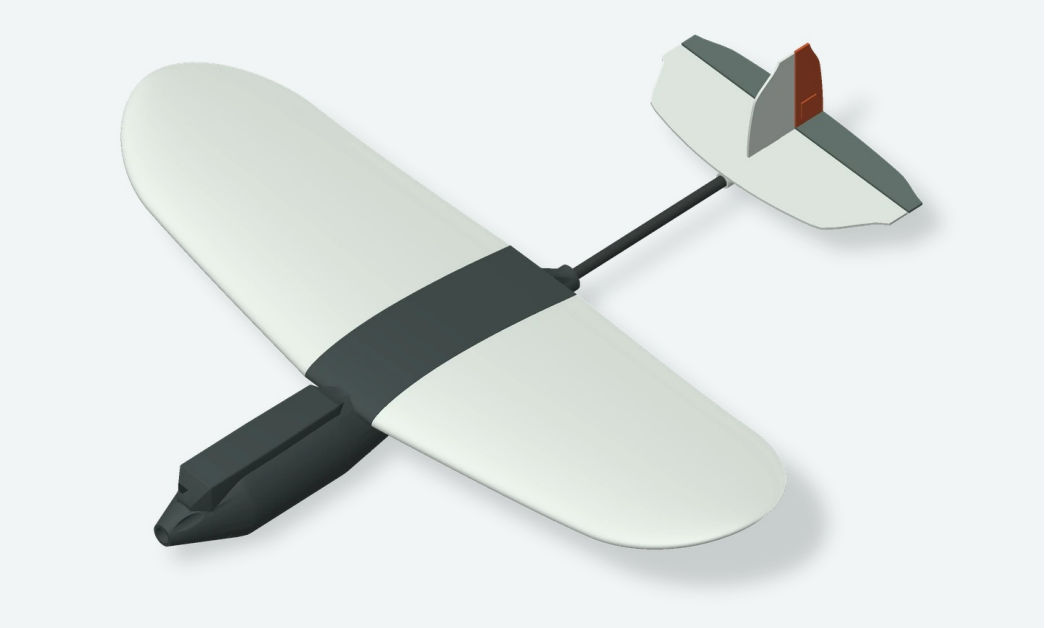
Raven Trainer R1-A4

Start with the pod of the 440 mm Raven Trainer. Check the fit and clear the passages before printing the wings and tail. Keep the battery unplugged and propeller off during assembly.



Digital assembly for this revision

Open the online 3D assembly and wiring reference

In this guide

01 Print and clear the pod

02 Dry-fit the wing and tail

03 Mount the servos and fit the pushrods

04 Fit the stabilizer, receiver and antennas

05 Fit the motor, ESC and battery

06 Connect the radio and power wiring

07 Check balance and control movement

08 Verify failsafe and record your measurements

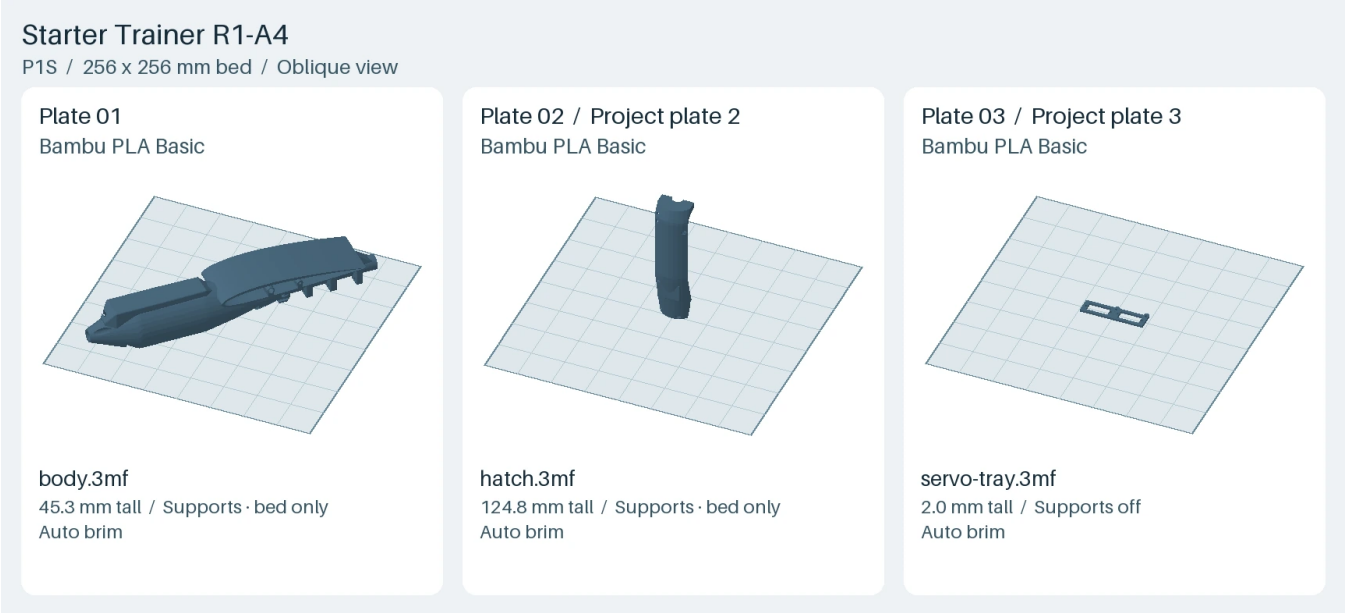
09 Print inventory

10 Bill of materials

Print setup

Bambu Lab P1S with a 0.4 mm nozzle and textured PEI. Print the pod parts in Bambu PLA Basic at 0.20 mm. Use the saved profiles for the colorFabb LW-PLA Natural wings and PLA Basic tail.

01 Print and clear the pod



Pod Fit project, plates 1-3. The body and hatch use build-plate-only supports. The tray prints without supports.

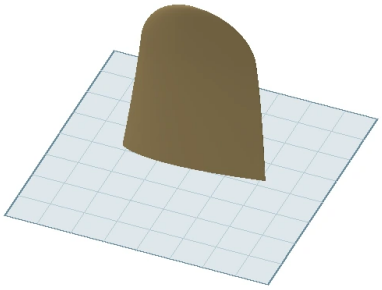
1. Open the three-plate Pod Fit project and preview supports on the body and hatch. The body sits diagonally on its belly.
2. Remove support through the open belly, especially around the battery pocket and motor lead passage. Clear the antenna exits, pushrod passages, strap slots and insert pilots. Dry-fit the empty hatch. The narrow seam is intentional.
3. Print the six wing and tail parts from the R1-A1 Wing and Tail project supplied in the kit. Inspect the wing walls, match the roots and weigh the cleaned parts.

Starter Trainer R1-A4

P1S / 256 x 256 mm bed / Oblique view

Plate 04

colorFabb LW-PLA Natural



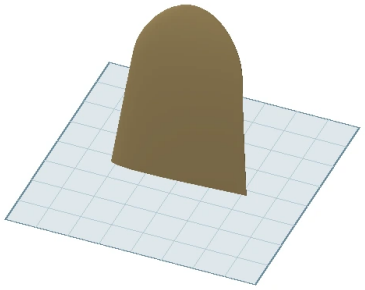
wing-left.3mf

195.8 mm tall / Supports off

8 mm outer brim

Plate 05 / Project plate 2

colorFabb LW-PLA Natural



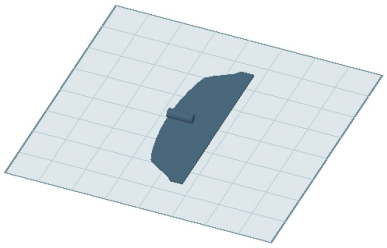
wing-right.3mf

195.8 mm tall / Supports off

8 mm outer brim

Plate 06 / Project plate 3

Bambu PLA Basic



tailplane.3mf

9.2 mm tall / Supports off

Auto brim

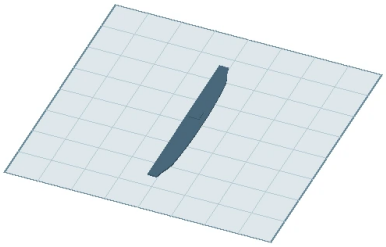
Wing and Tail project, plates 1-3. Stand each wing on its root with an 8 mm outer brim. Print the tailplane flat.

Starter Trainer R1-A4

P1S / 256 x 256 mm bed / Oblique view

Plate 07 / Project plate 4

Bambu PLA Basic



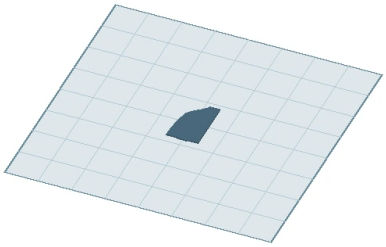
elevator.3mf

2.2 mm tall / Supports off

Auto brim

Plate 08 / Project plate 5

Bambu PLA Basic



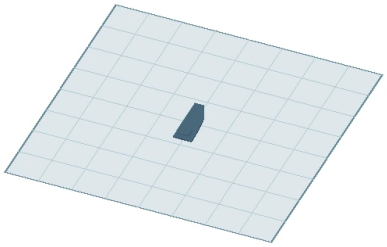
fin.3mf

1.4 mm tall / Supports off

Auto brim

Plate 09 / Project plate 6

Bambu PLA Basic



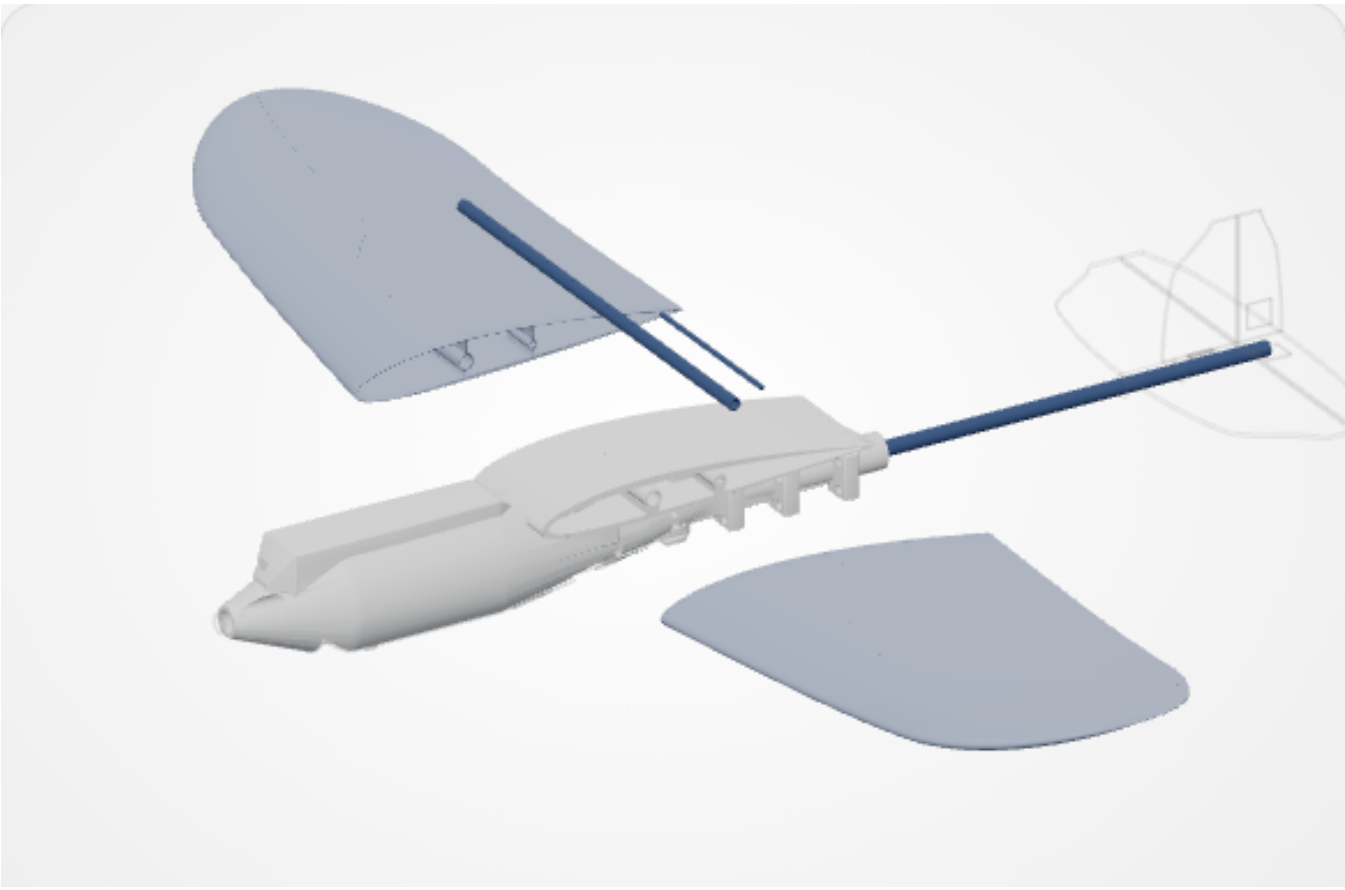
rudder.3mf

2.2 mm tall / Supports off

Auto brim

Wing and Tail project, plates 4-6. Print the elevator, fin and rudder in PLA Basic on separate plates.

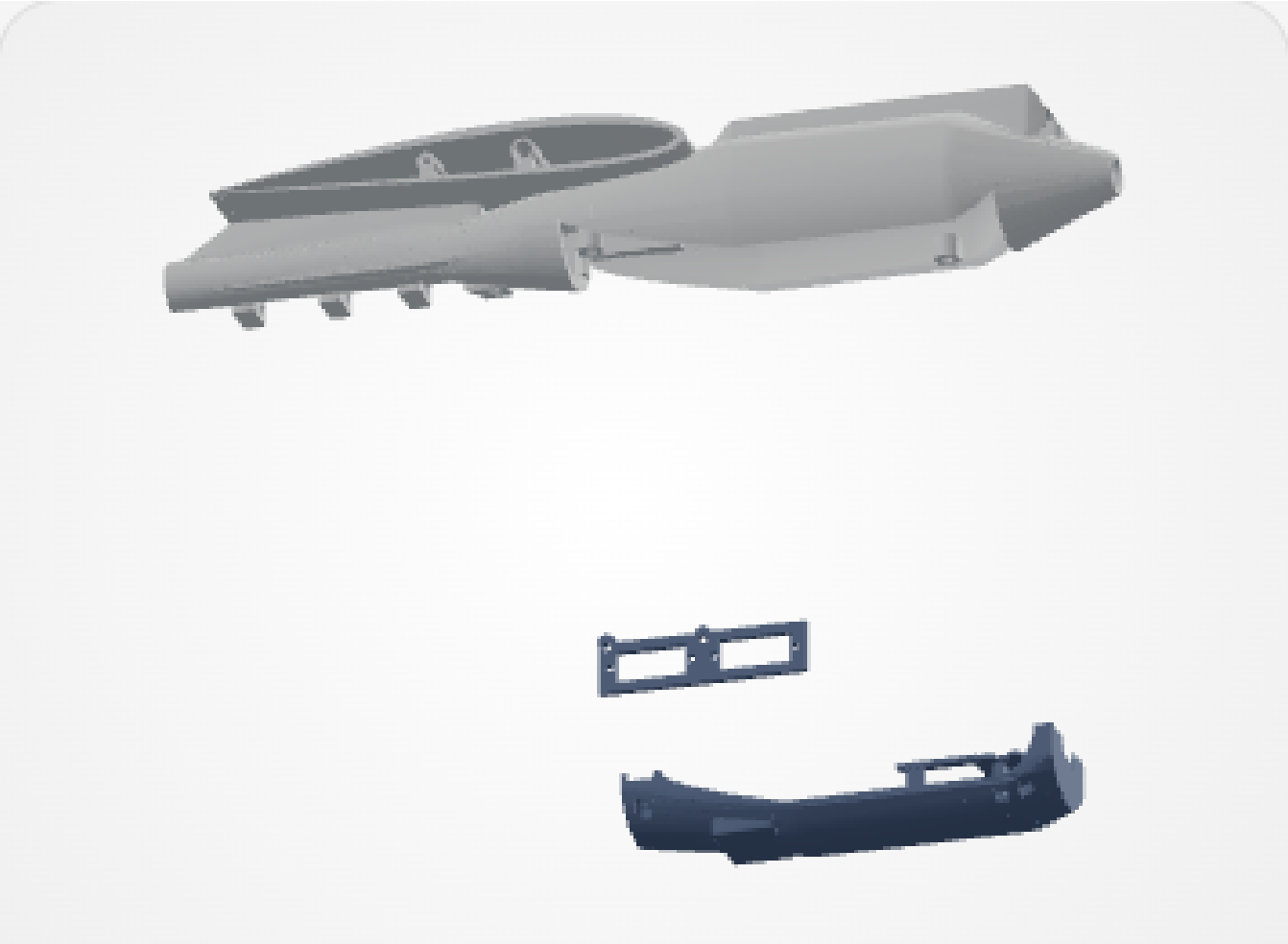
02 Dry-fit the wing and tail



The larger spar and smaller locator pass through separate bores at the wing roots.

1. Square and deburr the carbon stock. Pass the 190 mm spar (5 mm outside, 3 mm inside) and 70 mm solid locator (2 mm) through separate bores. Seat both roots by hand and check even seams and matching incidence.
2. Dry-fit the one-piece 6 × 4 mm carbon boom through the rear bridge and into the tail socket. Check engagement at both ends before cutting the modeled 222 mm length. Align the tailplane and fin and measure wing-to-tail incidence.
3. Fit the tape hinges and mark the pads from the supplied DU-BRO #848 horns. Check free movement through the nominal 1 mm hinge gaps. Hold each surface flush while fitting its linkage. Check the printed-to-carbon joints and horn bonds before loading them.

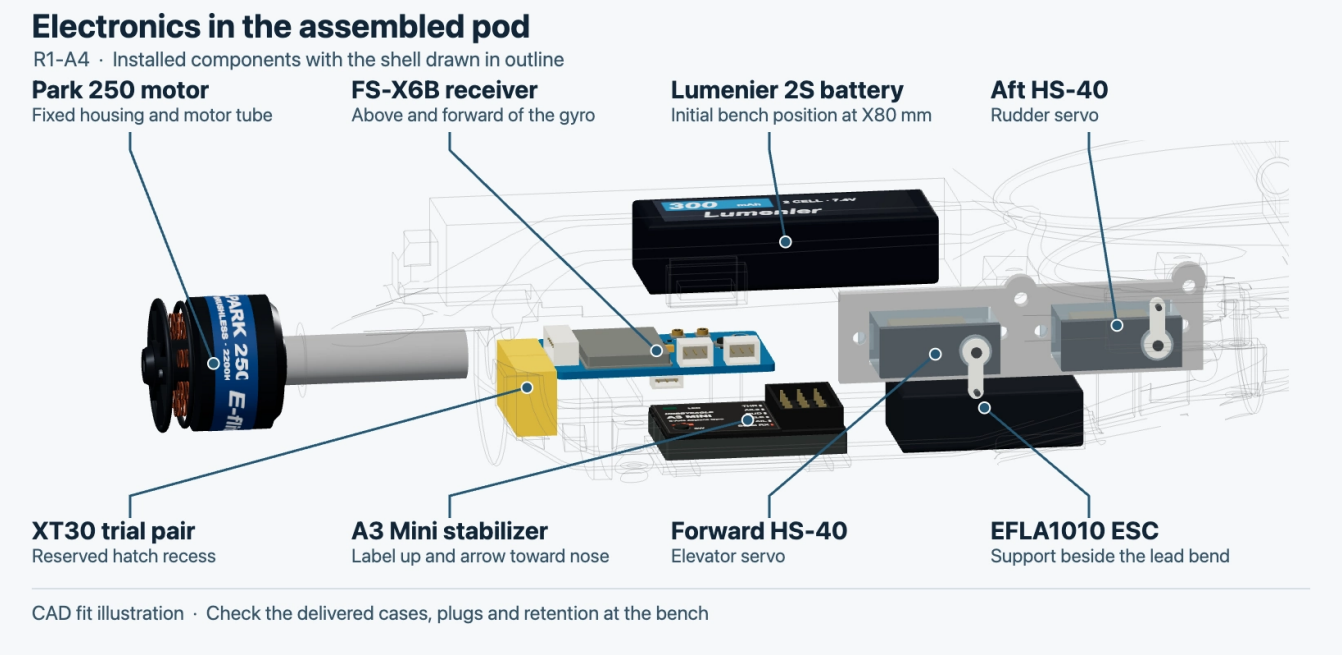
03 Mount the servos and fit the pushrods



Pod body, servo tray and lower hatch.

1. Test an M2 × 3 mm heat-set insert in printed material before fitting the five pod inserts. Use three hatch screws and two tray screws. Check seating, thread engagement and driver access.
2. Secure both HS-40s at their four mounting ears. Install the single arms with their center screws. Point the forward elevator arm toward the belly and the aft rudder arm toward the top of the pod.
3. Route the two #847 sleeves through the forward anchors and three pairs of 3.5 mm bridge pilots. Secure them at both marked boom stations without crushing them. Connect the rods at neutral. With the hatch on, check free travel, play and sleeve movement.

04 Fit the stabilizer, receiver and antennas



Fitted electronics with the battery at its X80 mm bench position.

1 Fit the A3 Mini flat on its lower mount with the supplied thin pad, label up and arrow forward. Keep its plugs, LED and button accessible.

2 Fit the FS-X6B above and forward with iBUS opposite the antenna exits. Leave a service loop for the hatch and keep both leads clear of the seam.

3 Set the active antenna ends 90° apart and at least 10 mm from carbon or metal. Check plug and lead bends before securing them. Use this placement for the range test.

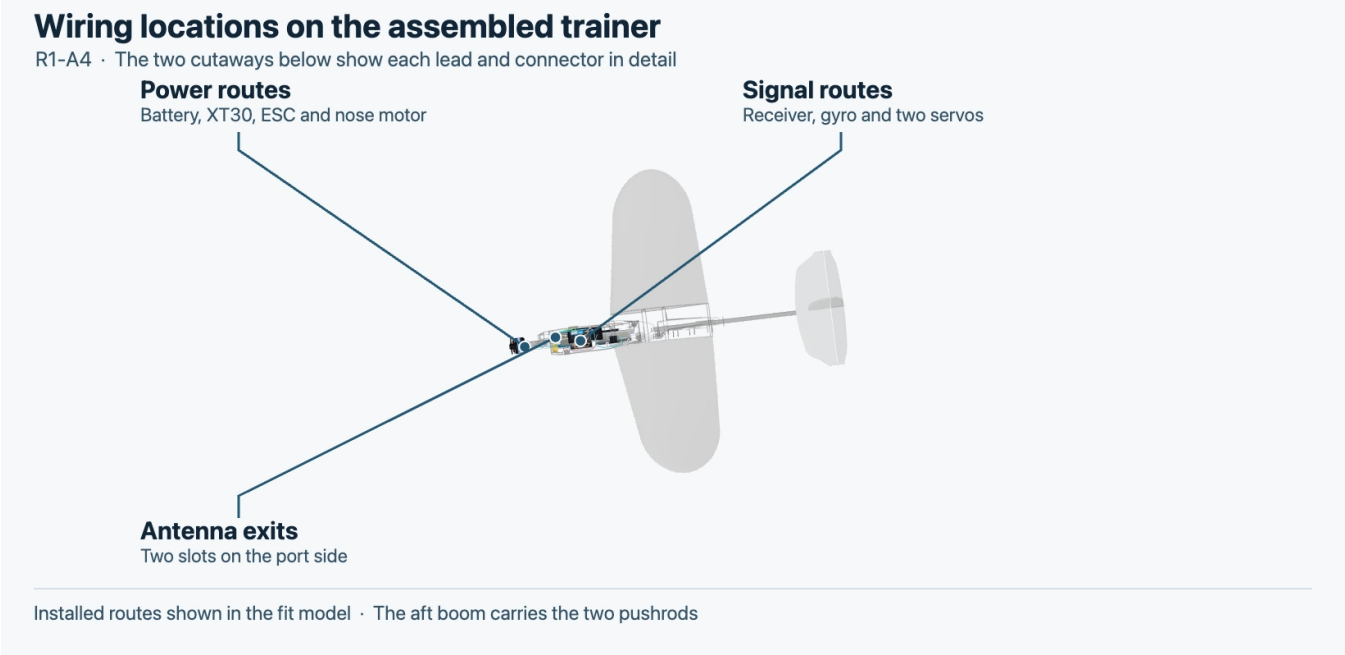
05 Fit the motor, ESC and battery

1 Dry-fit the 8 × 6 mm carbon tube in the fixed Park 250 housing. Check engagement before cutting the modeled 30 mm length. Feed each insulated 2 mm phase connector through the 6 mm nose passage separately. Check chafe protection, rotor clearance and retention against pullout and rotation.

2 Seat the EFLA1010 on its support without forcing the leads. Dry-fit an unplugged XT30 pair to check the hatch recess, finger access and plug withdrawal. Keep the gyro plugs accessible and leave room for ESC cooling.

3 With the hatch off, insert the unplugged battery centered at X63 mm aft of the printed nose. Slide it to X80 mm for the first fit. Use the X65 strap, roof pad and trapped foam end shims to retain it independently of the hatch. Check hatch closure, connector access and lead slack.

06 Connect the radio and power wiring



The pod carries the wiring. The tail boom carries the two pushrods.

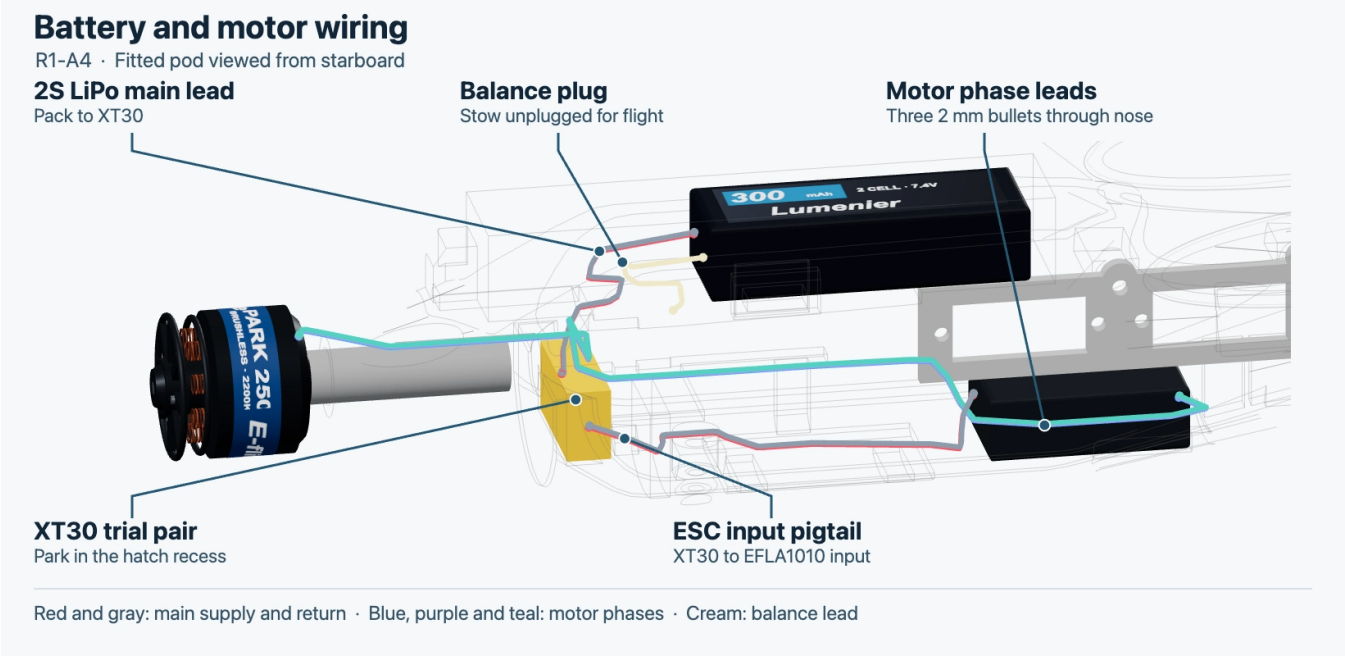
1 With the battery disconnected, match the replacement ESC-side XT30 to the pack contacts and verify polarity with a meter. Insulate each joint separately. Keep the balance plug accessible.

2 Match the radio leads to the hardware markings for signal, supply and return. Keep the harness clear of the servo arms and pushrods. Check slack with the hatch on.

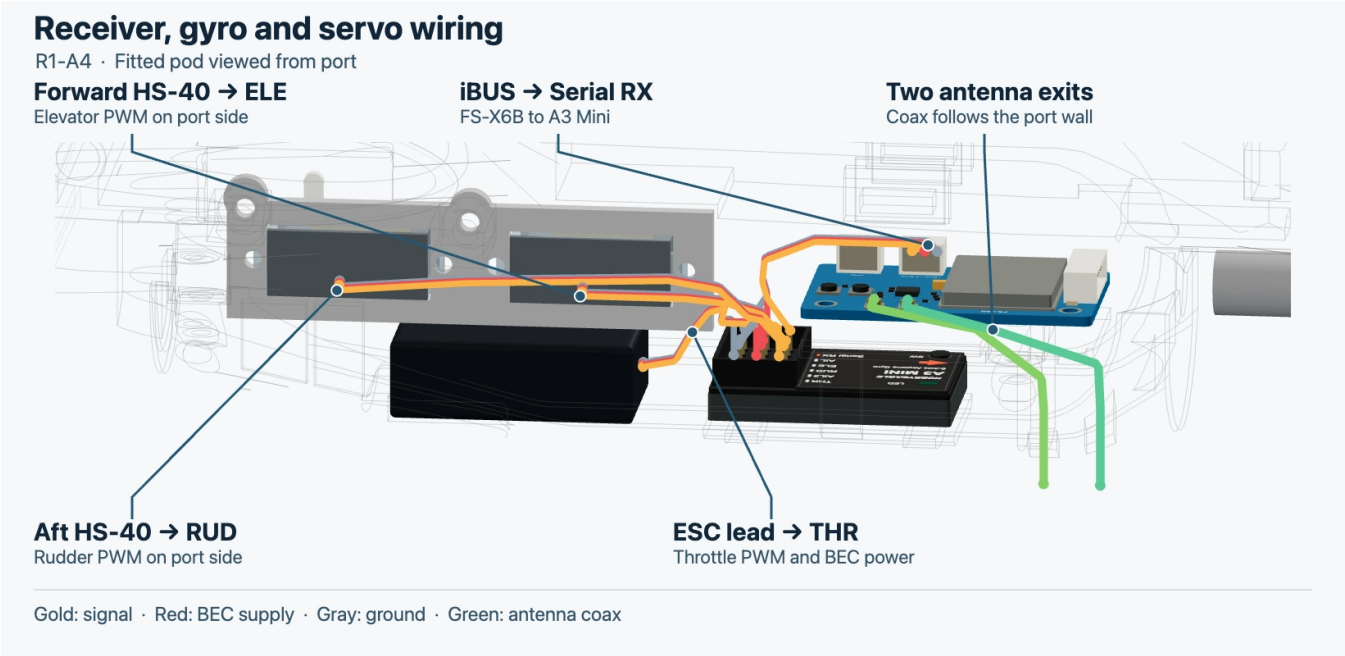
3 Check rotation with the propeller off. To reverse the motor, disconnect power and swap any two phase leads.

Connection map

- FS-X6B iBUS to A3 Mini Serial RX
- Forward HS-40 to A3 Mini ELE
- Aft HS-40 to A3 Mini RUD
- EFLA1010 receiver/BEC lead to A3 Mini THR
- 2S battery XT30 to EFLA1010 main input
- Three EFLA1010 phase bullets to Park 250 motor bullets



Starboard view. The XT30 feeds the ESC. Three motor leads pass through the nose. Stow the balance plug unplugged.



Port view. The servo leads run to the A3 Mini and the receiver antennas exit at the hatch.



Signal, supply and return from FS-X6B iBUS to A3 Mini Serial RX.

07 Check balance and control movement

1. Weigh with the pack secured and unplugged and the hatch shut. Use X152-154 mm aft of the printed nose as the initial balance reference. Set padded supports 60 mm from centerline and 28.4-30.4 mm behind the local leading edges.
2. Move the pack forward for tail drop or aft for nose drop. Secure it, check lead slack and recheck with the hatch shut. Correct the installation if battery travel cannot reach the target.
3. Remove the propeller and restrain the aircraft. Start the A3 with the airframe still, throttle at verified idle and both surfaces centered. Check 50 Hz servo output, 2S cutoff and BEC voltage under both servo loads.
4. In GYRO OFF, check elevator up on pullback and rudder right from behind on right command. Check opposite directions. For the propeller-off setup, start with ±10° elevator and ±13° rudder. In NORMAL, check that correction opposes pitch and yaw. With the hatch shut, check neutral return and free travel with stick and gyro inputs combined.

08 Verify failsafe and record your measurements

1. Keep the propeller off. Verify throttle cut and set FS-i6X CH3 failsafe to the confirmed motor-stop output. At low motor speed, test transmitter loss and confirm the motor stops.
2. With the pack unplugged, fit an iBUS signal-only break between receiver and gyro. Leave supply and return connected. At low motor speed with the radio linked, break iBUS and confirm motor stop. Set idle and engage throttle cut before restoring either link. Check for unexpected restart and verify radio range.
3. Record part and aircraft mass, joint fit and retention, balance, usable battery travel, throws and both failsafe results.
4. Check propeller, adapter and keeper fit before a restrained propeller-on test. Measure current during the test. Check charging limits, passive stability and trim authority.

Print inventory

Part	STL file	Qty	Material
Pod body	body.stl	1	Bambu PLA Basic
Hatch	hatch.stl	1	Bambu PLA Basic
Servo tray	servo-tray.stl	1	Bambu PLA Basic
Left wing	wing-left.stl	1	colorFabb LW-PLA Natural
Right wing	wing-right.stl	1	colorFabb LW-PLA Natural
Tailplane	tailplane.stl	1	Bambu PLA Basic
Elevator	elevator.stl	1	Bambu PLA Basic
Vertical fin	fin.stl	1	Bambu PLA Basic
Rudder	rudder.stl	1	Bambu PLA Basic

Bill of materials

Printed parts and filament

Item	Qty	Specification
Pod body, hatch and servo tray	1 each	Bambu PLA Basic, 1.75 mm. Use the R1-A4 body, hatch and tray STLs or the editable three-plate project. Print the body first. Body and hatch have build-plate-only supports. The servo tray prints without supports. The order link is for the PLA Basic filament. Print the three parts from the revision files. Order Bambu PLA Basic filament / Reference
Left and right wing panels	1 each	colorFabb LW-PLA Natural, 1.75 mm. Use the separate foaming profiles in the kit’s wing and tail project. The 440 mm assembled wing uses the original panel geometry. Measure actual mass, shell quality and bond strength. The order link is for the 750 g LW-PLA Natural spool. Print both panels from the revision files. Order colorFabb LW-PLA Natural filament / Reference
Tailplane, elevator, fin and rudder	1 each	Bambu PLA Basic, 1.75 mm. Use the retained wing and tail project. Each retained tail plate prints without supports. Use the same PLA Basic spool as the pod. Print the four parts from the revision files. Order Bambu PLA Basic filament / Reference

Carbon stock and control linkages

Item	Qty	Specification
Wing spar	1	5 mm OD × 3 mm ID carbon tube. CAD cut is 190 mm. Order 5 mm OD × 3 mm ID stock and cut it to length. Order 5 × 3 mm carbon tube
Wing locator	1	2 mm solid carbon rod. CAD cut is 70 mm. Order solid 2 mm stock and cut it to length. Order 2 mm solid carbon rod
Tail boom	1	6 mm OD × 4 mm ID carbon tube. The modeled cut length is 222 mm. Measure both socket engagements before cutting. Order 6 mm OD × 4 mm ID stock and cut it after the socket fit check. Order 6 × 4 mm carbon tube
Motor mount tube	1	8 mm OD × 6 mm ID carbon tube. The modeled cut length is 30 mm. Verify engagement on the fixed Park 250 housing, anti-rotation and rotor clearance. Order 8 mm OD × 6 mm ID stock and cut it after measuring the fixed motor housing. Order 8 × 6 mm carbon tube
Micro pushrod system	1 kit	DU-BRO #847. Two 20 in × 0.032 in wires, guides, horn-end links and servo-arm connectors. Measure actual sleeves. The modeled fit allows a sleeve up to 2.8 mm OD. Trim both continuous runs to the installed horns. Order DU-BRO #847 micro pushrod kit / Reference
Control horns	2	DU-BRO #848 glue-in horns, one on the elevator and one on the rudder. Order DU-BRO #848 control horns
Hinge tape	1 roll	DU-BRO #916 electric flyer hinge tape for the elevator and rudder. Check adhesion and both surfaces' free travel on the actual prints. Order DU-BRO #916 hinge tape
Sleeve ties	As needed	Thin no-crush ties for both forward sleeve anchors and the two exposed-boom stations. Use ties up to 2.5 mm wide and 1 mm thick. Verify sleeve retention and free movement with the ties fitted. HellermannTyton T18R0C2 is one option. Keep the loop loose enough to avoid pinching either pushrod sleeve. Order HellermannTyton T18R0C2 ties / Reference

Onboard electronics and propulsion

Item	Qty	Specification
HobbyEagle A3 Mini	1	Six-axis airplane stabilizer, 30 × 19.5 × 7.5 mm nominal case, with the supplied thin mounting pad. Order HobbyEagle A3 Mini Standard / Reference
FlySky FS-X6B	1	AFHDS 2A receiver with iBUS and both factory antennas. CAD envelope is 36 × 22 × 7.5 mm. Check the delivered board, iBUS plug orientation, antenna exits and retention. Order FlySky FS-X6B receiver / Reference
Receiver-to-stabilizer lead	1	Three-wire iBUS harness from FS-X6B iBUS to A3 Mini Serial RX. Match signal, supply and return on the delivered hardware. Plug keying, pin order, lead length and minimum bend radius require a fit check. Compare the supplied leads on both units. Choose or make a harness that matches the marked pin order, connector keying and installed length. Reference
Hitec HS-40 micro servos	2	Analog 4.8-6.0 V servos. Use two supplied one-sided arms and their center screws. Forward servo drives the elevator, aft servo drives the rudder. Order Hitec HS-40 servo / Reference
E-flite EFLA1010 speed controller	1	10 A Pro BEC brushless ESC with factory JST battery lead, 2 mm phase bullets and regulated receiver/BEC lead. Fit the mating XT30 pigtail to the ESC input and check clearance under the hatch. Verify BEC voltage under servo load and the 2S cutoff. Order SKU EFLA1010 with the factory JST battery input. The XT30 conversion parts are listed separately. Order E-flite EFLA1010 JST ESC / Reference
E-flite Park 250 outrunner	1	EFLM1130, 2200 Kv with 2 mm phase bullets and a 2 mm shaft. Use the fixed-housing tube mount. The manual specifies 7 A continuous, 8 A for up to 15 seconds and 55 W input. Order E-flite Park 250 EFLM1130 motor
Propeller, adapter and keeper	1 set	GWS 6 × 5 slow-fly (GW/EP6050, retailer code 55366050) is the fit reference. Match its hub to the Park 250 adapter and keeper. Check adapter and keeper fit, retention and the full propeller sweep with the pack unplugged. Remove the propeller for powered radio checks. Measure loaded current in a restrained test. The order link covers the GWS propeller. Select the adapter and keeper after measuring the prop hub and shaft. Order GWS EP6050 propeller / Reference

Item	Qty	Specification
Lumenier 10188 flight battery	1	2S 300 mAh LiPo, 48 × 17 × 12 mm nominal, 18 g published, with XT30 main and separate balance lead. Use the delivered contacts and marked polarity to select the mating parts. Order SKU 10188 with XT30. The Lumenier pack with a JST main plug is a different variant. Order Lumenier 10188 XT30 battery / Reference
Mating XT30 pigtail and wire insulation	1 pigtail plus insulation	Match the delivered battery XT30 contacts and polarity. Use heat-shrink on each ESC-side joint and fit protection at the motor lead exit. Verify withdrawal, polarity, bend radius and strain relief in the actual hatch. The order link covers an XT30 male lead with exposed pins for the ESC side. Confirm the battery's delivered contacts and polarity, then size the heat-shrink to the actual joints. Order XT30 male pigtail / Reference

Fasteners, restraint and assembly consumables

Item	Qty	Specification
Body heat-set inserts	5 installed plus test spares	CNC Kitchen M2 × 3 mm brass. Three for the hatch and two for the independent tray. Test insert fit in a printed 3.2 mm pilot with 4.5 mm depth before installing inserts in the pod. Order the M2 × 3 mm variant. One pack covers the five installed locations and fit tests. Order CNC Kitchen M2 × 3 mm heat-set inserts / Reference
Hatch and servo-tray screws	5	M2 socket-head screws. Hatch takes one 6 mm, one 8 mm and one 12 mm screw. Tray takes two 6 mm screws. Confirm head seating, driver access, thread engagement and no bottoming. The assortment contains the three specified lengths. Select only 6, 8 and 12 mm screws for this assembly. Order M2 socket-cap screw assortment / Reference
Servo-ear fasteners	4 positions	Fit M2 fasteners in the 2.2 mm tray holes, two per servo. Select matching washers or nuts if required. Final head and grip length depend on the actual servo ears and clearance. Measure the case ears and available grip before choosing a screw length and washer or nut combination.
Battery cinch strap, roof pad and end shims	1 strap, 1 pad, 2 shims	Soft hook-and-loop strap up to 8 mm wide at X65, a nonabrasive roof pad and trapped fore/aft foam shims. Secure the pack independently of the hatch and verify that the wrapper and connectors cannot chafe. The order link covers reusable hook-and-loop stock for the strap. Trim a strip to at most 8 mm wide and select the pad and shims after dry fit. Order VELCRO ONE-WRAP strap stock
Receiver and ESC retention and wire protection	As needed	Mounting pads or restraints, service slack, chafe protection and harness strain relief. Select exact materials and thickness after checking board clearance, ESC cooling and hatch access. Choose the restraint thickness and wire protection after checking the actual bay fit.
Bonding epoxy	As needed	Z-Poxy 30 Minute is an option for bonding carbon to printed parts. Test adhesion on the actual carbon and printed material. Follow the epoxy maker’s preparation and cure instructions. Order Z-Poxy PT-39 epoxy
Motor-mount RTV	As needed	DOWSIL 737 is a neutral-cure sealant option for the fixed motor housing mount. Verify retention and anti-rotation with the installed tube and housing. The order link selects the clear 90 mL DOWSIL 737 tube. Order DOWSIL 737 clear RTV / Reference

Ground equipment and bench tools

Item	Qty	Specification
FlySky FS-i6X transmitter and AA cells	1 transmitter, 4 AA	Mode 2, AFHDS 2A. Confirm binding to the exact FS-X6B and set CH3 failsafe to motor stop. The link selects Mode 2 Only i6X. Source the X6B receiver and four AA cells separately. Order FlySky FS-i6X Mode 2 transmitter / Reference
A3 setup equipment	1 set	Compatible HobbyEagle USB adapter and data cable with the A3 Configurator, or Program Card X. Include the receiver binding accessory if supplied. Use the USB adapter and data cable supplied with the A3 Mini Standard Edition. Program Card X is optional. Reference
2S LiPo balance charger	1	Hitec RDX1 Mini #44295 supports 2S LiPo balance charging and low charge-current settings. Verify the delivered balance connector and the pack maker’s permitted charge rate. Use a fire-resistant charging setup. Order Hitec RDX1 Mini #44295 charger / Reference
Charger lead	1	Hitec #44185 XT60-to-XT30 charge adapter. Match the pack’s separate balance connector to the charger and use a matching balance adapter if needed. Check mating contacts and polarity against both the charger and delivered pack. The order link covers Hitec #44185. Verify the pack's separate balance connector before ordering an additional adapter. Order Hitec #44185 charge adapter
Print and assembly tools	1 bench set	Bambu Lab P1S, 0.4 mm nozzle and textured PEI for supplied profiles. Use calipers, straightedge, safe carbon cutting and deburring tools, support-removal tools, small drivers and a suitable insert tool. The order link is for the printer. Select the P1S with the 0.4 mm nozzle. The profiles do not require an AMS. Order Bambu Lab P1S printer
Electrical tools and failsafe test lead	1 bench set	Multimeter, soldering and heat-shrink tools, and a signal-only iBUS break that preserves the supply and return. A wattmeter and restrained fixture are needed for later propulsion review. Use existing bench tools if available. Select or assemble the break lead only after confirming the actual signal pin and connector keying.
Balance and control measurement tools	1 bench set	Scale, padded CG stand, straightedge, incidence gauge and throw gauge or ruler. Set the paired CG supports 60 mm from the centerline. Standard workshop tools are suitable if the stand supports can be spaced as specified.