3DR

AERO

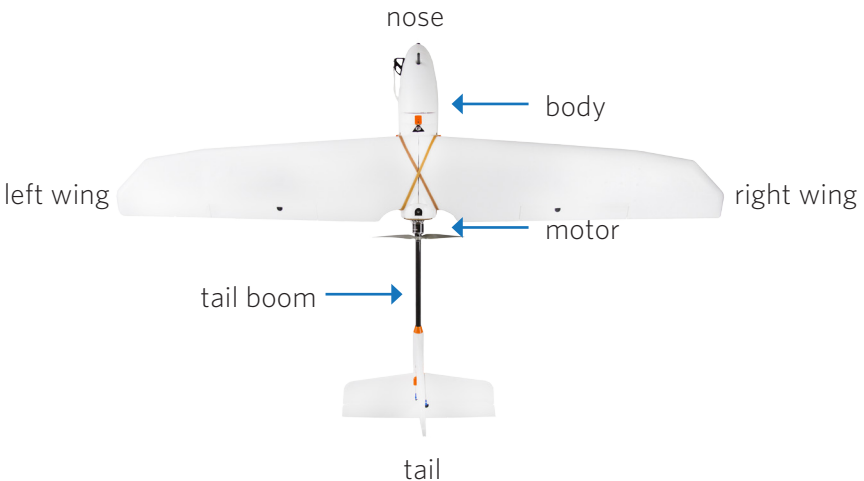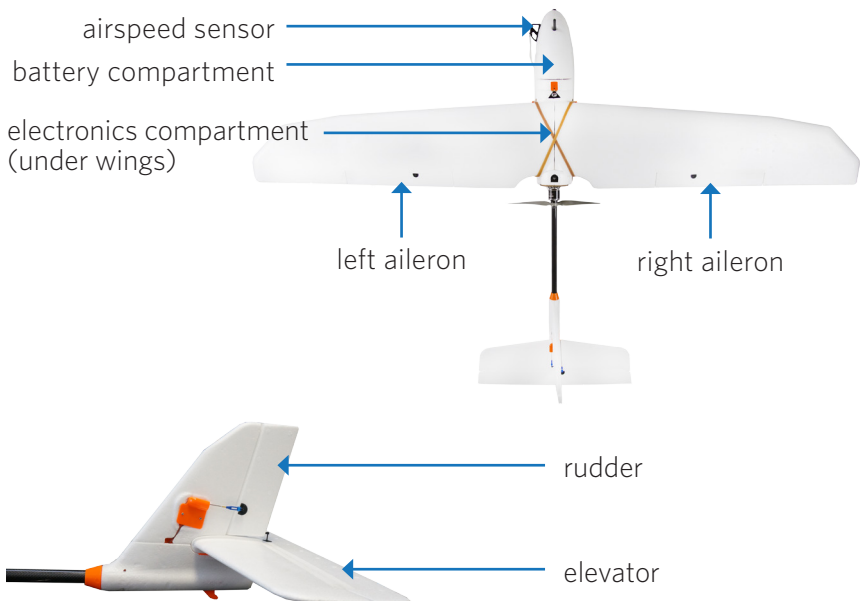**Congratulations on your purchase of an Aero!**

Please read the following sections of this manual to get started with your new autonomous aircraft.

Meet the Aero

airspeed sensor

battery compartment

electronics compartment
(under wings)

left aileron

right aileron

rudder

elevator

If the terms above are unfamiliar to you, visit **3dr.com/learn**,
and dive into the exciting world of planes with our
Introduction to Flying Fixed-Wing Aircraft.

RC transmitter

Spektrum

FlySky

If you did not order an RC transmitter with your
Aero, visit **3dr.com/learn** for instructions.

⚠ Safety

Before you fly, always determine the boundaries of your safe flying area. If the Aero moves outside the designated area or exhibits instability in flight, switch to fly-by-wire mode and land the plane manually.

The Aero will not avoid obstacles on its own, including during missions. As the operator, it's your job to recognize and avoid obstructions while flying. Always be ready to regain manual control of the plane in the event of an unsafe situation.

Spinning propellers can cause serious injury. The safety button indicates the status of the motor to help you prevent hazardous contact with the Aero's high-speed propeller. When the Aero is powered on, the safety button will blink red; the motor is inactive and the propeller is safe to handle. When you're ready to fly, press and hold the safety button until it shows solid red. This indicates that the motor is active and the propeller can spin if armed. To make the propeller safe to handle again, press and hold the safety button until it blinks red.
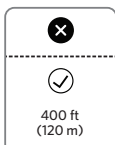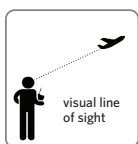
Always fly below 400 ft (120 m) and within your visual line of sight. Don't let the Aero get too far away from you; make sure you can always see its orientation. Don't fly in low light, heavy wind, rain, or other conditions that might impede visibility.

Always fly at least five miles (8 km) away from airports and other areas where pilots operate manned aircraft.

Always fly at least 100 feet (30 m) away from people, vehicles, and buildings. Make the safety of people and property your first priority!
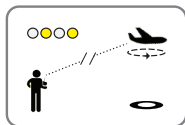
If the Aero looses contact with the RC transmitter, it will return to the launch point automatically and enter into a circle pattern above the launch point, indicated by a blinking yellow status LED.
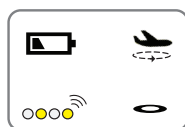
If the battery reaches 33% of its remaining charge, the Aero will return automatically to circle above the launch point, indicated by a blinking yellow status LED and a quick repeating tone.

3

Charge battery

The Aero is powered by a rechargeable lithium polymer (LiPo) battery. Store the battery at half charge, then charge fully before flying. Batteries must ship at half charge, so please charge before your first flight. Each full battery provides approximately 40 minutes of flight time.
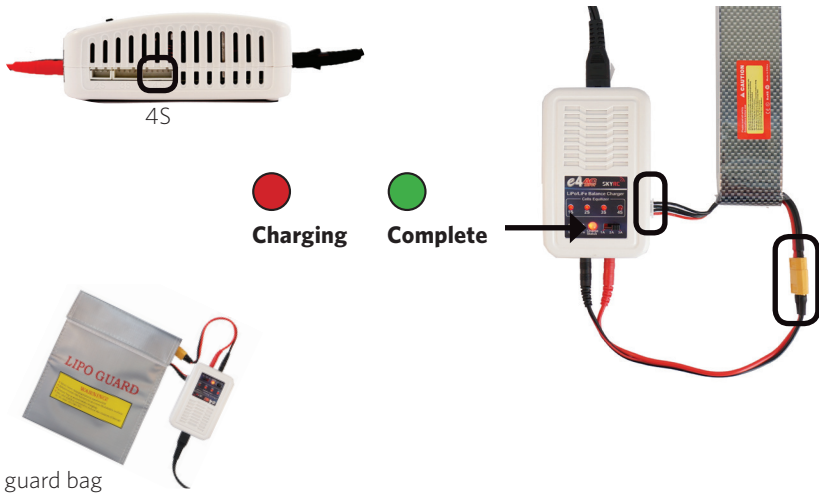
battery   charger

Connect the charger to the power adapter cable and a wall outlet. Connect the red cable to the + port and the black cable to the - port.

Set the charger to LiPo and 3A.

LiPo   3A
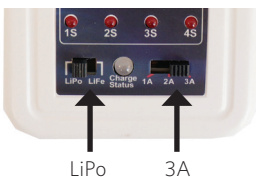
Connect the white connector to the 4S port. Join the two yellow connectors together. Secure the battery inside the guard bag while charging, and charge until the status indicator displays green.

Charging   **Complete**

4S

guard bag

⚠️ Battery safety

Protect the battery from extreme heat, extreme cold, puncturing, and flammable surfaces. Always transport, charge, and store the battery in the guard bag.

Charge the battery using a designated LiPo balance charger only. Always monitor the battery while charging.

Flying with a low battery is a safety risk and can render the battery permanently unusable. Always fly with a fully charged battery.

Inspect the battery for damage before takeoff and after landing. If you observe any swelling of the package or the battery ceases to function, locate your local battery recycling center to dispose of the battery. In the US and Canada, visit **call2recycle.org** to find a location. Do not dispose of the battery in the trash.
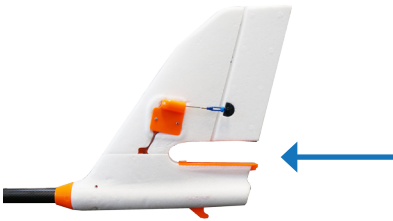
Setup

Follow these instructions to take the Aero from travel configuration to flight configuration.

1 Slide the horizontal stabilizer into the vertical stabilizer along the orange groove. Make sure not to stress any of the components on the tail.

horizontal stabilizer

vertical stabilizer
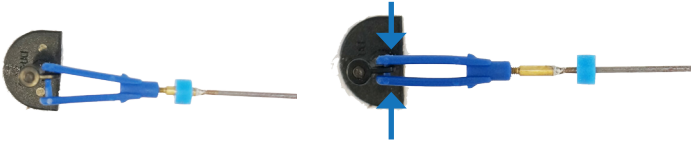

complete tail assembly

On the top of the horizontal stabilizer, open the blue clasp at the end of the servo rod.
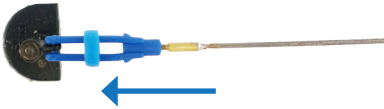
Insert the pegs on the clasp into the open space in
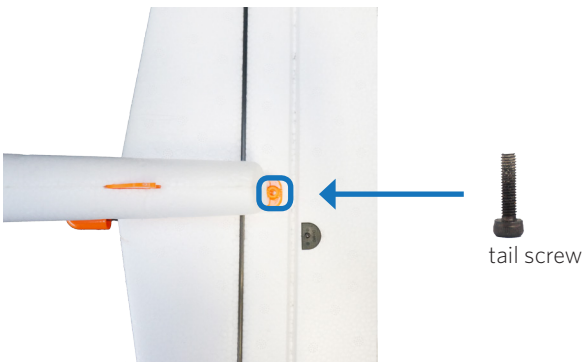the servo horn, and close the clasp.

servo horn

Slide the blue rubber ring over the clasp to secure it in place.

Turn the plane over and insert the provided tail screw
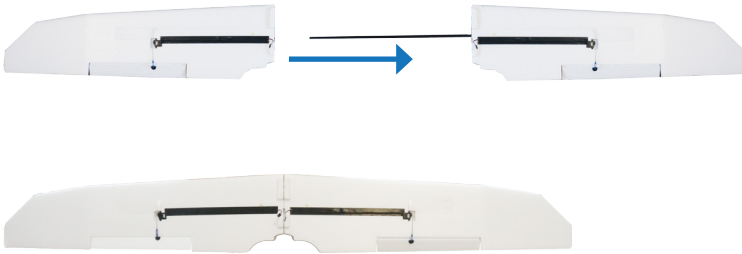into the horizontal and vertical stabilizers.

tail screw

2 Locate the wing spar (long rod) and the two wings.
Slide a wing onto the spar.

Slide the other wing onto the spar.
Do not twist the wing or the spar so as not to stress the foam.
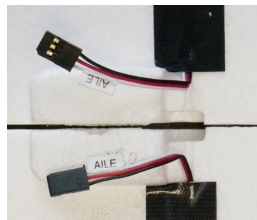

complete wing assembly

Locate the two cables inside the electronics compartment marked
AILE. Connect these cables to the two cables on the wings marked
AILE. (Either of the wing cables can connect to either of the plane
cables; the order doesn't matter.)


plane AILE cables

wing AILE cables

Place the wings over the body of the Aero with the foam squares
fitted into the matching space in the electronics compartment.
Make sure not to pinch the AILE cables.

wings placed onto the body of the Aero

Locate the four large rubber bands. Use the bands to secure the wings to the body of the Aero by the four orange knobs on the body around the wings.

Attach two of the bands to the two knobs on one of the short sides and opposite knobs on the opposing side.

add first band

add second band

orange knobs
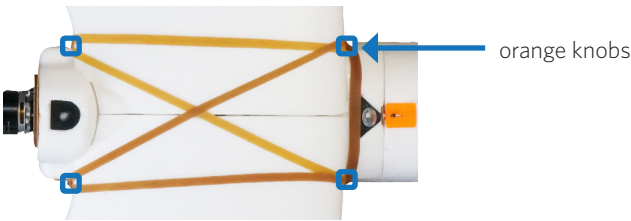
Repeat on the other short side with the remaining two rubber bands, resulting in two pairs of opposing right triangles.

add third band

add fourth band

complete band assembly
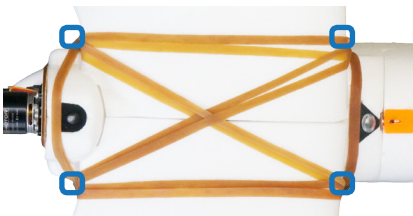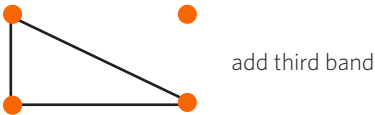
3 Locate the rings inside the propeller package. Remove the ring with the second-largest internal diameter, and insert it into the back of the propeller hub.
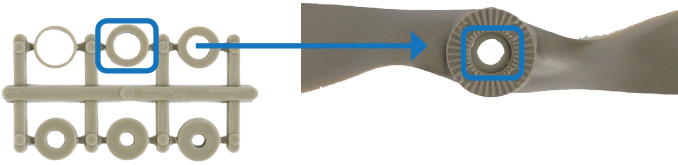

Remove the nut and the washer from the motor, add the propeller with the **writing on the propeller facing towards the nose of the plane**, add the washer and the nut over the propeller, and tighten the nut.
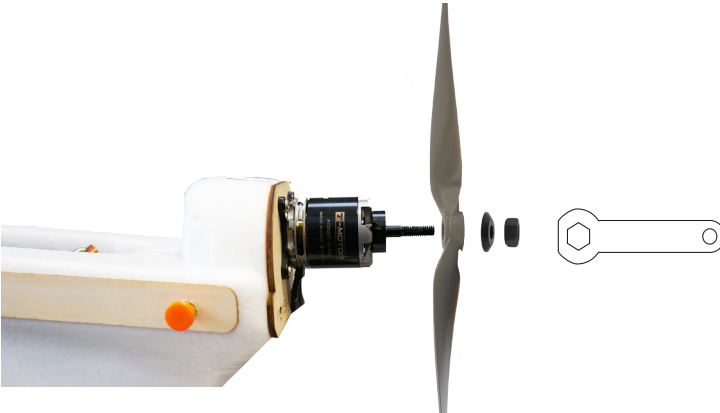
The tail boom arrives attached to the Aero. Follow these instructions to remove the tail boom for travel.

Disconnect the RUDD and ELEV cables inside the electronics compartment.
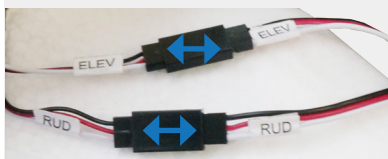
Remove the screws on the body and the tail indicated below.

body

tail

Pull out the tail boom to remove. To reattach, reverse these steps.

Setting flight modes

On 3DR transmitters, use the two-position switch and the three-position switch shown below to select a flight mode.

Spektrum mode switches

two-position switch
marked GEAR/MIX

three-position switch
marked FLAP/GYRO
available positions 0, 1, 2

FlySky mode switches

three-position switch
marked F MODE
available positions N, 1, 2

two-position switch
marked AIL D/R
available positions 0, 1

The two-position switch activates one of the two groups of modes then the three-position switch selects the specific mode within the group. The three-position switch can be set forward (away from you), center, and back (towards you). The two-position switch can be set forward and back.

three-position mode switch

forward
(away from you)   center   back
(towards you)

two-position mode switch

forward
(away from you)   back
(towards you)

The Aero includes six flight modes. Manual mode, two assisted flight modes (stabilize and fly by wire), autonomous mission mode, and two command modes (loiter and return to launch). The following sections of this manual describe the behavior of each mode. The Aero's six modes are assigned to your transmitter's mode switches according to model.

Flight modes on Spektrum

With GEAR/MIX set to **MIX**,

set FLAP/GYRO to: **0** for AUTONOMOUS
1 for FLY BY WIRE
2 for RETURN TO LAUNCH

With GEAR/MIX set to **GEAR**,

set FLAP/GYRO to: **0** for MANUAL
1 for STABILIZE
2 for LOITER

Flight modes on FlySky

With AIL D/R set to **0**,

set F MODE to: **N** for RETURN TO LAUNCH
1 for FLY BY WIRE
2 for AUTONOMOUS

With AIL D/R set to **1**,

set F MODE to: **N** for LOITER
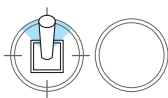**1** for STABILIZE
2 for MANUAL

Manual mode

Fly with fine-tuned manual control without autopilot assistance. Manual mode gives you the most direct input to the control surfaces, resulting in precise in-flight adjustment. Try manual mode if you're an experienced RC plane operator.

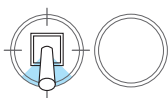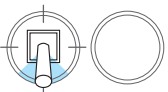no GPS lock required

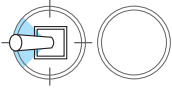## Manual mode RC controls

throttle

yaw

pitch

roll

Throttle up

Increase motor speed.

Throttle down
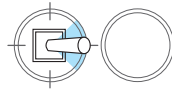
Decrease motor speed.

Throttle fully down

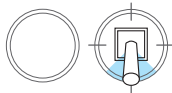Stop motor.

Yaw left

Turn left.
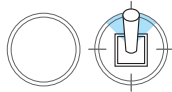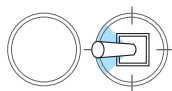
Yaw right

Turn right.

Pitch up

Pitch up.

Pitch down

Pitch down.

Roll left

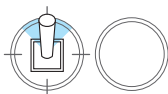

Roll left.

Roll right

Roll right.

Stabilize mode

Stabilize mode provides manual control with an added autopilot safeguard: Release the right stick and the Aero will automatically return to a level flying orientation. Use stabilize mode for the freedom of manual control with return-to-level stabilization.

no GPS lock required
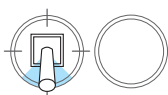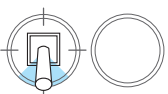
Stabilize mode RC controls

throttle

yaw

pitch

roll

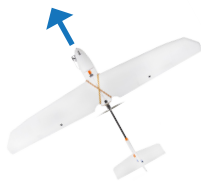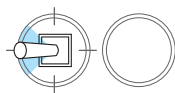|		
Throttle up		Increase motor speed.
Throttle down		Decrease motor speed.
Throttle fully down		Stop motor.

Yaw left

Turn left.

Yaw right

Turn right.

Pitch up

Pitch up.

Pitch down

Pitch down.

Roll left

Roll left.
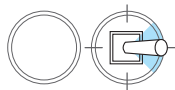
Roll right

Roll right.

Roll and pitch center
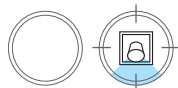
Automatically level.

Fly-by-wire mode

Let the autopilot manage the control surfaces, and navigate based on where you want the Aero to fly. Fly-by-wire mode* (FBW) is the easiest way to fly and is the recommended mode for new fliers.

*APM:Plane mode FBWA

no GPS lock required

FBW mode RC controls

throttle
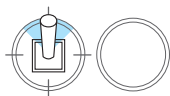
yaw

stabilized pitch

stabilized roll

Throttle up

Increase motor speed.
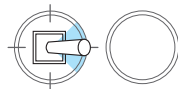
Throttle down

Decrease motor speed.

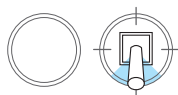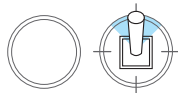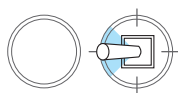Throttle fully down

Stop motor.

Yaw left

Turn left.

Yaw right
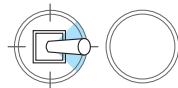
Turn right.

Pitch up

Pitch up.
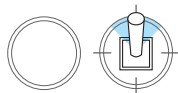
Pitch down

Pitch down.

Roll left
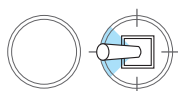
Fly to the left.

Roll right
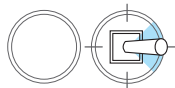
Fly to the right.

Roll and pitch center

Automatically level.

Command modes

Use command modes to enter into an automatic flight pattern. Once set to a command mode, the Aero will continue to follow the specified pattern until otherwise directed. Command modes require GPS lock prior to takeoff.

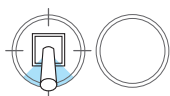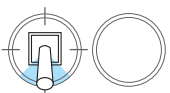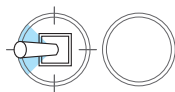**Loiter mode**: GPS-positioned circling

» The Aero will enter into a circle pattern with a radius of 60 meters at the current altitude.

» Move the right stick to adjust the position of the circle.

(GPS) GPS lock required

Return-to-launch mode: circling over launch point

» The Aero will return to the position where it acquired GPS lock and enter into a circle pattern at an altitude of 100 meters.

(GPS) GPS lock required

Missions

Use a ground station computer with the provided Telemetry Radio to fly a fully autonomous mission. To download software and learn how to plan a mission, visit **3dr.com/learn.**

laptop ground station with 3DR Telemetry Radio

Once you have saved a mission to the Aero, ensure that the autopilot acquires GPS lock during the preflight steps, and take off in manual, stabilize, or fly-by-wire mode. Fly to the approximate altitude of the first waypoint, and switch into autonomous mode to start the mission.

To fly a mission with automatic takeoff and landing, visit **3dr.com/learn** for instructions.

GPS GPS lock required

⚠ Do not set the Aero to autonomous mode without following the mission planning instructions at **3DR.com/learn**.

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Preflight steps

Select an open area for flying, away from people and buildings, and remember to bring the flight checklist and a fully charged battery. Follow these steps every time you fly.

flight checklist

1   Before flying, examine the Aero to ensure that all components are secured in flight configuration.

   »   Check that the wings, tail, and tail boom are fully assembled and securely attached.

   »   Check that the propeller is secured tightly to the motor.

   »   Check that the servo rods are secured to the servo horns with the blue clasps.

tail servos   wing servos

Check that the airspeed sensor is secured to the side of the Aero and the tube is free from obstructions.

airspeed sensor
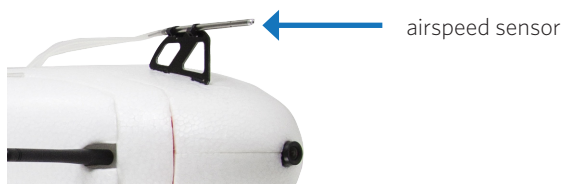
If any of the components or assemblies in these checks are not secure, tighten the screws or use CA glue (super glue) to secure the components to the foam.

Power on the RC transmitter, and set the throttle fully down.

2   Open the battery compartment by sliding the knob on the orange switch and lifting out the foam lid.

Secure a charged battery to the velcro strip within the marked lines, and attach the yellow connectors.

⚠️ **Hold the Aero still and level while it powers on.**
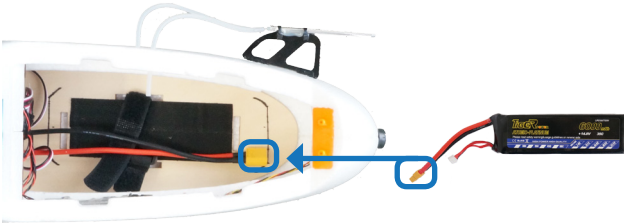
Secure with the velcro strap. Close lid by aligning the orange notches at the nose.

3   With the battery connected and the lid secured, check that the Aero is correctly balanced for flight. Hold the Aero with one finger on each of the clear, plastic balancing points shown below. These points indicate the Aero's center of gravity.

If the plane balances on your fingers, then the center of gravity is correct. If it won't balance, adjust the position of the battery until you can balance the plane on two fingers as shown below.

4   Check the LED for the status of the autopilot. If you plan to use loiter, return-to-launch, autonomous, or any other GPS-required modes during your flight, wait to see the blinking green light, indicating GPS lock, before proceeding. If you plan to fly only in manual, stabilize, or fly-by-wire modes, you may proceed when you see the blinking blue light.

LED

● ● ● ● Initializing, please wait
○ ● ○ ● Autopilot ready, no GPS
○ ● ○ ● Autopilot ready, GPS locked

5   To arm the motor, press and hold the safety button until it displays solid red.

safety button

○ ● ○ ● Inactive, motor disarmed
● ● ● ● Active, motor armed

6 Place the plane on the ground, and set the mode switches to select manual mode. Move each of the sticks as shown, and check for the corresponding movement of the motor or control surfaces.

Raise the throttle slightly until the motor spins, then immediately set the throttle back to fully down position.
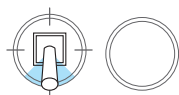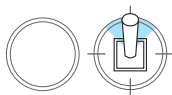
Motor spins.

⚠️ Do not raise the throttle more than just enough to spin the motor while the plane is on the ground, and do not place your hands in the way of the propeller while the motor is armed.
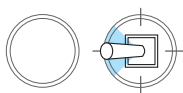
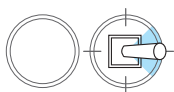Pitch down

Elevator tilts down.
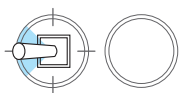
Pitch up

Elevator tilts up.

Roll left

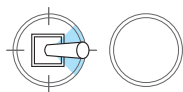Left aileron tilts up, right aileron tilts down.

Roll right

Left aileron tilts down, right aileron tilts up.

Yaw left

Rudder tilts left.

Yaw right

Rudder tilts right.

7 Set the mode switches to stabilize, and hold the plane in front of you. Move the plane as shown, and check for the stabilization response from the control surfaces.

Test: Tilt the plane left.

Result: Left aileron tilts down, right aileron tilts up.

Test: Tilt the plane right.

Result: Left aileron tilts up, right aileron tilts down.

Test: Tilt the plane down.

Result: Elevator tilts up.

Test: Tilt the plane up.

Result: Elevator tilts down.

Takeoff & landing

Now you're ready for takeoff! If you're new to planes, we recommend having a friend help you launch the Aero. Have your friend throw the Aero while you control the transmitter.

We recommend setting the Aero to **fly-by-wire mode** for takeoff.

Find a launching area with at least 100 feet of clear space in front of you. Face into the wind, and hold the Aero at the center of gravity. Raise the throttle to center position to start the motor. Be careful not to place your hand in the way of the propeller!

throttle center
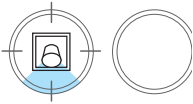
Hold the Aero above your head, run, and throw the plane at an upwards angle.

Once launched, the Aero will require immediate adjustment with the transmitter to navigate away from the ground and up to the desired altitude. Pitch up (right stick down) and add any other necessary controls based on wind, speed, and terrain.

When you're ready to end your flight, follow these steps to land:

» Fly a circle pattern above your landing area.

» Come in on a final approach, flying into the wind at an altitude of 20 to 40 meters.

» When the plane reaches an altitude of 10 meters, set the throttle fully down to turn off the motor and glide down on a 15 to 20 degree down-pitch angle.

» When the plane is one meter above the ground, pitch up (flare) to land the Aero on the body of the plane instead of the nose.
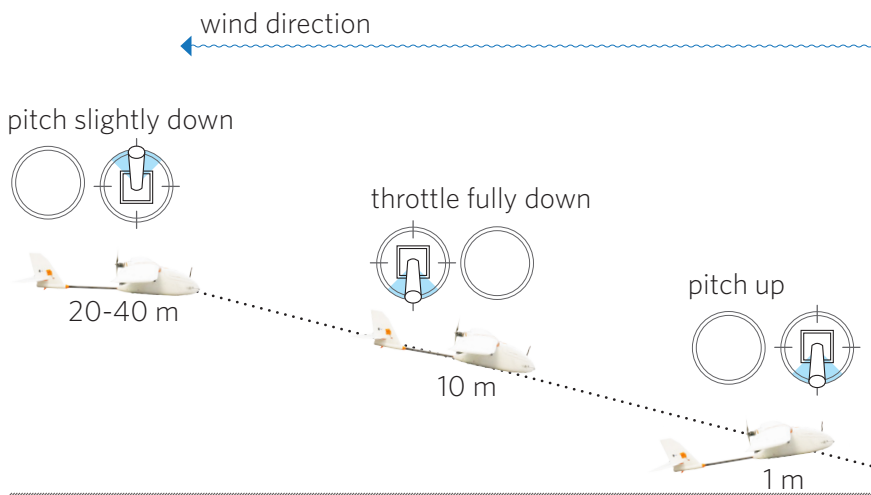
After stopping the motor at an altitude of 10 m, keep your thumb on the throttle stick in fully down position to ensure that the motor does not accidently spin during landing.
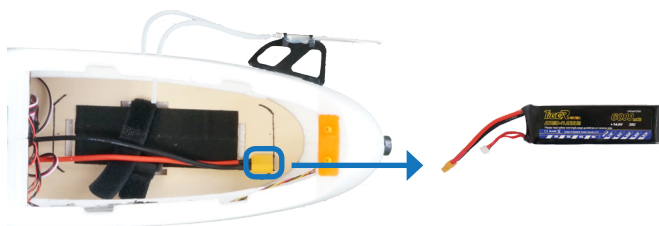
Postflight steps

1   To disarm the motor, press and hold the
    safety button until it displays blinking red.

safety button
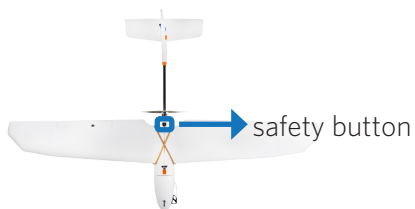
⭕🔴⭕🔴   Inactive, motor disarmed

🔴🔴🔴🔴   Active, motor armed

2   Disconnect battery

3   Turn off transmitter.

Your flight is now complete. Always following the preflight
and postflight steps described in this manual when you fly.

FPV/OSD video

If you received an FPV/OSD video system with your Aero, visit
3DR.com/learn for instructions on operating your video system.

Learning more

Visit **3DR.com/learn** for more instructions on flying, configuring,
and using a ground station with the Aero.

To learn more about the APM:Plane platform, including
adding new flight modes and flying autonomous missions,
visit **plane.ardupilot.com**.

APM PLANE

Support

For customer support, contact us at **help@3DR.com**
or call our support line at **+1 (858) 225-1414**
Monday through Friday, from 8 am to 5 pm, PST.

Happy flying!

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