

ASSEMBLY MANUAL & PRINT/USER GUIDE



Intruder XL

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Introduction

This design evolved from a picture on the Flitetest site of an Air Hogs Intruder converted to dollar tree foamboard. With permission of that designer, I used some of their sketches/images for approximate sizing. The overall approach is for vase mode style printing with some modifications but ultimately as few retractions as possible. The design is best printed in LW-PLA and requires two 2205 2300kv or similar motors. It accommodates a 2200-2700mah 3S up front for balance. A single 6mm carbon spar is required (alternatively a wooden dowel could be used) along with 3mm BBQ skewers as alignment pins between sections.

This model has taken hundreds of hours of effort evolving from chuck glider through failed hybrid version 1 to ultimately reach this very successful result. Therefore, please do not share the stl's.

General Specifications

Wingspan:	1050mm
Print weight:	~395g
Flying weight (w/o battery):	~700g

Electronics

Motor:	2 x 2205 2300kv or similar (6x4 prop – dependent on motor specs)
ESC:	2 x 30amp
Servos:	3 x 9g
Battery:	2200 3s (or similar)

Included:

STL files of all components

Cura parameters utilized

Required Components:

2 x 2205 2300kv motor

2 x 30amp ESC

2200 3s lipo

3mm bamboo skewers

2 – 10mm x 10mm x 2mm magnet round

Velcro

6mm x 700mm carbon tube or pine rod

M2 screws (servo covers)

1mm piano wire

M3 screws/nuts for motor mount attachment

Print Settings:

The STL's are divided into plane section. Wing, Fuse, Fin, and Hstab folders should all be printed in LW-PLA. The PLA folder should be printed in PLA/PLA+. **NOTE: Fuse 6 is the exception – please print that in PLA. Exception noted below.

Overall Settings for LW-PLA parts:

Nozzle temp = 235c

Bed temp = 60c

Nozzle diameter = 0.4mm

Line width = 0.4mm

Layer height = 0.25mm

Print speed = 50mm/s

Cooling fan = 40% for all layers.

1 wall

Infill percentage is set to 0%

0 bottom layer / 0 top layers

Spiralize outer contour - checked

Smooth Spiralized contours - checked

** The resultant wall thickness should be 0.55 – 0.65mm.

Print Specifics per part:

1. Wing Folder
 - a. All parts - 2 bottom layers

2. Fuse Folder
 - a. Fuse6 – PLA 0.12 layer height, 2 bottom / 3 top layers, 10% infill
 - b. Canopy F/R – 2 bottom layers

3. Hstab Folder
 - a. Hstab part: 2 bottom layers
 - b. Hstab outer - add 2 top layers, turn off spiral vase mode

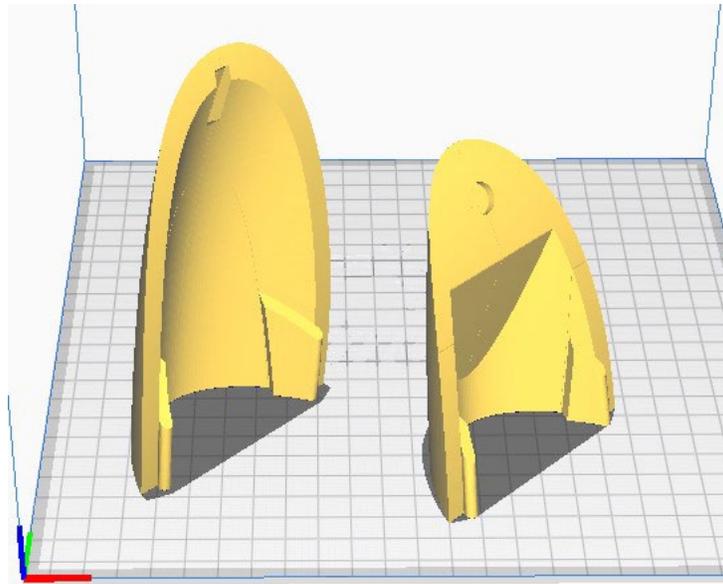
4. Fin Folder
 - a. All parts - 1 bottom layer
 - b. Fin Top Tip – also add 2 top layers, turn off spiral vase mode

5. PLA Folder
 - a. Motor Mounts - 10 bottom layers, 10 top layers, 25% infill, 2 walls, 0.2 layer height
 - b. Elevator/Aileron caps - 10 bottom layers
 - c. Nose - 2 bottom layers, 4 top layers, 50% infill (need nose weight), 2 walls, 0.2 layer height
 - d. 4 pieces - elevator connector rod - 0.12 layer height, 20 bottom layers (print solid)
 - e. Remainder - 2 bottom layers, 2 top layers, 20% infill, 2 walls, 0.2 layer height

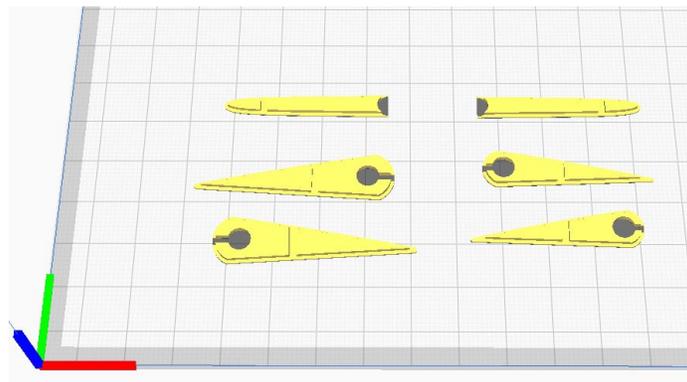
Part Orientation

Some parts have been designed with an intentional print orientation. Please see the attached orientation. In order to simplify the photos, I show more than 1 part printing at a time. It is recommended that for the LW-PLA parts, that only 1 part is printed at a time. I tend to orient my z seam as user specified front left.

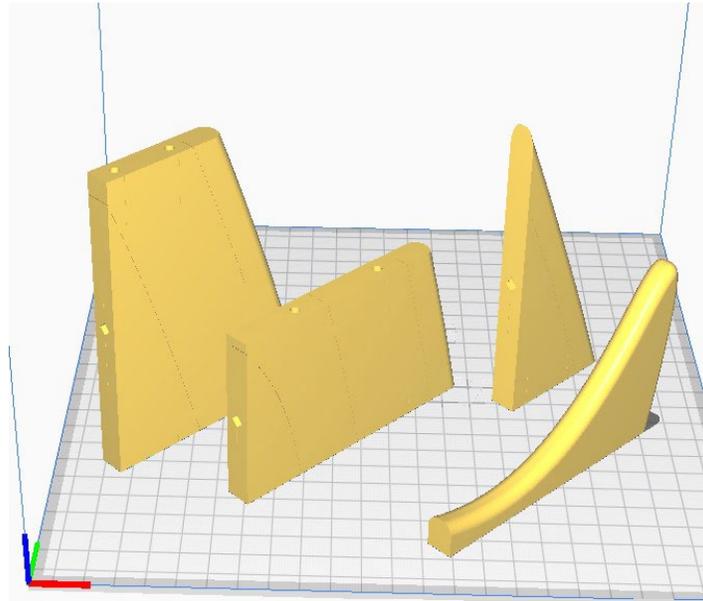
Canopy F/R



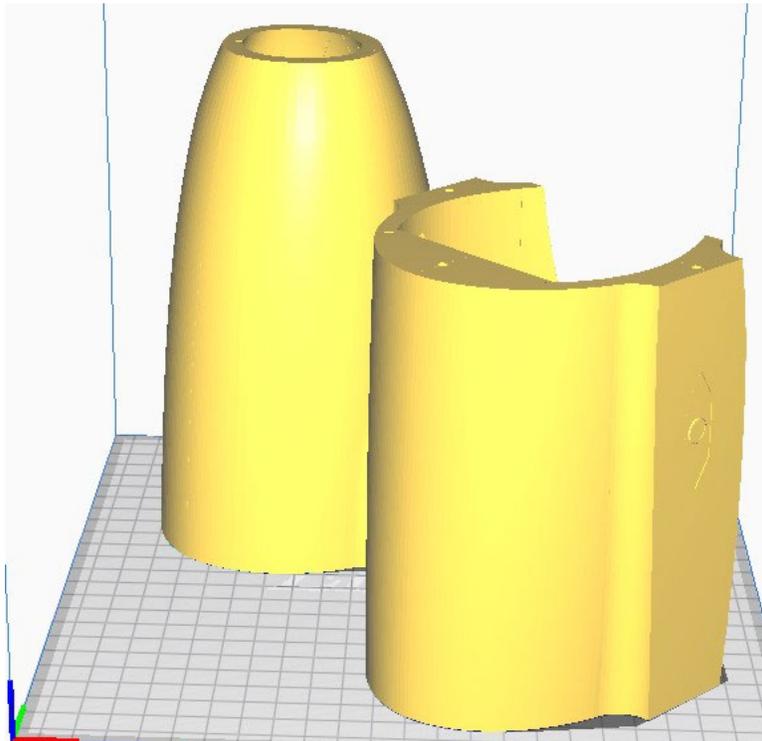
Aileron/Elevator end caps



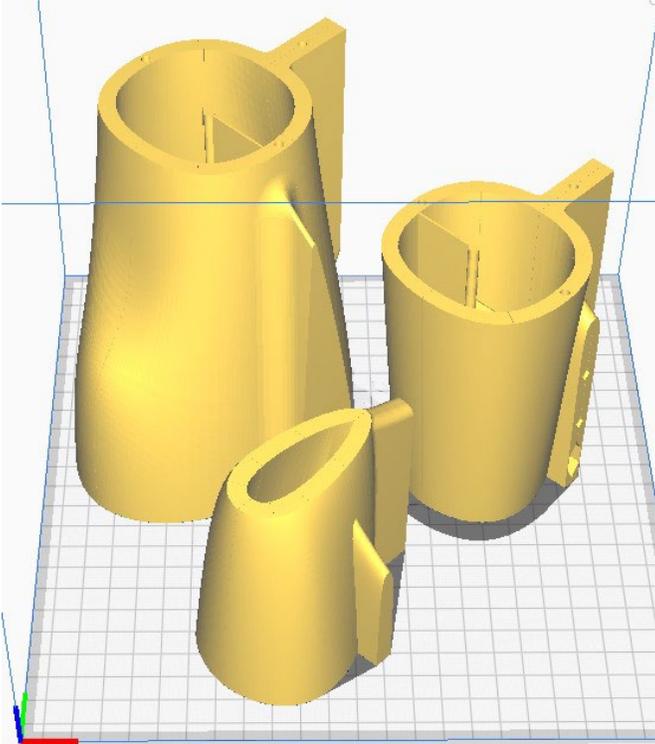
Fin



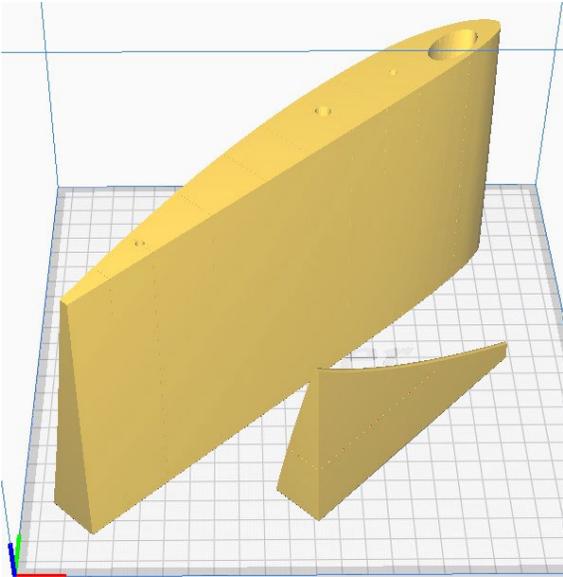
Fuse 1 / 2



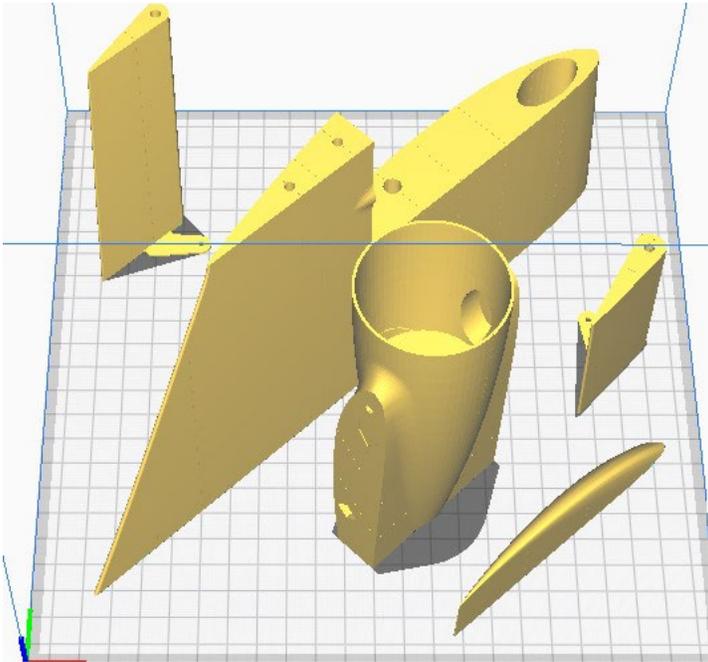
Fuse 3/4/5



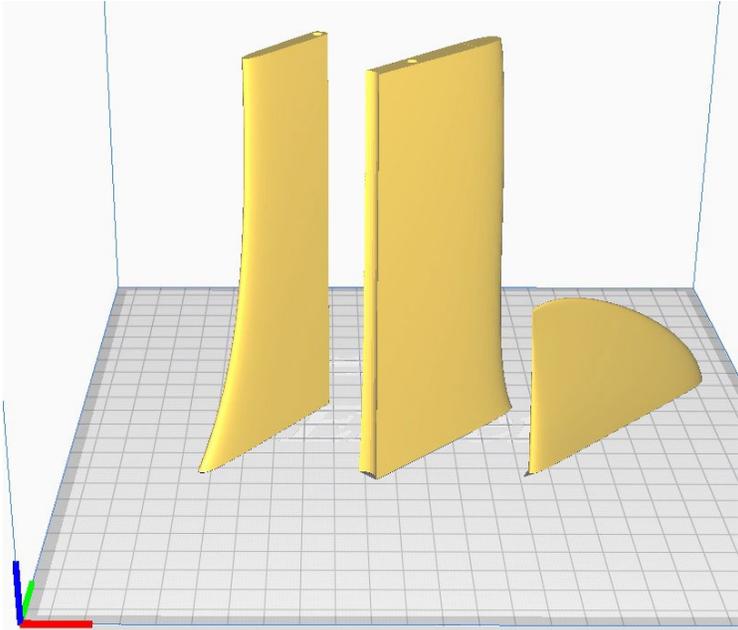
Wing 1 F/R



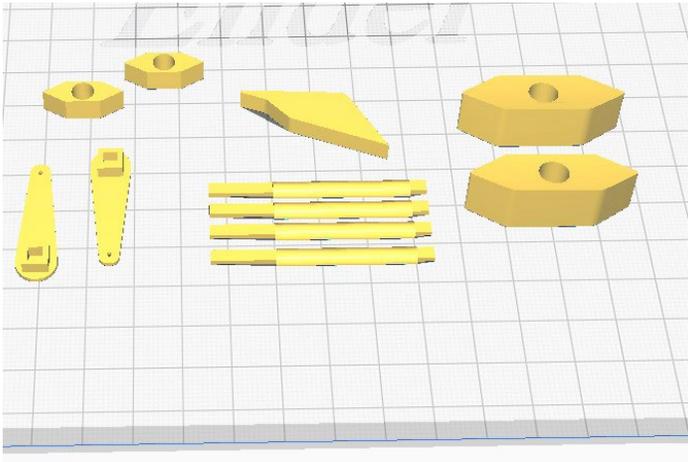
Wing 2, Nacelle wing, aileron inner/outer, wingtip



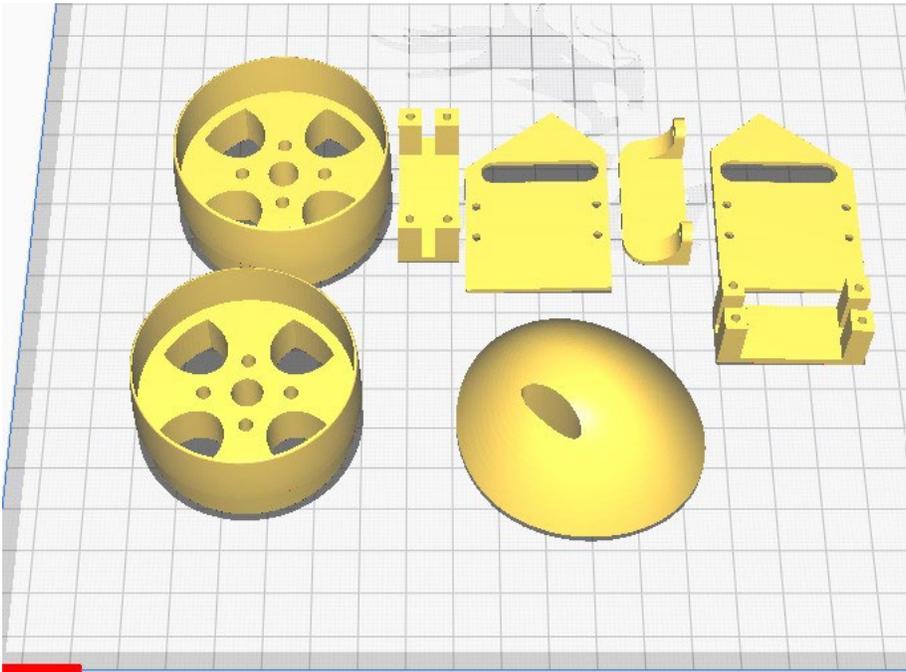
Hstab



Misc PLA Parts (spar reinforcements, canopy lip, elev horn, elev rod)



Misc PLA parts (motor mounts, servo mounts, nose)



Print Weights (Samples)

Fuse1	24g
Fuse2	28g
Fuse3	32g
Wing 1F	26g

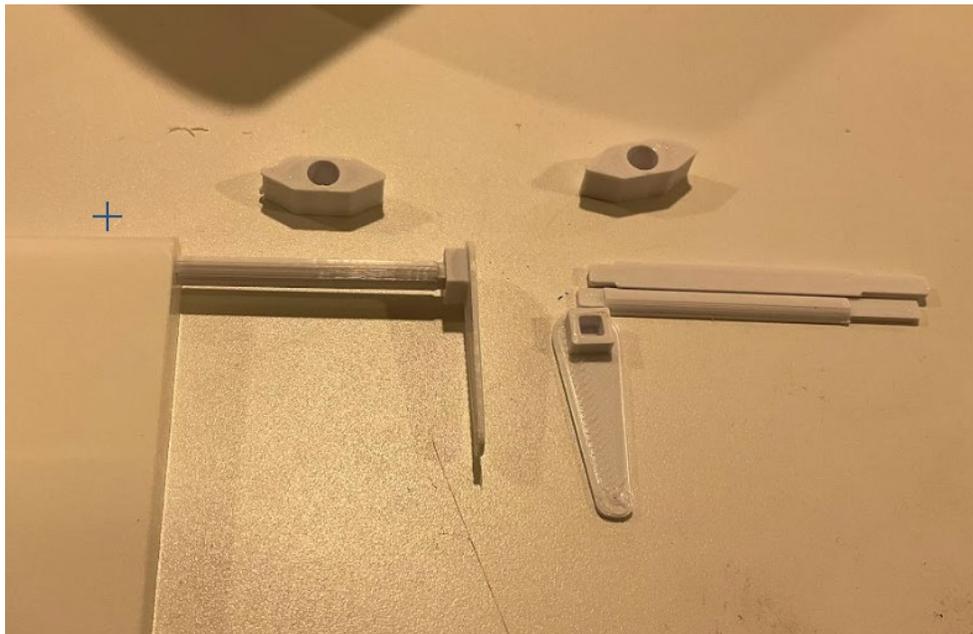
Assembly Instructions

Fuselage / Hstab

Use 10-12mm sections of 3mm bbq skewers in the alignment holes and starting with fuse 1, attach fuse 2, 3, & 4. Before gluing ensure that a 1mm piece of piano wire slides freely through the Bowden tube. DO NOT attach Fuse 5.

Next attach the Hstab to both sides of fuse 4 with bbq skewers. Do not attach Hstab outer at this time

Attach the two halves of the elevator horn with CA making sure they are well aligned. Also glue elevator rod pieces together, again carefully aligning to result in two rods.



Test fit the square end of the elevator rod into both the elevator and the horn. It will be a tight fit but that is expected. Next, add the Fuse 4 elevator hole reinforcement pieces and glue them in place. Starting on one side, glue the longer square end of the rod into one elevator half. Insert through the fuse section and first attach the piano wire with a z bend to the horn and then glue the horn to the short square end of the elevator rod from the one side. Repeat the process from the other side ensuring that when mated, the elevator halves are aligned. The next image shows this without the piano wire installed.



Next attach fuse 5 and 6 followed by canopy F and R with 3mm bbk skewers and add the magnets, watch the direction. Lastly add the canopy lip to the front recess of the canopy.

Now return back to finish the Hstab / elevator by adding bbq skewers to the Hstab Outer and using them as to attach to the Hstab part as well as act as the outer hinge for the elevator. Make sure both elevator halves move freely before glueing.

Fin

In a similar manner as above use BBQ skewers to attach the Fin F / M / R sections together and then align and use bbq skewers to attach to the fuse. I add Fin Top Tip last to help align everything. At this point it should look like the below image.



Wing

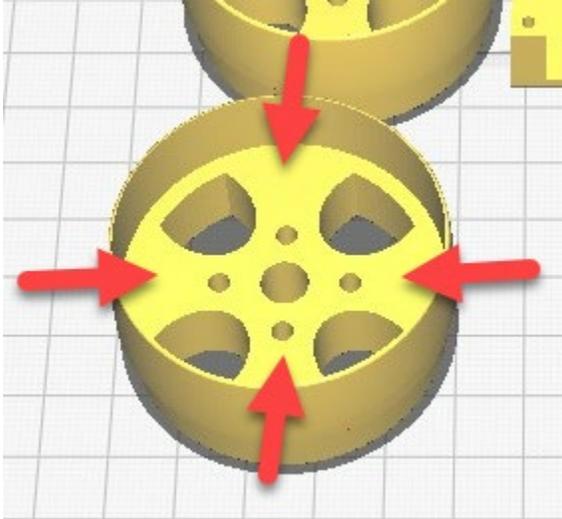
The wing goes together in the same way with bamboo skewers between each section. Starting with Wing 1F, attach Wing 2, Nacelle Wing, and Wing 3. Bbq skewers are used to attach aileron inner and outer and Bbq skewers are also used as hinge pins when attaching the wingtip. Make sure everything fits well and smoothly rotates before adding glue. Use the 6mm carbon tube to help alignment when gluing everything together.

To make things easier before attaching the wings with glue I ran motor wire extensions through the wing into the fuse as well as I added the servo with an extension in the wing pocket. The servo wire goes through the channel into the back of the nacelle and then rides through the same wire channel with the motor wire extensions. Use the 6mm fuse spar reinforcement piece on the inside of the fuse before gluing in the wing.

Motors

Attach the motors with 3mm screws through the motor mount, make sure the props are rotating opposite one another. Since this is a two motor, two esc setup remember to remove one of the signal wires when wiring up the receiver. You can either glue or screw the motor mounts to the wing. I choose to use 4 2mm x 8mm screws (or imperial equivalent) two screw through the outer nacelle into

the thick part of the motor mount. Make sure the screws pierce the thick part of the nacelle shown below.



Nose

I leave the nose for last, depending on your printer/settings, amount of glue, etc... you can print the nose with more or less infill to add nose weight if needed. The air duct is on the bottom half of the nose when glued.

Servos

The servo gets screwed to the fuse servo holder and glued to the bump out inside the fuse. Make sure the servo horn/piano wire move freely under the spar.

For the wing servos, they drop into the servo holder which is then glued into the wing. There is a recess in the servo pocket in the wing to aid alignment but do a dry fit first. Then just screw in the servo covers with servo screws to hold the servos in place.

First Flight

*The CG is marked on the top of the wing with two circles on either side of the canopy. In order to achieve the CG I had my ESCs and battery as far forward as possible using a 3s 2200.

Throttle up to 60-70% throttle and give it a toss. Enjoy!

Questions/comments – please reach out at jp3dprinteddesign@gmail.com