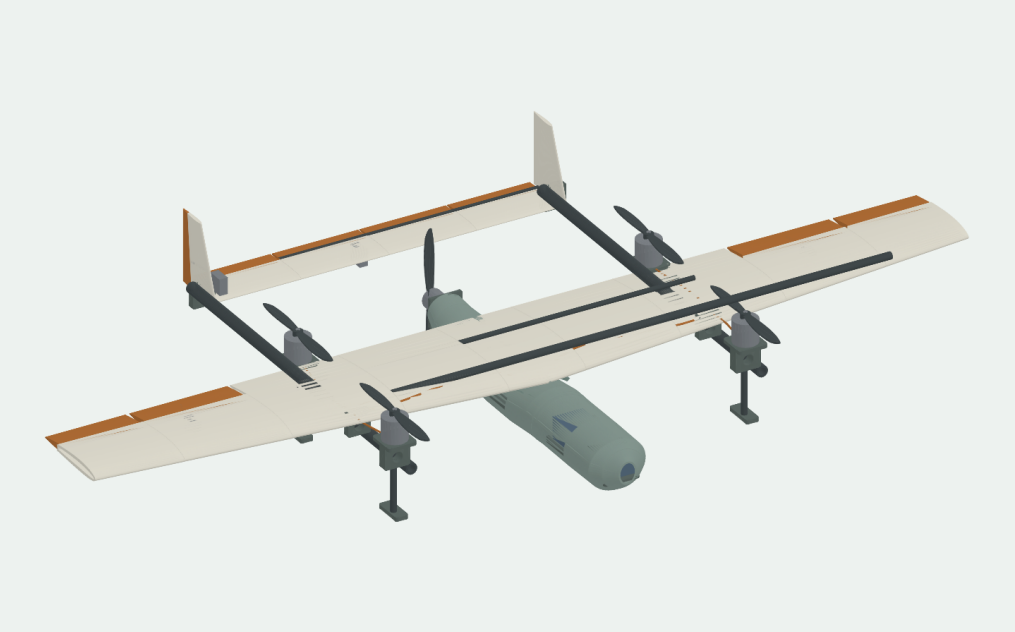
FLIGHTHUB / REVISION 0.2.0 / KIT EDITION 2

Raven Kestrel

Raven Kestrel 0.2.0 is the 4+1 high-wing bench prototype with removable port and starboard wing-to-pod fairings. The fairing-off and fairing-on configurations share the successor anchor shoes. The original 0.1.0 build is a separate control. Verify retention, propeller clearance and loads before powered testing.



Assembled view from the revision-matched CAD.

In this guide

01 Print and measure the seam coupons

02 Dry-fit the fuselage and structural frame

03 Fit and remove the wing-to-pod fairings

04 Fit the wing, tail and flight controls

05 Fit the four lift motors and rear pusher

06 Route signals, power and sensors

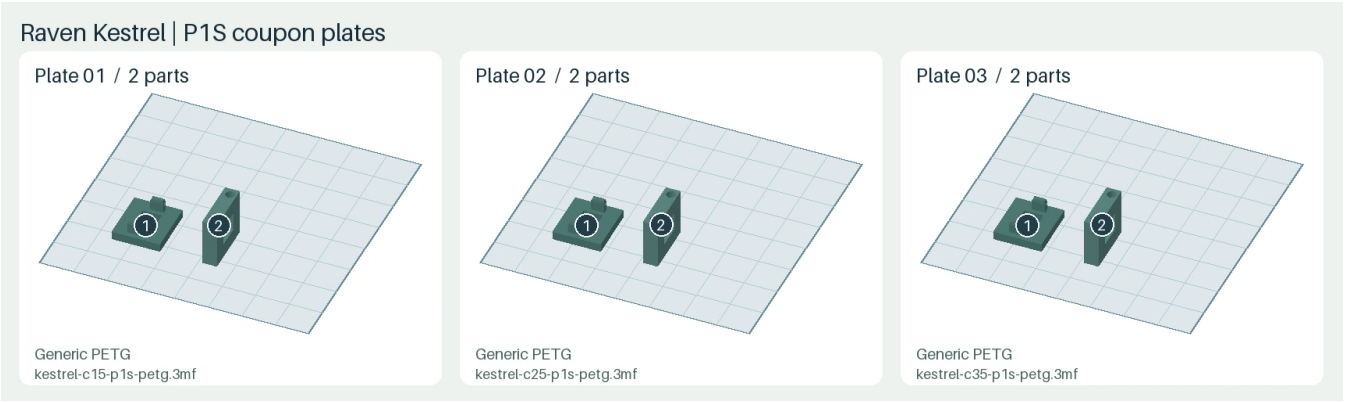
07 Commission the controller with propellers removed

08 Run guarded propulsion tests

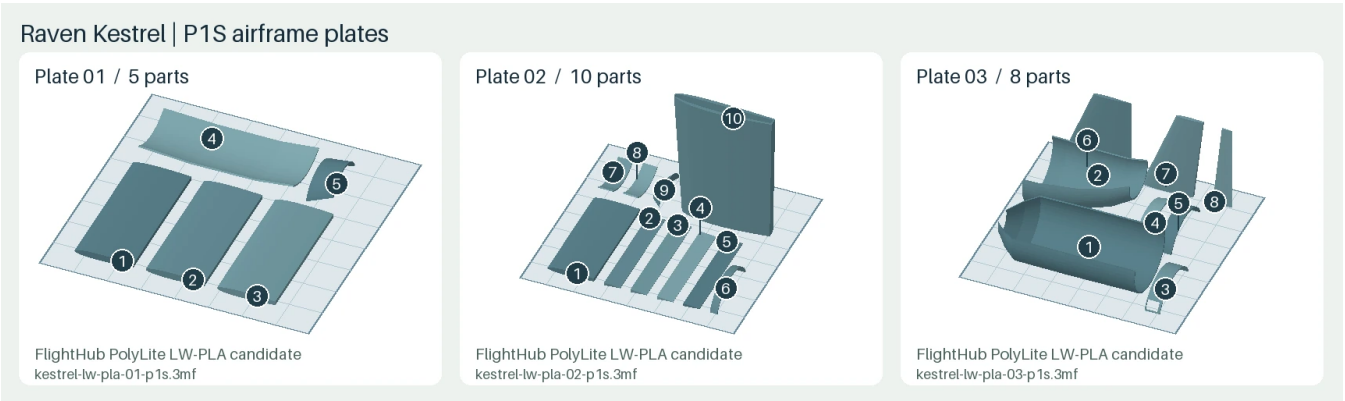
09 Review the evidence before hover and transition

Print setup

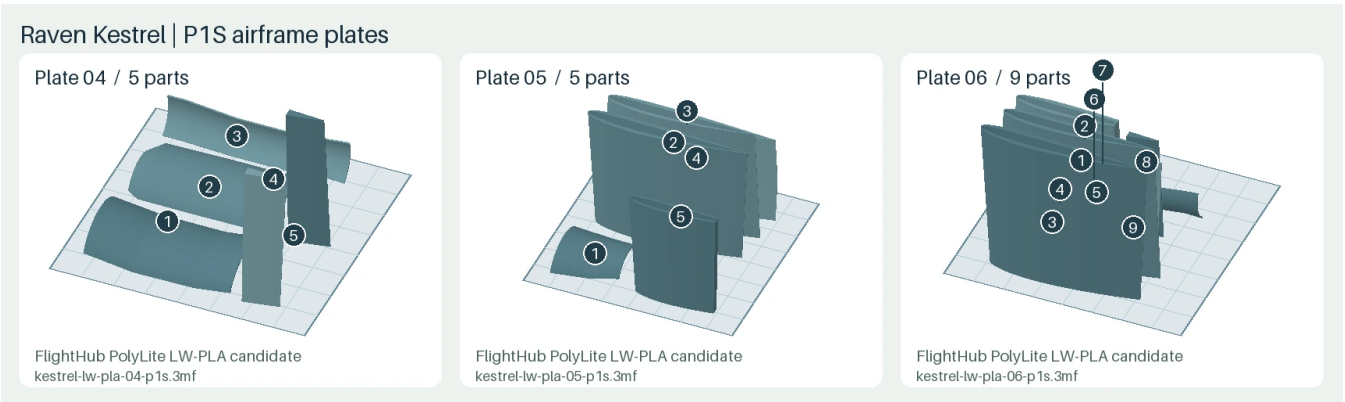
Bambu Lab P1S with a 0.4 mm nozzle. Start with the saved 0.15, 0.25 and 0.35 mm clearance coupon projects. The coupon profiles use Generic PETG on textured PEI at 0.20 mm layers, four walls and 30% gyroid. The 9 editable airframe plates were checked with Bambu Studio 02.09.01.70. Verify material, bed, supports and orientation on your own printer. Record the physical print, fit, retention, mass and balance before applying power.



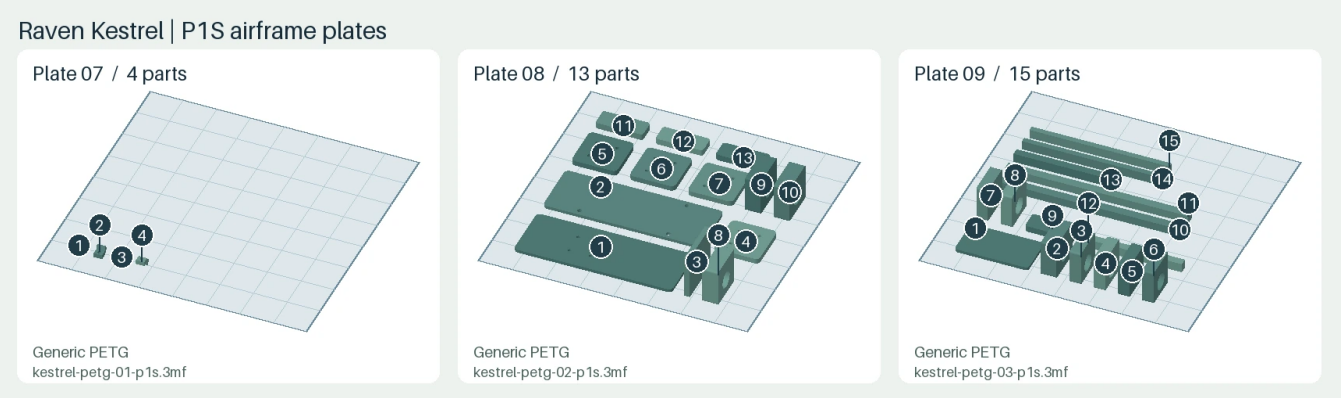
Raven Kestrel coupon plates 01-03. Saved print orientations on the P1S bed.



Raven Kestrel airframe plates 01-03. Saved print orientations on the P1S bed.



Raven Kestrel airframe plates 04-06. Saved print orientations on the P1S bed.



Raven Kestrel airframe plates 07-09. Saved print orientations on the P1S bed.

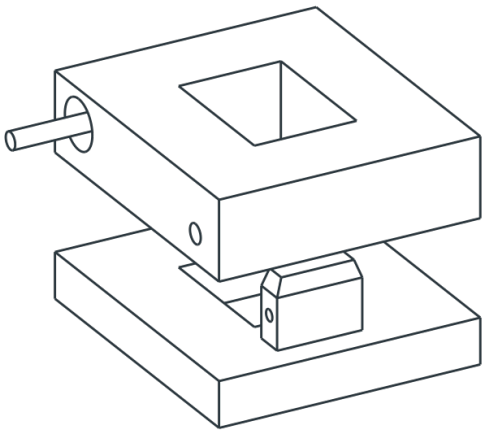
01 Print and measure the seam coupons

Why this matters

The shoulder sets the seam position and the independent pin carries retention. The coupon ladder checks how the selected print process affects both.

Where to look

Match the marked spigot and receiver pairs on the coupon sheet. Keep the insertion axis and pin access visible while checking fit.



Inherited coupon solids with identical installed source links. This is a fit sample.

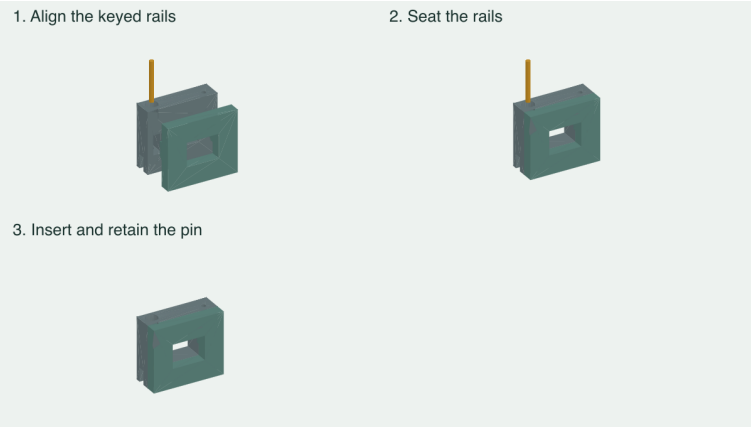
1. Slice the 0.15, 0.25 and 0.35 mm clearance-per-side coupon ladder first on the Bambu Lab P1S with its 0.4 mm nozzle. Record the nozzle, filament and lot, slicer profile, orientation and any support or cleanup for each fit sample.

2. Slide each keyed rail to its shoulder, check that the replaceable detent clicks at full seating, and verify the captive pin seats and stays retained. Check that partial engagement is visible and that deliberate release works without forcing the printed parts.

3. Record gap, play, insertion and release behavior, and pin engagement before and after repeated assembly and review-approved load and environmental trials. Hold the airframe print if a coupon binds, rocks, cracks or loses retention.

Before you continue

Record gap, rocking, insertion and withdrawal effort, and pin engagement for each clearance before selecting a fit.



Use the isolated coupon to check the latch sequence before trying it on the full airframe.

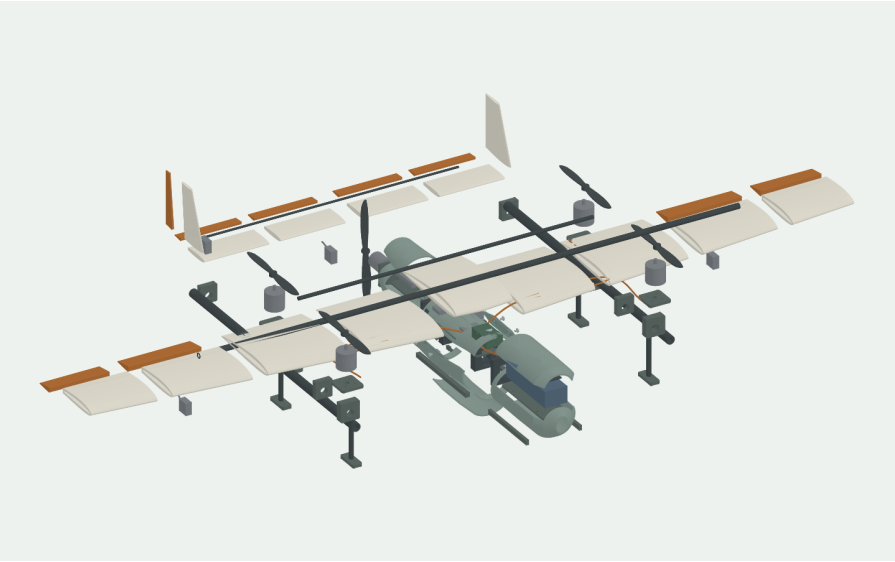
02 Dry-fit the fuselage and structural frame

Why this matters

The nose and aft interfaces locate the shell modules and give access to their own trays and harness branches.

Where to look

Find the two fuselage seams and their pin locations in the exploded view. Identify which tray and rails travel with each removable module.



Exact 0.2.0 scene meshes with service parts separated for identification.

1. Inspect the printed shoulders and rail carriers. Dry-fit the nose and aft shell to the center at X174 and X356 mm. Check both pins independently after seating the shells.

2. Trial-fit the spar, boom, lift mount supports, pusher firewall and skids on the internal frame. Check that motor, wing and landing loads have reviewed paths into the structure. Check that the frame can be inspected and the shells can be removed without disturbing it.

3. Set the battery on its tray with the axial stop and both straps. With the battery unplugged, check connector access, lead bend radius and clearance through both seams. Record part masses, actual engagement and observed interference.

4. Use the coupon for the isolated rail and pin sequence. The nose tray and battery move with the nose, and the aft rails and ESC tray move with the aft module. Disconnect and free the harness across each seam before checking installed travel and clip access.

Before you continue
Both pins engage independently at full seating, and the actual harness can be disconnected before moving either module.

03 Fit and remove the wing-to-pod fairings

Why this matters
Removable shoulders allow a matched comparison of the installed fairings and the same crown with its anchor shoes exposed.

Where to look
Look beneath the wing root at the port and starboard crown shoulders. The screws and load washers come out before each shell moves outboard.

1. Use a separate 0.2.0 crown for the fairing study. Dry-fit both PETG anchor shoes and the LW-PLA shell on each side. Nominal shell ray samples show 1.077 mm to the wing and 1.474 mm to the roof. Measure the actual clearances and access with the assembly unpowered.

2. Dry-fit the actual M2 screw, load washer and insert stack on a spare matching crown. The four shoes sit at X246 and X296 mm with a nominal 0.45 mm bond gap. The Ø3.2 × 4.4 mm insert bore is a sizing witness. Confirm insert retention and actual screw length before bonding the shoes.

3. Remove the four M2 screw and washer sets and pull each shell straight outboard. Leave the four shoes installed in both successor configurations. Record A with both fairings off and B with both fairings on. Record the configuration, revision and setup for each observation. Keep the original 0.1.0 build as a separate control.

4. Use independent retention or guarded containment on the bench. Review fit and loaded retention before moving to a powered test. Record actual section mass and any temperature or vibration differences.

Before you continue
Check insert depth, bond gap, measured clearances and attachment retention. Record complete fairing-on and fairing-off masses.

04 Fit the wing, tail and flight controls

Why this matters
Wing seating, spar engagement and retained linkages keep the control surfaces aligned under load.

Where to look
Follow the spars through the wing roots and the servo leads past the removable fuselage modules. Inspect the H-tail linkages and rear pusher envelope.

1. Dry-fit the wing panels and H-tail. Inspect spar engagement, alignment, panel seats and retained fasteners before closing access panels.

2. Fit the four HS-65MG servos to the port and starboard ailerons, elevator and starboard rudder. Check mechanical neutral, hinge and linkage retention, and free movement through the approved bench travel with each surface moved individually and together.

3. Mock up the routed servo leads and check service disconnects, abrasion protection and clearance from moving linkages, latch pins and the pusher disc.

Before you continue
Confirm full free travel, matching panel alignment and clearance to the fixed fairing shoes, wiring and pusher disc.

05 Fit the four lift motors and rear pusher

Why this matters
The lift stations and rear pusher use different mounts and have separate load and cooling paths.

Where to look
Identify all four lift adapters and the cruise mount before choosing screws or securing the ESC leads.

1. Trial-fit the four EMAX lift motors and the BadAss cruise motor to their respective adapters. Confirm the delivered mounting patterns, screw engagement, winding clearance, adapter stack and access for inspection. Keep propellers off for installation and electrical setup.

2. Identify the two standard and two reverse APC 7 × 4 lift propellers and the separate APC 8 × 6 reverse pusher. With power disconnected, use a clearance gauge or hand sweep to check all five discs against the airframe, wing, tail, skids and wiring. Remove the propellers again before powering the controller.

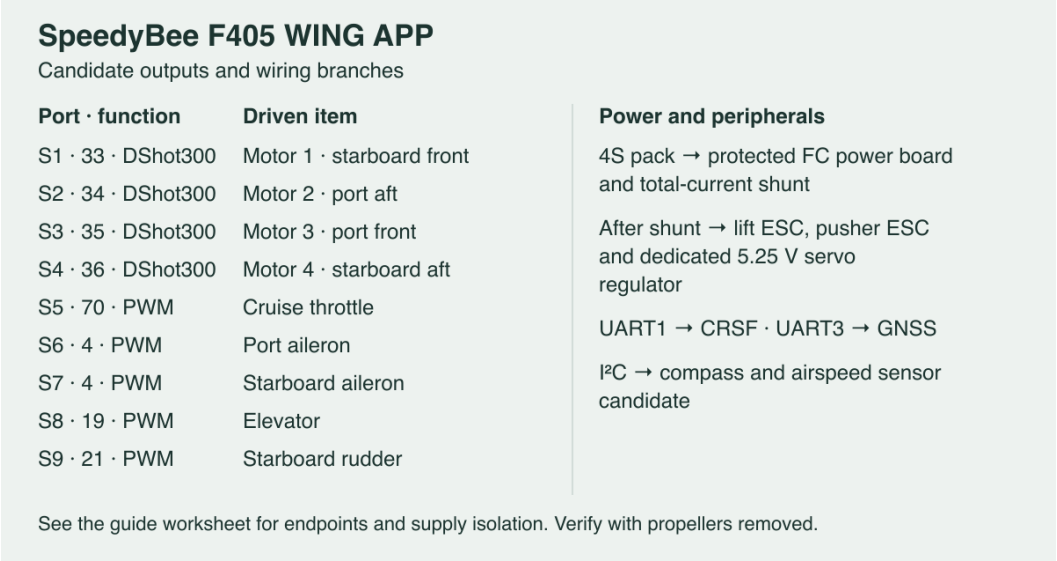
3. Secure the lift and cruise ESCs with airflow and strain relief. Confirm that phase wiring cannot reach the propeller envelopes or be pinched by a shell or hatch.

Before you continue
Verify delivered mounting patterns, screw depth and phase lead restraints with all propellers removed.

06 Route signals, power and sensors

Why this matters
Separate power and signal paths make isolation and inspection possible during service.

Where to look
Use the wiring worksheet and 3D harness traces to identify the power branches, service disconnects and controller outputs.



SpeedyBee F405 WING APP

Candidate outputs and wiring branches

Port · function	Driven item
S1 · 33 · DShot300	Motor 1 · starboard front
S2 · 34 · DShot300	Motor 2 · port aft
S3 · 35 · DShot300	Motor 3 · port front
S4 · 36 · DShot300	Motor 4 · starboard aft
S5 · 70 · PWM	Cruise throttle
S6 · 4 · PWM	Port aileron
S7 · 4 · PWM	Starboard aileron
S8 · 19 · PWM	Elevator
S9 · 21 · PWM	Starboard rudder

Power and peripherals

4S pack → protected FC power board and total-current shunt

After shunt → lift ESC, pusher ESC and dedicated 5.25 V servo regulator

UART1 → CRSF · UART3 → GNSS

I²C → compass and airspeed sensor candidate

See the guide worksheet for endpoints and supply isolation. Verify with propellers removed.

Revision-matched worksheet. Check exact pinouts and confirm the hardware with propellers removed.

1. S1 Motor 1 · starboard front (DShot300, function 33) · S2 Motor 2 · port aft (DShot300, function 34) · S3 Motor 3 · port front (DShot300, function 35)

2. S4 Motor 4 · starboard aft (DShot300, function 36) · S5 Cruise throttle (PWM, function 70) · S6 Port aileron (PWM, function 4)

3. S7 Starboard aileron (PWM, function 4) · S8 Elevator (PWM, function 19) · S9 Starboard rudder (PWM, function 21)

4. Connect CRSF to UART1 and GNSS to UART3. Route the compass and pitot differential pressure sensor to I²C. Keep the compass and receiver antennas clear of high-current wiring and carbon where practical. Reserve an unobstructed pitot location and check tubing for leaks and kinks.

5. Feed the servo breakout with the external Castle BEC at the documented 5.25 V target and maintain a common signal ground. Isolate the cruise ESC’s red BEC positive and the controller’s servo BEC positive from the external servo rail. Verify controller and peripheral power separately against their documented voltage and load limits.

6. Inspect polarity, insulation, branch protection and the current measurement path. Record connector types and wire sizes. Hold combined motor operation until the battery leads, mating connector and branch harness have a reviewed load budget.

Before you continue

Record terminal assignments, connector types, wire sizes and measured clearances through both removable seams.

07 Commission the controller with propellers removed

Why this matters

Individual channel checks establish the motor map, control direction and isolation before the propulsion system carries a load.

Where to look

Use the bench output worksheet, flight controller and the separate lift and cruise branches.

1. Restrain the airframe, remove all five propellers and use a current-limited source for first power. Confirm rail voltages, current draw and absence of backfeed before connecting loads. Check both BEC feed connections and monitor rail behavior while moving all control surfaces.

2. Record the ArduPilot build and calibration. Verify sensor orientation and response, CRSF link and loss behavior, low-power indications, throttle cut and disarm, and correct control movement with adequate clearance. Test GNSS and compass separately from the pitot zero and response checks.

3. Verify the four lift motor positions and directions one output at a time. Confirm cruise direction independently and confirm all five motors stop on command. Save the output map, parameter export and test log.

Before you continue
Confirm rail voltages, stop behavior and individual motor direction with all propellers off. Save the parameter export.

08 Run guarded propulsion tests

Why this matters
A guarded single-branch fixture lets the builder measure the actual motor, propeller and electrical combination.

Where to look
Use the reviewed stand, guard, remote disconnect and measurement instruments before fitting a propeller.

1. After fixture and hardware review, fit one matched motor, propeller and retainer on a guarded stand. Use remote power isolation. Verify propeller orientation, thrust direction and RPM for each handed lift configuration and the cruise pusher.

2. Log thrust, RPM, battery voltage and sag, branch current and temperatures at the motor, ESC, wiring and connectors. Stop on vibration, loosened retention, abnormal heating, desynchronization or electrical limits. Use the exact pack state and test duration in the record.

3. Compare measured results with the approved component and power-path limits. Test simultaneous loads only on a qualified, guarded power path. Reinspect hardpoints, pins and wiring after testing.

Before you continue
Record measured current, thrust, temperatures and hardpoint condition before any integrated powered test.

09 Review the evidence before hover and transition

Why this matters
Measured retention, load, balance and control evidence establishes whether this exact article can proceed to supervised testing.

Where to look
Use the installed battery datum and lift-rotor center, then inspect the fairings, pins, harness restraints and fixed-wing control surfaces.

1. Record measured all-up mass and balance with the pack secured, review the relationship between the center of gravity and lift rotor center, and confirm structural retention, control limits, radio range and failsafe behavior for this exact configuration.

2. Hold hover and transition pending review of measured lift reserve, current and thermal margins, installed airspeed sensing, both transition directions and abort behavior. Exercise the mode sequence and failure handling in simulation or a controlled bench setup first.

3. Use a separately reviewed field plan to establish controlled hover and landing before evaluating either transition. Record flight results only after the corresponding physical test.

Before you continue
Record reviewed bench results and keep hover, landing and both transition directions as separate physical test records.

Wiring worksheet

SpeedyBee F405 WING APP

Port and starboard are defined looking forward from behind the aircraft.

Match the physical 4-in-1 signal inputs and motor-pad markings before applying power. Check all motor ordering and rotation with propellers removed.

Use both Castle outputs into the separate servo breakout. Keep FC servo positive and all ESC BEC positives off that breakout. Share signal ground.

If the board GNSS connector cannot hold 4.7-5.2 V in the intended power states, qualify a separate regulated branch before connecting the GNSS.

Output	Signal	Function	Endpoint	Driven item
S1	DShot300	33	4-in-1 lift ESC channel 1	Motor 1 · starboard front
S2	DShot300	34	4-in-1 lift ESC channel 2	Motor 2 · port aft
S3	DShot300	35	4-in-1 lift ESC channel 3	Motor 3 · port front
S4	DShot300	36	4-in-1 lift ESC channel 4	Motor 4 · starboard aft
S5	PWM	70	Pusher ESC signal input	Cruise throttle
S6	PWM	4	Port aileron servo	Port aileron
S7	PWM	4	Starboard aileron servo	Starboard aileron
S8	PWM	19	Elevator servo	Elevator
S9	PWM	21	Starboard rudder servo	Starboard rudder

Power, motor phases and peripheral links

Link	From	To	Connection notes
Power	4S pack / XT90	FC power board	Reviewed disconnect and protection precede the monitored 4S feed.
Power	4S distribution after shunt	Lift ESC VBAT	Use the rated branch connector and verified current path.
Power	4S distribution after shunt	Pusher ESC VBAT	Use the rated branch connector and isolate the ESC BEC positive.
Power	4S distribution after shunt	Castle regulator input	Independent regulated servo supply with common signal ground.
Power	External 5.25 V servo breakout	Port aileron servo	Separate servo positive and common signal ground.

Link	From	To	Connection notes
Power	External 5.25 V servo breakout	Starboard aileron servo	Separate servo positive and common signal ground.
Power	External 5.25 V servo breakout	Elevator servo	Separate servo positive and common signal ground.
Power	External 5.25 V servo breakout	Starboard rudder servo	Separate servo positive and common signal ground.
Phase	Lift ESC channel 1 motor pads	Starboard front lift motor	Three motor phases. Confirm CCW rotation viewed from above with the propeller removed.
Phase	Lift ESC channel 2 motor pads	Port aft lift motor	Three motor phases. Confirm CCW rotation viewed from above with the propeller removed.
Phase	Lift ESC channel 3 motor pads	Port front lift motor	Three motor phases. Confirm CW rotation viewed from above with the propeller removed.
Phase	Lift ESC channel 4 motor pads	Starboard aft lift motor	Three motor phases. Confirm CW rotation viewed from above with the propeller removed.
Phase	Pusher ESC motor outputs	Pusher motor	Three phases. Confirm direction with the propeller removed before matching the reverse prop.
Signal	UART1 / SERIAL1	CRSF receiver	Cross TX/RX. Verify the receiver supply and common ground.
Signal	UART3 / SERIAL3	GNSS	Cross TX/RX. Verify 4.7-5.2 V at the device under load.
Signal	I²C	GNSS module compass	Match SDA/SCL and ground.
Signal	I²C	Matek ASPD-4525 candidate	Confirm bus address, driver and supply. The sensor is absent from the scene.

Checks to record

Record the exact part hashes, material lot, saved P1S profile, coupon gaps and loaded seam retention.

Inspect the aft pod rim and crown plus both optional fairing edges during dry-fit. The saved aft-pod outer wall ends at Z64.2 mm against a CAD maximum of Z64.643 mm because two isolated rim tips are narrower than the extrusion line. The removable joint lies away from these tips.

Record the actual M2 insert engagement and crown bond, both fairing masses, installed clearance and retention. Keep the baseline and fairing-off controls distinct.

Inspect complete mass and balance, loaded control direction and throws, propeller clearance, radio range, failsafe, current and temperatures.

Record reviewed hover, both transitions and landing independently after the exact physical article passes its bench gates.

Print inventory

File	Material	Qty	Envelope (mm)
parts/airframe/nose-pod.stl	LW-PLA candidate	1	174.0 × 88.0 × 49.6
parts/airframe/nose-pod-front-crown.stl	LW-PLA candidate	1	14.0 × 58.2 × 22.9
parts/airframe/nose-pod-hatch.stl	LW-PLA candidate	1	151.0 × 82.6 × 27.9
parts/airframe/nose-pod-rear-crown.stl	LW-PLA candidate	1	9.0 × 82.6 × 24.9
parts/airframe/center-pod.stl	LW-PLA candidate	1	182.0 × 16.5 × 43.2

File	Material	Qty	Envelope (mm)
parts/airframe/center-pod-starboard.stl	LW-PLA candidate	1	182.0 × 16.6 × 43.3
parts/airframe/center-pod-front-crown.stl	LW-PLA candidate	1	18.0 × 82.6 × 24.9
parts/airframe/center-pod-roof.stl	LW-PLA candidate	1	147.0 × 84.5 × 31.4
parts/airframe/center-pod-rear-crown.stl	LW-PLA candidate	1	17.0 × 82.6 × 26.7
parts/airframe/center-pod-front-belly.stl	LW-PLA candidate	1	18.0 × 58.7 × 10.7
parts/airframe/center-pod-hatch.stl	LW-PLA candidate	1	147.0 × 60.0 × 14.0
parts/airframe/center-pod-rear-belly.stl	LW-PLA candidate	1	17.0 × 58.7 × 11.5
parts/airframe/aft-pod.stl	LW-PLA candidate	1	119.0 × 88.0 × 64.6
parts/airframe/aft-pod-front-crown.stl	LW-PLA candidate	1	16.0 × 82.6 × 24.9
parts/airframe/aft-pod-hatch.stl	LW-PLA candidate	1	79.0 × 82.6 × 25.9
parts/airframe/aft-pod-rear-crown.stl	LW-PLA candidate	1	24.0 × 59.2 × 23.4
parts/airframe/center-rail-port.stl	PETG candidate for bench fit	1	174.0 × 8.0 × 8.0
parts/airframe/nose-guide-port.stl	PETG candidate for bench fit	1	133.0 × 5.0 × 9.0
parts/airframe/aft-rail-port.stl	PETG candidate for bench fit	1	92.0 × 7.0 × 9.0
parts/airframe/center-rail-starboard.stl	PETG candidate for bench fit	1	174.0 × 8.0 × 8.0
parts/airframe/nose-guide-starboard.stl	PETG candidate for bench fit	1	133.0 × 5.0 × 9.0
parts/airframe/aft-rail-starboard.stl	PETG candidate for bench fit	1	92.0 × 7.0 × 9.0
parts/airframe/battery-tray.stl	PETG candidate for bench fit	1	150.0 × 53.0 × 3.0
parts/airframe/avionics-tray.stl	PETG candidate for bench fit	1	150.0 × 54.0 × 3.0
parts/airframe/aft-esc-tray.stl	PETG candidate for bench fit	1	70.0 × 38.0 × 3.0
parts/airframe/wing-center.stl	LW-PLA candidate	1	200.0 × 24.9 × 116.0
parts/airframe/wing-port-1.stl	LW-PLA candidate	1	194.0 × 25.3 × 150.0
parts/airframe/wing-port-2.stl	LW-PLA candidate	1	178.6 × 23.6 × 165.0
parts/airframe/wing-port-3.stl	LW-PLA candidate	1	119.6 × 21.5 × 157.0
parts/airframe/aileron-port-1.stl	LW-PLA candidate	1	40.9 × 12.3 × 150.0
parts/airframe/wing-port-4.stl	LW-PLA candidate	1	107.6 × 19.2 × 130.0
parts/airframe/aileron-port-2.stl	LW-PLA candidate	1	36.7 × 10.9 × 123.0
parts/airframe/boom-saddle-port-front.stl	PETG candidate for bench fit	1	11.0 × 33.0 × 34.0
parts/airframe/boom-saddle-port-rear.stl	PETG candidate for bench fit	1	11.0 × 33.0 × 34.0
parts/airframe/boom-saddle-port-tail.stl	PETG candidate for bench fit	1	11.0 × 33.0 × 34.0
parts/airframe/skid-port-fore.stl	PETG candidate for bench fit	1	45.0 × 18.0 × 6.0

File	Material	Qty	Envelope (mm)
parts/airframe/skid-port-aft.stl	PETG candidate for bench fit	1	45.0 × 18.0 × 6.0
parts/airframe/stabilizer-port-1.stl	LW-PLA candidate	1	55.4 × 132.5 × 6.9
parts/airframe/elevator-port-1.stl	LW-PLA candidate	1	19.6 × 129.5 × 3.7
parts/airframe/stabilizer-port-2.stl	LW-PLA candidate	1	55.4 × 132.5 × 6.9
parts/airframe/elevator-port-2.stl	LW-PLA candidate	1	19.6 × 124.0 × 3.7
parts/airframe/fin-port.stl	LW-PLA candidate	1	86.0 × 7.7 × 107.0
parts/airframe/wing-starboard-1.stl	LW-PLA candidate	1	194.0 × 25.3 × 150.0
parts/airframe/wing-starboard-2.stl	LW-PLA candidate	1	178.6 × 23.6 × 165.0
parts/airframe/wing-starboard-3.stl	LW-PLA candidate	1	119.6 × 21.5 × 157.0
parts/airframe/aileron-starboard-1.stl	LW-PLA candidate	1	40.9 × 12.3 × 150.0
parts/airframe/wing-starboard-4.stl	LW-PLA candidate	1	107.6 × 19.2 × 130.0
parts/airframe/aileron-starboard-2.stl	LW-PLA candidate	1	36.7 × 10.9 × 123.0
parts/airframe/boom-saddle-starboard-front.stl	PETG candidate for bench fit	1	11.0 × 33.0 × 34.0
parts/airframe/boom-saddle-starboard-rear.stl	PETG candidate for bench fit	1	11.0 × 33.0 × 34.0
parts/airframe/boom-saddle-starboard-tail.stl	PETG candidate for bench fit	1	11.0 × 33.0 × 34.0
parts/airframe/skid-starboard-fore.stl	PETG candidate for bench fit	1	45.0 × 18.0 × 6.0
parts/airframe/skid-starboard-aft.stl	PETG candidate for bench fit	1	45.0 × 18.0 × 6.0
parts/airframe/stabilizer-starboard-1.stl	LW-PLA candidate	1	55.4 × 132.5 × 6.9
parts/airframe/elevator-starboard-1.stl	LW-PLA candidate	1	19.6 × 129.5 × 3.7
parts/airframe/stabilizer-starboard-2.stl	LW-PLA candidate	1	55.4 × 132.5 × 6.9
parts/airframe/elevator-starboard-2.stl	LW-PLA candidate	1	19.6 × 124.0 × 3.7
parts/airframe/fin-starboard.stl	LW-PLA candidate	1	73.0 × 7.7 × 107.0
parts/airframe/rudder-starboard.stl	LW-PLA candidate	1	22.4 × 4.2 × 107.0
parts/airframe/lift-cradle-port-fore.stl	PETG candidate for bench fit	1	15.0 × 37.0 × 36.0
parts/airframe/lift-plate-port-fore.stl	PETG candidate for bench fit	1	43.0 × 43.0 × 5.0
parts/airframe/lift-cradle-port-aft.stl	PETG candidate for bench fit	1	15.0 × 37.0 × 36.0
parts/airframe/lift-plate-port-aft.stl	PETG candidate for bench fit	1	43.0 × 43.0 × 5.0
parts/airframe/lift-cradle-starboard-fore.stl	PETG candidate for bench fit	1	15.0 × 37.0 × 36.0
parts/airframe/lift-plate-starboard-fore.stl	PETG candidate for bench fit	1	43.0 × 43.0 × 5.0
parts/airframe/lift-cradle-starboard-aft.stl	PETG candidate for bench fit	1	15.0 × 37.0 × 36.0

File	Material	Qty	Envelope (mm)
parts/airframe/lift-plate-starboard-aft.stl	PETG candidate for bench fit	1	43.0 × 43.0 × 5.0
parts/airframe/pusher-firewall.stl	PETG candidate for bench fit	1	5.0 × 48.0 × 44.0
parts/airframe/wing-pod-fairing-port.stl	LW-PLA candidate	1	115.0 × 12.4 × 9.0
parts/airframe/wing-pod-fairing-port-anchor-1.stl	PETG candidate	1	8.0 × 10.3 × 9.2
parts/airframe/wing-pod-fairing-port-anchor-2.stl	PETG candidate	1	8.0 × 10.5 × 9.2
parts/airframe/wing-pod-fairing-starboard.stl	LW-PLA candidate	1	115.0 × 12.4 × 9.0
parts/airframe/wing-pod-fairing-starboard-anchor-1.stl	PETG candidate	1	8.0 × 10.3 × 9.2
parts/airframe/wing-pod-fairing-starboard-anchor-2.stl	PETG candidate	1	8.0 × 10.5 × 9.2
parts/coupons/kestrel-c15-spigot.stl	PETG candidate	1	46.0 × 52.0 × 20.6
parts/coupons/kestrel-c15-receiver.stl	PETG candidate	1	46.0 × 52.0 × 14.3
parts/coupons/kestrel-c25-spigot.stl	PETG candidate	1	46.0 × 52.0 × 20.6
parts/coupons/kestrel-c25-receiver.stl	PETG candidate	1	46.0 × 52.0 × 14.3
parts/coupons/kestrel-c35-spigot.stl	PETG candidate	1	46.0 × 52.0 × 20.6
parts/coupons/kestrel-c35-receiver.stl	PETG candidate	1	46.0 × 52.0 × 14.3

Bill of materials

USD listings checked 2026-11-11. Shipping, tax and unpriced items require a separate budget.

Filament estimates cover all saved airframe plates, including supports and brims. Coupon material and measured print consumption are separate.

Printed parts and filament

Item	Qty	Specification
Kestrel rail and captive-pin fit coupons	1 set	Two seam stations with mating guide, shoulder, detent and pin samples. Measure repeatability in the intended interface material. print first
Nose center and aft fuselage shells	1 assembly	Removable nose and aft shell with keyed guides seated against the central module. Verify seams and connector access. prototype CAD
Keyed bulkheads and rail carriers	2 interfaces	Rigid guide faces, positive shoulders, replaceable detents and independently inspectable captive pins. prototype CAD
Battery hatch and tray plus avionics supports	1 set	150 × 50 × 38 mm battery case reserve, separate connector exit, tray stops, strap paths and accessible cooling and wiring. prototype CAD
Wing panels and ailerons	1 set	1,320 mm nominal NACA 2412 high wing with two separately driven ailerons. Spar and hinges require fit and structural checks. prototype CAD
H-tail horizontal tail and twin fins	1 set	Center elevator and starboard rudder with fixed port fin. Confirm installed propeller and linkage clearance through loaded travel. prototype CAD
Motor adapters and skid structures	1 set	Four lift adapters and one pusher firewall tied to the internal frame. Landing loads bypass the cosmetic skins. prototype CAD
Lightweight shell filament	1 lot	LW-PLA class candidate. Record exact product and lot after trial shells are weighed and checked for adhesion. material pending Reference $0.0375 per gram. 1,097.5 g estimate / $41.14. Gray 1.75 mm 0.8 kg spool PA08003. Candidate material. Bambu Studio estimate using the PolyLite LW-PLA candidate profile.
Rigid airframe filament (PETG)	1 lot	Use the saved Generic PETG airframe projects as the process reference. Choose and record the actual PETG spool. The three fit coupon projects have separate material estimates. material candidate Reference $0.0190 per gram. 245.6 g estimate / $4.66. Black 1.75 mm 1 kg spooled PETG HF candidate. Budget uses the Generic PETG slice estimate at the candidate PETG HF spool rate.
Removable port and starboard fairing shells	2	Two mirrored LW-PLA candidate shells at X215-330 mm. Dry-fit and measure actual wall quality, mass, seam clearance and retention. Successor bench CAD
Conformal fairing anchor shoes	4	Four PETG candidate shoes, two per side at X246 and X296 mm. The Ø3.2 × 4.4 mm insert bore and 0.45 mm adhesive gap are nominal sizing witnesses. Shoes stay on the successor crown in both A and B. Successor bench CAD

Propulsion and onboard electronics

Item	Qty	Specification
EMAX ECO II 2807 1300 KV lift motor	4	ECO228071300 or global code 0101096021. 3-6S, M3 on 19 × 19 mm, M5 nut, 18 AWG 200 mm leads. Bench thrust and current open. sourced candidate Reference $19.49 per motor
APC 7 × 4 lift propeller bundle	1 set	LP07040E-B4 includes two standard and two reverse propellers with adapter rings. Confirm fitted retainer and measured RPM. sourced candidate Reference $7.06 per 4-pack
Hobbywing XRotor FPV G2 45A 4in1 lift ESC	1	30902065 standalone AM32. 3-6S, DShot300, 40 × 33 × 5 mm, 20 × 20 mm M3, no BEC. Factory XT60 branch and airflow need qualification. sourced candidate Reference $114.99 per ESC
BadAss 2315 cruise motor	1	BA-2315-1110. Published Ø29.1 × 32.6 mm before adapter and 16 × 19 mm mounting. Confirm received KV because listing conflicts with spec table. sourced candidate Reference $40.69 per motor
APC 8 × 6 reverse propeller	1	LP08060EP. 203.2 mm diameter, Thin Electric reverse rotation. Fit and bench-test the actual pusher orientation and hub stack. sourced candidate Reference $2.92 per propeller
Hobbywing Skywalker 40A V2 cruise ESC	1	80060022. 3-4S, 40 A continuous, 60 × 25 × 8 mm. PWM signal and ground only at flight controller, with its BEC positive isolated. sourced candidate Reference $19.99 per ESC
CNHL G+Plus 4S 3000 mAh LiPo	1	300704. XT90, 10 AWG, 136 × 45 × 32 mm nominal, 323 ±5 g. Measure terminal voltage, fit and installed current path. restrained bench candidate Reference $36.99 per battery
Main distribution and branch harness	1 set	Qualify the connector assembly, protection, branch wires and total current measurement before simultaneous motor operation. Include restrained short power runs and labeled phase harnesses. release blocked
Castle CC BEC 2.0 WP	1	010-0153-00. Servo-only 5.25 V positive rail, two feeds to breakout, common signal ground and isolated ESC/FC BEC positives. sourced candidate Reference $56.95 per regulator
SpeedyBee F405 WING APP	1	Full-size SpeedyBeeF405WING target, 52 × 32 × 19 mm. Four DShot lift channels, five PWM channels and sensor/receiver ports. sourced candidate Reference
Hitec HS-65MG analog metal gear servo	4	Two ailerons, elevator and starboard rudder. 23.6 × 11.6 × 24.0 mm case and 1.2 A specified stall. Verify linkage loads and clearances. sourced candidate Reference $35.99 per servo

Item	Qty	Specification
RadioMaster RP3 V2 ELRS 2.4 GHz receiver	1	HP0157.RX-RP3-V2 or matching regional LBT variant. 5 V, CRSF full UART and two separate antenna positions. sourced candidate Reference $19.99 per receiver
Holybro Micro M10 GPS with IST8308	1	12097. UART GNSS and I2C compass, 32 × 26 × 9 mm, 4.7-5.2 V. Verify installed driver, power and clean antenna placement. sourced candidate Reference $27.99 per module
Matek ASPD-4525 digital airspeed kit	1	I2C differential pressure, 4-5.5 V, includes pitot and tubing. Confirm separate clean-flow location and bench zero response. sourced candidate Reference

Airframe stock and linkages

Item	Qty	Specification
Carbon spars and boom stock	1 set	Measure straight stock and review grade and sections against wing bending and propulsion loads before choosing hardware. source pending
Fasteners hinges horns and linkages	1 set	Size and source against delivered screws and inserts. Confirm hinge and linkage retention and actual screw engagement. source pending

Fasteners and assembly supplies

Item	Qty	Specification
KIPP K0310.04 ball detent	2	M4 thread, Ø2.5 mm ball and 9 mm body. Qualify installation depth, screw retention and click. Provides tactile feedback at each seam. sourced candidate Reference $144.75 per 25-pack
Captive seam pin and keeper hardware	2 sets	CAD witness uses a Ø3 × 30 mm transverse pin. Confirm actual grip, secondary keeper, captive tether and rated load after structural testing. source pending
Battery restraints and wiring retention	1 set	Two padded straps plus axial stop with separate connector access. Size clamps and abrasion guards after actual harness mockup. source pending
M2 fasteners, washers and compatible inserts	4 sets	Two removable M2 screws per side, matching inserts and one flat load washer per screw. CAD models a 5.12 mm under-head length and a Ø7 × 0.5 mm washer. Confirm actual length, engagement and anti-loosening provision on a spare crown. Sourced hardware fit pending

Radio and charging gear

Item	Qty	Specification
RadioMaster Pocket M2 ELRS 2.4 GHz transmitter	1	Use the internal 2.4 GHz ExpressLRS variant with compatible regional RF and two suitable 18650 cells. sourced candidate Reference $71.50 per radio
4S LiPo balance charger and XT90 charge lead	1 set	Use a documented compatible charger and correct balance and charge harness. bench equipment

Workshop equipment

Item	Qty	Specification
Bambu Lab P1S and calibrated calipers	1 set	Stock 0.4 mm nozzle. Log actual printer and slicer revision and measure fit coupons first. bench equipment Reference
Guarded thrust stand and electrical instruments	1 set	Current-limited props-off source and separate guarded stand with thrust, voltage, current, RPM and temperature logging plus remote power isolation. bench equipment
Commissioning computer and microSD	1 set	Use a pinned ArduPilot build and ground station. Store the revision, channel map, calibration and measured logs. bench equipment Reference