ALTA 8 Pro

Overview

Introduction

ALTA Pro is a professional multi-rotor aircraft designed for demanding cinematic, professional, and industrial, applications. In under five minutes, ALTA Pro can unfold from its carrying case to flying some of the most capable cinema cameras and industrial payloads on either the top or bottom of the aircraft. ALTA Pro runs the PX4 stack and has been customized for both cinema and commercial use, yielding precise yet smooth control.

This Aircraft Flight Manual describes the complete operation of airframe and flight control systems, and the normal maintenance of those items. Do not operate ALTA Pro without reading and understanding this manual.

This manual is not a substitute for adequate flight training. Training requirements can vary when operating in different countries or under different flight conditions. Always consult local regulations before flying ALTA Pro. In areas where there are no flight training requirements, it is the sole determination of the pilot-in-command as to whether he or she has the appropriate level of training or experience for a given flight. Always set and adhere to personal minimums and fly within your own capabilities.
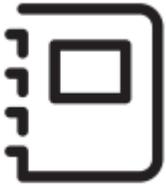
Throughout the manual, warnings, cautions and notes are used to highlight various important procedures. These are defined as follows:

WARNING

Warnings are used to highlight procedures which, if not strictly observed, may result in personal injury.

CAUTION

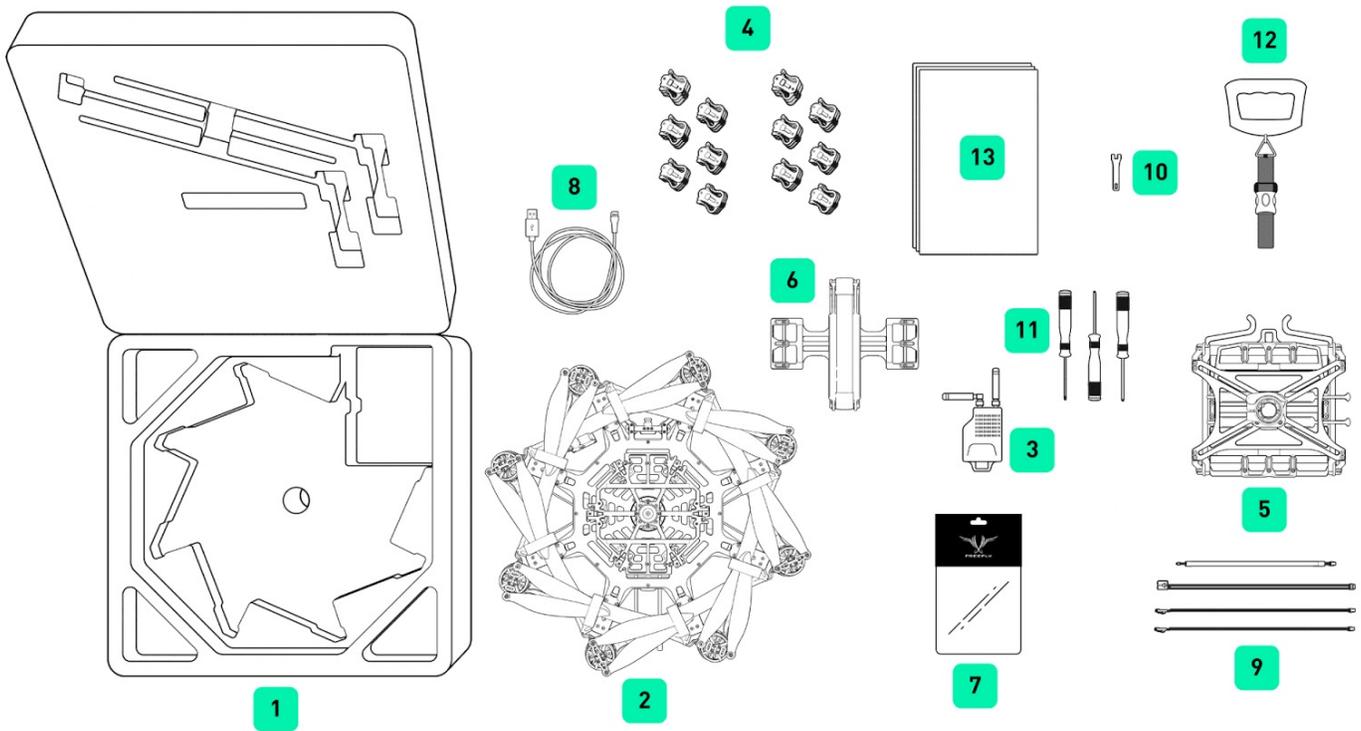Cautions are used to highlight procedures which, if not strictly observed, may cause damage to equipment.

Notes are used to highlight specific operating conditions, usability tips and tricks or steps of a procedure.

Specifications

Included Items

1.
   Case

2.

ALTA Pro

3.
Long Range Radio Modem

   a. Aerial portion mounted to ALTA

4.
Isolator Cartridges

   a. (6) Teal (Installed)

   b. (6) Black

   c. (6) Red

5.
Inverted Landing Gear

6.
Quick Release Battery Tray

7.
ALTA Product Spares

8.
USB-Futaba Power Cable

9.
FPV Cables

   a. Skyzone/BOSCAM

   b. BOSCAM, small connector

   c. ImmersionRC/Fat Shark

   d. Ready Made RC

10.
5.5mm Wrench

11.
   Hex Drivers (1.5mm, 2.0mm, 2.5mm)

12.
   Electronic Luggage Scale

13.
   Documentation

Additional Required Components (Not Included in Base Package)

Radio Controller

ALTA Pro supports a variety of radio controllers as outlined in the [Flight Controller Specifications](#). A minimum of five (5) channels are required, with four (4) used for flight control, and the remaining one (1) used for mode selection.

> **NOTE**
>
> **A radio controller with between six to ten channels is highly recommended to make use of Return-to-Land (RTH) and ALTA Pro's other functions. It is recommended to use a radio controller with a three-way switch for Mode selection and a two-way switch for the Return-to-Land function.**

Flight Battery

ALTA Pro can accommodate a variety of Lithium Polymer (LiPo) flight battery packs. Battery packs must be 6S, having a nominal voltage of 22.2 V. Only run ALTA Pro using two packs at a time. Each pack must have a continuous discharge rating of 250 amps or greater, and a peak discharge rating of 500 amps or greater. For additional information on expected flight durations, refer to the Performance Section of this manual.
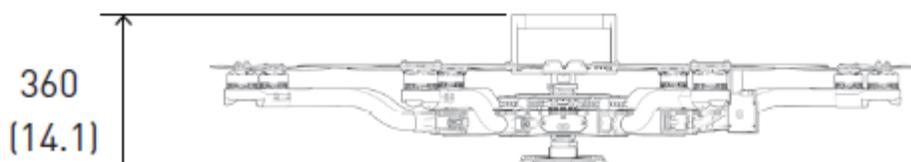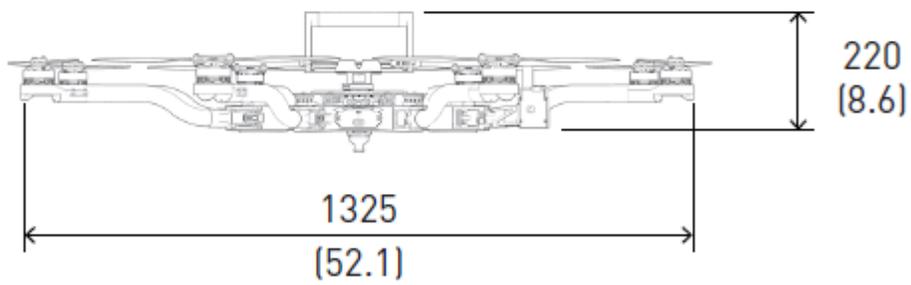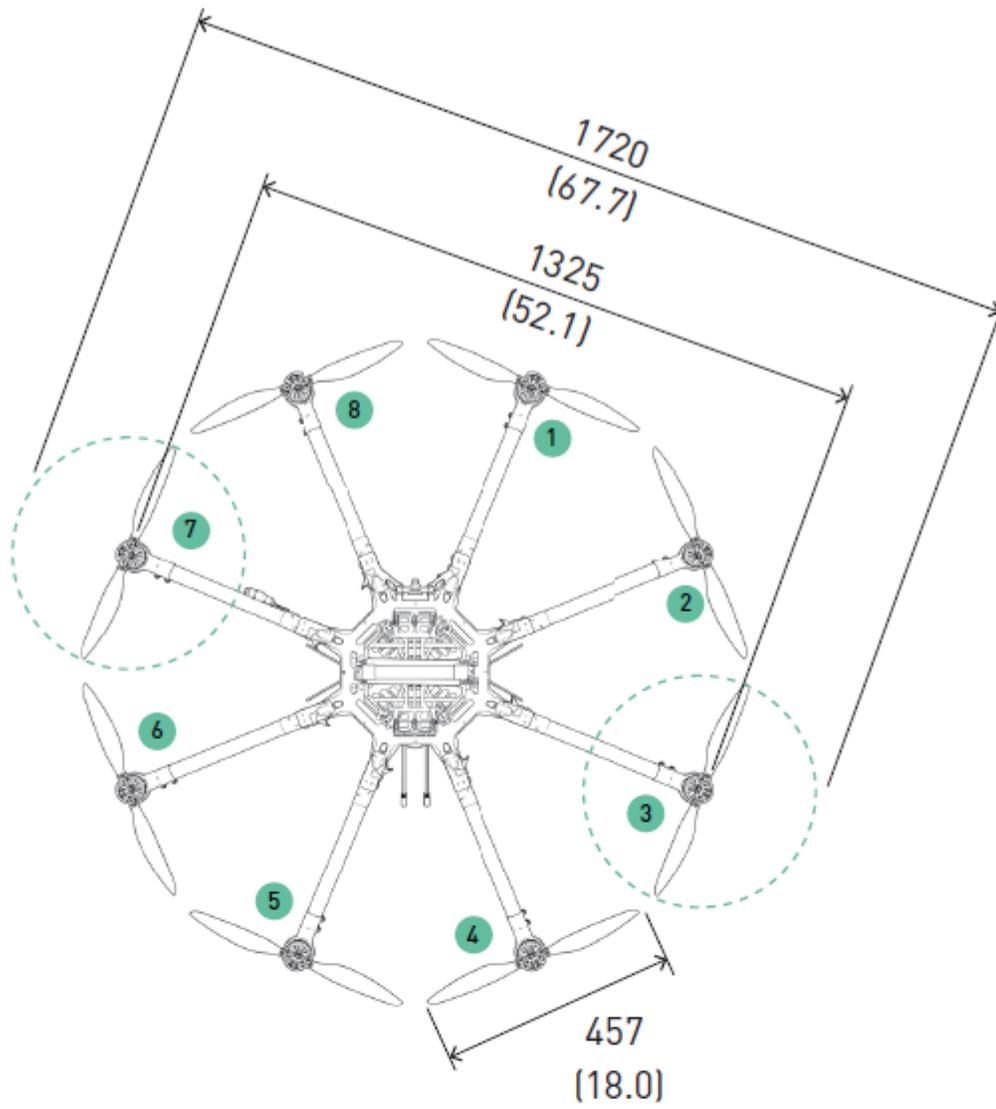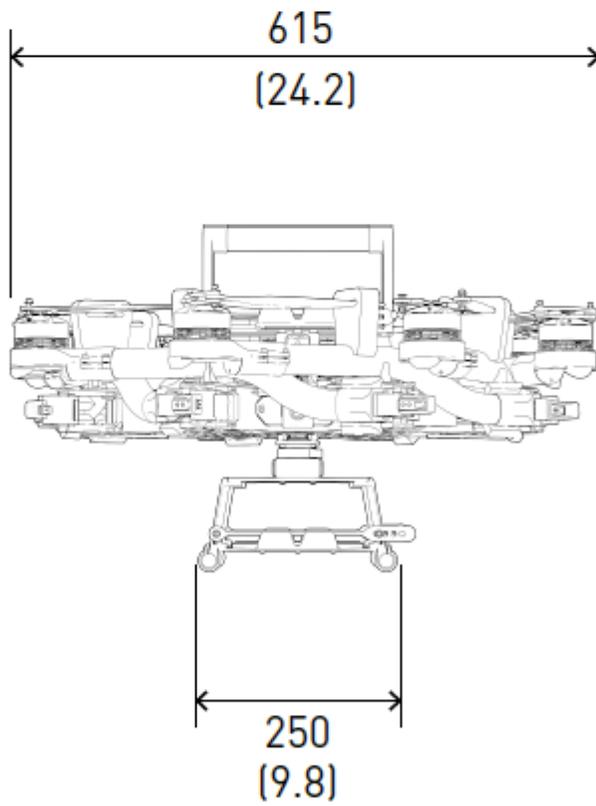
WARNING

The use of flight packs which do not meet the voltage and discharge rating above (22.2V nominal, 250a continuous discharge, and 500a peak discharge) can cause damage to the ALTA and the batteries.

Dimensions

Item	Dimension
Unfolded Diameter (does not include Props)	1325 mm - ALTA Pro
Folded Diameter (does not include Props)	660 mm - ALTA Pro
Height to base of Toad In The Hole (TITH)	263 mm - ALTA Pro

1720
(67.7)

1325
(52.1)

8

1

7

2

6

3

5

4

457
(18.0)

220
(8.6)

1325
(52.1)

360
(14.1)

660
(25.9)

615
(24.2)

250
(9.8)
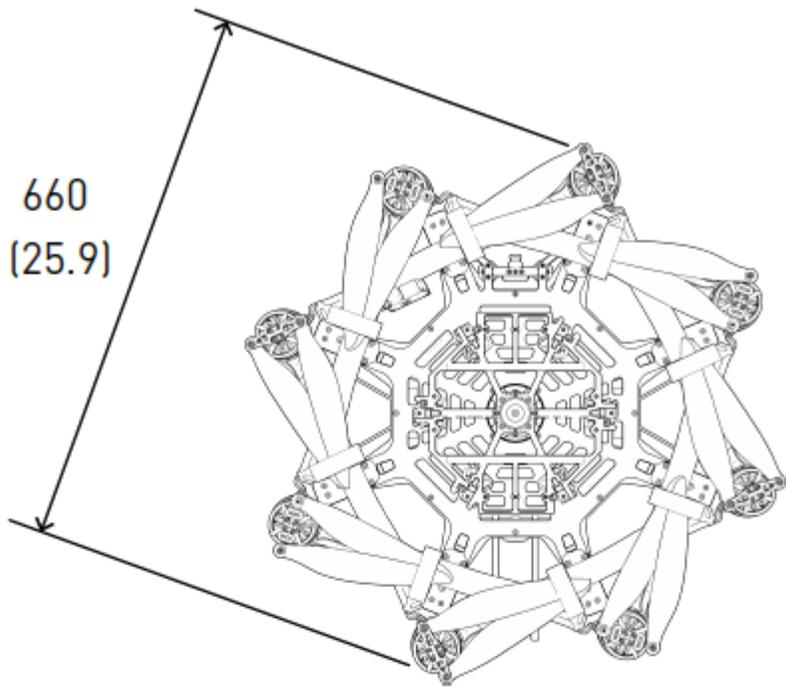
Powerplant

Item	Specification
Number of Motors	8 - ALTA Pro 8
Motor Type	Direct Drive 3-Phase PMAC Outrunner
Motor Make and Model	Freefly F45
Motor Max Continuous Power Output	350 W
Motor Max Instantaneous Peak Power Output	950 W
Maximum RPM (flat rated)	6300 RPM
Equivalent Kv	384
Electronic Speed Controller	Freefly Silent-Drive Sine Wave ESC

Propellers

Item	Spec
Make and Model	Freefly ALTA Propeller
Material	Carbon fiber with balsa core
Propeller Orientation	(4) CW and (4) CCW Props - ALTA Pro 8
Propeller Type	18 × 6 Folding

Battery

Item	Spec
Nominal Battery Voltage	6S / 22.2V
Maximum Battery Size (GroundView)	240 × 175 × 80 mm
Maximum Battery Size (SkyView)	220 x 156 x 64 mm
Maximum Battery Quantity	2 Battery Packs (Parallel)
Minimum Battery Quantity	2 Battery Packs (Parallel)

Item	Spec
Battery Connectors	2× EC5 (Parallel)
Required Minimum Battery Discharge Rating (Per Pack)	250A / 500A Peak

Weight

Item	Spec
Maximum Gross for Takeoff	18.1 kg (40.0 lbs) - ALTA Pro 8
Maximum Useful Load	12.0 kg (26.4 lbs) - ALTA Pro 8
Maximum Payload	9.1 kg (20.0 lbs) - ALTA Pro 8
Typical Standard Empty Weight	6.2 kg (13.6 lbs) - ALTA Pro 8

Specific Loadings

Item	Spec
Typical Specific Power	145 W/kg
Thrust Ratio at MTOW1	1.85 : 1

Flight Controller

Item	Spec
Autopilot Name	PX4
Flight Modes	Manual, Height Mode, Position Mode , Return-to-Land (RTH), Autoland, Waypoint Mission mode
Supported Inputs:	DSMX, DSM2, S.Bus, S.Bus2
Supported Radios	Futaba S.Bus & S.Bus2, DSMX, DSM2 (Spektrum/JR)
Supported Radio Controller Telemetry Systems	Futaba w/ built-in voltage sense port
Minimum Radio Controller Channels Required	5

Item	Spec
Supported GNSS	GPS, GLONASS, Galileo
Supported Satellite-based Augmentation System	QZSS, WAAS, EGNOS, MSAS
First-Person View System Video Formats	NTSC, PAL
Supported First-Person View Transmitters	Skyzone, BOSCAM, ImmersionRC, Fat Shark
Supported First-Person View Cameras	Ready Made RC RMRC-700XVN (Recommended), Runcam Eagle 2 Pro, or similar
First-Person View OSD Telemetry	User Configurable
Installed Transceivers	RFD900/868X Long Range Telemetry System Wi-Fi 2.4 GHz b/g/n
Default Data Logging Rate	25Hz

Lighting and Indication

Item	Spec
Status Light	1 Watt Red, 1 Watt White LED
Orientation Lights	3-Watt RGB LED
Orientation Light Color Options	Off, Red, Orange, Yellow, Green, Blue, Cyan, Purple, White
FPV Ability	FPV SD with OSD overlay
GPS Light Color Scheme	Solid Blue - Armed Without GPS Lock Solid Green - Armed With GPS Lock Breathing (Any Color) - Waiting/Standby

Item	Spec
	Blue (Solid or Breathing) - No GPS Lock
	Green (Solid or Breathing) - GPS Lock
	Fast Blinking Red - Arming Error

Isolation Systems

Item	Spec
Vibration Isolation System	O-Rings
Option 1: Soft / Light Payloads	Red O-Rings
Option 2: Medium / Medium Payloads	Teal O-Rings
Option 3: Stiff / Heavy Payloads	Black O-Rings

External Systems Mounting

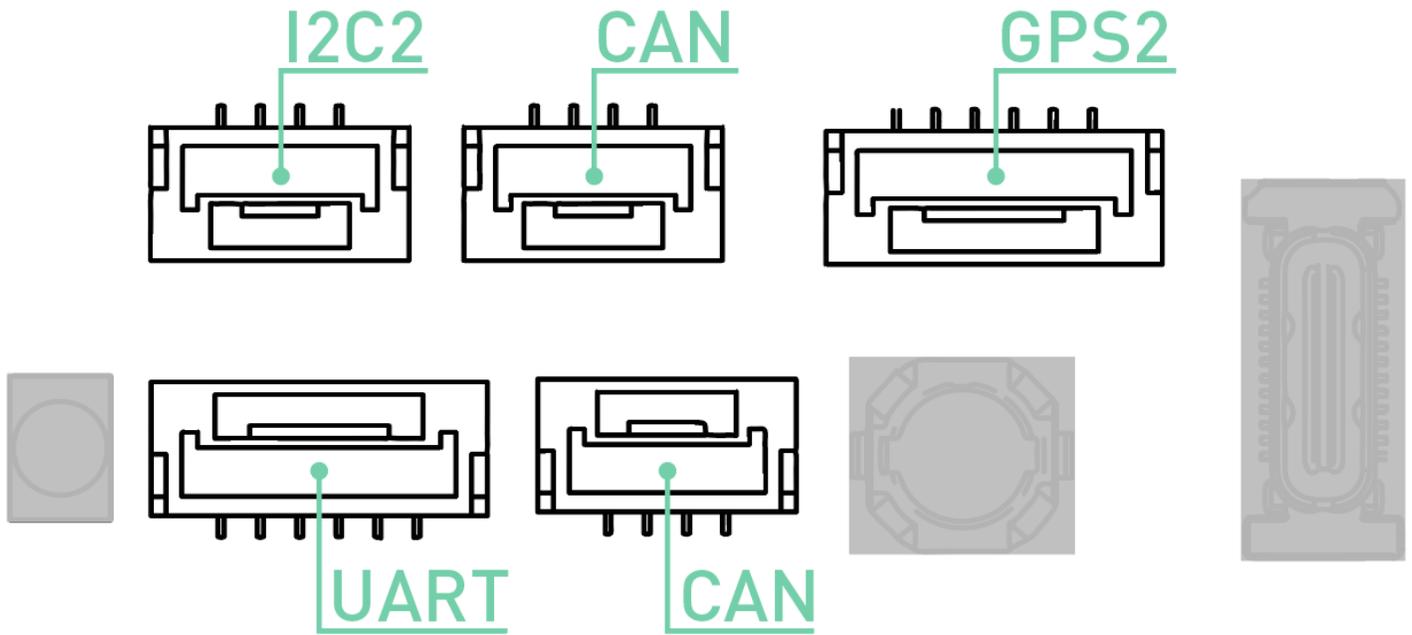| Item	Spec
Mounting Locations	FPV Transmitter Mount
	GPS Mount
	Telemetry Radio Mount
Mounting System	[Freefly Toad In The Hole (TITH) Quick Release](#) [Dimensions / Drawing](#)
FPV Camera Mount	Between Booms 1 & 8 - ALTA Pro 8
FPV Transmitter Mount	Boom 2 - ALTA Pro 8
GPS Mount	Boom 7 - ALTA Pro 8
Telemetry Radio Mount	Boom 3 - ALTA Pro 8

Expansion Port Pin-outs

I2C2   CAN   GPS2

UART   CAN

UART Port

Pin	Signal	Voltage (V)
1	VCC	+5V
2	TX (Out)	+3.3V
3	RX (In)	+3.3V
4	CTS (In)	+3.3V
5	RTS (Out)	+3.3V
6	GND	GND

GPS2 Port

Pin	Signal	Voltage (V)
1	VCC	+5V
2	TX (Out)	+3.3V
3	RX (In)	+3.3V

Pin	Signal	Voltage (V)
4	I2C1 SCL	+3.3V
5	I2C1 SDA	+3.3V
6	GND	GND

CAN Ports

Pin	Signal	Voltage (V)
1	VCC	+5V
2	CAN_H	+5V
3	CAN_L	+5V
4	GND	GND

I2C Port

Pin	Signal	Voltage (V)
1	VCC	+5V
2	I2C1 SCL	+3.3V (1.5K pull-up)
3	I2C1 SDA	+3.3V (1.5K pull-up)
4	GND	GND

Limitations

Limitations

These limitations are advisory in nature and do not extend or restrict limitations provided by governing aviation authorities.

Powerplant Limitations

Item	Spec
Maximum RPM	6300 RPM
Maximum Battery Voltage	25.2 Volts
Minimum Average Battery Voltage	19.2 Volts

Environmental Limitations

Do not fly ALTA Pro in temperatures exceeding 45°C (113°F) or below -20°C(-4°F).

Flight Controller Limits

Item	Spec
Maximum Pitch/Roll Angle	45°
Maximum Yaw Rate	150° / second

Weight Limits

Item	Spec
Maximum Payload	9.1 kg (20.0 lbs)- ALTA Pro 8
Maximum Takeoff Weight	See following tables

ALTA 8 Pro Max Allowable Gross Weight

ALTA Pro 8 ALLOWABLE GROSS WEIGHT

As altitude and temperature increase, the density of the air decreases. Consequently, ALTA Pro 8's thrust will decrease. The following table describes maximum gross weight limits with respect to altitude and temperature.

Press Alt Ft	0ºC		10ºC		20ºC		30ºC		40ºC	
	Maximum Gross Weight (lb)	Maximum Gross Weight (kg)	Maximum Gross Weight (lb)	Maximum Gross Weight (kg)	Maximum Gross Weight (lb)	Maximum Gross Weight (kg)	Maximum Gross Weight (lb)	Maximum Gross Weight (kg)	Maximum Gross Weight (lb)	Maximum Gross Weight (kg)
S.L.	40.0	18.1	40.0	18.1	39.3	17.8	38.0	17.2	36.8	16.7
1000	40.0	18.1	39.3	17.8	37.9	17.2	36.7	16.6	35.5	16.1
2000	39.2	17.8	37.8	17.2	36.6	16.6	35.4	16.0	34.2	15.5
3000	37.8	17.2	36.5	16.5	35.2	16.0	34.1	15.5	33.0	15.0
4000	36.4	16.5	35.2	15.9	34.0	15.4	32.8	14.9	31.8	14.4
5000	35.1	15.9	33.9	15.4	32.7	14.8	31.6	14.3	30.6	13.9
6000	33.8	15.3	32.6	14.8	31.5	14.3	30.5	13.8	29.5	13.4
7000	32.6	14.8	31.4	14.2	30.3	13.8	29.3	13.3	28.4	12.9
8000	31.3	14.2	30.2	13.7	29.2	13.2	28.2	12.8	27.3	12.4
9000	30.2	13.7	29.1	13.2	28.1	12.7	27.2	12.3	26.3	11.9
10000	29.0	13.2	28.0	12.7	27.0	12.3	26.1	11.9	25.3	11.5

Abbreviations and Terminology

Meteorological Terminology

Term   **Definition**

	International Standard Atmosphere in which:
	The air is a dry, perfect gas;
	The temperature at sea level is 15° Celsius (59° Fahrenheit);
ISA	The pressure at sea level is 1013.2 mbar (29.92 inches Hg);
	The temperature gradient from sea level to the altitude at which the temperature is -56.5°C (-69.7°F) is -0.00198°C (-0.003564°F) per foot and zero above that altitude
MSL	Mean Sea Level is the average height above the surface of the sea for all stages of tide
AGL	Above Ground Level is the height of the aircraft above the ground
OAT	Outside Air Temperature is the free air static temperature surrounding the aircraft
Pressure Altitude	Altitude measured from standard sea level pressure (1013.2 mbar, 29.92 in. Hg) by a pressure or barometric altimeter
	It is the indicated pressure altitude corrected for position and instrument error. In this Manual, altimeter instrument errors are assumed to be zero

Power Terminology

Term	Definition
Maximum Continuous Power Output	The maximum typical power output of a motor averaged over the entire flight
Maximum Instantaneous Peak Power Output	The maximum power output of a motor during any phase of flight, such as when maneuvering

Flight and Powerplant Control

Term	Definition
Throttle Stick	The radio controller stick responsible for throttle control. For Mode 2 controllers, this is the vertical movement of the left control stick. For Mode 1 controllers, this is the vertical movement of the right control stick
Yaw Stick	The radio controller stick responsible for yaw (also called pan) control For Mode 2 and Mode 1 controllers, this is the lateral movement of the left control stick
Pitch Stick	The radio controller stick responsible for pitch control. For Mode 2 controllers, this is the vertical movement of the right stick For Mode 1 controllers, this is the vertical movement of the left stick
Roll Stick	The radio controller stick responsible for roll control. For Mode 2 and Mode 1 controllers, this is the lateral movement of the right control stick
Pitch/Roll Stick or Cyclic Stick	The radio control stick responsible for both pitch and roll control For Mode 2 controllers, this is the right stick

Weight and Balance

Term	Definition
Maximum Takeoff Weight (MTOW)	Maximum allowable weight at liftoff
Standard Empty Weight	Weight of a standard aircraft
Basic Empty Weight	Standard empty weight plus optional equipment
Useful Load	Difference between take off weight and basic empty weight

Term	Definition
Payload	Useful load less battery weight

General Terminology

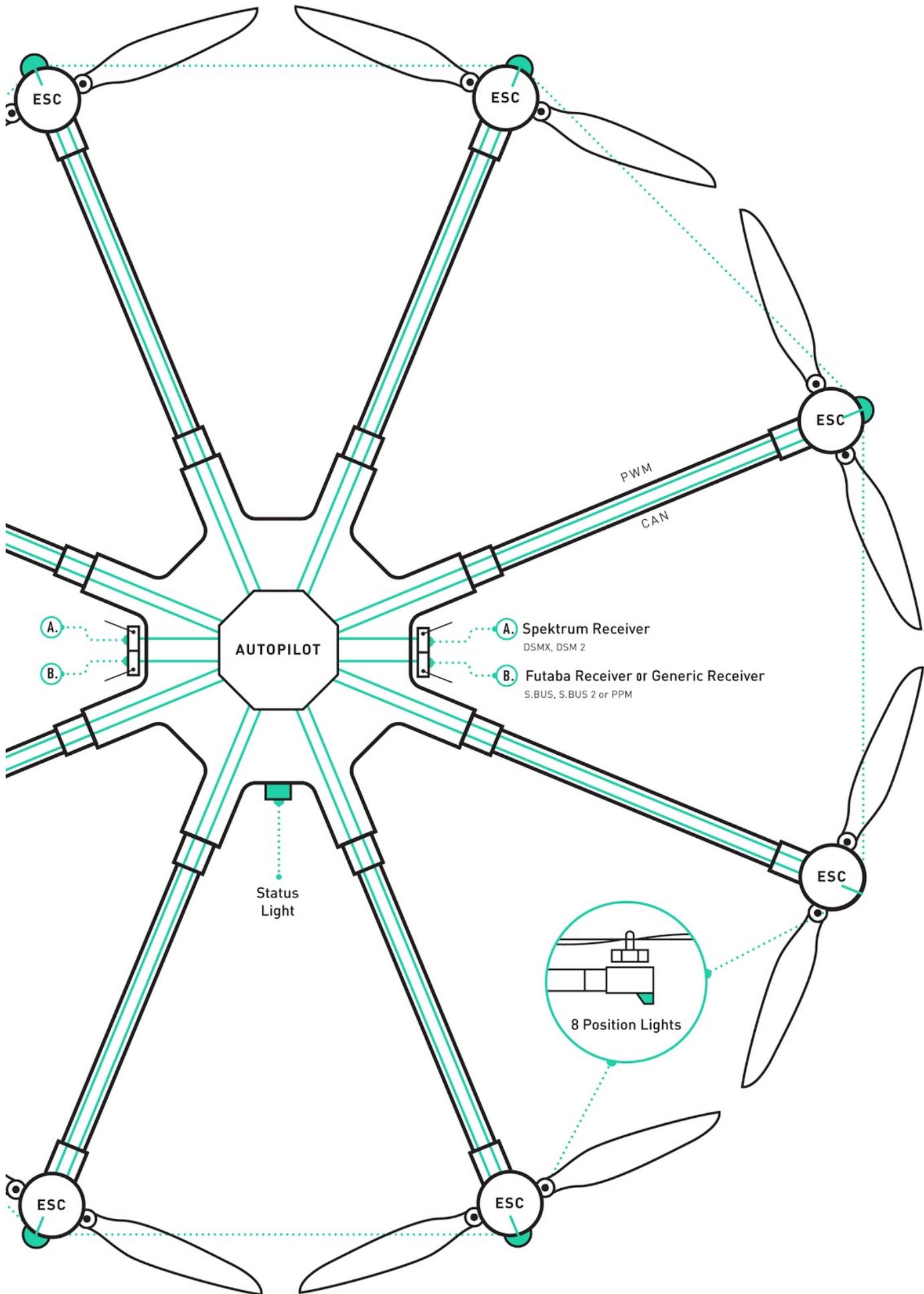| Term	Definition
LOS	Loss of Signal
RTH	Return-to-Land
sUAS	Small Unmanned Aircraft System includes all components of the system required for the flight of an unmanned aircraft, including the radio controller, data link and other related support equipment

Systems Diagrams

Overview

GPS Satellite

HD Video Link,
Preview Monitor*

ALTA Pro
QGround Control
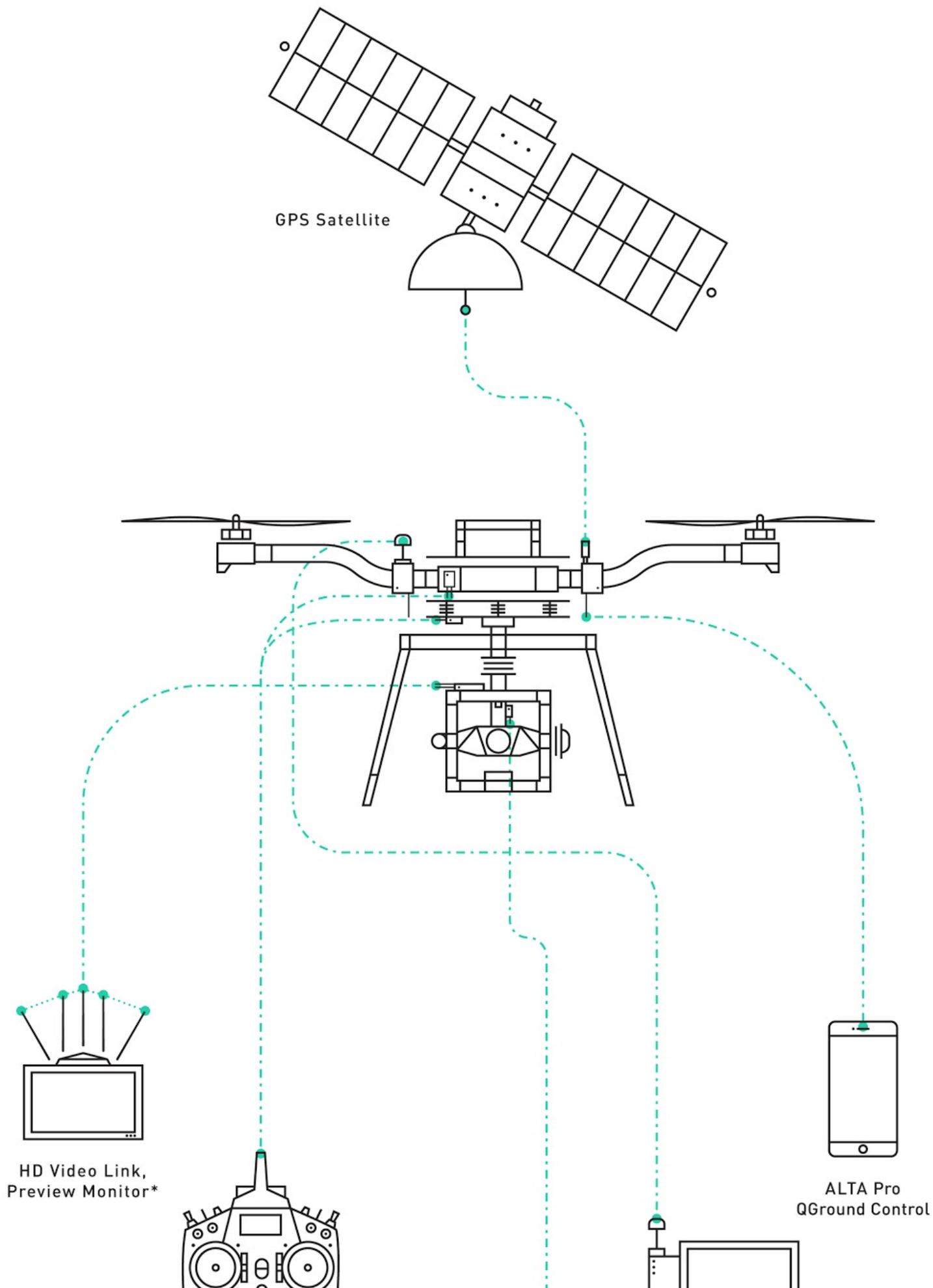
Flight Control

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ESC

ESC

ESC

PWM

CAN

AUTOPILOT

A. Spektrum Receiver
DSMX, DSM 2

B. Futaba Receiver or Generic Receiver
S.BUS, S.BUS 2 or PPM

A.

B.

Status
Light

8 Position Lights

ESC

ESC

ESC

Power System

****

Motor Lights

Motor Lights

Motor Lights

Motor Lights

Motor Lights

Motor Lights

Motor Lights

Motor Lights

AUTOPILOT

FPV CAM

FPV Tx

Futaba Tel.

RECIEVER

RECIEVER

FUSE

FUSE

12v 5v 5v

REGULATORS

EC5 Connector

Flight Battery

Flight Battery

FPV Equipment

****

FPV Camera
(not included)

FPV Camera Cable

FPV Tx Lead
Pre-installed

FPV Camera Lead
Pre-installed

FPV Tx
(not included)

FPV Tx Cable
Boscam/Skyzone or Fat Shark/ImmersionRC

AUTOPILOT

ALTA 8 Pro Ground Control Desktop and Mobile App

Getting QGroundControl up and running is quick and easy! Use the ALTA Pro QGroundControl program to change ALTA Pro's parameters, monitor statuses, and set up waypoint missions.

1. Download and install the application.
2. Start QGroundControl and ALTA Pro.
3. Connect your vehicle to the ground station device.
    1. WiFi
        1. To connect to ALTA Pro via WiFi, find the ALTA Pro's WiFi connection by searching for it in your device's WiFi menu and then connect to it like you would any other device.
        2. You may have to [enable the WiFi feature](#) on ALTA Pro if it is your first time connecting.
    2. 900/868MHz
        1. Simply plug in the 900/868MHz radio into your computer using the attached USB cable. If ALTA Pro is turned on the two radio's will automatically connect!

900 MHz

900 MHz Radio

ALTA Pro
QGround Control*
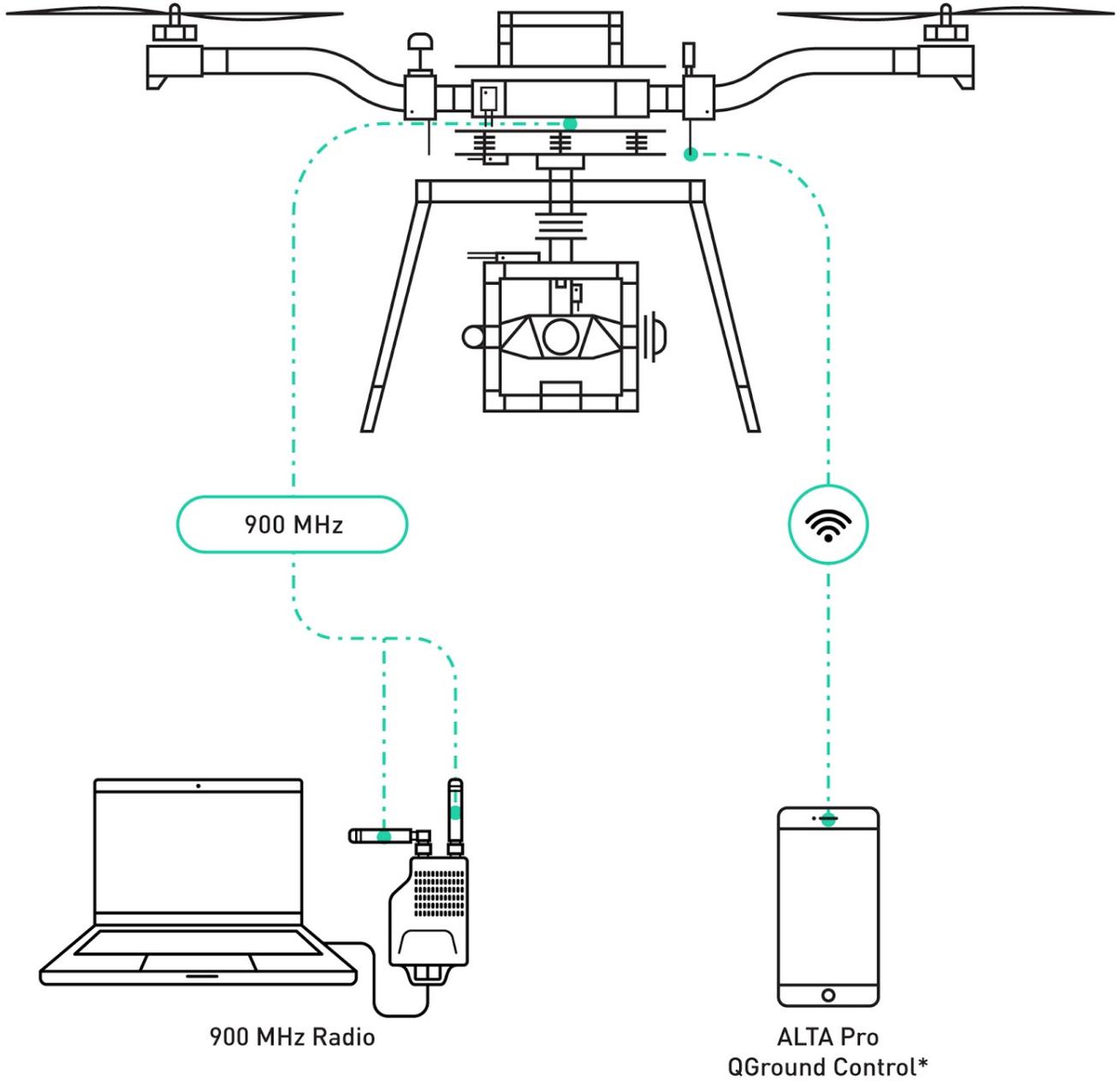
*NOT INCLUDED

New Features

QGroundControl

The implementation of QGroundControl into the ALTA Pro system results in new features.

1. By harnessing the full power of the PX4 autopilot controller architecture, ALTA Pro has all the features of a modern drone: waypoints, autonomy, telemetry/C2, autoland, etc.
2. Advanced, high-bandwidth position hold offers unprecedented precision, repeatability, and stability.
3. PX4 integration will allow users to create and fly complicated waypoints missions with ease.
4. The use of Mavlink and Dronecode protocol makes drone software integration possible and creates straightforward path to custom sUAS solutions for both cinema and business.
5. ALTA Pro has a built in 900/868MHz radio which will allow for a range of up to 2 miles between the aircraft and ground station.

The ALTA Pro QGroundControl App will be actively maintained, and additional functionality may be added over time. For information on individual app updates, refer to the App release notes.

NOTE **For a more indepth review of QGroundControl's capabilities and workflows, please visit the [QGroundControl User Guide](#).**

If you are currently operating with an ALTA (Autopilot) version, there is no need to upgrade if you're happy with the current feature set. The Autopilot-controlled ALTA has an excellent track record for reliability and smooth flight characteristics. Currently, the Alta Autopilot version offers Orbit mode functionality and the Velocity clamp feature. While the ALTA Pro will continue to see features added, it is does not currently support Orbit mode and Velocity clamp functionality.

When flying multiple aircraft at the same time, take extreme caution to ensure that the aircraft connected to the laptop/mobile device is the desired craft. Failing to connect to the correct device may result in an inadvertently arming a aircraft or disarming one that is inflight.

We suggest not selecting 'Connect Automatically' when using WiFi to connect to ALTA Pro and clearly labeling each 900/868MHz RX/TX pair.

900/868 MHz Radio

ALTA Pro makes use of a 900/868MHz radio to increase the communication range between the ALTA Pro and laptop ground station. This allows users to monitor, update, and reroute ALTA's while up in the air or on the move.

WARNING

All 900/868MHz radio's are set to default signal strength when they leave our facility. Users are responsible for making sure they are operating within the bounds of the radio communication regulations in their area. The radio strength settings can be updated with the **RFDTools** program. Users will have to use the USB supplied with the radio modules to connect to their computer and update signal strength parameters. This should be done for both radios. Contact support for questions concerning how to update the radio settings.

QGroundControl Overview
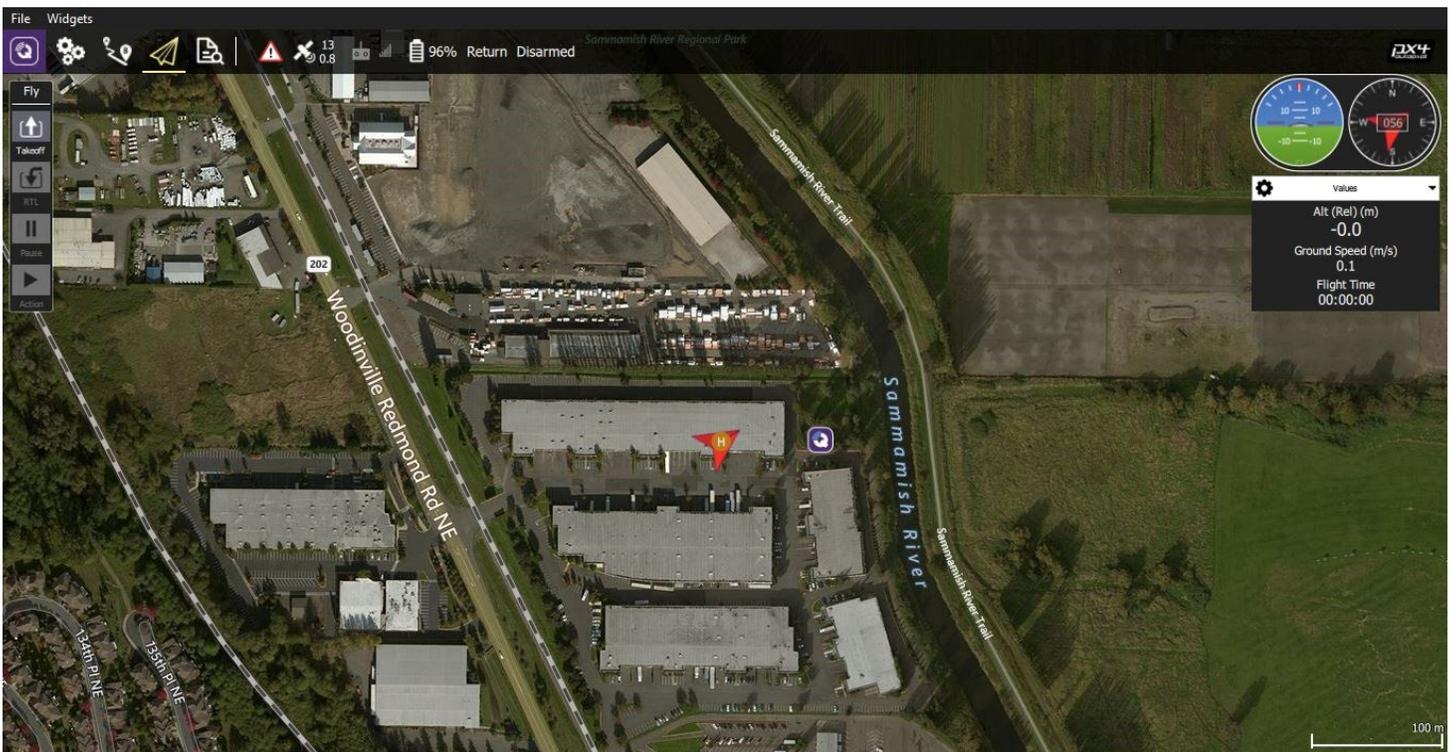
Symbol	Name	Function
	Settings	Configure the QGroundControl application.
	Setup	Configure and tune your vehicle.

Symbol	Name	Function
	Plan	Create autonomous missions.
	Fly	Monitor you vehicle(s) while flying, including streaming video.
	Analyze	Download logs, geotag images from a survey mission, access the MAVLink console
	Vehicle Messages	Click to show a dropdown of messages from the vehicle. This will change to a Yield sign if there are critical messages. Yield sign shown in image above.
	GPS Status	Shows you satellite count and current hdop.
	RC RSSI	RC signal strength information.
	Telemetry RSSI	Telemetry signals strength information.
	Battery	Remaining battery percent.
	Flight Mode	Current flight mode. Click to change flight mode.
	RTK GPS Survey-In Status	Shows you progress of RTK GPS Survey-In process.* *ALTA Pro does not ship with an RTK GPS
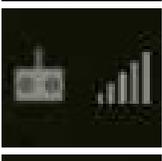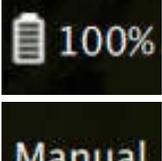
ALTA Pro Specific QGroundControl Features

Tuning Parameters

QGroundControl has a custom tab that allows quick access to the most important ALTA Pro parameters. These parameters are accessible through the 'Tuning' tab in the Vehicle Setup Menu.
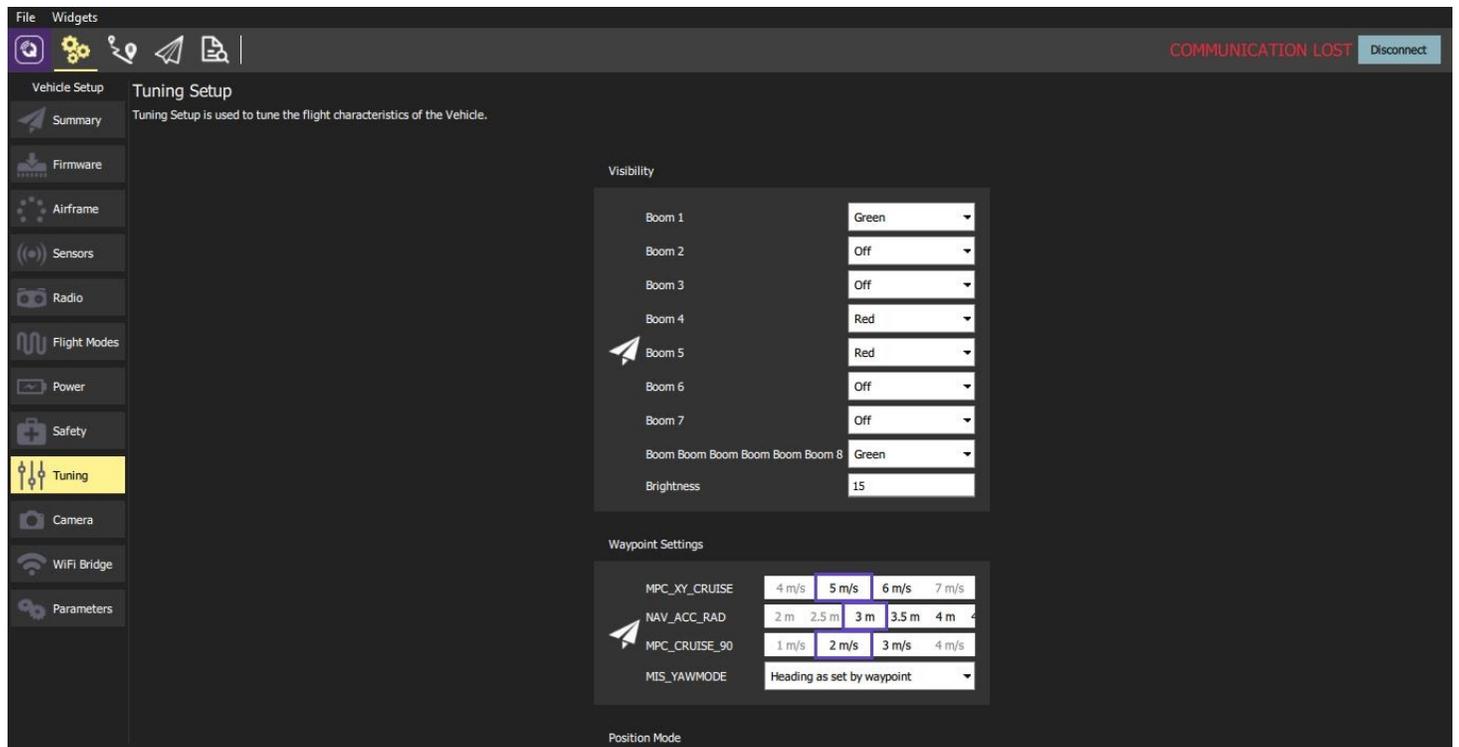
ALTA Pro Parameters

Access to boom LEDs and OSD parameters are also located in the Vehicle Setup Menu, under the Parameters tab and in the ALTA grouping.

Setting up ALTA 8 Pro

First Time Setup

If ALTA Pro is purchased as a bundle with a transmitter or FPV kit, these will be factory installed and ALTA Pro will be ready to fly out of the box! For customers installing their own receivers or FPV systems, please follow the instructions below. The guide details the first time setup process for ALTA Pro 8.

Radio Installation

Radio Controller Receiver

ALTA Pro requires the installation of a radio control system. S.Bus, S.Bus2, DSM2, and DSMX receiver types are supported. Some ALTA Pro emergency control modes (Return-to-Land and Autoland) may vary depending on the type of radio. Refer to the Flight Controller Modes section of this manual for additional details.

Additionally, ALTA Pro supports radio receiver diversity using S.Bus, S.Bus2, DSM2 and DSMX receivers. This means two receivers may be installed, and the Autopilot flight controller will automatically use the receiver with the best signal quality. Using two receivers requires the radio controller to be bound to both receivers. Refer to the instructions provided with your radio controller to complete the binding process. For Spektrum radios a receiver is required to bind the satellites to a radio controller.

Futaba Radio for ALTA Pro 8

1. Locate the noted closeout panels used for receiver installation (between booms 2 & 3 and 6 & 7).
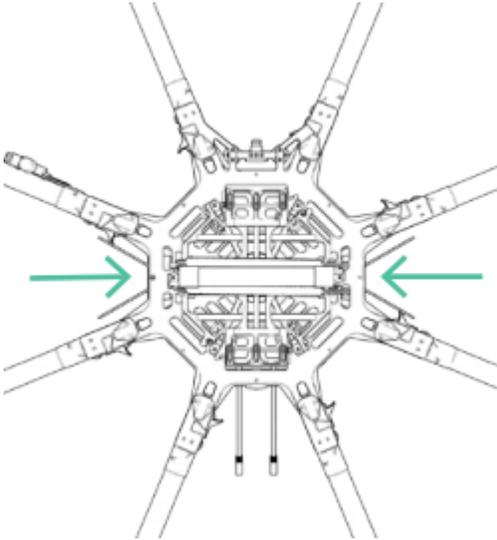
2. Remove side closeout panel with radio wires using a 2.0mm hex driver.
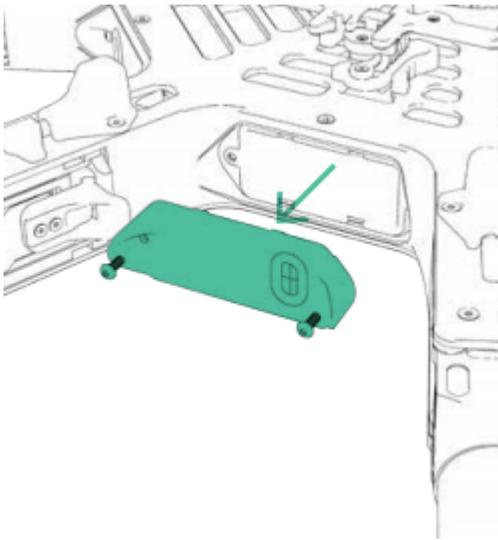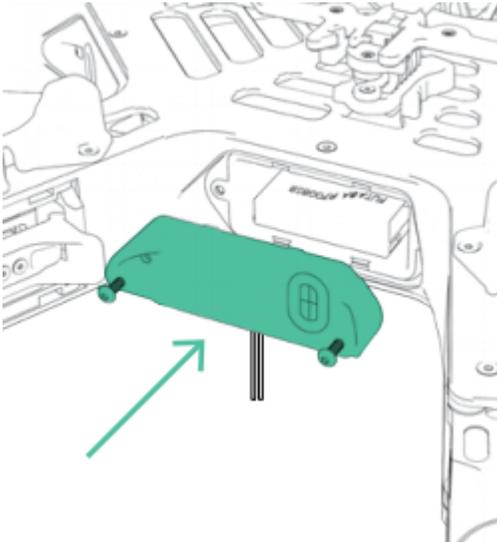

3.
   Plug signal wire into receiver.

4.
   If using telemetry, plug the telemetry wire located in the closeout between booms 2 & 3 into the primary receiver (refer to the Voltage Telemetry section).

5.
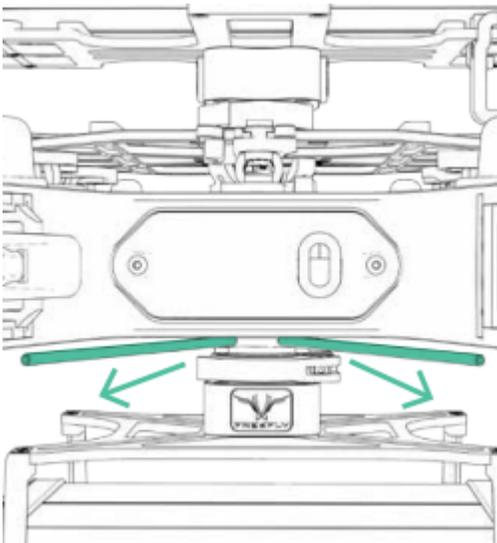   Feed receiver antenna into lower antenna tube.
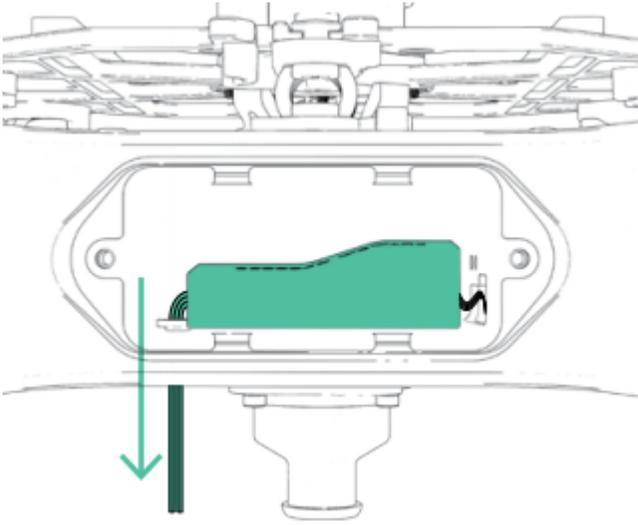
6. Secure receiver using the provided double-sided tape to inside of receiver housing.
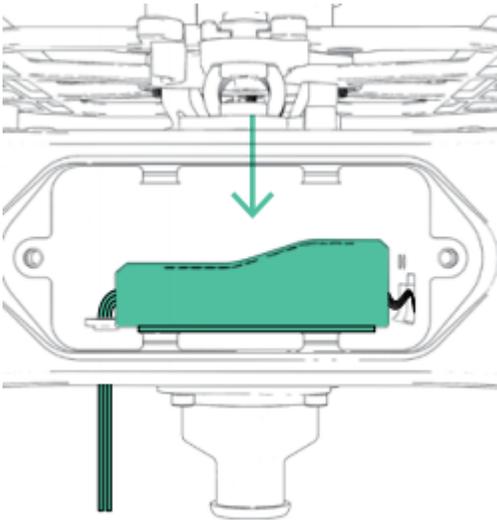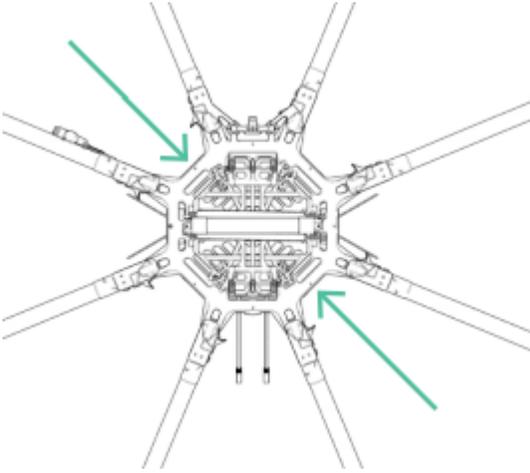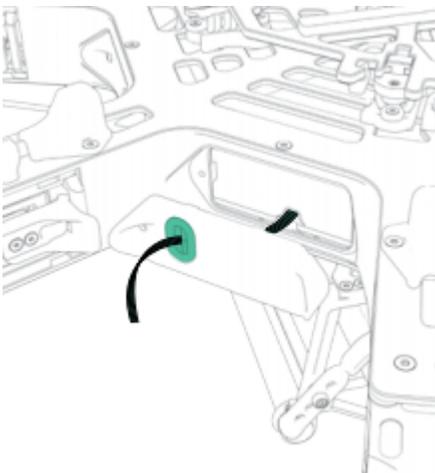

7. Reattach closeout panel.

8. Route antenna wires into the two antenna tubes below ALTA Pro chassis.

9. Repeat installation process for dual receivers (if applicable).

Spektrum Radio for ALTA Pro 8

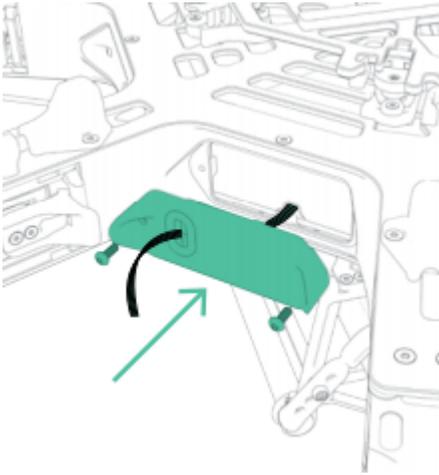1. Locate the noted closeout panels used for Spektrum receiver installation (between booms 3 & 4 and 7 & 8).

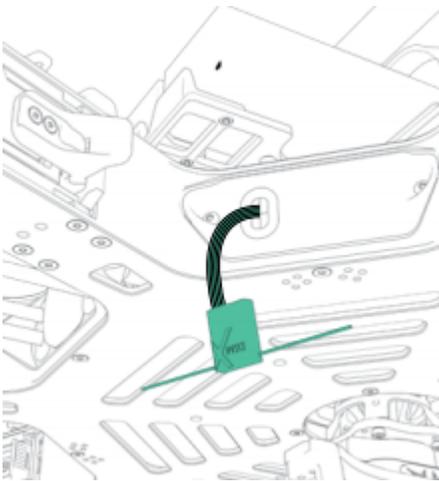2. Remove side closeout panel using a 2.0mm hex driver.
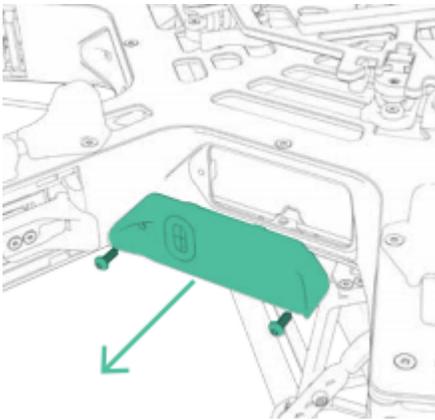
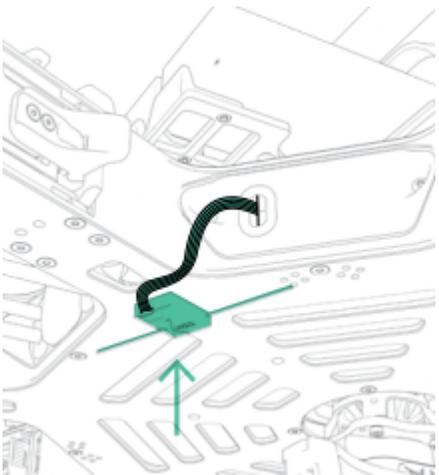3. Feed signal cable through panel grommet.

4. Reattach closeout panel.

5. Plug in receiver/satellite into signal cable.

6. Attach receiver/satellite to exterior using double-sided tape.

7. Repeat steps 1-6 for dual receivers (if applicable).

Voltage Telemetry

ALTA Pro supports battery voltage telemetry on Futaba radios when using a receiver that supports an external voltage sensor, such as the R7008SB. Installing the telemetry wire is easiest when initially installing the receiver. To set up ALTA Pro with voltage telemetry for Futaba radios:

Installing Voltage Telemetry for ALTA Pro 8

1. Remove the closeout panel between booms 2 and 3 with a 2.0mm hex driver and locate the radio receiver wire bundle.
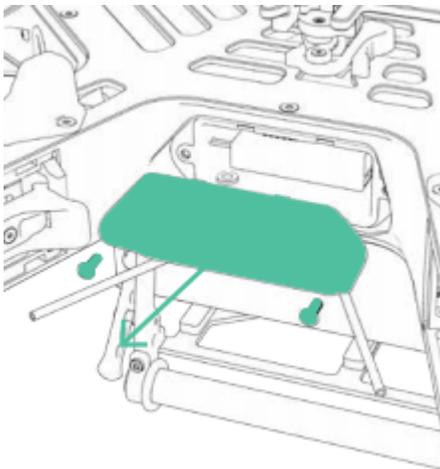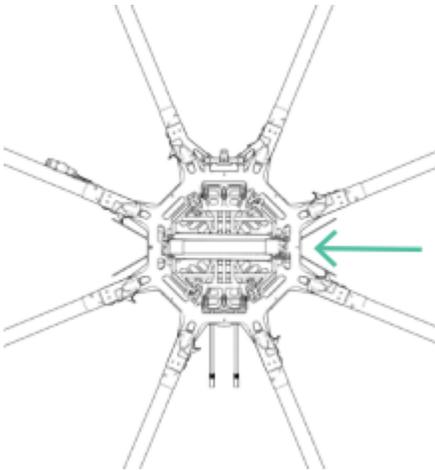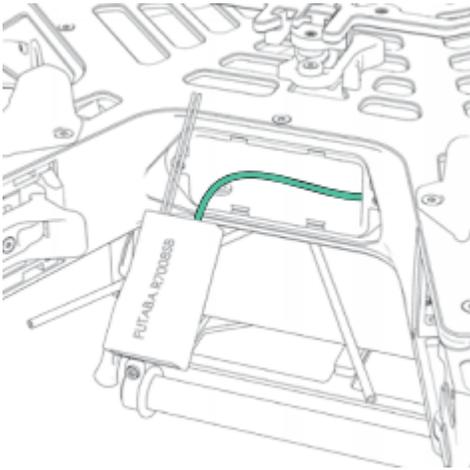

2. Identify the voltage sense wire and connector in the bundle. It is the small, 2-pin connector attached to a black and red wire pair.

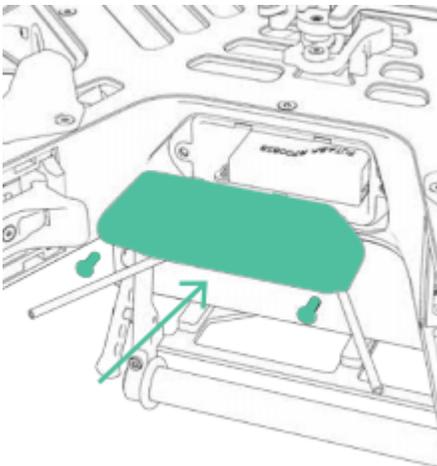**This wire is already connected to an in-line fuse. Soldering a fuse into this wire is not required.**

3. Connect the cable to the voltage sense port on the primary Futaba receiver.

4. Reattach the closeout panel.

First Person View (FPV)

ALTA Pro can power a variety of first person view (FPV) cameras and transmitters, as well as add informational on-screen display (OSD) elements to aid in FPV flying. Using an FPV ground station display can be a useful method of monitoring status, performance, and flight parameters of the ALTA Pro during flight.

Three FPV transmitter cables are included with each ALTA Pro. Each supplied cable has one side with a connector that mates with a cable located in the closeout panel between booms 1 & 2. The other end of each supplied cable has specialty connector(s) to run Immersion RC, Fatshark, BOSCAM, or BOSCAM compact FPV transmitters. For cable identification, refer to the FPV Transmitter installation instructions.

A single camera cable is provided and is configured to run a Ready Made RC camera (model RMRC-700XVN recommended). This cable mates with a pre-installed cable located behind the closeout panel between booms 1 & 8.

Camera and transmitter cables follow this wiring scheme:

Cable Color	Function
Red	+12 VDC
Black	Ground
Yellow	Video signal

It is the responsibility of the pilot to see and avoid other aircraft, people, or obstacles. Always maintain direct line of sight with ALTA Pro during flight, use visual observers as operations require, and follow local regulations regarding see-and-avoid requirements.

Do not short the pins of the FPV transmitter connector located on the pre-installed FPV transmitter lead in the ALTA Pro. Doing so could damage the on-screen display circuit. If using a multimeter to check the pins, first connect one of the provided transmitter cables, then take voltage readings from the transmitter cable.
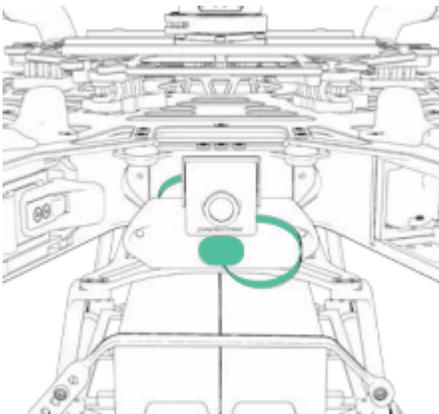
CAUTION

# FPV System Installation

FPV Camera ALTA Pro 8

1. FPV Camera ALTA Pro 8 Remove the front closeout panel with a 2.0mm hex driver.
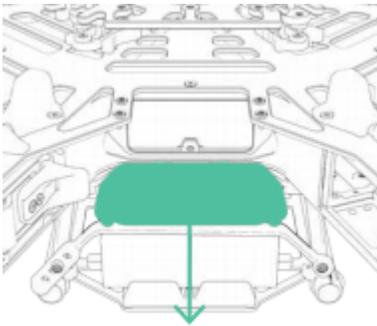
2.
   Locate the FPV camera cable included in the ALTA Pro package.

3.
   Pass the FPV cable through the closeout panel grommet and connect to the mating FPV camera lead inside ALTA Pro. Connect the other end directly to the camera.

4. Replace front closeout panel.
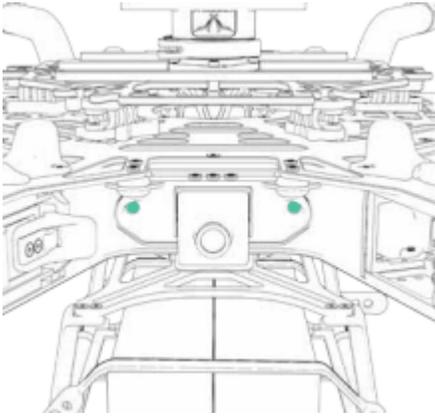
5. Mount FPV camera on the FPV mount on the front ALTA Pro using the provided hardware.
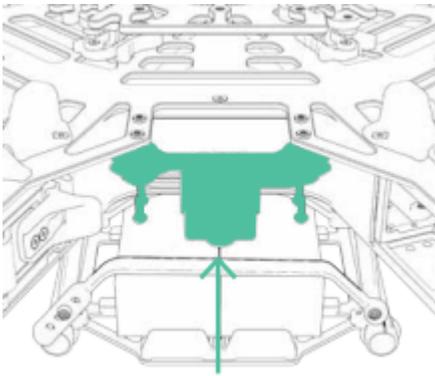
FPV Transmitter ALTA Pro 8

1. Mount FPV transmitter on the provided carbon fiber accessory mount plate
2. Attach accessory mount to boom 2 with M3x6 flathead bolts.
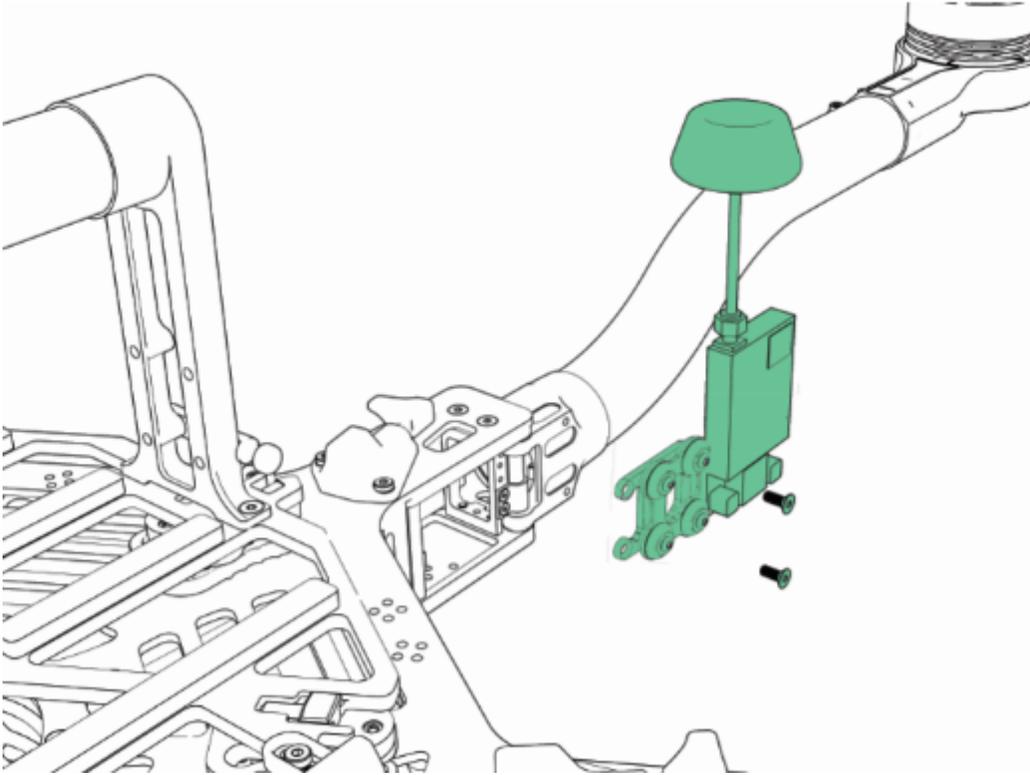
3.
Locate the appropriate FPV transmitter cable. The following cables are included:

a. ImmersionRC/Fat Shark (cable with two connectors)

b. BOSCAM/SkyZone (cable with one large connector)

c. Compact BOSCAM (cable with one small connector)
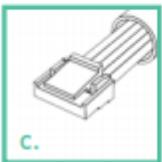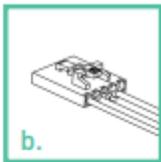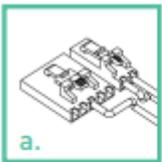
4. Use a pair of dykes to cut the zip tie holding the braided transmitter cable to the corrugated tube on boom 2
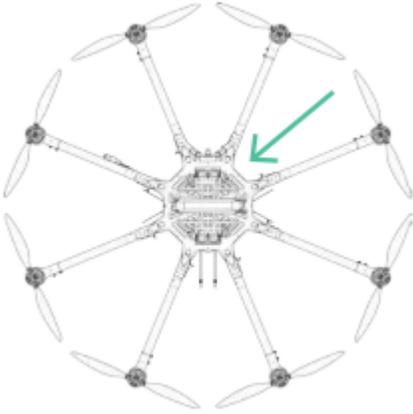
5. Pass transmitter cable through the underside of the hinge, connect to the correct FPV transmitter cable, and plug into the FPV transmitter.
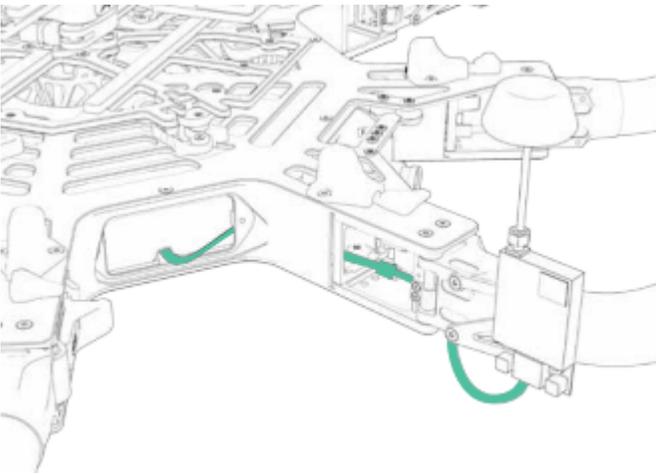
6. Zip tie the FPV transmitter lead to the boom 1 cable bundle and the FPV Transmitter mount for strain relief. The boom should be fully folded when the transmitter lead is zip-tied to cable bundle.

FPV On Screen Display Setup

A number of properties and components can be adjusted or added to the FPV On Screen Display (OSD) using QGroundControl. To access these settings go to the the ALTA settings group in the Parameters tab of the Vehicle Setup menu.

Properties

Name	Options	Description
OSD_ENABLE	Enabled/Disabled	Turns OSD on or off
OSD_PAL_NTSC	PAL / NTSC	Indicates the FPV video camera format to PX4
OSD_UNITS	Metric / Imperial	Changes the displayed units
OSD_HOR_OS	Min: 1	Centers the OSD components horizontally
OSD_VER_OS	Min: 1	Centers the OSD components vertically
OSD_LEFT_OS	Min: 1	Controls the margin to the left of the OSD
OSD_LOWER_OS	Min: 1	Controls the margin underneath the OSD
OSD_RIGHT_OS	Min: 1	Controls the margin to the right of the OSD
OSD_UPPER_OS	Min: 1	Controls the margin above the OSD
OSD_BAT_ALARM	3.000 - 4.200	Sets battery cell levels that trigger an on screen warning
OSD_MAX_ALTITUDE	Min: 1.000 Default: 121.900	Creates an on screen warning when exceeding the set max altitude (meters)
OSD_MAX_CLIMB	Min: 0.000 Default: 3.500	Creates an on screen warning when exceeding the set max climbing rate (meters per second)
OSD_MAX_RANGE	Min: 1.000 Default: 1000.000	Creates an on screen warning when exceeding the set max range (meters)

Name	Options	Description
OSD_MAX_VELOCITY	Min: 1.000 Default: 20.000	Creates an on screen warning when exceeding the set max velocity (meters per second)
OSD_GND_BRIGHT	0 - 16	Increases of decreases the brightness of the ground
OSD_SKY_BRIGHT	0 - 16	Increased and decreases the brightness of the sky

Text Components

The following components are displayed as text items, and can be configured to display as big or small letters, or no letters, effectively turning off the display.

Name	Description
OSD_SHOW_HEIGHT	Displays the height of ALTA Pro from its starting point in meters or feet
OSD_SHOW_VARIO	Displays the vertical speed of ALTA Pro in meters per second or feet per minute
OSD_SHOW_HEADING	Displays the magnetic heading of ALTA Pro and is measured in degrees
OSD_DISTANCE	Displays the horizontal distance along the ground ALTA Pro is from the initialization position in meters or feet
OSD_GROUNDSPEED	Displays the ground speed of ALTA Pro in meters per second or knots
OSD_SHOW_BATTERY	Displays the voltage of the flight battery packs
OSD_SHOW_TIME	Displays the time of the flight in minutes and seconds
OSD_SHOW_GPS	Displays the number of GPS satellites in view
OSD_SHOW_GPSHACC	Displays the horizontal accuracy of the GPS signal in meters or feet

Name	Description
OSD_SHOW_LATLON	Displays the GPS derived latitude and longitude coordinates of ALTA Pro
OSD_ROLL_MARKER	Adds indicators to the artificial horizon that indicate changes in roll
OSD_SHOW_ATT	Adds an attitude indicator on screen
OSD_SHOW_BATTERY	Adds a battery voltage indicator on screen

Artificial Horizon Components

The artificial horizon displays pitch and roll information in the center of the FPV display in the form of a horizon line and accompanying elements.

Name	Options	Description
OSD_ROLL_MARKER	Off-Small-Large	Turns off all artificial horizon components
OSD_PITCH_SCALE	1 - 200	Allows for scaling of the artificial horizon markings to compensate for FPV cameras of different field views
OSD_PITCH_IN	1 - 180	Sets the number of degrees between pitch markings when the artificial horizon ladder is used
OSD_ROLL_SCALING	1 - 200	Allows for scaling of the artificial horizon markings to compensate for FPV cameras of different field views

Other Components

The following components can be turned on or off. These components do not have adjustable settings.

| Name	Description
OSD_HEADINGARROW	Displays an arrow that points in the direction of north

Name	Description
OSD_HOMEARROW	Displays an arrow that points in the direction of the initialization point
OSD_VARIOGFX	Displays a bar on the right of the screen that scales with vertical speed. The bar will increase in length up to indicate a climb, or down to indicate a descent
OSD_SPEEDGFX	Displays a bar on the left of the screen that scales with the forward/rearward velocity component The bar will extend up to indicate forward velocity, or down to indicate a rearward velocity
OSD_SIDESLIPGFX	Displays a bar on the bottom of the screen that scales with the side-to-side velocity component The bar will extend left to indicate leftward velocity, or right to indicate rightward velocity

Unfolding and Folding ALTA

ALTA Pro features swan-neck booms that fold compactly for travel. They are secured in an open position for flight using over-center latches.

Unfold ALTA Pro

1.
   Remove ALTA from case.

2.
   Unfold ALTA Pro Remove ALTA from case. Fold down all six/eight boom retention clips.
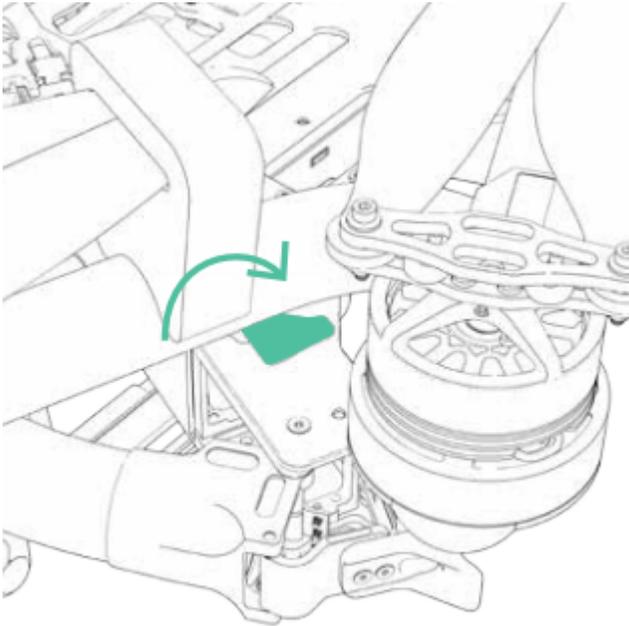
3. Open ALTA Pro booms. ALTA Pro can become unbalanced and tip over while unfolding booms individually, so unfold opposite boom pairs simultaneously to keep balance.
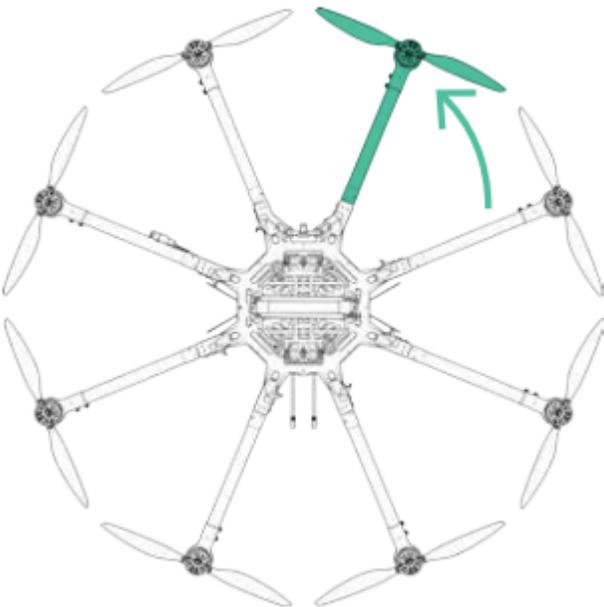
4. Snap shut all eight boom latches until they click and latch.
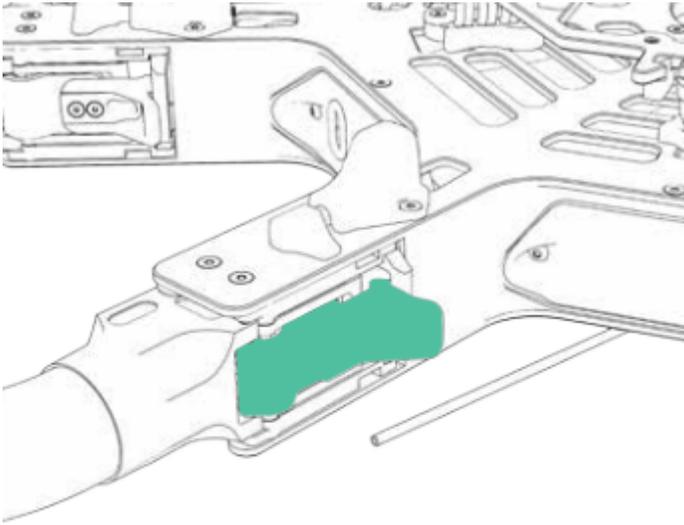
5. Visually confirm all latches are seated properly
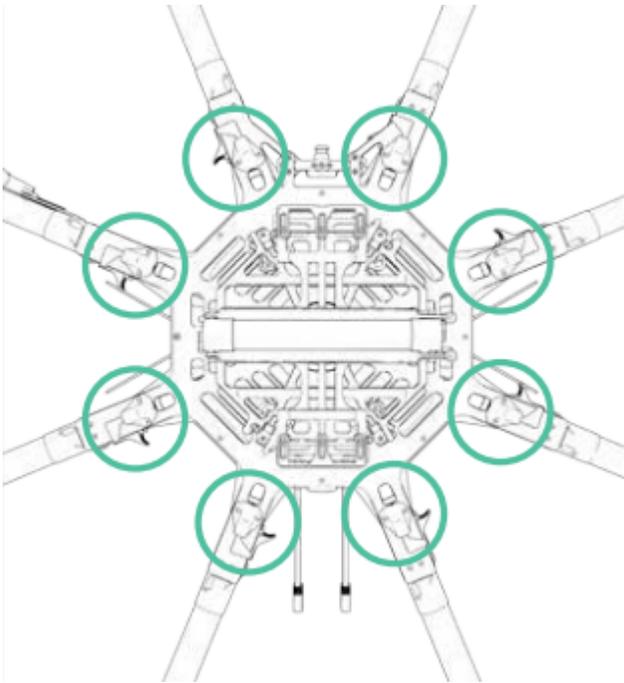
6. Remove prop protectors.
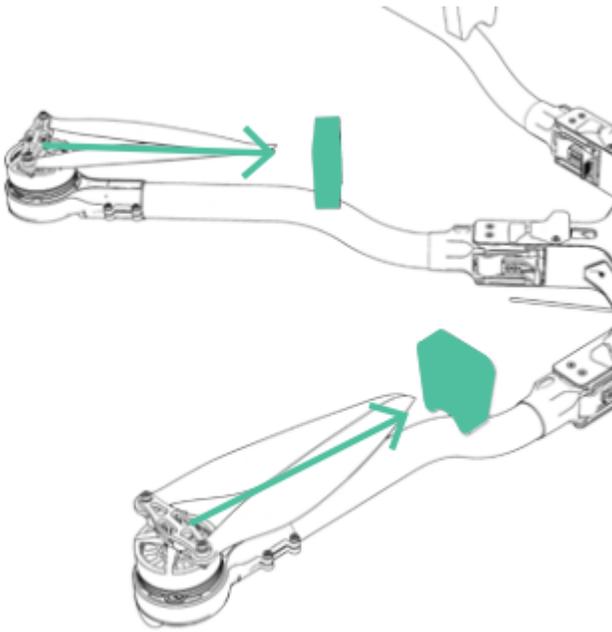
Fold ALTA Pro

Secure props with prop protectors.
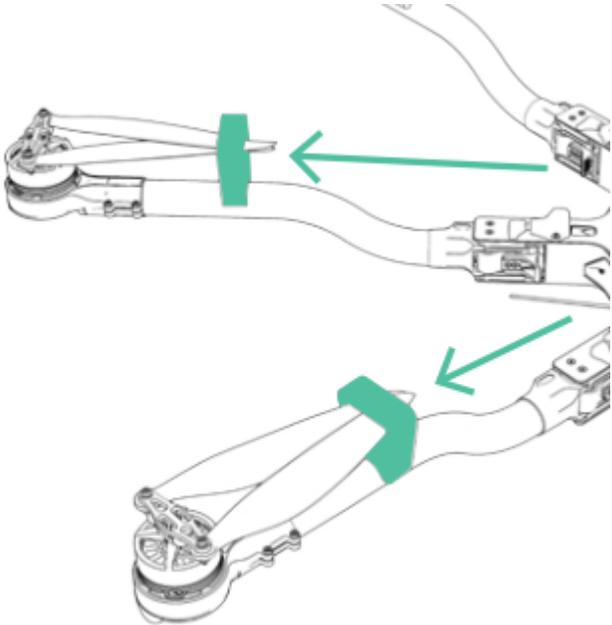
2. Unlatch all eight booms.
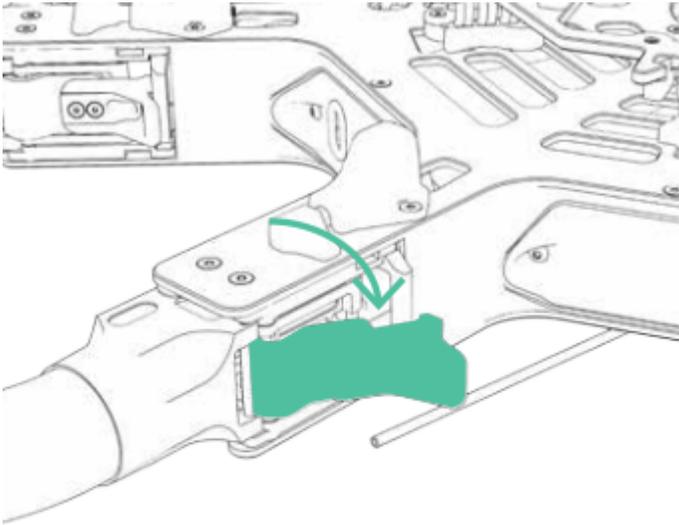
3. Close ALTA Pro booms in opposing pairs to keep balance.
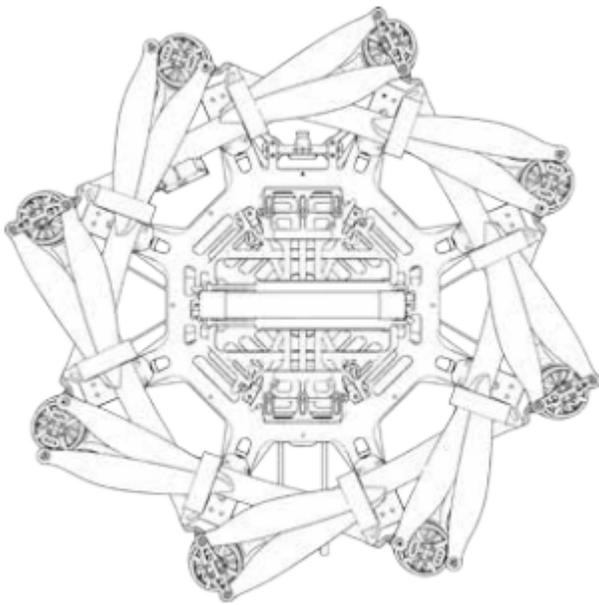
4. Fold up all eight boom retention clips to secure booms.

Radio Calibration and Channel Mapping

ALTA Pro can be used with a variety of radio controllers. Different radio controllers can map functions to different channels, so properly mapping controller channels to ALTA Pro functions is an important step before flying. Radio calibration and channel mapping are performed using the ALTA Pro QGroundControl program or app.

If you are uncertain about your radio channel mapping, obtain assistance from an experienced pilot or from Freefly Customer Support.

Calibrating Radios Using ALTA Pro QGroundControl App

Calibrating any compatible radio is done using the ALTA Pro QGroundControl app. This only needs to be done when using a new radio with the ALTA Pro; ALTA Pros that were bought with a radio have already gone through the Calibration and Mapping procedures.

- Power the ALTA Pro by plugging in a USB-C cable to the expansion port.
    - The expansion port is located under the closeout between booms 1 and
- Once connected, the ALTA electronics will be powered and you may turn on the radio.
- Open the ALTA QGroundControl program, navigate to the Radio tab in the Vehicle Setup menu, and then initiate the radio calibration.

-

  - **Make sure to reset all trims and subtrims to zero before continuing with calibrating and mapping your radio.**

- Set the transmitter mode radio button that matches your radio configuration (this ensures that QGroundControl displays the correct stick positions for you to follow during calibration).
- Move the sticks to the positions indicated in the text (and on the radio image). Press Next when the sticks are in position. Repeat for all positions.
- When prompted, move all other switches and dials through their full range (you will be able to observe them moving on the Channel Monitor).
- Press Next to save the settings.

Mapping Channels Using ALTA Pro QGroundControl App

Radio channel mapping is accomplished with the Alta Pro Qgroundcontrol App. Prior to mapping channels, ensure your radio controller and receivers are properly installed and calibrated. Refer to the Radio Installation section of this manual and your radio controller's documentation.

- Power the ALTA Pro by plugging in a USB-C cable to the expansion port. The expansion port is located under the closeout between booms 1 and 2
- Once connected, the ALTA electronics will be powered and you may turn on the transmitter.
- Open the ALTA QGroundControl program, navigate to the Flight Mode tab in the Vehicle Setup menu for access to the channel mapping.
- Channel mapping can be customized by the user on this menu to fit their preferences. Below is a quick description of the items mapped to the transmitter and suggested channels for each mapped item.

Function Descriptions

The following functions can be mapped to radio controller channels. These are found in the Radio section of the Configurations menu in ALTA QGroundControl. Each function is also represented by a chart that responds to control input allowing for quick verification of mapping settings.

Controller

Use this to select the appropriate receiver. The following guide is compiled for convenience. For complete specifications and which mode will work with your receiver, refer to your radio controller or receiver manuals. DSM2/DSMX are typically used by Spektrum controllers SBUS is typically used by Futaba controllers

Pitch/Roll/Yaw/Throttle

The Pitch, Roll, Yaw and Throttle controls are the basic flight controls and are mapped to the two radio controller sticks.

Mode

The required Mode Switch selects between the three different flight modes: Manual, Altitude, and Position. A three-position switch is recommended to select the three different modes. However, a two-position switch may be used, but will only allow for selecting between Manual Mode and (depending on radio controller mixes) either Altitude Mode or Height Mode

Return to Home Switch

The optional Return to Home Switch selects between the different Return-to-Land (RTH) functions. At minimum a two-position switch is required for the Home Switch functions to select between RTL Off, and initiate RTL functions.

Typical Channel Mappings

The following radio channel mapping configurations are recommendations only and can be set in ALTA QGroundControl. Depending on exact radio models, these may help as an initial configuration. However, it is up to the pilot setting up ALTA Pro for flight to determine if these settings are appropriate.

Futaba 14SG/8FG

Function	Channel Number	Direction
Pitch	2	Normal
Roll	1	Normal
Yaw	4	Normal
Throttle	3	Reverse
Mode Switch	5	Normal
Home Switch	6	Normal

RADIO MODE 2

MODES
Channel 5

▲ Manual
● Altitude
▼ Position

RTH
Channel 6

LD   RD

SA   SB

SC   SD

T14SG

Yaw
Channel 4

Roll
Channel 1

Throttle
Channel 3

POWER

Pitch
Channel 2

HOME/EXIT   T4   T3   T2   T1   U.MENU/MON.

```
FUTABA Co. 00:15 6.6V
T1 00:00.00 ▣
T2 00:00.00
▣14CH    MODEL-01
+0        00:15      +0
+0        VPP #1     +0
```
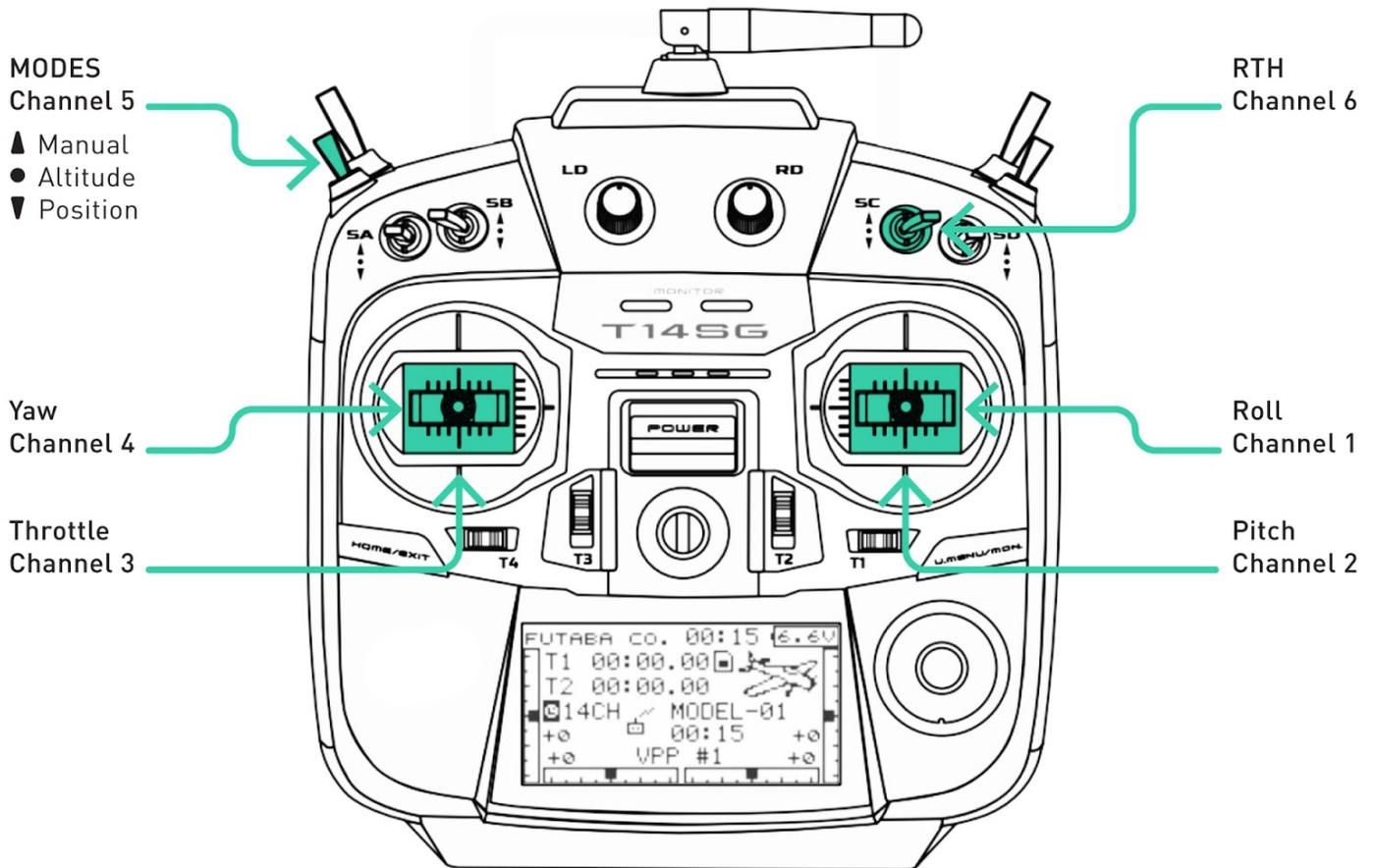
Spektrum DX18

Function	Channel Number	Direction
Pitch	3	Reverse
Roll	2	Reverse
Yaw	4	Reverse
Throttle	1	Normal
Mode Switch	6	Reverse
Home Switch	7	Normal

RADIO MODE 1

MODES
Channel 6

▲ Manual
● Altitude
▼ Position

RTH
Channel 7

Yaw
Channel 4

Roll
Channel 2

Throttle
Channel 1

Pitch
Channel 3
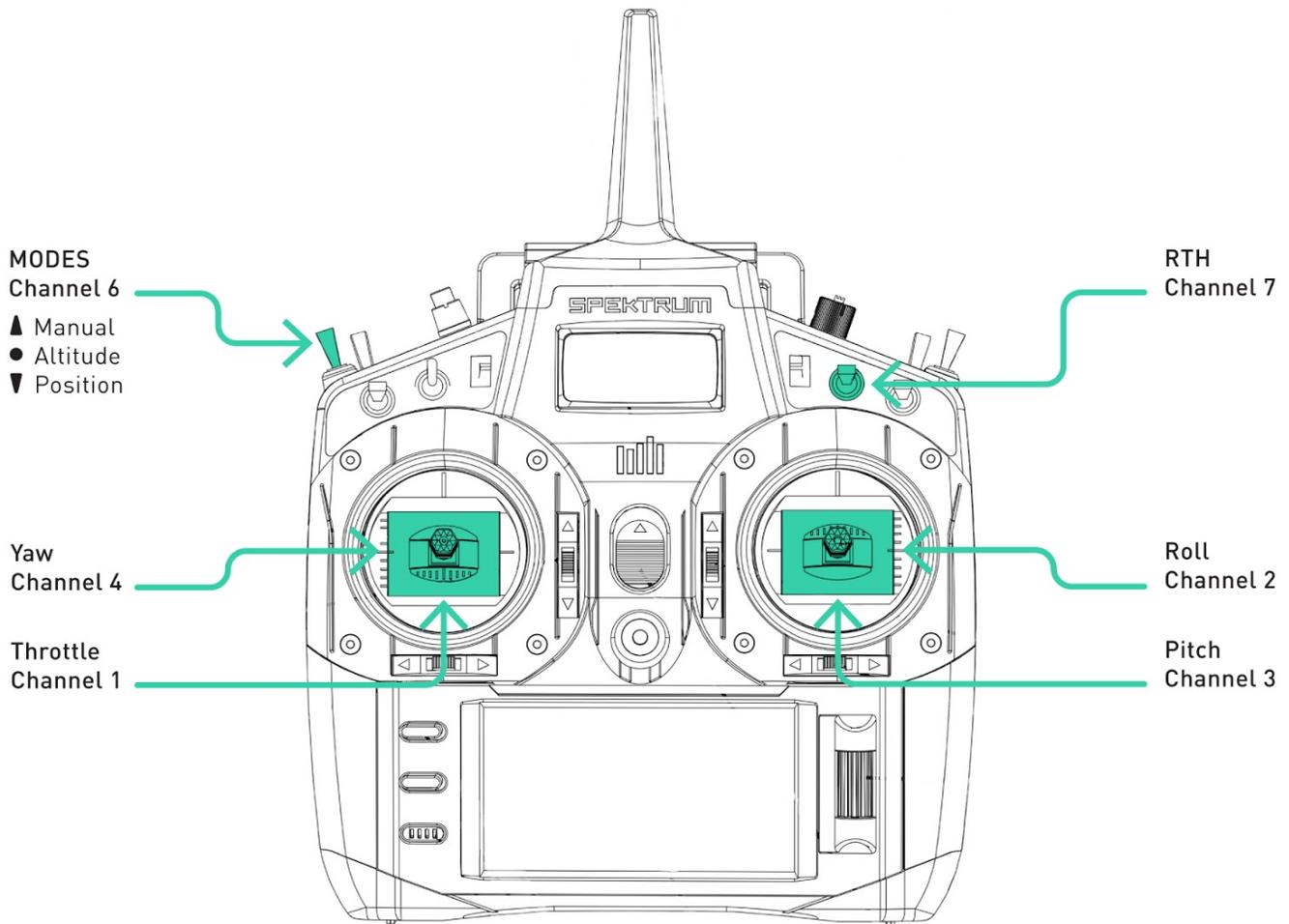
Configuring for MōVI

MōVI can be attached to either the top or bottom of ALTA Pro via the Freefly Toad In The Hole (TITH) quick release.

ALTA Pro comes pre-configured for GroundView mounting of MōVI.

Groundview

- Prepare your MōVI for GroundView flight (see MōVI manual)
- Attach landing gear
- Install TITH receiver on MōVI

- Connect MōVI to bottom Toad
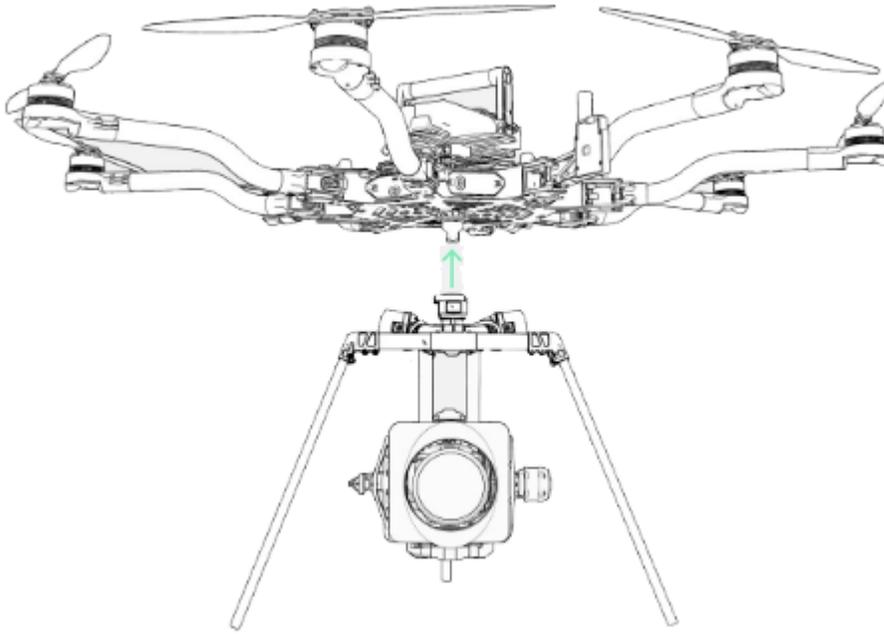
Skyview

****

- Prepare your MōVI for SkyView flight.
  - ○ Remove landing gear (see MōVI manual)
  - ○ Install TITH receiver on MōVI (see MōVI manual)
- Connect and secure the supplied inverted landing gear to the bottom Toad.

(!) CAUTION **Top mounting is not supported by the MōVI M10 without the keyed pan tube upgrade kit. If you are unsure whether your M10 has the upgrade kit, contact Freefly Customer Support for additional info.**
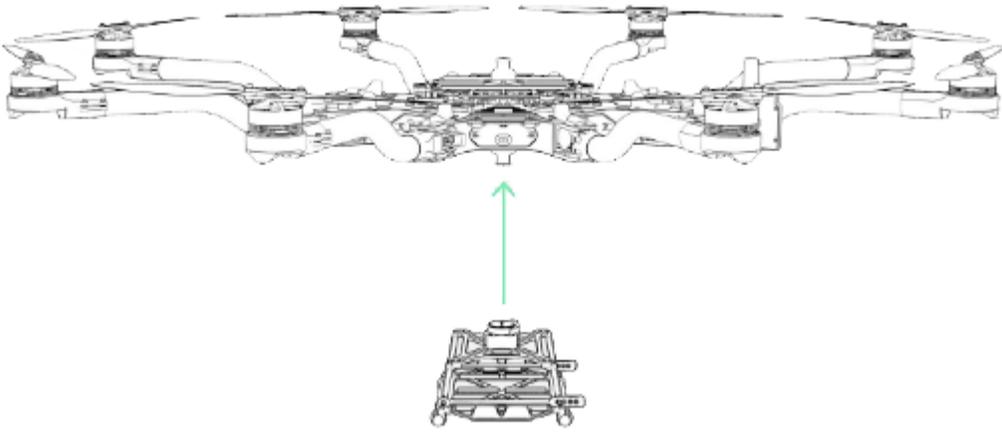
Remove Battery Mount Quick Release.

****
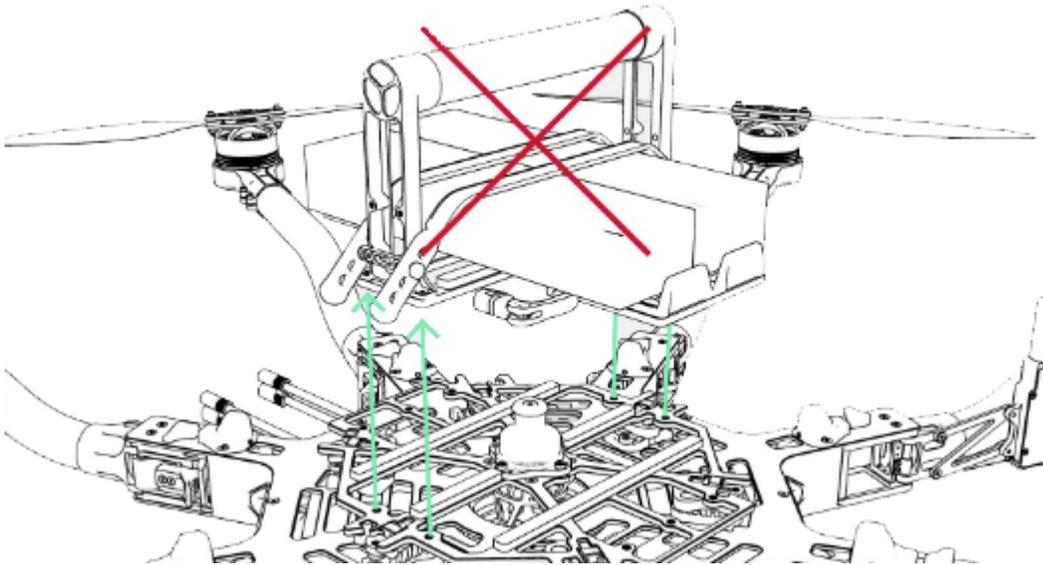
Connect MōVI to top Toad.
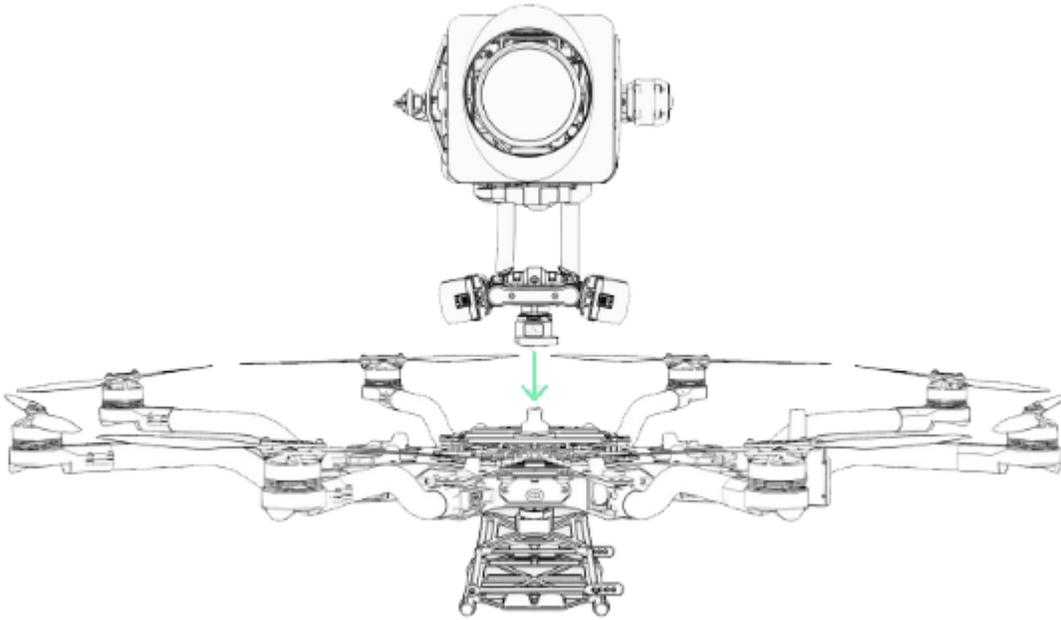
Isolator Cartridges

Isolator Cartridges

Different Isolator Cartridges can be used to fine tune vibration damping performance for different payload weights or ambient temperatures. Three isolation cartridge styles are provided with ALTA Pro. The cartridges have colored o-rings: red for light payloads or cold ambient temperature, teal for medium payloads or typical ambient temperature, and black for heavy payloads or hot ambient temperature. Flight testing may be required to determine the optimal isolator for a given setup.

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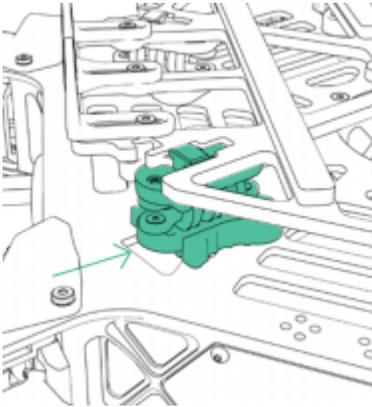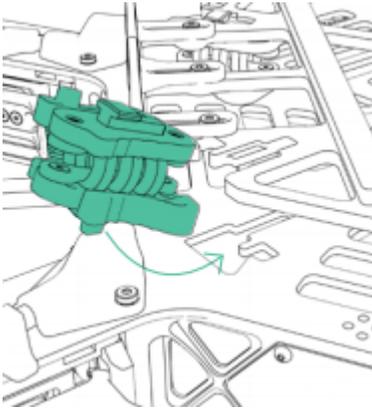
To install, place the cartridges between the top chassis plate and the battery plate. Ensure they are engaged in the track features and are parallel with the chassis and battery plate. Push inwards fully until they click, indicating the cartridges are locked in place. Pull outwards on the cartridge to ensure it is locked.

⊘ CAUTION   **Always ensure isolator cartridges are locked in place before flying ALTA Pro. Isolator cartridges that are not locked can cause the payload to loosen and change ALTA Pro's fundamental flying characteristics.**

        * * * *
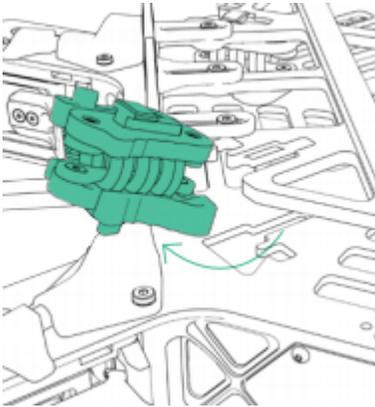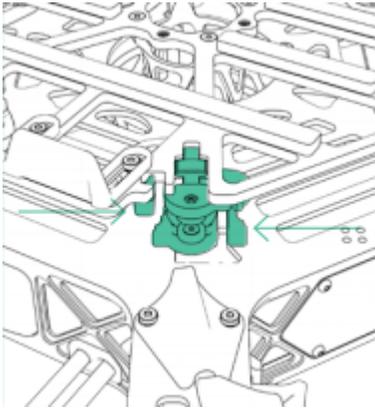
To remove, pinch the cartridge latch to unlock it from the battery and chassis plate, and slide it outwards to disengage. Simultaneously pull the battery and chassis plate apart while pulling the cartridge outward.

Battery Installation

Battery Installation

Batteries may be installed on either the top or bottom of an ALTA Pro and are always mounted opposite of the payload location. In both locations, battery packs are secured with silicone straps tensioned across the packs. The straps are secured using studs located on either side of the packs.

⚠️ **WARNING** Always secure battery packs with both battery retention straps.

🛈 **CAUTION** Ensure both battery packs are at a similar state of charge (a full pack voltage difference less than 0.5V) prior to connecting them to ALTA Pro. Plugging in two dissimilarly charged packs could cause one pack to rapidly discharge into the other and damage the batteries or cause a battery fire.

🛈 **CAUTION** Only use packs that are identical in their capacity and at a similar condition. Using a pack with another that is larger, or has many more charge/discharge cycles, can damage the battery packs.

🛈 **CAUTION** Always refer to and follow the battery manufacturer's instructions, recommendations and guidelines for battery handling.

🛈 **CAUTION** When plugging in battery packs, ensure the polarity is correct. Positive is indicated by a red power lead, and negative/ground is indicated by a black power lead. Reversing polarity will damage ALTA Pro's electronics.

Groundview

1.Place battery retention strap studs at the appropriate height to hold the battery packs firmly in position.
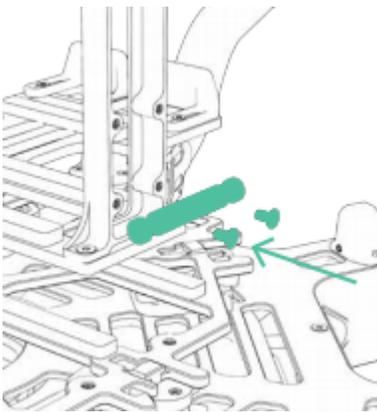
2. Adjust battery stops to fit battery packs.
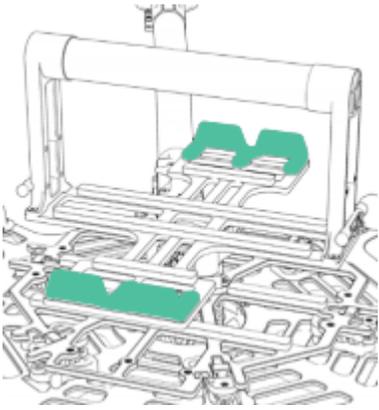
3. Attach the single-hole end of the battery retention straps to the studs.
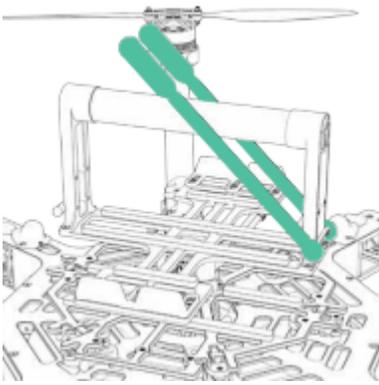
4. Place battery packs on the battery tray.
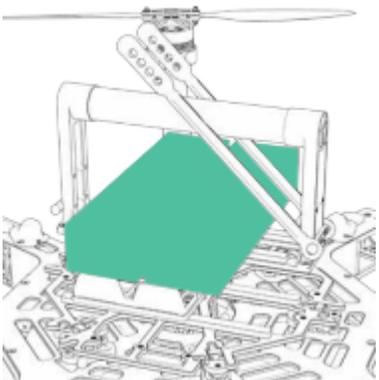
Do not install batteries directly on the lower battery tray if a Toad adapter is also installed. Either remove the Toad adapter or use the Quick Release Battery Tray.

5. Tension and secure battery retention straps.

Skyview

****
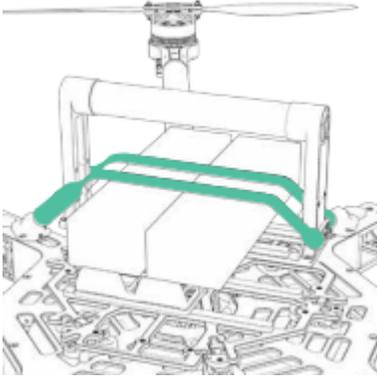
Always completely secure the inverted landing gear by closing the TITH quick release lever. Inverted landing gear that are not completely attached can rotate and unplug battery leads.

1. Pinch the battery tray handles and slide to remove it from landing gear.
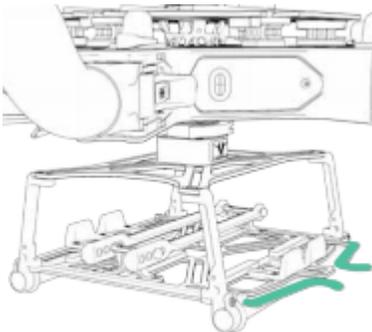
2. Attach the single-hole ends of the battery retention straps to the studs on the battery tray.

3. Place battery packs onto battery tray.
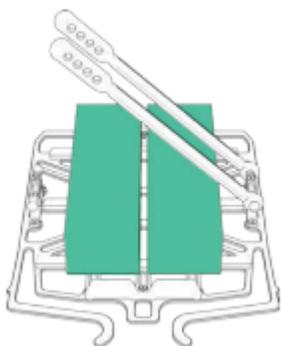
4. Tension and secure battery retention straps.
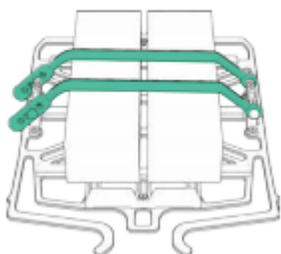
5. Slide tray with battery packs back into landing gear until the tray latches in place.
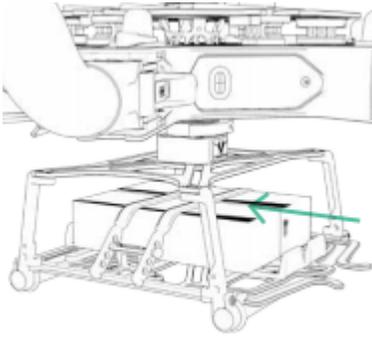
6. Ensure tray and battery packs are secure.

Sensor Calibration

ALTA Pro features a highly sensitive 3-axis magnetometer, gyroscope, and accelerometer that measure specific force, angular rate, and earth's magnetic field to infer heading and maintain stability. Occasionally, the sensors will require recalibration.

ALTA Pro's compass should be regularly calibrated, especially when traveling between different geographic locations. For best results, it is recommended to perform manual compass calibrations away from ferrous objects, buildings and vehicles. In addition, concrete can contain steel rebar which may influence compass calibrations

NOTE

Perform calibration without a payload attached and all motor booms extended and latched. Folded booms will cause an inaccurate calibration.

It is recommended to use two people to perform the compass calibration as it requires handling and rotating ALTA Pro.

To perform sensor calibrations on ALTA Pro:

1. Mount a pair of batteries onto ALTA Pro.
2. Plug in the batteries to power up the aircraft.
3. Open the ALTA Pro QGroundControl and connect to ALTA Pro.
4. Navigate to the Sensors tab under Vehicle Setup.
5. Available sensors are displayed as a list of buttons beside the sidebar. Sensors marked with green are already calibrated. Sensors marked with red require calibration prior to flight.
6. Click on the button for each sensor to start its calibration sequence and follow the instructions provided in the ALTA Pro QGroundControl.
7. Start by selecting Set Orientations and set the autopilot orientation
    1. Autopilot Orientation: ROTATION_YAW_270
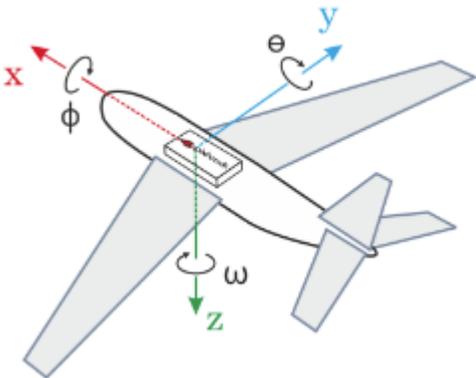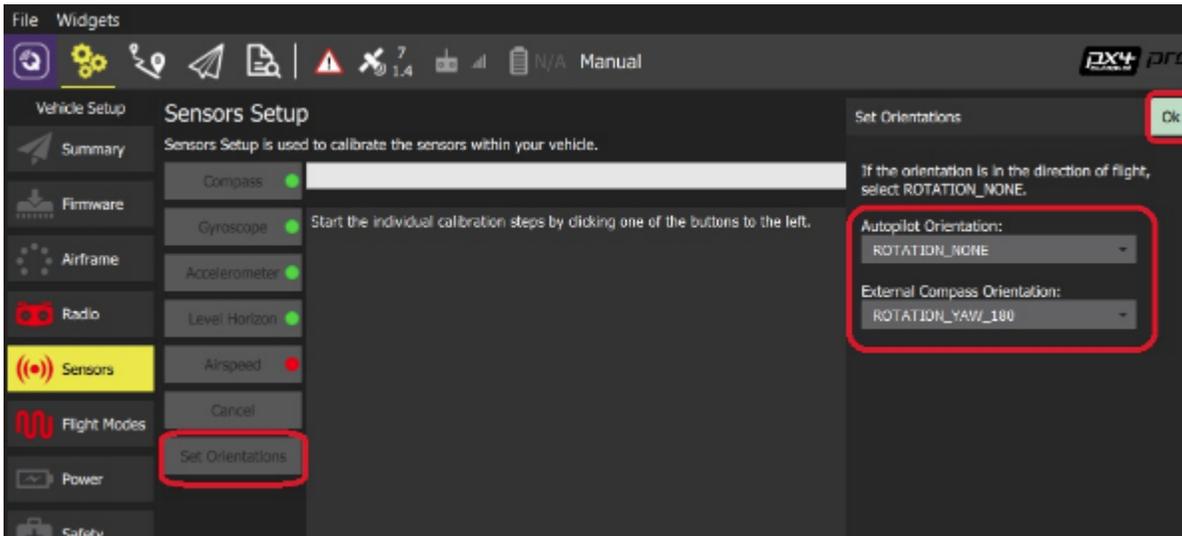
Compass Calibration

Follow the instructions below to perform a compass calibration on ALTA Pro. Compass calibrations should be done when flying in a new location or when ALTA Pro QGroundControl prompts a calibration.

1. Click the Compass sensor button.
2. Click OK to start the calibration.
3. Place the vehicle in any of the orientations shown in red (incomplete) and hold it still. Once prompted (the orientation-image turns yellow), rotate the vehicle around the specified axis in either/both directions. Once the calibration is complete in that orientation the associated image on the screen will turn green.
4. Repeat the calibration process for all vehicle orientations.
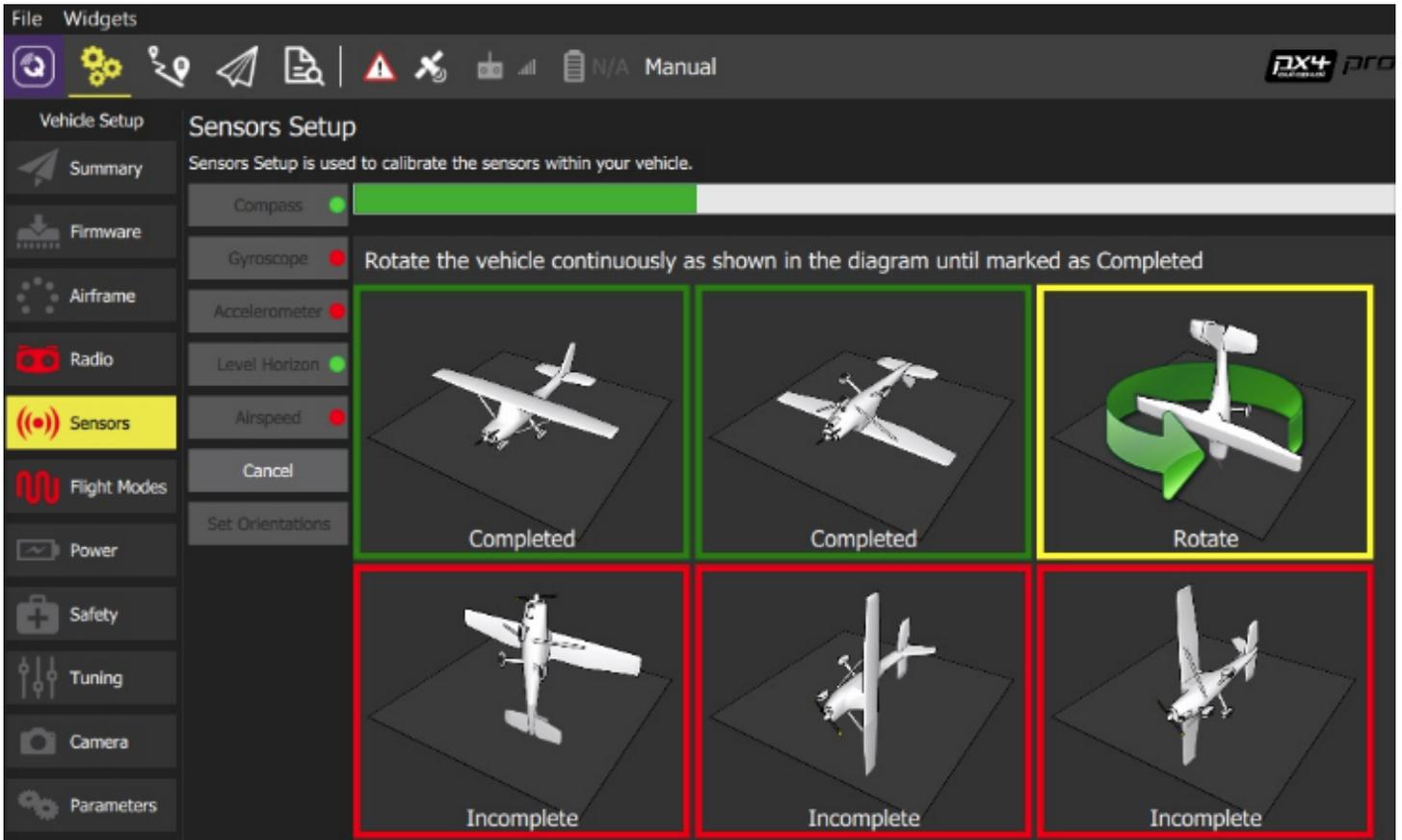
Accelerometer Calibration

Follow the instructions below to perform an accelerometer calibration on ALTA Pro. Accelerometer calibrations should only be done when prompted by ALTA Pro QGroundControl.

1. Click the Accelerometer sensor button.
2. Click OK to start the calibration.
3. Position the vehicle as guided by the images on the screen. This is very similar to compass calibration.
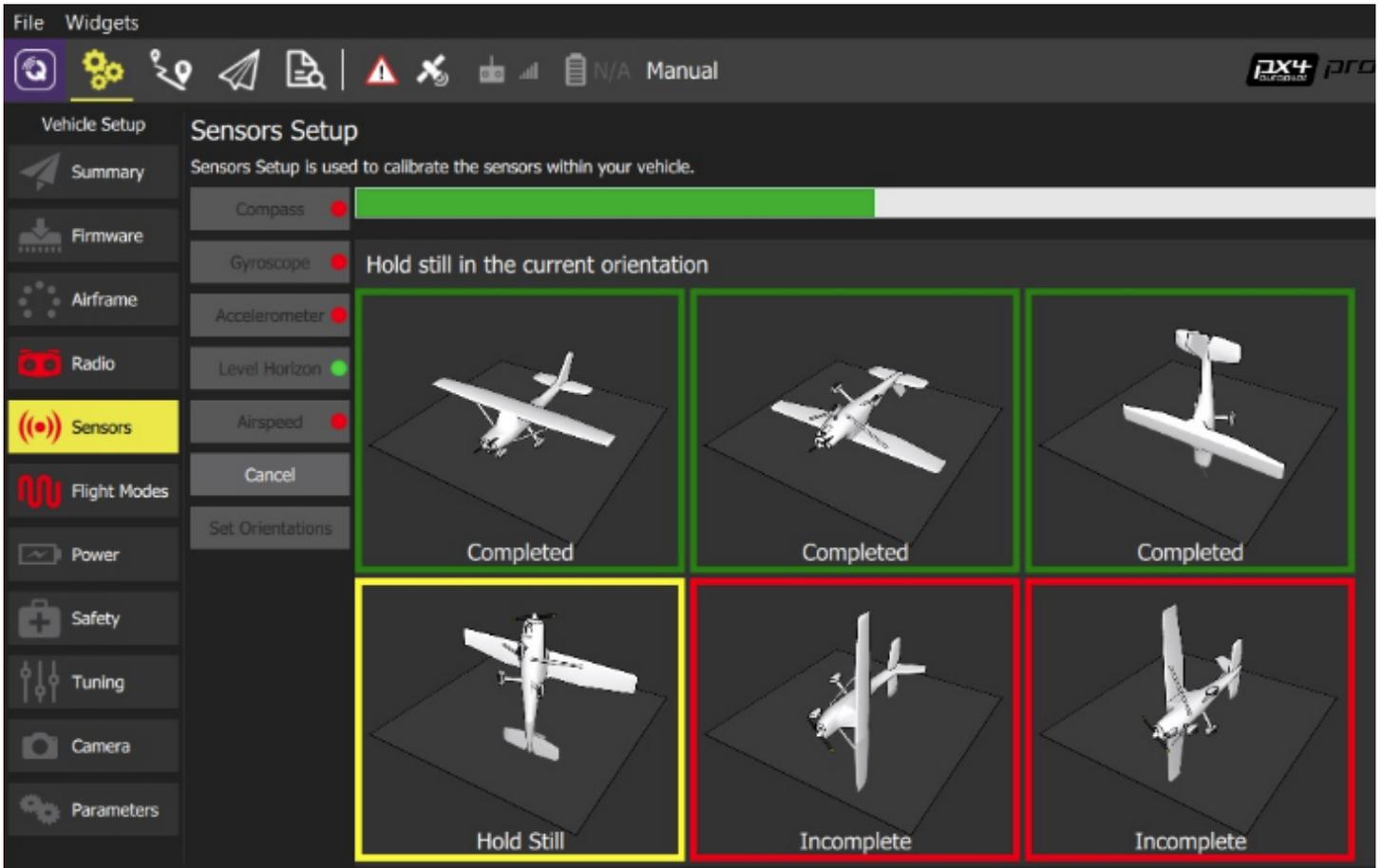
Level Horizon Calibration

Follow the instructions below to perform a level horizon calibration on ALTA Pro. Horizon calibrations should only be done if the horizon (as shown in the HUD) is not level after completing Accelerometer calibration.

1. Click the Level Horizon sensor button.
2. Place the vehicle in its level flight orientation on a level surface.
3. Click OK to start the calibration.

Propellers
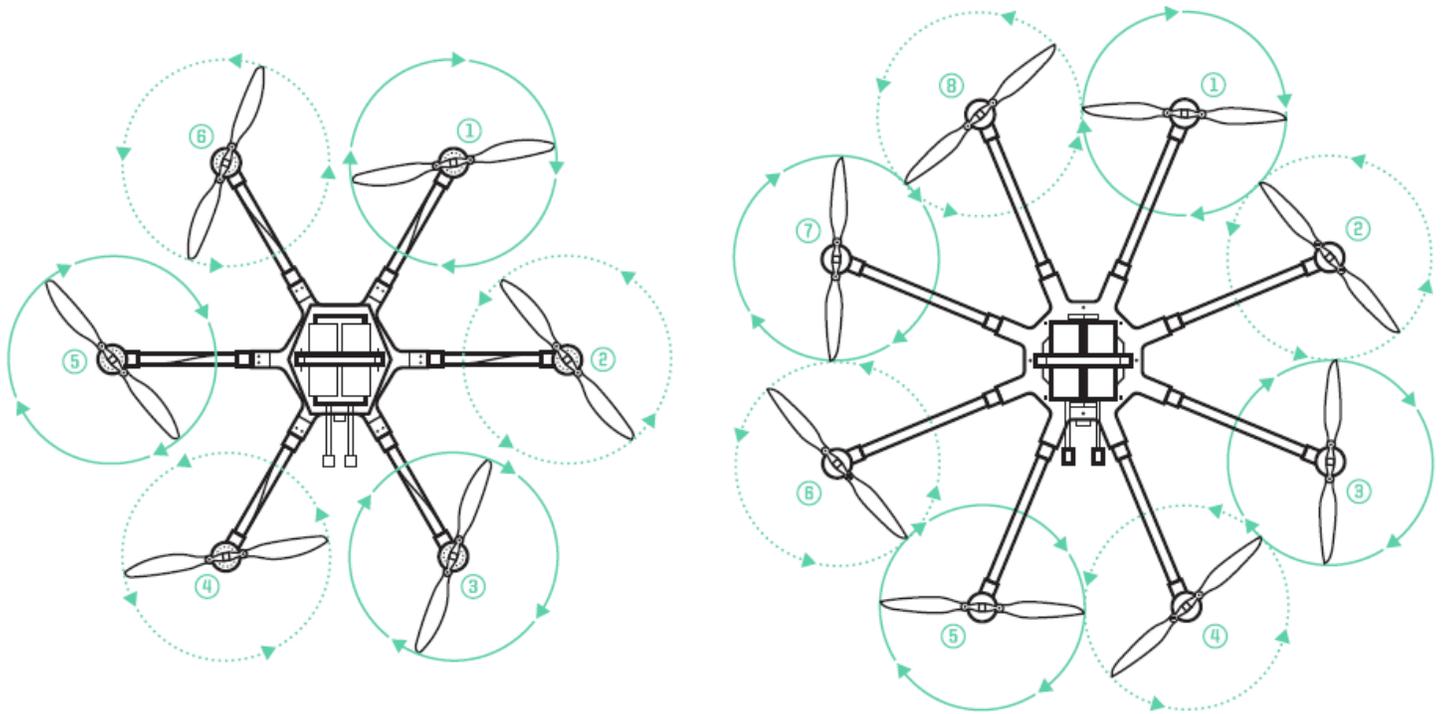
The folding propellers include two balanced carbon fiber propeller blades attached to propeller hubs, which are themselves secured to the motors. The propellers installed on booms 1, 3, 5, and 7 spin clockwise when viewed from above ALTA Pro, and the propellers installed on booms 2, 4, 6, and 8 spin counterclockwise when viewed from above.

For information on propeller installation and maintenance, refer to the Maintenance section of this manual.

⚠ CAUTION

Only use propellers supplied by Freefly on ALTA Pro. Use of third-party propellers can cause motor instability, overheating, and failure.

⚠ CAUTION

In rare cases propellers can experience icing, this occurs when ice begins to form on the tips and underside of the blades due to temperature and humidity. This will cause the props to become unbalanced, increases drag and reduces lift. Flying with iced blades can be dangerous and is not advised

Checking Propeller Bolt Tightness

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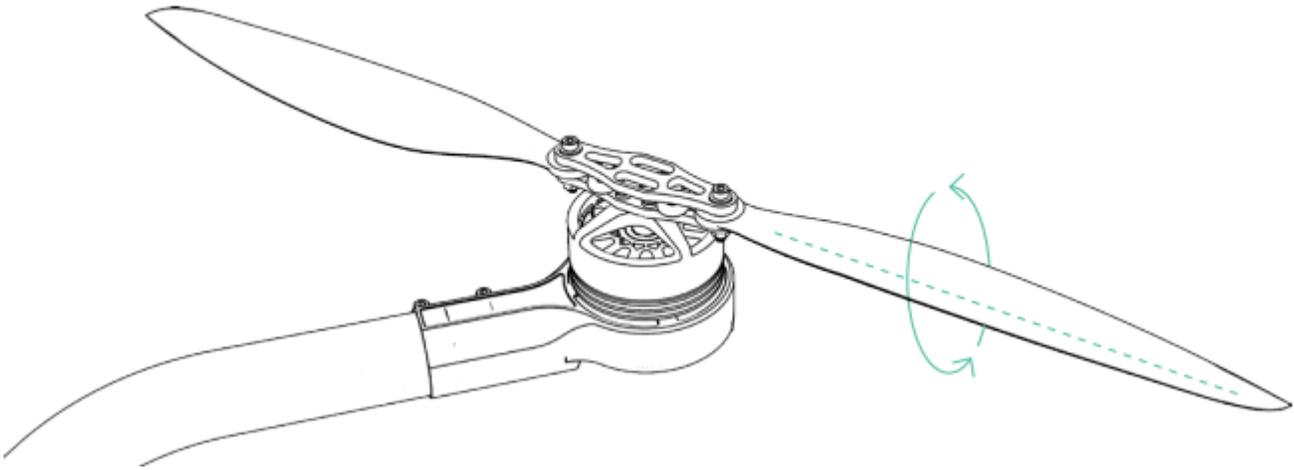
Over time, the bolts that hold the propeller blades to the propeller hub can loosen due to vibration. To check propeller bolt tightness, twist the propeller about its length. If there is free play, the propeller bolt is too loose. Use the provided 2.5mm hex driver and wrench to tighten the bolt and nut that secure the propeller blade just enough to remove the play.

(!) CAUTION **Do not overtighten, or the propeller may fail to unfold completely during motor start up, leading to excessive vibration.**

Tuning ALTA Pro's Flight Controller

ALTA Pro's Flight Controller comes pre-tuned for a wide variety of payloads and flying conditions. Generally, additional tuning is not required to fly ALTA Pro, and will only need to take place if more customization of control feel is desired. Default tuning values are included in Appendix A, Default Tuning Values.

DO NOT CHANGE FLIGHT CONTROLLER TUNING VALUES WITHOUT A FULL UNDERSTANDING OF THE TUNING PROCESS. A poorly tuned sUAV is dangerous and can result in property damage, injury, and death.

Parameters fall into three categories: Rate, Attitude, and Position. Typically, tuning should take place in that order, ensuring Rate parameters are set first, then moving to Attitude parameters, and finally Position parameters.

Before tuning, users should read and become familiar with the PX4 Tuning Guide.To tune ALTA Pro, open the ALTA Pro QGroundControl connect to your ALTA Pro and navigate to the Multicopter Attitude Control and Multicopter Position Control parameters groups under the Parameter Tab in the Vehicle Setup menu. Once you have found the parameter pages follow the instructions in the PX4 Tuning Guide.

WARNING

Tuning can change the fundamental flying characteristics of ALTA Pro. It is possible for ALTA Pro to become unstable or even uncontrollable if values are set too high or too low. Only change tuning parameters in small increments and with caution. Always test new tuning configurations in open areas away from people or obstacles.

WARNING

While ALTA Pro QGroundControl allows users to tune their ALTA Pro in the air we suggest changing tuning values while ALTA Pro is on the ground as a precautionary measure.

NOTE

When making configuration changes with ALTA Pro QGroundControl, make sure to save each parameter as you change them!

****

Additional Parameters

Additional Parameters

ALTA Pro QGroundControl allows users to alter many additional parameters that do not affect the Flight Controller characteristics of ALTA Pro. These parameters are used to select neutral points using trim or to set maximum or minimum values for a variety of different settings. These settings can be found under the Tuning and Parameters tabs in the Vehicle Setup menu.

WARNING

Users should understand the effect of parameter settings before changing them. Incorrect or poorly chosen parameters can result in crashes, injury, or death. You can always reset all parameters to defaults by following the [Reset to Default](#) instructions.

ALTA Configuration Setup

We have compiled a list of the most important ALTA Pro Flight parameters in the Tuning Tab under the Vehicle Setup Menu. Ensure you have an understanding of what the characteristic of the ALTA Pro a parameter effects before changing it.

You may need to update the Hover Throttle when changing payloads to optimize ALTA Pro's flight performance. The Hover Throttle settings can be found under the ALTA Configuration Setup tab or in the Parameters tab.

If you are unsure of what characteristics a parameter effects please reach out to Freefly's Customer Support Team for clarification.

Safety Parameters

QGroundControl allows users to customize ALTA Pro's fail safes and safety parameters. These options are found under the Safety tab in the Vehicle Setup menu.

Low Battery Parameters

This set of parameters allows users to select when battery levels warnings are triggered and what the aircrafts failsafe is when this threshold is met.

RC and Datalink LOS Failsafe Settings

This parameter determines the flight mode ALTA Pro will enter if it detects a Loss-of-Signal (LOS). Selecting 'Land at Current Position' will cause ALTA Pro to Autoland in place when the LOS is detected. Selecting 'Return to Land' will cause ALTA Pro to Return-to-Land and then Autoland when the LOS is detected.

Return Home Settings

Used to set the RTL altitude, loiter time, and RTL behavior.

Land Mode Settings

This adjusts the descent rate of the ALTA Pro during Autoland in meters per second. This value is applied to the Autoland descent profile for the final 15 meters above the ground until landing. This option also provides the option to automatically disarm ALTA Pro after landing.

Saving, Loading, and Resetting Parameters

Saving, Loading, and Resetting Parameters

ALTA Pro QGroundControl allows users to save, load, and reset all of ALTA Pro's parameters. This is useful when trying to save certain parameters that will need to used again in the future or when troubleshooting and needing to get back to a known good state.
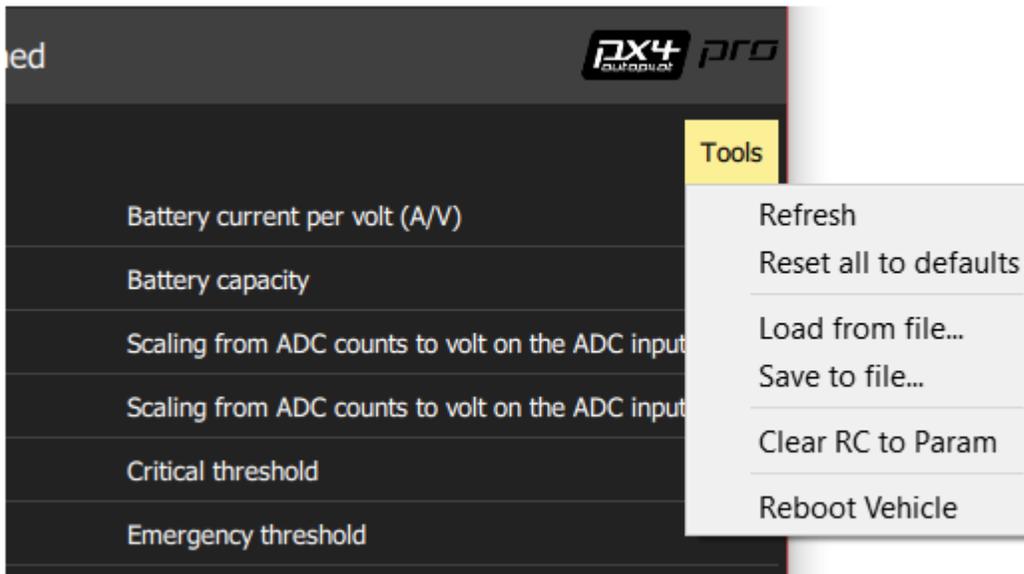
Saving Parameters

Saving parameters can be done in the Parameters tab of the Vehicle Setup menu. Navigate to the 'Tools' menu in the top right hand corner of the window and select 'Save to file...' from the dropdown. Then select a file name and folder to save to.

Loading Parameters

Loading parameters is also done from the Parameters tab of the Vehicle Setup menu. Navigate to the 'Tools' menu in the top right hand corner of the window and select 'Load from file...' from the dropdown. Then select the desired .params file to load.

Resetting Parameters

To reset all ALTA Pro's parameters to the ALTA Pro defaults follow the Loading Parameters instructions and load the ALTA Pro Default Parameters file. This can be found on the ALTA Pro support page.

CAUTION **Selecting the 'Reset all to defaults' option in the Tools menu will reset all parameters to the QGroundControl defaults. These are not the same as the ALTA Pro default parameters. To reset to ALTA Pro defaults load the ALTA PRO Default Parameters to the aircraft.**

Updating your Wifi Password and SSID

Enabling and Updating Your Wifi Password and SSID

1. Connect to ALTA Pro using the Radio Modem or USB
2. Go to the System Parameters under the Parameter tab in the Vehicle Setup menu and find the SYS_COMPANION parameter.
3. Change the SYS_COMPANION parameter to 'ESP8266 (921600 baud, 8N1)' and restart ALTA Pro to enable the WiFi connection.

To enable WiFi connectivity follow the steps below!

CAUTION **Please read this entire section if you intend to use the WiFi feature of ALTA Pro.**

When flying multiple aircraft with WiFi enabled, take extreme caution to ensure that the aircraft connected to the laptop/mobile device is the desired craft. Failing to connect to the correct device may result in an inadvertently arming a aircraft or disarming one that is inflight.

ALTA Pro allows users to update the system's WiFi password and SSID. All ALTA Pro's initially come with WiFi disabled for safety reasons.
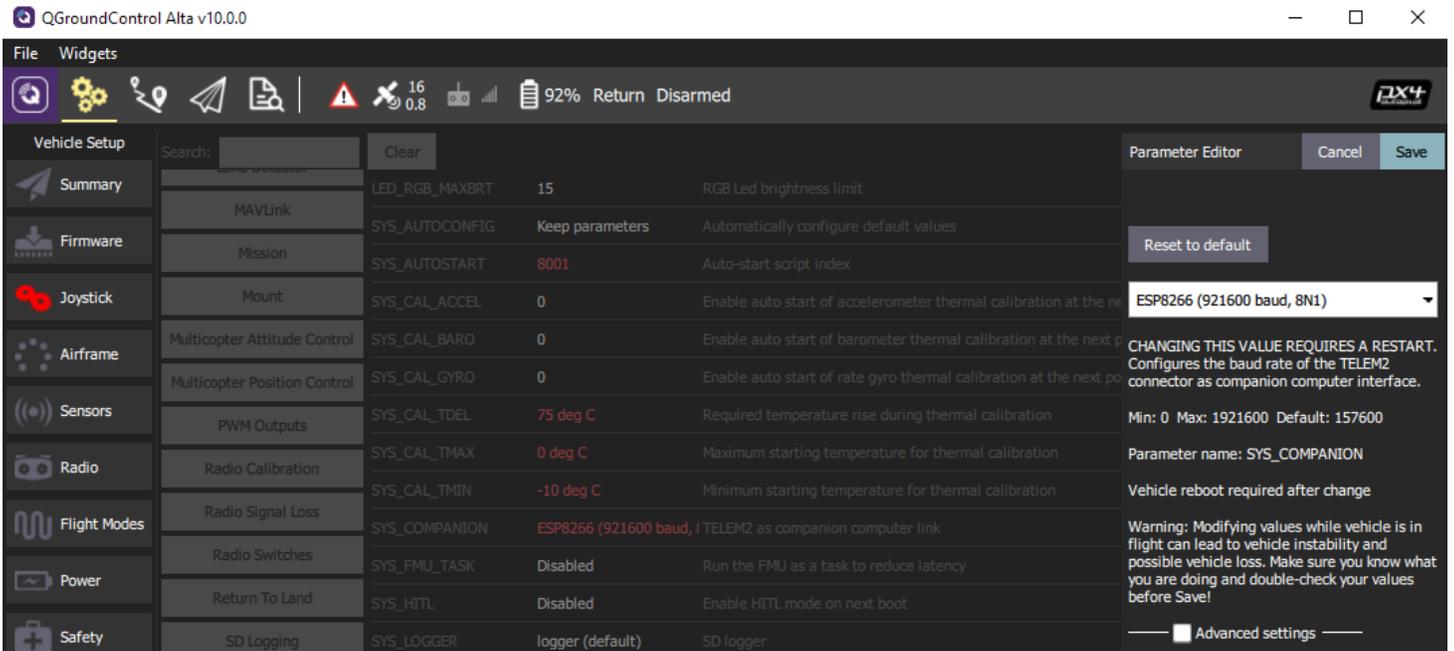
Once you have enabled ALTA Pro's WiFi, change the password and SSID from their defaults!

1. Connect to ALTA Pro's WiFi using the initial password listed below
    1. SSID: [off] AltaPro-<serial number>; eg. [off] AltaPro-781880
    2. Password: altaalta
2. Open your prefered web browser and go to 192.168.4.1
3. Select setup, then update the SSID and password. Make sure to make the password is eight characters long, secure, and noted down somewhere in case you forget!
    1. Do not change any of the other menu items!

ALTA Pro passwords must be longer than eight characters and should be unique for each ALTA Pro. Do not use the same password on multiple machines!

Alta WiFi Bridge

Version: 1.2.2

- Get Status
- Setup
- Get Parameters
- Reboot

Alta WiFi Bridge

Setup

WiFi Mode: AccessPoint AP SSID: APRO-8-1

AP Password (min len 8): altaalta

WiFi Channel: 11

Host Port: 14550

Client Port: 14555

Baudrate: 921600
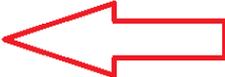
Save

We suggest not selecting 'Connect Automatically' when using WiFi to connect to ALTA Pro and clearly labeling each 900/868MHz RX/TX pair.

4. Once the password and SSID have been updated, hit the save button at the bottom of the menu.
5. Power cycle ALTA Pro and ensure you can connect to ALTA pro using the new password.
6. Connect to Futaba radio system and confirm both receivers work and system arms.

Operating ALTA Pro

Flight Controller Modes

Flight Controller Modes

Overview

ALTA Pro has three primary flight control modes which are selected using the Mode Switch: Manual Mode, Altitude Mode, and Position Mode. ALTA Pro also has two emergency control modes, Return-to-Land and Autoland, which are available only during certain situations. For additional information, refer to the sub-section associated with each emergency control mode.

Altitude Mode and Position Mode are assistive only and are not a replacement for pilot skill and ability. Pilots should be proficient in Manual Mode flight in order to react to emergency situations as required.

CAUTION **Always center the control input sticks on the radio controller when switching between control modes to prevent unexpected movement of the ALTA Pro.**

Manual Mode

In Manual Mode, ALTA Pro will only stabilize its attitude. At neutral control input (middle pitch and roll stick position), ALTA Pro will attempt to remain level. Throttle control is direct.

Altitude Mode

Altitude Mode changes the throttle stick behavior to command climb and descent rates. The higher the throttle stick position, the faster ALTA Pro will climb. Conversely, the lower the throttle stick position, the faster ALTA Pro will descend.

When the throttle stick is centered, ALTA Pro will enter Altitude Hold. In Altitude Hold, ALTA Pro will maintain a target altitude and try to correct for drift. If a disturbance moves ALTA Pro away from this target altitude, ALTA Pro will climb or descend to return to the target altitude.

WARNING **Altitude Mode is assistive only and is not a replacement for pilot skill and ability. Pilots should be proficient in Manual Mode flight in order to react to emergency situations as required.**

Position Mode

Position Mode changes the pitch/roll stick behavior to command ground speeds. Pitch and roll stick deflection will command fore/aft and left/right ground speeds respectively. Controlling altitude in Position Mode is the same as in Altitude Mode.

With pitch and roll controls centered, ALTA Pro will enter Position Hold. In Position Hold, ALTA Pro will maintain its position over a given point on the ground and correct for disturbances.

Position Mode requires a strong GPS signal and communication with a minimum of 6 satellites. If a weak signal is present, ALTA Pro will not enter Position Mode. If the GPS signal degrades while in Position Mode, ALTA Pro will automatically revert to Manual Mode.

Within Position Mode ALTA Pro enters Classic Control style which use the tuning parameters to control translational position over the ground.

⚠️ **WARNING**
Position Mode is assistive only and is not a replacement for pilot skill and ability. Pilots should be proficient in Manual Mode flight in order to react to emergency situations as required.

⚠️ **WARNING**
Flight using Position Mode in areas of degraded GPS signal, such as near buildings or under dense tree cover, is not recommended. The automatic reversion to Manual Mode can cause unexpected, abrupt changes in flight behavior.

⚠️ **WARNING**
Flight using Position Mode with Compass enabled in areas near large ferrous objects or high magnetic flux is not recommended. Incorrect compass readings can result in loss of control. Compass assist can be disabled in the ALTA App if desired.

Waypoints Mode

Waypoints mode allows ALTA Pro to execute a predefined autonomous waypoint missions that have been uploaded to the flight controller via ALTA Pro QGroundControl (QGC). For more information on all of the different options and abilities built into the Waypoint functionality you can read more in the PX Literature.
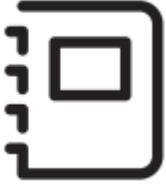
Return-to-Land

Return-to-Land Mode will command ALTA Pro to fly back to the defined Home Point. When ALTA Pro first acquires a GPS position, it sets this as the Home Point of the flight. See the Radio Channel Mapping section in this manual for more information on setting up the Return-to-Land Switch.

RTL can be initiated automatically with an LOS event if it is selected as the Signal Loss Action in the ALTA App. RTL can also be initiated manually while flying in Position Mode and setting the Home Switch to RTH.

When initiated manually using the Home Switch, ALTA Pro will fly back to the Home Point. ALTA Pro will hover above the home point and wait for a set amount of time and then land. The pilot can cancel the RTL procedure by returning the Home Switch to the middle or bottom position.

During an LOS event, RTL followed by Autoland will be initiated automatically if 'RTL' is selected as Signal Loss Action in the ALTA App and an S.Bus/S.Bus2 or DSM2/DSMX radio system is in use. ALTA Pro will first check its current altitude against Safe Height. If ALTA Pro is below the Safe Height, it will climb to Safe Height. If ALTA Pro is above Safe Height, it will remain at its current altitude. Next, ALTA Pro will fly back to the home position at the RTL Speed set in the ALTA Pro QGroundControl. Finally, upon reaching the home position, ALTA Pro will loiter for 15s and then begin to Autoland.

ALTA APP > CONFIGURATIONS > SAFETY > SAFE HEIGHT

Autoland

Autoland will only initiate if one of the following conditions is met and the Autoland is setup as the failsafe for these events. See the Safety Parameters to customize ALTA Pro's failsafe behaviors:

- Loss of Signal (LOS) occurs and 'Land' is selected as the Signal Loss Action in the ALTA app
- At the end of a LOS Return-to-Land event when using S.Bus/S.Bus2 or DSM2/DSMX radio systems
- Battery exhaustion failsafe is tripped and the failsafe is set to return to land in ALTA Pro QGroundControl.

 WARNING

Autoland and Return-to-Land will only occur if these settings are turned on in the aircraft parameters. Geofences

Geofences

Geofences are currently not supported by Freefly. We recommend that you do not use this feature. If this feature is used, set the Geofence breach action to Warning; Hold, RTL, and

Terminate should not be used as they may result in crash or an ALTA Pro that cannot return to its home position.

Home Switch

The home switch has three positions, however only the top toggle position will turn RTL on.

RTL Off

(Bottom/Middle Toggle Position)

This is the normal switch position and does not initiate an RTL command.

RTL On

(Top Toggle Position)

This manually initiates the RTL function. In RTL, PX4 will command ALTA Pro to climb to the set minimum altitude and then guide the unit's position to the home point.

Once RTL has been initialized it will continue to return to home unless the Home Switch is returned to RTL Off.

Status Light
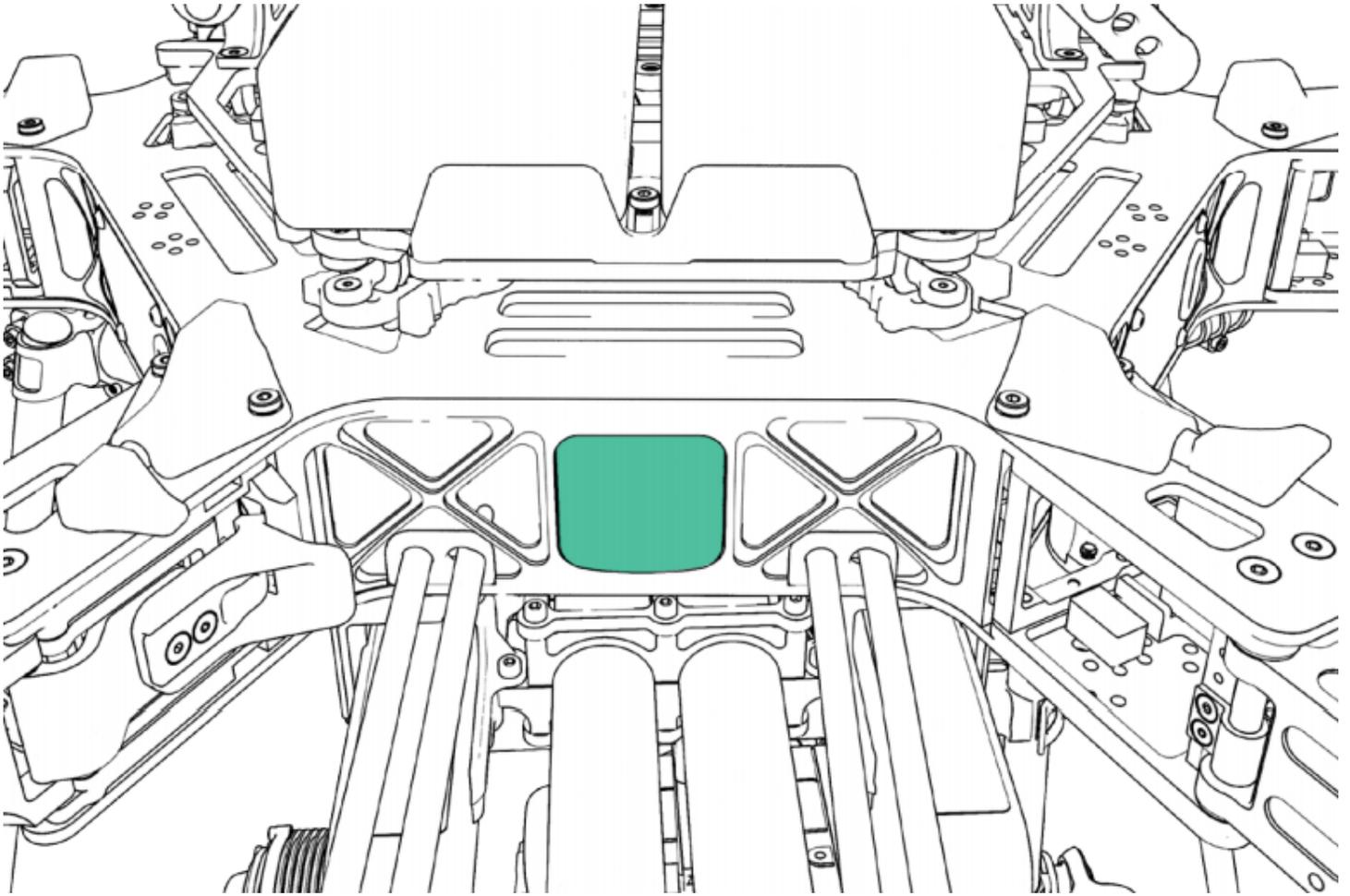
The rear-facing Status Light shows the status of ALTA Pro as it boots, arms, and flies. The following table shows the different meanings of the light in the various flight phases.

Flight Phase	Light Color	Meaning
Booting	Flashing Red + White	Flight controller is booting
Standby	Flashing White	Flight controller is running and disarmed
	Flashing Red	Flight controller is running and not ready to arm
	Solid Red	Flight controller boot unsuccessful
Armed	Off	Ready for Flight
Flight - all modes	Solid Red	Flight critical alarm—land immediately!

Flight Phase	Light Color	Meaning
Flight - Manual Mode	Off	Nominal flight status
		No errors
	Solid White	Outside user-defined range, height, or speed limits
	Solid Red	Flight critical alarm or battery alarm voltage—land immediately!
	Flashing Red	Battery land voltage—land immediately!
Flight - Height Hold	Off	Nominal flight status
		Height hold inactive
	Slow Flashing White	Height hold active
	Solid or Flashing Red	Flight critical alarm—land immediately!
Flight - Position Hold	Off	Nominal flight status
		Height hold inactive
		Position hold inactive
	Fast Flashing White	Height Hold and Position Hold Active
	Solid or Flashing Red	Flight critical alarm —land immediately!

Orientation Lights

BOTTOM VIEW
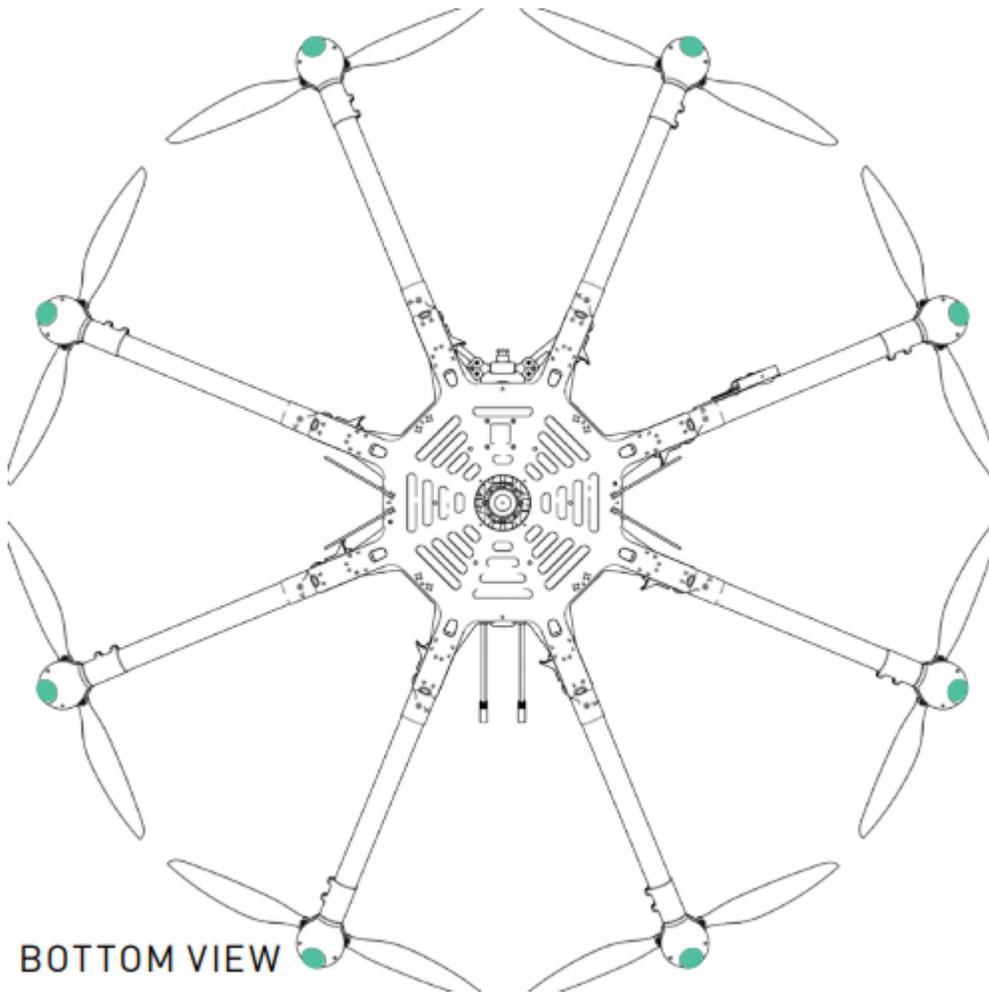
The boom-end mounted Orientation Lights indicate both the orientation of ALTA Pro in flight and the status of the individual motor Electronic Speed Controllers (ESCs) during other operational phases. The following table shows the different meanings of the light colors in the various operational phases.

Flight Phase	Light Color	Meaning
Standby	Flashing Green	ESC booted normally
Armed	User-defined	Nominal Status
Flight	User-defined	Nominal Status
Firmware Update	Pink	ESC firmware is updating

Alarms

ALTA Pro will notify the pilot of critical alarms through QGroundControl. These alarms indicate a serious issue has been observed in the behavior of the ALTA Pro that, if not acted upon immediately, can cause loss of control. Never continue a flight when ALTA Pro indicates an alarm!

Aircraft Monitor

ALTA Pro QGroundControl includes a flight status monitor that displays information about the health of the ALTA Pro and the various controls that can be selected.

Icon	Name	Description
	Boot	Indicates if the PX4 has completed its booting process and whether it was successful. Any issues that prevented a normal boot are indicated here.
	Battery	Displays the voltage of the battery packs.
	Status	Displays the state of the PX4 flight controller.
	Radio	Displays if the PX4 detects a radio controller signal. A LOS warning is displayed if no signal is present.
	GPS	Displays if PX4 has resolved a GPS fix or not.
	Sats	Displays the number of GPS satellites in view and being received. A minimum of 6 satellites are required in order to enter Position Mode.
	Lock	Clicking on this icon displays whether a position lock is ready, indicating a valid GPS fix and good heading. This is required before the Autopilot will allow switching into Position Mode.
	Altitude	Displays the current height control mode: Manual, Vario if in Height or Position mode and climbing or descending, and Hold.
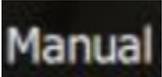
Icon	Name	Description
	Attitude	Displays the current attitude control mode.
	Compass	Displays the status of the compass and if the Autopilot believes the compass readings are good or bad. If Bad, the compass may require recalibration (see the Compass Calibration section in this manual).
	Speed	Displays ground speed.
	Flight Time	Displays the amount to time the aircraft has been flying.

Data Logging

ALTA Pro automatically logs flight and control data when ALTA Pro is armed for flight. Data is recorded to the autopilot and are accessed through the Log Download tab in the Analyze menu of ALTA Pro QGroundControl.
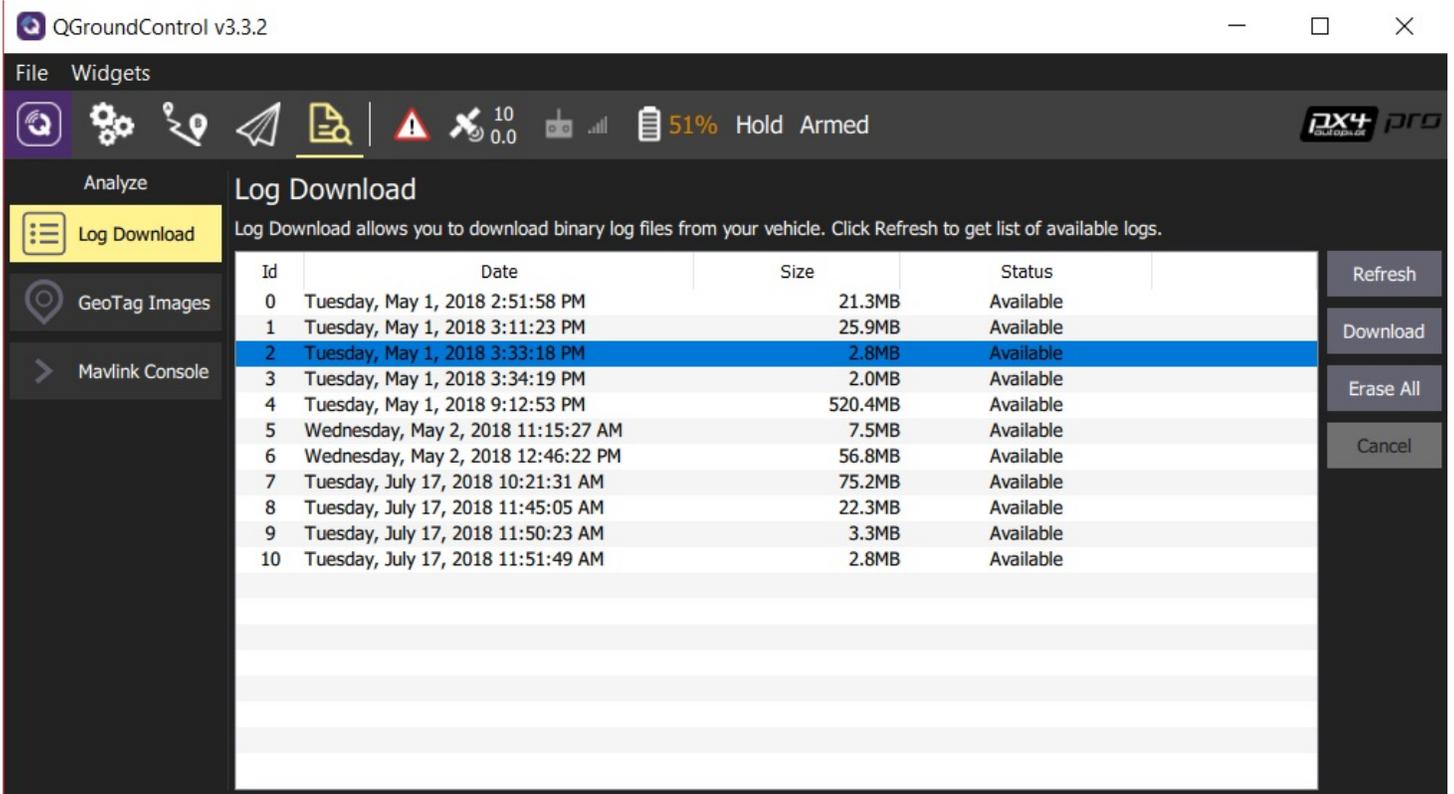
Summarized flight data from an individual flight can also be viewed immediately after landing by placing a downloaded log file into PixHawk Flight Review. Full details about the review process can be found in the Flight Reporting section of the Pixhawk User Manual.

A native data analyzer is being developed and will be available on the ALTA Pro Support page.

Normal Procedures

Unpacking and Setup

Unpacking and Setup

Item	Action
1. Aircraft	REMOVE from case
2. Prop protectors	REMOVE

Item	Action
3. Boom retention clips	STOW
4. Booms	UNFOLD
5. Boom latches	LOCK
6. Receivers and wiring	CHECK
7. Isolator cartridges	SELECT and INSTALL as necessary
8. Payload mounting location	CONFIGURE as necessary

To set up ALTA Pro for flight, remove it from the case, and remove the prop protectors. Stow the boom retention clips by folding them down. The clips fold in one direction and are spring-loaded to stay in open and closed detented positions.

Unfolding the booms is most easily accomplished by unfolding all opposite pairs partially, then unfold the opposite boom pairs completely. ALTA Pro can become unbalanced while unfolding booms individually, so unfolding opposite pairs reduces the possibility of tipping.

Once unfolded, push on the boom latches until they audibly click, indicating the booms are secure. There should be little to no slop in the hinge. Check that the receivers and the electrical connectors that attach to the receivers are secure.

For information on installing isolator cartridges and setting up payload mounting locations, refer to the Isolator Cartridges and Configuring GroundView or SkyView sections of this manual.

Before Starting

Item	Action
1. Payload	SECURED
2. Isolator Cartridges	VERIFY SECURE
3. Propellers	CHECK CONDITION, VERIFY TIGHT
4. Propeller Hubs	VERIFY SECURE
5. Motors	CHECK CONDITION

Item	Action
6. Radio Controller	ON, VERIFY TX BATTERY
7. Radio Controller Model	SELECT
8. Aircraft Placement	AWAY from people and obstacles
9. Battery Pack Voltage	VERIFY ABOVE 24V
10. Battery Packs	SECURE
11. Battery Leads	CHECK CONDITION and CONNECT
12. Aircraft	KEEP STATIONARY
13. Flight Controller	Allow to INITIALIZE
14. Status Light	VERIFY SLOW FLASHING WHITE
15. Orientation Lights	VERIFY FLASHING GREEN
16. Receivers	VERIFY BOUND
17. ALTA Pro QGroundControl	CONNECT
18. ALTA Pro QGroundControl	VERIFY NO WARNINGS
19. Compass Calibration	CALIBRATE as required
20. Radio Control Range Check	AS REQUIRED

Check that the payload is secure by checking that the Toad In The Hole quick release lever is pushed in and that the payload does not slip. Check that all isolator cartridges are locked in place, especially if they have been recently replaced.

The blades should be checked for damage, including nicks and scrapes. If a propeller blade has been nicked enough that it catches a fingernail, it should be replaced. Bolt tightness should be checked by rotating the blade about its length (blade pitch up and down). There should be no slop, and if there is, the bolt and nut should be tightened until the slope is removed. There should be no slop between the propeller hub and the motor.

Motors should spin freely, and there should be no grinding or scraping sound from the motor. The inside of the motor should be free of debris.

Always turn on the radio controller before powering ALTA Pro. Follow the battery installation guidance in the Battery Installation section of this manual for battery

installation instructions.

While the Autopilot initializes, keep ALTA Pro as stable as possible. Wedging a foam prop protector between the stationary gimbal or landing gear and the frame can be used to stabilize ALTA Pro from spinning during this process.

If ALTA Pro moves during initialization, it may not boot properly and will fail to start or not maintain heading.

At the end of this process, the status will begin slow flashing white, indicating ALTA Pro is ready for arming. The Orientation Lights will also begin flashing green. Verify that all motors are flashing green, indicating all ESCs initialized successfully.

Verify that there are no flight warnings by connecting to ALTA Pro via ALTA Pro QGroundControl and checking for warnings or errors. For more information, see the ALTA Pro QGroundControl section of this manual.

Before Takeoff

	Item	Action
1.	Prop Area	CLEAR
2.	Mode Switch	MANUAL
3.	Home Switch	UP/OFF
4.	Radio Controller	VERIFY CORRECT MODEL
5.	Telemetry (if equipped)	CHECK OPERATION
6.	GPS Signal	LOCKED
7.	ALTA Pro	ARM
8.	Status Light	VERIFY OFF
9.	Orientation Lights	VERIFY USER-DEFINED COLOR
10.	Motors	START and VERIFY OPERATION
11.	Flight Controls	VERIFY CORRECT

Item	Action
12. Throttle	ADVANCE directly to hover

Prior to start, check the surrounding area to ensure people and objects are clear of ALTA Pro and its props. Also ensure that there are no people or objects between the ALTA Pro's takeoff location and its intended flight path.

Ensure that ALTA Pro QGroundControl shows all sensors are calibrated and ready for flight.

⚠ WARNING **ALTA Pro's props spin at a high RPM and the ends of the blades move at high speeds. ALTA Pro's props can cause severe injury or death or cause damage to objects while rotating. Always ensure the area surrounding the props and ALTA Pro is clear of people or objects prior to starting the motors.**

⚠ WARNING **Do not approach ALTA Pro while it is armed or motors are spinning.**

To start the motors, hold full low throttle and full right yaw. Ensure that all the motors are spinning. Raise RPMs slightly and move the pitch, roll, and yaw controls slightly. ALTA Pro should pitch, roll, and yaw as commanded due to isolator cartridge flex. Ensure that the ALTA Pro behaves as expected. If it does not, shut down ALTA Pro and ensure the propellers are installed in the correct orientation and radio settings are correct.

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① CAUTION **Do not make large yaw commands while on the ground with the inverted landing gear installed. Large yaw commands can cause instability.**

After checking flight control directions, advance the throttle directly from idle to hover throttle. Prior to takeoff, do not advance throttle stick above idle until prepared for flight as this can spool up motors undesirably. While throttling up for takeoff, do not loiter in ground effect. Once in flight, use the Mode Switch to select between Manual, Altitude, or Position Mode only after first confirming proper flight performance in Manual Mode.

CAUTION Only take off in Manual Mode or let the ALTA Pro take off autonomously when doing a waypoints mission. Attempting to take off in Altitude or Position Modes may cause ALTA Pro to tip over.

WARNING Altitude Mode and Position Mode are assistive only and are not a replacement for pilot skill and ability. Pilots should be proficient in Manual Mode flight in order to react to emergency situations as required.

After Every Flight

	Item	Action
1.	Mode Switch	MANUAL
2.	Home Switch	OFF
3.	ALTA Pro	LAND
4.	Motors	DISARM and STOP
5.	Orientation Lights	VERIFY FLASHING GREEN
6.	Status LED	VERIFY SLOW FLASHING WHITE
7.	ALTA Pro QGroundControl	CHECK for warnings
8.	Batteries	DISCONNECT AND REMOVE
9.	Radio Controller Power	AS REQUIRED
10.	Aircraft Condition	INSPECT
11.	Motor and Prop Condition	INSPECT
12.	Battery Condition	INSPECT

When not using the Autoland feature, make sure to switch to Manual Mode prior to landing.

CAUTION

Users may land in Manual Mode, Altitude Mode, or letting the ALTA Pro land autonomously when doing a waypoints mission. Quickly reverting to manual mode when landing in Altitude mode will prevent ALTA Pro unwanted movements .

Upon landing, disarm the motors by holding minimum throttle and full left yaw. This is typically done on the left radio control stick by moving it to the bottom left corner with mode 2 controllers. Disarming can only be done while in Manual Mode. Once the motors are stopped and disarmed, the Orientations Lights will flash green, and the Status Light will slowly flash white, indicating it is safe to approach ALTA Pro.

WARNING

Only approach ALTA Pro after confirming that it is disarmed by verifying the Status Light and Orientation Light colors.

The downwash from the propellers can disturb debris. This debris can be ingested by the propellers or motors and cause damage. After the flight, ensure there is no damage to the propeller blades and that the motors still spin freely and quietly. Take extra care when operating in areas with large amounts of debris, such as in sand, dirt, or gravel.

After flight is also a good time to check the condition of battery packs. Always refer to the battery manufacturer's recommendations for inspection and replacement intervals or requirements.

After Last Flight

Item	Action
1. Propellers	FOLD and PLACE inline with booms
2. Prop Protectors	INSTALL
3. Boom Latches	UNLOCK
4. Booms	FOLD
5. Boom Retention Clips	EXTEND

Item	Action
6. Payload	REMOVE
7. ALTA Pro	INSERT into case

Fold propeller blades and install foam Prop Protectors to decrease the risk of damaging the propellers while packing ALTA Pro. Keeping ALTA Pro on the payload or landing gear easily facilitates the folding process as ALTA Pro may be turned on the Toad In The Hole adapter while folding the propellers and booms. Folding the booms in opposing pairs can help maintain balance and reduce the likelihood of tipping.

Make sure that the handle is aligned front-to-back with the battery leads facing to the right when putting ALTA Pro in the included case. Pay special attention to the external GPS, 900/868MHz Telemetry radio and optional accessories if installed (FPV camera and Tx) when putting the ALTA Pro back into its case.

Emergency Procedures

Emergency Guidance

The emergency procedures listed in this section are the recommended practices for handling the aircraft in the event of an aircraft emergency. This guidance should be considered and applied as necessary.

The risk of an emergency can be reduced substantially through proper aircraft maintenance, by performing thorough inspections before and after all flights, and with careful pre-flight planning.

Emergency situations are dynamic events, and not all conditions or procedures can be anticipated or applied during the event. These procedures are not a substitute for a thorough understanding of aircraft systems and sound pilot judgment.

In general, if an emergency occurs, three basic actions can be applied to most situations:

1. Maintain aircraft control—Small emergencies can quickly escalate if the pilot is distracted attempting to troubleshoot the problem. Always maintain visual contact with the aircraft during an emergency to reduce the likelihood of losing orientation.
2. Analyze the situation—Once the aircraft is stabilized, begin to assess the cause of the emergency if practical.
3. Take appropriate action—In many cases, the appropriate action will be to land the aircraft as soon as possible. Always consider the safety of yourself and others before attempting to save the aircraft in an emergency.

Alarm Indication

Alarm Indication (Flashing or Solid Red Light)

Item	Action
1. Mode Switch	MANUAL
2. ALTA Pro	LAND as soon as possible
3. ALTA Pro QGroundControl CHECK IN APP WARNINGS	

Alarms are displayed if the flight controller determines there is a condition present that can adversely affect the safety of the flight. Alarms are indicated by the Status Light staying or flashing Red (depending on the flight mode).

Land as soon as possible when the Status Light indicate a warning, and investigate the problem while ALTA Pro is safely on the ground. It is best practice to set the mode switch to Manual when an Alarm is observed to maintain full control authority of ALTA Pro.

Pilot Loss of Orientation

Item	Action
1. Control Inputs	NEUTRALIZE
2. Mode Switch	POSITION

Item	Action
3. Yaw	NOSE AWAY
4. Roll	VERIFY DIRECTION

Regaining spatial orientation as quickly as possible is most important. If the pilot loses orientation of ALTA Pro, control inputs will not give the expected result, so neutralize controls by centering the throttle/yaw and pitch/roll sticks to stabilize motion. If a good GPS signal is available, enable Position Mode so ALTA Pro will stay in one place.

Use yaw only to reorient ALTA Pro so the nose is pointed away, then use the roll control to verify the orientation of ALTA Pro.

⚠️ **WARNING** **Position Mode may not function as expected if Position Lock has not been achieved. It is best practice to wait for Position Lock prior to takeoff, even if Position Mode is not planned to be used during the flight.**

****

Unexpected Flight Controller Behavior

Item	Action
1. Control Inputs	NEUTRALIZE
2. Mode Switch	MANUAL
3. ALTA Pro	LAND as soon as possible

If ALTA Pro behaves unexpectedly, neutralize controls by centering the throttle/yaw and pitch/roll sticks and observe ALTA Pro. If it is still flying in an uncommanded manner in either Altitude or Position Mode, switch to Manual Mode. In most cases, unexpected behavior is due to erroneous sensor readings, degraded GPS signal reception, or compass issues.

If the unexpected behavior occurred while in Manual mode, land as soon as possible and check ALTA Pro QGroundControl for any warnings.

Battery Exhaustion

If battery cell voltage is below Alarm Voltage (all flight modes)

1. **Status Light ILLUMINATES RED (solid or blinking)**
2. ALTA Pro   LAND as soon as possible

If battery cell voltage is below Land Voltage while flying in Manual Mode

1. **Status Light FLASH RED**
2. ALTA Pro   LAND as soon as possible (Autoland is not initiated)

If battery cell voltage is below Land Voltage while flying in Altitude or Position Mode

1. **Status Light   ILLUMINATES RED (solid or blinking)**
2. ALTA Pro   WARNING popup in ALTA Pro QGroundControl
3. Pitch and Roll MANEUVER away from people or objects

If the battery cell voltage drops below the Alarm Voltage, the Status Light will turn solid red in Manual Mode or flash red if in Altitude Hold or Position Hold. Terminate the flight and land as soon as possible.

If the battery cell voltage drops below the Land Voltage, the Status Light will flash red. The orientation lights will flash as described above. The pilot will remain in full control of the ALTA Pro in all three flight modes and full throttle authority is available to the pilot in a battery exhaustion event

 ALTA Pro will only Autoland if the battery exhaustion failsafe is set to RTL.

Radio Loss of Signal

Radio Loss of Signal (LOS)

Item	Action
Item	**Action**
1. Controller Battery	CHECK
2. Controller Antenna	REPOSITION
3. Mode Switch	POSITION
4. Home Switch	Return-to-Land

Loss of Signal (LOS) can occur if the radio controller stops transmitting a signal, or if ALTA Pro is too far away to receive it. In the event ALTA Pro detects a LOS, it will automatically execute a Return-to-Land or Autoland as configured in ALTA Pro QGroundControl if using an S.Bus/S.Bus2 or DSM2/DSMX radio type. While ALTA Pro includes these emergency control modes, it is always recommended to attempt to regain signal link with ALTA Pro to keep the pilot in control of the aircraft.

Move the antenna orientation for best signal strength. Ensure the radio antenna matches the direction of the receiver antennas. Move the radio away from objects to get a clear line-of-sight to ALTA Pro.

Set the Mode switch to Position and the Home switch to Return-to-Land so ALTA Pro will continue to approach the home point if the signal is momentarily regained, resulting in higher likelihood of regaining full signal reception.

If efforts to regain control signal are unsuccessful, ALTA Pro will begin either the Return-to-Land and Autoland sequence as configured in ALTA Pro QGroundControl. Refer to the Flight Controller Modes section of this manual for additional information regarding functionality available with specific radio types.

Loss of FPV Signal

Loss of FPV Signal

Item	Action
1. Control Inputs	AS REQUIRED
2. Visual Contact	MAINTAIN
3. ALTA Pro	POSITION for optimal signal reception

If visual contact or FPV signal is not maintained:

Item	Action
1. Mode Switch	POSITION
2. Home Switch	RETURN TO HOME
3. Throttle	AS REQUIRED

An FPV Loss of Signal (LOS) can occur if the aircraft flies out of range or if it flies behind an object that interrupts the signal. Maintaining visual contact is the preferred method to re-establish control of the aircraft, either with the pilot seeing the aircraft, or by the use of a visual observer.

Yawing the aircraft can help signal reception if the body of the aircraft is blocking the line of sight between the transmitter and receiver antennas.

If FPV signal or visual contact cannot be maintained, setting the Mode switch to Position Mode and enabling Return-to-Land can be used to bring the aircraft back to signal reception range.

⚠️ **WARNING**

It is the responsibility of the pilot to see and avoid other aircraft, people, or obstacles. Always maintain direct line of sight with ALTA Pro during flight, use visual observers as operations require, and follow local regulations regarding see-and-avoid requirements.

Performance

Weight / Endurance Performance Data

Conditions:

Item	Condition
Altitude	Sea Level, ISA
Winds	Zero

ALTA 8 Approximate Flight Times vs. Payload
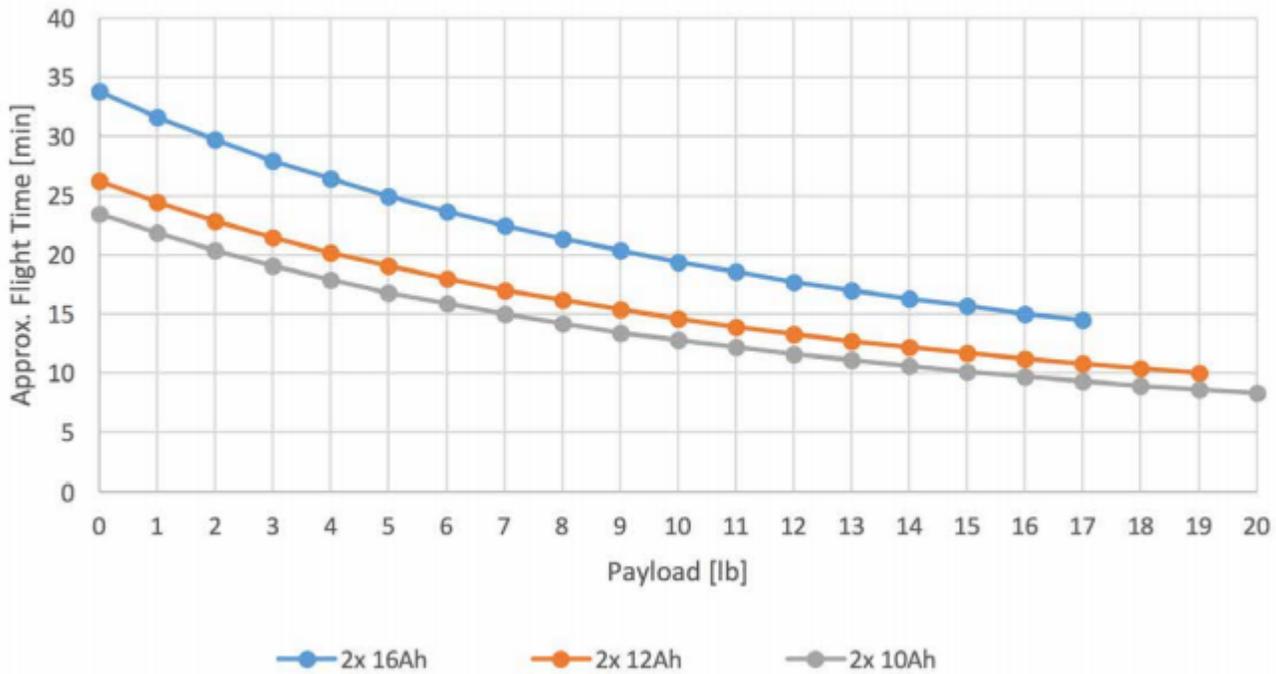
Allowable Gross Weight

As altitude and temperature increase, the density of the air decreases. Consequently, ALTA Pro's thrust will decrease. The following table describes maximum gross weight limits with respect to altitude and temperature.

Press Alt	0°C (32°F)		10°C (50°F)		20°C (68°F)		30°C (86°F)		40°C (104°F)	
	Maximum Gross Weight (lb)	Maximum Gross Weight (kg)	Maximum Gross Weight (lb)	Maximum Gross Weight (kg)	Maximum Gross Weight (lb)	Maximum Gross Weight (kg)	Maximum Gross Weight (lb)	Maximum Gross Weight (kg)	Maximum Gross Weight (lb)	Maximum Gross Weight (kg)
Sea Level	40.0	18.1	40.0	18.1	39.3	17.8	38.0	17.2	36.8	16.7
305m (1000ft)	40.0	18.1	39.3	17.8	37.9	17.2	36.7	16.6	35.5	16.1
610m (2000ft)	39.2	17.8	37.8	17.2	36.6	16.6	35.4	16.0	34.2	15.5
914m (3000ft)	37.8	17.2	36.5	16.5	35.2	16.0	34.1	15.5	33.0	15.0
1219m (4000ft)	36.4	16.5	35.2	15.9	34.0	15.4	32.8	14.9	31.8	14.4
1524m (5000ft)	35.1	15.9	33.9	15.4	32.7	14.8	31.6	14.3	30.6	13.9
1829m (6000ft)	33.8	15.3	32.6	14.8	31.5	14.3	30.5	13.8	29.5	13.4
2134m (7000ft)	32.6	14.8	31.4	14.2	30.3	13.8	29.3	13.3	28.4	12.9
2438m (8000ft)	31.3	14.2	30.2	13.7	29.2	13.2	28.2	12.8	27.3	12.4
2743m (9000ft)	30.2	13.7	29.1	13.2	28.1	12.7	27.2	12.3	26.3	11.9
3048m (10000ft)	29.0	13.2	28.0	12.7	27.0	12.3	26.1	11.9	25.3	11.5

Maintaining ALTA 8 Pro

General Information and Techniques

General Information and Techniques

Chassis

ALTA Pro ships from the factory with motors precisely aligned to minimize the difference in motor speed between clockwise turning and counterclockwise turning motors while in flight. Opening the chassis by removing the screws that attach either the top or bottom chassis plates affects this alignment and may reduce ALTA Pro performance.

Do not open the ALTA Pro chassis. Opening the chassis affects factory alignment.

All user maintainable items are outside the chassis and do not require the removal of screws attaching the top or bottom chassis plates.

Use Of Threadlocker

Bolts and screws this manual identifies as needing to be removed or replaced do not typically require threadlocking compound. This includes the screws holding on the handle, battery retention strap studs, battery stops, closeout panels, and the top male Toad In The Hole adapter. In addition, fasteners that attach to nuts with a nylon locking feature (nylock nuts) do not require threadlocker.

All structural fasteners require the use of threadlock. This includes chassis screws, lower male Toad In The Hole adapter, motor attachment fasteners, and the four M3 x 8 socket head bolts that attach the folding propeller to the motor. Typically, a low strength threadlocker (such as Loctite Purple 222) is used on structural fasteners.

Fastener Installation

The Freefly hex drivers included with ALTA Pro are designed to limit the torque that can be applied to each bolt or screw and help prevent stripping the fastener head.

Thread all fasteners into their respective holes until snug (when the fastener head bottoms out and lightly clamps the two mating parts together).

To prevent excessive tightening and damaging the fastener or parts, twist the driver from the smaller diameter knurled section of the tool between your thumb and index finger for small fasteners (under size M3) or with your thumb and two forefingers for larger fasteners (size M3 and larger).

Maintenance Items

Propellers
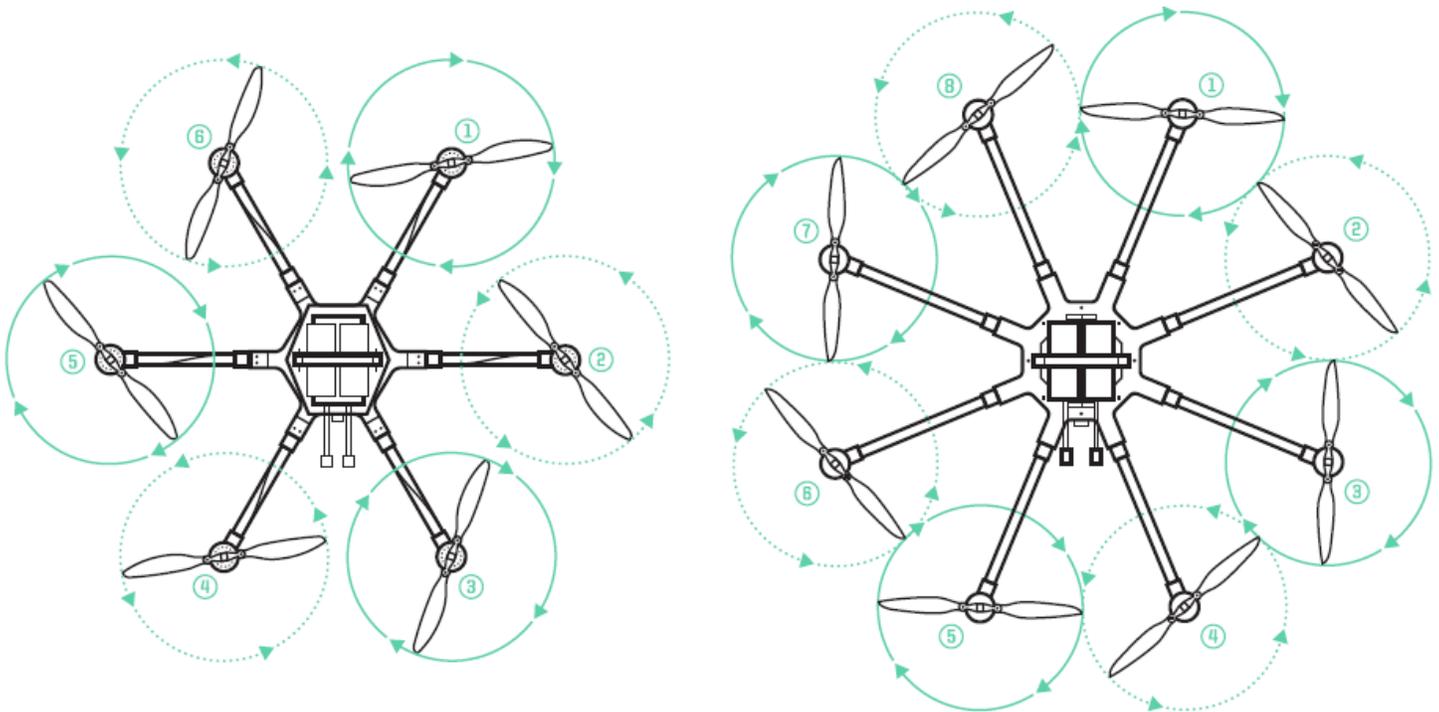
Propeller blades should be removed when making a change to the configuration of ALTA Pro to prevent propeller strikes in the event of unintentional motor starts and should be replaced if they become damaged. Generally, a nick on the leading edge that is large enough to catch a fingernail indicates that the propeller should be replaced. If the blade composite structure becomes delaminated, the propeller should be replaced.

Freefly makes folding propeller assemblies available that include the blades and propeller hub fully assembled and factory balanced. They are available in clockwise and counterclockwise orientations.

⚠ CAUTION — Only use propellers supplied by Freefly on ALTA Pro. Use of third-party propellers can cause motor instability, overheating, and failure.

The folding propellers are installed on the motors with four M3×8 socket head bolts.

CAUTION

Always use a thread locking compound on the bolt threads that attach the propeller hub to the motor.

Odd numbered booms (1, 3, 5 and 7) use clockwise rotating propellers when looking from the top down, and even numbered booms (2, 4, 6 and 8) use counterclockwise rotating propellers.

WARNING

Always check to ensure the correct propeller rotation direction and correct propeller prior to flight. Propellers that spin in the incorrect direction will cause ALTA Pro to be uncontrollable.

Replacing Propeller Bumpers

Under normal use, propeller bumpers (see exploded view figure on the next page) may split and fall out of the folding propeller assembly. Six spare bumpers are provided with the ALTA Pro. To replace the bumper, disassembly of the folding propeller is required.

Start by removing the M3 x 19 bolt and nylon nut. Pull off the upper prop adapter. The two bumpers are held in place by cylindrical features in the lower prop adapter. Replace the worn or split bumper.

Diagram labels: M3 × 19 Bolt, Upper Prop Adapter, Nylon Washer, PTFE Washer, Bumper, M3 x 8 Bolt, Blade, Lower Prop Adapter, PTFE Washer, Nylon Washer, Nylon Nut
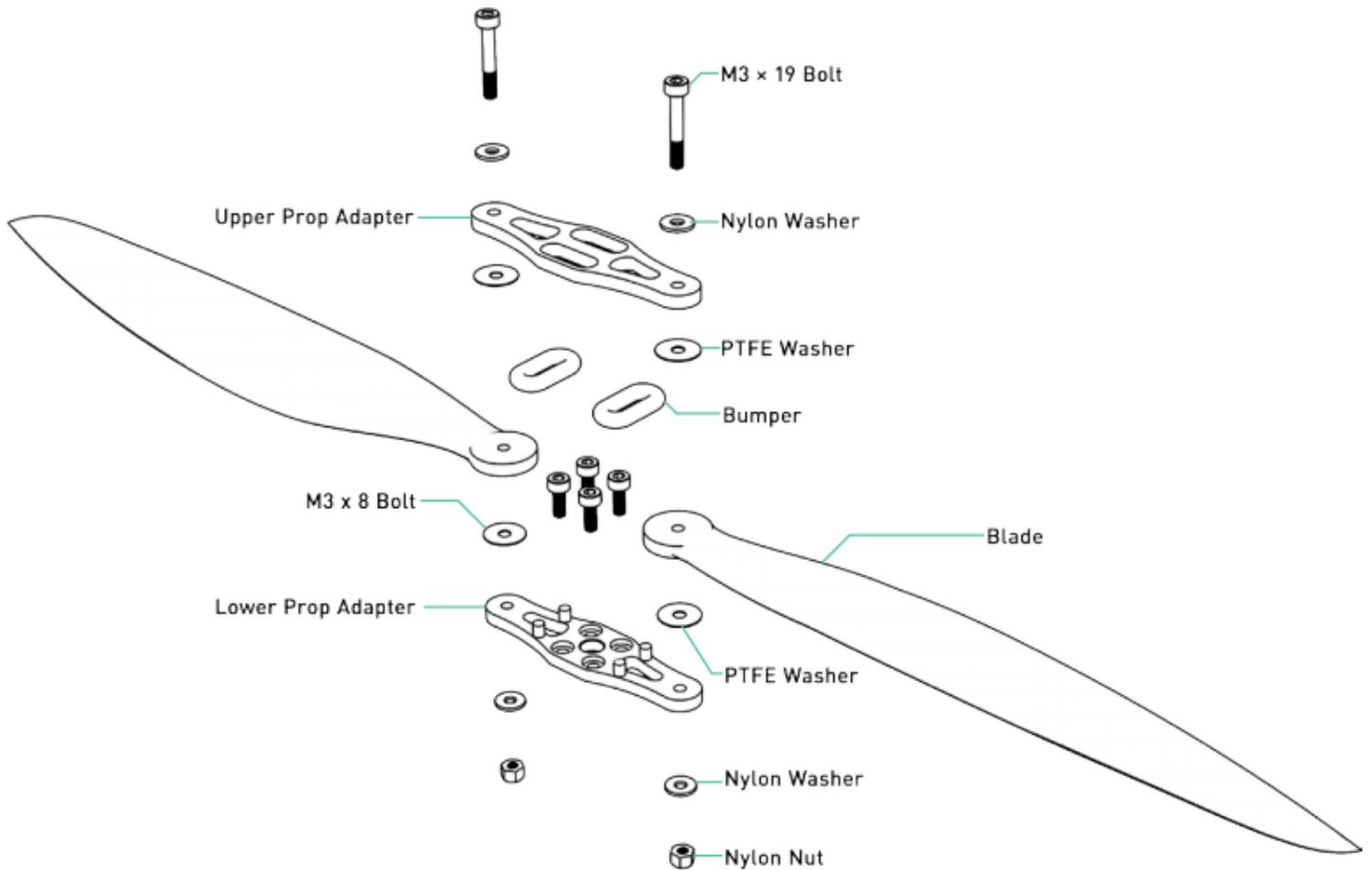
To reassemble, follow the parts layout in the figure above. Note that there are two different types of washers, one made of nylon and the other made of PTFE. The nylon washer is smaller in width and thicker, and is installed between the nut or bolt head and the two prop adapters. The PTFE washer is wider and thinner and is installed between the prop blades and prop adapters.

NOTE

Propeller blades are balanced and paired individually. Do not mix and match individual propeller blades when reassembling. Unbalanced propellers can affect flight performance.

Every 15 Flights

ALTA Pro is designed to be as low-maintenance as possible.

It is recommended to check ALTA 8's fasteners regularly. This check should occur roughly

after every 15 flights, depending upon the level of vibration ALTA 8 experiences in flight or during handling. To check ALTA 8's fasteners, apply a tightening torque to each fastener on the chassis using the supplied hex drivers. The fasteners should not slip.

If a fastener does slip, tighten it using the methods described in the Fastener Installation section. Do not apply additional thread locking compound unless the fastener has repeatedly come loose.

Every 15 Flight Hours

The following items should be checked after every 15 hours of flight.

Fastener Tightness

Check the tightness of the following fasteners:

- Motor mount bolts
- Prop hub bolts
- Prop bolts
- Top and bottom chassis bolts
- Closeout panel bolts
- FPV camera mounting plate bolts
- Accessory mounting plate bolts
- GPS/Compass mounting bolts

Inspection

Inspect the following items. Replace if worn.

- Propeller blades
- Prop bumpers

Hinge Latch Tightness

Check hinge latching tightness by closing the hinge. There should be a firm closing force and click. Adjust the tension by using a 1.5mm hex wrench on the set screw located under the

hinge latch.

Replacement Of Parts

Spare or replacement parts are available for sale separately at freeflysystems.com. Please refer to the store for a current listing of all available spare parts.

Firmware Update Process

Autopilot firmware is updated via the USB expansion port on ALTA Pro located in the chassis closeout between booms 1 and 2. To update firmware download the latest FW files from the ALTA Pro Firmware page and follow the instructions below:

1. Download the latest ALTA Pro FW from the ALTA Pro Firmware page on the support website.
2. Plug in a USB cable to your computer. Leave the other end unplugged from ALTA Pro for now.
3. Remove the chassis closeout between Booms 1 and 2 to reveal the expansion board.
4. Hold down the USB MSC Button on the expansion board while plugging in the USB C to the expansion board on ALTA Pro.
5. Enter the new folder now available in your file explorer. You should see a folder named FF-ALTA PRO.
6. Replace the 'Freefly' folder in the folder called FF-ALTA PRO with the new one downloaded from the Freeflysystems.com website.
7. Unplug ALTA Pro from the USB and then apply battery power while holding down the Boot button on the expansion board.
8. ALTA Pro should display a pink light to show it is updating its FW. Once complete the system will boot normally and display flashing green orientation lights and a flashing white status light.

 Test radio channels, arming, and disarming behavior after firmware updates to ensure radio mapping has been preserved. Incorrect radio mapping can lead to loss of control.

Motor Alignment

ALTA Pro's motors are aligned at the factory at an angle relative to the chassis. This slight angle improves aircraft yaw authority and reduces the possibility of clockwise and counterclockwise turning motors from spinning at different speeds during stable hover. However, this alignment can be lost when opening the ALTA Pro chassis or if a boom needs to be replaced.

If the motors need to be realigned, follow the realignment procedure, then verify realignment was successful using the [Pixhawk Flight Review](#) software.

To perform a realignment, Freefly recommends using a small, digital angle gauge with a flat surface so it can rest on the bottom of the motor mount (for example, the Wixey WR300 angle gauge).

Alta Pro Motor Realignment Procedure

1. Place ALTA Pro on a level surface.
2. Place a digital angle gauge on the chassis next to the boom facing outwards.
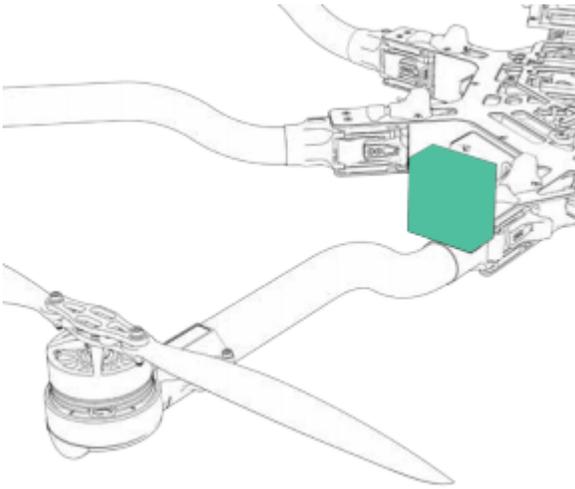
3. Zero the angle gauge.
4. Starting at motor 1, place the digital angle gauge on the flat surface of the motor mount with the gauge facing outwards.
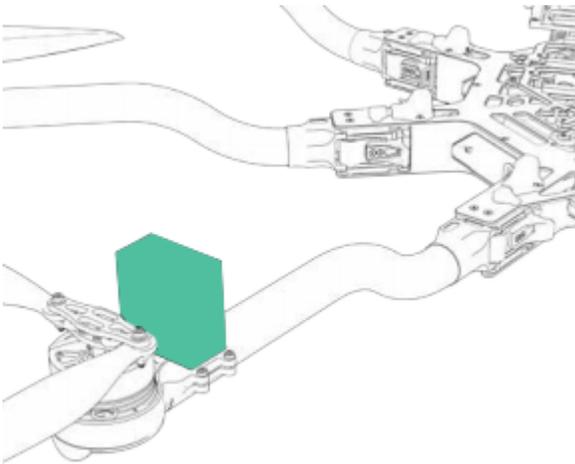
4. If the gauge reads a value outside the range 2.5°±0.1°, loosen the motor mount clamping bolts. While placing slight inward pressure on the motor, rotate the motor until the angle gauge indicates 2.5°±0.1°. When viewed from the end of the boom:

a. Motors 1, 3, 5 and 7 should be rotated clockwise.
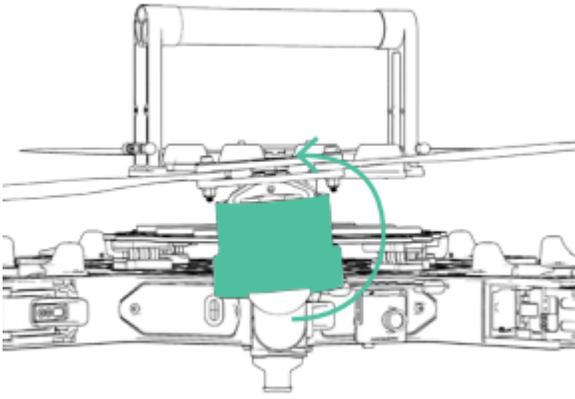
When rotating the motor, do not pull outwards on it.

6. Apply threadlock as required (Loctite 222 recommended), and tighten the motor mount bolts to 0.8 N-m (7 in-lbs). Do not over-torque the bolts.
7. Repeat steps 2 through 6 for the additional motors.
8. After aligning motors, recheck motor mount alignment and clamping bolt tightness.

Motor Alignment Verification Flight Test Procedure

1. Complete Unpacking and Setup, Before Starting and Before Takeoff checklists.
2. Enter a hover for at least 10 seconds. Do not yaw during the hover.
3. Perform the 'After Every Flight' checklist.
4. Retrieve the microSD card from the GPS module and open it with a computer.
5. Open the ALTA Flight Data Viewer.
6. Drag and drop the latest .csv data log file of the test flight from the microSD card on to the ALTA Flight Data Viewer window.
7. Under the Data Seeker section, select Hover from the Seek Event drop down box.
8. In the Flight Statistics section, look at the Yaw CW Bias value. It should be within +/- 5%. It Yaw CW Bias is outside +/- 5%, recheck motor alignment.

Guidelines Following an Accident

Guidelines Following an Accident

Extra precautions should be taken following an accident, including a crash, tip over, propeller strikes with solid bodies, or other abnormally stressing events. Contact Freefly Customer Support immediately after an accident for guidance as field inspections are no substitute for consultation and direct inspection and repair of damage by Freefly.

Freefly Customer Support can be reached at support@freeflysystems.com or by phone at +1 (425) 485-5500.

ALTA Pro is a precisely tuned flying machine with sensitive electronics and may become damaged or adversely affected by crashes, tip overs, propeller strikes with solid bodies, or other abnormally stressing events. Freefly recommends contacting Customer Support immediately for guidance in case of any of these events. Field inspections are no substitute for consultation and direct inspection and repair of damage by Freefly

Typical inspection points after an accident may include, but not be limited to, the following to gauge the flight-worthiness of ALTA Pro prior to subsequent flights:

- Propeller blade and hub damage
- Propeller tip spacing
- Motor alignment
- Chassis plate damage
- The Toad In The Hole spacer in the center of the ALTA Pro
- Booms for damage or cracking

- Position light covers
- Landing gear
- Closeout panels
- Hinge frame alignment
- Hinge tension-compression link and latch

Troubleshooting

General Warnings

Symptom	Potential Cause	Potential Solution
Boot Fail	Voltage limits exceeded	Check voltage of flight packs and replace as necessary
Compass readings out of limits	Check surroundings and boot in an area away from ferrous objects. Recalibration of the compass.	
Compass Warning	Invalid compass calibration	Calibrate the compass
GPS Warning	GPS/Compass Unit has become disconnected	Check the GPS/Compass unit wiring for damage
Accelerometer Warning	Hard landing	Reboot ALTA Pro
Motor Warning	ESC or Motor failure or error	Contact Freefly Customer Support immediately. Do not continue flying ALTA Pro.

Flight Controller

Symptom	Potential Cause	Potential Solution
ALTA Pro will not arm	Radio not bound	Follow radio controller manufacturer's binding procedure

Symptom	Potential Cause	Potential Solution
	Radio not mapped properly	Check radio mapping charts for correct behavior. Adjust mapping as necessary in ALTA Pro QGroundControl
	Flight Controller boot not successful	Power cycle ALTA Pro. Ensure it does not move during boot. If ALTA Pro must move during boot (such as on a moving platform), use Motion Booting
	Low Battery	A low battery error latches and does not allow further take off without a battery replacement.

Flight Behavior

Symptom	Potential Cause	Potential Solution
Unexpected flight behavior	Tuning too high or too low	Revert tuning to the last known working configuration. Set tuning back to default values
Alta Pro seems to "hop" or "dip" at the end of a climb	Hover throttle not set correctly	Change hover throttle to match weight of aircraft. 49% for ~10lb payload, closer to 40% for light aircraft.
ALTA Pro does not maintain level pitch or roll	Pitch or Roll Trim position not set	Use the ALTA app to set the appropriate pitch and roll trim
ALTA Pro oscillates or vibrates during flight	Tuning too high or too low	Check flight settings and tuning parameters in the App. Revert tuning to the last known working configuration. Re-tune.

Symptom	Potential Cause	Potential Solution
	Propellor Damage	Check for damage to propeller blades. Replace with spares as required.
	Propeller blades unbalanced	Replace with spares as required. Propeller blades are balanced and matched at the factory.
	Hinge or motor misalignment	Thoroughly inspect ALTA Pro following any accident. Contact Freefly for further inspection and assessment.
	Ice on Propellers	Ice build-up is causing vibrations due to unbalanced propellers. Remove ice from propellers before further flights.
ALTA Pro is sluggish in response to commands	Tuning too low	Check tuning in ALTA Pro and adjust as required
	Flight weight is over limit	Weigh the ALTA Pro and compare to the Allowable Gross Weight table in this manual. Remove weight.
ALTA Pro ascends or descends when switching between flight modes	Hover Throttle set incorrectly	Follow the instructions listed in the ALTA Pro Flight Parameters section of this manual to adjust Hover Throttle
ALTA Pro does not maintain heading	Yaw during boot	Re-initialize ALTA Pro while keeping ALTA Pro stationary in all directions
Unexpected behavior in Position Mode	Position lock not achieved	Monitor ALTA Pro QGroundControl and takeoff only after Position Lock has been achieved with strong GPS signal
	Incorrect heading due to yaw during boot	Re-initialize ALTA Pro while keeping ALTA Pro stationary in all directions
	Compass corruption or calibration	Check surroundings for ferrous objects or magnetic interference. Calibrate the compass.

Symptom	Potential Cause	Potential Solution
ALTA Pro circles a point in Position Mode	Compass calibration is invalid	Calibrate the compass
	Position tuning values too high	Reduce Position tuning values very slightly following the PX4 tuning guide.
ALTA Pro does not track straight in Position Mode	Compass calibration invalid	Perform a manual compass calibration.
ALTA Pro does not Return-to-Land when commanded	Position Lock not achieved	Monitor the ALTA Pro QGroundControl to ensure position lock has been achieved with strong GPS signal
ALTA Pro wobbles when descending	Vertical descent into turbulent air from propellers	Descend at a slight angle relative to vertical so the ALTA Pro does not fly into turbulent air from propeller downwash

Default Tuning Values

****https://freeflysystems.com/support/alta-pro-support****