



UAS PERFORMANCES

DRONE PILOT COURSE

UAS PERFORMANCES

FLIGHT AXES

Flight axes are called imaginary lines around which an aircraft can turn. There are three axes perpendicular to each other, around which any aircraft can move, whose point of intersection is located at its center of gravity.

- Longitudinal Axis: Extends from nose to tail in a fixed wing or front to back through the center body in a rotorcraft.
- Lateral/Transverse Axis: Extends from wingtip to wingtip in a fixed wing or from left to right across the fuselage in a rotorcraft.
- Vertical Axis: It is contained in a plane that passes through the center of gravity from the top to the bottom of the aircraft.

ACTUATOR/CONTROL SURFACES

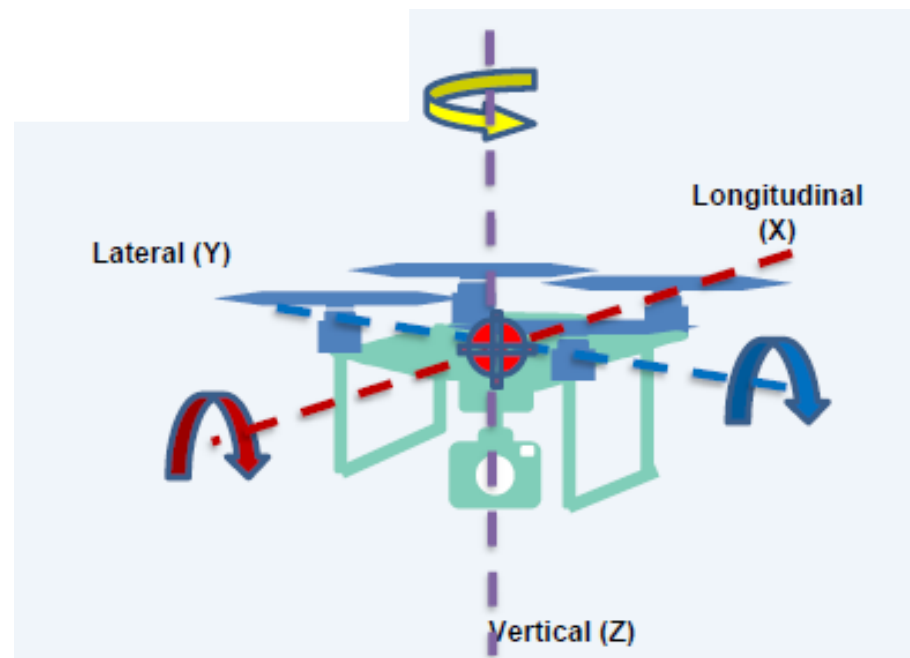
It is the physical component of the aircraft that makes it move according to each axis. The movement of the sticks at the control station sends the signals to the flight control center. This controller sends the necessary information to the actuators or servos (fixed wing) or to the electronic speed controllers (ESCs) of each motor (rotorcraft), so that they in turn direct the motors to increase or decrease speed.

FLIGHT MOVEMENTS

These are the movements made by the aircraft around the flight axes and are called:

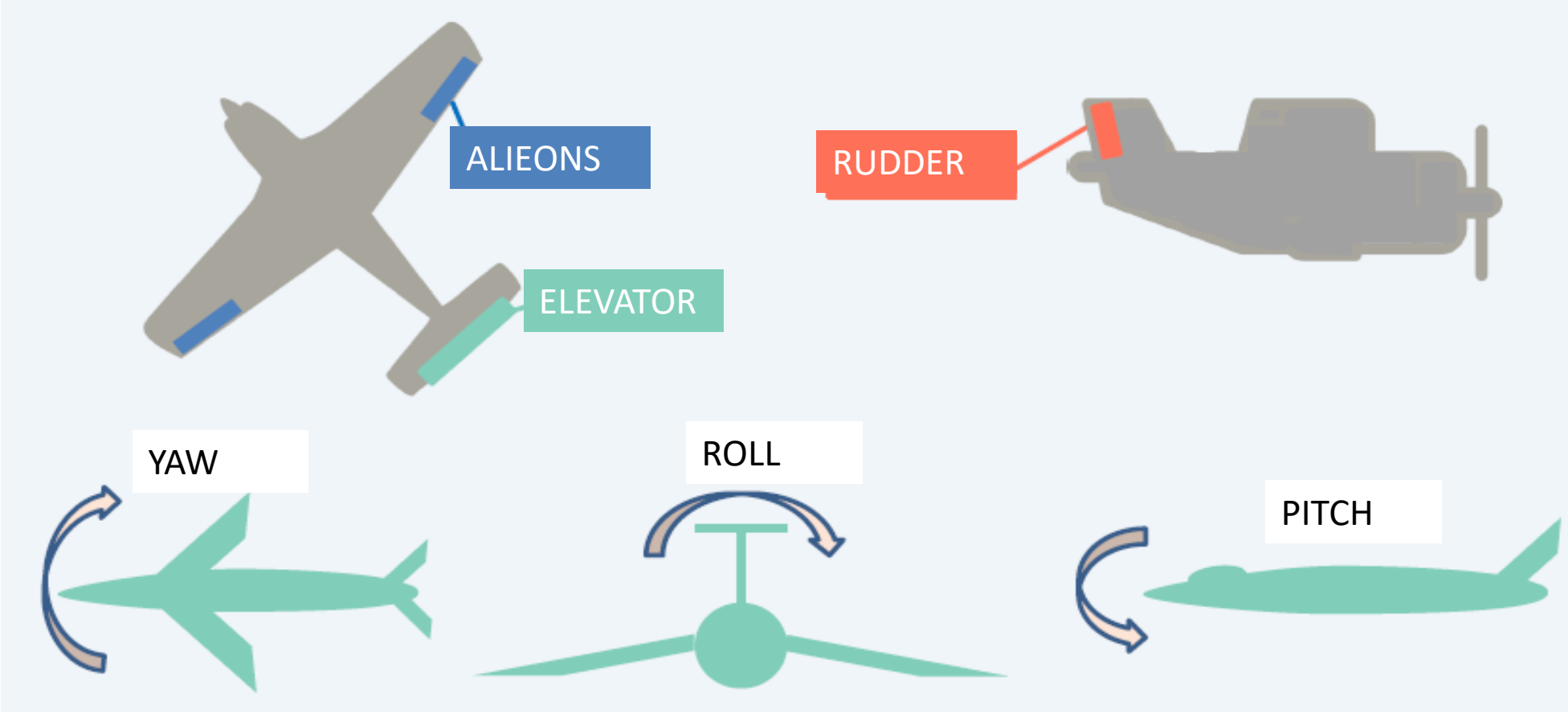
- **ROLL:** Movement around the longitudinal axis.
- **PITCH:** Movement around the transverse axis.
- **YAW:** Movement around the vertical axis.

UAS PERFORMANCES



AXIS	MOVEMENT	ACTION
LONGITUDINAL (X)	ROLL	Movement to the left or right, that is, movement made around the axis perpendicular to the plane of the rotors.
LATERAL (Y)	PITCH	Forward and backward movement, i.e. movement performed around the axis transverse to the plane of the rotors.
VERTICAL (Z)	YAW	Rotation or twist, that is, the movement made around the axis vertical to the center of gravity.

UAS PERFORMANCES

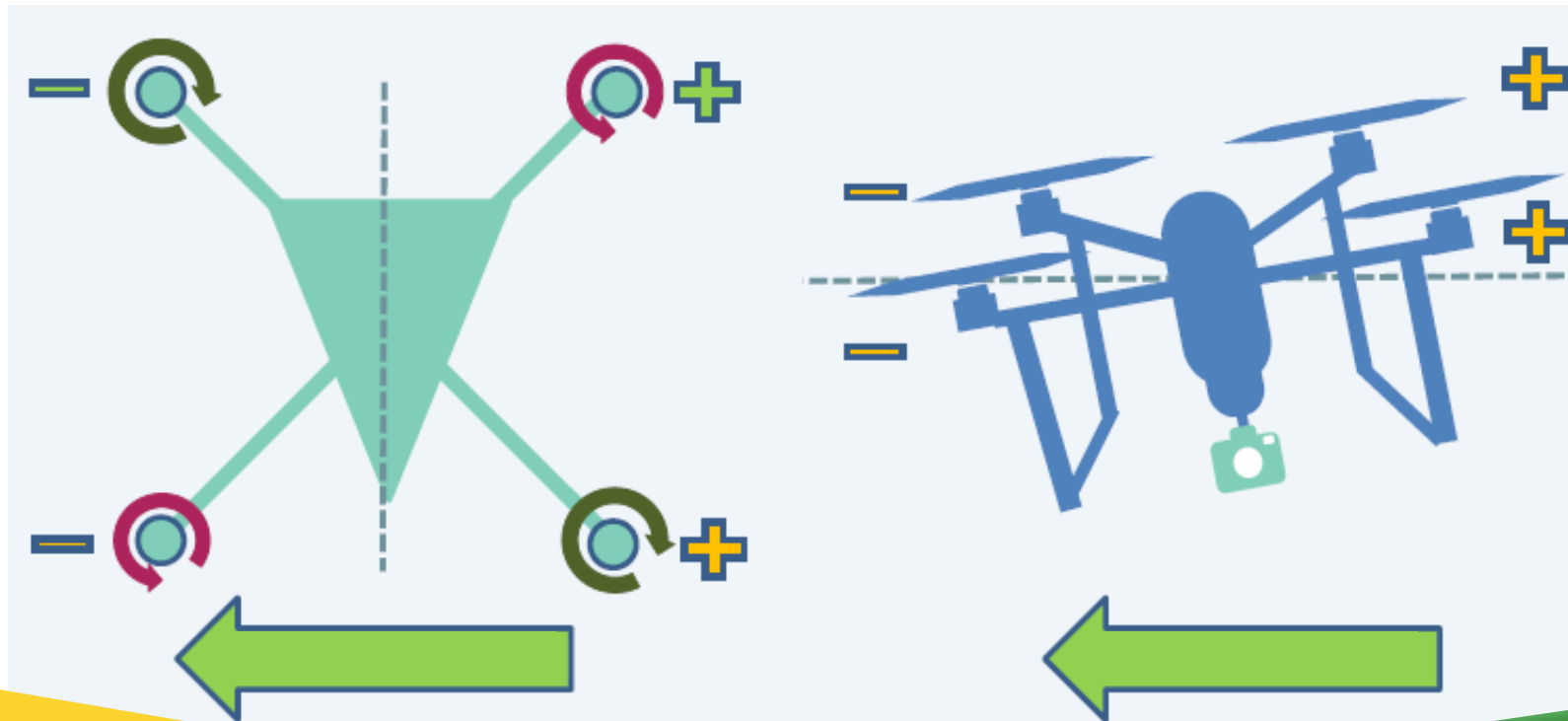


AXIS	MOVEMENT	ACTUATOR
LONGITUDINAL (X)	ROLL	Alieons
LATERAL (Y)	PITCH	Elevator
VERTICAL (Z)	YAW	Rudder

UAS PERFORMANCES

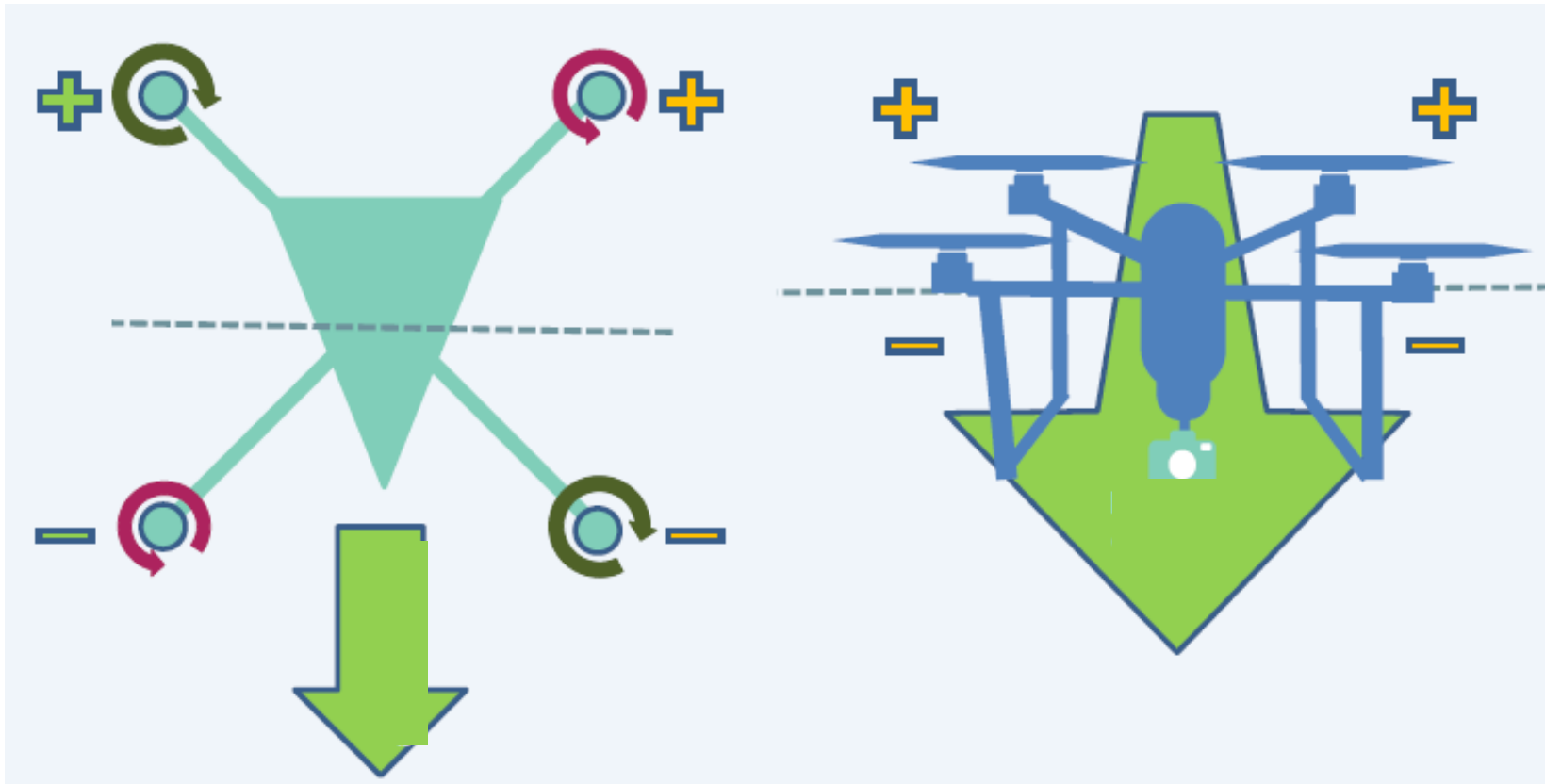
To achieve any movement, what the controller does is vary the speed of some motor to achieve a resulting force that allows the aircraft to perform the required movement. To explain the movements of a rotorcraft, an X configuration of a Quadcopter will be taken as a reference.

- ROLL: If the speed of the motors of the left plane is increased, the rotorcraft tilts towards the right side, appearing a displacement force to the right as shown in the drawing:



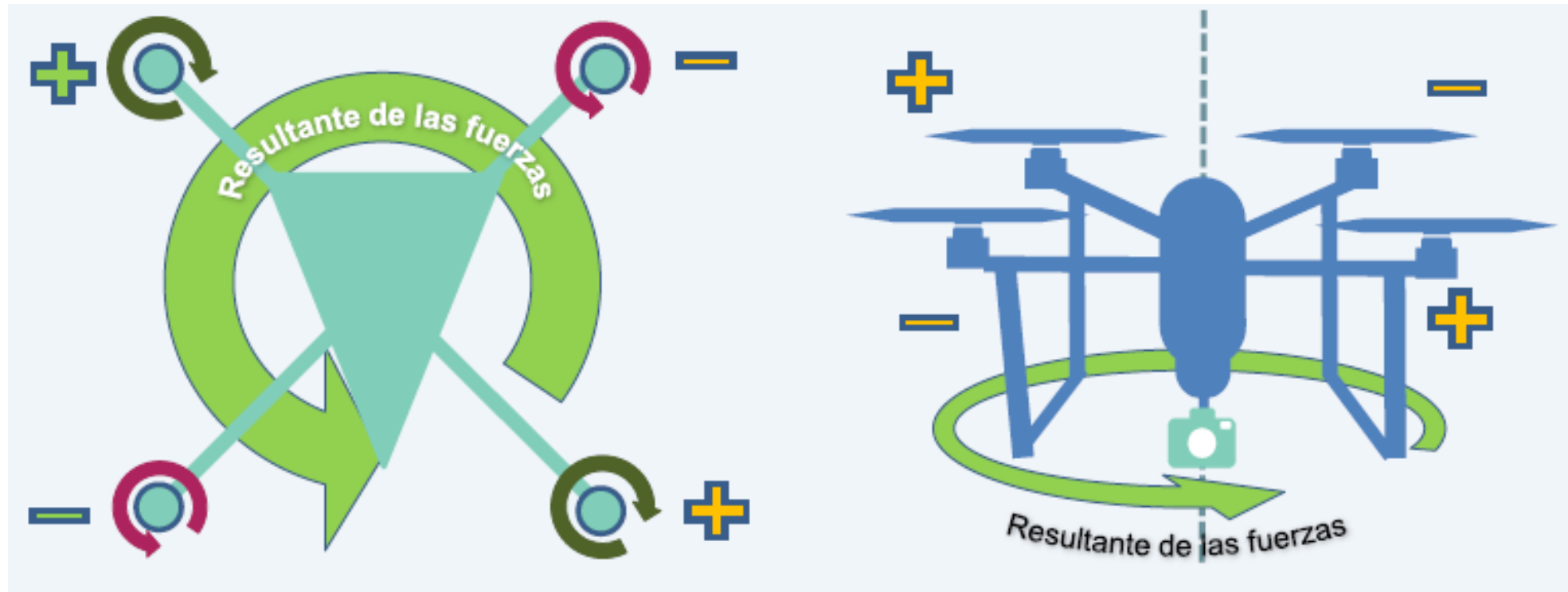
UAS PERFORMANCES

- PITCH: If the speed of the rear motors is increased, the multirotor tilts forward, appearing a forward force as shown in the drawing:



UAS PERFORMANCES

- YAW: If the speed of the clockwise rotating motors is increased, an imbalance of the angular momentum of forces around the vertical axis is produced causing the rotorcraft to rotate counterclockwise.



IMPORTANT UAS INFORMATION

SUMMARY OF THE MAIN ELEMENTS OF THE UAS

In the instructions there is a section where the main elements that make up the UAS are explained and how it should be handled before, during and after each flight.

AIRCRAFT LIMITATIONS

- Meteorological limitations: maximum wind speed, rain, fog or temperature. It is important to know these limitations, and evaluate them before each flight, to know if the flight will be possible.
- Limitations of maximum flight height and safe horizontal distance between the remote pilot and the unmanned aircraft.
- Maximum take-off mass limitations: it is important to know the MTOM of the UA and, in case of including additional systems or varying the payload, not to exceed this value in any case.
- Battery limitations and flight times: All the data related to the battery are indicated, among the most important are the temperature range, to use the batteries safely and their duration (it can vary according to the modes of operation). aircraft flight).

IMPORTANT UAS INFORMATION

UAS CONTROL IN ALL PHASES OF FLIGHT

Controlling the UAS in all phases of flight is essential for a safe flight. To do this, the remote pilot must follow the instructions provided by the UAS manufacturer, which specifies the steps to follow for a correct and safe engine start, takeoff, handling of the aircraft with its different flight modes, landing and stop. of engines.

PROCEDURES IN CASE OF UAS FAILURE

The unmanned aircraft instructions also establish guidelines to follow in case of failures in the UAS during the flight (loss of GNSS signal, loss of control link, etc.). It is important that the remote pilot knows the procedures and guidelines to follow in these anomalous situations.

Specifically, for those aircraft that have the automatic return home (RTH) system in case of loss of link, the remote pilot must know how to establish the necessary parameters for its correct operation prior to flight.

PROCEDURES FOR ESTABLISHING MAXIMUM HEIGHT

If the UAS has a system to establish a maximum flight height, it cannot be exceeded during the flight. The remote pilot must refer to the UAS manufacturer's instructions for the procedure to follow to set the maximum height.

IMPORTANT UAS INFORMATION

PROCEDURES LOADING GEOGRAPHICAL AREAS

The remote pilot must ensure that he uploads the most up-to-date information available for the geographical area where he is going to carry out the operation. In the instructions provided by the UAS manufacturer, you can find the procedure for uploading this information, which will be provided by the Member State.

LOADING PROCEDURES OPERATOR REGISTRATION NUMBER

Prior to the flight, the remote pilot must ensure that the UAS operator registration number, which is unique, non-transferable and must be kept private, is uploaded to the remote identification system of the unmanned aircraft, if available. of it. The procedure for uploading this identification number to the unmanned aircraft is detailed in the instructions provided by the UAS manufacturer.

UAS MAINTENANCE

To maintain safe airworthiness conditions for the UAS, it is necessary to follow the maintenance instructions provided by the UAS manufacturer.

The remote pilot must carry out an external inspection of the equipment, prior to each flight, to ensure that the unmanned aircraft is in optimal conditions for flight and to detect possible defects. As a general rule, among the main elements to inspect are:

- Control equipment, support systems and subsystems (antennas, wiring, connections, etc.).
- Structural integrity (fuselage, airframe, engines, propellers, etc.).
- Battery(ies)/fuel (check voltages, condition).
- Verification of the attached systems (camera, sensors).
- Dynamic testing of motors, control surfaces, etc.
- Software/firmware update.



Thanks for your attention

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