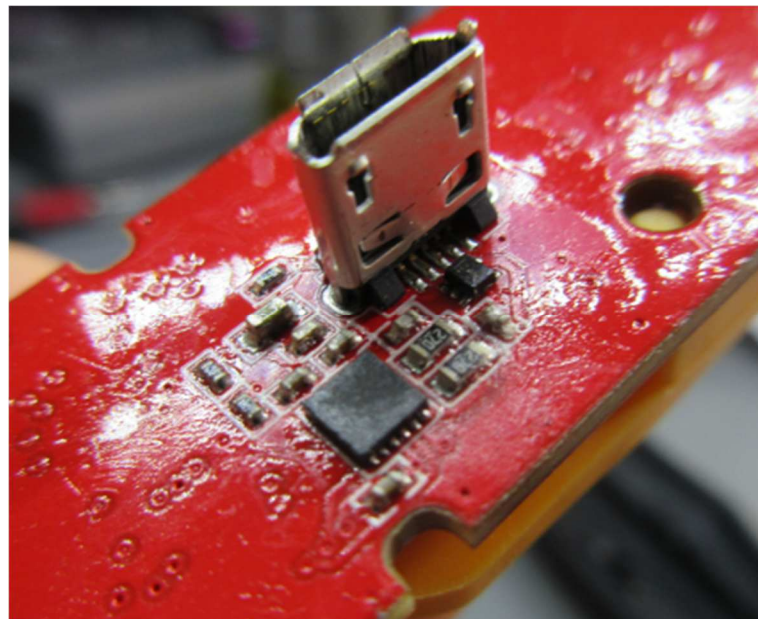


Multiple plug in events scored two dot-hub recognitions. Logs were retrived by dot-hub. Many unsuccessful attempts.

Re-wet UART I/O to uP.

Re-wet FTDI solder.

Replaced FTDI chipset. USB communications working.



Uploaded firmware V043 for testing. Successful.

Passed function test.

```
-----  
dot Remote Control  
  
Model           : RC100  
Hardware Version : 11  
Software Version : 43  
Bootloader Version : 4  
Serial Number    : DDDD003D  
Paired MC Serial : FFFFE000  
Batch Number     : 4  
Production Date  : 8-1-2020  
  
Push Buttons  
- LEFT          : -          ----  
- RIGHT         : -          ----  
- UP            : -          ----  
- DOWN         : 317        ----  
  
Throttle  
- Curve         : 0  
- Upper Deadband : 250  
- Lower Deadband : 150  
- Sensor Min    : 1935        ----  
- Sensor Current : 1956        ----  
- Sensor Max    : 3740        ----  
- Recall       : 1935/3631  
  
Brake  
- Curve         : 0  
- Upper Deadband : 250  
- Lower Deadband : 200  
- Sensor Min    : 1941        ----  
- Sensor Current : 1975        ----  
- Sensor Max    : 3867        ----  
- Recall       : 1941/3775  
  
Measurements  
- VCC           : 2510mV        ----  
- Battery Voltage : 4098mV        ----  
- Charging Current : 391mA         ----  
  
Communications  
- Wireless RF    : Present        ----  
- Packet Count Tx/Rx : 3420/1078  
- Paired Serial  : FFFFE000  
- Paired Status  : Synced        ----  
  
Other  
- Ride Level     : Novice  
- Handbrake Level : Off  
- Battery Display : Basic  
- Auto Off Timer  : 10mins  
- Units          : Metric  
- Display Brightness : 7  
- OLED Display   : Present        ----  
  
Factory Tested   : PASS  
Test Result      : PASS  
  
-----
```

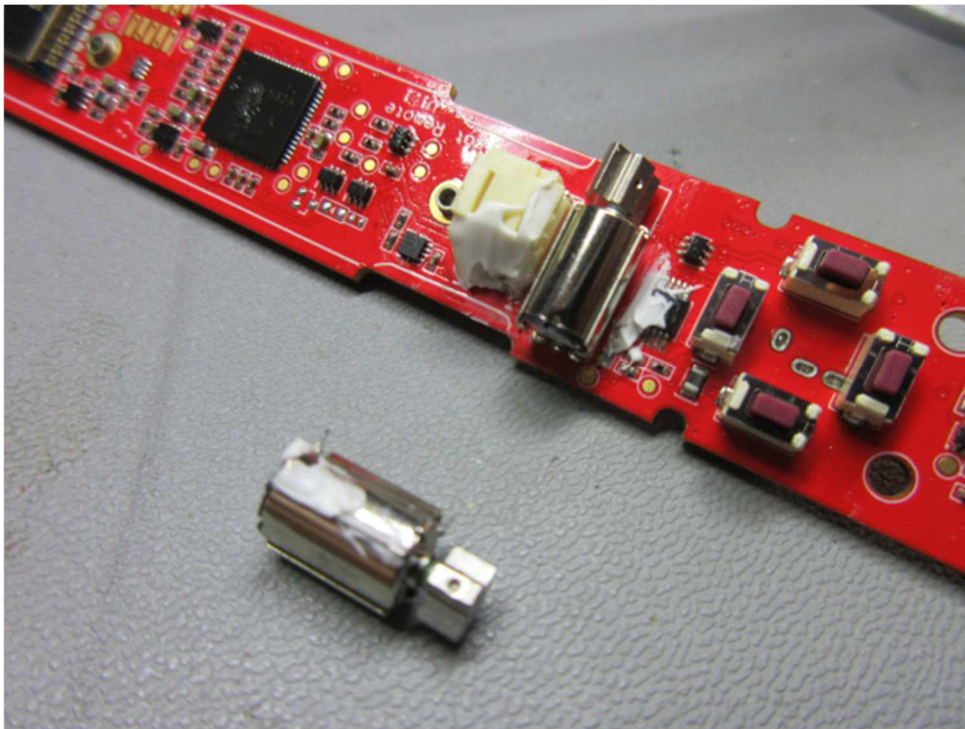
4.4 DDDD008A

Production Note:

ERM stuck in one position, will rotate but seems to stop in a position.

Replaced ERM and DRV2603 chipset.

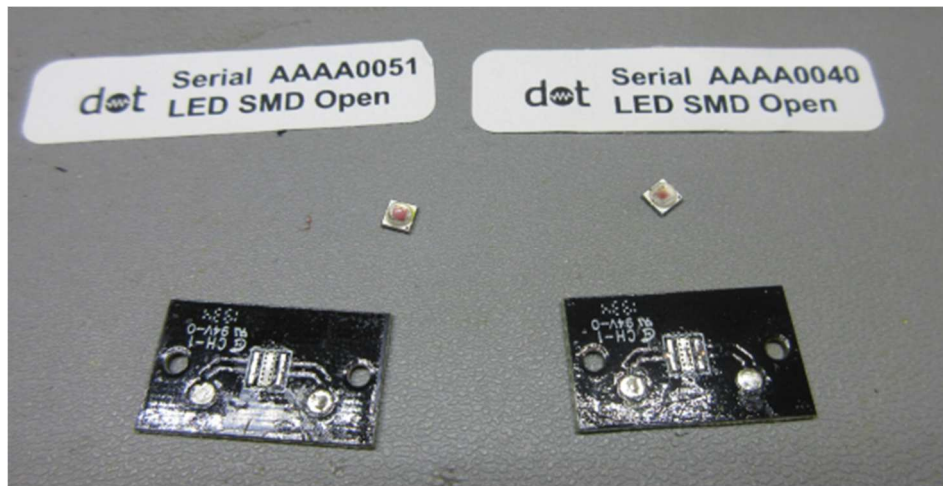
ERM functional.



5 TAIL LIGHTS

Two LED boards examined.

Both had failed LEDs components (not soldering or PCB).



6 SUMMARY

Main Controllers

- AAAA0062 – Charger failure. **Time consuming repair.**
- AAAA005B – **REPAIRED.** Charger circuit tolerance out of range. Simple fix.
- AAAA0027 – **REPAIRED.** Changer detection circuit broken. Easy fix, rare case.
- NO SERIAL – Likely PCB etching issue. **Time consuming repair.**
- AAAA0060 – **REPAIRED.** Charger IC replacement.
- AAAA0068 – **REPAIRED.** Configuration update. Re-enabled VESC.
- AAAA0028 – Field unit with blown VESC. Lukes cruiser. **Time consuming repair.**
- AAAA0031 – Field unit with grey history. **Not considered beneficial to examine.**
- AAAA008B – **REPAIRED.** VESC MCU replaced. PCB etching fault.
- AAAA0095 – **REPAIRED.** Charger IC & FET replacement, R26 adjusted.
- AAAA0083 – **REPAIRED.** Charger circuit tolerance out of range. Simple fix, R26 adjusted.
- AAAA0084 – **REPAIRED.** Charger IC replacement, R26 adjusted.
- AAAA007B – **REPAIRED.** Charger IC replacement, R26 adjusted.
- AAAA007F – **REPAIRED.** Charger IC replacement, R26 adjusted.
- AAAA0008 – **REPAIRED.** VESC damage from wiring fault. Replaced FETs. MC not fit for re-sale.

6.1 BATTERY MODULES

Battery Modules

- BBBB0106 – **REPAIRED.** LTC4368 failure. Not fit for re-sale.
- BBBB0125 – **REPAIRED.** LTC4368 failure.
- BBBB01A4 – **REPAIRED.** Short fixed.
- BBBB0181 – Could not find fault. Recommend internal use only. Not fit for sale.
- BBBB01F7 - **Inspected.** Calibrated.
- BBBB0200 - **Inspected.** Calibrated.
- BBBB01FC – **REPAIRED.** LTC4368 failure. Not fit for re-sale.
- BBBB0104 - **Inspected.** Calibrated.
- BBBB01AF - **Inspected.** Calibrated.

6.2 REMOTES

- DDDD001C – **REPAIRED.** Tactile button replaced.
- DDDD0060 – Unsure on reliability.
- DDDD003D – **REPAIRED.** Replaced FTDI chipset.
- DDDD008A – **REPAIRED.** Replaced ERM and DRV2603 chipset.

6.3 TAIL LIGHTS

- 2 tail light boards failed. Not worth repairing.

Out of >240 LED boards used, this is acceptable and not significant to warrant time on specific manufacturing followup.

<end of report>