OM - OPERATIONS MANUAL

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reference documents

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| --- | --- | --- |
| RD1 | JAR doc 06 SORA (package) | JARUS – Joint Authorities for Rulemaking on Unmanned Systems |
| RD2 | Law No. (4) of 2020 Regulating Unmanned Aircraft in the Emirate of Dubai | Emirate of Dubai |
| RD3 | EN 4709-001. Unmanned Aircraft Systems - Part 001: Product requirements and verification | ASD-STAN |
| RD4 | EN 4709-002. Unmanned Aircraft Systems - Part 002: Direct Remote Identification | ASD-STAN |
| RD5 | EN 4709-003. Unmanned Aircraft Systems - Part 003: Geo-awareness requirements | ASD-STAN |
| RD6 | EN 4709-004. Unmanned Aircraft Systems - Part 004: Lighting requirements. | ASD-STAN |
| RD7 | 4444- PROCEDURES FOR AIR NAVIGATION SERVICES, AIR TRAFFIC MANAGEMENT  | ICAO |
| RD8 | ASTM F3411-19. Standard Specification for Remote ID and Tracking | ATSM |
| RD9 | SC Light UAS – Special Conditions for Light UAS | EASA |
| RD10 | ARP4671. Guidelines and Methods for Conducting the Safety Assessment Process on Civil Airborne Systems and Equipment | SAE International / Eurocae |
| RD11 | DO-160, Environmental Conditions and Test Procedures for Airborne Equipment is a standard for the environmental testing of avionics hardware. | RTCA |

abbreviations

| **Acronym** | **Definition** |
| --- | --- |
| BVLOS | Beyond Visual Line of Sight |
| DCAA | Dubai Civil Aviation Authority  |
| DHA | Dubai Health Authorities |
| ERP | Emergency Response Plan |
| GCAA | General Civil Aviation Authority  |
| HMI | Human machine interface |
| OM | Operations Manual  |
| UAS | Unmanned Aerial System  |
| UTM | Unmanned Traffic Management |
| USP | UTM Services Provider |
|  |  |

DEFINITIONS

|  |  |
| --- | --- |
| **Contingency volume** | Area outside of Flight Geography where contingency procedures are applied to return the operation to its desired state |
| **Detect and avoid** | The capability to see, sense or detect conflicting traffic or other hazards and take the appropriate action. |
| **Flight geography** | Geographically defined volume, contained within the Operating Volume, where the UAS flight is intended to be contained when performing the operation. |
| **Geofence** | A virtual three-dimensional perimeter around a geographic point, either fixed or moving, that can be predefined or dynamically generated and that enables software to trigger a response when a device approaches the perimeter (also referred to as geoawareness or geocaging). |
| **Operational volume** | Is the combination of the Flight Geography and Contingency Volume. |
| **Operator** | A person, organization or enterprise engaged in or offering to engage in an aircraft operation. |
| **Remote pilot** | A person charged by the operator with duties essential to the operation of a remotely piloted aircraft and who manipulates the flight controls, as appropriate, during flight time. |
| **Unmanned aircraft (UA)** | An aircraft intended to be operated with no pilot on board. |
| **Unmanned aircraft system (UAS)** | An aircraft and its associated elements which are operated with no pilot on board. |

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# INTRODUCTION

## Purpose and scope of application

The main objective of this Manual is the exhaustive description of the operational process applied during the business activity with UAS.

This Operations Manual is for the use and guidance of all personnel involved in the UAS operations. All flight possibilities and conditions have been foreseen in this document and will be executed in accordance with its policies and requirements. Any situation or emergency not contemplated in this Manual will be faced and solved by the remote pilot, acting under his best judgment, based on the flight experience and training.

The instructions for the preparation of the operation, the criteria to determine the take-off and landing zones, as well as the operational minimums, the interpretation of meteorological information, the elaboration of an operational flight plan and the maximum distances between the pilot and the aircraft shall be defined.

Likewise, the organizational structure of the operating company and the responsibilities of each position, the type of operations to be performed and their supervision, an accident prevention and flight safety program, and the training required for the staff will be established.

The precautions related to the health and hygiene of the crew and their flight time limitations will be considered, according to the rest times established by the company.

## Safety statement

*[Include here a statement that the OM complies with the relevant requirements of DCAA and GCAA regulations.]*

This OM has been elaborated and issued under operator’s authority and complies with all applicable legal standards as set forth in the regulations issued by the DCAA and the GCAA (Dubai Law No. (4) of 2020).

The operator agrees to comply with current regulations and the operations manager ‘Peter Smith’ is designated as the person in charge of communications with the authority.

In case of contradiction between the present Operations Manual and the legal regulations in force, the latter shall prevail.

In situations not foreseen in this manual, nothing contained herein should prevent the personnel in charge of the operation from acting according to their best judgment.

November 4th, 2021 in Dubai.

Signed: Peter Smith.

# Organizational structure of the operator

## Organigram and managers

*[Organizational structure and designated personnel. Description of the organizational structure of the operator, including an organization chart showing the different departments, if any (e.g., flight / ground operations, safety, maintenance, training, etc.) and the person in charge of each department.]*

OPERATOR's organizational structure dedicated to the operation is detailed in the figure below:

Figure 1: Organization Chart

**Operator**:

* Name: OPERATOR
* Address: Emirates Towers, Ground Floor - Dubai - United Arab Emirates
* Phone, mail: +97157491242 / smith@operator.com

**General Manager:**

* Name: Mr. Smith
* Contact: +97157491242 / smith@operator.com

**Operations Manager:**

* Name: Mr. Smith
* Contact: +97157491242 / smith@operator.com

**Training Manager:**

* Name: Mr. Smith
* Contact: +97157491242 / smith@operator.com

**Maintenance** **Manager**:

* Name: Mr. Smith
* Contact: +97157491242 / smith@operator.com

**Ground Operations Manager:**

* Name: Mr. Smith
* Contact: +97157491242 / smith@operator.com

## Main functions and responsibilities

*[Roles and responsibilities of the members of the organization not directly involved in the operation.]*

**General Manager:**

* General management of the operator company.
* Creation and distribution of safety policies.
* Cooperation and communication with DCAA and other authorities.
* Ensure that all operations and maintenance activities can be safely performed.

**Operations Manager:**

* Ensure that the operation is carried out in accordance with the applicable rules and regulations.
* Responsible of the safe operation of the UAS.
* Supervision of the pilot and assurance of the application of the corresponding procedures.
* Responsible of the licenses, medical exams and evaluation of the remote pilots.
* Development and implementation of operational procedures.

**Training Manager:**

* Identify training needs.
* Organize and planification of the training programs.
* Training records.
* Selection and negotiation with training entities for the most appropriate training.

**Maintenance Manager:**

* Responsible of the technical record of the UAS.
* Analysis of the effectiveness of the Maintenance Program.
* Verification and control of the UAS maintenance.

**Ground Ops. Manager:**

* Development and implementation of operational procedures.
* Responsible of the correct implementation of the ground procedures during operations.
* Coordination with external agents assisting ground operations.

## Individual and key position responsibilities

*[Roles and responsibilities of remote pilots and other members of the organization involved in operations (e.g., payload operator, ground attendant, maintenance technician, etc.).]*

Tasks and responsibilities of the **Remote Pilot**:

* Full authority over the flight.
* Responsible for the UAS.
* Responsible for the selection of a safe environment for the flight.
* Has the authority to decide, based on the limitations of the UAS and the procedures set forth in this manual, whether the weather conditions are unsuitable for flight.
* Execution of a safe and efficient flight.

**Observers** and other assistants on the flight:

* Support to the pilot when required during the operation.
* Control the payload mounted on the aircraft.

# CONOPS

## List of activities

*[The Operator in this section will have a list of the operations for which will be requested. For example*

* *Basic Type operations. Daytime out of controlled airspace.*
* *Advanced Type operations. Scenario B.2: Cargo delivery.*
* *Advanced Type operations. Scenario C: Cargo transportation.]*

**OPERATOR** will perform the following activities under the non-standard scenario:

* Delivery of cargo from airport to logistics hub.

## Nature of the operation and associated risks

*[List the most relevant risks identified and, mitigations and contingency plans]*

**OPERATOR** is a company dedicated to the transport of goods using unmanned systems. The operations carried out by **OPERATOR** and its personnel will be performed through simple flights in the environments selected by the company or according to the demand of the customers.

The following types of flights are contemplated in these Operations Manual:

* Delivery flights.

**OPERATOR** will also carry out test flights following the UAS manufacturers' instructions when incorporating any new and/or repaired part or component that requires it.

This type of operation consists of transporting goods from a UAS Airports to a specific point using an unmanned aircraft. In this work it is possible that people outside the operation may fly over, so it will be necessary to adopt coordination measures with the agents involved to reduce the risks to people and goods on the ground. Coordination will also be necessary prior to each flight with whoever is involved (DCAA, USP...).

## Operation environment and geographical area for the intended operations

*[Description of the environments where the operations may take place as per each CONOPS]*

As mentioned above, **OPERATOR** will operate between the UAS Airport established on the DSO Flight Test Area and the logistics warehouse that the operator has 400m away.

**H**

The Operator will use the stablished air routes given by the USP/DCAA when coordinating each operation.

The conduct of air operations in this scenario is subject to prior authorization by the USP/DCAA. The Operator must submit the corresponding request according to the authorization request procedure published on the DCAA website.

## Technical means used

*[Brief description of the UAS and other technical means used and the reason why they are used]*

The operator has support elements that allow the operation to be carried out within an additional security environment and further improve the levels of protection and security carried out, such as:

* Anemometer
* Portable weather station
* Landing/take-off tarpaulin at OPERATOR’s logistics hangar
* Reflective vests, hazardous area warning cones, etc.

This operation will be carried out by the mentioned above remote pilots, and using the following aircrafts:

* DRONE MODEL 1.
* DRONE MODEL PRO.

## Competency, duties and responsibilities of personnel involved in the operation

**OPERATOR** is committed to keeping its pilots trained and educated to the appropriate levels for the performance of their activity as set out in the current regulations.

Furthermore, **OPERATOR** declares that all qualified personnel are properly trained and valid for the performance of any type of work designated by the operator, always supervised and validated by the Operator’s Manager.

Signed: Peter Smith.

### Training and qualifications requirements

*[In this section the operator makes a declaration committing to maintain the training of the pilots for the performance of his activity, and declares that the personnel are properly trained and valid to perform the work designated by the operator.*

*Small syllabus of the training considered:*

* *A*
* *B*
* *.*
* *.*
* *.*
* *N]*

The objective of the training is that the pilot knows how to solve any type of abnormal situation in flight and feel comfortable to control the UAS while identifying the emergency landing site, choosing his flight environment and interpreting meteorological or telemetric data of the aircraft.

Pilot’s training will be provided initially and independently of the operator by an external training company, from which pilots obtain their license. To perform operations at **OPERATOR**, pilots must be trained in:

* Generic Part: UAS pilot
* Standard Scenario B2 on advanced type operations
* Rating type on **DRONE MODEL 1** and/or **DRONE MODEL PRO**.

It is the responsibility of the operator to train the pilot in rating type if the pilot does not come with this training previously, although it can be provided by an external company.

In the same way the Operator must provide the pilot with training in his Operations Manual.

#### Theorical, practical and medical requirements

*[The pilot must hold a pilot's license issued by an approved entity and the Operator shall verify that the pilot possesses such knowledge.*

*In addition, the pilot must be in possession of the corresponding medical certificates.*

*All operations must be carried out by the operator's pilots.]*

*[Add here a list of pilots and their licenses, license numbers, expiring dates, and type ratings]*

As stated on the paragraph below, the pilots must hold a pilot's license issued by an approved entity and the Operator shall verify that the pilot demonstrates such knowledge.

In addition, the pilot must be in possession of the corresponding medical certificates.

All operations must be carried out by OPERATOR's pilots.

As required by law, the operator **OPERATOR** certifies that its remote pilots are in possession of the permits required by the following regulations:

|  |
| --- |
| Name: **Mr. Smith**Certificate ’ABC’ and license nº 555555Medical certificate class ’ABC’, expiring date 30-12-2025Certificate advanced type B2 operations.Rating type UAS: **DRONE MODEL 1**, **DRONE MODEL PRO** |
| Name: **Mr. Smith**Certificate ’ABC’ and license nº 555555Medical certificate class ’ABC’, expiring date 30-11-2024Certificate advanced type B1 and B2 operations.Rating type: **DRONE MODEL 1**.  |
| Name: **Ms. Smith**Certificate ’ABC’ and license nº 555555Medical certificate class ’ABC’, expiring date 15-12-2025Certificate advanced type B2 operations.Rating type UAS: **DRONE MODEL PRO** |

#### Training requirements and recurrent training

*[The training courses carried out by the personnel in charge of the operation will be part of Operator’s general training program and therefore recorded in the individual records of the personnel in their Flight Books.*

*On the other hand, the periodic training flights carried out by the authorized pilot will be recorded in the Flight Log Books.]*

Apart from the certificates required by the authority to be a drone pilot, the operator **OPERATOR** will require a minimum of demonstrable experience from the pilots.

To satisfy this requirement, pilots must perform 3 regular flights in the type of UAS declared by the operator to be piloted. They will be carried out during the 3 months prior to the start date as a pilot on the operator. They will include a take-off, climb, cruise, approach and landing.

In addition to the requirements of the legislation, pilots operating in **OPERATOR** must take refresher courses every year, consisting of 2 periodic flights, which must be recorded in the pilot's log books. Pilot Log books format in *Appendix. 1.*

#### Maintenance training

*[List and briefly describe which maintenance tasks will be carried out by the operator (if none, this section will just say that the service is outsourced to an external company).*

*List the training requirements that maintenance personnel must have to perform those tasks.*

*Add here a list of the certified maintenance staff of Operator, their license number and expiring dates (if there is).]*

The maintenance tasks carried out by the Operator are, as set out in the UAS Manufacturer's Maintenance Manual:

* Checks and tests after assembly.
* ......
* ......
* .......

Maintenance personnel is trained in the maintenance activities for the UAS by the manufacturer, and their training includes:

* Maintenance actions
	+ Replacement of a propeller
	+ Replacement of an engine
	+ Battery replacement, connector adaptation
	+ Aircraft weight and balance
	+ Replacement of chassis elements
	+ Autopilot replacement
	+ Transmitter replacement
	+ Cleaning and maintenance
* Checks and tests after assembly
* Periodic checks
	+ Daily
	+ Service
	+ Basic
	+ General

At the time of acquisition of an aircraft, **OPERATOR** will establish with the UAS manufacturer those maintenance tasks that must be performed by the UAS manufacturer or entities accredited by the manufacturer to do so.

Maintenance personnel shall comply with the following requirements:

* Be at least 18 years old
* Accreditation of the technical knowledge required for the safe performance of their duties.

Maintenance personnel list:

|  |
| --- |
| Name: **Mr. Smith**License nº 555555Rating type: DRONE MODEL 1.  |
| Name: **Ms. Smith**License nº 555555Rating type UAS: DRONE MODEL PRO |

### Crew health

#### Environmental conditions in the area

*[The crew must control at all times the environmental conditions of the area in which they are working, not only because they affect the operation but also the personnel themselves. When there are conditions that may affect the pilots, for example: extreme cold or heat, excessive humidity or strong gusts of wind; the operation shall be directly aborted.*

*Here it must be listed those limiting conditions for the crew]*

**OPERATOR** pilots shall at all times monitor the environmental conditions of the operating area, aborting any of these if there is a high risk that the operation will be affected*.*

The list of conditions that may affect the operation includes, but is not limited to:

* High temperatures
* Extreme cold
* Excessive humidity
* Strong gusts of wind

#### Medications, narcotics and drugs

*[A pilot in possession of a medical certificate may not take any non-prescription medication or drugs. In the case of prescription drugs, they must be absolutely certain that the drug will not have any adverse effect on the ability to perform the duties safely.]*

Pilots and other personnel of the operator holding a medical certificate, may not take any prescription or over-the-counter medication or drugs, or undergo any other treatment unless they are absolutely certain that the medication, drug or treatment will have no adverse effect on their ability to perform their duties safely. If there is any doubt, advice will be sought from an aeromedical examiner.

#### Vaccinations

*[This chapter will depend on the country of operation. Therefore, it will have to be defined according to what is established by the DHA (Dubai Health Authorities).*

*In any case, if any pilot needs to be vaccinated, this vaccine will be provided recommended time before the beginning of his flight activity.]*

Pilots operating in Dubai will be vaccinated according to what is established by the DHA (Dubai Health Authorities).

In case of any vaccination/revaccination to be performed to the remote pilot, the treatment will be carried out not less than 24 hours before the start of the activity.

#### Fatigue, stress and rest

*[A remote pilot shall not perform UAS piloting duties if they are in any doubt as to their ability to perform their assigned duties, or if they know or suspect that they are suffering from fatigue or feels unwell, to the extent that the flight may be in danger.*

*The pilot has the obligation to inform the Operator whenever he/she finds himself/herself in these situations and is assigned to any service.]*

A remote pilot shall not perform UAS piloting duties if they are in any doubt as to their ability to perform their assigned duties, or if they know or suspect that they are suffering from fatigue or feels unwell, to the extent that the flight may be in danger.

The pilot has the obligation to inform the Operator whenever he/she finds himself/herself in these situations and is assigned to any service*.*

For activities and rest time regulations, see chapter 3.5.3 of the Operations Manual.

#### Others

*[Pilots must take into account their state of health and be fully recovered from any illness and/or surgery before returning to their activity. Likewise, if the pilot wants to donate blood, he/she must wait a period of 24 hours before starting to operate again.]*

**Blood donation**

Pilots who donate blood must wait 24 hours before starting flight duty.

**Food precautions before and during the flight**

Precautions should be taken to avoid the risk of food poisoning. Although eating is not usual during UAS piloting, pilots should pay attention to eating and drinking enough during the day, especially before flight.

**Surgical operations**

After undergoing surgery, the UAS pilot must be fully recovered before returning to work.

### Flight time limitations

#### Activity and rest policy

**Operator responsibilities**

All information on flight time limitations, flight activity maximums and minimum rest periods is established for pilots of the operator **OPERATOR** and are in accordance with current legislation in force.

The development of all the operations is programmed to be carried out within the allowed flight time, taking into account the time necessary for all the pre-flight activities, all subsequent flights and the post-flight.

The remote pilots and the operator **OPERATOR** are the responsible for the strict observance of these regulations. No remote pilot shall start a period of flight activity if it is foreseeable that the limitations of service time exceed the limitations are foreseeable to exceed what is indicated in this chapter of the Operations Manual.

**Flight time and activity limitations**

Any work that a pilot performs on behalf of **OPERATOR** will count as service time or activity.

The period of service of a remote pilot cannot exceed:

* 42 hours of activity in 7 consecutive days.

The operator's policy on flight and activity time limitations and rest requirements is described below:

* Maximum continuous flight time for the different flight modes
	+ Manual: 2 hours with 2 hours of resting time and maximum of 6 hours per day.
	+ Assisted: 3 hours with 2 hours of resting time and maximum of 6 hours per day.
	+ Automatic: 4 hours with 2 hours of resting time and maximum of 8 hours per day.

**Rest time**

A minimum period of 6 hours is established from the end of an operation to the start of the new operation the following day.

After a service period of 7 days, a rest period of at least 24 hours (including 1 local night) is required.

#### Excesses of flight time limitations and/or reduction of rest periods

*[Pilots must inform the Operator of any flight operations that exceed any of the aforementioned limitations.*

*The Operator shall record the control of compliance with the conditions and limitations of the crew.]*

Pilots must inform the operator **OPERATOR** if the above limitations are exceeded for any reason, such as urgent flights, standby, etc.

**OPERATOR** will record the control of compliance with the conditions and limitations of the crew.

## Risk analysis and methods for reduction of identified risks

The Operator does not have to perform any risk analysis as it will operate in a certified non-standard scenario, whose risks and requirements have already been assessed, tested and reviewed by DCAA/C-USP.

If at any time it is decided to perform an operation not defined as standard, **OPERATOR** will carry out the corresponding safety study and issue the corresponding application process.

## Maintenance

**OPERATOR** will perform maintenance activities as set forth in the aircraft maintenance manual provided by the manufacturer.

# Normal procedures

## General procedures valid for all operations

### Flight preparation (pre-flight)

#### Verification of compliance with UAS regulations

Review of the intended operation with the approved CONOPS, risk assessment, flight environment and personnel suitability will be verified.

#### Request for additional authorizations

Airspace reservation and flight approval will be requested by **C-USP** interface.

#### Consultation of aeronautical information

AIP updated information of the area (cartography, NOTAM, etc.) will be checked to know the information of the airspace where the operation is going to take place. This information is also provided by **C-USP** services contracted.

#### Consultation of meteorological information

Likewise, weather information may be provided by the **C-USP**. In any case, **OPERATOR** will be able to obtain these meteorological data from the following information channels:

* <https://metar-taf.com/es/OMDB>
* <https://www.ogimet.com/metars.phtml>
* <https://www.ncm.ae/maps-radars/radar-merge-sat?lang=en>

The trustworthy meteorological reference information is provided by the National Center of Meteorology.

#### Preparation of an operational flight plan

Flight preparation requires:

* Study of meteorological reports and forecasts
* Planning alternative arrangements in case the flight cannot be completed as planned due to weather conditions.

**OPERATOR** will consider the following factors in the development of its operational flight plan:

* Flight environment
* Flight speed
* Flight altitude: assigned flight levels will be given by the C-USP, but will never exceed 400ft AGL dictated by the regulations and the minimum flight altitude will never be less than 2 meters, except for take-off and landing manoeuvres. Also, will be limited by the requirements of the operation stated in the approved CONOPS.
* Flight path: the Operator designs the trajectory in which the aircraft will move, always within the limits set by law, the **C-USP** (if applicable) and the limitations established in this OM.
* Criteria and identification of emergency landing sites: they must be clear and unobstructed areas, without elevations, in which there is no presence of people and with little vegetation.
* Battery: when reaching 20% of the total battery consumption, according to the company's internal policy, the aircraft will be prepared for the landing manoeuvre.
* Take-off and landing: it be selected suitable area within designated UAS airport of landing pads, free of obstacles, with no FODs around. The take-off and landing manoeuvre will be performed only when flight approval is granted.
* Archive: All the documentation generated during the flight will be saved.

#### Meteorological minima by type of operation

**Limitations by speed and wind direction:** speed limitations stated in the user’s manual of each UAS. *[it is advisable to always fly the UAS in the best possible wind conditions. By studying the METAR, TAF and other meteorological reports OPERATOR will define if it is safe to fly or not within the limitations from the authorities and manufacturer.]*

**Rain and snow**: UAS manufacturer does not recommend operations under rain or snow. **OPERATOR** will not fly under these adverse conditions.

**Maximum and minimum temperatures**: the operator shall operate in accordance with the manuals of each UAS.

**Fog**: **OPERATOR** will not operate under foggy conditions.

**Lightning, hurricanes and tornadoes:** **OPERATOR** will not operate under these conditions.

#### Fuel/power management

**OPERATOR** uses high-capacity batteries for its equipment, fuel is not used in any case. By means of telemetry data system, apart from reading and logging flight data, the level of the batteries will be checked in real time during the operation.

*[Include here manufacturer info about power management and how it is displayed in the Remote Pilot User Interface]*

**OPERATOR** will stock batteries following the next table:

|  |  |
| --- | --- |
|  | ***Batteries stock*** |
| ***Identification number*** |  |  |  |  |  |  |  |  |  |
| ***Serial number*** |  |  |  |  |  |  |  |  |  |
| ***Manufacturer*** |  |  |  |  |  |  |  |  |  |
| ***Model*** |  |  |  |  |  |  |  |  |  |
| ***Type*** |  |  |  |  |  |  |  |  |  |
| ***Capacity (mAh)*** |  |  |  |  |  |  |  |  |  |
| ***Discharge capacity*** |  |  |  |  |  |  |  |  |  |
| ***Maximum number of safe cycles*** |  |  |  |  |  |  |  |  |  |
| ***Maximum number of safe hours*** |  |  |  |  |  |  |  |  |  |
| ***Weight (gr)*** |  |  |  |  |  |  |  |  |  |
| ***Date of purchase*** |  |  |  |  |  |  |  |  |  |
| ***Seller***  |  |  |  |  |  |  |  |  |  |
| ***Date of first use*** |  |  |  |  |  |  |  |  |  |
| ***Withdrawal date*** |  |  |  |  |  |  |  |  |  |

Table 1: Batteries stockage record

#### External inspection of the equipment

Before performing any flight, all the checks included in the maintenance section must be initiated as far as the following aspects:

* Check of the correct fixation of the propellers on the engines.
* Check of anchorages of the equipment installed on the aircraft.
* Calibrate the GPS position
* Check that the screws are correctly fastened.
* Check of controls
* Check of the condition of the batteries of the remote-control transmitter, the battery of the FPV screen and the battery of the aircraft.
* Telemetry: check that the flight data (pitch, speed, position, climb/descent) are correctly reflected on the FPV screen.
* Aircraft wiring: check that no wires are coming out of the interior of the aircraft and, if it protrudes, it must be properly secured so that it does not interfere with the moving propellers.
* Landing gear: check that the landing gear is in perfect condition and undamaged.
* Check the correct condition of the impact energy limiting device.
* Check the correct condition and operation of the aircraft lights.

#### Support and safety material in the operation

**OPERATOR** will not have any support material in the operation beyond what is already established in this manual, although it may be required, due to circumstances of the operation, the incorporation of some complementary material for the correct development of the operation.

#### Verification of the aptitude of the crew

As established in this manual and to avoid incidents related to crew conditions, prior to each operation the **OPERATOR** Operations Manager will check that all pilots involved in the operation are properly fit to fly, that they comply with their rest and duty hours and that they are not under the effects of fatigue or anything else that prevents them from performing their activity in a safe manner.

#### Navigation procedures

The possible control and navigation modes are as follows:

* Manual: the pilot has full control of the aircraft.
* Automatic: the pilot configures the system so that the UAS navigates autonomously and the system itself performs its autonomous navigation procedures. The pilot always knows the position and status of the aircraft during the flight.
* Assisted: the pilot activates some systems that assist him during navigation.

**OPERATOR** will attempt to perform most of the operations in automatic and assisted modes, although it may be the case that the pilot must take manual control of the aircraft due to circumstances not foreseen in the flight plan. In such case, the pilot must notify the Operations Manager upon completion of his activity in order to justify his decision.

### During operation

#### Briefing

Before each operation, the pilot in command will conduct a short briefing with everyone involved in the operation prior to the deployment of equipment and systems. During this briefing the following aspects will be discussed:

* Nature and objectives of the operation.
* Planning of the flight.
* Functions and responsibilities of each crew member.
* Use of checklists for checking the aircraft status.
* Communication procedures between crew members and with third parties.
* Other instructions deemed necessary by the pilot or another crew member

#### Assessment and monitoring of meteorological conditions

Throughout the operation, weather conditions and forecasts will be constantly monitored to ensure that they do not interfere with the operation and to ensure flight safety.

#### Checklists and operational flight plan

During the flight the crew will be constantly checking the admissible flight parameters and verify that the flight is performed under normal conditions and will follow the guidelines of the flight plan, provided or not by the **C-USP**, which may be change throughout the operation.

#### Coordination and communication between operations personnel

Communications between the personnel involved in the operation shall always be made in person, in voice and using appropriate phraseology. When personnel are not in the same place, such communications shall be made using cell phones or radios.

#### Coordination and communication with third parties

Once flight approval has been obtained from DCAA/C-USP or whoever is responsible for the authorization of the operation, flights that take place in controlled airspace, in a wildlife protection zone, etc. must keep adequate coordination and communication means with competent stakeholders.

Once the flight has started, communications with these third parties will be made using cell phones or radios.

#### In-flight fuel/energy management

The operator must follow manufacturer's recommendations for the use of the batteries, as stated in this operation manual.

Each battery shall be charged with the appropriate charger for its type, configuration and capacity according to the UAS Manufacturer's instructions.

### After completion of the operation (post-flight)

#### Coordination and communication with third parties

Once the operation has been completed, all parties involved must be informed about the completion of the operation, as well as of any incidents during the operation, if any.

In case of any structural or electrical failure of the aircraft, it will be taken, once collected in its corresponding transport case, to the maintenance service to check all those parts that have been affected, to proceed immediately to repair them or replace them with a new one.

#### Debriefing

The pilot in command will conduct a debrief with the rest of the crew (if applicable) at the end of the operation and before leaving the aircraft.

The minimum content of this meeting must be:

* General status of the UAS
* General status of the payload (if any).
* What went well and what went wrong.
* Proposals for improvements in instruction and procedure manuals.
* Proposals for improvements in equipment and material means.

#### Generation of flight records and file

At the end of the operation, all pilot records, UAS records, etc must be completed and registered. As well as the operator's internal documentation related to the operation and maintenance activities, etc., must be filled in.

#### Aircraft disassembly

The crew, according to their assigned tasks, will execute disassembly activities as per disassembly instructions and checklist. This procedure comprises the verification of:

* General condition of the UAS.
* General condition of the sensors/payload.
* General condition of the ground station equipment and communication equipment.
* Incident reports.
* UAS conditions for safe storage.

## Procedures peculiar to a single operation

All the above procedures will be applied to each particular operation as and when needed and/or applicable.

# Contingency procedures

This section contains the procedures to be followed according to the different failures that the UAS or the remote control could have, considering the different safety measures and strategies implemented by the UAS Manufacturer and **OPERATOR**.

## Failure of the automatic flight control system

If during the flight a loss of GNSS signal occurs, the flight control system will immediately switch to applicable failsafe mode. If the signal is recovered in less than 2 seconds the flight control system will switch back to the previous flight mode.

In case the loss of the GNSS signal occurs flying in manual mode, the operation would not be affected.

## Loss of command-and-control radio link and activation of the flight termination system

In the event of loss of the command-and-control radio link the flight control system will immediately switch to applicable failsafe mode and try to recover the signal. In case the signal is not recovered after certain time (UAS user’s manual), safe flight termination system will be activated. That flight termination plan will initiate return to home maneuver. In case the GNSS signal is not available, the aircraft will remain in hover conditions.

## Battery protection level

In the event the voltage of the UAS batteries is below certain limit, as per UAS user’s manual, the low battery protection modes will be activated. There are 2 levels of protection:

* First level: it is activated when the voltage becomes low, but there is still enough to maintain the aircraft maneuverability for a few minutes. In this case the aircraft will automatically perform a return to home maneuver. The user will always be warned with an acoustic and visual indicator.
* Second level: it is activated when the voltage level becomes too low. In this case the aircraft will proceed to descend gradually. The user will always be warned with an acoustic and visual indicator during the maneuver.

In any case, during pre-flight and in-flight checks, the battery voltage of the aircraft will be periodically checked. During the flight planning, the flight plan will be defined in such a way that safe flight time margin is always provided.

## Flight termination system

The UAS are equipped with a parachute system that can be activated in the event of and emergency situation or a sudden loss of power.

This device is activated from the remote pilot’s radio transmitter and reduces the impact speed for an aircraft.

The flight termination system must be equipped with an impact energy limitation system that must be capable of reducing the impact energy of the aircraft from flight altitude to the ground, by less than 80J.

The minimum flight altitude and flight envelope of the operation shall be calculated based on the ability of the safe flight termination system to reduce the impact energy of the aircraft to less tan 80J.

This system will be activated in situations when contingency procedures are not effective and emergency procedures must be applied, as the UAS leaves the contingency zone.

## Attacks

### Bird attacks

Possible attack by territorial birds on the aircraft in flight. If it is observed the intention of a bird to attack the aircraft, we will maneuver to get the aircraft out of the flight zone, proceeding to its immediate landing.

### External attacks by people

Attacks on the aircraft by physical means. People throwing objects to the UAS. If we perceive a person attacking our aircraft, we will divert the trajectory until we put the UAS in a safe area. We will notify the DCAA, Dubai Police or the competent authority according to jurisdiction.

### Aircraft hijacking

Interceptions of the command and control link signal between the aircraft and the ground control station by means of radio interference or signal hijacking. Aircraft is equipped with a system that does not allow the interception of the signal by a third party if it does not know the frequency with which the aircraft is linked to the ground station and the encryption protocol.

# Emergency Response Plan

*[If the UAS operator has prepared a separate ERP manual, this section does not need to be completed and it is sufficient to refer to that manual.]*

*If, on the other hand, the operator does not have an ERP manual, he should develop at least the following in this section:*

* *ERP should be adequate to the situation.*
* *A plan to limit the effects of escalation after an accident (e.g.: notifying USP).*
* *Define the criteria to identify an emergency situation.*
* *It is easy and practical to use.*
* *Clearly delimits the responsibilities of the personnel in charge of the essential tasks for the UAS operation.*
* *Developed according to the stablished by the competent authority. ]*

# Occurrence reporting system

##  General

As established on Law No. (4) of 2020, operators should immediately notify the DCAA upon occurrence of any accident, incident or violation of the terms of a flight approval. The personnel involved in the operations of **OPERATOR** such as the remote pilot, the maintenance manager, the operations manager or any other personnel involved in the operation, have the obligation to report any incident or accident that could have endangered the operation.

##  Target

The objective of event reporting is to improve operational safety:

* Preventing future incidents and accidents
* Prior to the occurrence of an accident, a number of incidents of lesser severity have revealed the existence of safety hazards.
* Conducting risk assessments and analyzing and monitoring trends.
* Undertake corrective and/or preventive actions.

## Mandatory occurrences

Events and incidents reported by the operator may include, inter alia, the following:

* Occurrences related to the operation of the aircraft:
	+ Occurrences related to collisions
	+ Events related to take-off and landing
	+ Fuel related events
* In-flight events:
	+ Communication events
	+ Injury, emergency and other critical situations events
	+ Crew incapacitation or other crew-related occurrences
	+ Weather or safety events
* Occurrences related to the technical condition, maintenance and repair of the aircraft:
	+ Structural defects
	+ System failures
	+ Maintenance or repair problems
	+ Propulsion problems
* Events related to air navigation services and facilities such as:
	+ Collisions, near-collisions situations or potential collisions
	+ Specific air traffic management and navigation services events
	+ Air traffic Management or navigation systems operational events

# Security

*[On this chapter the Operator shall define the procedures and responsibilities on how to implement security means, including procedures to ensure that the security requirements applicable to the area of operations are implemented in the operation and a description of the measures to consider if an act of unlawful interference or an unlawful access authorized occurs.]*

The operator’s equipment will at all times be stored at **OPERATOR** facilities. At the facilities, only authorized and qualified personnel will have access to the UAS, to prevent any manipulation of them by unauthorized personnel.

In flight or during operations, all equipment, aircraft, ground control stations, etc., will be stored in vehicles or containers owned by **OPERATOR** and used for the transportation of personnel and UAS and other equipment to the flight zones. The places where they are located will be protected and marked as restricted access, either because the operation is carried out from UAS airports or from areas cordoned off by operator’s personnel.

To avoid deliberate or illegal interference in the radio segment in flight and on the ground the communication system will use encrypted signal. This technology is incorporated by the manufacturer on the 2 types of UAS on **OPERATOR’s** fleet.

Regardless of the safety measures considered by the operator or the authority, whenever the pilot detects interference or security risk that may endanger flight safety, the Return to Home function will be activated to return the aircraft safely to its original location.

# Record-keeping procedures

*[Instructions, logs, records and other data considered useful for tracking and monitoring the activity.]*

As established on Law No. (4) of 2020**, OPERATOR** will keep records of the conducted operation, checks, maintenance activities, training and any other information determined relevant by the DCAA.

These records will show DCAA that the operator complies with de safety rules and allows the operator to be proactive regarding the UAS operations and safety.

# Appendixes

##  Remote pilot Logbook format.

|  |
| --- |
|  **Shape  Description automatically generated with medium confidence****UAS REMOTE PILOT LOGBOOK** **Name and surname of the holder: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_****Volume nº: \_\_\_\_\_\_\_\_\_\_\_** |
| **1** | **2** | **3** | **4** | **5** | **6** |
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| Departure | Arrival | (Arrival – Departure) | Day | Night |
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