BMS BOX · PARTS

Boat 1 · A4 · v10.5 · small IP65 plastic box on a long side wall of the battery box (as built) · reads and balances, switches nothing

A



Box, IP65 plastic, with plate
Which box: not written.
Drawn 8.7 x 6.7 in, a guess
1 · have, size open

B



Watchman, Electrodacus SBMS0 v03d
4.0 x 2.8 x 1.2 in. Stands on its 4 nylon bolts
1 · coming (ordered Oct 31)

C



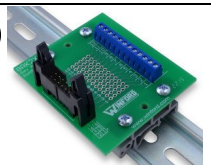
WiFi/USB add-on
The SBMS0's back cover.
Micro USB. DIP on Normal
1 · coming (Oct 31)

D



Balancer, JKBMS JK-B2A8S
5.4 x 3.4 in, 2 A. Own power 10 to 40 V. Plug P1
1 · have

E



Winford BRK2X6-L-DIN
Ribbon to 12 screws. About 2.4 x 2.7 in
1 · check shelf (sent Oct 5)

F



12-pin ribbon, 8 in
Female both ends. Amazon B07L9Q3R2K, or the 6 in on hand
1 · buy

G



DIN rail, 35 mm (1-3/8 in)
About 3 in, cut from an 8 in rail. Holds E
1 · have

H



Heat-shrink butt splices, red
22 to 16 AWG. W0 and W8 take two wires in one end
9 · have (kit)

I



Glands: PG13.5 x1, PG9 x2
Holes 1, 1a, 3. All in the bottom wall
3 · count the shelf

J



Split gland, Altelix 4-port
Hole 4: the USB plug passes whole. 3 ports plugged
1 · have

K



Stranded Cat6 patch cord
Shunt sense pairs, brown and orange. Plugs cut off
1 · have

L

micro USB to USB-A lead

Micro USB to USB-A lead
16 ft at most. To the hub box beside Pi A
1 · check (not on the tracker)

M



30 AWG copper wire
Fuse links at the 4 shunt screws. Not the nichrome
1 · buy

N

bolts, fender washers, lock nuts

Bolts: 1/4 in stainless
Fender washers, nylon lock nuts, sealant on each
4 · check (not on the tracker)

O

small crimp ferrules

Ferrules, smallest size
On the four Cat6 wires at the green plug
4 · have (kit)

P

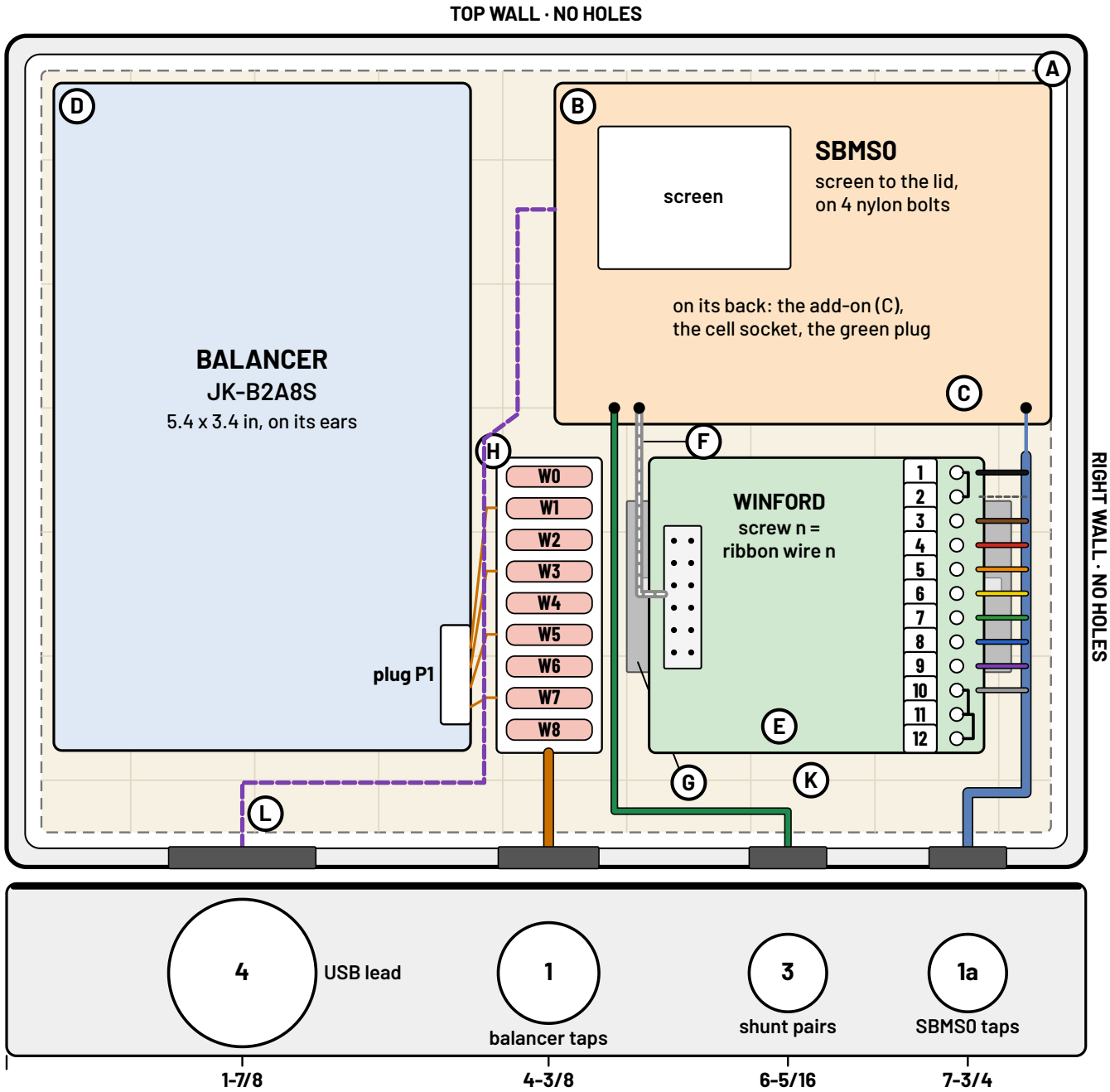


Dielectric grease, silicone, tie mounts
Grease on gland inserts and plug seals only
1 · have

STILL OPEN · **The box:** which one and its size are not written. It is on a long side wall of the battery box; which side and how high: not logged. · **The ribbon:** buy B07L9Q3R2K, or use the 6 in one on hand if both its plugs are female. · **Both shunts are built on the minus side;** they move to the plus side before the first power-up (Mike). · **30 AWG copper** for the fuse links: still to buy (Wire List E4 says none needed). · **Micro USB lead, or a serial adapter** on the add-on's green block? Mike's question. Drawn as the guides stand. · **Small points:** the SBMS0's serial speed; the split gland's hole ("PG25" or 1-3/16 in).
Not in this box: the two tap cables and the XT1 thermistor (battery box plan, A9); the two shunts (main bus board). No charger wiring, no entries 2, 5, 6, no vent.

BMS BOX · LAYOUT

lid off, looking in · about to scale · letters = page 1, numbers in circles = holes



BOTTOM WALL from below · inches from its left end · every center 1-13/16 in from the back face (thick line, against the battery box)

LID OFF, LOOKING IN

Box bolted on a long side wall of the battery box (as built); bottom wall down, glands down. 1 grid square = 1 in. Box size is a guess (open). Claude's layout, drawn Nov 1.

CABLES

- 1 · 18/10, balancer taps
- 1a · 12-core, SBMS0 taps
- 3 · Cat6, shunt pairs
- 4 · USB lead to Pi A
- ribbon, Winford to SBMS0

WINFORD SCREWS

Black bars = the 3 jumpers: 1 to 2, 10 to 11, 11 to 12. W0 on 1, drain on 2, W1 to W7 on 3 to 9, W8 on 10. 11, 12: jumpers only. Page 3 has the map.

NOT DRAWN

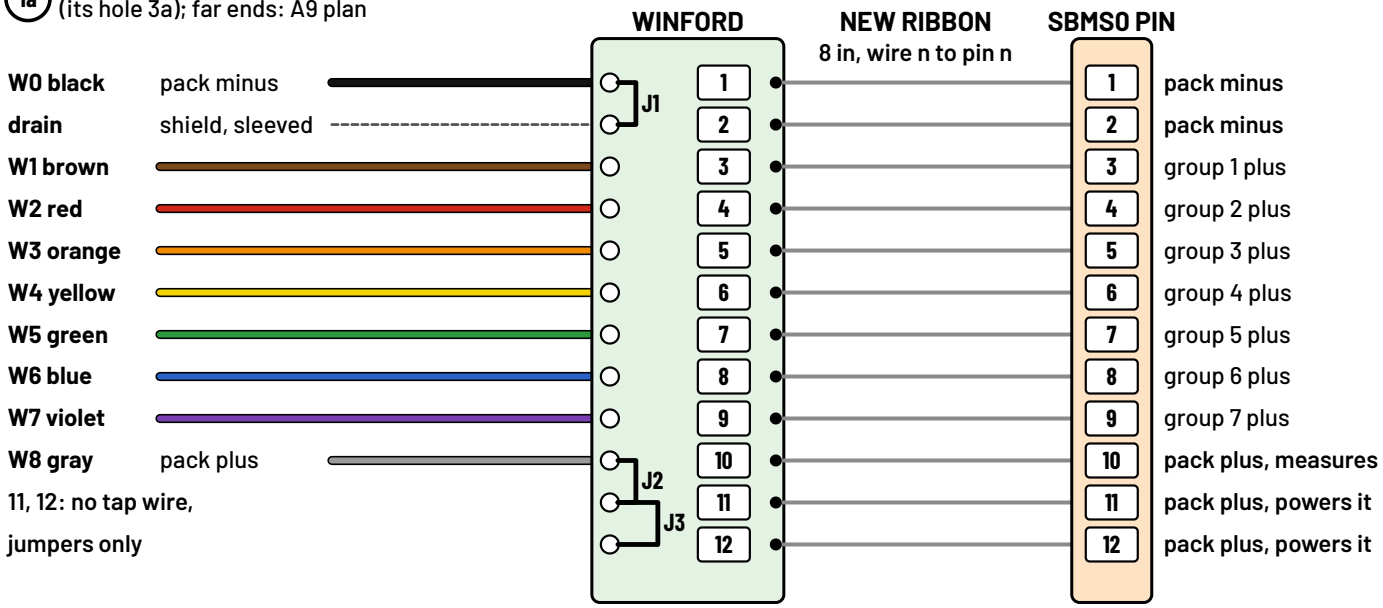
4 bolts (N) through the box back, under the plate, so the plate lifts out with the box bolted on. Holes 2, 5, 6 and a vent: not drilled.

BMS BOX · WIRING

what lands where · numbers in boxes = screws and pins, numbers in circles = holes · not to scale

SBMS0 TAPS: 12-CORE IN BY HOLE 1a, ONTO THE WINFORD SCREWS, THE NEW RIBBON TO THE SBMS0

(1a) 12-core from the battery box (its hole 3a); far ends: A9 plan



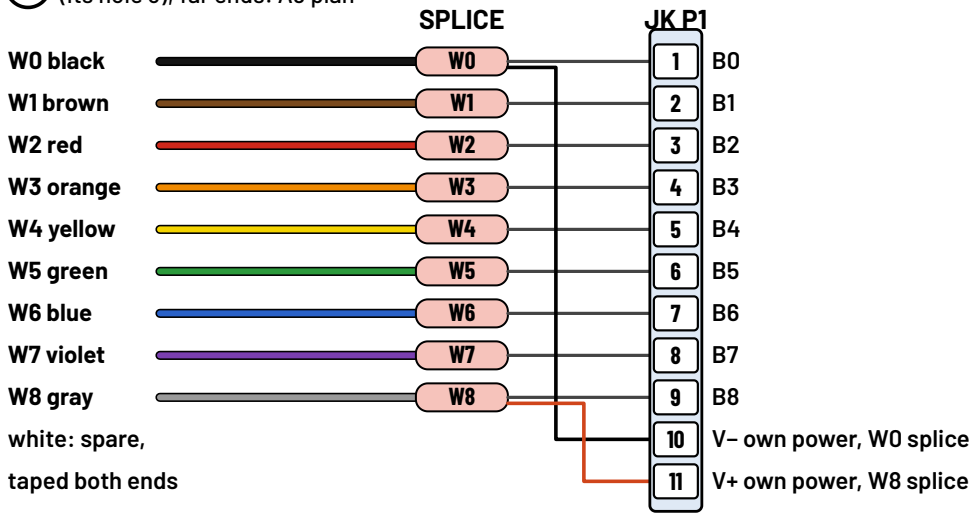
SCREW NUMBER = RIBBON WIRE NUMBER = SBMS0 PIN

Screw 1: W0 black, jumper J1 to 2
Screw 2: J1 from 1, the shield drain
Screws 3 to 9: W1 to W7. Each sits ONE ABOVE its W number
Screw 10: W8 gray, jumper J2 to 11
Screw 11: J2 from 10, jumper J3 to 12
Screw 12: J3 from 11

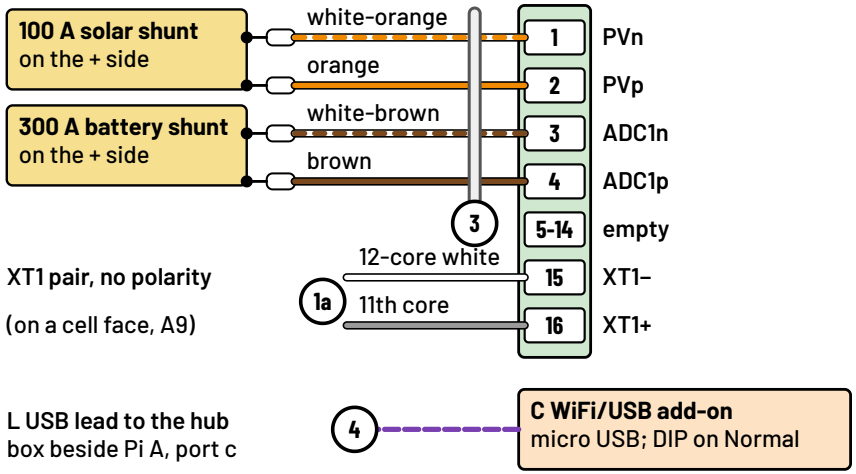
Never skip a jumper. Two wires at most under a screw. Pins 1, 2 are both pack minus; 11, 12 carry pack plus that powers it.
The first SBMS0 burned out on Oct 21: every wire sat one screw low, no jumpers.

BALANCER TAPS: 18/10 IN BY HOLE 1, 9 BUTT SPLICES, THE JK'S OWN HARNESS

(1) 18/10 from the battery box (its hole 3); far ends: A9 plan



SBMS0 GREEN PLUG (PUSH-IN), DATA LEAD



M = ⬭ 30 AWG fuse link at each shunt screw.
Cat6 (K): blue and green pairs cut back in its jacket.

tap cores in their own colors · ribbon · jumpers · shunt pairs, Cat6 · USB data · no wire leaves this box to a charger, relay or load

BMS BOX · EVERY WIRE

screws, splices and pins as on pages 2 and 3

WINFORD SCREWS: THE SBMS0 TAPS

Screw number = ribbon wire number = SBMS0 pin. Bare 22 AWG under each screw, stripped about 1/4 in, no ferrule. Never more than two wires under a screw.

Screw	Pin job	Wires under the screw
1	pack minus	**W0 black** + jumper J1 to 2
2	pack minus	J1 from 1 + the **12-core drain**
3	group 1 +	**W1 brown**
4	group 2 +	**W2 red**
5	group 3 +	**W3 orange**
6	group 4 +	**W4 yellow**
7	group 5 +	**W5 green**
8	group 6 +	**W6 blue**
9	group 7 +	**W7 violet**
10	pack +, measures	**W8 gray** + jumper J2 to 11
11	pack +, powers it	J2 from 10 + jumper J3 to 12
12	pack +, powers it	J3 from 11

Jumpers: J1 black, J2 and J3 gray: short 22 AWG, one screw to the next. **Never skip one.**

Ribbon R1 to R12: the new 12-pin ribbon, wire n from the Winford header to SBMS0 cell pin n, all 12. Tie it flat to the plate.

BEFORE THE FIRST PLUG-IN

Land the battery rings last (A9 plan). Meter both sets: each neighbor pair about 3.3 V, W0 to W8 about 26 V. SBMS0 set at the Winford screws: 1 to 3, 3 to 4 … 9 to 10, and 1 to 10 about 26 V. Balancer set at its plug pins. A strange reading means two wires are swapped: fix it first. Then plug in the balancer, then the SBMS0's cell ribbon, then its green plug (Battery Box Part 8).

FAR END OF EACH TAP (A9 PLAN)

Ring posts, SBMS0 / balancer: W0 A2 / A3, W1 A1 / A2, W2 A8 / A9, W3 A10 / A11, W4 A15 / B15, W5 B10 / B11, W6 B8 / B9, W7 B1 / B2, W8 B2 / B3. Each ring on its own 30 AWG fuse link.

BALANCER: SPLICES AND JK PLUG P1

Each harness wire to its core by pin number; the harness colors do not matter. Stagger the splices, shrink them, tie the bundle to the plate. The JK still unplugs at P1. P2 (temperature) and P3 (data) stay empty.

Splice	18/10 core in	Harness out to JK P1
W0	black	pin 1 B0 + pin 10 V–
W1	brown	pin 2 B1
W2	red	pin 3 B2
W3	orange	pin 4 B3
W4	yellow	pin 5 B4
W5	green	pin 6 B5
W6	blue	pin 7 B6
W7	violet	pin 8 B7
W8	gray	pin 9 B8 + pin 11 V+
white	spare	none: taped back, both ends

SBMS0 GREEN PLUG, 16-PIN PUSH-IN

Pin	Wire	From
1 PVn	Cat6 white-orange	solar shunt, bus-side screw
2 PVp	Cat6 orange	solar shunt, solar-side screw
3 ADC1n	Cat6 white-brown	battery shunt, bus-side screw
4 ADC1p	Cat6 brown	battery shunt, battery-side screw
5 to 14	empty	ADC2, ADC3, EXTIO: nothing wired
15 XT1–	12-core white	XT1 thermistor, one leg
16 XT1+	12-core 11th core	the other leg (write its color down)

Strip about 1/4 in, push in to the stop; press the button beside the hole to release. Ferrules on the four Cat6 wires; XT1 strands twisted tight.

DATA LEAD

Add-on micro USB to the USB lead (L), out by hole 4 to the USB hub box beside Pi A, port c. Tied down right outside the plug. Required: the battery percentage comes from it.

CABLES IN, BY HOLE

Hole	Cable	Cores
1	18/10 ENERJOUR, PG13.5	W0 to W8 into splices W0 to W8. White: spare, taped. From battery box hole 3
1a	22 AWG 12-core shielded, PG9	W0 on 1, W1 to W7 on 3 to 9, W8 on 10, drain on 2. White on plug 15, 11th on 16. 12th: taped. From battery box 3a
3	stranded Cat6, PG9	brown on 4, white-brown 3, orange 2, white-orange 1. Blue and green pairs cut back. From the two shunts
4	USB lead, split gland	Micro USB on the add-on, plug passed whole; 3 ports plugged. To the hub box beside Pi A, port c
2, 5, 6	not drilled	No charger wiring; the probe trunk goes straight to the central node

BEFORE WIRING

Both board plugs unplugged; build this end first. Add-on DIP switch on Normal, as shipped (MTX, STX, SRX on; WRX, WTX, I00 off). New ribbon: pin 1 to pin 1 with a meter, and the SBMS0's socket two rows of 6 at 0.1 in (Part 8). Cat6: plugs off, brown and orange pairs kept in its own jacket. Tie both ribbons flat before the boards go on.

SETTINGS, AFTER WIRING

SBMS0: LiFePO4, 8 cells, 1256 Ah; Store Parameters, unplug and replug the cell ribbon. Battery shunt 0.2500, solar shunt 0.7500 milliohm. EXTIO4, EXTIO3: Type 1, Type 2, nothing wired. Parameter 30: 1182. Parameter 29: XT1's ice-water reading. UART on. Save device settings, or all is lost at the next power cycle. JK: Jikong app, LiFePO4, 8 cells, the rest factory.

WIRE AND ENDS

Label both ends of every wire. Each cable tied to the plate right outside its plug, so no plug carries motion. Grease on plug seals and gland inserts only; a dab of removable silicone on each plug body. Drip loop on every cable below the box. The SBMS0's own 6 ft ribbon is not used here: never cut it. Never join an SBMS0 tap to a balancer wire. No USB isolator.

MOUNTING

Bolted to a long side wall of the battery box. Keep the bolt nuts and fender washers inside clear of the cell padding and the cells. The tap cables run from the aft wall glands round the corner to this box, each with its drip loop.