VESC A BOX WIRING

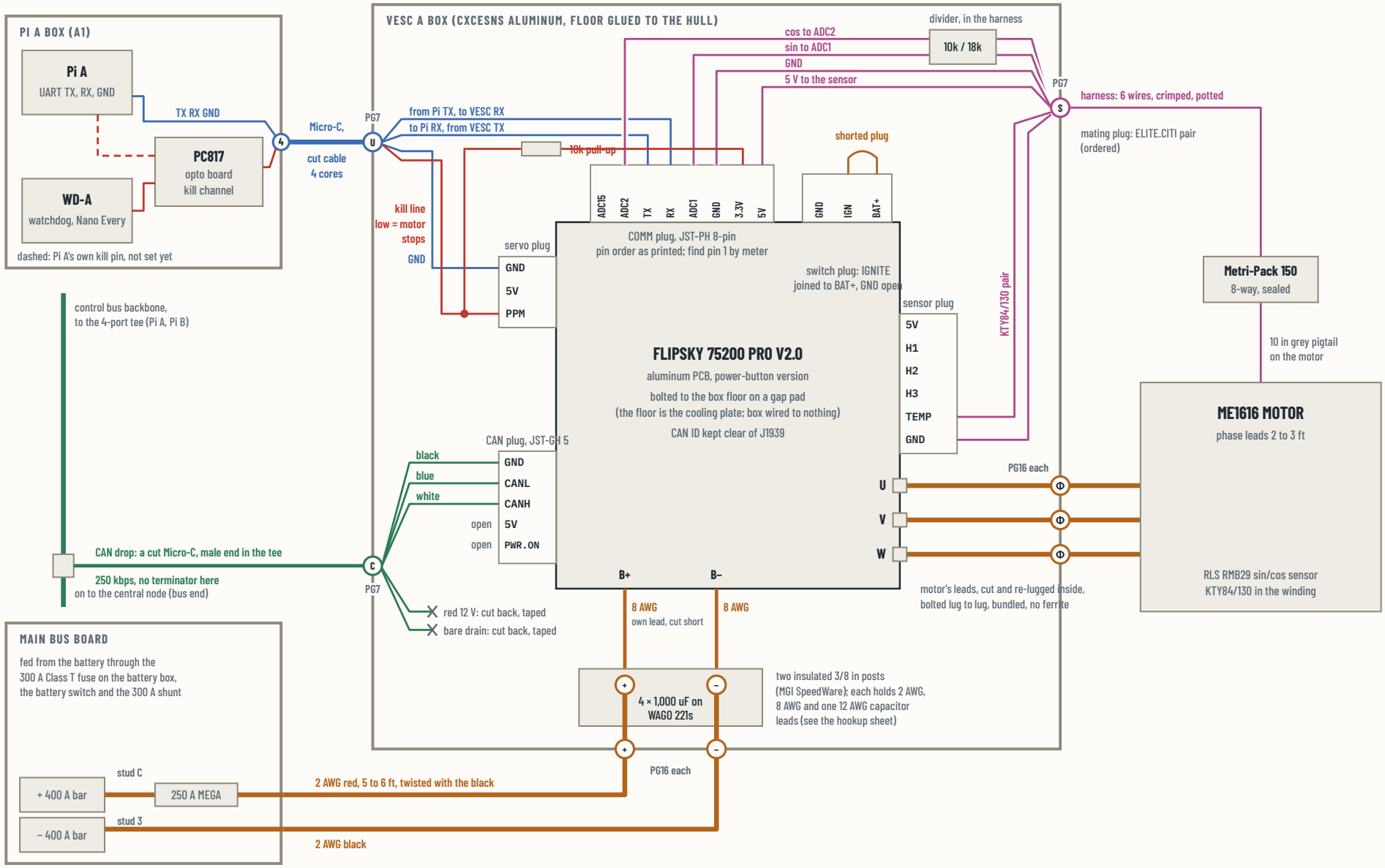
Every wire into and inside the motor controller box (Boat 1's only VESC). Drawn from the Box Wiring Sheets (A7), the Electronics and Wiring Plan (A7, sec 5, sec 7.6) and the Build Guide (sec 5.1). Hole spots are schematic; the hole list is Sheet A7.

BOAT
Boat 1, Prime Ranger

DOC SET
v10.3

DRAWN
Oct 14, 2026; updated Oct 24

Battery and motor power
CAN, control bus
UART backup (Pi A)
Kill line
Motor sensor harness
Not wired yet
Dot = joined. Lines crossing with no dot do not touch.



COMM plug JST-PH 8

Other plugs

ADC15	open
ADC2	cos, through its divider
TX	to Pi A's RX
RX	from Pi A's TX
ADC1	sin, through its divider
GND	the motor sensor's ground only
3.3V	10k pull-up to the servo plug's PPM, in the harness (Mike, Oct 24)
5V	feeds the motor's sin/cos sensor

CAN plug JST-GH 5

GND	black core of the drop
CANL	blue core
CANH	white core
5V, PWR.ON	open

Switch	shorted plug: IGNITE joined to BAT+, GND open. The board runs whenever the battery is on.
Servo PPM	kill line (Mike, Oct 14), VESC Tool kill switch on PPM, active low; held high by the 10k
Servo GND	the Pi A cable's ground core, beside the kill (Mike, Oct 24)
Sensor TEMP	one leg of the KTY84/130 motor temperature sensor
Sensor GND	its other leg
B+ / B−	controller's own 8 AWG leads, cut short, ring lugs on the two posts
U V W	the motor's three leads: lugs cut off, fed in through their PG16s, new 3/8 in lugs inside, each bolted lug to lug to the Flipsky lead of the same letter, glue-lined heat-shrink over (Mike, Oct 24)

Into the box 8 holes

U	UART + kill from Pi A, PG7
C	CAN drop, PG7
+ −	2 AWG battery feed, PG16 each
Φ ×3	motor phases, PG16 each
S	motor sensor harness, PG7

Power. No precharge: the battery switch makes the first connection. The capacitors' legs get crimped 18 AWG tails into two WAGO 221 lever nuts (one +, one −), each with a 12 AWG lead to its post (no copper strips, no solder; Cap_Board_Drawing_2026-10-14). Everything lands on the posts, so there is no splice in the 2 AWG or the 8 AWG. Check each capacitor's stripe faces the minus post before first power-up. No surge diode on the feed (Mike, Oct 24): the battery and the capacitors hold it, and a failed diode would short and blow the 250 A motor fuse.

Kill line. WD-A pulls it low through the PC817 opto board when Pi A's heartbeat stops, and the motor stops whatever CAN or UART are doing. It lands on the servo plug's PPM pin, and the Pi A cable's ground core lands on the servo plug's GND beside it (Mike, Oct 24). A 10k from COMM 3.3V to PPM, in the harness, holds the line high (motor allowed) whenever the opto is off, whatever the firmware does with the pin, so a loose kill wire cannot stop the motor; the motor still ramps to zero if CAN and

the serial line both go quiet. COMM's GND serves the sensor alone, so no thin wires are spliced. No surge part on the UART or kill pair, by choice.

Sensor. The 10k and 18k divider goes on sin and on cos only if the sensor's tops go over 3.2 V (the Build Guide's assembly check). If the sensor ever fails, the motor runs sensorless.

Cooling. The box is a CXCESNS aluminum box, 11.8 x 8.3 x 3.9 in, and its floor is the cooling plate (Mike, Oct 24): the floor glues straight to the hull in the heat-carrying epoxy, and the Flipsky bolts to studs through the floor on a gap pad. No separate plate. Build steps, floor plan and hole map: VESC_A_Box_Build_Prep_2026-10-24.

Ferrites. None. The phase leads are too short for the 1.0 in clamp (Mike, 2026-10-15), and the other cables stay in the cabin.

Not written in the docs yet

1. **Motor temperature pins.** The docs give the sensor type but not the pins. Drawn on the sensor plug's TEMP and GND, where VESC boards normally take it (inferred, not checked on this board).
2. **2 AWG feed length.** The Electronics plan says 5 to 6 ft; the main bus board drawing says about 10 ft.