INSPIRED FLIGHT

IF1200A Hexacopter

HereLink Blue
HereLink Black
Long Range Telemetry

Pilot Operating Handbook

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1. Safety Information and Notes

The IF1200A is a high-performance system, engineered for safe use. Where appropriate, this manual alerts the user to specific actions necessary for safe operation of the aircraft.

The following alert symbols are used:

Symbol	Meaning
	General alert to an action or condition that may affect the safe operation of the equipment.
	Indicates a hazardous situation that, if not avoided, can result in death or serious injury.
	Indicates hazards or unsafe practices which could result in severe personal injury or death
	Indicates hazards or unsafe practices which could result in minor personal injury or equipment damage.

NOTE	Offers important information about a topic.

2. IF1200A Overview

The IF1200A is an American-made, NDAA-compliant heavy-lift hexacopter. The IF1200A uses the Open Source ArduPilot Flight Control System running on an NDAA compliant CubePilot Blue Cube H7. This User Manual describes how to use the full functionality of this aircraft to meet your most demanding needs.

There are three models of the IF1200A, which differ according to which remote control they use:

- IF1200A HereLink Blue: uses the NW Blue HereLink Blue remote control
- IF1200A HereLink Black: uses the CubePilot HereLink hand controller
- IF1200A Long Range Telemetry (LRT): uses the Jeti DS-12 hand controller in conjunction with the RFD900x-US radio.

All three versions of the IF1200A are identical except for the remote control. This Pilot Operating Handbook (POH) describes all three versions.

Figure 1 below is a front view of the IF1200A aircraft. See Figure 2 on the following page for a top view.

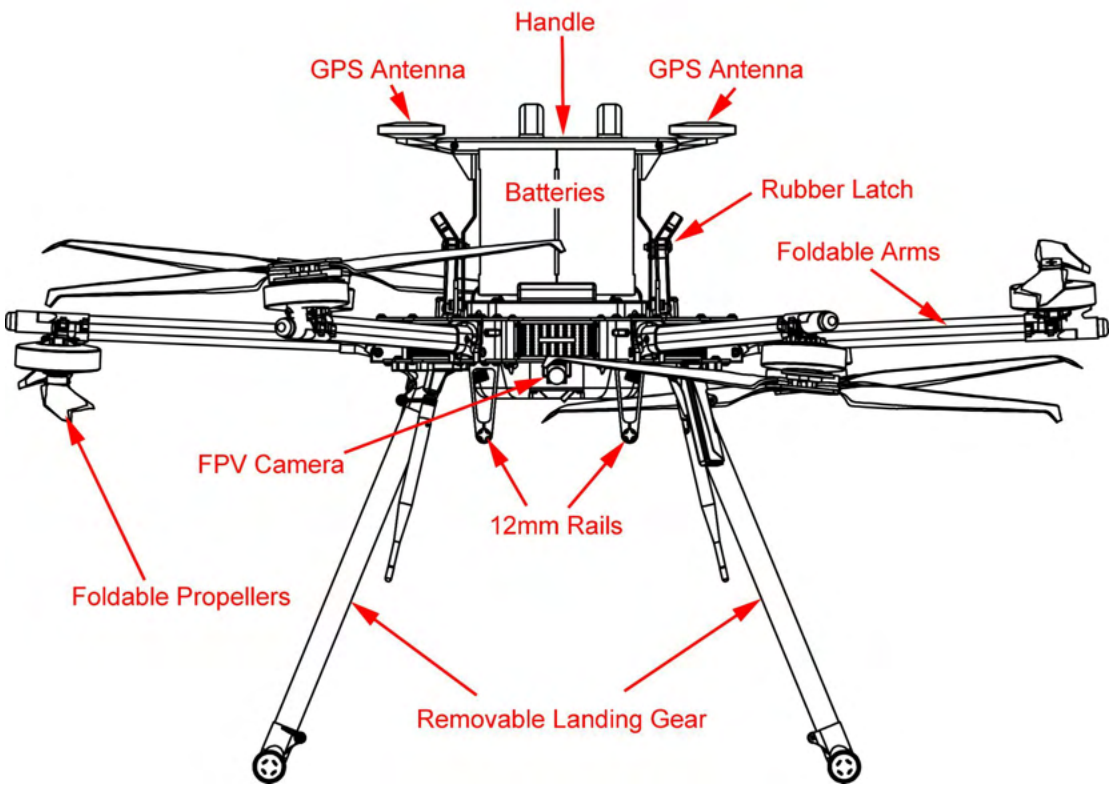


Figure 1. IF1200A (Front View)

Figure 2 below is a top view of the IF1200A aircraft, and shows some features used to orient yourself to the aircraft.

NOTE: The Handle incorporates a dual GPS, and also serves as a battery clamp for the aircraft.

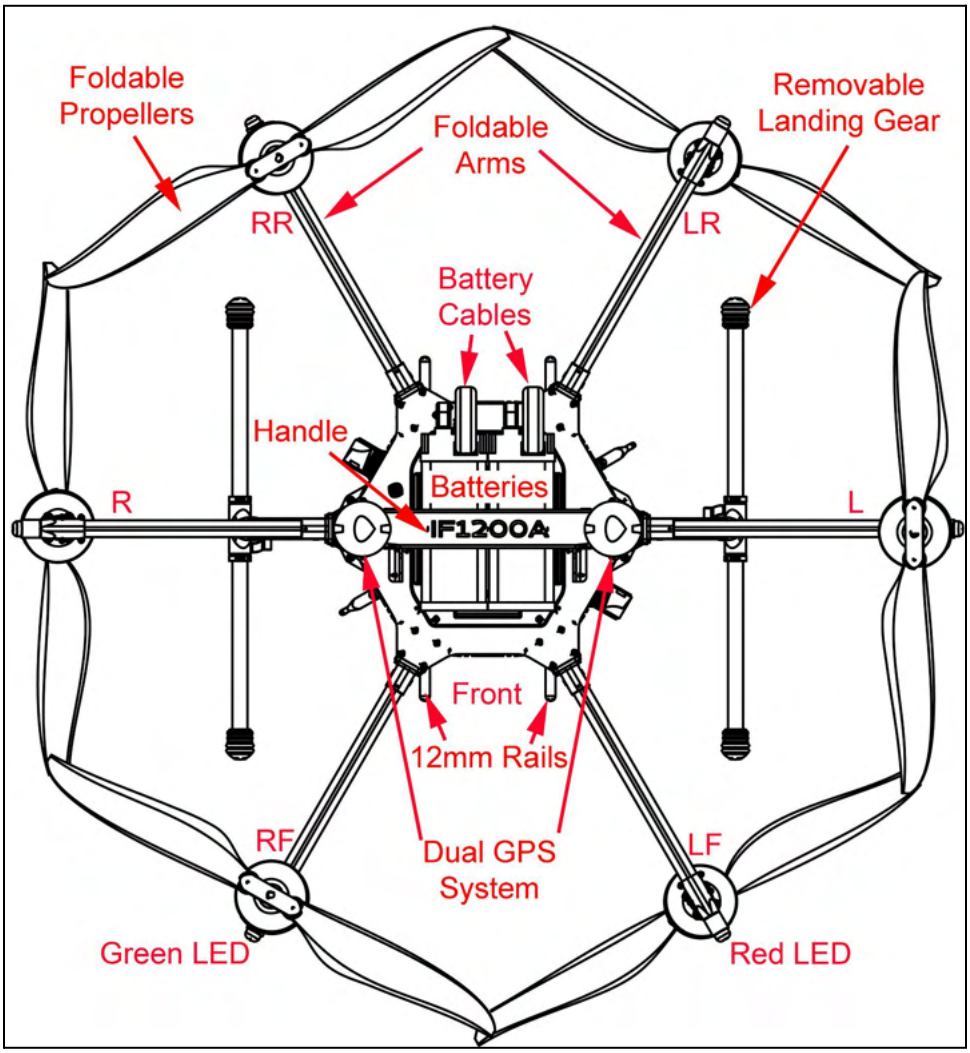


Figure 2. Top View of the IF1200A Aircraft facing towards you

Orientation: The six arms in Figure 2 are designated as follows:

- **LF**: Left Front (red LED)
- **RF:** Right Front (green LED)
- **R:** Right side of aircraft (white LED)
- **RR:** Right Rear (white LED)
- **LR:** Left Rear (white LED)
- **L:** Left side of aircraft (white LED)

3. Hand Controller Descriptions

The IF1200A includes one of the hand controllers shown below. Click on the link to go to the page for that hand controller.

NOTE: The HereLink Blue and HereLink Black both have QGroundControl software installed.

	HereLink Blue (NW Blue) Uses QGroundControl HereLink Blue Hand Controller
	HereLink Black (CubePilot HereLink HD video transmission system) Uses QGroundControl HereLink Black Hand Controller
	IF1200A Long Range Telemetry (LRT) Uses a Jeti DS-12 hand controller and RFD900x-US long range telemetry radio Customer supplied computer with QGroundControl and/or Mission Planner installed Long Range Telemetry (LRT)

4. HereLink Blue Hand Controller

This configuration uses the HereLink Blue hand controller, made by NW Blue. The User Guide for this hand controller can be found online at:

https://docs.nwblue.com/nw-blue/products/herelink-blue

The HereLink Blue has an internal battery which can be charged via a micro USB port on the bottom of the unit.

The HereLink Blue has QGroundControl software installed at the factory.

Note: The HereLink hand controller can be used while it is being charged.

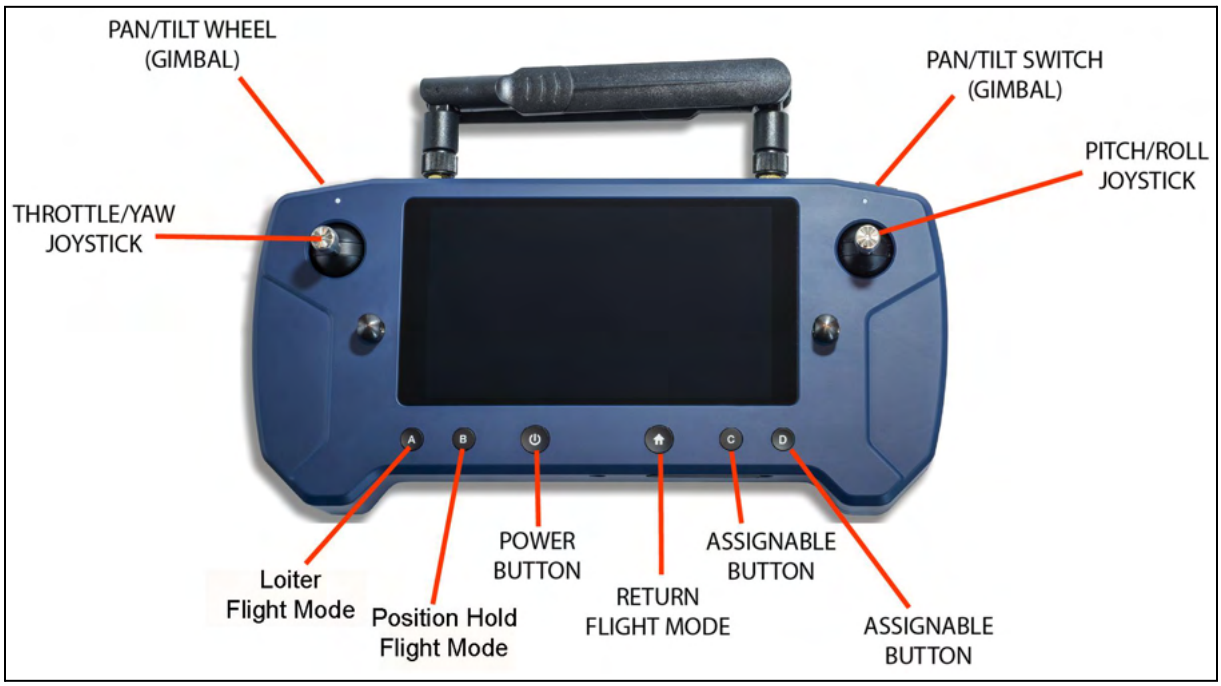


Figure 3. HereLink Blue Hand Controller

5. HereLink Black Hand Controller

This IF1200A version uses the HereLink Black, made by CubePilot. The HereLink Black User Guide can be found online at:

https://docs.cubepilot.org/user-guides/herelink/herelink-overview

The HereLink Black has an internal battery which can be charged via a micro USB port on the bottom of the unit.

The HereLink Black hand controller has QGroundControl software installed at the factory.

Note: The HereLink hand controller can be used while it is being charged.

Figure 4. HereLink Black Hand Controller

6. Long Range Telemetry (LRT)

The LRT system includes:

- IF1200A aircraft
- Jeti DS-12 hand controller
- RFD900x-US telemetry radio

Customer-supplied:

- Laptop or tablet, with QGroundControl and/or Mission Planner installed. The RFD900x-US telemetry radio plugs into a USB port on this device.

The RFD900x-US telemetry radio connects to a USB port on a device (laptop or tablet).
The device operates as a ground control station. MAVLink compatible Ground Control station software such as QGroundControl (QGC), Mission Planner (MP), UGCS, or MAVProxy must be installed on the device before flying.

Figure 5 below shows how the parts of the LRT work together.

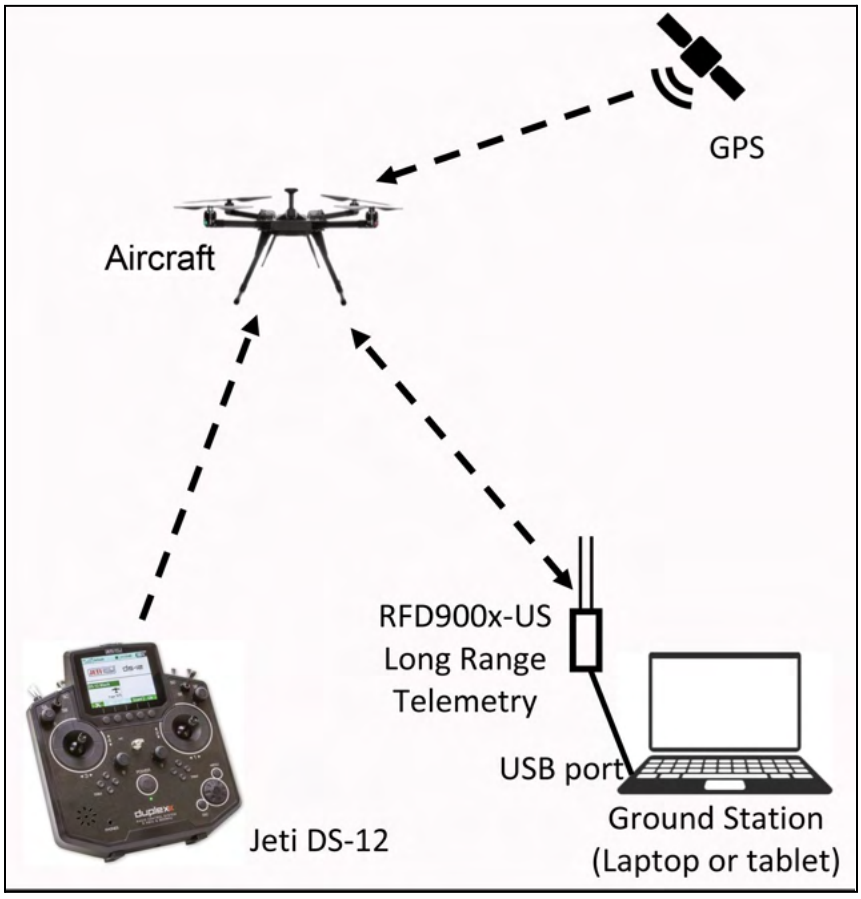


Figure 5. Long Range Telemetry Signals

Figure 6 below shows the Jeti DS-12 remote control.

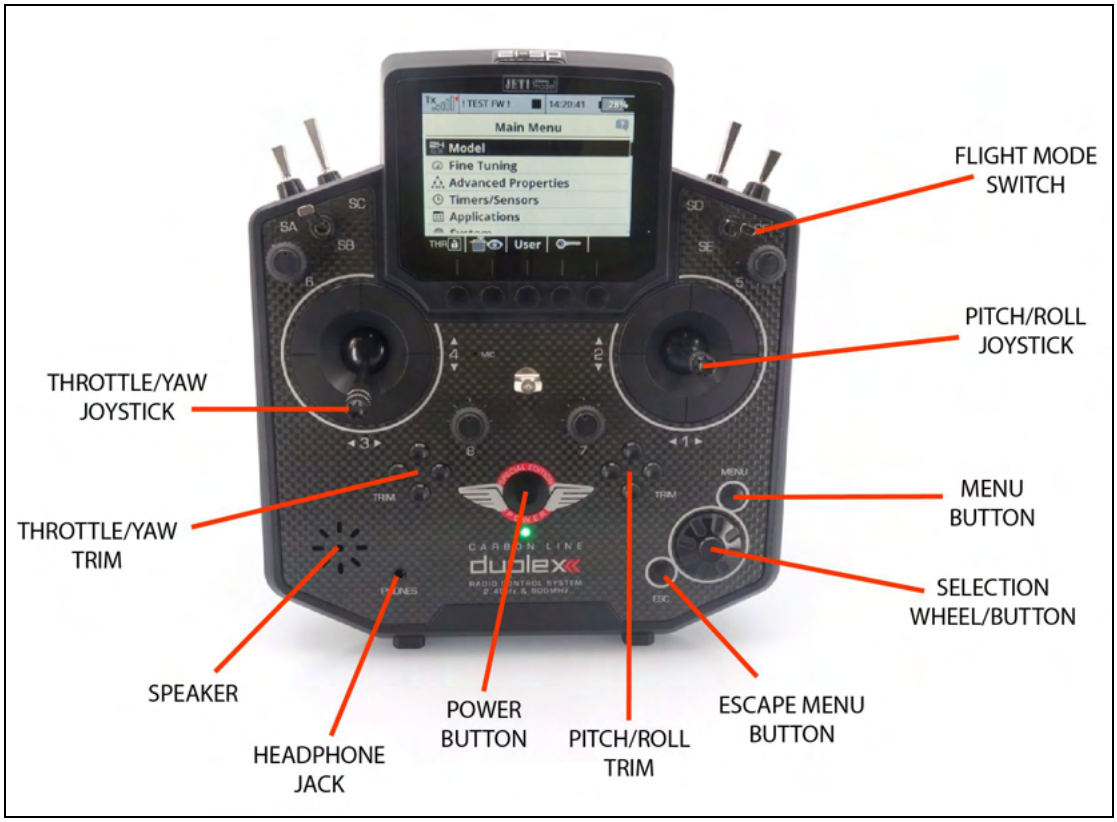


Figure 6. Jeti DS-12 Hand Control

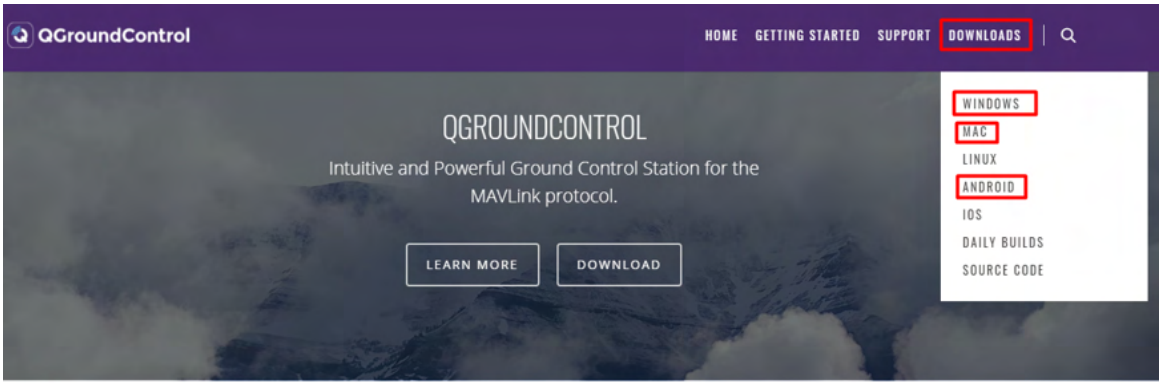
Flight Mode Switch Settings on Jeti DS-12

The Flight Mode Switch in the upper-right corner of the Jeti DS-12 (see Figure 6 above) is a three-position switch that selects between the following flight modes:

Switch Position	Flight Mode
Upper	**Loiter**
Middle	**Position Hold**
Lower	**RTL (Return to Launch)**

7. Install QGroundControl

QGroundControl (QGC) is an open-source mission planning and configuration software application for UAVs using the MAVLink Communication Protocol. QGC is well documented, and first-time users are encouraged to review the available user guide at: https://docs.qgroundcontrol.com/en/. Training videos describing all aspects of planning and uploading an autonomous mission are available online.
Installing QGC or MIssion Planner on a laptop is required for the LRT configuration. It is optional for the HereLink configurations.

Step	Action
1	Download the QGroundControl installer from http://qgroundcontrol.com/. The download links for PC, Mac or Android tablets can be found on the top right 'Downloads' drop-down menu of the website (see below).
2	Follow the prompts on the website to download and install QGC to your device.
	
3	To establish a link between the aircraft and QGC, power on the ground station (and open QGC) BEFORE you power on the aircraft. QGC automatically connects to the aircraft when it powers up.
End of Procedure	

8. Install Mission Planner

Mission Planner is an open-source mission planning and configuration software application for UAVs using the MAVLink Communication Protocol. Mission Planner is well documented, and first-time users are encouraged to review the available user guide at: https://ardupilot.org/planner/. Training videos describing all aspects of planning and uploading an autonomous mission are available online.
Installing QGC or MIssion Planner on a laptop is required for the LRT configuration. It is optional for the HereLink configurations.

Step	Action
1	Go to the following link to download Mission Planner: https://ardupilot.org/planner/docs/mission-planner-installation.html.
2	Follow the prompts on the website to download and install Mission Planner to your device.
	
3	To establish a link between the aircraft and Mission Planner, power on the ground station (and open Mission Planner) BEFORE you power on the aircraft. Select the comm port for your radio and select Connect.”
End of Procedure	

9. Battery Charging

The IF1200A kit includes a Tattu TA1200 battery charger (see below) for charging the flight batteries. The Tattu charger can charge two batteries simultaneously. Looking at the top of the charger, you can see that both sides of the charger have the same controls, outputs, and displays.

NOTE	Please read the Tattu TA1200 Product Manual thoroughly before using the charger.

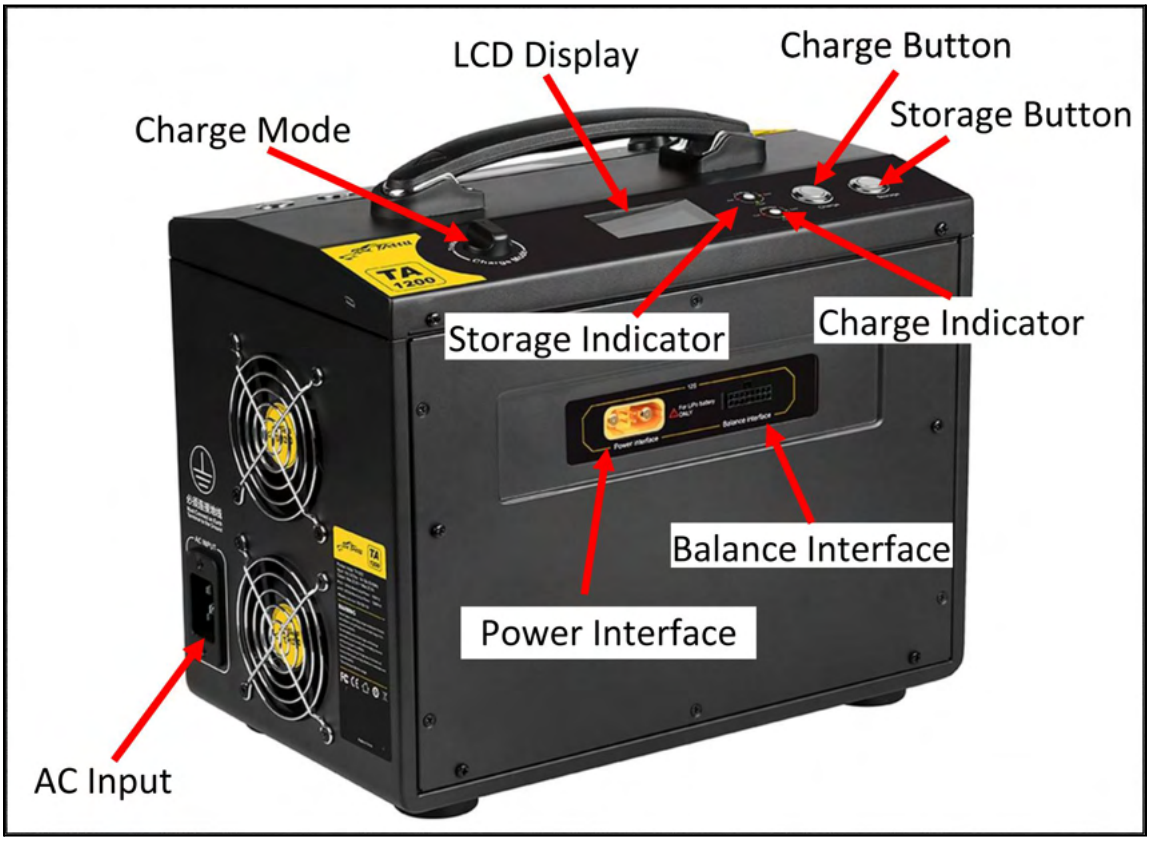


Figure 7. Tattu TA1200 Battery Charger

Charge the Flight Batteries

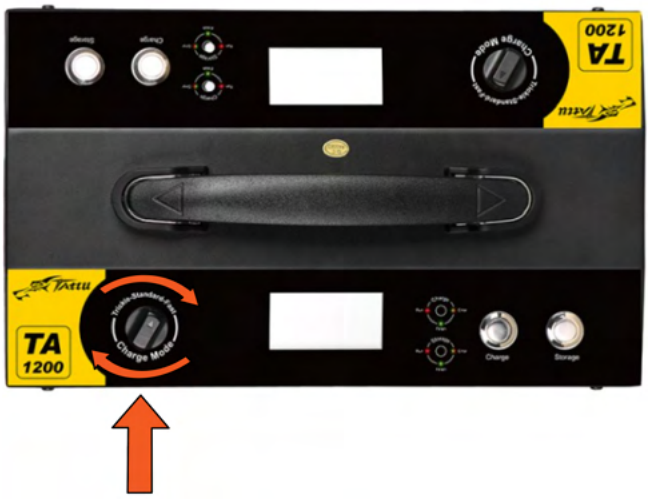
⚠	**IMPORTANT! Read the accompanying charger manual thoroughly before connecting power and batteries to the charger. It contains important safety information.**

NOTE	**Balancing cells:** The flight batteries used in the IF1200A contain multiple cells. Differences in the voltages between cells can degrade the performance of the batteries, and shorten its life. The Tattu battery charger has a function for balancing the voltages of the cells. Read the included manual to implement this function.

Step	Action
1	Connect the included AC power cable into the AC input connector on the charger.
2	Connect the other end of the AC power cable to a power source (100V–240 VAC).
3	Press the power button on the side of the battery charger (see below) to power on the unit. The internal fans begin spinning, and the LCD displays on top of the charger illuminate.
	

Continued next page

Charge the Flight Batteries, Continued

Step	Action
4	Rotate the Charge Mode dial (see below) to select the charge mode. There are three charging modes: ● Trickle: The slowest charging rate. Use Trickle mode when possible to extend the battery life. ● Standard: A compromise between Trickle and Fast ● Fast: Typically used in the field **Note:** Faster charging rates shorten the battery's lifespan.
	
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Charge the Flight Batteries, Continued

Step	Action
5	Uncap the battery cable and plug it into the Power Interface port on the charger (see below). **Note**: The battery cable and Power Interface port on the charger are designed to prevent incorrect mating of the two.
	
6	Locate the Balance Cable in the aircraft kit (see Figure 8, below). **NOTE:** The balance cable for the IF1200A is different from the balance cable for IF1200.

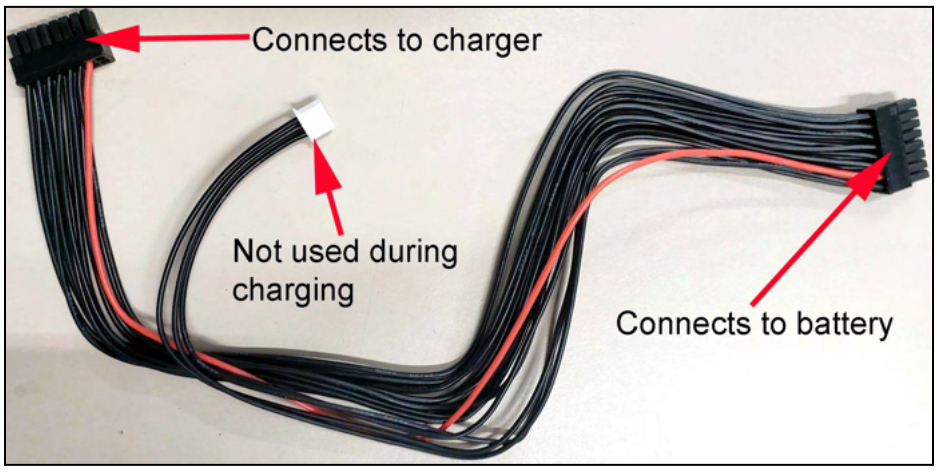

Figure 8. Balance Cable

Step	Action
7	Connect one end of the Balance Cable to the Balance Interface on the charger (see Figure 7), and the other end to the Balance port on the battery. **Note: The white connector on the balance cable is not used during charging.**
8	Once connected, the battery goes through a precharge countdown for 10 seconds, then begins charging automatically. **Note:** To skip the precharge countdown, hold the 'Charge' button for 2 seconds.
9	Cell voltages and battery levels are displayed on the LCD screen. When the batteries are fully charged, each cell voltage should be about 4.20 Volts, and the charger will display 'Fully Charged'.
NOTE	If you can't wait for the batteries to fully charge, press the Charge button to discontinue the charging process BEFORE unplugging the batteries.
WARNING	**DO NOT disconnect the battery cable from the charger while the battery is charging. Doing so may result in electrical arcing, causing severe burns to the operator.**
End of Procedure	

Storage Mode

If a battery will be shipped or will not be used for long periods of time, it is highly recommended to put the battery into storage mode. Depending on the battery's state of charge, putting the battery into storage mode will either charge or discharge the battery to a voltage that is most stable for shipping and sitting for long periods of time.

To place a battery into storage mode, plug the battery's power cable into the charger and hold the Storage button for 5 seconds. The charger will beep, the fans will spin up, and the LCD display will indicate that storage mode has begun.

Self Storage

The Internal Battery Management System supports high-power discharge. Considering the internal structure and safety of the cells, when the battery is fully charged, if the battery is static, there is no communication, and there is no high current, after waiting for 120 hours, the battery will turn on automatically. The discharge circuit, the current size is about 50ma. This process will continue until the voltage is 3.90V. For example, the remaining capacity of BMS is about 16Ah. After about 7 days, a single cell will drop to 3.90V.

When the cell voltage reaches 3.90V, the peripheral self-discharge circuit will stop working. At this point, the MCU will continue to enter a low-power sleep mode. at this time, For example: when the cell voltage is 3.90V, the remaining capacity of the BMS is about 8Ah, and at a normal temperature of 25'C, the capacity of self-consumption for a month is 500mAh, including the cell, including the self-consumption of the BMS system.

Troubleshooting Battery Charging

Error message appears on the screen:

- Unplug the battery and press the 'Charge' button to reset the interface.

Popping or arcing when plugging the battery into the charger:

- The battery likely needs to be balanced. Plug in the balance cable to both the charger and battery, then plug the main lead of the battery into the charger to conduct a balanced charge.

10. Assemble the Aircraft

This section describes how to assemble the mechanical components of the IF1200A aircraft.

Step	Action
1	Locate the landing gear parts in the shipping container. There are two landing gear, each consisting of a horizontal tube, and a vertical tube (see figure below).
2	Loosen the clamp on one of the horizontal tubes (with the rubber feet). See Figure 10 on next page.
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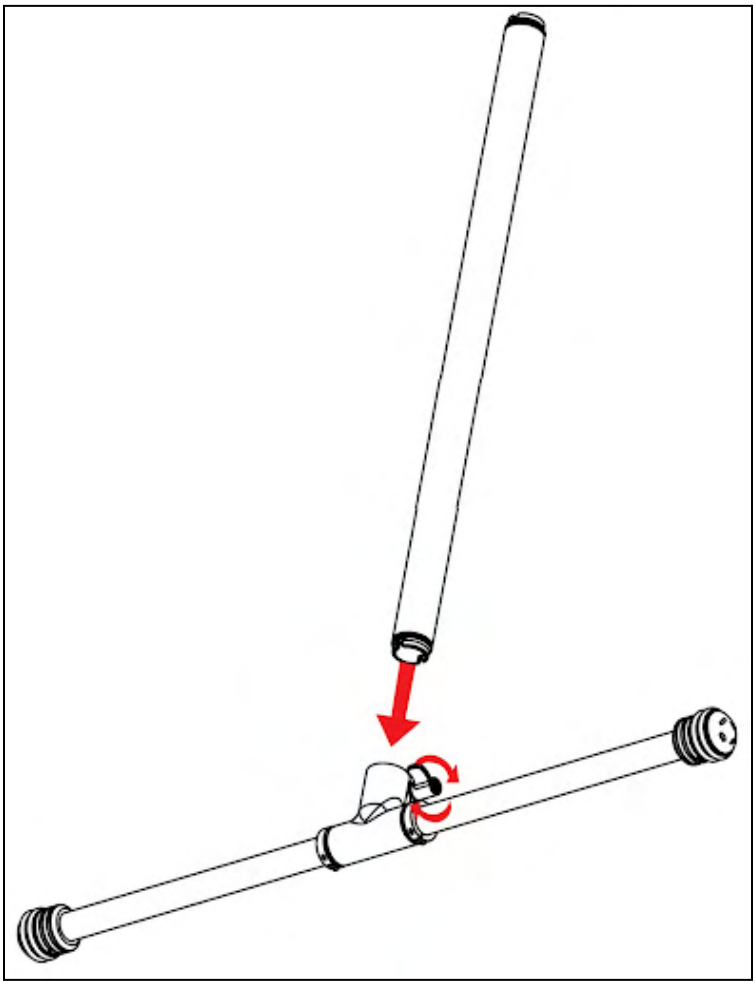

Figure 9. Landing Gear Parts

Step	Action
3	**Note:** There is a notch in the end of each vertical tube (see Figure 11 below). Insert the vertical tube so that the notch aligns with the inner features of the horizontal tube, so that the vertical tube is fully seated in the horizontal tube.
4	Tighten the clamp on the horizontal piece to secure the vertical piece in place.
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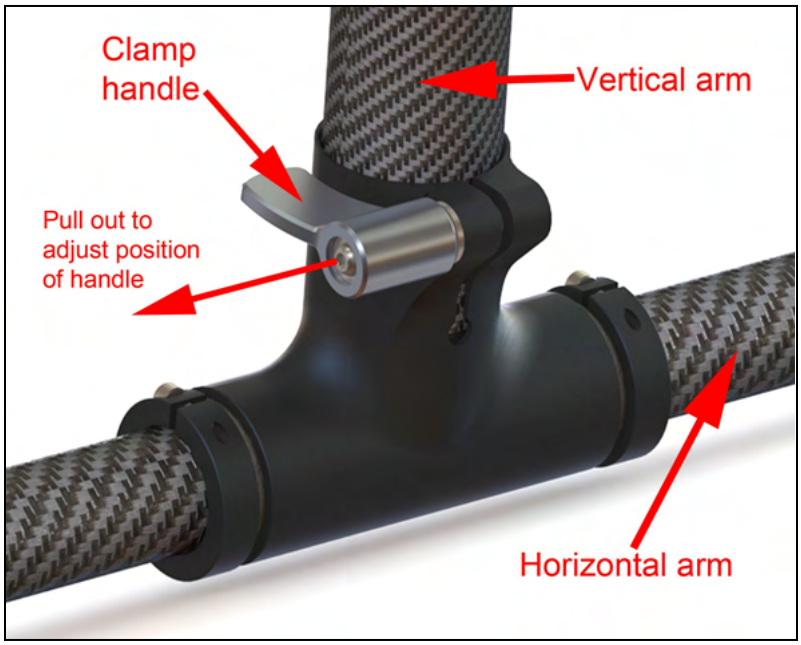

Figure 10. Landing Gear T-Clamp (shown assembled)

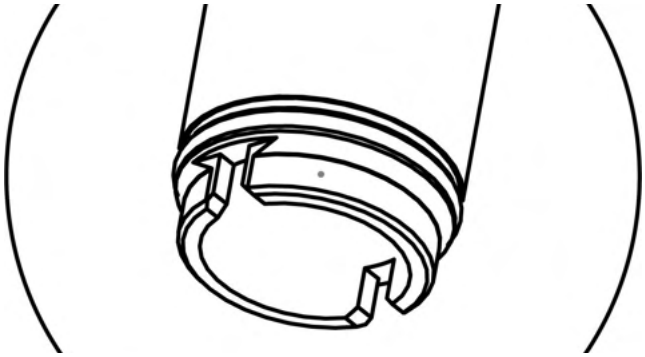

Figure 11. Alignment Notch in the end of the Vertical Tube

Step	Action
5	Repeat the previous steps to assemble the second landing gear.
6	The next steps involve lifting the aircraft body out of the shipping container with one hand, and attaching the assembled landing gear to it with the other hand. Place the assembled landing gears close to the shipping container for easy access.
NOTES	● The aircraft weighs 7.7 Kg (17 lbs), without batteries. ● In Figure 11 below, the propeller holders hold the propellers stationary on the arms for transporting or storing the aircraft. Reference is made to these later in this procedure.
7	Grasp the handle on the IF1200A body (see below), and gently remove the aircraft from the shipping container.
⚠ CAUTION	Grasp the handle at the center; **DO NOT** pull or lift the GPS antenna on either end of the handle, as this could damage the vehicle. Verify that the handle is locked in place, in the upright position.
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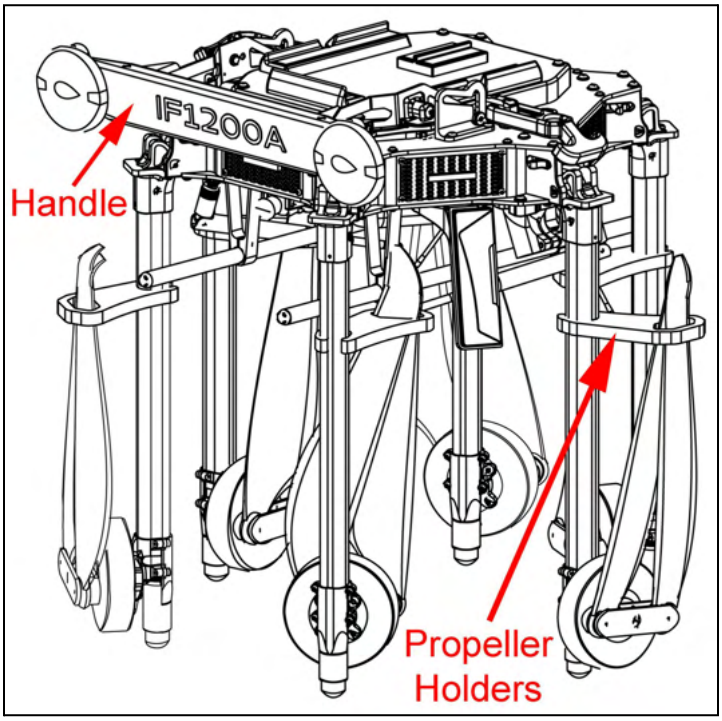

Figure 12. Aircraft Handle and Foam Propeller Holders

Step	Action
8	Refer to the figure below to locate the two landing gear sockets in the bottom of the aircraft. You insert the landing gear assemblies into these sockets in the next step.
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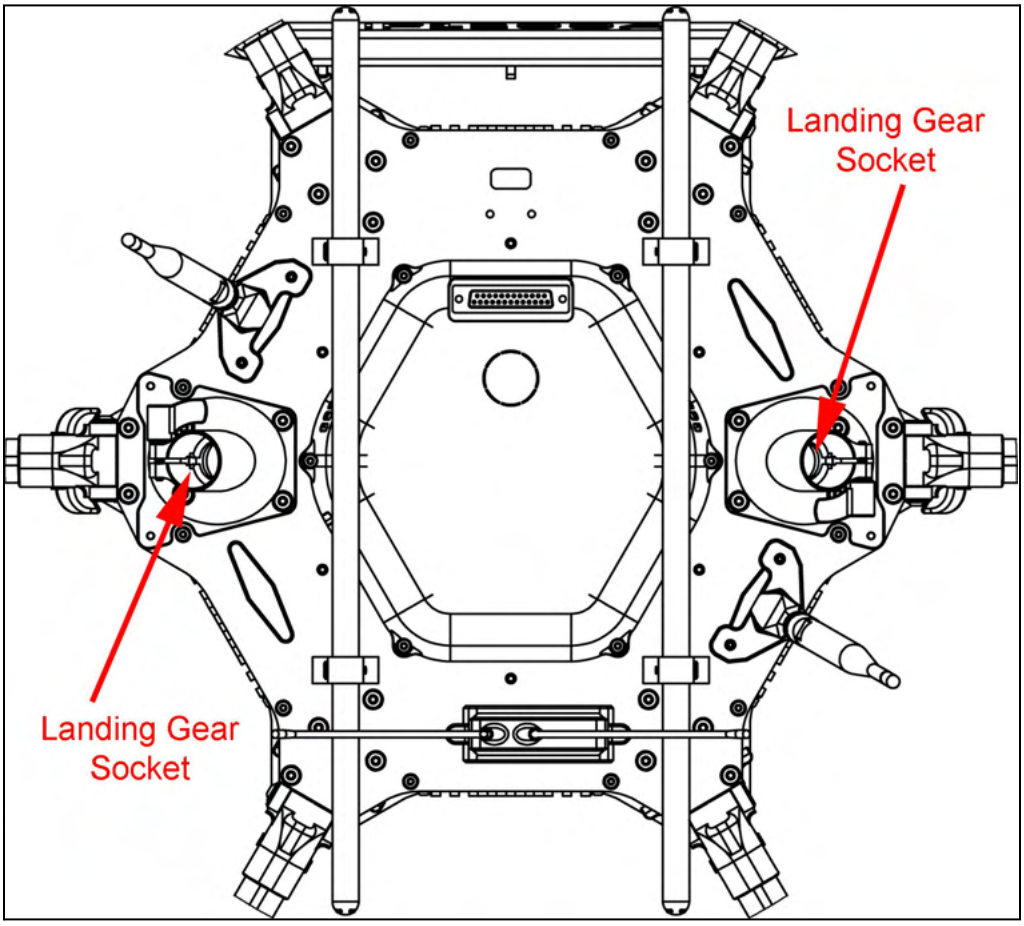

Figure 13. IF1200A Bottom View (arms excluded for clarity)

Step	Action
9	Extend and lock the two arms that are above the landing gear sockets (see below).
10	Locate the clamps on the landing gear sockets and loosen them (see the Figure on next page).
11	Insert the landing gear into the two sockets in the bottom of the aircraft (see below). Ensure the landing gear are fully inserted in the sockets. Place the aircraft on a clean work surface, on the landing gear, for the remainder of the assembly procedure.
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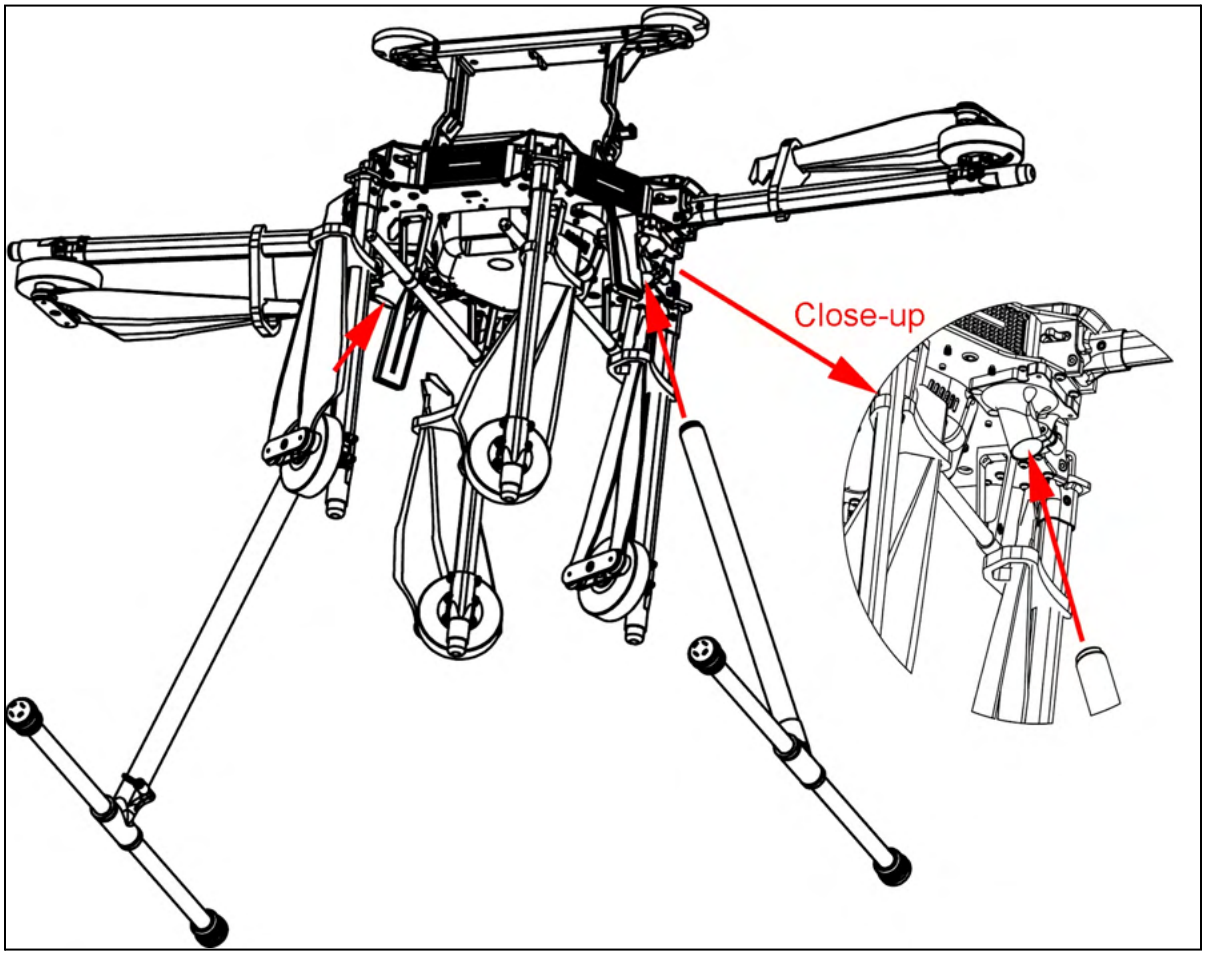


Figure 14. Arms Extended for Installing Landing Gear

Step	Action
12	Tighten the clamps (see figure below), until snug, then tighten a quarter turn more.
13	Extend the remaining arms fully, and lock them into position.
14	Gently remove the foam propeller holders that secure the propellers to the arms. Save the propeller holders for future use.
15	Completely unfold all of the propellers.
CAUTION	**Completely unfold all propellers before takeoff to avoid possible damage to the aircraft.**
End of Procedure	

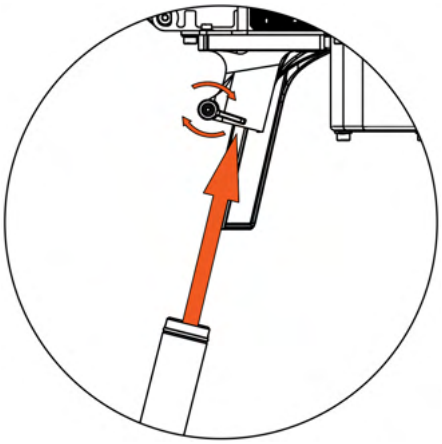
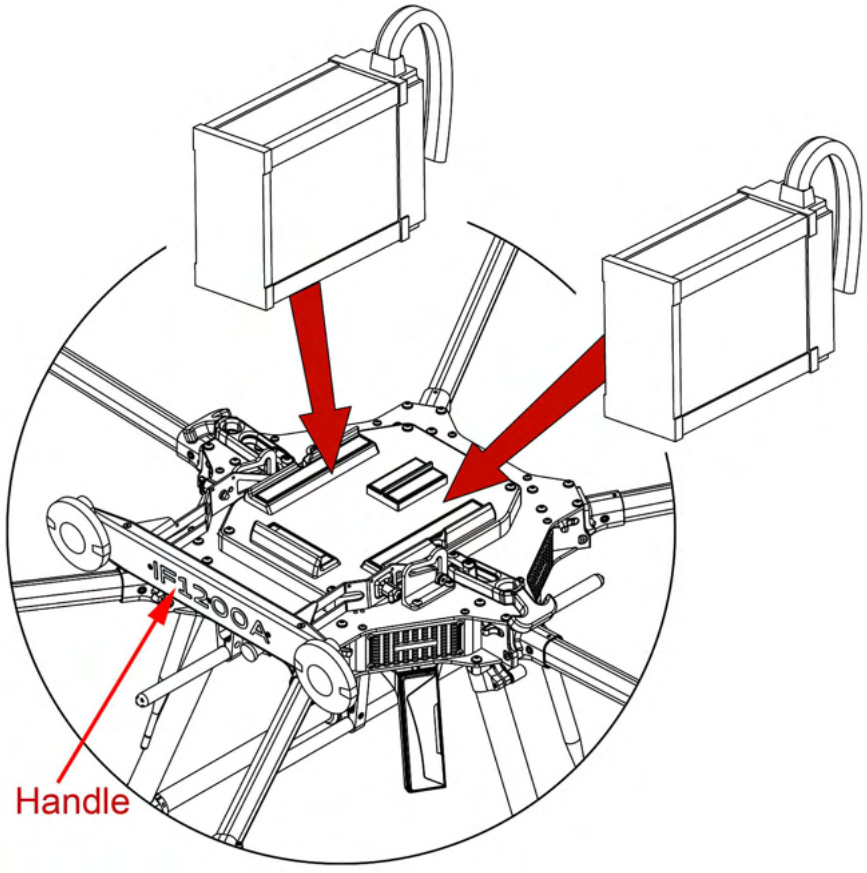


Figure 15. Landing Gear Clamp

11. Install the Flight Batteries

Step	Action
1	Locate the battery platform on the top of the aircraft (see below). The handle (see graphic), has three functions: • Carry/lifting handle for the aircraft • GPS antenna: a dual GPS system is used, with an antenna on both ends of the handle. • Clamp the batteries in place.
	
2	Place the batteries in the rubber alignment pads on the battery platform. Ensure the batteries are oriented so that their cables are towards the rear of the aircraft, as shown above. Ensure the batteries are seated firmly between the side, front, and rear mounts.
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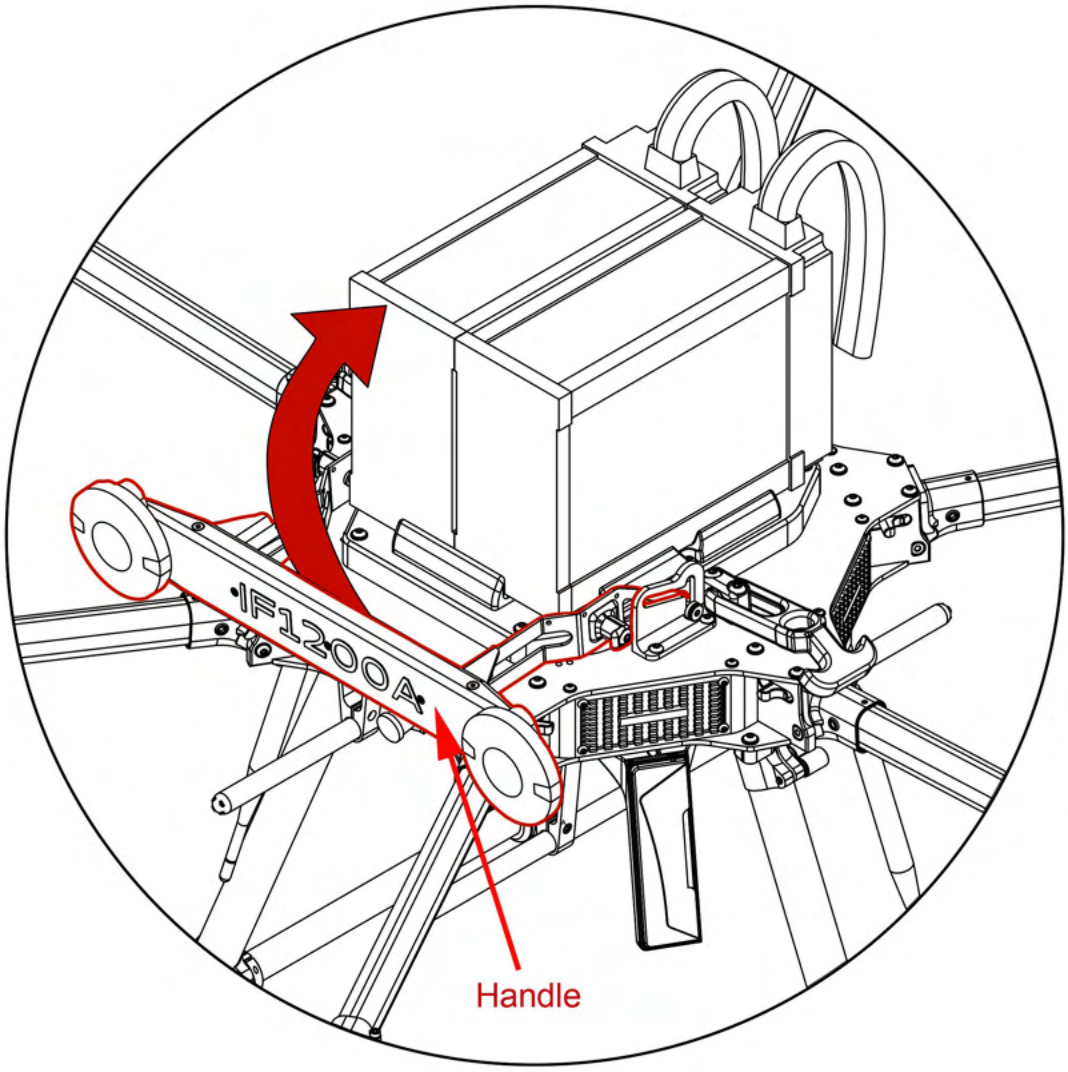
Step	Action
3	Grasp the handle (see below), and pull it out and up, so that it's above the batteries (see below).



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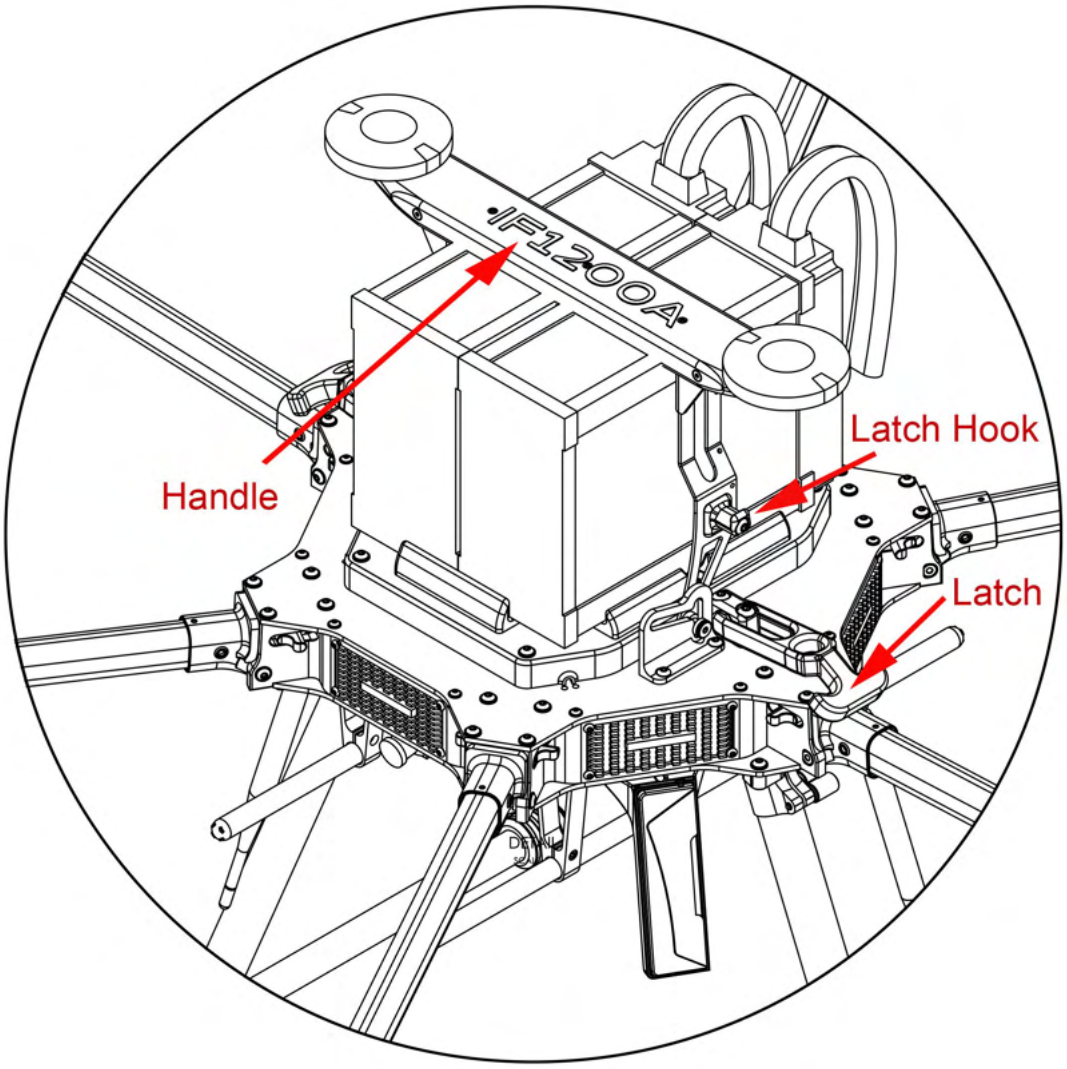
Step	Action
4	The batteries, and handle, are now in position as shown below.



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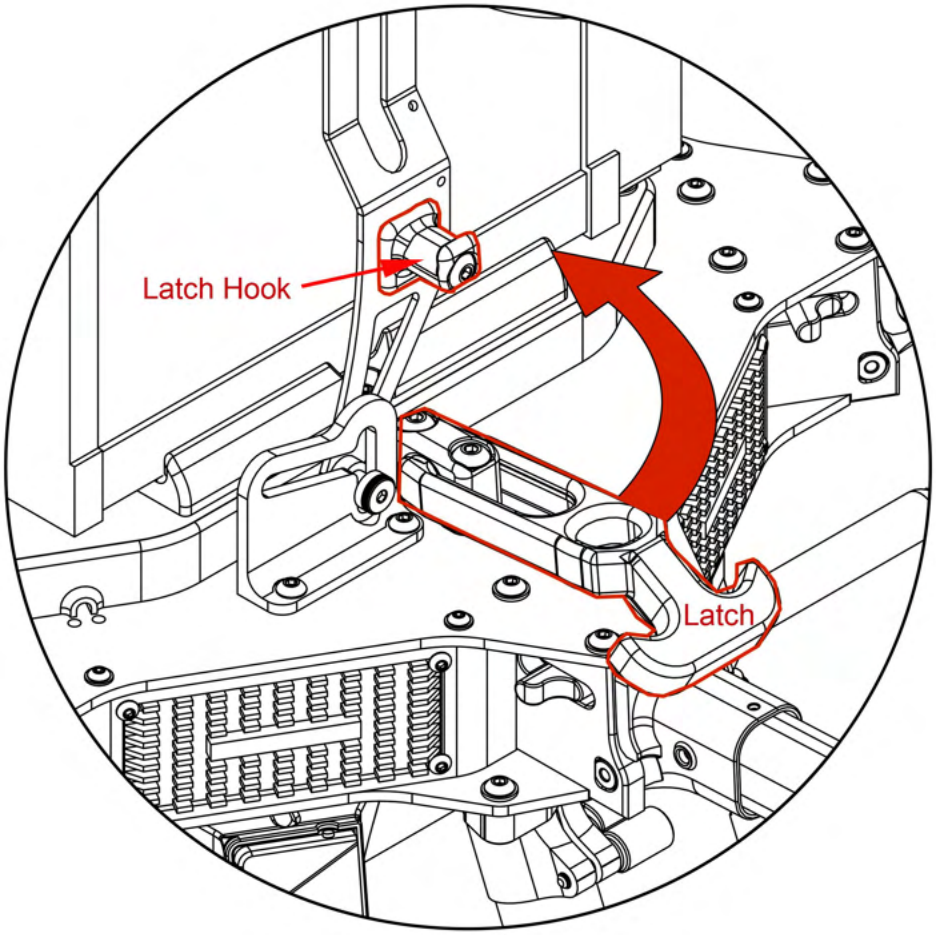
Step	Action
5	Locate the Latches on both sides of the base of the battery platform (see below). Lift them up, then secure them to the Latch Hooks on the base of the handle (see below).



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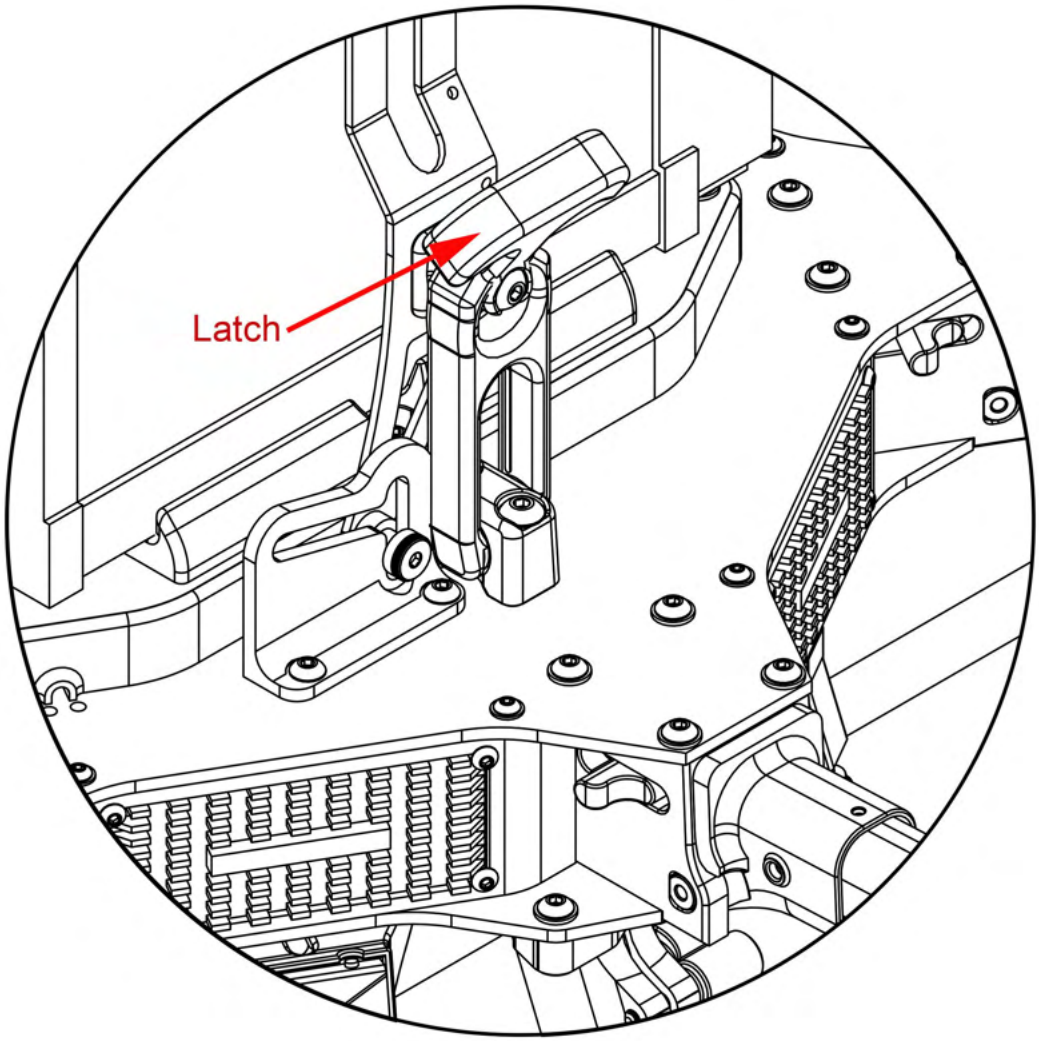
Step	Action
6	When properly secured on the Hooks, the Latches will be positioned as shown below.



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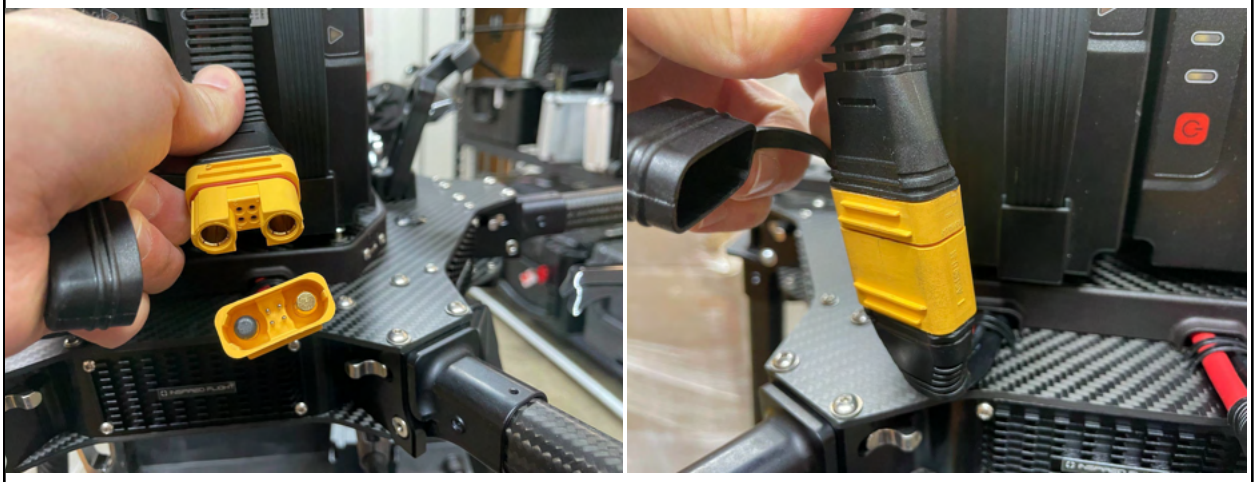
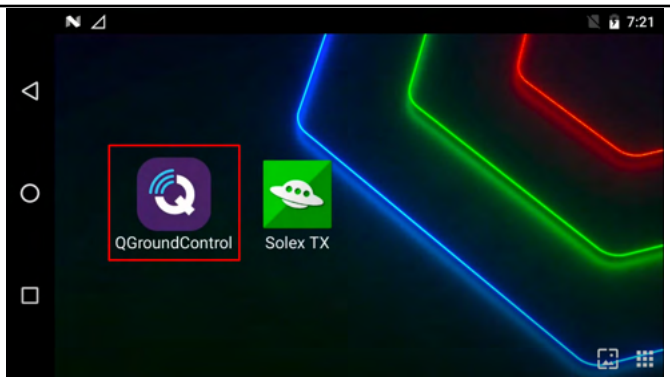
Step	Action
7	Plug the battery cables into the battery connectors on the aircraft (see below). **Note:** The mating connectors are designed to prevent incorrect connection.
	
	CAUTION **Ensure the connectors are fully mated. Failure to do so could lead to inflight failure of the aircraft or arcing and damage to the connector.**
	End of Procedure

12. Using HereLink Hand Controllers

Both the HereLink Blue and HereLink Black hand controllers have QGroundControl (QGC) software installed at the factory. Full documentation for QGC is available at: https://docs.qgroundcontrol.com/en/. Training videos describing all aspects of planning and uploading an autonomous mission are also available online.

Step	Action
1	Install the antennas on the top of the hand controller.
2	Press and hold the power button on the hand controller. Two applications appear on the hand controller's screen (see below). Select QGroundControl (QGC).
	
3	Two icons appear in the toolbar in the upper-left corner of the QGroundControl screen (see below). The Fly icon is highlighted. Next to it is the Plan icon. Tap on either icon to switch between the two screens. **Note**: When QGroundControl is first opened, it defaults to Fly mode, which displays a connected camera's video stream and map.
	
Plan	Use this screen to plan and upload autonomous missions to the UAV. Waypoints can be added and configured to plan a mission. Tools are available to create various patterns such as surveys and corridor scans. A mission command list appears on the right-hand side of the screen where you can change waypoints and planned actions.
Fly	Monitors the aircraft during operation, providing telemetry readouts and an overlay of any video streaming. You can toggle between a map view of the aircraft's current flight, or a video stream if the aircraft is equipped with that capability. All in-flight actions, emergency and otherwise, can be accessed through the Fly view.
Note: QGC can be accessed on the HereLink or on a laptop receiving a Wi-Fi signal from the HereLink.	
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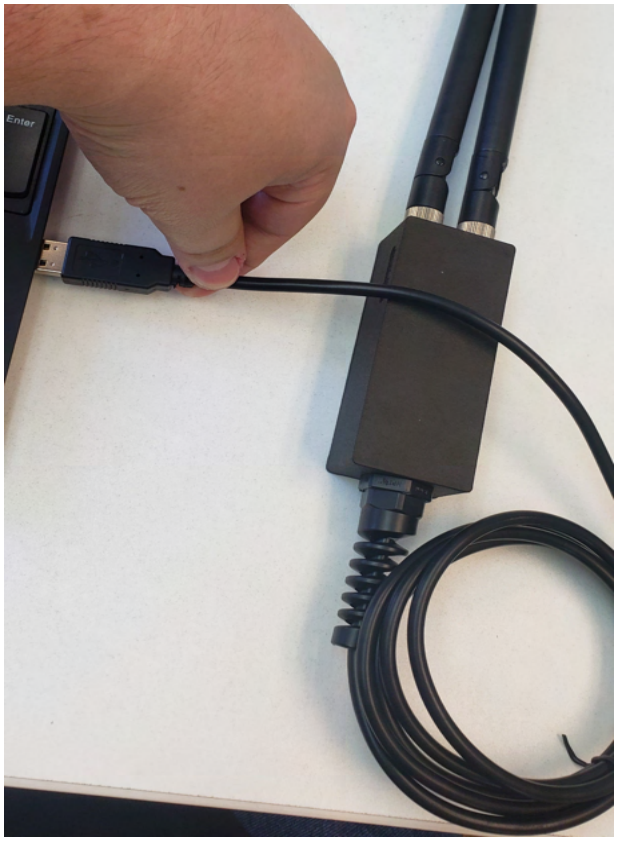
Step	Action
4	**GPS satellite count and status:** This is indicated in the toolbar at the top of the QGroundControl screen (see below). The top number is the satellite count, the bottom number is the HDOP (horizontal dilution of precision).
NOTE	To assure a GPS lock, the aircraft must be connected to a minimum of 10 satellites before flying.
	
End of Procedure	

13. Set Up the Long Range Telemetry Radio

Note: IF1200A LRT Only
Note: The IF1200A LRT can be flown in Loiter, Position Hold, or Return to Launch modes using only the Jeti DS-12 transmitter. For Altitude mode and autonomous missions that require location information (GNSS) and aircraft information, a ground station (laptop or tablet) with the RFD900x-US connected to it is required.

Step	Action
NOTE: Before performing this procedure, your Ground Control Station software must be Installed on the device (laptop or tablet) that will be used as the ground control station.	
1	Plug the Long Range Telemetry (LRT) radio into an open USB port on the ground control station (see below).
	
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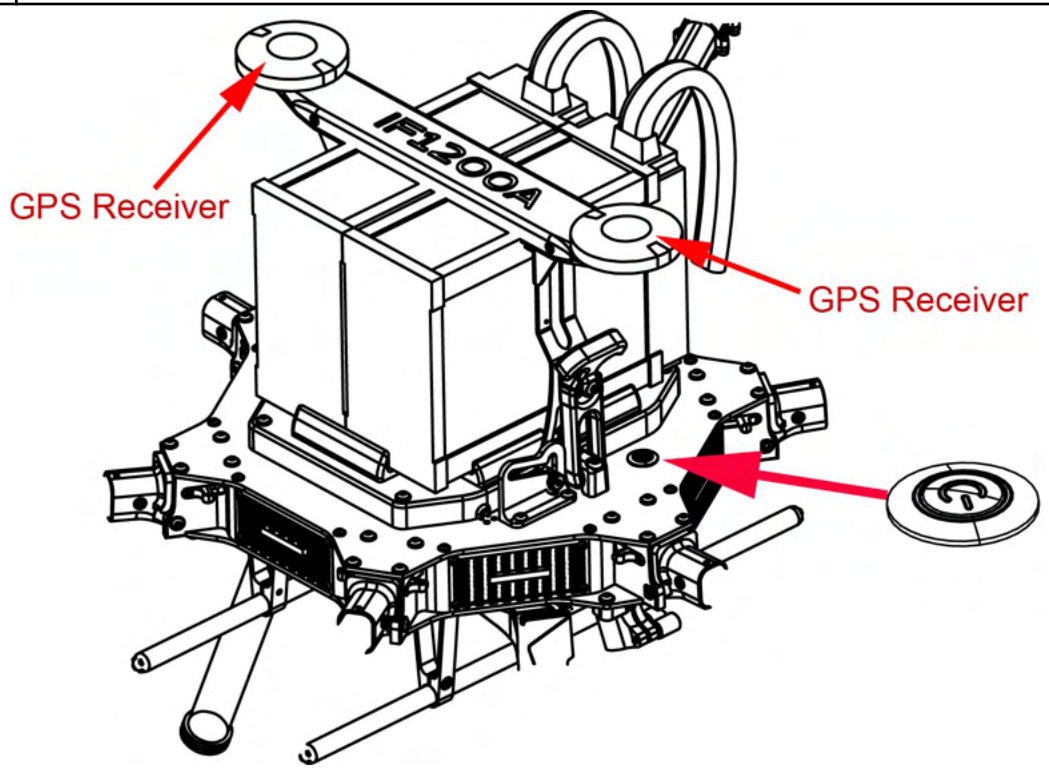
Step	Action
2	Turn on the Jeti DS-12 by pressing the Power button for two seconds (see below).
	
3	When the screen activates, it prompts you with, “Start Transmitter?” Press the button “Yes” (see below).
	
End of Procedure	

14. Power On the Aircraft

Step	Action
1	Press and hold the power button (see graphic below) on the chassis until the button illuminates green. This takes about nine seconds.
	
2	**Navigation LEDs**: There are navigation LEDs on the end of all six arms on the aircraft, just below each motor. These become active as follows: • Front-left: Red (port) • Front-right: Green (starboard) • Side & Rear: a white LED, on each (2) rear motor
3	The aircraft will emit a series of beeps during the initialization sequence. The GPS status indicators (there are two, graphic in Step 1) behave as follows: • **Blue flashing on and off**: Waiting for GPS lock • **Flashing green**: GPS Lock obtained, ready to fly. • **Red flashing**: Error - See GCS for error message details, or reboot aircraft.
End of Procedure	

GPS LED / Audio Behaviors and Meanings

GPS LED / Audio Behavior Meanings	
Behavior	**Meaning**
Flashing red and blue	Initializing gyroscopes. Hold the vehicle still and level while it initializes the sensors.
Flashing blue	Disarmed, no GPS lock found
Solid blue	Armed, no GPS lock
Flashing green	Disarmed (ready to arm), GPS lock acquired
Fast flashing green	Same as above but GPS is using SBAS
Solid green - with single long tone at the time of arming	Armed, GPS lock acquired. Ready to fly
Flashing double yellow	Failing pre-arm checks (system refuses to arm). Check the pre-arm error message
Single Flashing yellow	Radio failsafe activated
Flashing yellow - with quick beeping tone	Battery failsafe activated
Flashing yellow and blue - with high-high-high-low tone sequence (dah-dah-dah-doh)	GPS glitch or GPS failsafe activated
Flashing red and yellow - with rising tone	EKF or Inertial Nav failure
Flashing purple and yellow	Barometer has problem
Solid Red	Error. Usually due to inability to detect SD card (try to re-plug or replace SD card), MTD device, or IMU sensors. Analysis can be found in BOOT.txt in SD card.
Solid Red with SOS tone sequence	SD Card missing (or other SD error, i.e., bad format etc.)
Not lighting up	No firmware detected or firmware corrupted

15. Flight Modes

Flight Mode Descriptions

Mode	Description
Loiter	Loiter mode is optimized for precise movements and to hold station in latitude, longitude, altitude, and heading. If the aircraft is moving and you release the joystick the aircraft will stop and hold station at the location the aircraft was at when you centered the joystick.
Position	Position mode is optimized for larger movements compared with Loiter. The aircraft will hold station in latitude, longitude, altitude, and heading. If the aircraft is moving and you release the joystick the aircraft will decelerate and hold station at the location when the aircraft stops moving.
Return to Launch (RTL)	This mode is recommended for normal landings and for landing after an autonomous mission. When activated, the aircraft automatically returns to its Launch position and lands. The Launch position is the original takeoff location of the aircraft.
CAUTION	The IF1200A automatically returns to the launch site as a failsafe when the battery voltage gets too low to continue flight; visually monitor the battery level in QGC and replace the battery conservatively to mitigate risk.

Selecting Flight Modes on the Hand Controllers

This section describes the location and function of the flight mode controls on the hand controllers. See Figure 16 and Figure 17 below for control locations.

Flight Mode Controls		
Control	**Flight Mode**	**Location on Hand Controller**
	**Loiter**	**HereLink:** Button labeled “A” on bottom of the front panel (see Figure 16). **Jeti DS-12:** Top of three-way switch on upper-right of front panel (see Figure 17).
	**Position**	**HereLink:** Button labeled “B” on bottom of the front panel (see Figure 16). **Jeti DS-12:** Mid-position of three-way switch on upper-right of front panel (see Figure 17).
	**Return to Launch**	**HereLink:** Button on bottom of the front panel (see Figure 16). **Jeti DS-12**: Bottom position of three-way switch on upper-right of front panel (see Figure 17).

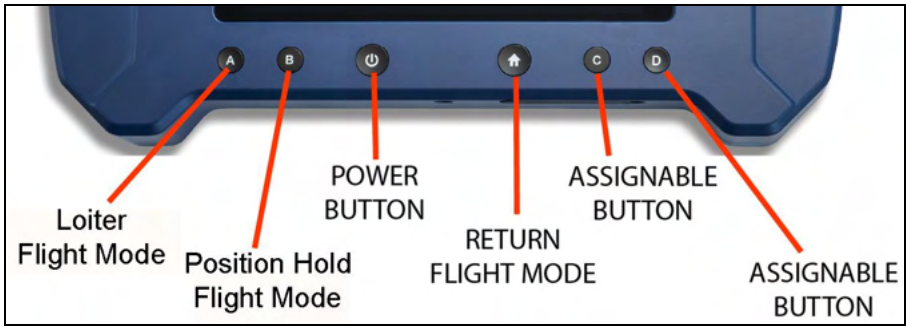


Figure 16. Flight Mode Buttons on HereLink Hand Controller

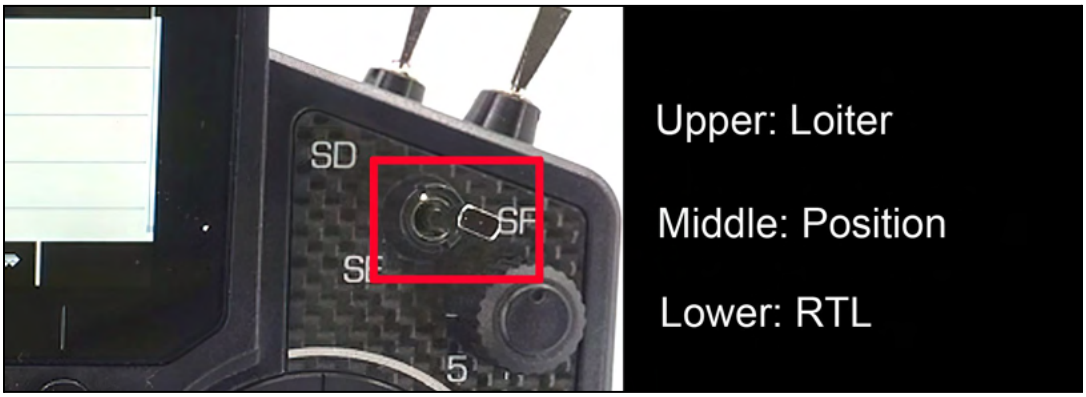


Figure 17. Flight Mode Switch on Jeti DS-12.

Jet DS-12: When the Mode Switch on the Jeti DS-12 is used to switch flight modes, the display on the ground control station updates to show the new flight mode.

HereLink: The current flight mode is indicated in the top right corner of the QGC display (see the figure below).

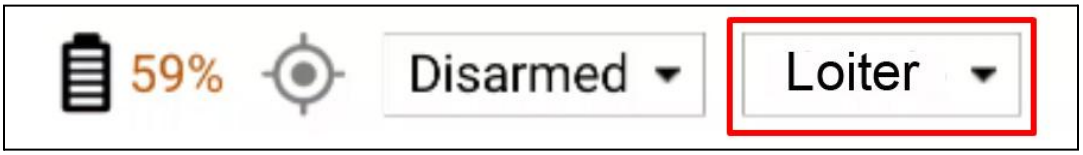
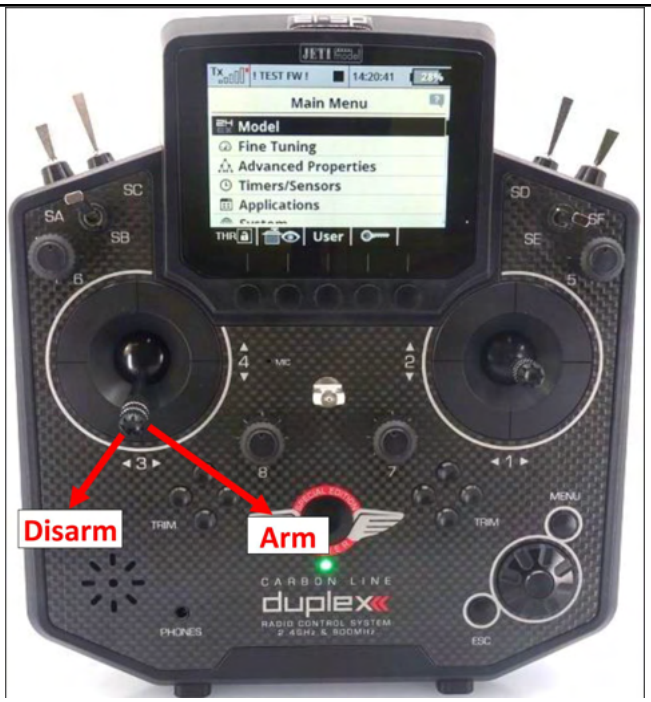


Figure 18. Loiter Mode Shown

16. Arm and Disarm

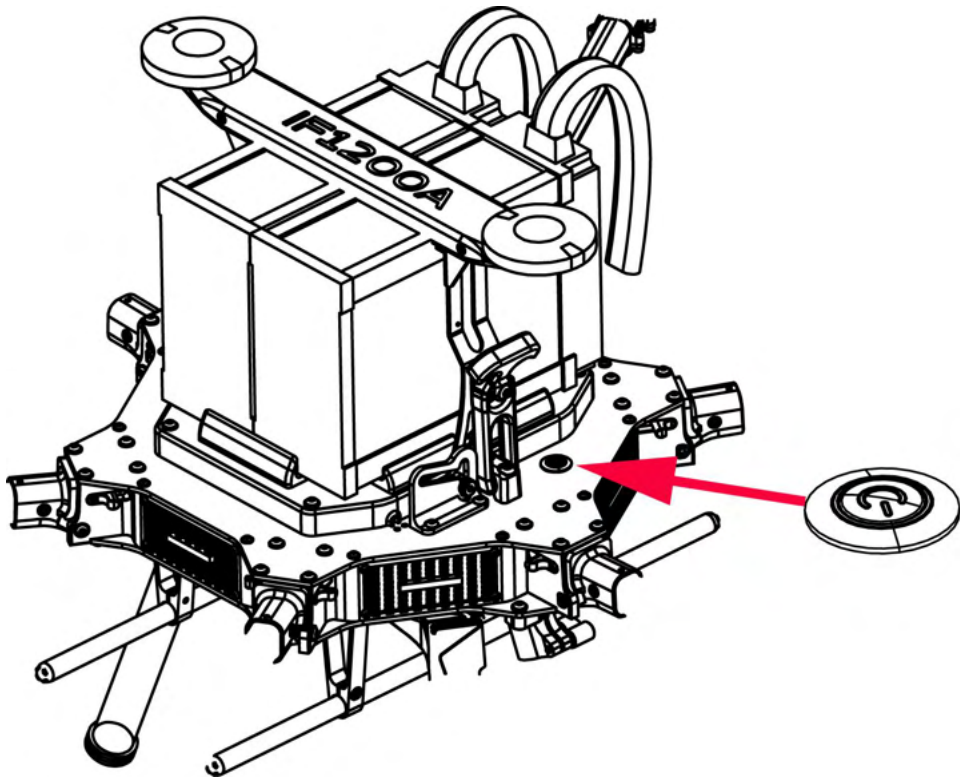
- **Arm** means to start the propellers spinning.
- **Disarm** means to stop the propellers from spinning.

Step	Action
	Arming
1	Verify each item on the Preflight Checklist (see the end of this User Manual).
2	**Arm** the aircraft by bringing the left joystick stick down and towards the right (see below). The motors start spinning in an idle state.
3	**Continue to hold the stick in the low throttle position and verify that all motors and propellers are spinning correctly.** **Note:** a Jeti DS-12 is shown below. These instructions also apply to the HereLink hand controllers.
	
	Disarming
1	**Position Mode:** Once the aircraft has landed, hold the throttle down and to the left to stop the propellers. **Autonomous Mode**: The aircraft automatically disarms upon landing.
	End of Procedure

17. Takeoff and Landing

Step	Action
Takeoff	
1	Verify each item on the Preflight Checklist (see the end of this User Manual).
2	**Arm** the aircraft by bringing the left joystick stick down and towards the right. The motors start spinning in an idle state.
3	Takeoff by slowly raising the throttle (left joystick). The throttle must be raised above the midpoint. Continue raising the throttle and the aircraft will take off.
CAUTION	If the aircraft begins to tip over on takeoff, immediately lower the throttle and disarm. This can occur if a propeller is installed on the wrong motor, or the propellers are not completely unfolded prior to flight.
Landing in Loiter or Position Mode	
1	Be sure the landing site is level and clear of obstructions. • If the takeoff and landing locations are the same, the aircraft slows itself before landing. • If the aircraft is landing at a location where the elevation is different from takeoff, reduce throttle on landing.
2	Lower the throttle completely until the aircraft has landed.
3	Disarm the aircraft by moving the left stick to the lower left corner.
Landing in Return to Launch Mode	
1	The launch location is automatically set before takeoff. Select a Launch location that is level and clear of obstructions for landing. The aircraft will autonomously return to the takeoff location and slowly descend.
2	If the aircraft is not positioned exactly over the landing pad, use the joysticks to reposition it.
3	Disarm the aircraft by moving the left stick to the lower left corner.
End of Procedure	

18. Power Off the Aircraft

Step	Action
1	Power down any camera attached to the aircraft.
2	Press the power button on the IF1200A (see below) to power off the aircraft
	
3	Disconnect the battery power cables from the aircraft (pull on the connectors, not the wires).
4	Power down the hand controller by keeping the Power button pressed in, then follow the on-screen prompts.
End of Procedure	

19. Disassemble and Store the Aircraft

In general, disassembling the aircraft is the reverse of the assembly procedure. However, some details of disassembly need further explanation. Disassembled and folded, the aircraft looks as shown below.

Instructions for disassembling and collapsing the aircraft start on the next page..

Note the following about the collapsed aircraft (see figure below). Once disassembled and collapsed, the IFT logo on all of the foam Propeller Holders face up, EXCEPT FOR the Propeller Holder on the front-left Arm.

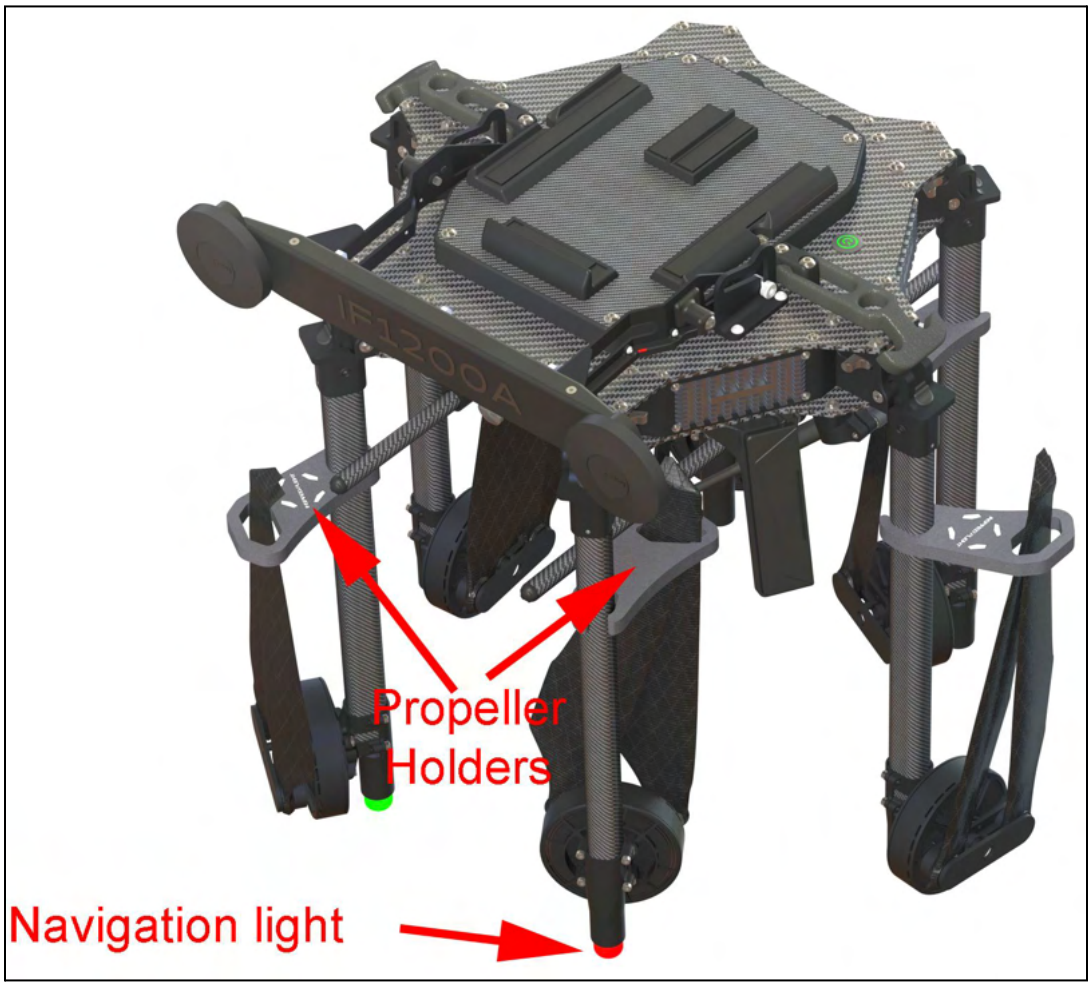


Figure 19. Aircraft Disassembled and Collapsed

Step	Action
1	Place the aircraft on a clean work surface.
2	Locate the case the IF1200A was originally packed in, and place it close at hand.
3	Remove the flight batteries. **Note:** If the aircraft will be stored for a long period, connect the batteries to the charger and set the charger to Storage mode.
NOTE	In the following steps, begin with the arms that are NOT over the two Landing Gear sockets. This allows you to leave the aircraft on its Landing Gear while working on it.
4	Attach a foam Propeller Holder onto an Arm, with the IFT logo facing the aircraft body (except for the left-front Arm). Slide the Propeller Holder as close to the aircraft body as possible.
5	Fold the propeller blades so they are pointing towards the aircraft body.
6	Slide the Propeller Holder outward along the Arm, guiding the propeller tips through the hexagonal opening in the Propeller Holder. Slide the Propeller Holder further outward until the propellers fit snugly in the Propeller Holder.
Continued next page	

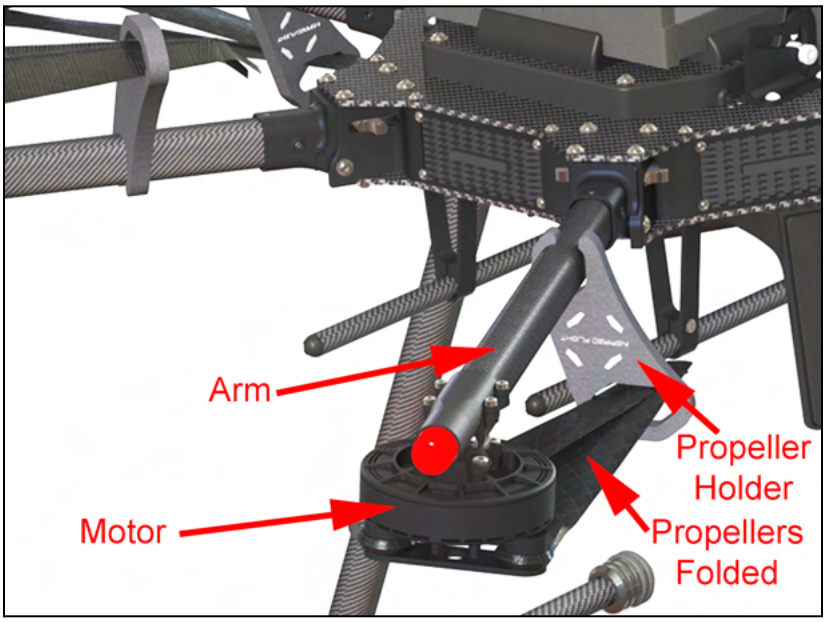


Figure 20. Detail of Propeller Holder Orientation

Step	Action
7	Locate the Arm Lock for the Arm you are working on (see figure below).
8	Grasp the Arm Locks on both sides of the joint, and push them in, towards the center of the aircraft. This loosens the arm. Fold the Arm down.
9	Follow the previous steps to fold down all four Arms except the two that are directly above the Landing Gear. **Note:** On the left and left-front Arms (see Figure 2 on page 3), install the Propeller Holders so that the IF logo faces away from the aircraft .
10	Loosen the clamps that secure the Landing Gear in the aircraft.
11	Fold the remaining two Arms down, as described in previous steps.
12	Grasp the Handle in preparation for removing the Landing Gear.
13	Hold the aircraft by the Handle, remove the Landing Gear, then place the aircraft in its case.
End of Procedure	

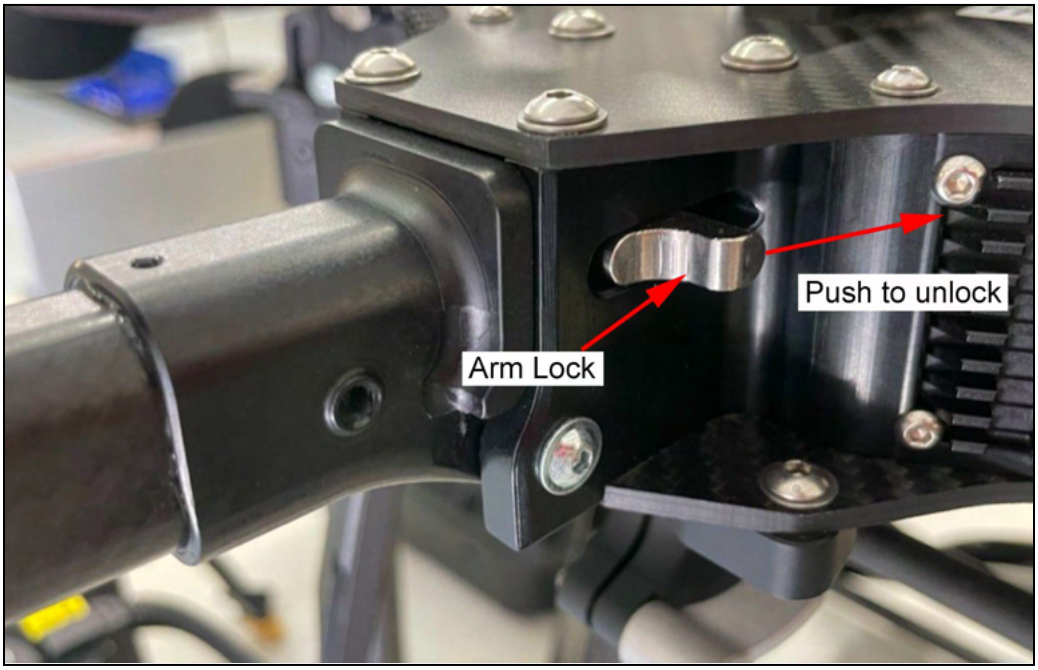


Figure 21. Arm Release Mechanism

20. Planning a Mission

This section presents the basics of setting up an autonomous mission in QGC and then describes in detail how to create an example mission.

Once you are comfortable flying the aircraft, learning how to plan an autonomous mission greatly expands the applications of the aircraft. The information in this section is taken from the QGroundControl website, and the website should be referenced if you have any questions. QGroundControl documentation has detailed information about planning an autonomous mission at the following link:
https://docs.qgroundcontrol.com/master/en/PlanView/PlanView.html

WARNING	If the aircraft starts behaving unexpectedly, dangerously or abnormally during a mission, switch to Position mode to regain control.

Planning a Mission in QGC

The figure below is a screenshot of a mission plan in QGroundControl. The mission starts with a takeoff at the Planned Home position (H), flies through three waypoints, then lands on the last waypoint (waypoint 3).

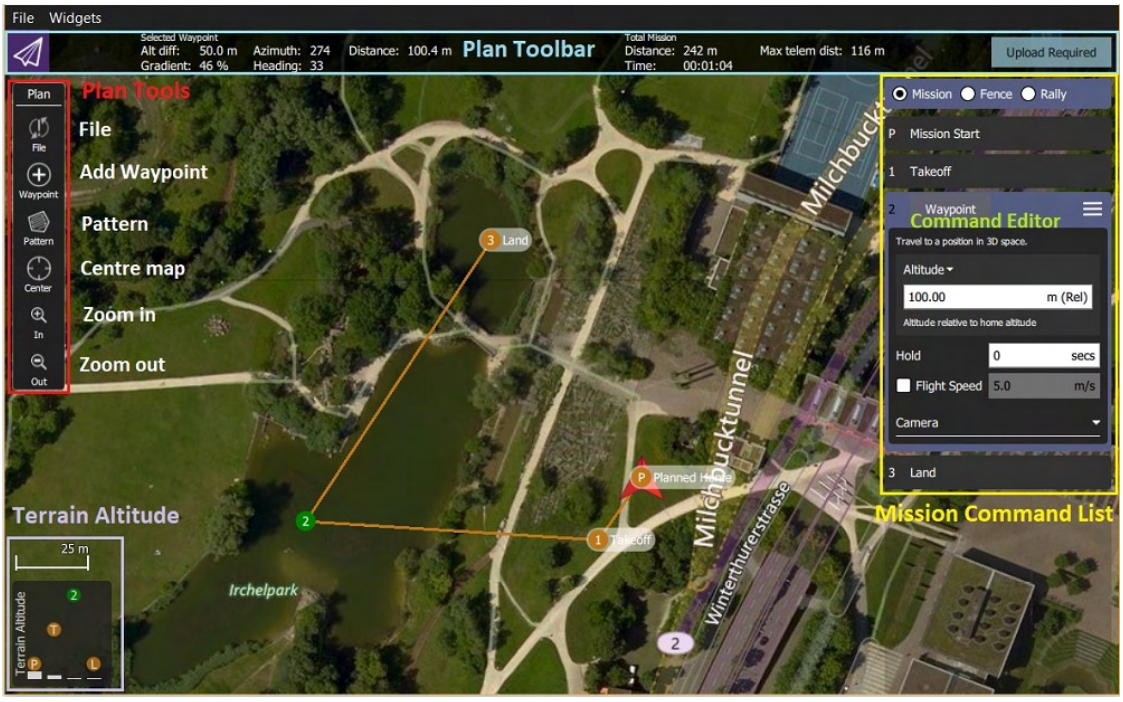


Figure 22. QGroundControl Screenshot of Mission Plan

QGroundControl User Interface Overview

The main elements of the User Interface (UI) for planning a mission are described below (see Figure 22 on the previous page)

- **Map (main area of display)**: Displays the numbered indicators for the current mission, including the Planned Home. Click on the indicators to select them for editing, or drag them around to reposition them.
- **Plan Toolbar (top of display)**: Status information for the currently selected waypoint relative to the previous waypoint, as well as statistics for the entire mission (e.g. horizontal distance and time for mission).
    - `Max telem dist`: the distance between the Planned Home and the furthest waypoint.
    - When connected to an aircraft, an Upload button is shown,and can be used to upload the plan to the aircraft.
- **Plan Tools (left side of display)**: Used to create and manage missions.
- **Mission Command List Overlay (right side of display)**: Displays the current list of mission items (select items to edit).
- **Terrain Altitude Overlay (lower left corner of display)**: Shows the relative altitude of each mission command.

It shows you information related to the currently selected waypoint as well as statistics for the entire mission.

Example Mission

The basic steps for planning and executing a mission are:

1. In QGroundControl, change to Plan view.
2. Set Home position
3. Add waypoints
4. Set landing point
5. Upload the mission to the aircraft.
6. Change to Fly view and execute the mission.

The following procedure describes how to plan a basic mission. There are different methods for planning a mission; the basic procedure described below illustrates some of the tools used for planning a mission.

Please refer to the online QGC documentation for more details regarding planning a mission: https://docs.qgroundcontrol.com/master/en/PlanView/PlanView.html

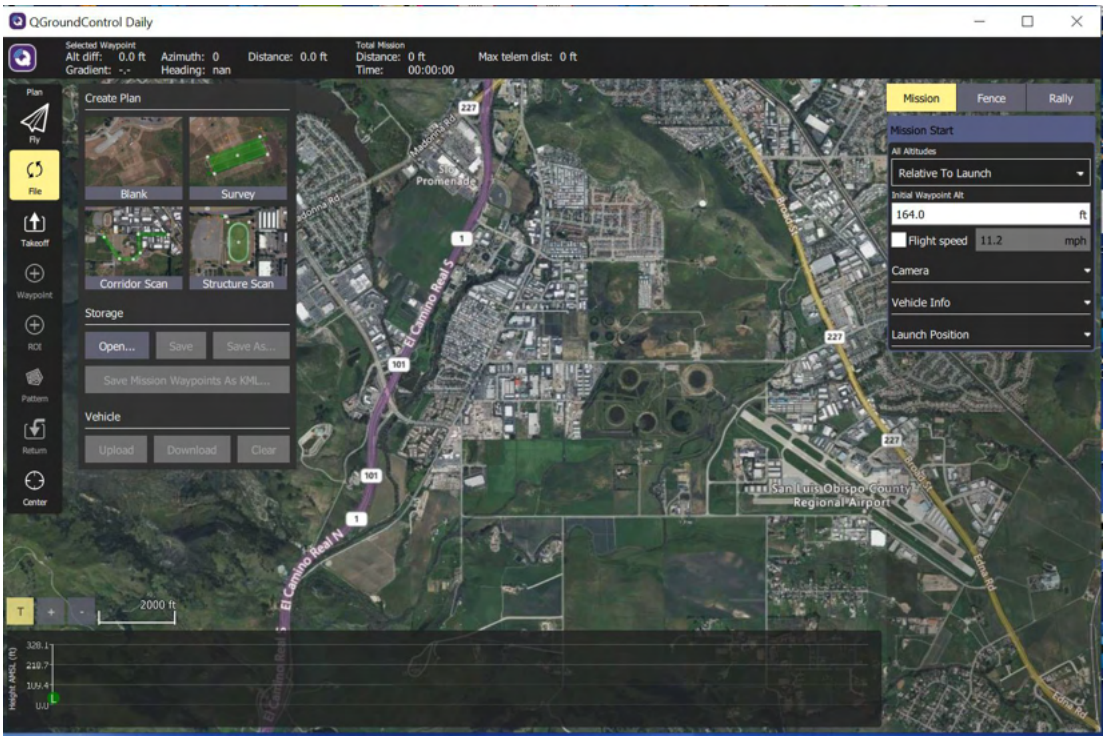
Note 1: in the following procedure, “select” means to tap (if using a touch screen), or mouse click (if using a mouse).

Note 2: QGC does not need to be connected to the aircraft to plan a mission. However, QGC must be connected to the aircraft to upload the mission.

Note 3: The following procedure is based on QuickGroundControl version 4.1.6.

Step	Action
1	Open QGroundControl on the ground station.
2	On the Toolbar (upper-left of display), switch to Plan mode (see screenshot below).
	
3	The Plan screen opens (see next page).
Continued next page	

Example Mission, Continued

Step	Action
4	On the left side of the screen, locate the Create Plan overlay. Select (mouse click or tap screen) Blank. **Note:** Other Plan types are available. The Blank plan is chosen for illustration purposes for this example. The Blank plan screen is displayed (see below). **Map navigation:** You can drag the Map to bring a specific geographical area into view. You can also zoom in and out of the Map view by selecting the + and - icons in the lower-left corner of the screen.
	
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Example Mission, Continued

Step	Action
5	On the Plan Tools panel on the left side of the screen, select the Takeoff button (#1 below). The Takeoff icon appears (# 2 in the screenshot below). **Note:** A Takeoff panel appears in the Mission Command List on the right side of the screen when the Takeoff icon is selected. The trashcan in the Takeoff panel allows you to delete a Takeoff point if you need to redo the takeoff point.
6	Drag the Takeoff icon and release it at the desired location on the map.
Continued next page	

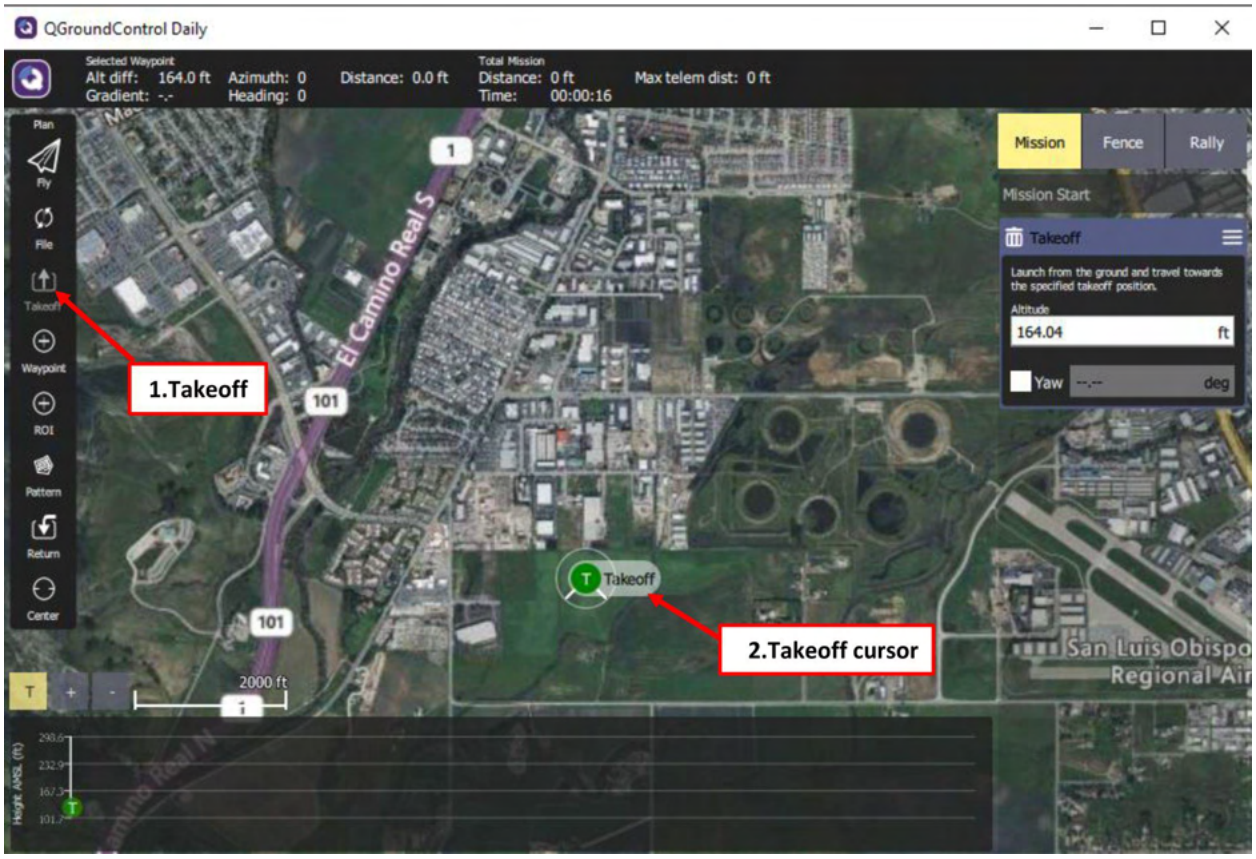

Figure 23. Selecting a Takeoff Point

Example Mission, Continued

Step	Action
7	Place the first Waypoint: 1. In the Plan Tools, select Waypoint (#1 below). 2. Place the cursor on the map for the desired Waypoint location (#2 below), then select it 3. Notice that the Waypoint panel appears on the right side of the screen when Waypoint was selected in the Plan Tools panel.
8	Use the steps described in the previous step to add more waypoints as desired. **Note:** Waypoints may be deleted by selecting the trashcan icon at the top of the Waypoint panel.
Continued next page	

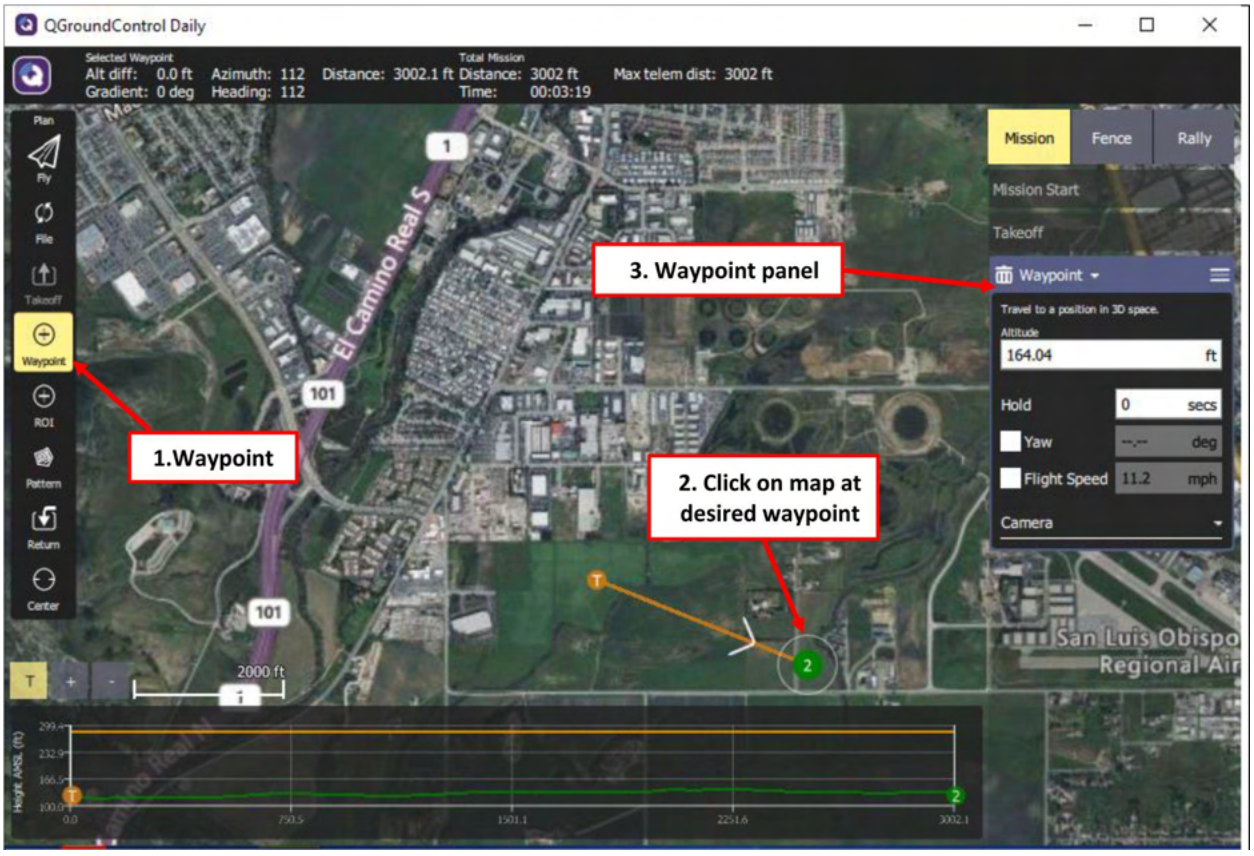

Figure 24. Adding Waypoints

Example Mission, Continued

Step	Action
9	After you've added the desired Waypoints, complete the mission plan by creating a Return to Launch point. In the Plan Tools panel, select the Return icon (#1 below).
10	When you select Return, the default is Return to Launch (RTL), as shown in the Mission Command List. The last leg of the mission (#2 below) is shown on the map. **Note:** For more Return and other options, click on the down arrow next to *Return to Launch* (#3 below). This opens the *Basic Mission Command Editor* (see next page).
Continued next page	

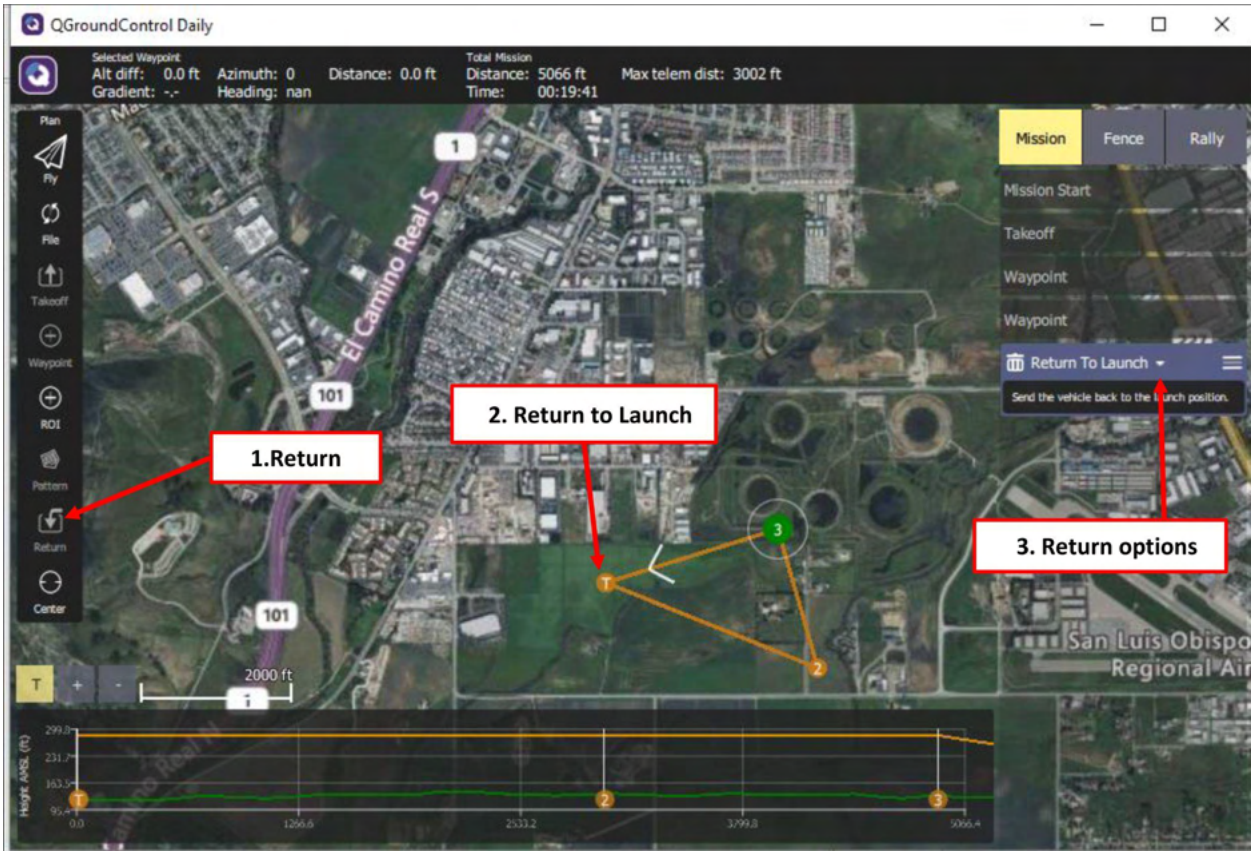

Figure 25. Add a Return

Example Mission, Continued

Step	Action
11	The Basic Mission Command Editor (the left image in the figure below) offers Return and other options. **Note:** If you select the down arrow next to the Basic category (see the figure below), it opens a dropdown menu (right side of the figure), which offers more Mission Command Editors.
Continued next page	

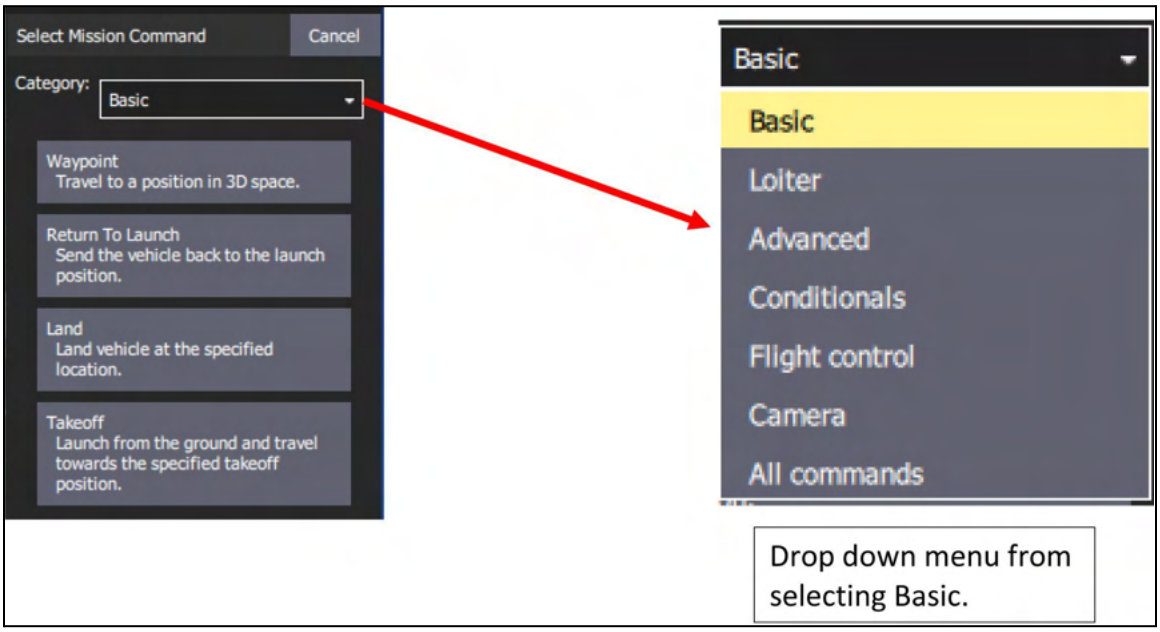

Figure 26. Basic Mission Command Editor

Example Mission, Continued

Step	Action
12	After you have finished planning a mission, you can see details of the mission in the Mission Command List, on the right side of the screen. To see details about individual events in the mission, select an event, such as a Waypoint, and details about that event appear below it (see the figure below).
13	**Note:** The mission can be uploaded to the aircraft two ways: wirelessly; or via a physical connection. The following steps describe both ways. 1. power on the aircraft 2. If you are uploading the mission wirelessly, proceed to Step 14. 3. If you are uploading the mission via a physical connection, connect a USB cable between the device supporting QGC and the USB port on the aircraft. Then go to the next step.
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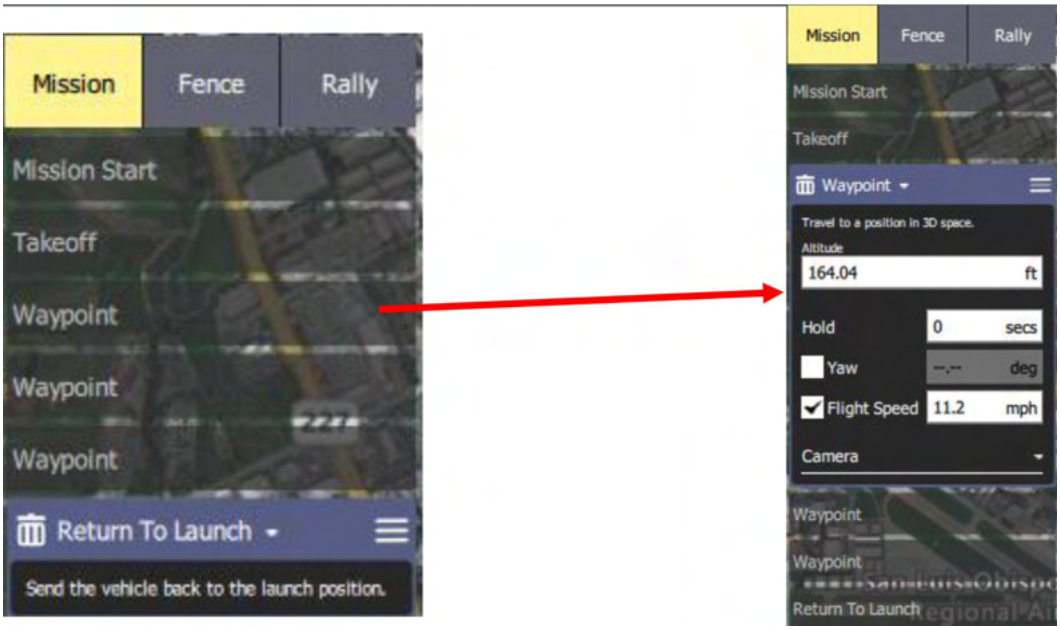


Figure 27. View Details About Mission Events

Example Mission, Continued

Step	Action
14	Set up the camera, if necessary. The camera section (see screenshot below) allows you to specify a camera action to take, control the gimbal (if applicable), and put your camera into photo or video mode. The available camera actions are: • No change (continue current action) • Take photos (time) • Take photos (distance) • Stop taking photos • Start recording video • Stop recording video
Continued next page	

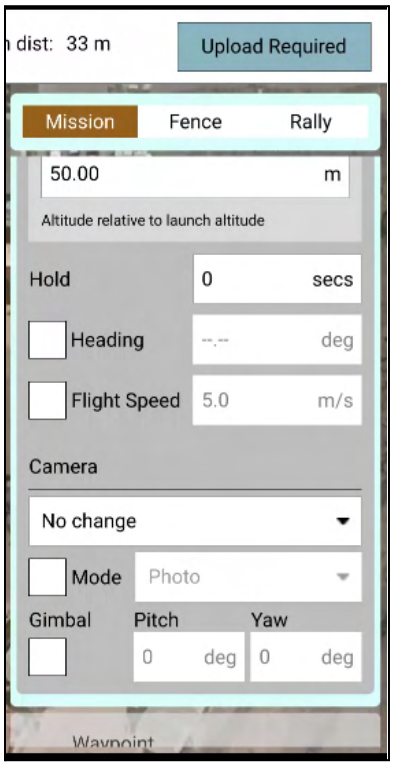


Figure 28. Camera Settings

Example Mission, Continued

Step	Action
15	When you have completed planning the mission, an *Upload Required* icon in the upper-right corner of the screen flashes. Select it, and *Done* appears at the top of the screen if the upload was successful.
16	Select the Fly icon at the top of the Tools panel (see Figure 29, below), then select Takeoff.
17	A Start Mission window appears at the bottom of the QGC screen (see Figure 30 below). Slide in the Slide to confirm from left to right to takeoff.
End of Procedure	

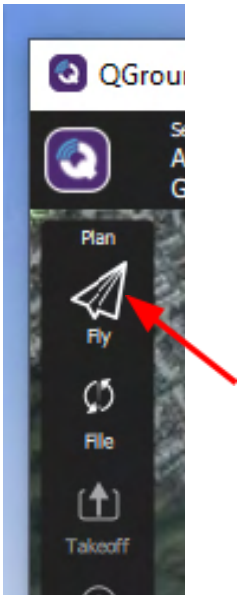


Figure 29. Fly and Takeoff

Figure 30. Start Mission Window

IF1200A HereLink Preflight Checklist

Powered Down Checks	
Launch area	Landing Pad unfurled and site secure
Landing gear	Check engagement window. Ensure 4 thumb screws are tight.
Batteries	Installed
Battery Latch/GPS antennae	In position over batteries and securely latched
Battery cables	Connectors fully engaged
Arms	Lifted in place and latches secure
Propellers	Unfolded, straight, free from visible defects
Motors	Rotate freely
Payload	Installed and Connectors Secure
Hand Controller	Antennas and joysticks installed
Hand Controller	Power On

Powered Up Checks	
Personnel	Pre-Takeoff Briefing and at safe distance
Launch area	CLEAR FOR VEHICLE POWER!
Press Aircraft Power button	Power Indicator turns Green
ESC Tones	12 Tones
Auto Pilot	Successful Boot Tones
Hand Controller Status	Connected to aircraft & parameters downloaded
Mission & Payload	Loaded and/or working as Required
Safety Settings	Failsafes Appropriate for Mission
Hand Controller Instruments	Move Aircraft and ensure Heading and Attitude match
Hand Controller Battery	Sufficient for Mission / Minimum 50%
Aircraft Battery	Sufficient for Mission / Minimum 50%
Hand Controller GPS Status	>10 Satellites
LEDs on GPS Antennae	Flashing Green
Flight mode	Set to Loiter

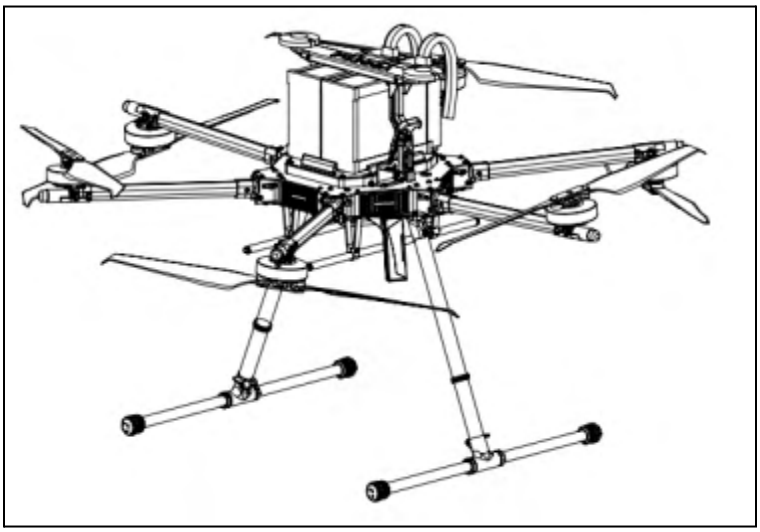
Arming Checks	
Launch area / Personnel	CLEAR TO ARM!
Propellers	All Propellers balanced and spinning

IF1200A LRT Preflight Checklist

Powered Down Checks	
Launch area	Landing Pad unfurled and site secure
Landing gear	Check engagement window. Ensure 4 thumb screws are tight.
Batteries	Installed
Battery Latch/GPS antennae	In position over batteries and securely latched
Battery cables	Connectors fully engaged
Arms	Lifted in place and latches secure
Propellers	Unfolded, straight, free from visible defects
Motors	Rotate freely
Payload	Installed and Connectors Secure
Hand Controller & GCS	Antennas, cables, and joysticks installed
Hand Controller & GCS	Power On and Connect to Aircraft

Powered Up Checks	
Personnel	Pre-Takeoff Briefing and at safe distance
Launch area	CLEAR FOR VEHICLE POWER!
Press Aircraft Power button	Power Indicator turns Green
ESC Tones	12 Tones
Auto Pilot	Successful Boot Tones
GCS Status	Connected to aircraft & parameters downloaded
Mission & Payload	Loaded and/or working as Required
Safety Settings	Failsafes Appropriate for Mission
Hand Controller Instruments	Move Aircraft and ensure Heading and Attitude match
Hand Controller Battery	Sufficient for Mission / Minimum 50%
Aircraft Battery	Sufficient for Mission / Minimum 50%
GCS GPS Status	>10 Satellites
LEDs on GPS Antennae	Flashing Green
Flight mode	Set to Loiter

Arming Checks	
Launch area / Personnel	CLEAR TO ARM!
Propellers	All Propellers balanced and spinning



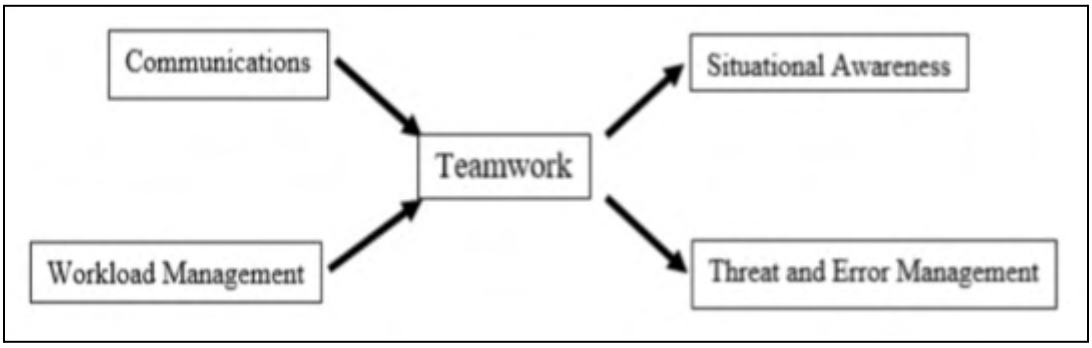


Figure 31. Personnel Briefing & Crew Resource Management

Pilot Operating Handbook	**225 Suburban Rd San Luis Obispo, CA 93401 +1 (805) 776-3640**	**Customer Support Center**

Appendix

This Appendix addresses the topics listed below. Click on a topic to go to that page.

Security Risks and Mitigation

This section describes steps that can be taken to protect sensitive information in the IF1200A aircraft.

Each security issue listed below is followed by one or more remedies.

Issue: Physical Access to the Aircraft

- Store the aircraft and the hand controller in a secure area accessible only by authorized personnel. Issue: Unauthorized Access to Flight Logs
- If logs are required, transfer them from the aircraft after flight, then delete them from the aircraft.
- If logs are not required by the user, disable logging. **Note:** If you disable logging a full analysis will **NOT** be able to be completed in the event of an accident.
- Do not physically remove the SD card from the aircraft. If it is necessary to remove the SD card from the aircraft, store it in a secure area accessible only by authorized personnel.

Issue: Automated Transfer of Mission Plan to Unauthorized Client Applications

- Promptly deleting mission plans after each flight reduces the window of vulnerability.
- Missions can also be deleted during flight, while the aircraft is connected to the ground station.

Issue: Data Encryption

- Enable AES Encryption and change the Encryption keys often. Refer to the following document, available from Inspired Flight Technologies:
    - Long Range Telemetry Modem Configuration Supplement: Go to this link:

https://inspiredflight.freshdesk.com/support/solutions/articles/67000705237

Registering an Aircraft with the FAA

U.S. law requires that all unmanned aerial vehicles must be registered with the FAA prior to flight.

Go to this link to register the aircraft: https://faadronezone.faa.gov/

We recommend that you print the FAA registration number and affix it to the aircraft, on the top carbon plate where the battery is mounted.

Critical Situations

Below are some situations which require immediate action.

- Battery Less than 15%: If flying with a critical battery voltage, determine the trajectory of the aircraft and fly above open ground. The aircraft is now unstable and should be brought to the ground as quickly and safely as possible. If flying in an autonomous flight mode, it is recommended to switch the control to position mode to bring the aircraft down faster.

- Loss of Aircraft Control While Flying a Mission: if mission/return is behaving unexpectedly, dangerously or abnormally, switch to Position mode to regain control.

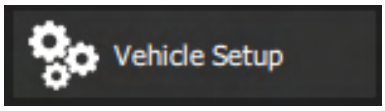
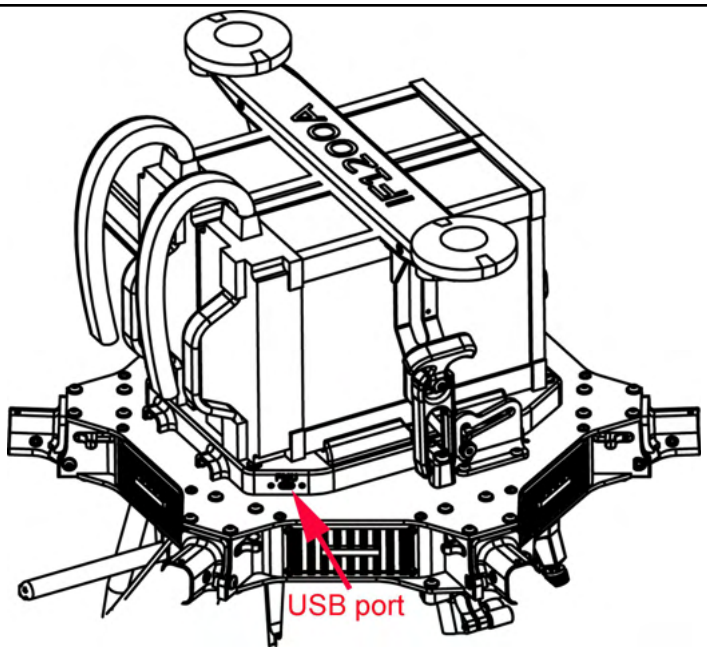
- Entire Loss of Aircraft: If a flyaway or battery depletion away from the home point occurs, follow the FAA guidelines on loss of aircraft, and notify Inspired Flight Technologies.

- Aircraft Crash: If the aircraft is flown into an obstruction or crashes for any reason, follow the procedure in the FAA guidelines, and notify Inspired Flight Technologies.

- Other: If any other anomaly or unexpected failure occurs, please contact Inspired Flight. Refer to the Contact Information in the front of this manual.

Upgrade the Aircraft Firmware

Note: Firmware upgrades are only necessary if advised by Inspired Flight. The aircraft comes with firmware installed at the factory.

Step	Action
1	Power on the aircraft.
2	Open QGroundControl on a PC.
3	Open the Settings tab, then Vehicle Setup. 
4	Click on Firmware. 
5	Connect a USB-C to USB-A cable between the aircraft's USB port (see below), and the device with QGC.
	

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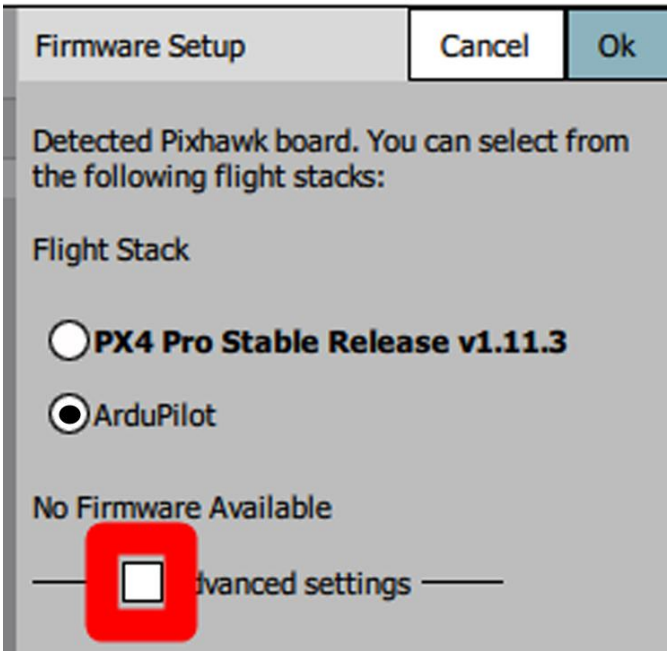
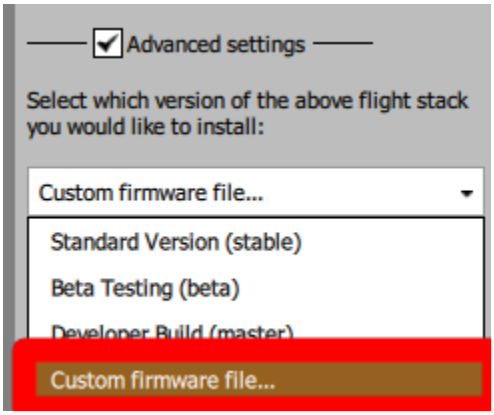
Upgrade the Aircraft Firmware	
Step	**Action**
6	On the right side of the PC's screen, a 'Firmware Setup' window will appear. Select the 'Advanced Settings' checkbox (see below).
	
7	Under the dropdown menu, select 'Custom firmware file' (see below). Select 'OK.'
	
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Upgrade the Aircraft Firmware	
Step	**Action**
8	Navigate to the correct firmware file, and select ‘Open’.
9	Wait about one minute for the firmware to upgrade. The beeping will stop when the upgrade is complete. Below is a screenshot of the firmware upload progress.
End of Procedure	

Calibration Orientations

The following sections describe how to perform Compass and Accelerometer calibrations. In both cases, the IF1200A aircraft must be lifted and moved into various orientations.

CAUTION	**The IF1200A aircraft weighs 35.9 lbs.** The procedures in the following sections require that the aircraft be lifted and moved into various orientations. The weight of the IF1200A may make this hazardous for some people. Where available, alternative procedures that avoid lifting and moving the IF1200A are referenced.

Figure 31 and Figure 32 on the following page show two views of the IF1200A, with names of the parts of the vehicle used in the compass and accelerometer calibration procedures.

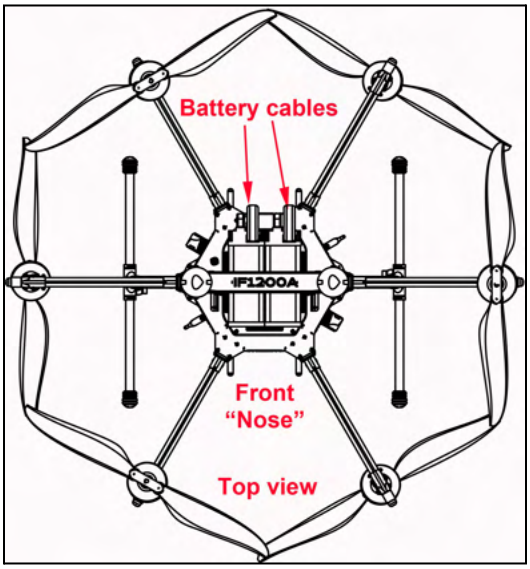


Figure 31. IF1200A Top View Orientation (Nose Down)

- **Overall Orientation (and Nose Down):** See Figure 31. If you imagine the ground being at the bottom of this graphic, this is the "Nose Down" orientation of the aircraft during calibration.

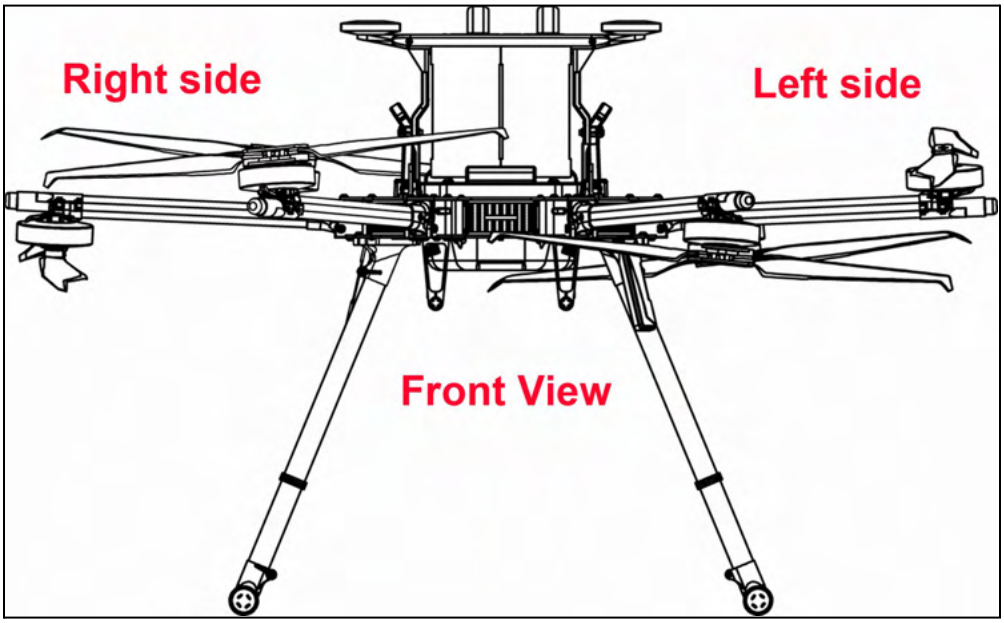


Figure 32. IF1200A Front View (Level) Orientation

- **Front View (and Level):** See Figure 32. This graphic shows the front view, and shows the right and left sides of the aircraft. If you imagine the ground being at the bottom of this graphic, this is the be the “Level” orientation of the aircraft

Compass Calibration

This section describes how to calibrate the internal compass in the aircraft.

NOTES	The aircraft's compass is calibrated at the factory and typically does not need to be re-calibrated. Compass calibration may be necessary if significant hardware changes have been made or if metal has been added to or removed from the aircraft. Indications that the compass may require calibration include: ● Toilet bowling (circling during hover) ● Veering off-path when attempting to fly straight. **IMPORTANT:** Do not calibrate the compasses near any metallic or magnetic field producing object (computers, cell phones, metal desks, power supplies, etc.) or incorrect calibration will occur. **Metal is not always obvious**! Do not calibrate on top of an office table (often contains metal bars) or next to an aircraft. Calibration can even be affected if you're standing on a slab of concrete with uneven distribution of rebar.

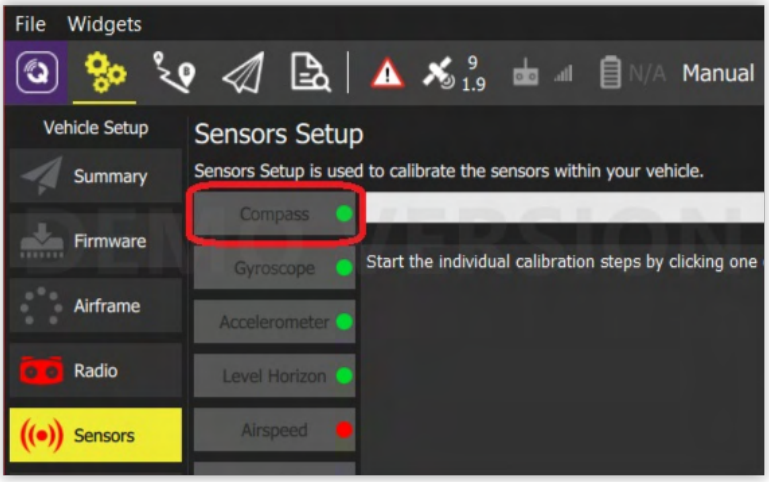
Compass calibration is accomplished by using either QGroudControl or Mission Planner. Click on one of the links below to go to that procedure:

- QGroundControl: go to Compass Calibration: QGroundControl
- Mission Planner: go to Compass Calibration: Mission Planner

Compass Calibration: QGroundControl

NOTE	The steps that follow are excerpted from the QGroundControl (Ardupilot) User Guide, and show a fixed-wing aircraft. The orientations apply to a copter vehicle as well. For a full discussion of QGroundControl Compass Calibration, go the following link: https://docs.qgroundcontrol.com/master/en/SetupView/sensors_ardupilot.html

Compass Calibration: QGroundControl (Ardupilot)	
Step	**Action**
1	Choose a location for compass calibration, away from magnetic fields and metal.
NOTE	Metal is not always obvious! Do not calibrate on top of an office table (often contains metal bars) or next to an aircraft. Calibration can even be affected if you're standing on a slab of concrete with uneven distribution of rebar.
2	Power up the vehicle.
3	Power on the ground station (with QGroundControl), and open QGroundControl.
4	Connect the ground station to the vehicle.
5	In QGC, select the gear icon (Vehicle Setup) in the top toolbar, and then Sensors in the left sidebar (see below). Then, select Compass.



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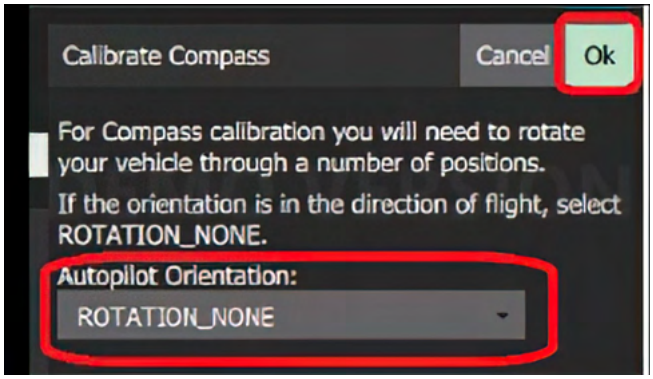
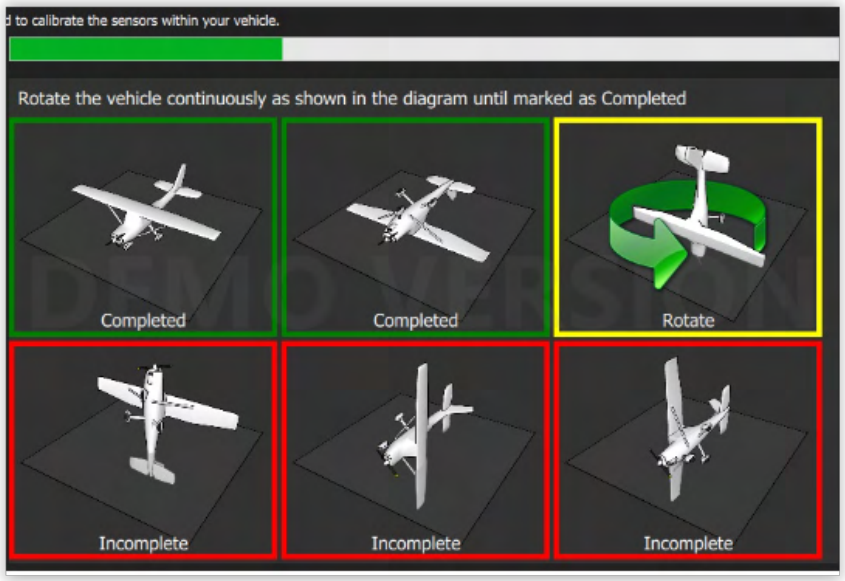
Compass Calibration: QGroundControl (Ardupilot)	
Step	**Action**
6	On the right side of the window, click on OK (see below) to start compass calibration.
	
7	Place the vehicle in any of the orientations shown in red (incomplete) and hold it still. Once prompted (the orientation-image turns yellow) rotate the vehicle around the specified axis in either/both directions. Once the calibration is complete for the current orientation the associated image on the screen will turn green. **NOTE:** The graphic below shows a fixed-wing aircraft. The orientations apply to a copter vehicle as well. 
	Continued page

Compass Calibration: QGroundControl (Ardupilot)	
Step	**Action**
8	Repeat the calibration for all aircraft orientations until all orientations have a green border.
9	Once you've calibrated the vehicle in all the positions, QGroundControl will display Calibration complete (all orientation images will be displayed in green and the progress bar will fill completely). You can then proceed to the next sensor if desired.
10	Reboot the aircraft prior to flight.
End of Procedure	

Compass Calibration: Mission Planner

This section describes how to calibrate the aircraft's internal compass in Mission Planner. For a full discussion of all aspects of this topic, please follow this link:

https://ardupilot.org/copter/docs/common-compass-calibration-in-mission-planner.html

Compass Calibration: Mission Planner	
Step	**Action**
IMPORTANT: Before performing this procedure, click on the following link and read the notes on the first page of this section: Compass Calibration	
1	Power on the aircraft
2	Connect the aircraft to the ground station.
3	Power on the ground station that has Mission Planner installed.
4	Open Mission Planner, and click on **SETUP** > **Mandatory Hardware** > **Compass** (see the figure below).
Continued next page	

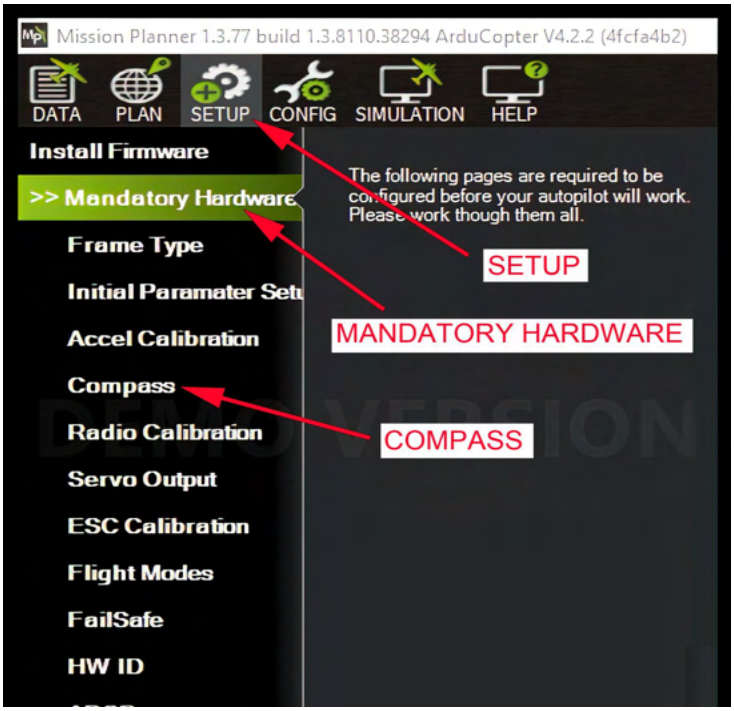


Figure 33. Mission Planner Compass Setup

Compass Calibration: Mission Planner	
Step	**Action**
CAUTION	In the next steps, you must lift the vehicle and turn it in various orientations. The IF1200A, with batteries installed, weighs 35.9 lbs. If lifting the vehicle is not possible, perform the Large Vehicle MagCal (see Figure 34 below) instead. Go to: https://ardupilot.org/copter/docs/common-compass-calibration-in-mission-planner.html
5	In the Compass pane (see Figure 34), locate Onboard Mag Calibration near the bottom. Select Start. The aircraft will emit a single tone followed by a short beep once per second. This begins the calibration procedure.
6	While holding the vehicle in the air, orient the front down towards the earth. Rotate yourself 360°, keeping the front of the vehicle pointed towards the ground.
7	Repeat the previous step for the remaining five sides: back, left, right, top and bottom. While doing this, the progress bars below the Start button should fill in, left to right.
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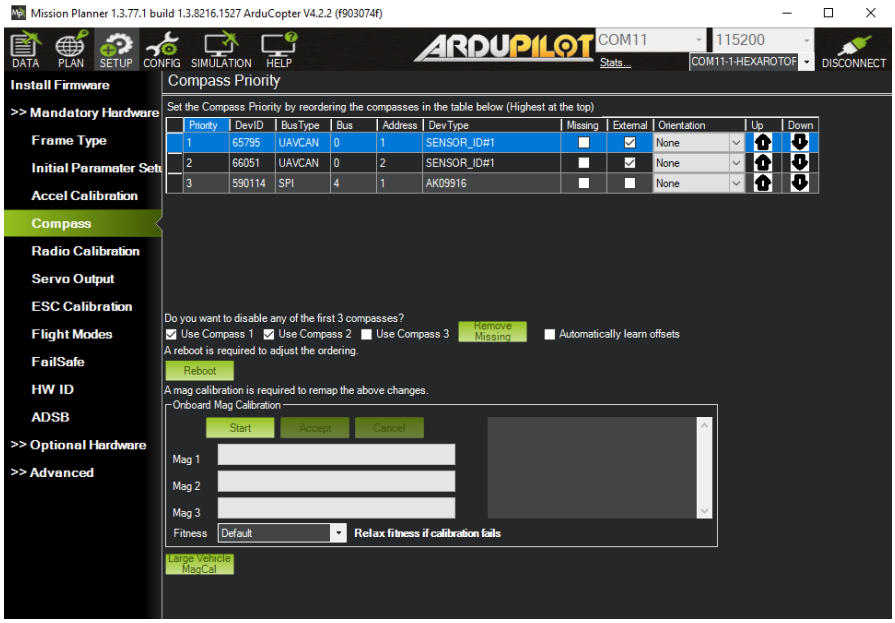


Figure 34. Mission Planner: Start Compass Calibration

Compass Calibration: Mission Planner	
Step	**Action**
8	**Successful calibration** is indicated when the aircraft emits three rising tones, and a “Please reboot the autopilot” window appears on the Mission Planner screen. **NOTE:** You must reboot the aircraft before you can arm the vehicle.
9	**Failed calibration** is indicated when the aircraft emits a failure tone. The progress bars may reset to the left, and Mission Planner will restart the calibration routine. Continue to rotate the vehicle as described in the previous steps. ● If a compass does not calibrate, consider moving to a different area away from magnetic disturbances, and remove electronics from your pockets. ● If, after multiple attempts, the compass does not calibrate, press the “Cancel” button and change the “Fitness” drop-down to a more relaxed setting and try again. To cancel calibration at any time, hold the throttle stick full up and full left yaw for 2 seconds.
End of Procedure	

Calibrate the Accelerometers

This section describes how to calibrate the accelerometers on the aircraft. Accelerometer calibration is not normally required unless instructed by Inspired Flight Customer Support.

Accelerometer calibration corrects the autopilot bias offsets in all three axes, as well as any off-axis variations.

CAUTION	**The IF1200A aircraft weighs 35.9 lbs.** The procedures in this section require that the aircraft be lifted and moved into various orientations. The weight of the IF1200A may make this hazardous for some people. Alternative procedures that avoid lifting and moving the IF1200A are referenced, if available.

NOTES	• The accelerometers in the autopilot must be calibrated to correct for their bias offsets in all three axes, as well as any off-axis variations. • Accelerometer calibration is mandatory in ArduPilot. • Accelerometer calibration cannot be performed while the vehicle is armed.

Two procedures are described for calibrating the accelerometers (click on a link to go there):

- Mission Planner: Go to: Accelerometer Calibration: Mission Planner
- QGroundControl: Go to: Accelerometer Calibration: QGroundControl

Accelerometer Calibration: Mission Planner

For a full discussion of this topic, please follow this link:
https://ardupilot.org/plane/docs/common-accelerometer-calibration.html

Accelerometer Calibration: Mission Planner	
Step	**Action**
1	Power on the aircraft
2	Connect the aircraft to the ground station.
3	Power on the ground station that has Mission Planner installed.
4	Open Mission Planner, and click on **SETUP** > **Mandatory Hardware** > **Accel Calibration** (see the figure below). This opens the Accelerometer Calibration pane (see Figure 36 next page).
Continued next page	

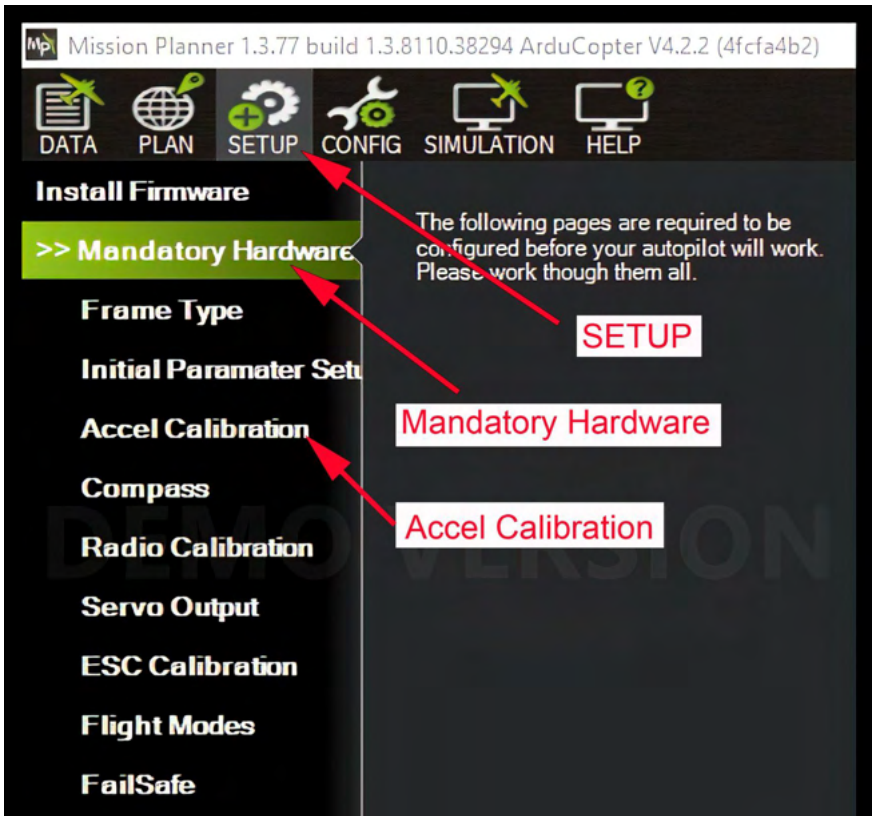


Figure 35. Open Mission Planner Accelerometer Calibration

Accelerometer Calibration: Mission Planner	
Step	**Action**
NOTE	In the following steps, Mission Planner instructs you to place the aircraft in various orientations. **THE AIRCRAFT MUST BE AS MOTIONLESS AS POSSIBLE** when placed in the orientations. This is more important than placing the aircraft in an exact orientation. **IMPORTANT:** The Level calibration is most important, as this is the attitude that your controller considers level while flying.
5	Click on Calibrate Accel (see the figure below). This starts the full three-axis calibration.
⚠ CAUTION	The IF1200A weighs 35.9 lbs, with batteries. The following steps require that the aircraft be lifted and held steady in various orientations. Doing this may be hazardous for some users.
Continued next page	

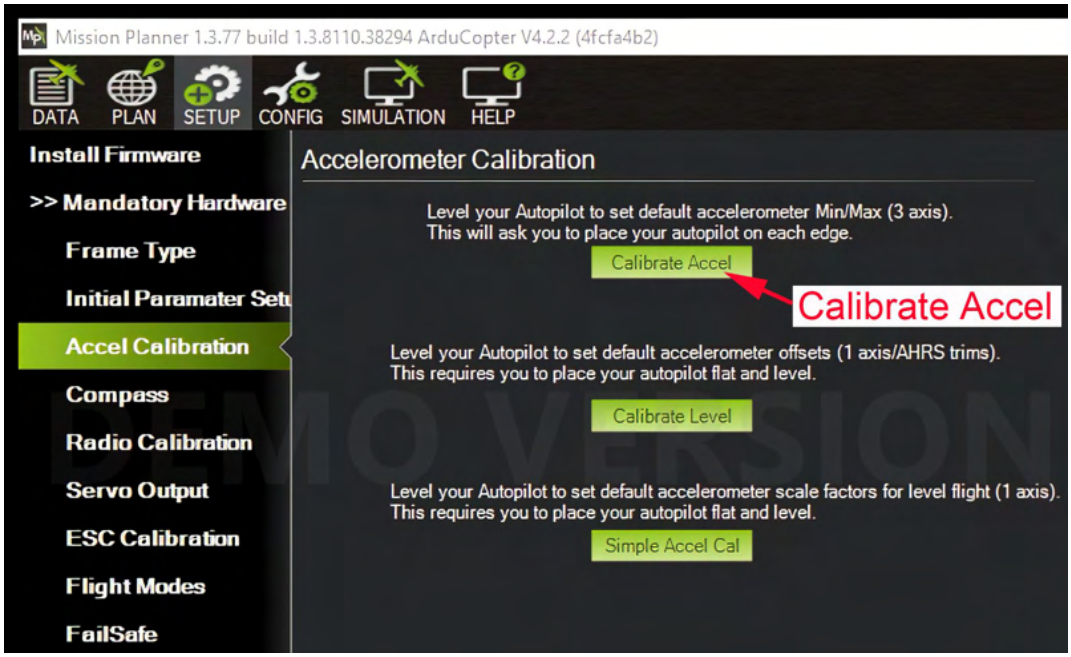


Figure 36. Mission Planner Accelerometer Calibration Pane

Accelerometer Calibration: Mission Planner	
Step	**Action**
6	Mission Planner will prompt you to place the vehicle on each axis during the calibration. Press any key to indicate that the vehicle is in position and then proceed to the next orientation. **IMPORTANT: The vehicle must be kept still immediately after pressing the key for each step**
7	Proceed through the required positions, using the Click when Done button once each position is reached and held still.
8	When you have completed the calibration process, Mission Planner displays “Calibration Successful!”.
NOTE	The Level position is the most important calibration. This is the attitude that your controller considers level while flying. You can recalibrate the Level position using Mission Planner after you have installed the flight controller and are ready to fly. Place the vehicle in its level flying attitude and use the Calibrate Level button (see Figure 36 on the previous page).
End of Procedure	

Accelerometer Calibration: QGroundControl

The steps in this section are excerpted from the QGroundControl online documentation. A full discussion of the topic can be found at the following link:
https://docs.qgroundcontrol.com/master/en/SetupView/sensors_ardupilot.html

Accelerometer Calibration: QGroundControl	
Step	**Action**
1	Power up the vehicle.
2	Power on the ground station (with QGroundControl), and open QGroundControl.
3	Connect the ground station to the vehicle.
4	In QGC, select the gear icon (Vehicle Setup) in the top toolbar, and then Sensors in the left sidebar (see below). Then, select Accelerometer (see the figure below).
NOTE	On the right side of the screen in Figure 37 is the Autopilot Orientation. Make a selection for the starting position.
5	Click on Ok in the upper-right side of the screen to start accelerometer calibration.
Continued next page	

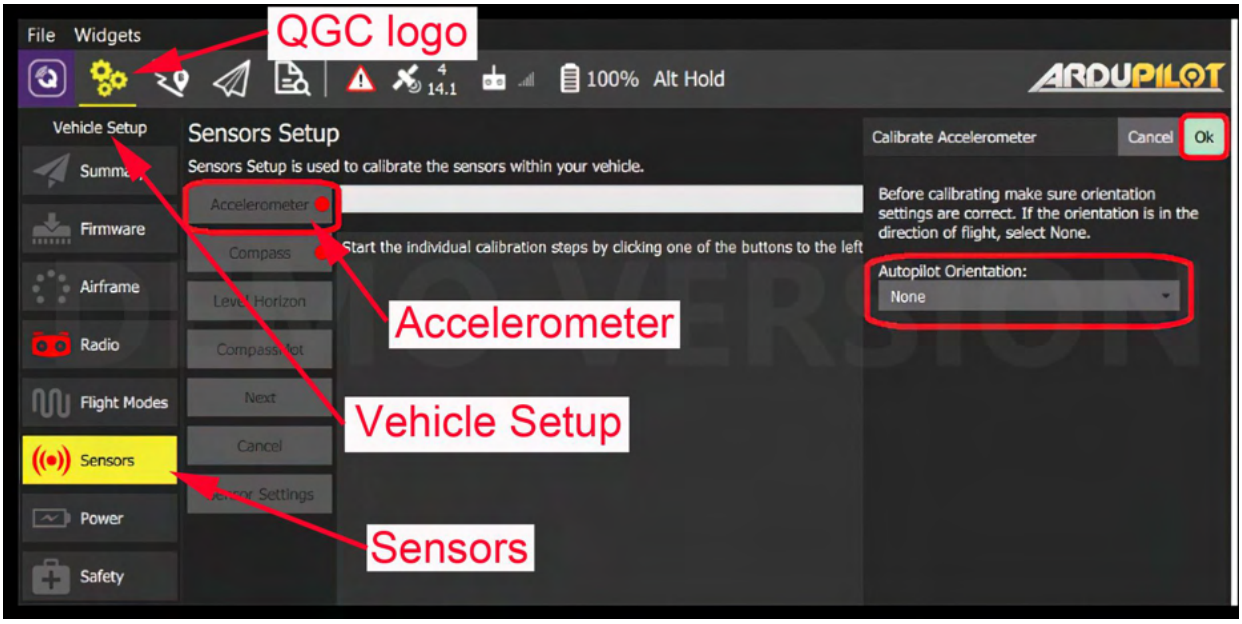


Figure 37. Start QGC Accelerometer Calibration

Accelerometer Calibration: QGroundControl	
Step	**Action**
6	Position the vehicle based on text instructions in the center display. Click the Next button to capture each position.
7	QGC will display Done when the accelerometer has been successfully completed.
End of Procedure	

Wirelessly Connect a Hand Controller to a Ground Control Station

This section describes how to wirelessly connect a hand controller, (in this case, a HereLink Blue or Black), to a Ground Control Station (GCS). The GCS is typically a laptop or tablet that has one of the following ground station software applications installed:

Ground Station Software

- QGroundControl
- Mission Planner

Two methods to wirelessly connect between a hand controller and GCS:

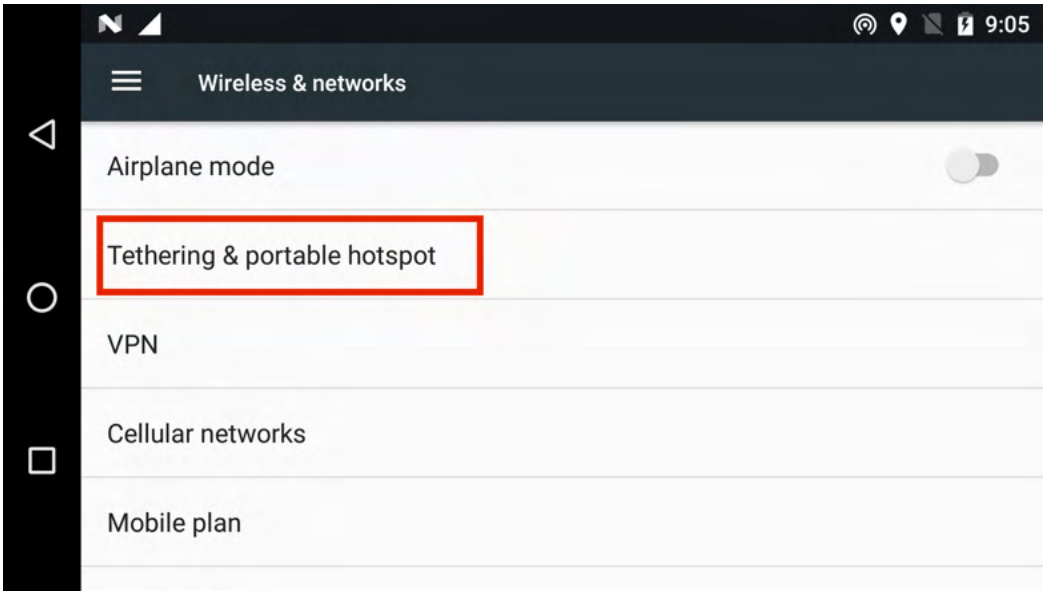
- Use the Wireless Hotspot in the HereLink Hand Control
  (applies to QGround Control and Mission Planner)
- Connect HereLink to Mission Planner Through a WiFi Network
- Connect HereLink and QGroundControl Through a WiFi Network

In both connection scenarios, the GCS must be set up so that either the HereLink hotspot, or a WiFi network, are listed in the device's Network & Internet Settings.

Note: When setting up a wireless connection between a HereLink hand control and a GCS with Mission Planner installed, the Remote Port (in Mission Planner), must have one of two settings:

- **Connecting to the HereLink hotspot: 14450**
- **Connecting via a common WiFi network: 14552**

Enable the Wireless Hotspot in the HereLink Hand Control	
Step	**Action**
1	On the Herelink, go to Settings->More->Tethering & portable hotspot (see below).



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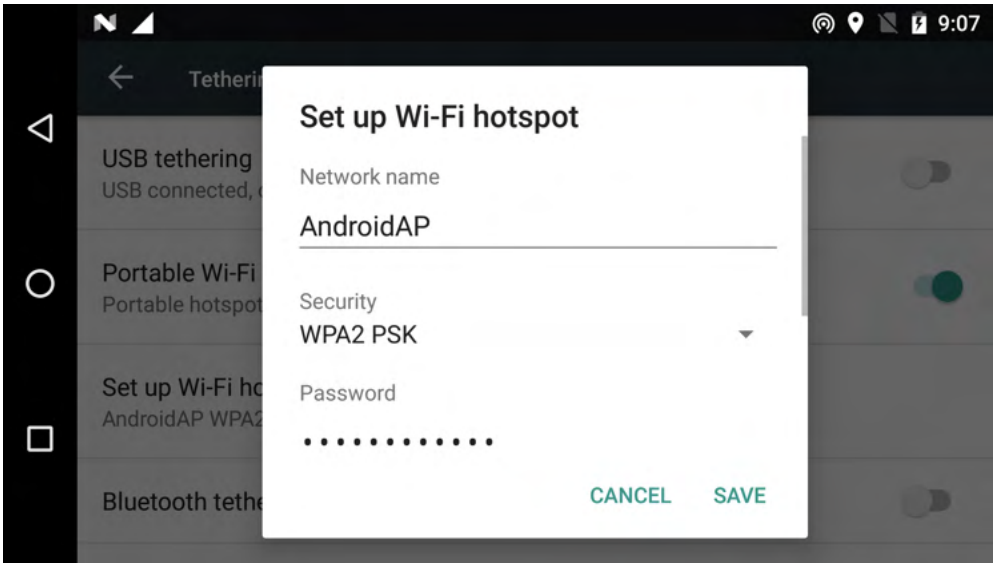
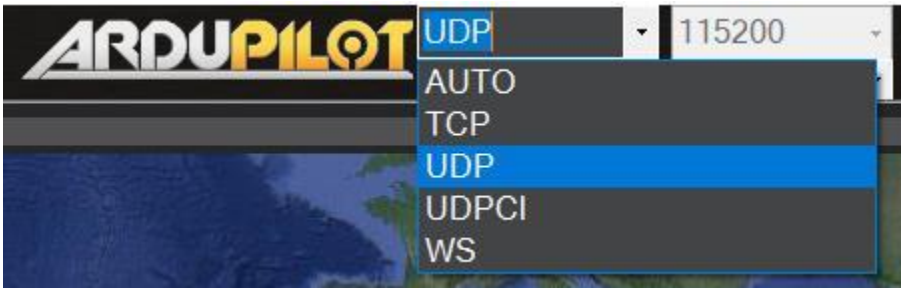
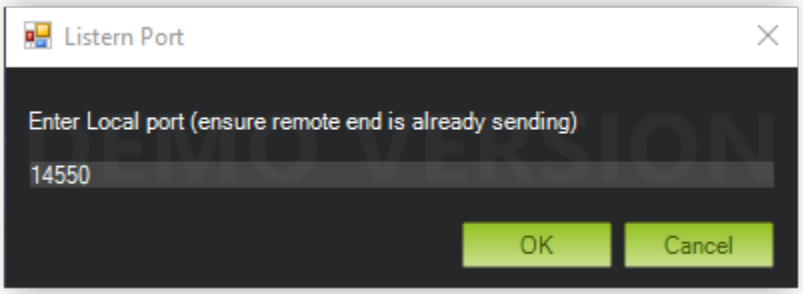
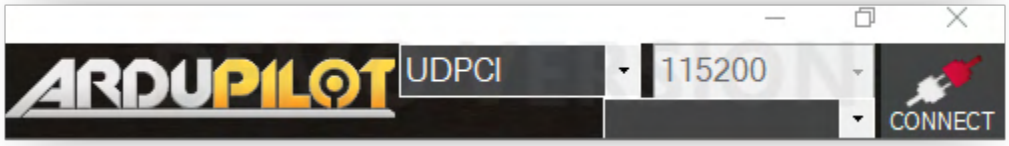
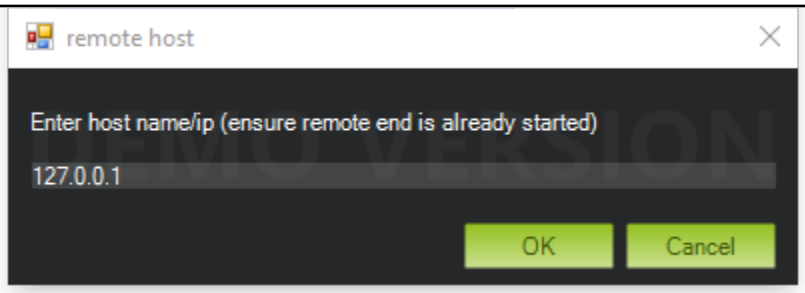
Use the Wireless Hotspot in the HereLink Hand Control	
Step	**Action**
2	Enable Portable WiFi hotspot (the button on the right side of the screen). A Set up Wi-Fi hotspot dialog window appears (see below).
	
3	Record the Network name and Security information that appears in the dialog window (see above). This information will be used later.
4	On the GCS, open the Network & Internet Settings, and enter the network name and security information for the HereLink hotspot (from the previous step).
5	Connect your ground control software application to the HereLink: • **QGroundControl (QGC)**: after performing the previous steps, QGC will automatically connect to the HereLink when QGC is opened. **End of Procedure for QGC.** • **Mission Planner:** go to the next page.
Connect to Mission Planner: go to next page	

Connect Mission Planner to the HereLink Hotspot	
Step	**Action**
1	Open Mission Planner.
2	In the upper-right corner of Mission Planner, click on the down arrow to open the communication protocol dropdown menu, and select UDP (see graphic below).
	
3	In the upper right corner of Mission Planner, click on Connect. The Listen Port window opens (see below). If necessary, change the port number to **14550**, as shown below, then click OK. Mission Planner is now connected to the HereLink via its WiFi hotspot.
	
End of Procedure	

Connect HereLink to Mission Planner Through a WiFi Network

This section describes how to connect a HereLink Blue or Black hand control to Mission Planner through a WiFi network..

Connect HereLink to Mission Planner Through a WiFi Network	
Step	**Action**
1	Connect the GCS to an available WiFi network.
2	On the HereLink, go to Settings -> About Phone -> Status Information -> IP Address. Record the HereLink's IP address for later use.
3	Open Mission Planner.
4	In the upper-right corner of Mission Planner, click on the down arrow to open the communication protocol dropdown menu, and select UDPCL (see graphic below).
	
5	Click on Connect in the upper right-hand corner of Mission Planner. The Remote Host window appears (see below). Enter the IP address of the HereLink in the field, then click on OK.
	
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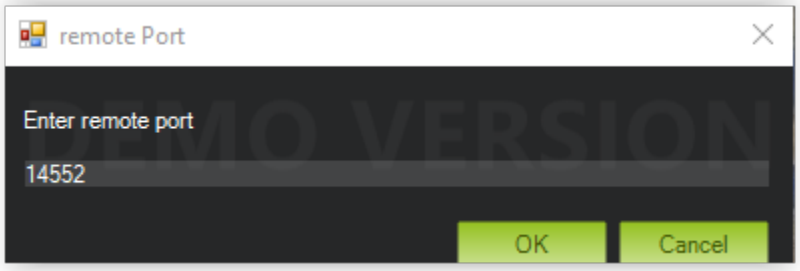
Connect HereLink to Mission Planner Through a WiFi Network	
Step	**Action**
6	The Remote Port window opens (see below). Enter **14552** in the field, then click OK. Mission Planner will then connect to the HereLink. **Note: The Herelink hotspot port is 14450. The WiFi port is 14552.**
	
End of procedure	

Connect HereLink and QGroundControl Through a WiFi Network

This section describes how to wirelessly connect a HereLink to QGroundControl through a local WiFi network.

Note 1: The HereLink uses an Android operating system. The instructions below reflect this.

Note 2: Before performing the following procedure, connect the device on which QGC is installed (tablet or laptop), to the WiFi network that the HereLink will be connected to.

Note 3: In order to confirm the wireless connection between the HereLink and GCS, power on the aircraft before performing the following procedure.

Connect HereLink and QGroundControl through a WiFi Network	
Step	**Action**
1	On the Herelink, go to the Settings -> About phone -> Status information -> IP address. Write down the IP address of the HereLink.
2	On the Herelink, go to Settings -> Connections -> WiFi, and connect the HereLink to a local WiFi network.
3	On the GCS, open QGroundControl (QGC).
4	locate the QGroundControl icon in the upper-left corner of the screen (see below). Select (click) this icon to open the Select Tool window (see next page).
	
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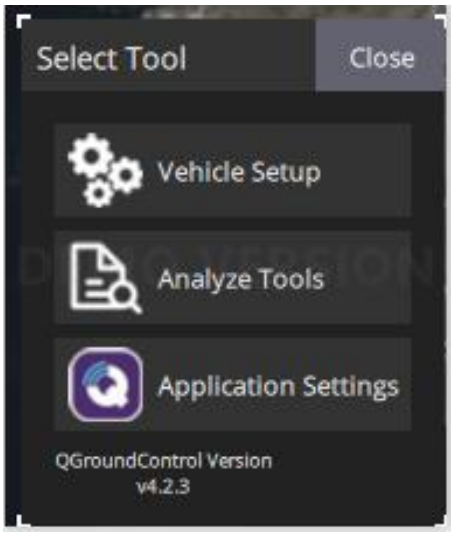
Connect HereLink and QGroundControl through a WiFi Network	
Step	**Action**
5	In the Select Tool menu (see below), click on Application Settings.
	
6	A selection menu opens in the upper-left corner of the screen (see below). Select Comm Links.
	
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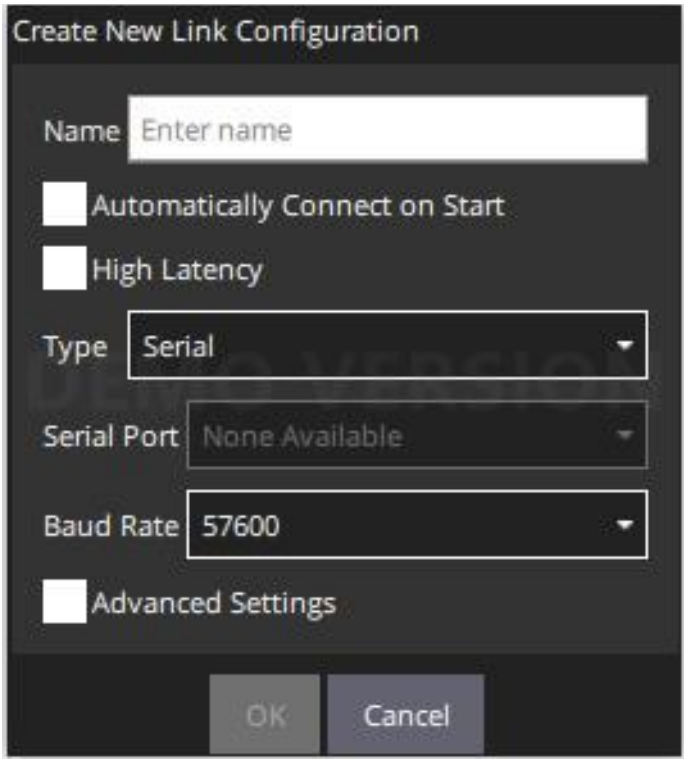
Connect HereLink and QGroundControl through a WiFi Network	
Step	**Action**
7	A selection menu appears at the bottom of the window (see below). Select Add.
	
8	A dialog box, Create New Link Configuration, appears (see below).
	
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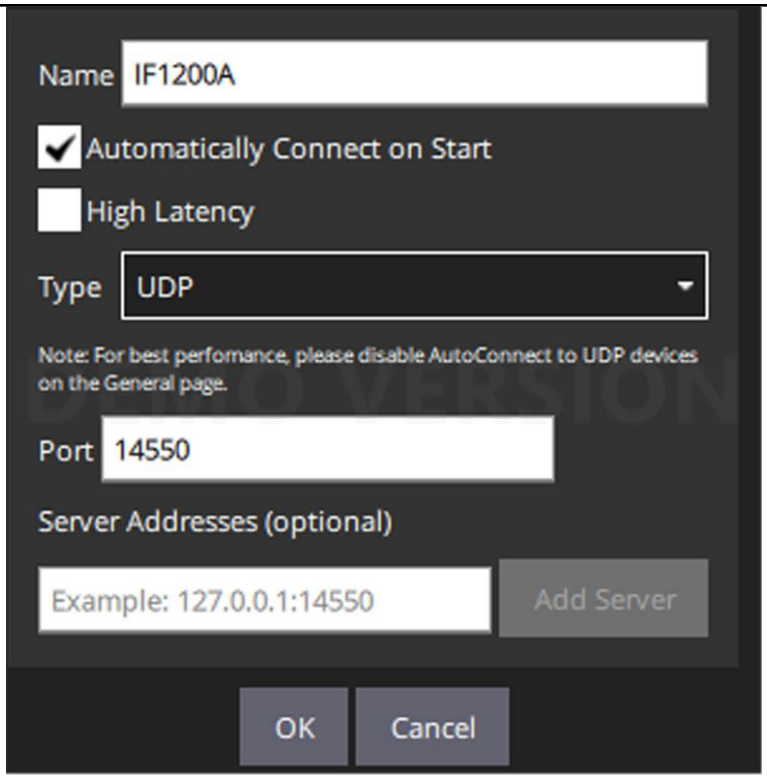
Connect HereLink and QGroundControl through a WiFi Network	
Step	**Action**
9	Enter a name for the Comm Link (see below). In this example, the name we created is “IF1200A.”
10	Select Automatically Connect on Start.
11	In the Type field, select UDP.
12	In the Port field, verify it is set to 14550.
13	In the Server Addresses (Optional) field, enter the IP address of the Herelink (see Step 1).
14	Click on OK at the bottom of the dialog box.



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Connect HereLink and QGroundControl through a WiFi Network	
Step	**Action**
15	The Create New Link Configuration dialog box closes, and the new Comm Link name that you created (IF1200A) appears at the top of the screen.
16	To connect the GCS to the HereLink, select the new Comm Link to the HereLink (IF1200A), at the top of the screen, then click on Connect at the bottom of the screen.
17	Once the aircraft and HereLink are wirelessly connected, the GCS begins issuing audible signals. This may take a few moments.
End of Procedure	

Maintenance Schedule

	Maintenance Intervals (Every X Flights)							
Recommended Maintenance Activities	Every Flight	10 Flights	25 Flights	50 Flights	100 Flights	400 Flights	800 Flights	1600 Flights
Inspect all moving components for wear/damage.	X							
Check propellers for damage.	X							
Dust all lenses	X							
Inspect all visible screws & tighten if needed.		X						
Clean aircraft & all motors with an air can			X					
Examine batteries and motors for wear and tear, replace as needed				X				
Replace								
Propellers						X		
Motor Bearings						X		
Battery							X	X
Motors								X

Maintenance Assumptions
1. For the maintenance schedule above, flights are assumed to be 30 minutes in length.
2. Proper care of UAV is taken during flight and in storage.

Major Parts Replacement and Maintenance Items:
1. **Batteries**
   Manufacturer: Tattu, Mfg's PN TAA16KP12S15
   Tattu Plus 1.0 Compact Version
   16000mAh 44.4V 15C 12S1P Lipo
   Smart Battery Pack with AS150U Plug
2. **Propellers**: TM 24.2x7.9
3. **Landing Gear**
4. **GPS Antenna Mount Replacement**
5. **Bearing Service**
6. **Motor Replacement**

For current costs for the above items, please go to:
https://inspiredflight.freshdesk.com/support/solutions/articles/67000704943-maintenance-and-replacement-parts-costs

Revisions

Revision Number	Changes
1.0	Initial release
1.02	Updated the Pre Flight Checklist