Sentinel Automatic Antenna Tracker

LITE

ASSEMBLY MANUAL

VirtualPilot

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AAT – DIY PCB assembly

Solder the following parts to the PCB:

1. **RCA/Phone/CINCH video connector**
2. **4 pole video Fatshark style connector**
3. **DC Power connectors * 2**
4. **Buzzer (NOTE POLARITY)**
5. **LED's * 4 - use 3d printed assembly jig to help (NOTE POLARITY below)**
6. **0.1" PCB header pins for strip on the following:**
    a. **I2C (4 pins *1)**
    b. **W-EN (2 pins * 1)**
    c. **Servo (3 pins * 2)**
    d. **VRX-IN (5 pins *1)**

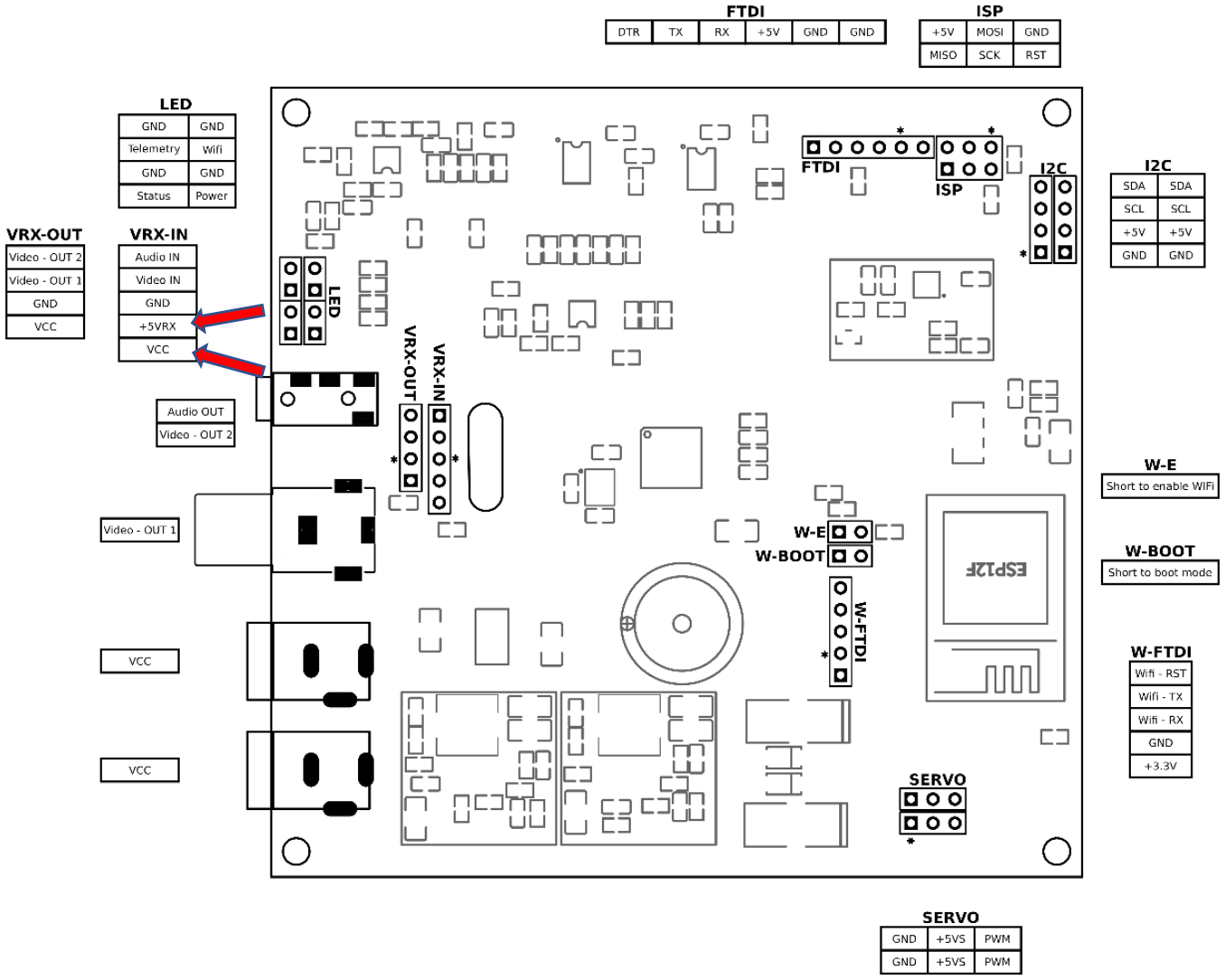
OPTIONAL – typically not used:

1. **OPTIONAL 0.1" PCB header pins for strip on the following:**
    a. **VRX-OUT (4 pins *1)**
    b. **I2C (4 pins *1)**
    c. **ISP (3 pins * 2)**
    d. **FTDI (6 pins * 1)**
    e. **W-FTDI (5 pins * 1)**
    f. **W-BOOT (2 pins * 1)**

IMPORTANT – fit a jumper on W-EN pins to enable WiFi/GUI use
IMPORTANT – LED POLARITY: long leg goes to square PCB pinhole

DANGER ZONE:
VRX-IN connector has both +5v and VCC (same as supply battery voltage input).
Check carefully any wiring to VRX-IN.
Ensure any RX powered by the PCB can support the chosen voltage.

AAT – DIY PCB connections



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VRX-IN connector has both +5v and VCC (same as supply battery voltage input).
Check carefully any wiring to VRX-IN.
Ensure any RX powered by the PCB can support the chosen voltage.

AAT – 3D STL and source files

Files are available here: https://github.com/aat-sentinel/AAT-lite-hardware

AAT – 3D print recommendations

Print recommendations:

- Print with the highest % of material that you can as the AAT will need to be resilient enough to deal with handling during normal and potentially rough use.
- Figures below are recommended minimum for PLA / ABS.
- Adjust for your needs.
- TIP – for printing gears the most common fault is to avoid “elephants foot”. See guide: https://rigid.ink/pages/ultimate-troubleshooting-guide#issue-elephants-foot-15

Item	ABS/PLA	PET-G
QR adapter	80% / 5 shells	80% / 5 shells
Box - base	35% / 5 shells	55% / 5 shells
Gears	35% / 5 shells	55% / 5 shells
All other parts	25% / 5 shells	45% / 5 shells

AAT – 3D printed component preparation

Preparation:

1. Smooth edges of **Box – panel xxxx** to ensure a good fit in **Box – base**.
2. Check gears mesh together well by rotating **Gears – servo** and **Gears – main shaft** together. If required smooth teeth with a file or glass paper until a good mesh is achieved.
3. Fixing holes in the **Tilt – base** are printed horizontally and may benefit from clearing with a 2mm drill.
4. Servo holes in the **Tilt – mount plate** are printed horizontally and may benefit from clearing with a 2mm drill.
5. The bearing pivot hole in the **Tilt – mount plate** is printed horizontally and will benefit from clearing with a 3mm drill.
6. Smooth sharp edges as required. https://github.com/aat-sentinel/AAT-lite-hardware

AAT – DIY Case assembly

Box assembly:

7. Attach tripod **QR adapter** to **Box – base** using M3 10mm self tapping screws.
8. Test fit to tripod before proceeding as QR adapters can vary. This is best time to resolve.
9. OPTIONAL OLED display - fit OLED into **Box – panel front** using **OLED - spacer. WARNING!** Take great care with OLED displays – they are very fragile until fully mounted. The glass will break even if gentle pressure is applied in the wrong places. Make sure it fits correctly into mounting position before tightening screws. The unit can be used without OLED fitted.
10. Fit **Box – panels front** to the PCB and place into **Box – base.** Fix PCB to **Box – base** using M3 10mm self tapping screws.
11. If using an OLED display, attach 4 wires from OLED to PCB I2C connector. Take note to ensure correct pins are connected at each end.
12. Note PCB is rectangular. Side panels are the longest.

Gear assembly:

1. Press fit 2 * bearings into **Box – top.**
2. Attach **Bearing retainer – outer** to **Box – top** using M3 10mm self tapping screws.
3. Test fit to tripod before proceeding as QR adapters can vary.
4. Attach servo to **Box – top** using M3 18mm bolts and M3 nuts. Servo should be able to move with a little force to allow adjustment later. Fit servo from underside.
5. Remove servo horn, fit **Gears – servo** to servo circular horn using M2 10mm screws from servo pack. Note it fits under the servo horn. Trim excess.
6. Attach servo horn to servo.
7. Power up servo and ensure it is set to center using FC, RX, servo tester etc.
8. Fit **Gears – main shaft** into Box-top bearings. Place so that any one of the four holes faces to the edge.
9. Attach **Bearing retainer – inner** to **Gears – main shaft** using M3 10mm self tapping screws.
10. Push **Gears – servo** towards **Gears – main shaft** with very gentle pressure to minimise any gear movement and tighten servo bolts.
11. Attach **Box – gear cover** to **Box – top** using M3 10mm self tapping screws.

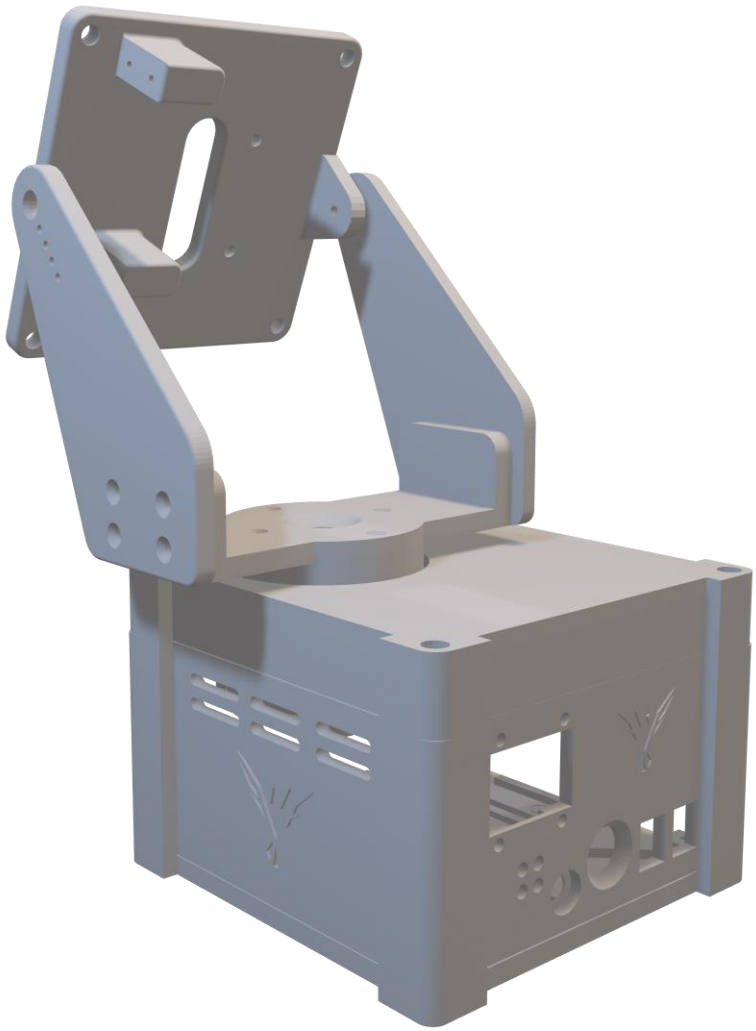
Tilt assembly:

1. Press fit bearing into one of **Tilt – arms**.
2. Fit servo horn to inside of **Tilt – arms** using M2 10mm self tapping screws. Excess may bet cut /files smooth
3. Fit **Tilt – arms** to **Tilt – base** using M3 10mm self tapping screws.
4. Fit tilt servo to **Tilt – mount plate** using M3 10mm self tapping screws and with the servo spline positioned in centre of plate.
5. Fit tilt servo to **Tilt – mount plate** to **Tilt – arms** using M3 16mm bolt and nut. Use washer under nut and between Tilt – mount plate and Tilt – arms. Do not over tighten. Plate should move freely.
6. Power up servo and ensure it is set to center using FC, RX, servo tester etc.
7. Servo spline can be placed into servo horn with mount plate at approx. 45-degree angle. This is starting point for future calibration. Servo horn retaining screw can be fitted – or after tilt calibration.
8. Attach **Tilt – base** to **Gears – main shaft** using M3 10mm self tapping screws.

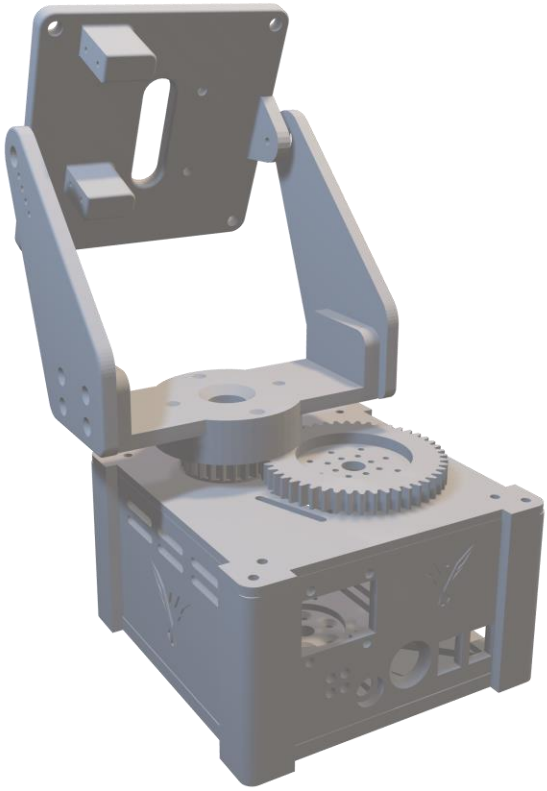
Final assembly:

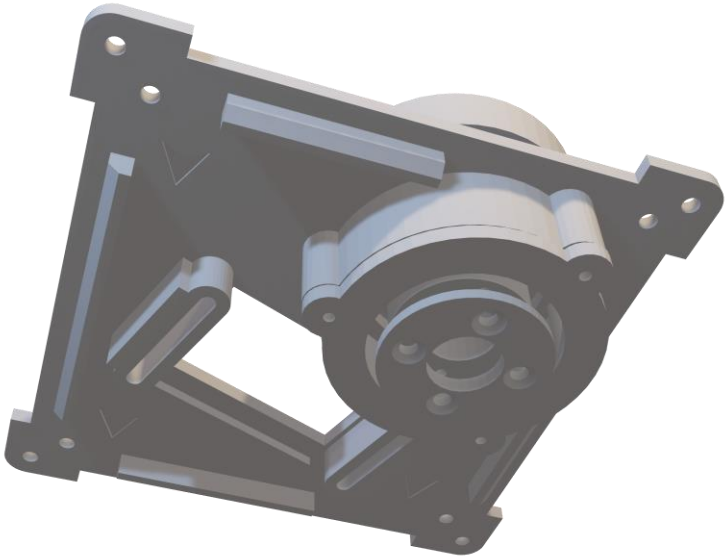
1. Prepare cables used to connect the AAT PCB to the receiver. ***Take utmost care*** to check the polarity of cables and connections to avoid the magic smoke that powers all electronics. Servo wires are ideal and are included for this. Pins can be swapped to make the correct cable similar to this video link https://www.youtube.com/watch?v=rR6aX_8v3pM
2. Wind tilt servo cable around a pen to produce a helical cable – greatly improves endurance and performance of cables during pan actions.
3. Similarly, wind a video connection cable.
4. Feed both servo and video connection cables through the **Tilt – base** in preparation for connecting to the PCB.
5. Insert **Box – panels side** and **Box – panels rear** into **Box – base**.
6. Position the assembled tilt unit above the box and connect servo and video cables to the AAT PCB.
7. Lower the tilt unit onto the box, noting the arrows on the components showing the correct orientation of the top assembly in relation to the lower assembly and fit using M3 16mm self tapping screws.

AAT – Assembled unit



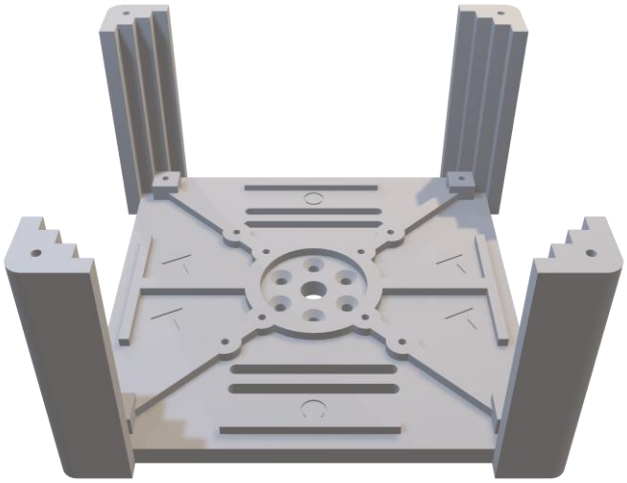
AAT – internal views



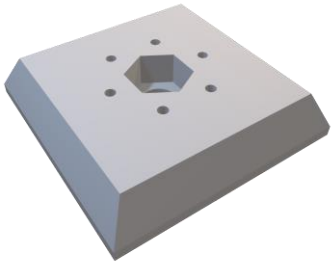


Parts list – STL components

Box - base

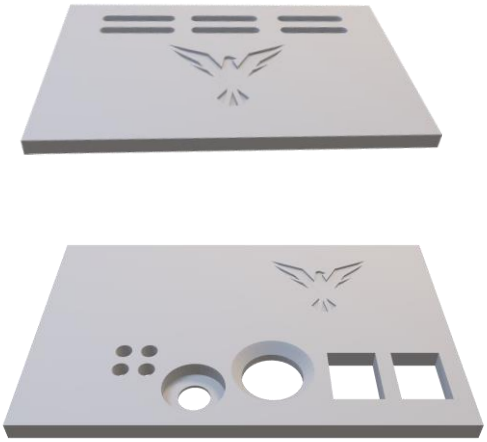


QR adapter

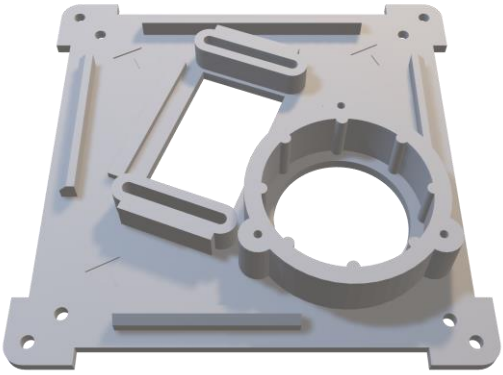


Box – panels side

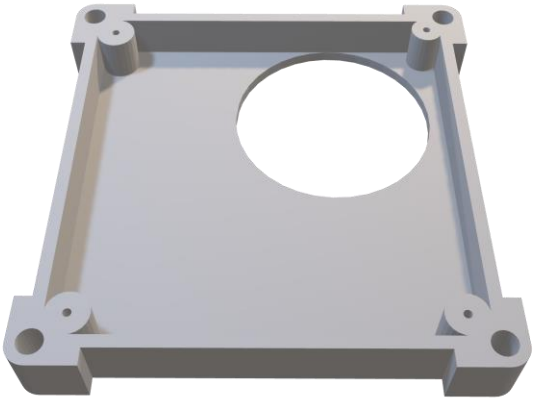
Box – panels front and rear



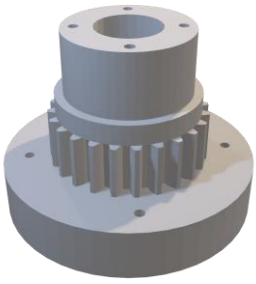
Box – top



Box – gear cover



Gears – main shaft

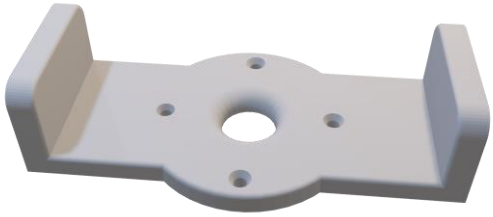


Gears - servo

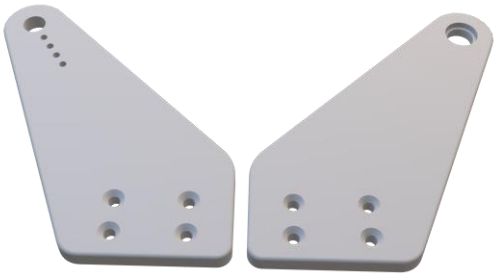
Bearing retainer - inner

Bearing retainer - outer

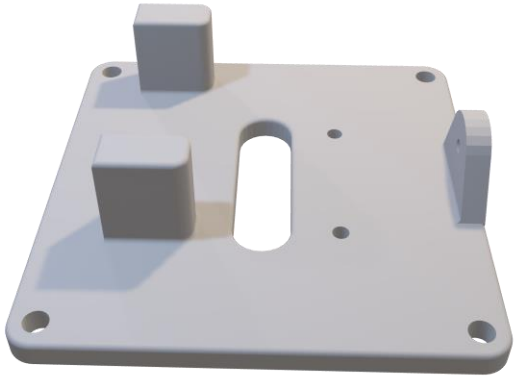
Tilt - base



Tilt - arms

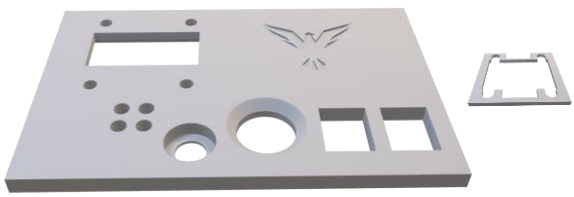


Tilt – mount plate



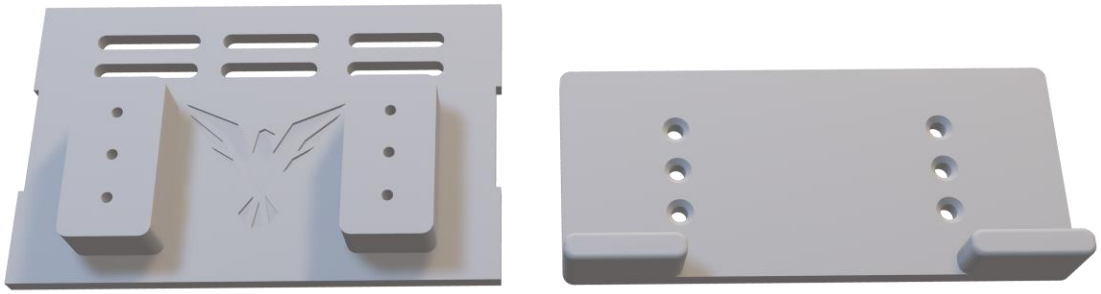
Parts list – optional AAT STL extras

OLED panel mount

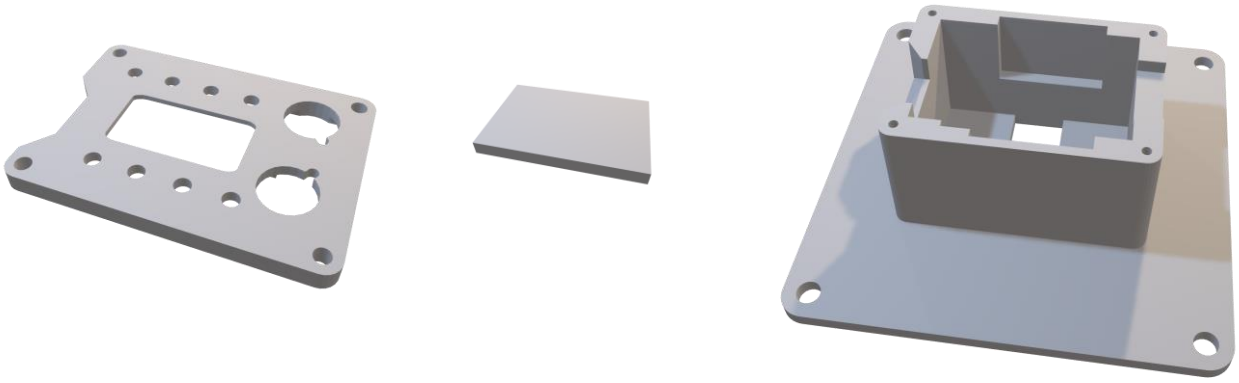


4 “ LCD side panel mount

Battery side panel battery mount

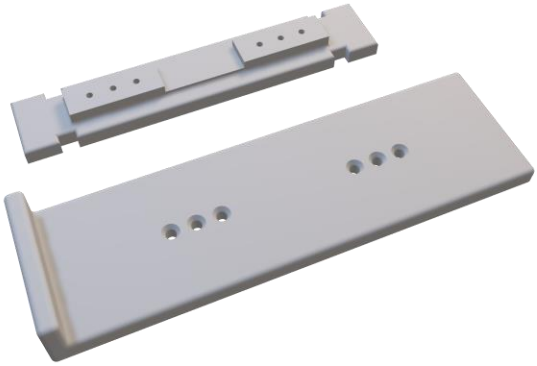


EACHINE RX5808 pro mount

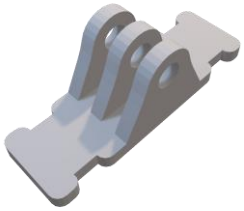


Parts list – miscellaneous STL

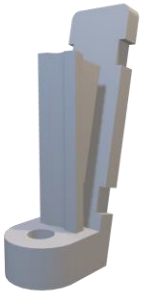
Tripod leg battery mount



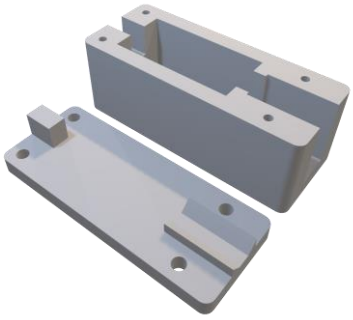
Tripod leg GoPro mount



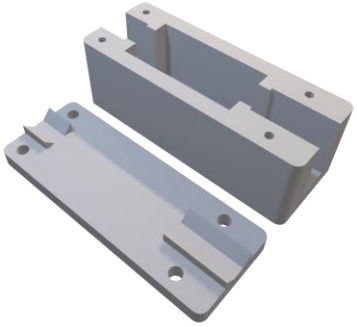
Tripod leg 7” LCD mount



XT60 in line power switch



XT60M to XT60F in line power switch



XT60M to XT60F in line power switch

Parts list – fixings

Item	QTY
6805 2RS bearing	2
F693ZZ bearing	1
M3 16mm ST screw	4
M3 10mm ST screw	37
M2 10mm ST screw	6
M3 bolt 18mm	5
M3 bolt 12mm	4
M3 Washer	2
M3 Nut	9
OLED screw (use M3 12)	4
OLED nut (use M3)	4
2 * MG996R 180	2

Parts list – components

Item	QTY
RCA / Phone / CINCH	1
4 Pole 3.5mm	1
LED	4
OLED	1
Buzzer	1
PCB header pins	1
Jumper	1

Parts list – extras

Servo lead (RX internal) 150mm M2M	1
Servo lead (RX external) 100 M2F	1
Goggles video cable - 4 pole fatshark style 3m	1
XT60-DC 5.5/2.1 Power leads	1
OLED wires	4