draganFLY™

INNOVATIONS INC

# DRAGANFLYER X4
# USERS MANUAL

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## Operator Notice

***The responsibility falls upon owners operating or authorizing the operation and pilots operating the Draganflyer X4 helicopter for operation of the helicopter in a safe manner that ensures no injury to persons or damage to property occurs by taking unnecessary risk in its operation.***

***Further more the onus is upon each owner authorizing the operation of the Draganflyer X4 helicopter, and each pilot operating the Draganflyer X4 helicopter, to comply with all regulations pertinent to the use of the Draganflyer X4 helicopter and associated components, at the location of operation with regards to the use of airspace as well as radio communications.***

***Draganfly Innovations Inc. does not accept any responsibility for the damages or financial compensations which may arise there of as the result of an owner operating or authorizing a pilot to operate and failing to comply with any of the respective regulations and which leads to a claim of a third party against the user.***

# Warnings

**The Draganflyer X4 helicopter is a precision machine that is vulnerable to misuse and can prove to be dangerous if not properly maintained or used in an inappropriate manor.**

***Throughout this manual, look for this symbol, which will be used to remind you about safe operating procedures.***

Helicopters by their nature are not positively stable. Although the Draganflyer X4 will maintain an attitude and a position relative to wind movement without constant control input , operators should always be aware of its position and be able to take immediate control of the helicopter to recover from an unwanted position and avoid any mishaps. Please completely read and understand all Draganflyer X4 instructional information before attempting to fly the Draganflyer X4.

To provide optimum performance, a Lithium Polymer battery powers your Draganflyer X4. The same properties that make these batteries extremely powerful and lightweight also make them dangerous if handled incorrectly. Please read and understand all information pertaining to the battery before attempting to use or charge it.

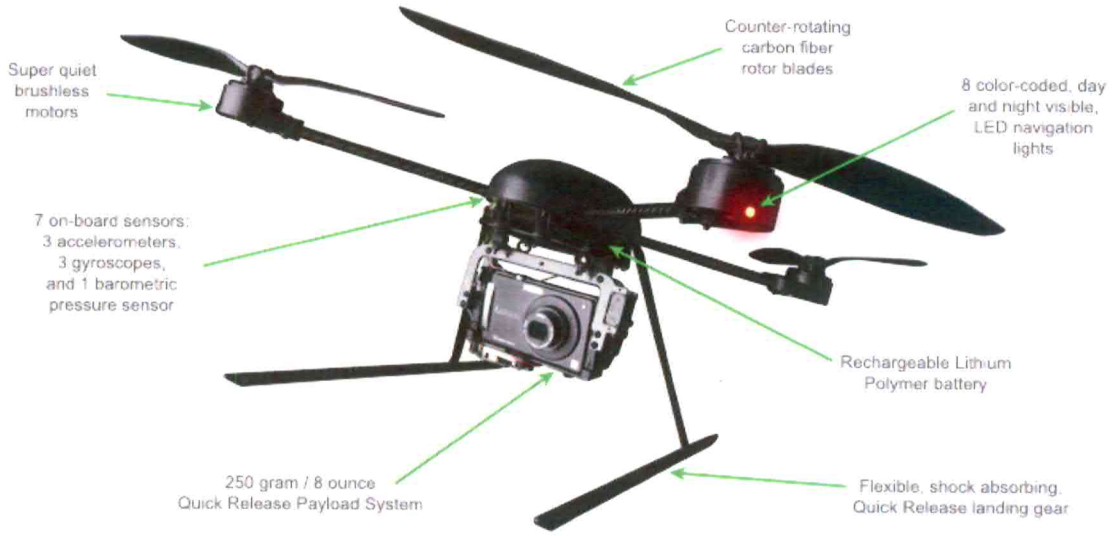
**IF MISUSED THIS AIRCRAFT IS CAPABLE OF CAUSING SERIOUS BODILY HARM TO THE OPERATOR AND SPECTATORS AS WELL AS PROPERTY DAMAGE. ANY DAMAGE OR INJURY OCCURRING DUE TO MISUSE OF THIS PRODUCT IS SOLELY THE OPERATOR'S RESPONSIBILITY.**

**DO NOT PLACE YOUR HANDS OR ARMS IN CLOSE PROXIMATY TO THE ROTORS OR ATTEMPT TO STOP SPINNING ROTORS WITH YOUR HANDS AS SERIOUS INJURY COULD RESULT FROM CONTACT.**

**THIS PRODUCT CONTAINS CHEMICALS WHICH ARE KNOWN BY THE STATE OF CALIFORNIA TO CAUSE CANCER, BIRTH DEFECTS AND/OR OTHER REPRODUCTIVE HARM.** Many common materials such as metals, plastics, glues, lubricants and other coatings contain chemicals in varying amount and concentrations which will cause harm if introduced into the human body. For further information on toxic or dangerous chemicals please refer to California's Health and Safety Codes Sections 25249.5-13

# X4 Overview and Specifications

With experience gained through the production of the Draganflyer V series helicopters and the Draganflyer X6 as well as feedback from customers, Draganfly Innovations has utilized the talents of skilled engineers, designers and technicians to bring you the Draganflyer X4. This collaboration has resulted in a powerful, highly stable flying platform that requires minimal training to effectively fly. The Draganflyer X4 can be equipped with a variety of cameras allowing for video or still pictures to be taken with live feed to enable one-person operation.




## Technical Specifications

### Helicopter Size

- **Dimensions**
  *(standard configuration)*
  - Width: 64.5 cm (25.4in)
  - Length: 64.5 cm (25.4in)
  - Top Diameter: 78.5 cm (30.9in)
  - Height: 21 cm (8.3in)
- **Dimensions**
  *(Without Rotors)*
  - Width: 36 cm (14.1in)
  - Length: 36 cm (14.1in)
  - Top Diameter: 51 cm (20in)
  - Height: 21 cm (8.3in)
- **Dimensions**
  *(without rotor blades or landing gear)*
  - Width 36 cm (14 in)
  - Length: 36 cm (14 in)
  - Top Diameter: 51 cm (3 in)
  - Height: 7.5 cm (3 in)

# Draganflyer X4 – Users Manual

## RF Communications

- **2.4GHz Data Link**
  - Link Type: Helicopter to Ground & Ground to Helicopter (Two-Way)
  - Helicopter Antenna: Wired Whip Antenna
  - Controller Antenna: Omni-Directional (transmitting uniformally in all directions)
  - RF Data Rate: 250kbps
  - Receiver sensitivity: -100dBm dB relative to one milliWatt
  - Transmission Technique: DSSS (Direct Sequence Spread Spectrum)
  - Frequency band: 2.4000 - 2.4835 GHz
  - Certifications: CE, FCC, IC, ETSI
  - Data Link Channel Selection: Automatic (13 Channels)

the least possible power of signal that can be sensed by the quadrotor

- **5.8GHz Video Link**
  - Link Type: Helicopter to Ground (One-Way)
  - Transmitter Antenna: Omni-Directional
  - Receiver Antennas: Omni-Directional & Flat Patch
  - Transmission Power: 12dBm
  - Transmitter Power Consumption: 500mW
  - NTSC and PAL Compatible
  - 7 Selectable Channels: 5740MHz, 5760MHz, 5780MHz, 5800MHz, 5820MHz, 5840MHz, 5860MHz

## Black Box Data Recorder

- Flight Data Recording: On-Board
- Stored To: Removable 2Gb MicroSD Memory Card
- Data Recorded: Onboard Sensor Flight Data
- (Link quality, Orientation, Altitude, Battery Voltage)

## Weight & Payload

- Helicopter Weight (with battery): 680g (24oz)
- Payload Capability: 250g (8.8oz)
- Maximum Gross Take-Off Weight: 980g (33oz)

## Rotor Blades

- Four Counter Rotating Blades
- Rotor Blade Material: Molded Carbon Fiber

## Electric Motors

- Brushless Motors: 4
- Configuration: Direct Drive (One Motor per Rotor)
- Safety Features: Stall Protection
- Ball Bearing: 2 per Motor
- Rotor Mounting Points: Integrated

## Camera Attachments

- Panasonic DMC-FX580 12.1 MP (Mega-Pixel) Digital Still / Video Camera with Remote Controlled Tilt, Zoom & Shutter

- FLIR (Forward Looking Infra Red) Tau Micro Infra Red Video Camera with built in DVR.
- Watech 902 Low Light Video Camera with built In DVR.
- Micro Analog Board Camera with built In DVR.

**Position Navigation Lights**

- Number: 8, Two Per Motor Arm
- Colors: 2 Red, 2 Blue, 2 White, and 2 Green
- Type: 1 Watt LED Variable Brightness Emitters
- Purpose: Helicopter Navigation and Orientation
- Visible Range: Direct Sunlight to Full Darkness
- Color Scheme:
  - Front Left: Red
  - Front Right: Green
  - Rear Left: White
  - Rear Right: Blue

**Rechargeable Helicopter Battery**

- Cell Chemistry: Lithium Polymer
- Voltage: 14.8V
- Capacity: 1900mAh
- Connectors: Integrated Balance and Power
- Recharge Time: Approx. 30 minutes (after typical flight)

**Landing Gear**

- Installed Height: 17cm (7in)
- Stance Width: 26cm (12in)
- Skid Length: 31cm (12in)
- Landing Gear Material: Molded Carbon Fiber

**Materials**

- Carbon Fiber
- Glass Filled Injected Nylon
- Aluminum & Stainless Steel Fasteners
- RoHS Compliant

**Operating Requirements**

- Recommended Pre-Use Temperature: 10° to 35°C (50° to 95°F)
- Maximum Environmental Operating Temperature: -25° to 38°C (-13° to 100°F)
- Relative Humidity: 0% to 90% Noncondensing
- Maximum Wind speed Recommended for Novice Pilots: 16km/h (10mph)

**Draganflyer X4 Handheld Computerized Controller**

- Width: 22cm (8.7in)
- Height: 12cm (4.7in)
- Depth: 8cm (3.1in)
- Weight: 790g (28.0oz)

# Safety Precautions

- **Always wear protective eyewear.**
- **Do not use batteries other than those specifically designed for the Draganflyer X4, doing so will interfere with Magnetometer settings.**
- **Do not fly the Draganflyer X4 in excessive winds - Manual flight mode limited to 16 km/h (10 mph) winds.**
- **Do not fly near people on the ground or objects in the air.**
- **Do not fly near high-tension lines, electrical substations, high structures or communication facilities.**
- **Be careful where you place the controller during flight preparations, be sure that it will not be dropped or suffer a fall as this may cause serious damage.**
- **Never fly this aircraft where damage to property or injury to persons may result if loss of control occurs.**
- **Never leave the Draganflyer X4 unattended with the battery connected to it. Always disconnect the battery when not flying.**

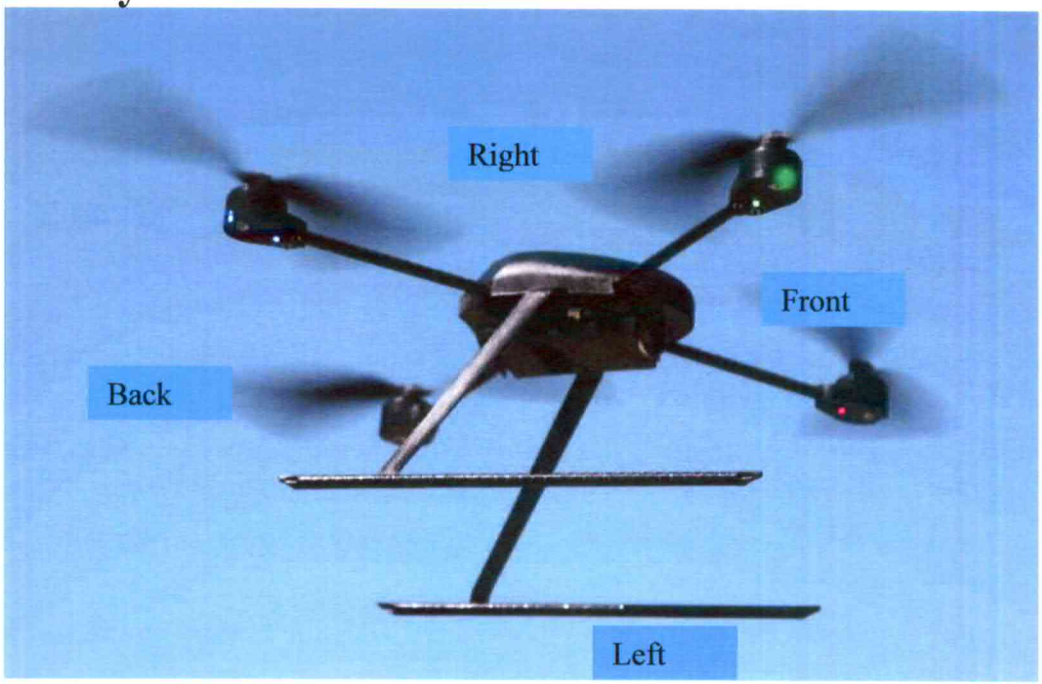
# Maintenance

**Maintaining the Draganflyer X4 is very easy since there are so few moving parts, however there are basic care steps that you should be aware of.**

- **Clean off any dirt build up using only a soft damp cloth; do not use any chemical cleaners as they may cause deterioration of some of the Draganflyer X4's components.**
- **Do not attempt to lubricate the motor bearings. Using the wrong type of lubricant or improper lubrication methods can result in permanent damage to Draganflyer X4 motors.**

- **Do not interchange motors or swap motor positions. Each of the motors is specifically coded for operation at their specific location. Installing motors with out the proper coding will result in a crash of the Draganflyer X4.**

# Assembly Instructions




Up/Down/Fore/Rear /Left /Right Conventions:
With the helicopter in front of you with the front of the helicopter pointed forward away from you:

- The helicopter's back is identified by the straight edge of the back of the canopy and motor pods with LED's showing a blue LED on the left and a white LED on the right.
- The deck and curved portion of the canopy extending beyond center identify the helicopter's front with a red LED on the left and a green LED on the right .
- Up is identified by the deck and canopy mounted on top of the frame's hub.
- Down is identified by the landing gear.
- Left is identified by the front left motor pod with a red LED and at the back left motor pod with a blue LED.
- Right is identified by the front right motor pod with a green LED and at the back right motor pod with a white LED.

**Draganflyer Parts Required (included):**

- ❑ Draganflyer X4
- ❑ 2 clockwise rotors
- ❑ 2 counter clockwise rotors
- ❑ 2 landing gear halves
- ❑ Lithium-polymer battery
- ❑ 4 black o-rings

**Tools Required: for normal operation**

- 3/16" Hex Driver
- 3/32" Hex Driver
- 1/16" Allen wrench
- .050" Hex driver
- 5/64 " Hex driver
- 2.5 mm Hex driver
- ¼" Nut driver
- 3/16" Nut driver
- Hook tool

## Assembly Steps:

### Landing Gear

The landing gear features the best compromise between weight, stability, ease of assembly, camera viewing angle, and absorption.

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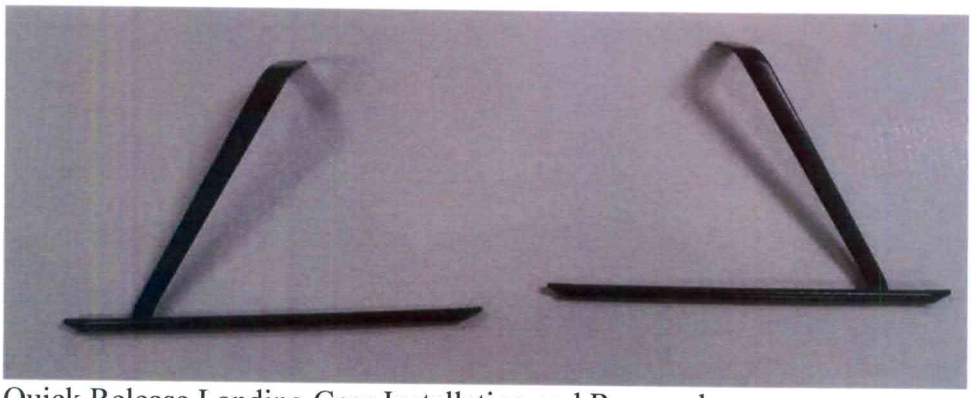
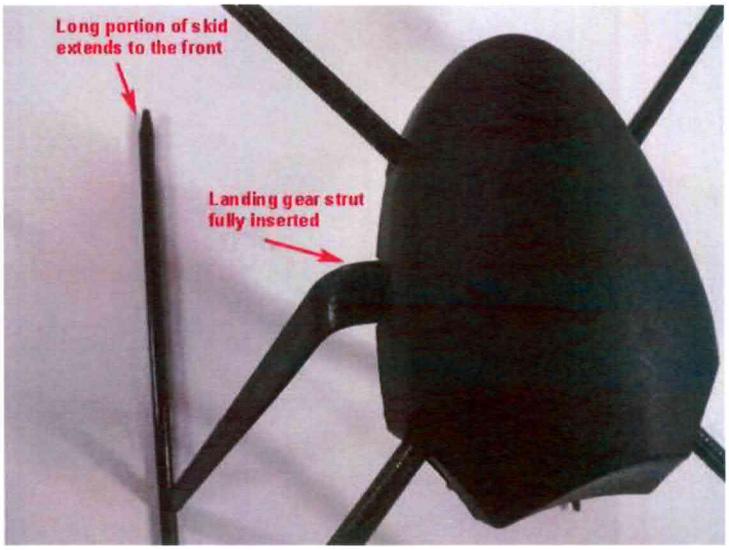
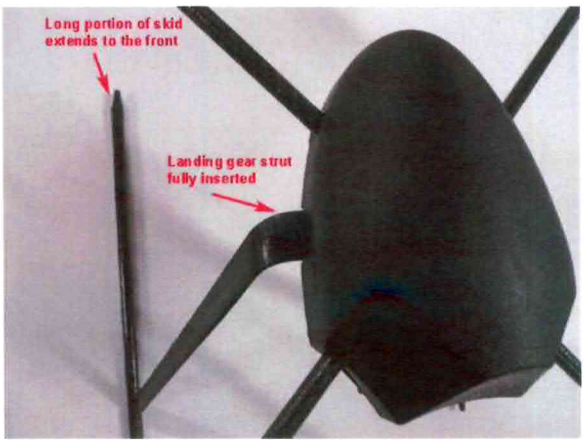


Quick Release Landing Gear Installation and Removal

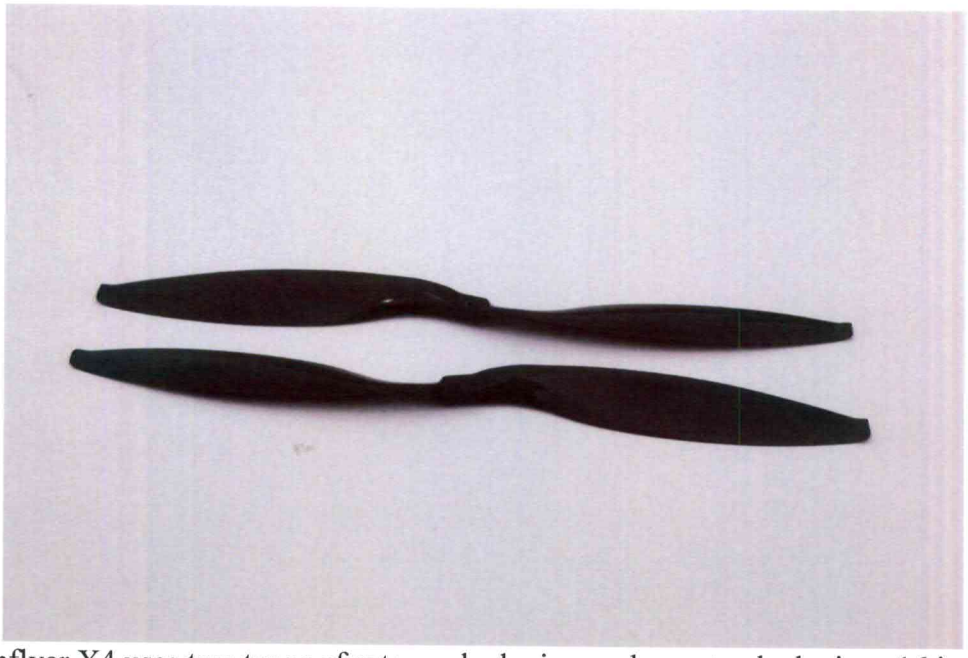
Insert landing gear by sliding the top flat end of the landing gear into the landing gear slot located on the Draganflyer X4 frame sides. Slide strut into position until it can be inserted no further.




To remove the press tabs inside slightly to release pull straight out from the side.

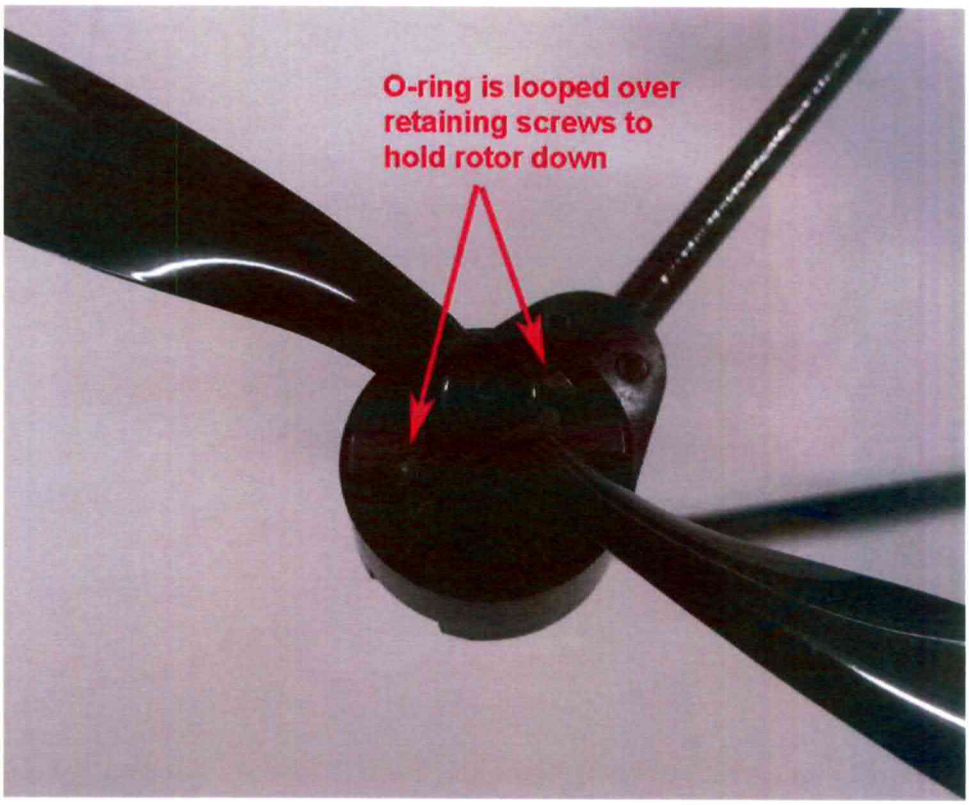
**Rotors**



The Draganflyer X4 uses two types of rotors: clockwise and counterclockwise - 16 inch long. The front left and rear right rotors turn clockwise. The right front and left rear rotors turn counter clockwise.

- Position rotor on rotor-mount, with shaft sticking through rotor's central hole. Ensure the concave side of each blade is pointing downward. Install one o-ring by hooking the o-ring over one of the retaining screws, stretch it over top of the blade's hub, and then hook it over the other retaining screw on the other side of the hub. Use the small hook tool provided, but be careful to avoid damaging the motor's exposed wires.

**Installation for all four rotors is identical however:**
***It is imperative that the rotors are installed correctly with regards to the placement of the clockwise and counter clockwise motors. Failure to do so and attempting to fly will cause the helicopter to malfunction and may cause damage to the rotors and or helicopter.***



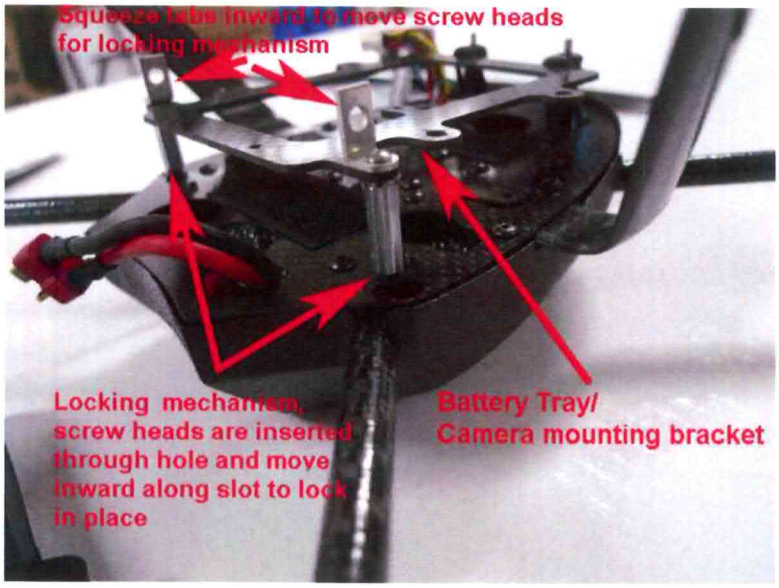

***Ensure o-rings are properly secured; failure to secure O-rings could result in loss of a rotor and subsequent crash of the helicopter***

## Battery

The Draganflyer X4's main power source is a removable, rechargeable lithium-polymer battery (14.8 volt Cell 1900 mAh). It has been carefully selected and custom-made to ensure maximum helicopter performance. The Draganflyer X4 has been precisely tuned for this battery.

***Use of batteries other than the Draganflyer X4 4 Cell 1900mAh battery will void the Draganflyer X4 warranty. Alternative batteries will severely degrade performance and will interfere with the operation of the magnetometer.***

The battery sits in the bottom plate its position and orientations are important. Duplicate the described battery installation carefully. Velcro loop pads are found on the bottom of the battery and are set on the Velcro hook pads on the underside of the circuit board plate. The battery is then further held in place by the battery tray/camera mounting bracket which locks into place.



**Installing the Draganflyer X4 helicopter battery**

1. Position the battery so the red connector on the battery is aligned with the red connector on the Draganflyer X4 helicopter. Center the battery on the Velcro strips Adjust the battery so it sits against the edge of the circuit board but does not overlap on to it.
2. Connect the red male battery connector from the circuit board to the red female connector on the battery.

***Only mate this connector if you plan on flying immediately. Once you connect the battery to the helicopter the 4 motors ESC LEDs will turn on, as seen below left. The Navigation lights will also turn on once the helicopter is turned on. Even while the board is turned off, it will slowly drain the battery due to the ESC lights receiving power. Don't leave this connection mated for more than 10 minutes without flying.***

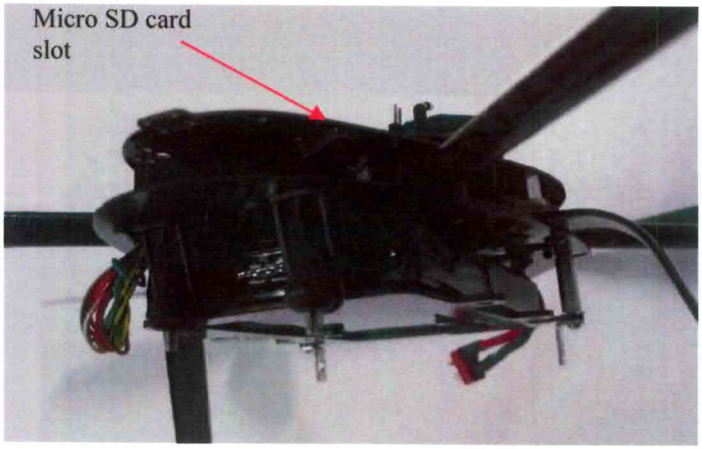
***When the low battery voltage warning comes on this does mean "land now" although it will still provide enough power to get the helicopter back and land safely, continuing to fly will run the risk of permanent damage to the battery and also crashing the helicopter***

***Once the helicopter batteries are drained below 12 volts they become extremely unsafe to charge or use. Doing so may result in a fire. Batteries in this condition should be disposed of To dispose of it soak it in saturated salt water for 48 hours and then it can be safely put in with household garbage.***

***When transporting or temporarily storing Lipo batteries in a vehicle, temperature ranges should be greater than 20 ° F(-6.6° C) but no more than 150 ° F (65.6. °C)***
***Storing Lipo batteries at temperatures greater than 170° ( 76.6 ° C) may cause damage to battery and possible fire.***

## Draganflyer X4 Micro SD card

In the event an upgrade is required for the firmware of the helicopter, an electronic file will be sent to you with instructions for installation. To install the upgrade the file will have to be downloaded onto a Micro SD card and then inserted into the micro SD card port on the helicopter. This port is located towards the front of the helicopter on the underside of the power board.




Problem with the driver "USB EMP Audio Device"
failure to install when connected to the base station

# Operator Instructions

**When trimmed properly and under sufficient power the Draganflyer X4's default flight is level flight, but first it has to get into the air. Like any aircraft preflight checks need to be performed. Failure to carry out preflight checks and to rectify any identified problems may result in disastrous consequences that could injure someone, damage or destroy property including your helicopter.**

**This aircraft is not designed for aerobatic manoeuvres or high speed flight. Do not perform aggressive or erratic manoeuvres at high speeds or fly in wind conditions above 16 kmh (10 mph). Failing to abide by this warning and performing such manoeuvres may cause boom strikes and damage to your helicopter.**

## Wind.

***Although the Draganflyer X4 is designed for both indoor and outdoor flight, care must be taken to ensure you are able to maintain control of the helicopter in various wind conditions. The Beaufort Scale shown below indicates wind speeds and visual references which may be observed around your environment. Also be aware that wind speeds generally increase with altitude gained. Therefore what you may believe is a light breeze at ground level may be a gentle breeze at 10-20 meters (32- 64 ft) and a moderate breeze or stronger at altitudes higher than 20 meters (32 ft) .***

***<u>Recommended flight wind conditions:</u> Inexperienced operators and flight for video purposes, should be limited to calm conditions, ground winds not exceeding 10 kmh (6 mph). For Manual Flight winds should not exceed 16 kmh (10 mph). As you obtain experience flying the Draganflyer X4 you may want to fly in slightly increased winds, however even experienced operators should not fly in wind conditions more than a moderate breeze. The Beaufort Scale below provides for an estimation of wind speeds based on environmental clues***

BEAUFORT SCALE: Specifications and equivalent speeds for use on land

| FORCE | EQUIVALENT SPEED 10 m above ground | | DESCRIPTION | SPECIFICATIONS FOR USE ON LAND |
|---|---|---|---|---|
| | miles/hour | knots | | |
| 0 | 0-1 | 0-1 | Calm | Calm; smoke rises vertically |
| 1 | 1-3 | 1-3 | Light air | Direction of wind shown by smoke drift, but not by wind vanes. |
| 2 | 4-7 | 4-6 | Light Breeze | Wind felt on face; leaves rustle; ordinary vanes moved by wind. |
| 3 | 8-12 | 7-10 | Gentle Breeze | Leaves and small twigs in constant motion; wind extends light flag |
| 4 | 13-18 | 11-16 | Moderate Breeze | Breeze Raises dust and loose paper; small branches are moved. |
| 5 | 19-24 | 17-21 | Fresh Breeze | Small trees in leaf begin to sway; crested wavelets form on inland waters. |

## Draganflyer X4 Helicopter/Controller Range Test

Need to do this test

The simple method of testing the controller and helicopter for range is to turn on the handheld controller and power up the helicopter but do not arm it. Observe the blink rate of the LEDs on the helicopter. Now increase the throttle, the LEDs should blink at a quicker rate, throttle down the controller. Walk approximately 60 paces away from the helicopter and then increase the throttle again, the blink rate should increase as before. If the blink rate does not increase proportionately with the throttle increase, you are not getting the correct response and you should not attempt to fly the helicopter.

***Antenna orientation; for best reception it is best if the ends of antennas on the Draganflyer X4 transmitter are not pointed directly at the helicopter as you are flying it. The antennas are hinged to allow them to be adjusted off of a direct line.***

## Recommended Operational Guidelines

### General

1. Be aware of and abide by remote controlled aircraft regulations applicable to the airspace used.
2. Manned aircraft have the right-of- way.
3. Avoid flight over persons or property which could be damaged by a crash..
4. Do not fly under the influence of alcohol or drugs.
5. Helicopter shall remain in line of sight at all times.
6. If optical systems such as video goggles are used by the pilot, have a designated spotter.
7. Do not undertake a flight operation unless the helicopter is airworthy.

### Flight Operations Checklists

There are six phases to flight operations; Pre-Flight, Control Systems Check, Before Take Off, In-flight Operations, Landing, and Post Flight Operations.

## 1 Preflight Preparation

### ❑ Environment

For manual flight ensure wind speed is below 16 km/hr (10 mph). Manually controlled flights in gusty or turbulent conditions can result in shorter flight duration due to increased power consumption.

### ❑ Eye Protection

Ensure you are wearing safety glasses or other suitable eye protection.

### ❑ Side Arms

Check the arms and clamps for weakness. Replace any worn or damaged parts.

### ❑ Landing Gear

Inspect the landing gear for cracks or damage.
Ensure the landing gear is not deformed and the Draganflyer X4 helicopter sits level.

### ❑ Rotors

Check that all four rotors are correctly installed on motors (front left and back right rotors clockwise , front right and back left motors counter clockwise).
Inspect rotors for chips or cracks; Replace any damaged rotors.
Check that each rotor blade is secured with o-rings; replace any worn or damaged o-rings.

### ❑ Battery

Always fully charge battery before each use.
Ensure battery is placed in the correct position, and securely connected.

### ❑ Canopy

Inspect canopy for cracks; replace if damaged.
Ensure canopy is correctly placed and securely latched.

### ❑ Handheld Controller

Always fully charge controller battery before each use.
Ensure controller is communicating with the helicopter.
Ensure the Micro-SD card is inserted in the Micro-SD port.

### ❑ Camera /Video System

Always fully charge camera batteries before each use.
Always fully charge receiver batteries before each use.
Ensure camera is mounted securely.
Test camera system for proper operation before each use.
Ensure only payloads approved by Draganfly Innovations are used.

### Control Systems Check

1. Make sure that all of your body parts, clothing, other obstructions and bystanders are well away from any rotors and their arc before turning power on to any systems. Make sure the helicopter is secure and will not move if the motors suddenly power up.
2. Announce out loud "CLEAR ROTORS".
3. Turn on the handheld controller. Ensure the telemetry information is displayed.
4. Make sure that the throttle stick on the handheld controller is lowest position.
5. Connect the battery and/or turn on the power button to the helicopter, located at the back of the canopy.
6. Follow recommended range test procedures.
7. Check motors and rotors for proper operation. Firmly secure the helicopter and gradually increase the throttle to full power and back down to off- checking for lack of thrust, vibration, or other possible anomalies.

8. Check that the motors stop completely when the throttle is at the off position.
9. If a camera is installed, check that the camera equipment power is on. Check to make sure the shutter trigger is working properly.

**Before Takeoff**

1. Confirm that the handheld controller antennas are installed.
2. Check that the flight area is clear of people and obstructions.
3. Double check weather and environmental conditions and review potential emergency landing areas.
4. Announce out loud "TAKE OFF".

**Launch Helicopter**

1. Point front of the helicopter so it is facing into the wind.
2. Slowly increase the throttle to ensure all rotors are spinning, then increase to take off.
3. Climb to a safe altitude away from potential hazards and check control systems. Adjust trims if necessary.
4. Keep helicopter at a safe operating distance from people and buildings.
5. Continually scan the flight and ground areas for potential hazards.

**Landing**

1. Scan landing area for potential obstructions and hazards.
2. Announce out loud "LANDING".
3. Carefully land the helicopter away from obstructions and people.

**Post Flight**

1. Wait for the rotors to stop turning.
2. Disarm the helicopter.
3. Turn off the power to the camera.
4. Turn the power off to the helicopter ***(the throttle must be set at the lowest position possible)*** and disconnect the battery.
5. Turn off the handheld controller.
6. Check the helicopter for signs of damage or excessive wear.
7. Secure the helicopter.

## Logbooks

Log books are not only used to record flight times with a running total, but also to record all maintenance items as well. Each helicopter should have its own identifying number and a corresponding log book. The log book should be kept with the helicopter and entries made including flight times, conditions, parts that are replaced airworthiness testing and any other notes of interest related to performance. The Flight data log number should also be included in your logbook as Flight Data Logs are not date stamped and in the event of needing to review the flight data log from a past flight the Flight Data Log number if referenced to in the log book will make it much easier to find.

**Draganflyer X4 Helicopter Serial Number _____ Flight Log**

| Date | Location | Pilot | Flight Number | |
|---|---|---|---|---|
| | | | Flight Data Log Number | |
| Take-Off Time | Land Time | Total Flight Time | Accumulated Flight Time | |
| | | | | |
| Wind Speed | Temperature | Camera Operator | Camera Type | |
| | | | | |
| | Spotter | | File Name | |
| Weather Conditions | | | Flight Authorization Information | |
| | | | | |
| Purpose of Flight | | | Battery | |
| | | | Pack # | Start Voltage / End Voltage |
| Comments Include damage sustained, repairs made or required | | | | |

The Flight Data Log number is the number corresponding to the Log Files number found displayed on the Handheld Control Config Screen

Information in the log books is valuable to assess any problems and can assist in preventative solutions for future flight to avoid similar issues.

## Maintenance

Maintenance of the helicopter is very simple as there are few moving parts. In the event the helicopter is used in a dusty environment simply use light air pressure to blow off the circuitry and motors. No lubrication is required for any components. Visually inspect your helicopter and remove any excess dirt or debris such as grass, before proceeding with any flight. Inspect the helicopter as outlined in the Preflight inspections list. Any damage or worn out parts need to be replaced or repaired before the next flight.

## Spotters

The use of a Spotter is highly recommended at all times. A spotter can alleviate much of the burden to the pilot of scanning for possible hazards in the air and on the ground. An experienced Spotter can be invaluable in helping to line up pictures. In addition they can deal with bystanders who may want to get a closer look and want to talk with you as you are concentrating on flying.

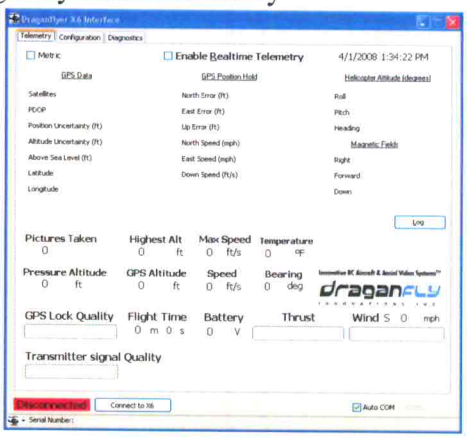
## Telemetry and Calibration

The telemetry program allows you to see real time data and to record instrumentation and sensor measurements of the helicopter. Some of the information provided includes battery voltage, altitude and battery levels.

### Telemetry Program

- Install DraganflyerX4 Interface and USB Telemetry Transceiver driver from provided software DVD
- Plug the included Draganfly USB Telemetry Transceiver *(this allows the Draganflyer X4 to communicate with the computer)* into your Windows computer. Let Windows install it automatically.

- Turn on your Draganflyer X4.
- Launch the Draganflyer X6 Interface program.
- Connect to your Draganflyer X4 by selecting the Draganfly USB Telemetry Transceiver COM port from the list.




- Select "Connect to Draganflyer X4." When the Interface program has established a communications link with the Draganflyer X4, it will display "Found."
- You can now turn on telemetry streaming. Click on the Telemetry tab, and then click the Enable Telemetry button. It should be streaming data from the Draganflyer X4.

## Handheld Controller


The Draganflyer X4 comes with a unique advanced handheld controller. The controller has been designed specifically for the Draganflyer X4 for ease of use.

To begin using the handheld controller, turn it on by momentarily pressing the red Power Button. However, finish reading this section before you attempt to fly, or make adjustment on the controller. This portion of the manual explains everything relevant about the handheld controller.

**Battery:**
Your handheld controller uses a lithium-polymer battery to make it lighter and last longer on a charge. Expect about three hours of use for each charge. To charge this battery, connect the charging harness charge and balance connector to the charge and balance ports on the back of the controller. Connect your lithium-polymer charger to the controller charging harness, and charge it as a "3s" lithium-polymer (3-cell, 12.6V max) at 2.10 Amps.

The battery pack features a protection circuit to prevent damage and reduce the risk of a fire if misused. In this protection circuit there is overcharge prevention, when the battery is fully charged (12.6 Volts actual voltage) this circuit turns on and will prevent the battery from being charged again until it is depleted adequately. With this circuit on there is a drop of approximately 0.6 volts in the displayed voltage so when the battery is actually at 12.6 Volts it will only display 12.0 volts. This circuit will stay on and prevent charging until the actual voltage reaches approximately 11.9 volts (11.3 displayed voltage).

If your battery is near the lower voltage and you attempt to recharge you may get "[8] Failure Output Circuit" reading. This is the protection circuit working, if you deplete the hand held controller a little further, probably a couple of flights, the circuit will turn off and you will be able to charge again. Alternatively you could use the discharge feature of the charger to accomplish this.

*A full-charged battery will display around 12.4V on the handheld controller's screen. Never let the voltage go below 11.0V. Consider charging once you see 11.3V. Never leave the handheld controller charging unattended. Never leave the controller turned on when not in use.*

- **Control Sticks:**

The two large joysticks are your primary helicopter controls.

*The Left joystick* controls the throttle by moving it forwards; all the way down is off, all the way up is full throttle. The left stick also controls heading. Sideways deflection of the left joystick stick rotates (yaw) the helicopter left (counter-clockwise when looking at the helicopter from above), and vice versa.

*The Right joystick* is for controlling helicopter movement forward or backward (pitch) and left or right movement (roll). Moving the joystick forward gives you forward movement and moving the joystick back gives backward movement on the pitch axis. Moving the same joystick to the left gives left movement and to the right gives right movement on the roll axis.

More information about the joysticks is found in the Flight Modes sections.

Do not under any circumstances fully reduce the throttle during flight, this will cause a drastic decrease in altitude and may result in an irrecoverable attitude and crash.

**Switches:**

Above the left joystick (throttle) there are two switches, the switch on the right is the Flight Mode switch. *Up position is on GPS Hold mode on****( Note Not applicable to the Draganflyer X4 if placed in the top position it will function as altitude hold).*** *Middle position is Altitude Hold. Down is GPS Hold off, (Manual control on).*

The switch to the left of the Flight Mode switch is the *Ascent/Descent* switch. While in Altitude Hold mode or you can ascend or descend in a vertical column using this switch

do not adjust the throttle. Pressing the switch down descends the helicopter, middle is neutral, and pressing up causes the helicopter to ascend.

The Ascent /Descent switch is spring loaded and will default to the middle position unless held in the ascent or descent position. Only move it once you are in the Altitude-Hold or GPS Hold Flight Modes. Holding the descent switch in the down position when in Manual flight mode will not cause the helicopter to descend, however it will eliminate the low throttle warning and could cause the rotors to stop.

***Flight/Motor Termination - Holding the descent switch in the down position when in manual flight and bringing the throttle to the lowest position will immediately cause the helicopter rotors to stop.***

**Trims:**
The three slide switches surrounding the joysticks are trim levers. You can push them to program a permanent stick input in that direction. Note that the handheld controller's display screen shows the trim positions in a pop up screen when adjusting.

You should not use much trim. By default, set the trims to zero. Only add trim if you are flying in very calm weather and the helicopter is consistently drifting to one side. Trim can disrupt the Hold Flight Modes, so if your Draganflyer X4 requires lots of trim, you should inspect it for problems and contact Draganfly Innovations.

**Trainer Switch:**
A push button on the top left side of the handheld controller is a trainer switch. A wireless link incorporated into the Draganflyer X4 controller allows your controller to link to another Draganflyer X4 controller and control one helicopter. Controllers are designated and programmed as either master or slave. Once linked, the slave controller will only communicate with that Draganflyer X4 helicopter while the button on the master controller is pressed. To link to another Draganflyer X4 controller, see the section titled Flight Training in this manual.

**Camera Controls**
On the top right side of the controller, two controls activate camera functions of shutter control and camera tilt. The camera tilt knob remotely adjusts the angle of the camera mount. The camera shutter switch allows you to remotely trigger the camera shutter. The camera zoom control tab is located immediately below the roll trim tab; this allows remote access to zoom in or out.

**Dual Video Output Jacks**
The dual jacks video out put jacks found on the bottom of the handheld controller allows for video goggles and a recording device to be plugged in simultaneously. This allows the operator to see what the cameras are seeing and record at the same time.

The Draganflyer X4 transmitter has the capability of logging data acquired during each flight. This information is important to be able to diagnose problems that may arise during flights. In addition the data can be used to track movements of the helicopter and times and locations pictures were taken.

**Data log Micro-SD Port**

To get a data log of a flight a micro-SD card must be installed in the transmitter. The micro –SD card is installed in the SD slot on the top of the transmitter. When the transmitter is on and paired with an X4 helicopter which is turned on a data log will record all interactions between the transmitter and the helicopter. To retrieve the data, turn off the transmitter and the Draganflyer X4. Remove the micro-SD card from the transmitter and place it in the micro-SD adapter. Place the adapter with the micro-SD card in it into an SD card slot on your computer. Upon opening the drive which shows you the files the data log will be listed as a log.txt file. You can read these files in Microsoft Excel, Notebook, Word or any other software that accepts .txt files. Like any other file you may save these files to your computer and rename them if you wish.

If you are experiencing issues with the Draganflyer X4 these data log files are valuable to help diagnose problems.

**Once the SD card is full the controller will allow you to pair with a helicopter but not fly, the touch screen will appear frozen. If this occurs turn off the helicopter and the controller then remove the SD card and download the flight logs onto a hard drive or other storage device and delete them from the SD card. You will then be able to resume normal operations.**

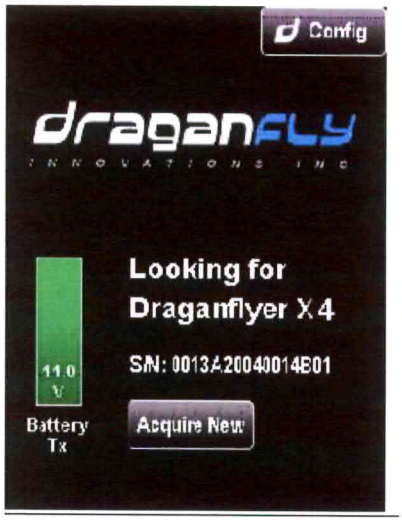
***The Micro-SD card must be installed in the transmitter in order to log any flight information. For warranty purposes the Micro-SD is required to be installed in the transmitter for each flight***

***The micro-SD card must not be taken out of the transmitter while it is turned on. Doing this will erase or corrupt the files on the micro-SD card***

**Draganflyer X4 Touch Screen**

***To turn on the Draganflyer X4 Handheld Controller press the Red power button as located in the picture at the beginning of this section.***

**Power up screen**




**Config** button, used to access programming and operating screens.

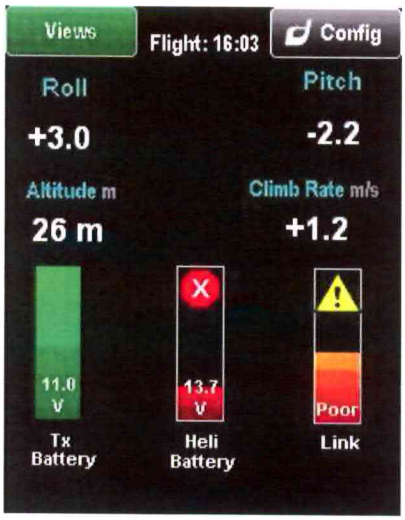
**Battery TX,** a bar indicator of controller battery status.

**No helicopter is paired with this handheld controller yet**, or **Looking for Draganflyer X4 SN XXXXXXXX,** indicates it is searching for the last Draganflyer X4 helicopter it was connected to. If it acquires a helicopter it will immediately display the Basic screen.

**Acquire New** button, used to access a new helicopter.

**Note:** The **Views** button on the upper left and the **Config** button on the upper right are visible on Views or Config screens after the Power up screen.

**Basic Screen;**



**Views** button, gives access to Basic, Inertial, the active screen is highlighted in green. By default, pressing the Views button will always bring you to the Basic Screen.

**Config** button gives access to helicopter set up and calibration functions.

**Flight** displays length of flight, (calculated by the length of time the throttle is up and rotors are moving to cause flight). Flight time is accumulated as long as the handheld controller and helicopter are powered up (flight time will reset to zero upon change of battery).

**Altitude** determined by barometric pressure, value displayed in meters.

**Climb Rate** displayed in meters per second.

**TX Battery** the live color graph indicates handheld controller battery strength, green, yellow, and red scale, green strong, yellow warning, and red inadequate.

**Heli Battery** the live color graph indicates helicopter battery strength, green, yellow, and red scale green strong, yellow warning, red inadequate. In addition when helicopter battery levels reach the warning and critical stages the following popup screens are displayed.



**Link** the live color graph, indicates helicopter controller link strength, green, yellow, and red scale green good, yellow fair, red poor.

Note: Text where the time and flight time are displayed is also used to momentarily display messages such as Trim adjustment and Flight Mode

## Config Screen

**Basic Config** – gives access to menus for Basic configuration, Flight timer,Find New Helicopter, Video Setup, Trainer Setup and Helicopter Calibration.


**Flight Timer** – allows adjustment to give a warning when a flight time of a set duration is reached.


**Find New Helicopter** – gives the transmitter a command to pair with another available helicopter.


**Video Set Up** – allows for the adjustment of channels, sound and power.

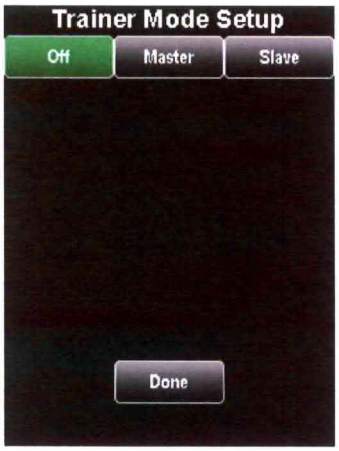

**Receiver Channel** – allows you to select the best channel to receive the video transmission from the camera.

**Audio Settings** – allows you to turn audio transmission on or off.

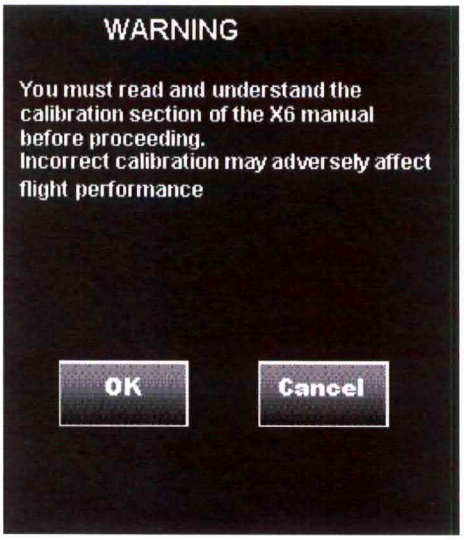
**Power Settings** – allows you to choose to have the diversity receivers in the transmitter always turned on, always turned off or in automatically detects if video glasses or a recording device is plugged into the transmitter.

NOTE: When changing the receiver channel you must also change the video transmitter to the corresponding channel.

**Trainer Setup** - Configures the transmitters for training set up as a Master or Slave. See FLIGHT TRAINING section in this manual for more detail

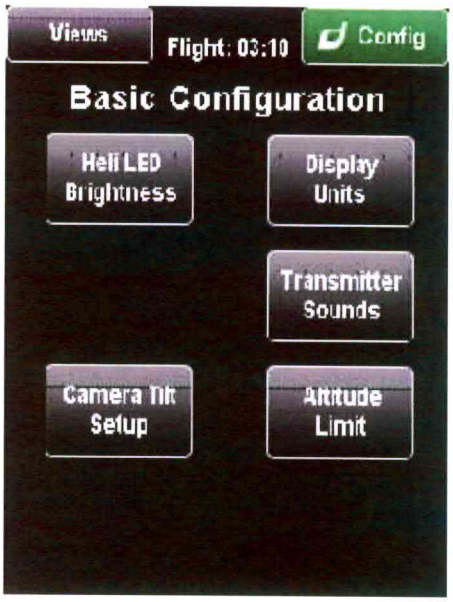



**Helicopter Calibration** - Detailed instructions for Helicopter Calibration are found under the "Calibrations" section of the manual.

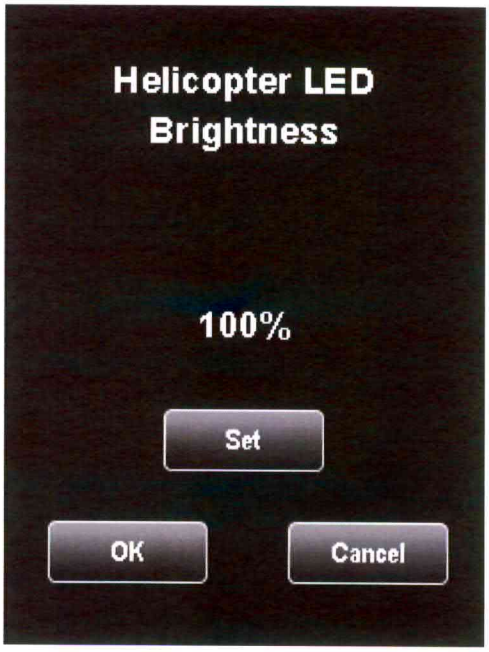



## Basic Configuration Screen

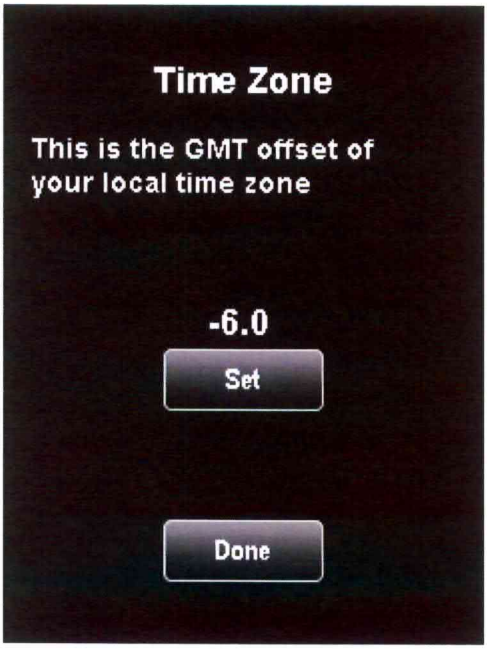
This screen gives access to Helicopter LED brightness, Time Zone Set Up, Camera Tilt, Display Units, Transmitter Sounds and Altitude Limit.



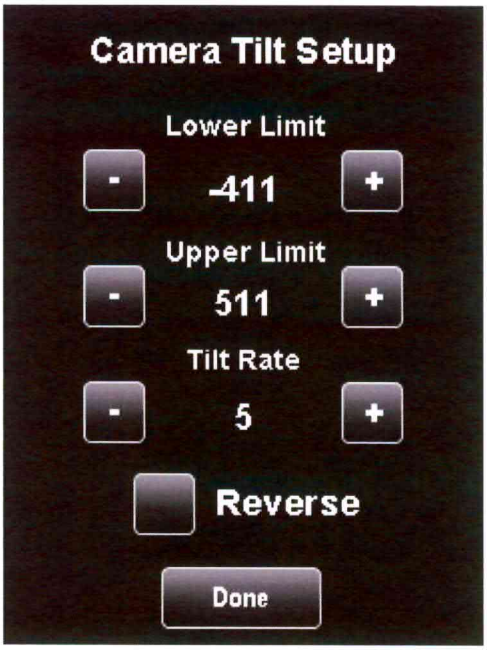

**Heli LED Brightness** – adjust helicopter LED lights from 0% (off) to 100% (Extremely Bright)



**Time Zone Set Up** – allows for an adjustment of the time setting to reflect your local time based on the difference from Greenwich Mean Time.



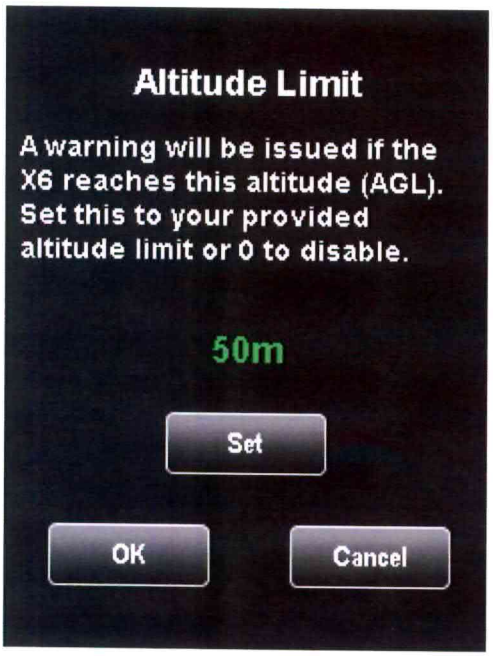

**Camera Tilt Setup** –The tilt mechanism on the Draganflyer X4 camera mount allows for adjustment from 0 to 90 degrees of range (zero being vertical and 90 being horizontal). The tilt set up allows you to set the maximum movement as you desire with the lower limit maximum being -511 and the upper limit being 510. There is also a tilt rate adjustment with the fastest being 10 and the slowest being 1. You are also able to reverse the movement of the tilt knob.

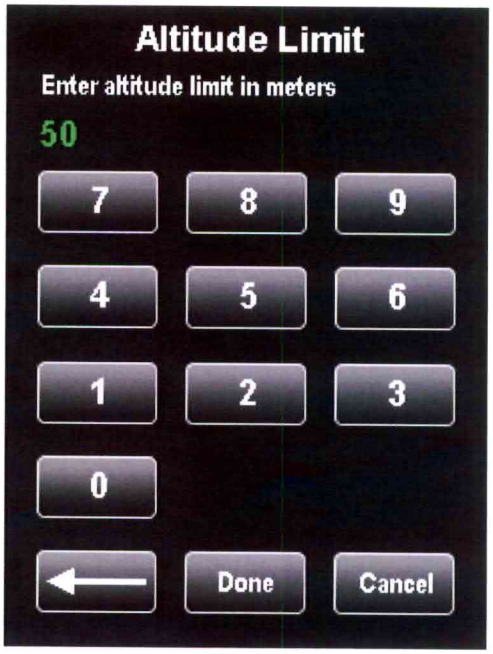



**Display Units** – measurements can be selected for metric or imperial display.

**Transmitter Sounds** – provides an opportunity to hear and learn the sounds made by the transmitter.


**Altitude Limit** – allows you to set the maximum height above ground level the helicopter will fly while in Altitude Hold or GPS Position Hold modes. While in Position Hold modes the helicopter will not exceed this set altitude. While in Manual Flight mode you will receive a message indicating the altitude limit has been reached.



## Warnings and Confirmations

### Visual

The following displays will appear on the Draganflyer X4 touch screen to draw your attention to critical operations of the helicopter.




### Audible

The Draganflyer X4 also has audible warnings. There is a sound device in your handheld controller that will convey important Draganflyer X4 status information to you. Each beep pattern has a unique meaning, and you should know them all.

***You can learn the different warning sounds by accessing them through the Basic Config menu - Transmitter Sounds.***

**Triple-beep**:

1. When you turn the handheld controller on, its 2.4GHz two-way radio system searches for a Draganflyer X4 to communicate with.
2. If it finds one (i.e. if your Draganflyer X4 is powered up), you will hear three long beeps.
3. Your handheld controller is now controlling the Draganflyer X4.

**Alarm**

1. Approximately three minutes before your Draganflyer X4 runs out of battery power, your handheld controller will begin emitting an alarm.
2. Shortly after the alarm begins, the helicopter will start descending if it is in a Hold mode. This slow descent is another method of informing you that the Draganflyer X4 is running out of battery. At this time you should take control of the Draganflyer X4.
3. Return to Manual Flight Mode.
4. Land the helicopter.

**Rising tones**

1. The handheld controller will emit rising in pitch-tones when your Draganflyer X4 acquires a GPS satellite lock sufficient to perform GPS Position Hold flight.

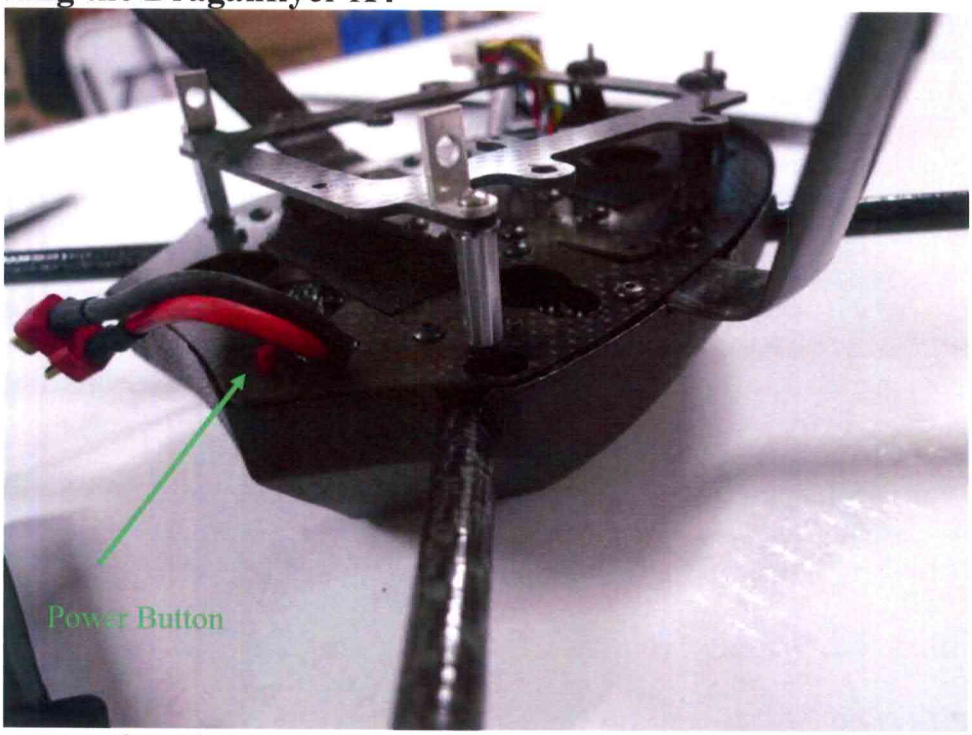
**Falling tones**

1. The handheld controller will emit falling in pitch tones when the GPS loses a lock. (Loss of GPS lock is usually caused by objects or people obstructing the helicopter's view of the sky.)
2. Return to Manual Flight Mode immediately.

**Power button**

1. To turn on, press and hold momentarily then release.
2. To turn off, press and hold for three seconds then release.

## Activating the Draganflyer X4




Once you press the red power button on the back right underside of the helicopter deck, the LED on the canopy and navigation lights on the motor pods will light and start blinking.

Your Draganflyer X4 is now on and will communicate with the handheld controller. However, it is not armed and will not engage the motors.

To activate the motors you have to arm the helicopter. This feature ensures that a power-up will be safe, regardless of controller inputs.

**Arming Procedure**

1. Set the Draganflyer X4 helicopter on a flat surface away from obstacles. Ensure blades do not touch nearby objects.
2. Turn ON the handheld controller.

3. Turn ON the helicopter by pressing the power button on the back right underside of the helicopter deck.
4. Make sure Flight mode hold switch is at the lowest position, in manual flight mode.
5. The handheld controller will emit a Triple-Beep that confirms it is communicating with the Draganflyer X4 helicopter.
6. Increase the throttle to about 75%, you should see an increase in the white LED blink rate.
7. Move the left stick (throttle-yaw) to its lowest position.
8. Next move the left stick to the lower-right corner and HOLD it there for 5 seconds.
9. After 5 seconds you will see the LED lights on the helicopter's motor pods display a rotating pattern for a few seconds and you will hear a beep indicating it is armed. The LEDs remain on continuously and do not blink.
10. The Draganflyer X4 helicopter is now armed.

**Takeoff**

An armed Draganflyer X4 can be dangerous, so maintain control over the handheld controller. We recommend holding the left stick in its lowest position when you are not flying.

The motors will begin spinning when you increase the throttle. Leave the throttle stick in a low position to give the motors a chance to spin up. Once they are all spinning (usually two seconds), you can add more throttle. Around 50% throttle the helicopter will take off.

You may notice the helicopter shaking on its landing gear before it lifts off. This is normal. Add more throttle and the helicopter will safely takeoff. A smooth throttle increase from spin-up to takeoff will reduce the shaking.

## Disarming the Draganflyer X4

After landing, disarming the Draganflyer X4 is a very simple process.
Ensure left joystick is at its lowest position and move it to the lower left corner and hold for 5 seconds or until the LED lights start flashing. The rotors may speed up briefly before shutting down.

## Flight Modes

**Manual Flight Mode**

Entered by putting GPS Hold switch in the down position, this Flight Mode is similar to that of a standard R/C helicopter. However, the Draganflyer X4's advanced electronics still make it significantly easier to fly.

The left joystick has direct control over throttle and yaw. The right joystick commands helicopter tilt angles. The right joystick in the neutral position will cause the helicopter to stay level indefinitely, while moving it off neutral will

cause the helicopter to hold that much tilt as long as that joystick input is maintained. Maximum stick deflection causes about 30 ° of tilt.

Take-offs and landings should be performed in this flight mode. Once you have established a stable hover and have a GPS lock, you can switch to a Hold Mode.

**Altitude-Hold Flight Mode**
Establish a steady hover. Then, by putting the GPS Hold switch in the middle position, you are telling the Draganflyer X4 to control altitude. The altitude is controlled by barometric pressure. You can now move anywhere in the horizontal plane and the Draganflyer X4 will maintain its altitude. Remember, the Ascent/Descent switch now commands it to climb, stay, or descend. You can now stay at an altitude or move up and down vertically by simply using the Ascent /Descent switch.

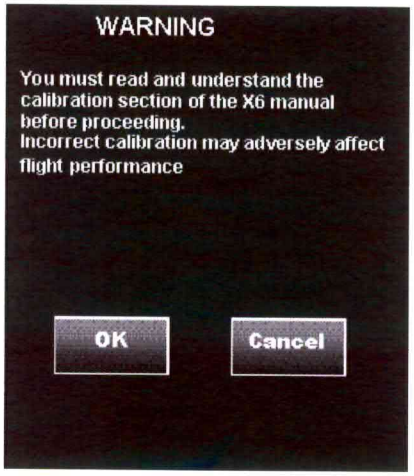
You still control yaw, pitch and roll. You also have control over throttle, but the helicopter is relying on you to maintain the throttle position. **Changing throttle position once in this mode will temporarily degrade the altitude-hold.** However, you still have enough control to get out of a bad situation if needed. In this position the helicopter tracks its position but does not compensate for return to it.

***If flying indoors the barometric pressure can be subject to sudden change due to changes in pressure by the opening of doors. This may result in a sudden drop of altitude by the helicopter as it tries to adjust to the pressure difference. The drop in altitude is directly related to the change in barometric pressure at the time. The bigger the change in pressure the larger the drop may be.***

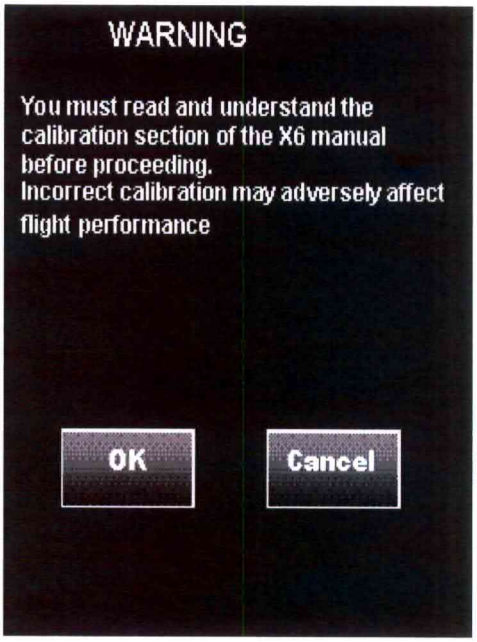
***When Flying in Altitude Hold mode do not use the throttle to adjust altitude, instead use the Ascend/Descend switch. If you use the throttle and change the throttle beyond or below a hover setting then switch to manual mode the helicopter will either climb suddenly or descend suddenly in response to the throttle setting.***

# Calibrations:

There are a number of calibrations the Draganflyer X4 uses to maintain its stability and its position.


- **Next choose OK.** ***When calibrating the Draganflyer X4 using the handheld controller you will be required to tap the OK button (Config - Warning Screen) 3 times to proceed with the calibration process.***

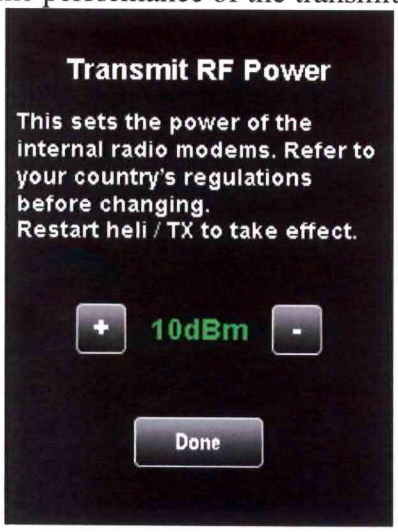

- **Next choose OK , tap 3 times.**

***IMPORTANT NOTE:***

***When calibrating the Draganflyer X4 using the handheld controller you will be required to tap the OK button in (Config Warning Screen) 3 times to proceed with the calibration process***

## Transmitter RF Power

You can set the Draganflyer X4 Transmitter power to conform with your locations regulatory standards. For North America the Standard is +18dBm, for International areas it is +10dBm. Although the calibration allows for an adjustment within that range those are the standards and they must be adhered to for regulatory reasons. Adjusting this level will not increase or decrease the performance of the transmitter or helicopter.



# Camera Power

The amount of power supplied to the camera from the Draganflyer X4 Battery can be adjusted as required. A setting of 9.3 will normally work for all of the available cameras.

If required, make adjustments using the set button. A number pad will appear. Select the value required then press Done. If an error message appears press Done and retry your entry again.

# Battery Charging System


Your Draganflyer X4 comes equipped with a complete charging unit for the batteries used by the Draganflyer X4 system. It has been designed for ease of use, portability, safety and convenience so down time due to depleted batteries is minimal.

Included with the Draganflyer X4 charging system is;

- 1 - XP Power - regulated AC power source
- 1 - Thunder Power 610 C, Digital Balancer & Charger/Discharger (User's Manual included)
- 1 - 6 wire balancer to battery cable
- 1 - Battery to Charger cable
- 1 - Controller to Charger cable
- 1 - 6' DC Power source to Charger cable
- 2 - 4 Cell 1900mAh Lithium Polymer Rechargeable Batteries
- 1 - Lipo Sack

## Set Up and Operation

**Use only provided batteries that are designed exclusively for use with the Draganflyer X4 helicopter.**

**Never leave batteries charging while unattended.**

The Draganflyer X4 Charging System is capable of:

- Charging the Draganflyer X4 battery
- Charging the Draganflyer X4 handheld controller

**Connecting Charger to Power Source**

1. If using the included AC power supply, remove the supply from the case, connect it to the power input of charger, and plug supply into AC outlet
2. If using 12V battery (car battery), connect the provided cable to the charger and connect the clips to the terminals of your 12V battery (red clip to positive, black clip to negative)

**Charging the Helicopter Batteries**

1. Use the control buttons to ensure the Thunder Power 610C is set as follows: **LiPo Charge** (battery type), **4s Pack** (cell count), **C= 4.0 A** (charge rate); (consult Thunder Power 610C charger manual for instructions on changing settings)
2. Connect battery pack to charger with both the 6-wire balance cable **and** the 2-wire main cable (observe polarity and do not force connectors)
3. Place battery into Lipo Sack

***Ensure Battery Type (LiPO Charge) and Cell Count (4S Pack) selected are correct! Failure to do so may result in fire or damage to battery and or charger. It is required that both the charger leads and the balance leads are connected for effective and safe charging. Always use the LipoSack when charging helicopter batteries.***

4. Press and hold Red 'ENT/STOP' (►) button for 2 seconds to start the charging process

**Charging the Handheld Controller Battery**

1. Ensure controller is turned off.
2. Connect controller to charger using both the 6-wire balance cable and the 2-wire main cable (observe polarity and do not force connectors)
3. Use control buttons on the Thunder Power 610C to ensure the charger is set as follows: **LiPo Charge** (battery type), 3**s Pack** (cell count), **C= 2.10 A** (charge rate); (consult Thunder Power 610C charger manual for instructions on changing settings)

***Ensure Battery Type (LiPO Charge) and Cell Count (3S Pack) selected are correct! Failure to do so may result in fire or damage to battery and or charger.***

4. Press and hold Red 'ENT/STOP' (►) button for 2 seconds to start the charging process

For more detailed in formation on use of the TP- 610C Balancer and Charger/Discharger consult the included Thunder Power 610C Charger User's Manual Camera Systems

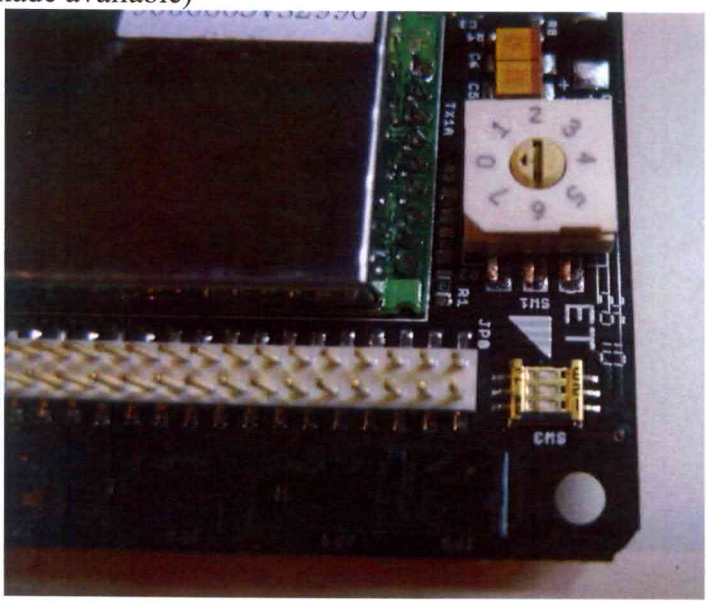
# Camera Systems

The Draganflyer X4 comes equipped with your choice of four camera systems. Still Digital Camera, Low Light (1lux) Black and White Video, and Thermal Infra-red video, Micro Analog video are the choices however all of these systems are compatible with your Draganflyer X4. Any camera system that you did not select can be purchased as an accessory and is easily interchangeable for use as the mounting systems are identical.

***Use of payloads/cameras or mounts other than those approved by Draganfly Innovations Inc. will void the Draganflyer X4 warranty. Alternative payloads and mounts will severely degrade performance and will interfere with the operation of the helicopter.***

**Video Transmission Channel Selections**

To change video channels for the camera system, the both the transmitter and the receiver must be matched. For the transmitter mounted on the bottom of the camera mount there is a dial numbered 0-7.(Although there are 8 positions available due to regulations only 4 channels can be made available)

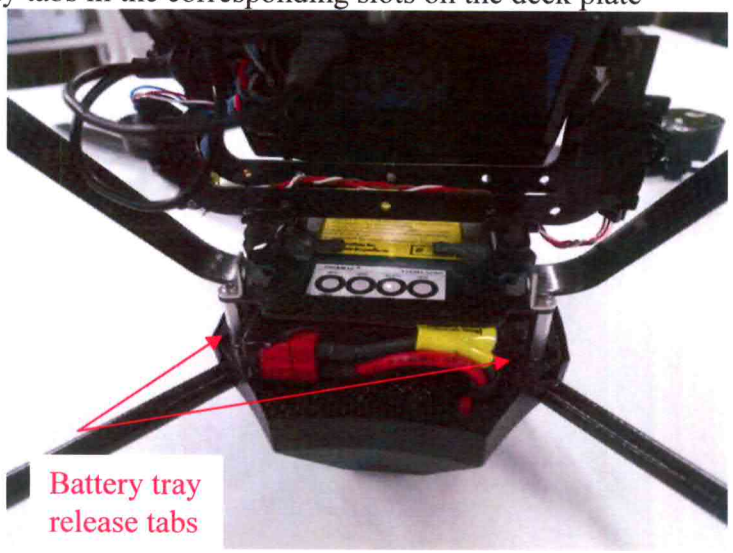


| Transmitter Dial # | Controller/Base Station |
|---|---|
| 0 or 4 | 1 |
| 1 or 5 | 2 |
| 2 or 6 | 3 |
| 3 or 7 | 4 |

Video channel selection on the Handheld Controller is accessed using the Video Set Up menu in the Config Screen. Video channel selection on the Base Station is available using the arrow button on the Base Station menu.

**Quick Release Camera Mount Installation**
**Note: All camera mounts install in the same manner.**
Install grommets over exposed bolts at nose of the deck plate and secure with o-rings.
Plug in camera wire harness


Insert battery tray tabs in the corresponding slots on the deck plate




**Go-Pro Hero Camera**

- Remote shutter is not available with this camera option. In order to start the camera recording you will need to manually press the shutter button on the camera before take off
- To install the neutral density filter (which reduces rolling shutter) line up the filter housing with the lens of the camera and apply light pressure until it is seated flush with the camera body
- Ensure the Velcro strap has been installed around the camera and cradle prior to flight as this holds the camera on to the mount

- Operation – consult the camera user's manual. Remote tilt control is available from handheld controller as required.

To remove the camera and mount follow above process in reverse.

**Camera Receiver**

- Setup – plug the video glasses or other recording device into the handheld controller video output jacks, located on the bottom of the hand held controller.
- Operation - power up your video glasses or other recording device. Live feed from the camera allows for viewing what the camera is seeing.
- NOTE: When in video record mode if the Aspect Ratio setting (found on top of lens ring) is set to 16:9 the display screen will black out. Set it to 4:3 to allow for viewing. It is also a good idea to set the Auto Focus set to AF setting found on side of lens ring.

# VIDEOGRAPHY

Creating great video with the Draganflyer X4 is much like creating great video with any other tool. Every type of shot, be it a boom shot or dolly shot, requires skill and practice.

So, the first step to good video is to become an experienced pilot. The fastest way to do this is to start by using a computer based flight simulator. A couple of hours practice using the simulator will make you comfortable with the controls. Next move to the Draganflyer X4 with the camera system removed.

After you are confident flying the Draganflyer X4 without the camera system, add it back to the assembly.

- Plan your shots carefully, taking into consideration the locale and current conditions. Wind is not your friend. You can fly if there is light wind but it will add a significant level of difficulty.

- Consider lighting as you would any other shot. Shoot with the sun behind you unless you are trying to develop a dramatic backlit scene.

- While you can fly and shoot alone, it is better to have someone watching the incoming video and giving you directions. Flying is hard enough without trying to watch a monitor at the same time.

- The Draganflyer should be moving before the action starts you want to use in your shot. This will allow you to stabilize the helicopter and achieve a smooth motion.

- Film 5 to 10 seconds before and after capturing the footage to leave room for editing later.

- Plan several takes varying your speed and other movements. This will give you more choices when you edit.

- Try different motion approaches. Remember that rising vertically is more easily controlled than descending.
- In stable hover, use the yaw control (left stick) to create a slow circular pan.

- Combine movements like lifting off while using yaw to create interesting new perspectives.

Once you are confident in your ability to make the Draganflyer X4 go where you want it to go the sky is no longer the limit. Be safe, have fun and create awesome video.

# PRE-TRAINING FOR DRAGANFLYER X4

## Flight Simulator

Even if you are an experienced remote controlled helicopter pilot we strongly suggest that you first train with a flight simulator. You can use any flight simulator that provides for a two joystick configuration, with the left joystick providing throttle and yaw and the right joystick providing pitch and roll. This will allow you to familiarize yourself with the control concepts which are used by the handheld controller of the Draganflyer X4 helicopter.

Another good flight simulation training method is to use any small indoor helicopter that flies well, and has the same two joystick configuration as noted above. This will give you the added benefit of actual flight in all three dimensions.

In addition to allow you to become more familiar with the control configuration, it will save you money by avoiding costly crashes due to being unfamiliar with the Draganflyer X4.

## Electric Coaxial Indoor Training Helicopter Training

In this section, you will learn how to fly a helicopter with similar control concepts as the Draganflyer X4. As most customers of the Draganflyer X4 UAV are new to RC flying, we have sent you a training helicopter. The indoor training helicopter is a standard, hobby grade RC helicopter whose basic flight characteristics closely match those of the X4.

Using the indoor training helicopter means that the small mishaps that happen to everyone while learning how to fly are inexpensive. We recommend that you practice the following flight exercises with your indoor training helicopter before attempting to fly the Draganflyer X4.

**Setting Up the Practice Flight Area:**
Find a indoor area free of obstructions (an average living room will do), and set up a practice area resembling the figure 1 below. You can use any easy to see objects as markers.

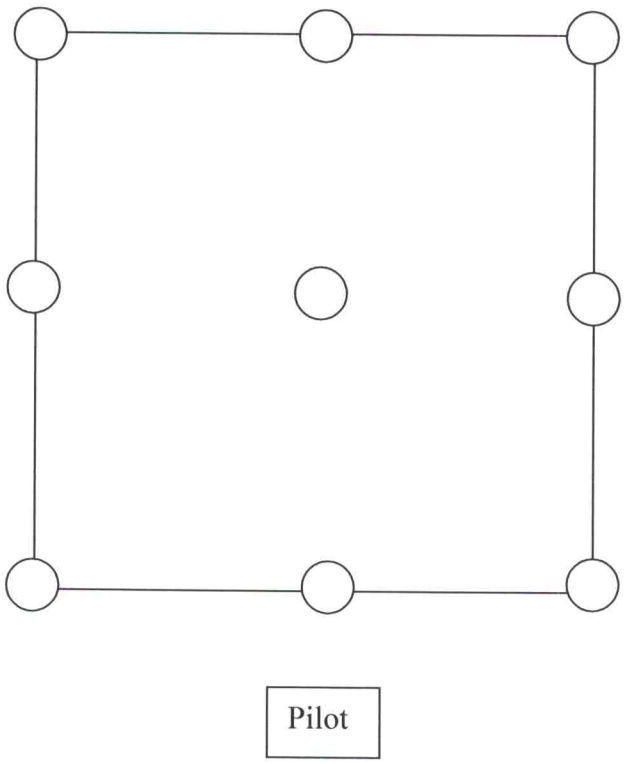



**Figure 1 – How To Set Up The Practice Flight Area**

## Flight Exercises

Exercise #1-Hoover:
The first exercise is relatively simple. Get your training helicopter ready for flight by following the instructions that came with it. Set the helicopter on the floor in the center of the markers that you set up earlier, and slowly increase the throttle to around 50%. The helicopter should take off and start rising. Back off on the throttle a small amount and try to maintain a hover. If required use the trim tabs for roll, pitch and yaw to try to keep the

helicopter hovering in one spot. When setting trims make only small adjustments then see how the helicopter reacts to the adjustment. Don't use any of the other flight controls unless the helicopter starts to drift. Hold the helicopter in a steady hover for a few minutes, then slowly decrease the throttle and allow it to settle to the ground. Ideally, the helicopter should stay at exactly the same spot over the ground while hovering. To help you keep track of it's position above the ground, use the markers set up earlier.

Exercise #2- Roll:
Once you are confident hovering in one place, you can try moving the helicopter around. Begin by hovering above a marker, and then gently push the right transmitter stick to the left. Don't push it too far, just enough to make it start to move to the left. This will cause the helicopter to tilt over slightly and begin moving to the left. As long as you apply inputs the helicopter will continue moving in the direction you are applying direction to. As you near the next marker move the joystick back to center this should cause the helicopter to again be vertical and directional movement should discontinue after any speed has been depleted. Hoover momentarily at that marker then move the joystick to the right to move the helicopter back to the center marker and then onto the right marker. Practice moving it left and right until you are confident, then move on to the next exercise. You will find the more input you provide the steeper the angle of the helicopter is which causes an increase in the speed of the flight.

Exercise #3 - Pitch:
Start in a hover like before, and push the right transmitter stick forward slightly. This will cause the helicopter's nose to drop, and the helicopter will start to travel forward. As with the roll inputs the same type or reaction applies to pitch. To eliminate forward movement re-centre the right joystick, this will cause forward motion to cease once any momentum is depleted. If you move the joystick back past centre it will cause the helicopter to fly backward. Practices moving from marker to marker to become familiar with the pitch control.

Exercise #4 - Yaw:
The training helicopter can rotate, pointing the nose in a new direction. Control yaw (rotational motion) by nudging the left transmitter stick left or right. Cancel out any spin you cause by nudging the stick in the opposite direction to re-centre it.

Practice flying the training helicopter around the perimeter of the rectangle of markers set up earlier, keeping the nose pointing in these positions:

1) Left
2) Right
3) Towards you
4) In the direction the training helicopter is traveling.

**Exercise #5:**

Once you become confident holding the nose in these positions, try flying a square figure 8 while holding the nose in a given position. The figure 8 should be flat, with the

helicopter maintaining the same altitude throughout the maneuver. You can also try flying in diagonal movements by incorporating both pitch and roll.

When you feel confident flying the indoor training helicopter using all the controls, you should be able to fly it to any desired location and land. Becoming proficient at flying the training helicopter will prepare you to pilot the Draganflyer X4, and should reduce mishaps when flying.

# FLIGHT TRAINING

## TRAINER FLIGHT

There isn't an easier way to learn to fly the Draganflyer X4 than using the "buddy" system and using an additional second handheld controller for training. The Draganflyer X4 trainer setup allows an instructor to give or limit the amount and type of control to the student. In order to set up the Draganflyer X4 for this method there are a number of steps that need to be followed so unexpected responses do not occur. The system is setup by programming the Master/Instructor Controller first then programming the Slave/Student Controller.

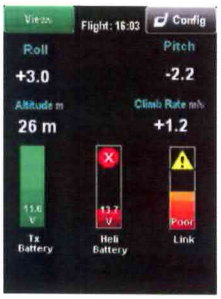
***Warning***

***Ensure you have two handheld controllers and only one Draganflyer X4 helicopter prepared.***

***Prior to the Buddy System being implemented the instructor should fly the Draganflyer X4 using each of the handheld controllers separately to ensure the controllers and the Draganfly X4 are working properly.***

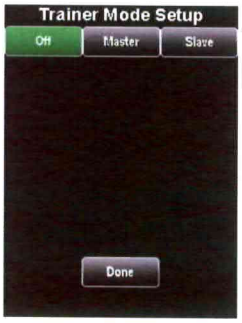
### Master Controller Setup

1. Turn on Draganflyer X4 helicopter
2. Turn on Master Controller to connect to helicopter and ensure it is synched to the Draganfly X4
3. Using Touch Screen tap "Config" once





4. Select "Trainer Setup" by tapping "Trainer Setup" once
5. Trainer Mode button should display "Off", select "Master"




6. Select channel options you wish to allow student to manipulate by selecting "Master" to retain control and "Slave" to give control to the student. Select this for each of the controls.



The Master Controller can now turn over control to the student once the Slave Controller has been set up and the Trainer button on the Master Controller is depressed and held.

**Slave Controller Setup**

***Ensure no other Draganflyer X4 helicopter is turned on.***

1. Turn on Slave Controller
2. Using Touch Screen tap "Config" once
3. Select "Trainer Setup by tapping "Trainer Setup" once
4. Trainer Mode button should display "Off", select "Slave"



5. Select "Acquire". The controllers will now communicate and acknowledge when they find each other by indicating on the touch screen the status. For the Slave Controller a message box will show "Transmitter correctly paired with Master" After pressing "Done" the Slave Controller will show" Master Found". On the Master Controller it will show "Slave Present"



In addition to the Touch Screen indication of status an audible set of tones will indicate a change of status. A rising tone indicates control to the Slave. A lowering of tones indicates control to the Master.

The student can now obtain control of the Draganflyer X4 for the options which the instructor has allowed when the instructor depresses and holds the trainer button down.

***Ensure the throttle positions on both handheld controllers are equal if control of throttle has been given, otherwise the helicopter may suddenly ascend or descend once the trainer button is depressed.***

***It is generally a good idea for the instructor to start the flight by lifting off and placing the helicopter in a stable hover before turning over control.***

***Once Trainer setup is selected no other telemetry information from the helicopter is displayed on the touch screen of either controller.***

**Turning Trainer System Off**

**Slave Controller**

1. Tap "Off " button once on touch screen.
2. Tap "Done" to return to default touch screen.

**Master Controller**

1. Tap "Off " button on touch screen.
2. Tap "Done" to return to default touch screen

***Channel options settings for Master control to Slave are retained on the Master Controller until changed. However, if the power has been cycled on either controller the setup as Master or Slave must be reset.***

## FLIGHT LESSONS

**Lesson 1: Familiarization and Trimming:**

Start with the DraganflyX4 on a smooth, flat surface such as a paved driveway, patio or linoleum floor. The motors will begin spinning when you increase the throttle. Leave the throttle stick in a low position to give the motors a chance to spin up. Once they are all

spinning (usually two seconds), you can add more throttle. Around half throttle the helicopter will take off.

You may notice the helicopter shaking on its landing gear before it lifts off. This is normal. Add more throttle and the helicopter will safely takeoff. A quick throttle increase from spin-up to takeoff will reduce the shaking. Slowly increase the throttle until the Draganflyer X4 is hovering two feet off the ground, do not increase the throttle any further at this point. Slowly move the pitch (right stick, up/down motion) to observe its effect on the helicopter.

Repeat this with the roll (right stick, left/right motion), and yaw (left stick, left/right motion) controls one at a time. By using these controls try your best to keep the Draganflyer X4 stationary. The Draganflyer X4 may drift in one or more directions. This is what the trim tabs on the handheld controller are for. These trim tabs should be moved in the opposite direction that your helicopter is drifting.

For example, if the Draganflyer X4 wants to drift to the right you would need to apply left roll trim. When inputting trim corrections only use very small amounts and observe the effect. In some cases the Draganflyer X4 may drift in more than one direction. Start by correcting for the largest noticeable movement, then move on to the next one. You should become comfortable with trimming the helicopter, as it may need to be done after a crash or rough landing. Once all of the trims are adjusted correctly you can move on to the next lesson

**NOTE: When landing there should be no forward speed, the Draganflyer X4 is designed for vertical takeoff and landing. Allowing forward speed on landing may result in the helicopter tipping forward and damage to the rotors may result if they come into contact with the landing surface.**

**Do not under any circumstances fully reduce the throttle during flight, this will cause a drastic decrease in altitude and may result in an unrecoverable attitude and crash.**

**Lesson 2: Basic Hovering**

In this lesson, we will lift the Draganflyer X4 off of the ground a small distance and practice hovering in one spot. For this lesson it is best to fly over a flat, smooth surface again. Stay less than one foot above the ground, this will greatly lessen the chances of a crash. Remember that if you get disoriented or lose control simply reduce the throttle to minimum immediately. Trimming the Draganflyer X4 is important and should be checked each flight so that it does not wander off on it's own. For safety, stand about 15-20 feet away from the Draganflyer X4, slowly increase the throttle until it begins to lift off from the ground.

Use gentle, smooth movements of the pitch, roll, and yaw controls to keep the helicopter on a stable, level position. It is important that you use the yaw control (left stick: left and right) to keep the front of the Draganflyer X4 pointed away from yourself. At this point do not worry about maintaining a perfect hover, just concentrate on keeping the Draganflyer X4 level and within an imaginary 10 foot by 10 foot square. If the helicopter starts to oscillate back and forth simply reduce the power to land and start again.

Learning to hover is the most difficult part of flying a radio control helicopter so it is ok if it takes a while.

Remember to take a break every 5-10 minutes to give yourself a rest. Once you are able to comfortably maintain a steady hover for 1–2 minutes you can increase the throttle to allow the Draganflyer X4 to climb up to waist or stomach height (For safety reasons, you should never fly at or near eye level). At this altitude, control will actually be easier, and you can practice tightening up that imaginary square until you can maintain a steady hover.

To descend for landing, decrease the throttle a small amount and allow the Draganflyer X4 to gently settle to the ground. Keep practicing hovering as it is a requirement before being able to take off and land, as well as perform many other maneuvers. Most people will take 1-2 hours of practice to be able to hover steadily, so don't get discouraged if you do not pick up the skill immediately.

**Lesson 3: Movements**

This time, we will learn to move the Draganflyer X4 around in a hover. This will teach you how to transition from a hover to moving flight and back again. Prepare the Draganflyer using the same checklist and trimming technique we have used in previous lessons. For this lesson you should also select a location where you can take off and land on a smooth surface and fly over a grassy area. The edge of your driveway or patio would be well suited for this if the area is free of obstructions. If you are comfortable enough, you can begin this lesson by taking off closer to yourself (5 feet would be a minimum safe distance). This will allow you to keep the Draganflyer X4 over the grassy area for the duration of the flight.

Lift 2-3 feet off the ground and gently push forward on the pitch control momentarily to move a safe distance away from yourself. Return the pitch control to neutral once forward movement has begun. Pull back gently to cause the Draganflyer X4 to decelerate and then attempt to establish a hover at the waist/stomach level. Any time you give a control input to the Draganflyer X4 you will have to give the opposite control input to level out the helicopter. So if you input forward pitch the helicopter will continue flying forwards until you give it an equal backwards pitch input. Now, imagine a large square drawn on the ground in front of you.

Using very gentle movements at first, and keeping the front of the Draganflyer X4 away from yourself at all times, try to fly from one corner of the square to another along the edges. Allow a slight delay after your control input for the Draganflyer X4 to accelerate/decelerate. As you make changes to the pitch and roll controls you may need to adjust the throttle to maintain a steady altitude.

It is better to lose a small amount of altitude than to apply too much throttle and have the Draganflyer X4 climb out of your control, so be gentle on any throttle adjustments. Use appropriate pitch/roll control inputs to decelerate as you approach the corners of the imaginary square. Once you are comfortable flying front, back, left, or right, try combining the pitch and roll to fly diagonally across the imaginary square. As you practice, slowly start adding more control inputs to increase the speed of the movements until you can fly around that imaginary square at a comfortable walking pace.
As always, remember to take a break every 5-10 minutes. If you choose to land in the grass ensure that the throttle is reduced to the lowest possible setting once on the ground to avoid stalling a motor. Takeoffs from grass are not recommended, as the blades of grass can be hard on the rotors and motors.

**Lesson 4: Orientation**
The object of this lesson will be to teach you to control the Draganflyer X4 in orientations other than "nose-out" (front of the helicopter pointing away). Take off with the Draganflyer X4 and establish a stable hover. Keep the helicopter fairly low to the ground as it is likely that you will lose control at least once during this lesson.
Start by using the yaw control to slowly rotate the Draganflyer X4 from left to right and back again (do not rotate further than 10-15 degrees initially). Once you are comfortable spinning the Draganflyer X4, start rotating further until you have spun it 90 degrees from the starting position and maintain a hover with this orientation. It will help if you turn so you are facing in the same direction as the front of the Draganflyer X4 and watching it over your shoulder. Remember to take a break every 5-10 minutes.
Once you master hovering the Draganflyer X4 with it turned 90 degrees, you can think about beginning to practice "nose-in" flight. To do this, you will be best served to repeat lessons 1, 2, and 3, but complete all these with the front of the Draganflyer X4 turned towards yourself. The roll and pitch controls will be reversed in this orientation, so don't rush! Learning to fly "nose-in" will be just like learning to fly all over again, but don't get discouraged! Try to practice a few minutes of nose-in each time you fly the Draganflyer X4, and continue through the rest of the flying lessons.

**Lesson 5: Climbs and Descents**
Now you are ready to begin flying the Draganflyer X4 at higher altitudes. The helicopter does not know it has gone any higher, so the only real factor here is your own nerves. Climbing is easy; just add power and it will smoothly climb up. Reduce the throttle setting to hover, and the climb will stop naturally (remember, small movements are essential). Descending is more difficult, because the Draganflyer X4 forces air downwards to generate the lift it needs to fly (this is called downwash), as you descend vertically, you will pass into air that is moving downwards, causing the helicopter to accelerate as it descends. To counter this, you can either begin the descent and then add small amounts of power as necessary to offset the downwards acceleration, or you can descend while moving the Draganflyer X4 forwards, backwards, left, or right. Descending in this manner will allow you to fly outside of the downwash the helicopter generates. Set up for this lesson by first making sure your batteries are fully charged. Stand well away, as you will be passing through your eye level, and make sure any spectators are also a safe distance away. Start by establishing a hover, then add power to climb to just above your head. Reduce power to stop the climb, settle back into a hover,

then slowly descend. Keep the front of the Draganflyer X4 away from you at all times. Repeat this process until you can climb and descend comfortably.
Now you can begin climbing higher and faster. However keep in mind that the higher you fly, the greater the risk of causing damage in a crash. As well, you should keep the remaining power in the battery in mind, as you will be drawing more power from the flight battery by climbing repeatedly.

**Lesson 6: Introduction to Forward Flight**
Anytime the Draganflyer X4 is moving horizontally through the air, it is considered forward flight; this could be forwards, backwards, left or right. This is an advanced topic, so this lesson will be fairly brief. Select a large, open area, away from anything or anybody that the Draganflyer X4 might cause damage to. Prepare for flight and trim the helicopter. Begin by establishing a hover just above your head and at least 25-30 feet away from yourself.

Turn 90 degrees and start moving forwards. Continue the forward motion, and turn to begin flying in a circle around yourself. Do not fly around yourself continuously, as you may get dizzy; instead, fly a few circles to the left and then to the right, taking breaks often. Try to maintain a constant altitude and to keep the front of the Draganflyer X4 continuously pointed in the direction of motion. Once you can fly circles around yourself, try reversing direction as you complete each circle and climbing/descending as you fly.

**Lesson 7: Advanced Forward Flight**
If you have mastered basic forward flight and nose-in flight, you are truly a master of the Draganflyer X4. Flying figure-8s will be the last test. Once you can fly the figure-8 consistently and repeatedly, you are ready to perform any other advanced maneuvers such as pirouettes, fast forward (and backward!) flight, rapid climbs and descents, and anything else you can think of. Please remember however, to keep safety first. It's no fun when somebody gets hurt.

# How to Update the Draganflyer X4 Transmitter and Helicopter Firmware

**What is firmware and why keep it up to date?**

Firmware is software that runs on the Draganflyer X4 Transmitter (TX) and helicopter. As the Draganfly X4 system evolves and matures, Draganfly Innovations will continue to improve the user experience, optimize the flight characteristics of the aircraft, find solutions to problems being reported and over time, add new functionality to the system.

Firmware releases are taken very seriously at Draganfly. The new software is thoroughly tested by systems engineers and a select test group to insure a quality upgrade is being released to the field.

Before installing or flying the Draganflyer X4 helicopter be certain to read the firmware Release Notes. The Release Notes are published with each firmware version and describe the new features being introduced or what issues have been corrected with the latest software update. In some cases you'll find small changes ... in others more complex issues may be addressed so it very important to always read the Release Notes before installing and flying.

By keeping the Draganflyer X4 helicopter and transmitter firmware current you will have access to the latest features and enhancements, bug fixes and our customer service representatives will be able to assist you more effectively whenever you have a problem.

**How do I know what firmware versions are installed?**

Obtaining firmware version information is very simple and straight forward.

1. Power on the X4 helicopter
2. Power on the TX
3. When the TX connects to the X4 helicopter you will see the default telemetry screen 4. Press the "Config" button 5. On the Config screen located at the bottom you will see the TX serial number, TX Firmware version number, Helicopter Firmware Version number and the last recorded TX log number.

**How to Update the Draganflyer X4 UAV Firmware:**

Firmware updates will be issued for both the Draganflyer TX and X4 helicopter on an "as needed" basis meaning there is no set published schedule. The updates are driven by customer feedback, continued development of the system and new functionality being introduced.

In some cases new firmware will be introduced for both the TX and X4 Helicopter at the same time and in other cases it might be for just one device. Always read the Release Notes to understand if any dependencies apply. For example: Upgrading the X4 Helicopter to firmware version 1.2.3.b requires the TX be at a minimum firmware version 1.2.4.f. If any dependencies ever do occur, they will be clearly identified.

**Downloading the Firmware**

1. Check the installed firmware version of your system and determine if the update is needed.
2. Download the firmware files to your computer 3. Using the supplied SD adapter and MicroSD cards, copy the firmware update files to a MicroSD card. Insure you're copying the files to the top level directory and not to a folder.

3. **Note**: If you have misplaced your SD adapter or MicroSD cards, they are inexpensive and readily available for purchase at just about any computer store.

4. Remove the MicroSD card from your computer and remove the card 5.The card is now ready to update the TX and X4 helicopter

**Draganflyer X4 UAV Firmware Update Procedure**

Contact Draganfly Innovations Technical Support for Instructions to update the Draganflyer X4 UAV Firmware:

**Draganflyer X4 Transmitter Firmware Update Procedure**

Follow this procedure to update the firmware on the Draganflyer X4 UAV transmitter.

1. Turn off the transmitter by holding down the red power button.
2. Place the flash card in the small slot found on the top of the transmitter.

3. Begin the firmware update by holding down the left (yaw) trim to the right and right (roll) trim to the left (**not the control sticks, the small black plastic tabs**), and pressing the red power button. You can think of this as pressing both trim tabs towards the center of the transmitter. The transmitter screen will display "*Transmitter bootloader invoke*". After the update finishes, the screen will show "*Release trim tabs to continue*". Release both the trim tabs, and the transmitter will return to normal operation.

4. Confirm that the firmware update worked by pairing the helicopter with the transmitter, opening the "config" screen, and reading the firmware. revisions shown at the bottom of the display. It should report the latest version.

# How to Update the Draganflyer X4 Configuration File

### What is a Configuration File, and Why Should I keep it Up To Date?

The configuration file controls several aspects of the Draganflyer X4's flight, including:

- **Gyro Gains** – "Gain" is a measure of each onboard gyroscope's sensitivity. When the gain is set higher, the gyroscope becomes more sensitive to small movements. If its set too high, the helicopter overcompensates for small movements, and if it's set too low, the helicopter becomes harder to control.

- **Accelerometer Response** – Like gyro gain, accelerometer response measures how sensitive each accelerometer is.
- **Helicopter Rates** – The Draganflyer X4 is programmed with maximum rates, which determine how fast it can pitch, bank, climb, and descend.

At Draganfly Innovations, we pride ourselves in constantly optimizing and improving the Draganflyer X4 flight performance, to ensure the best user experience. This constant improvement often results in the need to change several flight control variables, so we issue updated configuration files to reflect these changes. All new configuration files are made available, along with firmware updates, on our website. We recommend that customers check the support section periodically, and download new firmware and configuration files when they are released.

**How to Update the Draganflyer X4 Configuration File**

Updating the configuration file on a Draganflyer X4 UAV is extremely easy to do, simply follow these steps:

1. **Check for a newer version of the configuration file.** You can check for new configuration files on our support page (http://www.draganfly.com/supportbase/.)
2. **Download the latest version.** Click on the download link to obtain the latest configuration file changes. Save the file to a convenient location, such as the Desktop or your "C:" drive.
3. **If the configuration file is zipped, uncompress it.** If the configuration file you download ends in a ".zip" filename extension, extract it by double clicking, and following the uncompress wizard steps. Note the name of the file that you extract – it should end in a ".DFC" extension.
4. **Plug in the USB transceiver.** The USB transceiver is included with all Draganflyer helicopters. If you don't already have the driver files installed, you can do so using the CD-ROM included with your helicopter, or by downloading them from our website. **Note:** If you don't install the driver for the USB transceiver, it will not work.
5. **Start the control software.** The helicopter control and telemetry software is also included on the CD-ROM that came with your helicopter. It would have been automatically installed when you installed the drivers for the USB transceiver earlier.
6. **Power on the helicopter.** Turn on the helicopter by pressing down the switch on the back. The control software will automatically find and interface to the helicopter. When the control software has found the helicopter, it will display the serial number in the lower part of the screen. **Note:** The hand held controller must be **off** for the software to detect the helicopter.
7. **Click on the "Configuration" tab at the top of the control software window.** This opens up a new page, with several options. The ones we're interested in have to do with updating the configuration file.

8. **Press the "Load Draganflyer Configuration File" button.** This will open a file selection window, which you can use to browse to the configuration file you downloaded earlier. Select this file, and then press "Open".
9. **Click the "All Payloads" and "All Wind Conditions" radio buttons.** After you do this, the "Upload to X4" button becomes active.
10. **Click the "Upload to X4" button.** The upload will begin. This process usually takes 5 to 10 sections.

Congratulations! You've just successfully updated the Draganflyer X4 helicopter configuration file, giving you improved flight performance, and all the latest optimizations.

## Flight Troubleshooting

| PROBLEM | POSSIBLE CAUSES | SOLUTION |
|---|---|---|
| Draganflyer X4 won't start the motors at all | Handheld controller not connected to Draganflyer X4 | Turn on Draganflyer X4, and then turn on controller. The controller should emit a triple-beep, indicating it has connected. Also when connected you will see telemetry on the controllers screen |
| | The Draganflyer X4 is not armed yet | Ensure you are holding the left controller stick in its lower right corner for at least five seconds. You will hear a beeping tone and the LED lights will stop flashing once armed |
| | The Flight Mode Switch is not in Manual Mode | Ensure the GPS switch is down in Manual Flight mode, you will receive and audible and visual warning when trying to take off in GPS or Altitude hold. |
| Draganflyer X4 will not turn on | Fuse may be blown | Check the fuse on the bottom of the helicopter to ensure it is not blown replace if necessary. |
| One motor doesn't start properly | Poor signal, damaged or disconnected | Shut the motors off by going to the lowest throttle setting on the handheld controller's left stick. Slowly advance the throttle stick until motors begin to power up. Leave the throttle stick at a low setting until all motors are spinning slowly and smoothly. It is now OK to throttle up more |
| | | If one motor always fails to start, despite repeated attempts on your part, it may be damaged or disconnected. Open the motor pod for inspection, and ensure both motors are connected properly. |
| | | Swap connectors between upper and lower motors |
| | | Launch Draganflyer X4 Interface program. Utilize single motor utility to help trouble shoot the problem |
| Draganflyer X4 requires a lot of stick input or trim to hold level. | Wind, damaged rotors, insecure circuit board | Check for this behavior indoors, to rule out the effects of wind |
| | | Inspect each motor to ensure it spins freely, and each rotor by looking for cracks and missing sections. |
| | | Inspect the Draganflyer X4 circuit board. Ensure it is solidly mounted to the carbon fiber plate via the insulating soft-mounts |
| | | If the problem hasn't been spotted, contact Draganfly Innovations. You may need to send in the Draganflyer X4 circuit board for repair |
| Draganflyer X4 spins in circles despite yaw input. | Yaw control trim is not centered | Center the yaw trim |

| | | |
|---|---|---|
| Flight times are very short. | Degraded batteries | Normal flight times are 18-20 minutes without a payload, and 7-15 minutes with a payload. If yours are significantly shorter, you probably need to replace your Draganflyer X4 lithium batteries. |
| | Overheated motors | After a flight, feel the four motors to gauge their temperatures. If one or two are especially hot, the motors may need replacing |
| | Damaged rotor blades | Inspect rotor blades for damage including chips and crack, replace all damaged rotors before flying. |

# My Draganfly Support Center

Within the Draganfly.com website we have a dedicated area to provide support for Draganflyer X4 and X6 owners. To access this area go to https://www.draganfly.com/support.php

Only owners of the Draganflyer X4 and X6 are authorized to access this area. Please log in using your e-mail address and the password you have been provided.

## How do I obtain a log in and password?

Are you an owner of a Draganfly Innovations industrial product? (example Draganflyer X4 or Draganflyer X6) If you are you should have received a "Welcome to the Draganflyer Support Center" e-mail which will include your password and instructions for logging in. If you have not received this "Welcome e-mail" please e-mail support@draganfly.com.

## How do I contact Draganfly Innovations?

**Technical Support**:

For Draganflyer Aircraft owners please log into our SupportBase

Or e-mail: support@draganfly.com.

**Phone & Fax:**

Toll Free: 1-800-979-9794
Int: 1-306-955-9907
Fax: 1-306-955-9906

**Mailing Address:**

Draganfly Innovations Inc.
2108 St. George Avenue
Saskatoon, SK S7M0K7
Canada

# Glossary of Terms

***If you find a term in the manual that you don't understand, look here for its definition.***

- **Accelerometer** – An accelerometer measures acceleration (change in velocity) in 3 dimensions.
- **Altitude** – A measure of how high something is. Altitude can be measured above ground level, or above sea level.
- **Altitude Hold Flight Mode** – The helicopter will maintain altitude with this flight mode turned on.
- **Attitude** – Attitude is a term for the orientation of an aircraft, in other words, which way it's pointing.
- **Barometric Pressure Sensor** – A barometer senses atmospheric pressure. The Draganflyer X4 comes equipped with a small electric barometer, which is used to sense and hold altitude.
- **Bearing** – The direction that the helicopter is moving.
- **Brushless Motor** – A type of electric motor powered by DC (direct current) electricity. They provide superior performance to brushed motor designs.
- **Celsius** – The metric measure of temperature. In America, temperature is usually measured in degrees Fahrenheit. Switch between metric and imperial units by selecting config > basic config > display units in the transmitter menu.
- **Climb Rate** – The rate of change of an aircrafts altitude.
- **dBm** – Short for Decibel Milliwatt, this is another measure of power, but referenced to one Milliwatt.
- **Direct Drive** – Each motor shaft is directly attached to a rotor blade, without using gears.
- **DSSS** – Short for Direct Sequence Spread Spectrum, this is a type of spread spectrum technology. Spread spectrum radios "spread" their frequencies across different wavelengths, which reduces radio interference.
- **Gb** – A gigabyte is a measure of data capacity.
- **Ghz** – Short for Giga Hertz, this unit is used to measure frequency in billions of cycles per second.
- **GPS** – Short for Global Positioning System, a GPS receiver locks on to radio signals from several satellites and uses them to determine its location.
- **GPS Hold Flight Mode** – This flight mode holds both altitude and position without pilot input not applicable for the Draganflyer X4.
- **Gyro** – A Gyro (short for gyroscope) is a device which measures or maintains orientation based on the principles of angular momentum. In the simplest case, a gyroscope contains a disc which spins extremely fast. The spinning disc has angular momentum, so it will tend to maintain its position. The helicopter senses its rotation relative to the gyro, and the computer nulls out any motion.
- **Heading** – The direction that the helicopter nose is pointing.

- **Kbps** – Short for kilo bytes per second, this unit is used to describe the rate at which data is transmitted. One byte is 8 bits, with each bit being either a 1 or a 0, so 1 kilo byte means that 8000 bits are being transmitted every second.
- **Latitude** - The elevation angle of the helicopter above or below the equator.
- **LED** – Light emitting diode. A light emitting diode is a highly efficient and very bright light source.
- **Lithium Polymer Battery** – Lithium polymer batteries technologically evolved from lithium ion batteries, and use a lithium salt electrolyte held in a polymer composite to achieve superior capacity and performance.
- **Lm** – Lumen, or unit of luminous flux. This measures how bright something is, or the perceived power of light.
- **mAh** – Short for Milli Amp Hour, this unit measures the capacity of a battery, or the total charge that it can provide.
- **Manual Flight Mode** – When flying the Draganflyer X4 manually, the altitude is off, giving you complete control of the UAVs position.
- **mW** – Short for Milliwatt, this is a measure of power, or the rate at which energy is emitted. One watt corresponds to one Joule of energy per second, and milli means "thousandth", so one Milliwatt is a thousandth of a Joule per second.
- **Omni Directional** – Omni Directional is a term usually used to describe a radio transmitter that emits a signal evenly in all directions.
- **Pitch** – How far an aircrafts nose is tilted up or down.
- **Radio Waves / Radio Signal** – A radio is a device which emits electromagnetic waves with a long wavelength, on the order of 1 meter in length. These waves are transmitted and received by the helicopter and transmitter, allowing communication between them.
- **RoHS** - Directive on the restriction of the use of certain hazardous substances in electrical and electronic equipment.
- **Roll** – How much an aircraft is rotated side to side.
- **Servo** – A servo is a digital device which changes the orientation of a mechanical component. Servos are used to control the camera tilt on the Draganflyer X4 Helicopter.
- **Spotter** – A spotter is a person designated to look for hazards in the air or on the ground, so that the pilot can concentrate on flying.
- **Stall** – For a helicopter type aircraft like the Draganflyer X4, a stall (loss of lift) occurs when the angle of attack (amount of tilt relative to the ground) is too steep. Recover from a stall by pitching forward.
- **Telemetry** – Refers to all the sensor measurements and flight data.
- **Throttle** – The throttle is the flight control which corresponds to how fast the motors and rotor blades are spinning. The throttle directly controls the thrust produced by the rotor blades, and thus the altitude of the helicopter.
- **Trim** – Adding trim to the helicopter compensates for unwanted drift in any direction.
- **VTOL** – Abbreviated form of "Vertical Takeoff and Landing". A VTOL aircraft can take off and land vertically, without needing a runway to accelerate.
- **Watt** - The SI unit of power, one Watt is one Joule of energy per second.

- **Wired Whip Antenna** – A type of radio antenna, used to transmit radio waves.
- **Yaw** – How much an aircraft is rotated left or right.

## Transmitter Abbreviations and Terms

Some of the terms used in the transmitter menus and displays might not be familiar to new operators. The following is a list of all the non obvious menu entries and display terms found in the Draganflyer X4 transmitter.

- **Barometric Altitude** – This is the altitude above ground level as determined by the onboard barometer.