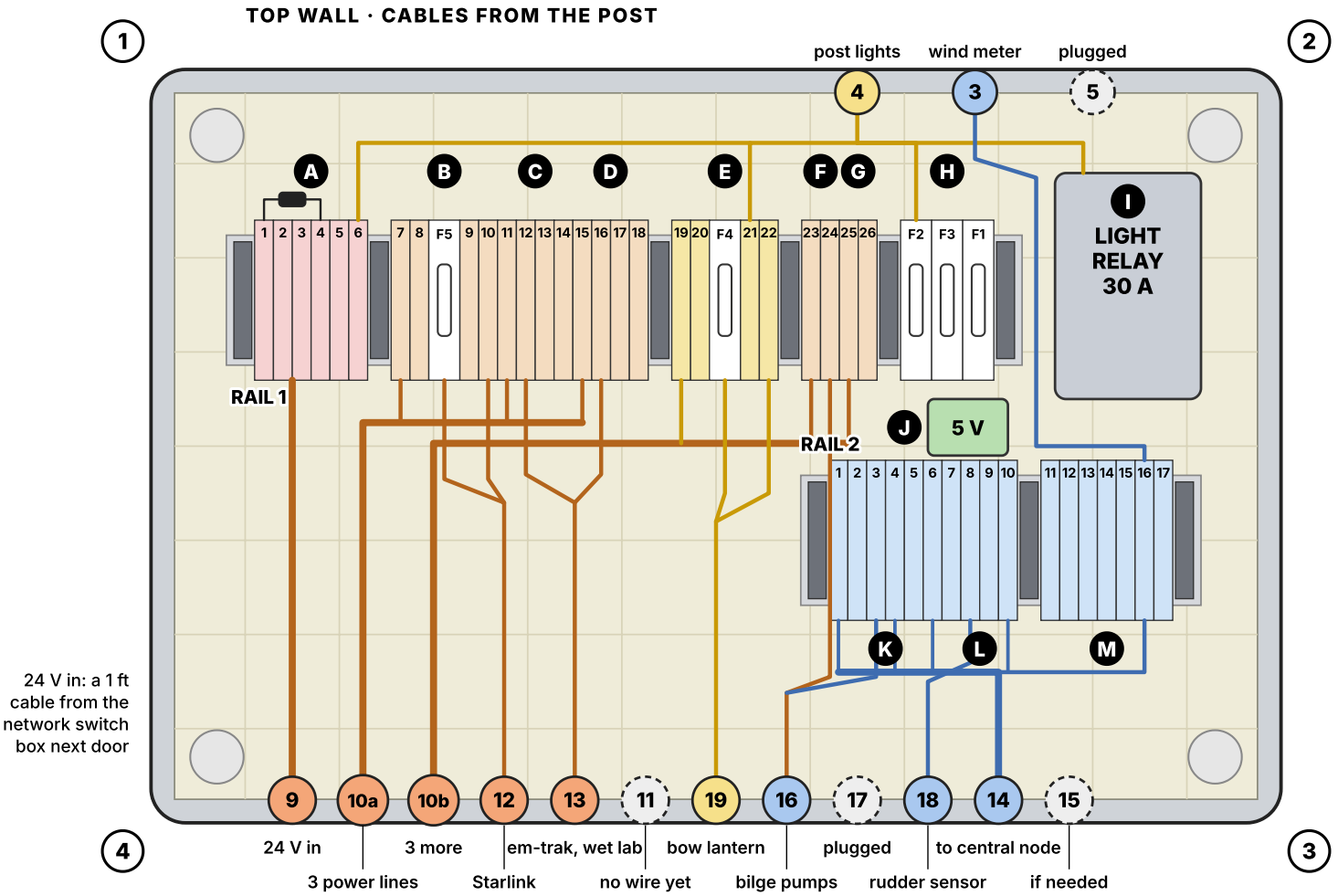
AFT JUNCTION BOX · BUILD SHEET

Boat 1 · lid off, looking in · about to scale, 1 grid square = 1 in



A 24 V in, always on, and 0 V (blocks 1 to 6). The black bar across them is the surge diode.

B Starlink power, ch 1, with its fuse F5 (5 A).

C Wet lab power, ch 2: passes straight through.

D em-trak (AIS radio) power, ch 4: passes straight through.

E Nav lights, ch 3: bow lantern through fuse F4 (1 A); stern light through F2.

F Bilge pump 1, switch-on wire, ch 6.

G Light relay's on/off wire, ch 7.

H Fuses for the post: F2 stern light, F3 white lights, F1 wind meter. 1 A each.

I Light relay, 30 A: turns on the two white lights on the post when motoring in the dark.

J 5 V board (Pololu D36V6F5): turns 24 V into 5 V for the post wind meter. 24 V would kill the meter.

K Bilge pump wires: pump 1 and 2 running, pump 2 switch-on.

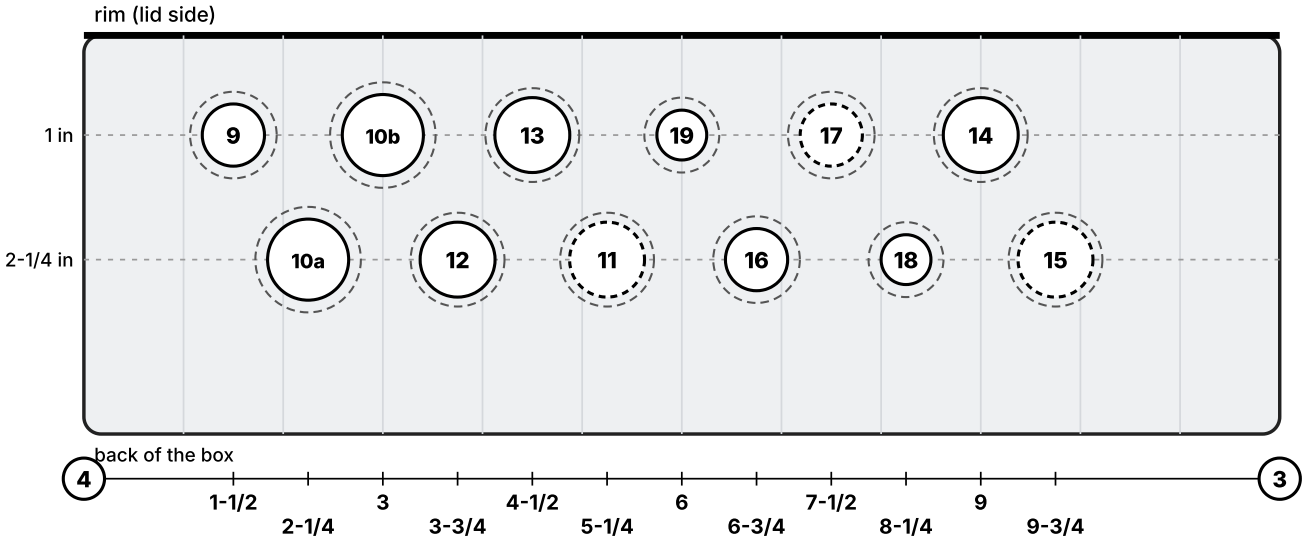
L Rudder angle sensor (encoder A): its 3.3 V power and its signal.

M Wind meter: 5 V, ground, and its two data wires on to the central node.

power cables · light cables · sensor cables

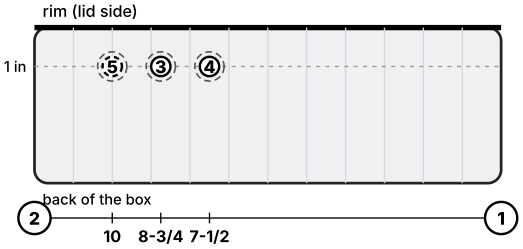
Small numbers on the rails: terminal numbers, every wire listed on page 3. Dashed circles: hole with no cable.

BOTTOM WALL, SEEN FROM OUTSIDE · 12 GLANDS IN TWO STAGGERED ROWS, MEASURED FROM CORNER 4



#	Wall, inches from corner, row	Gland · hole, in	Cable	Cores, notes
4	top, 7-1/2 from 1	PG7 · 1/2	Post lights, 4-core (not named yet)	red stern +, black stern 0 V, white whites +, 4th whites 0 V. Ferrite outside
3	top, 8-3/4 from 1	PG7 · 1/2	Wind meter: a 22/12 shielded offcut, 0.24 in	5 V, ground, data out, data in. Ferrite outside
5	top, 10 from 1	PG7 · plug	None: no weather pod	
9	bottom, 1-1/2, upper	PG9 · 5/8	16/2 jumper, about 1 ft, from the switch box (its entry 13)	red +24 V, black 0 V. Sealant-filled
10a	bottom, 2-1/4, lower	PG13.5 · 13/16	Three 16/2 runs from the central node: ch 1, 2, 4	red +, black 0 V each. Sealant-filled
10b	bottom, 3, upper	PG13.5 · 13/16	Three 16/2 runs: ch 3, 6, 7	red +, black 0 V each. Sealant-filled
12	bottom, 3-3/4, lower	PG11 · 3/4	Starlink power out, 14/2	Sealant-filled
13	bottom, 4-1/2, upper	PG11 · 3/4	em-trak 14/2 and the wet lab line 14/2	Sealant-filled. Two cables: still open
11	bottom, 5-1/4, lower	PG11 · 3/4	"Lights group": no wire planned	Still open
19	bottom, 6, upper	PG7 · 1/2	Bow lantern feed, 2-core (not named yet)	red +, black 0 V. Ferrite outside
16	bottom, 6-3/4, lower	PG9 · 5/8	Bilge leads (not named yet)	pump 1 running, pump 2 running, pump 1 on, pump 2 on
17	bottom, 7-1/2, upper	PG9 · plug	None: no shaft sensors	
18	bottom, 8-1/4, lower	PG7 · 1/2	Encoder A lead (not named; the Belden 6504FE on hand fits)	3.3 V, ground, pulse
14	bottom, 9, upper	PG11 · 3/4	Trunk to the central node, 22/12 shielded, 0.24 in	Cores on page 3
15	bottom, 9-3/4, lower	PG11 · 3/4	Second trunk: drill only if the core count needs it	

TOP WALL, SEEN FROM OUTSIDE · 1 IN BELOW THE RIM, FROM CORNER 1



Seen from outside, corner 1 is on the right. Measure from corner 1.

Bottom wall: upper row 1 in below the rim, lower row 2-1/4 in below it. One row will not fit: the eleven glands need about 12-1/2 in side by side. Solid circle = the hole; dashed ring = about the size of the gland nut. 5, 11, 15 and 17 dashed: plugged, no wire yet, or only if needed. The lower row needs a base at least 3-1/2 in deep.

Drill: 1/2 in x5, 5/8 in x3, 3/4 in x4 (x5 with 15), 13/16 in x2. Deburr every hole. Nothing through the lid or the back. Entry numbers are the Electronics plan's (A6); 1, 2, 6 to 8 and 20 to 24 moved to the switch box and are not drilled here.

AFT JUNCTION BOX · EVERY WIRE

TB1 = rail 1, TB2 = rail 2, numbered left to right as on page 1

RAIL 1 (TB1) · FEED, SWITCHED LOADS, POST FUSES

Blocks joined in a group share one bridge bar: 1 to 3, 4 to 6, and each pair. One wire under each screw.

Block	Job	Wires
1 to 3	+24 V, always on	1: jumper red from gland 9, and one surge diode leg. 2: to F1. 3: to F3
4 to 6	0 V	4: jumper black, and the other surge diode leg. 5: to TB2-13. 6: whites 0 V (post cable, 4th core)
7, 8	ch 1 +, Starlink	7: run ch 1 red. 8: to F5
9, 10	ch 1 0 V	9: run ch 1 black. 10: Starlink black
11, 12	ch 2 +, wet lab	11: run ch 2 red. 12: wet lab red (gland 13)
13, 14	ch 2 0 V	13: run black. 14: wet lab black
15, 16	ch 4 +, em-trak	15: run ch 4 red. 16: em-trak red (gland 13)
17, 18	ch 4 0 V	17: run black. 18: em-trak black
19, 20	ch 3 +, nav lights	19: run ch 3 red, and to F2. 20: to F4
21, 22	ch 3 0 V	21: run ch 3 black, and stern light 0 V (post cable black). 22: bow lantern black
23, 24	ch 6 +, pump 1 on	23: run ch 6 red. 24: pump 1 on (gland 16). The run's black has no job: fold it back and tape it, both ends
25	ch 7 +	run ch 7 red; relay DC+
26	ch 7 0 V	run ch 7 black; relay DC-
F5	Starlink fuse, 5 A	from TB1-8; Starlink red (gland 12)
F4	bow lantern fuse, 1 A	from TB1-20; bow lantern red (gland 19)
F2	stern light fuse, 1 A	from TB1-19; stern light + (post cable red)
F3	whites fuse, 1 A	from TB1-3; to relay COM
F1	wind fuse, 1 A	from TB1-2; to regulator VIN

RAIL 2 (TB2) · SENSORS

Bridged: each pair 1 to 10, and 12 to 15.

Block	Job	Wires
1, 2	pump 2 on (ch 12)	1: from the trunk (cores 8 and 9) or a 16/2 run, set at loom time. 2: to pump 2 (gland 16)
3, 4	pump 1 running	3: bilge lead. 4: trunk core 6
5, 6	pump 2 running	5: bilge lead. 6: trunk core 7
7, 8	encoder 3.3 V	7: trunk core 4. 8: encoder lead
9, 10	encoder pulse	9: encoder lead. 10: trunk core 5
11	wind 5 V	regulator VOUT; wind cable 5 V core
12 to 15	ground	12: regulator GND, and the wind cable ground. 13: from TB1-5. 14: trunk core 3. 15: encoder lead ground
16	wind data out	wind cable, the meter's TX; trunk core 1
17	wind data in	wind cable, the meter's RX; trunk core 2

OFF THE RAILS

Part	Wires
Relay	COM from F3. NO to whites + (post cable white). NC empty. DC+ from TB1-25, DC- from TB1-26. A short wire from IN to DC+, trigger jumper set to high: the relay pulls in whenever ch 7 is on and draws nothing otherwise. Read the terminal names off the board.
Regulator	Pololu D36V6F5. VIN from F1, GND to TB2-12, VOUT to TB2-11. Terminal block on at the bench, then potted in silicone. Glued to the plate under F1.
Surge diode	1.5KE33CA across TB1-1 and TB1-4. Either way round. Legs short and sleeved.

TRUNK TO THE CENTRAL NODE (GLAND 14)

22 AWG 12-core shielded (C1 roll). Write each core's color in at first cut. Drain: to 0 V at the central node only; here trimmed back and sleeved.

Core	Job	At the node	Color
1	wind data out	node D0 (wind in)	
2	wind data in	node D1 (wind out)	
3	signal ground	node 0 V	
4	encoder 3.3 V	node 3.3 V	
5	encoder pulse	node D6	
6	pump 1 running	opto board	
7	pump 2 running	opto board	
8, 9	pump 2 on, if it rides here	relay ch 12	
10 to 12	spare	fold back and tape, both ends	

WIRE INSIDE THE BOX

- 24 V and 0 V jumpers: 18 AWG red and black from the shelf.
- 5 V, ground and signal jumpers: 22 AWG.
- A ferrule on every stranded end under a screw. Crimps only, no solder on wires.
- Labels at both ends of every wire: CH1+, CH1-, P1 RUN, ENC 3V3, WIND 5V, and so on.

THE SIX RUNS FROM THE CENTRAL NODE

- ch 1 Starlink power, ch 2 the wet lab's own line, ch 4 em-trak: through gland 10a.
- ch 3 nav lights (fails on), ch 6 pump 1 on, ch 7 motoring relay coil: through gland 10b.
- Each 16/2: red +, black 0 V. The TSW202 switch is on no channel.

AFT JUNCTION BOX · NOTES AND BUILD ORDER

Plain patch panel at the stern, beside the network switch box

DECIDED (IN THE GUIDES)

- A patch panel, no computer: no Nucleo, no CAN, no network parts. The switch sits beside it in its own aluminum box.
- 24 V comes in always on, on a 16/2 jumper about 1 ft long from the switch box, where line 6 lands first. A short in a post cable blows only its own fuse here; the switch stays up.
- One fuse per post feed. The wind meter gets 5 V from its own regulator, right after its fuse. Never 24 V into the meter: it dies at first power-up.
- Nav lights come in already switched on ch 3, which fails on. The two motoring whites go through the 30 A relay here, coil on ch 7: on only when dark and the motor runs.
- Fuses on the two deck feeds too: bow lantern 1 A (F4), Starlink 5 A (F5), so a short on deck never takes down the central node (Mike, Oct 30).
- Sealed: no vent. Every gland holding 16/2 or 14/2 is filled with Berkland 4000 UV.
- One 1.5KE33CA surge diode across the 24 V in. A ferrite (mix 31, 0.30 in) on the post wind, post lights and bow lantern cables, just outside the box.

CLAUDE'S CALLS, STANDING UNLESS YOU SAY OTHERWISE

- Fuses: DIN rail holders with 5 × 20 mm slow-blow fuses, 1 A each, like the central node's puller fuses (the BOM said blade fuses; no holder was picked). Three, not two: the post lights cable carries two feeds from two sources.
- The relay runs off ch 7 itself, so it draws nothing while the whites are off.
- Encoder A runs on the central node's 3.3 V, sent up the trunk, so its pulse stays at 3.3 V for the Nucleo.
- No shield lands in this box.

RULES

- Feed dead before touching a wire: main battery switch off, or lift line 6's lug at its 20 A breaker (the breakers have no off lever).
- Only TB2-11 touches the wind meter's power core.
- One cable per gland, except 10a, 10b and 13. A drip loop below every gland.
- Dielectric grease on the rubber gland inserts only.

BUILD ORDER

BEFORE YOU START

1. Count the shelf (right). Pick the cables still open (bottom right).

AT THE BENCH

2. Regulator: solder its terminal block on (it comes with bare holes), land three short leads (VIN, GND, VOUT), then pot it in silicone.
3. Relay: trigger jumper to high; a short wire from IN to DC+.
4. Cut two DIN rails: rail 1 about 8-1/2 in, rail 2 about 4-1/4 in. Screw them to the plate where page 1 shows.
5. Snap on the blocks in page 3's order, an end stop at each end and at each gap. Fit the bridge bars.
6. Fuse holders: F5 in the Starlink group, F4 in the nav lights group, F2, F3, F1 at the right end of rail 1. Slow-blow fuses: 5 A in F5, 1 A in the rest.
7. Relay onto the plate on its four holes, on nylon standoffs. Regulator glued down under the right end of rail 1.
8. Inside wires from page 3: the dashed lines on page 1. Surge diode under TB1-1 and TB1-4, legs sleeved.
9. Label every block, and both ends of every inside wire.

BOX PREP

10. Number the corners as on page 1.
11. Mark the hole centers from page 2: top wall from corner 1, bottom wall from corner 4, upper row 1 in and lower row 2-1/4 in below the rim.
12. Drill 1/2 in x5, 5/8 in x3, 3/4 in x4, 13/16 in x2. Deburr.
13. Glands in, domes loose. Plugs in 5 and 17.
14. Plate into the box.

AT THE BOAT

15. Glue the box beside the switch box, high, where it can be reached through a drogue box opening: sand the box back, wipe with alcohol, glue to pads glued to the boat, tape until cured.
16. Feed dead. Bring each cable in through its own gland (page 2), drip loop below, labels at both ends.
17. Land every core per page 3. Spare trunk cores folded back and taped.
18. Shields: trimmed back and sleeved here. The trunk's drain goes to 0 V at the central node.
19. Ferrites on the wind, post lights and bow lantern cables, just outside the box, glued to the structure, never hanging on the cable.
20. Fill glands 9, 10a, 10b, 12 and 13 with Berkland 4000 UV around the jackets. Tighten every dome.
21. Read every label against page 3. Lid on. Feed back on.

SHELF: NOTHING TO BUY IF THESE COUNTS HOLD

- The box: TICONN, about 12 × 8 × 5 in (on hand). This layout needs a plate about 10 × 6 in.
- Relay: HiLetgo 24 V 30 A (six bought; one is the steering cut relay).
- Regulator: Pololu D36V6F5, the third of three (on hand).
- About 43 DIN terminal blocks, about 8 end stops (uxcell 50-pack), bridge bars (the Erayco kit has some), two DIN rails.
- Five DIN fuse holders (MECCANIXITY pack: four went to the central node, five go to the wet lab box; buy more if short) and slow-blow fuses, four 1 A and one 5 A (QBGTFAK kit).
- One 1.5KE33CA (Chanzon bag). Three mix 31 ferrites, 0.30 in.
- Glands: PG7 ×5, PG9 ×3, PG11 ×4, PG13.5 ×2, and two plugs.
- Berkland 4000 UV, dielectric grease, ferrules, labels, 18 AWG red and black, 22 AWG.
- Cable: 16/2 (the jumper and six runs), 14/2 (three loads out), 22/12 shielded (trunk and wind cable).

STILL OPEN

- Entry 11 has no wire: the post lights cable (4) carries the stern light and the whites, and the bow lantern has 19.
- Entry 13 holds two cables to two different places (em-trak, wet lab); the gland rule allows two only when both go to the same box. Entry 11 could take the wet lab line.
- Pump 2 on: two trunk cores or a seventh 16/2 run, at loom time.
- Cables not named: post lights 4-core, bow lantern pair, bilge leads, encoder lead.
- A surge part on the wind data line: the post guide asks for one here; the 1.5KE33CA is the wrong voltage.
- The box on hand: the lower gland row needs a base at least 3-1/2 in deep.

Homes: Electronics and Wiring Plan A6 and sec 4.1; Box Wiring Sheet A6; Compute Bay Plan sec 11 (the channels); Instrument Post Guide 10.3 and 10.4.