Air Data Systems LTD

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Operations Manual

Version 1.0 - 30/04/2019

Amendment Record

Change Number	Change Date	Incorporated by	Date Incorporated
Initial Issue V1.0		Edwin Purnell - Director	30/04/2019

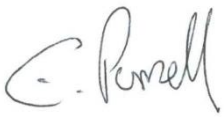
Referenced Documents

REFERENCE	TITLE	ISSUE	DATE
CAP 382	Mandatory Occurrence Reporting (ECCAIRS)	10	**December 2016**
CAP 393	Air Navigation: The Order and the Regulations (ANO)	5.6	**21st March 2019**
CAP 722	Unmanned Aircraft System Operation in UK Airspace – Guidance	6th Edition	**24 Mar 2015**

Safety Statement and Commitment by Accountable Manager

Air Data Systems LTD is committed to providing safe SUA / SUSA during all operations.
Safety is our priority and takes precedence over any other consideration, our mission is to operate at the highest standards and comply with all regulations and obligations laid down by the CAA and this operation manual. Under no circumstances shall any Remote Pilot operate company UAS outside of the procedures contained within this manual or the Permission for Commercial Operations as awarded by the CAA.
No commercial drone operation will be undertaken without valid insurance.
Our commitment to safety is proven by using the following procedures:

- Qualified personnel
- Ongoing specific training as required
- Ongoing currency requirements
- Maintenance
- Risk management

Signed: 

Edwin Purnell
Accountable Manager

Date: 30/04/2019

Acronyms & Abbreviations

Glossary of Terms

Aircraft (ICAO)	Any machine that can derive support in the atmosphere from the reactions of the air other than the reactions of the air against the Earth's surface.
Command and Control Link (C2) (ICAO)	The data link between the remotely-piloted aircraft and the remote pilot station for the purposes of managing the flight.
Detect and Avoid (ICAO)	The capability to see, sense or detect conflicting traffic or other hazards and take the appropriate action.
Operator (ICAO)	A person, organisation or enterprise engaged in or offering to engage in an aircraft operation. Note: In the context of remotely-piloted aircraft, an aircraft operation includes the remotely-piloted aircraft system.
Radio Line-Of-Sight (RLOS)	A direct electronic point to-point contact between a transmitter and a receiver.
Remote Pilot (ICAO)	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.
Remote Pilot Station (RPS) (ICAO)	The component of the remotely-piloted aircraft system containing the equipment used to pilot the remotely-piloted aircraft
Remotely Piloted Air System	An unmanned air system includes a number of elements such as the ground-based control unit, ground launch system and the Remotely Piloted Air Vehicle (RPAV) and all associated flight safety-critical elements.
Remotely-Piloted Aircraft (Drone) (ICAO)	An unmanned aircraft which is piloted from a remote pilot station.
Remotely-Piloted Aircraft System (RPAS). (ICAO)	A remotely-piloted aircraft, its associated remote pilot station(s), the required command and control links and any other components as specified in the type design.
Drone Observer (ICAO)	A trained and competent person designated by the operator who, by visual observation of the remotely-piloted aircraft, assists the remote pilot in the safe conduct of the flight.
Unmanned Aerial Vehicle	See 'Unmanned Aircraft System'
Visual Line-Of-Sight (VLOS) Operation (ICAO)	An operation in which the remote pilot or Drone observer maintains direct unaided visual contact with the remotely-piloted aircraft.

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1.1 Model Identification

The SUA/SUSA listed in the table below are covered in this Operations Manual. SUSA may be added to the Operations Manual as the scope / variety of works undertaken develops / increases.

UAS Type/Model
DJI Phantom 4 Pro
DJI M200
DJI M600

1.2 Introduction

Air Data Systems LTD operates Class 1 (20Kg or less) UAV's for the purposes of photography, surveys, various forms of inspection and videography.

Air Data Systems LTD will, always adhere to the relevant rules and regulations in place. All remote pilots will be qualified and certified by the CAA (and any other relevant bodies). They will abide by the applicable permissions as required to allow legal and safe operation.

The purpose of this manual is to:

- Provide the necessary operating limitations, procedures, performance & systems information the operator needs to safely and efficiently operate the SUA / SUSA during all anticipated commercial operations.

- Serve as a comprehensive reference for use during transition training onto Air Data Systems LTD SUA/SUSA.

- Serve as a review guide for use in recurrent training and proficiency checks.

- Provide necessary operational data from the UK CAA to ensure legal requirements are satisfied.

- Establish standardised procedures and practices to enhance Air Data Systems LTD.

- Establish operational philosophy & policy.

This manual is periodically revised to incorporate pertinent procedural and systems information.

Any questions about the content or use of this manual can be directed to:

Name: **Mr Edwin Purnell**
Address: **ADS Head Office - Leeds22 Burley Street, Leeds, England, LS3 1LB**
Telephone: **07858 508888**
Email: **edd.purnell@airdatasys.com**

2 Safety Policy

2.1 Overview

It is Air Data Systems LTD's policy to take all appropriate measures to ensure the protection of property, employees and the public whilst on company property, travelling to site and during the undertaking of SUA / SUSA activities. In following this policy, the company will comply with this Operations Manual and all existing legislative requirements.

Safety shall be regarded by everyone as a prime consideration in the successful performance of their duties. The Accountable Manager is specifically responsible for the development and implementation of safe practices and procedures. Employees have the responsibility to perform their duties in a manner which will not jeopardise the safety of the public, property and customers or adversely affect their own health, safety or physical well-being or that of their fellow-workers or contractors.

2.2 Safety Policy

The Air Data Systems LTD mission is to provide a safe service using the latest state-of-the-art Small Unmanned Surveillance Aircraft equipment for survey, inspection, photography and videography.

Safety risks are kept to a minimum by the provision of certified training, operator support and establishing RP currency requirements whilst utilizing state-of-the art software.

The Unmanned Aircraft Control Systems we use are the result of intense research, development and testing effort allied with exact engineering standards.

An accumulated sufficient flight-testing period ensures high confidence in the SUASs flight capabilities. In addition, the SUA/SUSA will only be operated by trained and experienced RPs during all intended operations.

2.3 Employee Involvement

Safety shall be regarded by everyone as a prime consideration in the successful performance of their duties. Staff participation in ongoing safety workshops and training will be the norm.

2.4 Risk Management Process

Air Data Systems LTD completes thorough risk assessments before undertaking any drone operation.

The risk assessment is split into two sections.

1. Standard risk (not site specific)
Standard risks encompass risks that could happen at any site, for example equipment failure etc.

2. Site specific risks
Site Specific risks are picked up whilst re-searching each individual location including dynamic risks. For example, an area around a certain building may present no major risks apart from a particular day i.e. a football stadium.

By looking at each operational situation, we can build a picture of the potential hazards associated with each operation and identify what might cause harm to people, and property and make decisions to prevent that harm from occurring.

Air Data Systems LTD cannot remove all risks but can protect people by putting in place measures to, as far as reasonably practicable, control the identified risks.

Our risk assessments only include what Air Data Systems LTD could reasonably be expected to know – **we cannot anticipate unforeseeable risks.**

2.5 Safety Procedures Audit & Evaluation

The Air Data Systems LTD Safety Procedures will be audited on an annual basis by the Accountable Manager. The findings will be communicated to all staff by the Accountable Manager and change will be implemented where required.

2.6 Accident / Incident Investigation & Analysis

All accidents / incidents are reported to the Accountable Manager, who will decide if any mandatory reporting is required. Following the investigation, the findings are fed back into the company and may influence the requirement for additional refresher training.

2.7 Corrective Action Development, Implementation & Monitoring

Thorough analysis of incidents and accidents allows Air Data Systems LTD to discover weak points of the delivery chain from the initial project brief to on site operations.

Corrective action to procedures is only achieved through understanding the steps leading to an incident / accident. Implementation of corrective action is carried out by further training or policy decision.

Monitoring of the effectiveness of corrective action is undertaken by the Accountable Manager.

2.8 Compliance with Regulations & Ops Manual

Compliance to Air Data Systems LTD company & statutory limitations is achieved by:

- 'Line check' type testing by the Accountable Manager or Chief Pilot. Observing RPs during operations is an efficient method of measuring compliance.
- Members of staff are encouraged to monitor the actions of their colleagues and report any breaches of policy to the Accountable Manager.

2.9 Skills Training & Supervision

Working as a RP is a skill that requires constant practice. Minimum currency levels are set out in this Operations Manual.

2.10 Governing Authorities / Regulations

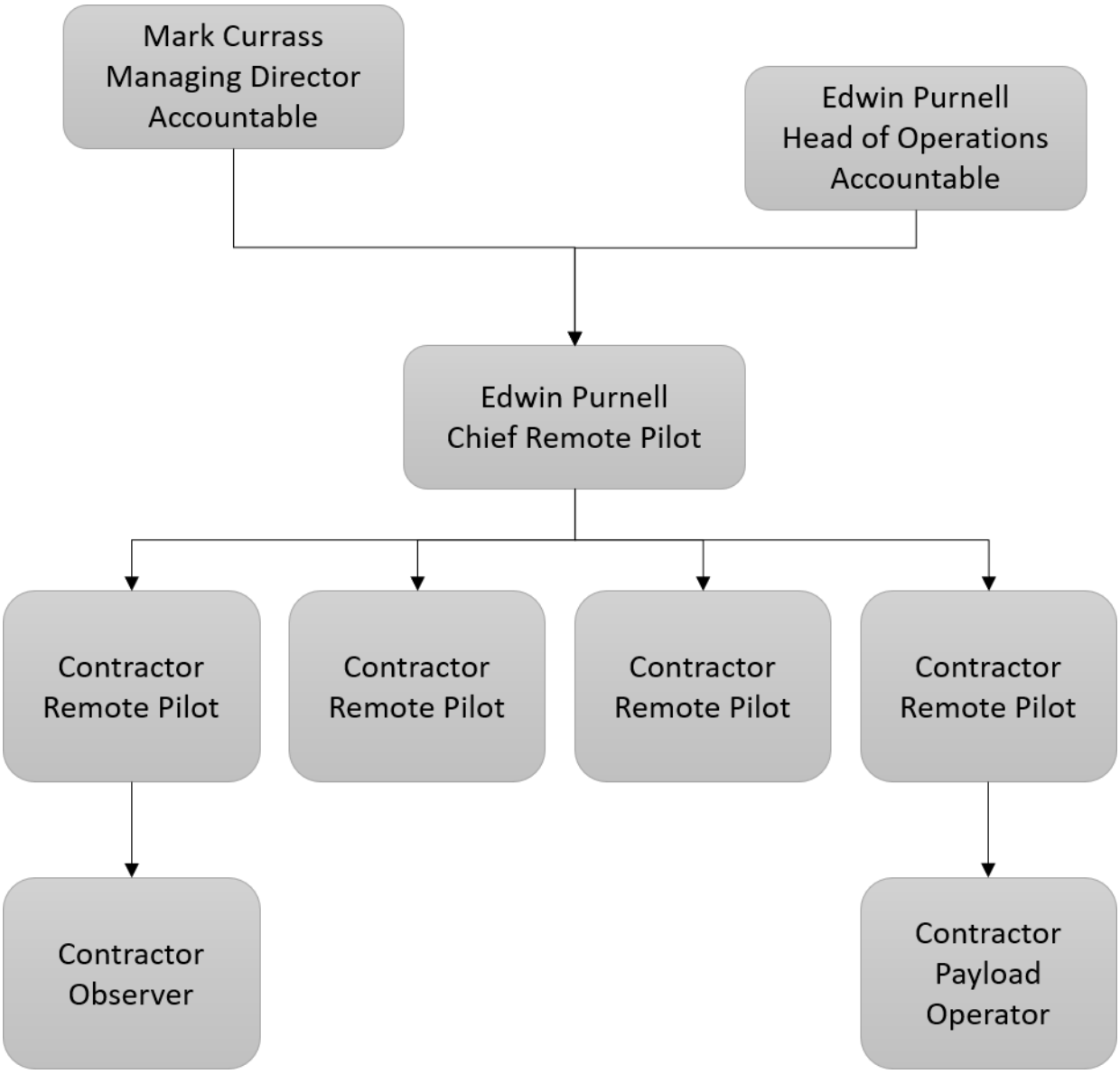
Governing Authorities revise legislation from time to time. This can include establishing of further operational limitations, medical limitations, crew rest requirements etc.

The Accountable Manager is responsible for ensuring Air Data Systems LTD operates within the confines of the law and all staff are made aware of changes to legislation in the following ways:

- Revision of OM
- Ad hoc training as required

3 Organisation & Operations

3.1 Structure of Organisation & Contact Details



3.1.1 Nominated Personnel

Appointment	Name	Contact No	Email address
Accountable Manager	Mark Currass	07935 222525	mark.currass@airdatasys.com
Head of Operations	Edwin Purnell	07858 508888	edd.punrell@airdatasys.com
Chief Remote Pilot	Edwin Purnell	07858 508888	edd.punrell@airdatasys.com
Remote Pilot	See Pilot List		
Payload Operators	As Required		
Observer	As Required		

3.1.2 Register of Remote Pilots

This page details all registered remote pilots reporting to the Accountable Manager and their contact details.

Remote Pilot Name	Contact No	Email Address
Edwin Purnell	**07858 508888**	**edd.purnell@airdatasys.com**

3.2 Roles & Responsibilities

3.2.1 Accountable Manager

- Adheres to the CAA documents & (PfCO), Operations Manual and Manufactures technical specifications.
- Ensures all staff are made aware of CAA documents, Operations Manual and Manufactures technical specifications and amendments.
- Revises / updates the Operations Manual as required and submits same to the CAA.
- Monitors staff adherence to Legislation, CAA documents, Company Policies, Operations Manual and Manufactures technical specifications.
- Monitors SUA/SUSA incident / MOR and devise ongoing training using incident data to improve safety.
- Organises ongoing Human Factors & currency training as required by the Operations Manual.
- Keeps up to date with changes to Legislation (CAP) and filter relevant information to staff through memos or training.
- Appoints and fully briefs additional staff if required.
- Ensures personal protection policy (such as hard hats, life jackets) is adhered to.

3.2.2 Remote Pilot

- Adheres to Legislation, CAA CAPs, Company Policies and the Operations Manual.
- Monitors crew medical status, their fitness to fly and personal logbooks.
- Completes a Survey form to assess the client requirements.
- Completes a Risk Assessment.
- Checks that the flight area is clear of any danger areas.
- On arrival at the site complete an On-Site Survey Form and updates the Risk Assessment.
- Carries out a local weather check and review with most recent local forecast.
- Operate the drone IAW the recommendations in the Ops manual and manufacturers technical specifications.
- Briefs the crew appointed for the day with regard to the intended flight plan and their duties.
- Maintains Flight Safety Awareness during the flight.
- Notes time of flight and records in logbook.

3.2.3 Gimbal Operator / Observer

- Operates the Gimbal safely to the RP instructions or per client brief.
- The Drone Pilot will brief the Observer on actions to be taken by the Observer in the event of any emergency or the Pilot becoming incapacitated.
- Before any flight, the Observer will assist the Pilot in choosing the take-off area and ensuring any third parties and animals are kept clear of the area.
- The Observer will keep watch on the Drone during the entire flight and advise the pilot of any loss of sight or risk of collision with aircraft, trees, buildings or obstructions.
- Maintains situational awareness with regard to other air users and ground incursions.
- Ensures good communication with the Pilot.

3.3 Type of Operation

Air Data Systems LTD will operate SUA/SUSA during daylight and night hours within VLOS rules following the separation rules set out in CAP 393 Article 94 & 95 and any notice which amends this be it more or less restrictive.

3.4 Supervision of SUA Operations

The Accountable Manager is responsible for the supervision of all SUA/SUSA operations within Air Data Systems LTD.

3.5 Accident Prevention, Risk Management & Flight Safety Program

Accountability for accidents and incidents lies with the Accountable Manager. Air Data Systems LTD has established a pro-active and robust Safety Management Scheme (SMS), see Chapter 2.0, to achieve and maintain risk awareness by all persons involved in SUA/SUAS operations. Air Data Systems LTD conducts assessments of ongoing process and develops mitigation to prevent potential accidents or incidents from occurring.

It is outdated and not part of Air Data Systems LTD culture, to purely react to events as they occur. Finding the cause and establishing steps to stop them happening again is the way Air Data Systems LTD wishes to operate.

Reporting

The CAP382 is the compliance document with reporting carried out using the ECCAIRS European Reporting Portal. http://www.aviationreporting.eu

3.6 Qualification Requirements

It is the belief of Air Data Systems LTD that personnel engaged in aviation activities which include RPAS, must be suitably qualified, trained and experienced to be able to undertake their tasks safely.

Air Data Systems LTD has developed minimum criteria in terms of remote pilot competency and currency which must be met before individuals may undertake work for the company.

The table below outlines the minimum levels of competency and currency.

Job Title	Minimum Qualification Requirement	Minimum Currency Requirements	
Remote Pilot	Certificate of recommendation / competence issued by a UK NQE	Monthly	45 Minutes flight time Remote pilot's logbook audit
		Quarterly	2 flying hours
		6 Monthly	Line Check by Chief Pilot or suitable agency

Remote Pilots involved in commercial operations, are required to maintain operational currency standards by ensuring that they operate an aircraft for at least forty-five minutes flight time every calendar month. This may be completed with training flights or, in extreme circumstances (such as during periods of adverse weather conditions), a flight simulator may be permitted. In the event that weather conditions or other circumstances prevents an RP from maintaining minimum levels of currency, in order to re-commence operations, the RP must first complete the monthly minimum currency requirement as training and not during operational flying.

3.7 Crew Health

It is the responsibility of the individual to determine if they are in a physically and mentally fit condition to operate as part of a Flight Crew. Crewmembers shall not perform SUA / SUSA duties if they are in any doubt of their ability to accomplish their assigned duties, or if they know or suspect that they is suffering from fatigue, or feel unfit to the extent that the flight / assignment may be endangered. Crewmembers must report unfitness to the accountable person when assigned for duty and should immediately advise the Remote Pilot or Observer if an aircraft is in flight, if they feel unable to continue with their assigned responsibilities.

3.7.1 Eyesight

Crew members must be capable of clearly reading a vehicle registration number plate from twenty metres distance using the same optical correction system (if worn) that will be used during the flight.

3.7.2 Alcohol and other intoxicating liquor

Crewmembers shall not consume alcohol of any nature within 10 hours of scheduled reporting time or whilst on active duty.

3.7.3 Narcotics, Drugs, Sleeping tablets, Pharmaceutical preparations

Crewmembers shall not take any prescription or non-prescription medication or drug, or undergo any other treatment, unless they are completely sure that the medication, drug or treatment will not have an adverse effect on their ability to perform their duties safely. If there is any doubt, advice shall be sought from a General Practitioner.

3.7.4 Meal precautions prior to and during flight

Sensible precautions should be taken to avoid the risk of food poisoning. Although eating is not usual during a SUSA/SUA flight, crewmembers should ensure that they eat and drink enough during the day, especially before the assignment.

3.7.5 Sleep and rest

Crewmembers shall not perform their duties if they know or suspect that they are suffering from fatigue, or feel unfit to the extent that the flight may be endangered.

3.8 Log & Records

Concise and careful documentation of flight activities is essential to ensure efficient and effective operations. Traceability of process is a vital element to sound supervision and control.

The control, analysis and storage of the records and associated flight data documentation, is a valuable tool for operational supervision, traceability and quality control. The completeness and accuracy of the documents is constantly monitored by the Accountable Manager. Ready access to original information, or copies thereof, which concern details regarding a particular SUA/SUSA, is made available to audits and quality inspections by the CAA.

The following documents must be collated after each flight and batched to make a flight record document:

- Pre-deployment survey
- On site survey form
- On site risk assessment
- Weather forecast
- NOTAMS

After each flight the RP must update the RP logbook.

3.9 Operator Training Programme

Air Data Systems provides training to all operators prior to RP's being able to carry out commercial operations. All RP's will have completed a PfCO with a CAA approved NQE and new pilots joining Air Data Systems will complete their PfCO with Skeyetrain. Air Data Systems will provide advanced courses for RP's to develop their skills and build a better situational awareness.

3.10 Accident / Incident and Investigation Policy

Incidents are categorised as either 'Limited' or 'Full'.

3.10.1 Limited incidents

- Any unusual or unexpected flight behaviour from the aircraft which does not result in damage or loss.
- Any failure of any aircraft system which does not result in damage or loss.

3.10.2 Full incidents

- Any unusual or unexpected flight behaviour from the aircraft which results in damage or loss.
- Any significant damage to the aircraft caused by an aircraft system failure.
- Any significant danger or damage to persons, possessions or property during flight operations.
- Any public encroachments or aircraft incursions which required preventative measures to avoid.

3.10.3 Immediate steps to be taken Post Accident/Incident:

- Ensure site is safe
- Wear appropriate PPE as required
- Administer any first aid as required (Full incident only)
- Inform emergency services as necessary
- Restrict site access to essential personnel with no disturbance of items (Full incident only)
- Health and safety precautions to be taken
- Take photos and or make diagrams of crash site
- Recover Drone if appropriate
- Preserve any evidence for investigation.
- Take statements from all personnel and any witnesses.
- Reportable accidents will be reported using European Reporting Portal www.aviationreporting.eu

3.11 Copy of CAA Permission

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3.12 **Copy of Insurance Document**

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4 Operations

4.1 Role Training & Currency

See Section 3.6

4.2 Area of Operation

Air Data Systems LTD will operate during the day and night hours, primarily in the UK and globally as required in accordance with National legislation.

Air Data Systems LTD flight operations are likely to be varied with areas of operations to include:

- Forest and Forest establishment site mapping and survey
- Industrial, commercial and residential building and structural inspections
- Property/Agricultural, construction survey
- Photography and Videography
- General Commercial work
- Surveying and Inspection Work

All Air Data Systems LTD flight operations will take place in accordance with UK CAA regulations.

4.3 Night Operations

- The SUA must have an illuminated take-off / landing area for the duration of the night flight.
- The Remote Pilot must be able to record the wind direction to determine the SUA take off / landing direction.
- Lights must be fitted to indicate the relative path of the SUA to an RP / observer.
- Lights on the SUA may not be fitted to be mistaken for an aeronautical ground light such as approach lighting near a runway.
- A site suitability survey is to be carried out prior to the flight in daylight hours. To assess any possible obstacles/hazard to the intended flight.

4.4 Operating Limitations & Conditions

Air Data Systems LTD will not operate outside of the Operational Limitations for the Aircraft being used. The specification for each aircraft used by Air Data Systems can be found in the Appendix.

4.4.1 Statutory operational Limitations

The following statutory limitations take precedence over any operational limitations unless prior permission is granted from the UK CAA.

Article 240 - Endangering safety of an aircraft

A person must not recklessly or negligently act in a manner likely to endanger an aircraft, or any person in an aircraft.

Article 241 - Endangering safety of any person or property

A person must not recklessly or negligently cause or permit an aircraft to endanger any person or property.

Article 94 - Small unmanned aircraft requirements

(1) A person must not cause or permit any article or animal (whether or not attached to a parachute) to be dropped from a small unmanned aircraft so as to endanger persons or property.
(2) The remote pilot of a small unmanned aircraft may only fly the aircraft if reasonably satisfied that the flight can safely be made.
(3) The remote pilot of a small unmanned aircraft must maintain direct, unaided visual contact with the aircraft sufficient to monitor its flight path in relation to other aircraft, persons, vehicles, vessels and structures for the purpose of avoiding collisions.
(4) [ ]
(4A) [ ]
(5) The SUA operator must not cause or permit a small unmanned aircraft to be flown for the purposes of commercial operations, and the remote pilot of a small unmanned aircraft must not fly it for the purposes of commercial operations, except in accordance with a permission granted by the CAA.

Article 94A – Small unmanned aircraft: Permissions for certain flights

(1) If the permission or permissions that are required under this article for a flight, or a part of a flight, by a small unmanned aircraft have not been obtained—
(a) the SUA operator must not cause or permit the small unmanned aircraft to be flown on that flight or that part of the flight, and
(b) the remote pilot must not fly the small unmanned aircraft on that flight or that part of the flight.
(2) Permission from the CAA is required for a flight, or a part of a flight, by a small unmanned aircraft at a height of more than 400 feet above the surface.
(3) But permission from the CAA is not required under paragraph (2) if—
(a) the flight, or the part of the flight, takes place in a flight restriction zone at a protected aerodrome, and
(b) permission for the flight, or the part of the flight, is required under paragraph (4) from an air traffic control unit or a flight information service unit.
(4) Permission for a flight, or a part of a flight, by a small unmanned aircraft in the flight restriction zone of a protected aerodrome is required—
(a) from any air traffic control unit at the protected aerodrome, if the flight, or the part of the flight, takes place during the operational hours of the air traffic control unit;

(b) from any flight information service unit at the protected aerodrome, if the flight, or the part of the flight, takes place during the operational hours of the flight information service unit and either

(i) there is no air traffic control unit at the protected aerodrome, or

(ii) the flight, or the part of the flight, takes place outside the operational hours of the air traffic control unit at the protected aerodrome;

(c) from the operator of the protected aerodrome, if—

(i) there is neither an air traffic control unit nor a flight information service unit at the protected aerodrome, or

(ii) the flight, or the part of the flight, takes place outside the operational hours of any such unit or units at the protected aerodrome.

(5) In this article, "operational hours", in relation to an air traffic control unit or flight information service unit, means the operational hours—

(a) notified in relation to the unit, or

(b) set out in the UK military AIP in relation to the unit.

(6) In this article and article 94B, "protected aerodrome" means—

(a) an EASA certified aerodrome,

(b) a Government aerodrome,

(c) a national licensed aerodrome, or

(d) an aerodrome that is prescribed, or of a description prescribed, for the purposes of this paragraph.

(7) The "flight restriction zone" of a protected aerodrome is to be determined for the purposes of this article in accordance with the following table—

Type of protected aerodrome	*The "flight restriction zone"*
A protected aerodrome which is— (a) an EASA certified aerodrome, (b) a Government aerodrome, or (c) a national licensed aerodrome, and which has an aerodrome traffic zone.	The flight restriction zone consists of— (a) the aerodrome traffic zone at the aerodrome, (b) any runway protection zones at the aerodrome, and (c) any additional boundary zones at the aerodrome.
A protected aerodrome which is— (a) an EASA certified aerodrome, (b) a Government aerodrome, or (c) a national licensed aerodrome, but which does not have an aerodrome traffic zone.	The flight restriction zone consists of the airspace extending from the surface to a height of 2,000 feet above the level of the aerodrome within the area bounded by a circle centred on the notified mid-point of the longest runway and having a radius of two nautical miles. But if the longest runway does not have a notified mid-point, the mid-point of that runway is to be used instead for the purposes of determining the flight restriction zone.
A protected aerodrome that is prescribed, or of a description prescribed, under paragraph (6)(d).	The flight restriction zone consists of the zone that is prescribed for the purposes of this paragraph.

Article 94B – Interpretation of expressions used in the definition of "flight restriction zone"

1) This article makes provision about the meaning of expressions used in the definition of "flight restriction zone" in article 94A(7) that applies in relation to a protected aerodrome which is—

(a) an EASA certified aerodrome,

(b) a Government aerodrome, or

(c) a national licensed aerodrome,

and which has an aerodrome traffic zone.

(2) Subject to paragraph (4), there is one runway protection zone for each runway threshold of each runway at the aerodrome.

(3) A "runway protection zone", in relation to a runway threshold at the aerodrome, is the airspace extending from the surface to a height of 2,000 feet above the level of the aerodrome within the area bounded by a rectangle—

(a) whose longer sides measure 5 km,

(b) whose shorter sides measure—

(i) 1 km (except in the case of Heathrow Airport), or; (ii) 1.5 km, in the case of Heathrow Airport, and

(c) which is positioned so that—

(i) one of the shorter sides of the rectangle ("side A") runs across the runway threshold, and

(ii) the two longer sides of the rectangle are parallel to, and equidistant from, the extended runway centre line as it extends from side A out to, and beyond, the runway end to which the runway threshold relates.

(4) There is no runway protection zone—

(a) for any runway threshold at the London Heliport;

(b) for any runway threshold that is prescribed, or of a description prescribed, for the purposes of this paragraph.

(5) The "runway threshold" of a runway at the aerodrome is the location that, for the purpose of demarcating the start of the portion of the runway that is useable for landing, is—

(a) notified as the threshold of the runway, or

(b) set out as the threshold of the runway in the UK military AIP.

(6) The "extended runway centre line", in relation to a runway at the aerodrome, is an imaginary straight line which runs for the length of the runway along its centre and then extends beyond both ends of the runway.

(7) An "additional boundary zone" is the airspace extending from the surface to a height of 2,000 feet above the level of the aerodrome within any part of the area between—

(a) the boundary of the aerodrome, and

(b) a line that is 1 km from the boundary of the aerodrome (the "1 km line"),

that is neither within the aerodrome traffic zone nor within any runway protection zone at the aerodrome.

(8) The 1 km line is to be drawn so that the area which is bounded by it includes every location that is 1 km from the boundary of the aerodrome, measured in any direction from any point on the boundary.

Article 94C – Registration As An SUA Operator

(1) Subject to the following provisions of this article, the CAA must issue a certificate of registration as an SUA operator to a person, or renew that person's certificate of registration as an SUA operator, if the person—

(a)has applied to the CAA in such manner as the CAA may require to be registered as an SUA operator

(b)has supplied such information and evidence as the CAA may require, and

(c)has, in the case of an individual, attained the age (if any) that is prescribed.

(2) Subject to paragraph (3), a certificate of registration may relate—

(a) to a particular description of small unmanned aircraft;

(b) to a particular description of flights by small unmanned aircraft.

(3) No certificate of registration is to be issued in relation to—

(a) small unmanned aircraft with a mass of less than 250 grams without their fuel but including any articles or equipment installed in or attached to the aircraft at the commencement of their flight, or

(b) flights by small unmanned aircraft of that description.

(4) A certificate of registration issued, or renewed, under this article is valid for the period shown on the certificate, subject to—

(a) article 253, or

(b) the SUA operator notifying the CAA, in such manner as the CAA may require, that the SUA operator surrenders the certificate.

(5) The CAA is not required to accept applications for certificates of registration under this article before 1st October 2019.

Article 94D – Requirements For Registration As An SUA Operator

(1) This article applies to a flight by a small unmanned aircraft only if it has a mass of 250 grams or more without its fuel but including any articles or equipment installed in or attached to the aircraft at the commencement of its flight.

(2) The SUA operator must not cause or permit the small unmanned aircraft to be flown unless—

(a) the CAA has issued the SUA operator with a certificate of registration which is valid for that flight at the time of the flight, and

(b) the SUA operator's registration number is displayed on the aircraft in the manner (if any) that is prescribed.

(3) The remote pilot of the small unmanned aircraft must not fly it unless the remote pilot has reasonably formed the view that the SUA operator complies with the requirements in paragraph (2) in relation to that flight.

(4) In this article—

"certificate of registration" means a certificate issued under article 94C;

"registration number" means the ten digit registration number assigned by the CAA in relation to an SUA operator's registration under article 94C

Article 94E – Competency Of Remote Pilots

(1) Subject to the following provisions of this article, the CAA must issue an acknowledgement of competency to an individual, or renew that individual's acknowledgement of competency, if the individual—

(a) has applied to the CAA, in such manner as the CAA may require, for an acknowledgement of competency,

(b) has supplied such information and evidence as the CAA may require,

(c) has undertaken such training as the CAA may require, and (d) has undergone such tests as the CAA may require.

(2) That training or those tests may relate to matters which include—

(a) the practical operation of small unmanned aircraft;

(b) matters connected with the operation of small unmanned aircraft (such as respect for privacy, data protection, safety, security and environmental protection).

(3) Subject to paragraph (4), an acknowledgement of competency may relate—

(a) to a particular description of small unmanned aircraft;

(b) to a particular description of flights by small unmanned aircraft.

(4) No acknowledgement of competency is to be issued in relation to—

(a) small unmanned aircraft with a mass of less than 250 grams without their fuel but including any articles or equipment installed in or attached to the aircraft at the commencement of their flight, or

(b) flights by small unmanned aircraft of that description.

(5) An acknowledgement of competency issued, or renewed, under this article is valid for the period shown on the acknowledgement, subject to article 253.
(6) The CAA may issue an acknowledgement of competency subject to such conditions as it deems appropriate.
(7) The CAA is not required to accept applications for acknowledgements of competency under this article before 1st October 2019.

Article 94F – Requirement for acknowledgement of competency

(1) This article applies to a flight by a small unmanned aircraft only if it has a mass of 250 grams or more without its fuel but including any articles or equipment installed in or attached to the aircraft at the commencement of its flight.
(2) The remote pilot of the small unmanned aircraft must not fly it unless the CAA has issued the remote pilot with an acknowledgement of competency which is valid for that flight at the time of the flight.
(3) The SUA operator must not cause or permit the small unmanned aircraft to be flown unless the SUA operator has reasonably formed the view that the remote pilot of the aircraft complies with the requirements in paragraph (2) in relation to that flight.
(4) In this article "acknowledgement of competency" means an acknowledgement issued under article 94E.**c**

Article 94G – Registration as an SUA Operator

In this Order—
(a) the "remote pilot", in relation to a small unmanned aircraft, is an individual who—
(i) operates the flight controls of the small unmanned aircraft by manual use of remote controls, or
(ii) when the small unmanned aircraft is flying automatically, monitors its course and is able to intervene and change its course by operating its flight controls;
(b) the "SUA operator", in relation to a small unmanned aircraft, is the person who has the management of the small unmanned aircraft. (c)

Article 95 – Small Unmanned Surveillance Aircraft

(1) The SUA operator must not cause or permit a small unmanned surveillance aircraft to be flown in any of the circumstances described in paragraph (2), and the remote pilot of a small unmanned surveillance aircraft must not fly it in any of those circumstances, except in accordance with a permission issued by the CAA.
(2) The circumstances referred to in paragraph (1) are—
(a) over or within 150 metres of any congested area;
(b) over or within 150 metres of an organised open-air assembly of more than 1,000 persons;
(c) within 50 metres of any vessel, vehicle or structure which is not under the control of the SUA operator or the remote pilot of the aircraft; or
(d) subject to paragraphs (3) and (4), within 50 metres of any person.
(3) Subject to paragraph (4), during take-off or landing, a small unmanned surveillance aircraft must not be flown within 30 metres of any person.
(4) Paragraphs (2)(d) and (3) do not apply to the remote pilot of the small unmanned surveillance aircraft or a person under the control of the remote pilot of the aircraft.
(5) In this article, "a small unmanned surveillance aircraft" means a small unmanned aircraft which is equipped to undertake any form of surveillance or data acquisition.

4.5 Methods to determine intended task and feasibility

An initial meeting/discussion with the client is required to determine if an operation is feasible. The company representative should act in a professional manner and work through the content of the pre-deployment survey form with the client. It is vitally important at this stage to establish landowners' permission.

Ideally the meeting should take place at the operation site. If this is not possible then the exact location must be established and Google Earth, SkyDemon Light and aeronautical charts used to assess the feasibility of the operation. Once the company representative and client are satisfied that the operation is possible, all relevant issues surrounding the operation should be agreed with the client.

4.6 Operating Site Planning & Assessment

The RP must carry out a site survey and risk assessment as detailed in the on-site survey form. The operation must not proceed until all relevant areas have been completed and agreed with the client. Consider contacting the landowner for further input into the planning process.

4.7 Communications

If the operation is being carried out in an unfamiliar location, the RP must ensure that he has the contact details for relevant local authorities as detailed in the survey form.

If necessary, the RP should provide his contact details to local authorities such as local ATC. Effective communications may facilitate future safe operations so it is very helpful to keep the local ATC in the loop.

On-site communication between RPs and observers / assistants must be considered using mobile phones / radios etc. Forms of communication should be practiced to ensure that the transfer of information is readily achieved.

4.8 Pre-notification

During the completion of the survey form it should be established if the operation falls into an ATZ or is in proximity to an aerodrome or military installation. If necessary the relevant ATC, authorities and the Police should be contacted to prevent issues during the operation.

Operations near nuclear installations will require special permission. Operations in London may require an enhanced non-standard flight procedure application. This will be coordinated through the NATs online process.

4.9 Site Permissions

Before commencing the operation, the nominated Remote Pilot will obtain permission from all landowners where flight operations are to be conducted on their property.

4.10 Weather

The information from this weather forecast will either be printed and stapled to, or written on the Survey Form. The Remote Pilot will review the weather forecast and based on the aircraft

limitations, will decide on the validity and advisability of the planned flight operations. The client must be informed as soon as possible if flight operations are to be postponed.

Weather should be checked using the Met Office (www.metoffice.gov.uk) and Metcheck (www.metcheck.co.uk) Aeroweather App or other websites.

4.11 On-site Procedures

A flight shall not be commenced until all pertinent pre-flight data has been compiled and the flight deemed safe.
The following forms / actions must be completed before any flight is undertaken:

1. Site Survey.
2. Site Risk Assessment.

See CQNet for current survey and risk assessment forms.

4.11.1 Site survey

A site survey should be carried out and a map generated prior to the operation using the survey form. Any potential hazards should be identified and marked on the map and included in the risk assessment. Access should be agreed and areas identified for parking, equipment assembly and launch. The site should be re-assessed on the day of operation to ensure that there have been no changes.

4.11.2 Selection of operating area and alternate

A safe launch area should be identified and the return-home area for the RPAS cleared and, if necessary, cordoned to avoid people entering it. The technical manual states that with 6 or more satellites DJI flight controllers should have an accuracy of + or – 2 metres. As a result, an area of at least 3 metre radius around the take-off point should be identified and, if necessary, cordoned off. It may be appropriate to use existing boundaries (e.g.) fences as part of this cordon.

4.11.3 Crew briefing

Any support crew and, if appropriate, persons who are to be under the control of the RP must be briefed on site. This should include final allocation of roles, a synopsis of the flight and emergency procedures. If persons under control of the RP are to be overflown they must be made aware of what to do in the event of a loss of control of the craft (see RPAS specific Emergency Procedures in Ops Manual).

The Remote Pilot must cover the criteria listed below. If any crewmembers feel unable to complete their assigned tasks or has reservations about the flight operation, then they must make their concerns known at this briefing:

- Check that all relevant and required crewmembers are present.
- Issue identification badges and fluorescent vests if required
- Advise crew of Take-Off, Landing, Emergency and other Operating areas.
- Confirm flight plan with the crew.
- Advise the crew on timescales (expected flight times, durations and quantities).
- Ensure all crewmembers are aware of their individual responsibilities.
- Ensure crew are familiar with the Emergency Procedures and have emergency contact numbers.
- Ensure Observer is familiar with the failsafe functions.
- Check that the crew are happy to proceed.

- Issue radio communication devices if required and state channel to use.
- Check Cell-phones have adequate signal for emergency use and batteries are charged.
- Night Flying specific procedure.

4.11.4 Crew Clothing

All flight crewmembers, should check the general weather forecast before the planned flight operation and bring suitable protective clothing and footwear to the operating site.

4.11.5 Cordon procedure

The Survey should have identified if a cordon is required but the Remote Pilot will confirm this. If large numbers of the public are expected, a cordon should be established fifty metres around the planned flight path. This cordon should be set out using cones and safety tape. Signs should be placed every ten metres advising members of the public that UAS flight operations are in progress. Extra spotters may be required to be positioned at gates or on public footpaths to advise members of the public about the dangers of entering the area. Gates may be closed and access restricted but spotters may not detain any members of the public or prevent them from accessing public rights of way. They should advise the public on the dangers of entering operational areas.

If the location is set in a more rural area, a local cordon around the take-off and landing area may be utilised, this can be as little as four cones set out into a five metre square.

The Spotter are to ensure that the Observer is made aware of any encroachment from a member of the public. The Observer will in turn advise the Remote Pilot of any encroachments. This process will ensure that the Remote Pilot remains focused on operating the aircraft.

4.12 Aircraft Assembly & Functional Checks

Logs of previous aircraft operations should be checked in advance to establish if any repairs or servicing was carried out, if any is due and further steps as required.

It is the responsibility of the RP to ensure that the RPAS is in a fit state to fly. This will include checking that all batteries are correctly charged for the RPAS, laptop and photographic equipment and that the correct equipment is brought to the site.

4.13 Pre-Flight Checks

4.13.1 On site

Action	Remarks
Carry out On-Site Survey & Risk Assessment.	As per Operations Manual
Daylight Site Walk Through	A site walk through & survey must be carried out in daylight hours before any night operations are conducted
Emergency Landing Area	Confirm location Check area for suitability
Weather Check	Wind speed, direction & temp

Check RPAS Maintenance and Logbook for Serviceability	RPAS Maintenance Document if applicable.
Client/observer Briefing	Brief observer or client on actions to be taken as per briefing list to include; emergencies, pilot incapacitation, RTH and actions of Drone.
Lighting	Ensure all lights as required are working.

4.13.2 Pre-Flight Checks - check list

Action	Remarks
Check Drone for damage.	• Drone body for cracks and cleanliness • Ensure all sensors are free of FOD • Security of attachments
Remove Gimbal lock	Store gimbal lock in rucksack
Check Navigation Lights	Ensure Operational
Check Antennas	Alignment
Check Camera	• Check security • Check lens filter and lens cleanliness • SD Card with sufficient memory fitted
Check Drone motors.	• Rotate freely without resistance • Dampers for signs of wear
Check propellers & fit	Chips, cracks and security
Check TX	• Look for damage • Unfold antenna
IPAD	Connect to RC Controller. Switch on and start App.
Switch on Drone	Call "*CLEAR PROPS"* Ensure battery is securely locked in airframe
Orientate and place Drone	• Check area for FOD • Place > 5m from ground station
Check primary transmitter switches	Flight mode switch to P or ATTI as required
Monitor LEDs on Drone	• Confirm flight mode and GPS status • Blinking Green light matching DJI GO App
Compass calibration	• Perform compass calibration if indicated by APP or if operating at a new location • P-Mode/Calibrate Compass
RTH	Set height to avoid obstacles
Check camera/video quality	
Adjust camera settings	Still or Video - resolution and mode
Check gimbal operation	
Review Mission	

4.13.3 Take off Checks - Expanded check list

Action	Remarks
Confirm weather conditions.	
Switch on Navigational Lights	Ensure operational and Visible
Request ATC take off clearance	If under ATC control
Check Air Space for Other Air Users	Final 360 check by RP and observer
Check landing area clear for take-off	• Assistants >5m • Public >30m

4.13.4 Take Off Checks

Action	Remarks
Check switches	P or ATTI as required
Confirm flight LED status	
Both control sticks to bottom corners	• Call *"CLEAR"* • Drone propellers start at idle speed, check rotor rotation
Take off and climb to 3m	Switch to GPS flight mode if necessary
	• Check control responses • Check camera responses
Commence task	Take last look around and depart

4.13.5 Landing Checks

Action	Remarks
Check landing area clear	Assistants >5m Public >30m
Note wind direction	Strength and gusts
Check switches	P or ATTI as required
Lower undercarriage	Not Applicable
Illuminate Landing Zone	Night Flight Only
Land	Call "*LANDING*""
Swith off UAV and TX	Call "*AIRCRAFT SAFE"* All LEDs extinguished

4.14 Post flight & between flight checks

Post Flight Checks

Action	Remarks
Monitor Motor Temps	If hot, wait until cool before packing
Check Drone for signs of visible damage	Note in airframe log book
Check & remove propellers	Chips and cracks
Check Drone landing gear	Signs of damage
Remove flight battery	Check for: Damage Swelling Excessive heat if hot, allow to cool before packing Loose connectors
Pack Drone away if task complete	Pack and account for all equipment Check area
Complete the required documentation	

4.15 Emergency Procedures

4.15.1 Loss of Control Data Link

Symptom/Issue	Warning	Pilot Action	Crew Action	Remarks
Drone not responding to commands	SUA unresponsive. Poor signal strength. Drone warning LEDs will **flash rapid yellow**	Alert crew to issue. Check height, speed, wind and direction of travel Confirm Failsafe mode Check Tx battery charge Attempt to regain control of the SUA by changing flight mode from its current mode to an alternate and back. Monitor video for location Monitor drone Recover drone	Ensure landing location is clear. Monitor video display (if still functioning). Provide pilot with appropriate updates on status. Call CLEAR	SUA will enter a 'failsafe' mode in this situation after 3 seconds. When failsafe is initiated: If below 20m the SUA will climb to 20m (if already above 20m the SUA will stay at the same height) The SUA will return directly to the launch position, hover for 15 seconds then gradually descend until it lands and the motors will automatically disarm. If SUA re-acquires link at any time the pilot can change the flight mode to regain control of the RPA by cycling the flight mode switch. Pilot must land the RPA as soon as it is safe to do so to investigate the issues. Complete CAP 382 MOR ECCAIRS.
Drone Returning to Home Location	Drone Warning LED will **flash rapid yellow** OSD on iPad will indicate failsafe	Monitor Drone. Call CLEAR (If required) Inform other air users If required.	Monitor Drone. Call CLEAR (If required) Inform Other air users If required.	as above RTH Logic.

4.15.2 Loss of GPS Signal

Symptom/Issue	Warning	Pilot Action	Crew Action	Remarks
Drone will not hold lateral position. Erratic flight behavior.	**Flight mode indication + 3 red LED flashes.**	**Control Drone** **Consider Failsafe or Home Lock functions.** Monitor Drone. Continue with flight with no GPS position hold if confident of safe operation of Drone and operator capability.	Monitor Drone. Call CLEAR (If required) Inform Other Air Users If Required.	GPS signal is not vital. Pilot must not rely on RTH function only. Consider terminating flight

4.15.3 Loss of Drone Power

Symptom/Issue	Warning	Pilot Action	Crew Action	Remarks
L**oss of power (SUA)** due to depleted battery	Uncommanded descent **Rapid red LED flash** due to low voltage condition	**Alert crew** to impending crash. **Attempt to regain control** by changing flight mode switch. If control regained, bring SUA home and land. If control not regained, prepare for crash landing. *Call "CLEAR"* Proceed to crash site if possible Inform local ATC if required Inform emergency services if required	Identify a landmark on the horizon to assist with location of SUA. Monitor video display (if still functioning). Provide pilot with appropriate updates on status. Proceed to crash site if possible Inform local ATC if required Inform emergency services if required	Carry out post-crash management procedure. Complete CAP 382 MOR ECCAIRS.

4.15.4 Loss of Transmitter Power

Symptom/Issue	Warning	Pilot Action	Crew Action	Remarks
Drone Not Responding to Commands	Flashing Rapid Yellow LED	Location, Height, Wind, Direction. **Check Tx battery state and replace, retake control if able.** **If unable:** **Check if Drone has entered failsafe via monitor display.** Monitor Video Imagery and OSD for location Monitor Drone. Call CLEAR if necessary Inform Other Air Users If Required. Recover Drone.	Location, Height, Wind, Direction. Monitor Drone Call CLEAR if necessary Inform Other Air Users If Required.	1. Failsafe mode will initiate after 3 seconds' loss of data link. 2. Drone will ascend to RTH height if currently lower. Default RTH height is set to 20m. If above set RTH height the Drone will return home at this height – no lower. 3. Drone will directly return to Take Off point and hover for 15 seconds. 4. Drone will descend at home position, then lower gear, land and shut down motors. 5). Note: Failsafe mode may be interrupted and control re-gained if signal recovers by switching away from current control mode then back.

4.15.5 Rogue Drone

Symptom/Issue	Warning	Pilot Action	Crew Action	Remarks
SUA is flying without response from Remote Pilot or is uncontrollable	SUA unresponsive	Check Drone has not inadvertently entered failsafe mode. If so follow failsafe checklist. If Drone has un-commanded movement: Enter failsafe mode and switch off transmitter & wait 5 seconds. If Drone continues un-commanded movement beyond 500m. 1). Warn anyone in the close flight path verbally. 2). Telephone local ATC unit. 3). Telephone local police. 4). Telephone any other organization, landowners briefed as part of initial flight safety survey. 5). Using the last known track, approx. speed and remaining endurance information draw a map of possible search area. 6). Organize search using man power available	Identify a landmark on the horizon to assist with identifying direction of flight, from launch area or mark location. Monitor video display (if still functioning). Provide pilot with appropriate updates on status. Take a bearing of the direction of flight. Inform local ATC if required Inform emergency services if required	If available, the operations assistant filming the rogue Drone during its un-commanded movement may provide vital evidence in an accident investigation and for future accident prevention. **Note:** In normal operations the Drone radius limit is set to 500m in the internal software. It is pertinent to wait until the 500m limit is broken by the rogue Drone before contacting the relevant authorities / organizations listed. Complete CAP 382 MOR ECCAIRS.

4.15.6 Pilot Incapacitation

Symptom/Issue	Warning	Pilot Action	Crew Action	Remarks
RP feels unwell, suspects they will soon become incapable of piloting safely	N/A	1). Initiate failsafe mode if able and sit away from the recorded landing area. 2). Call for help from passersby or dial 999.	1). Monitor RP, initiate failsafe mode by following instructions from RP briefing. 2). Administer first Aid, keep RP in the recovery position if required and call for emergency services if situation becomes serious. 3). Clear site after RP has been taken away using the relevant checklist.	When the RP feels ill the priority is to get the Drone on the ground in a safe and timely manner, preferable in the take-off/landing area. 1. Failsafe mode will initiate after 3 seconds' loss of data link. 2. Drone will ascend to RTH height if currently lower. Default RTH height is set to 20m. If above set RTH height the Drone will return home at this height – no lower. 3. Drone will directly return to Take Off point and hover for 15 seconds. 4. Drone will descend at home position, then lower gear, land and shut down motors. 5). Note: Failsafe mode may be interrupted and control re-gained if signal recovers by switching away from current control mode then back.

4.15.7 Airspace Incursion

Symptom/Issue	Warning	Pilot Action	Crew Action	Remarks
RP notices another airspace user entering the task area	**N/A**	**In flight:** Hold position and monitor other airspace user. If other Drone is on a collision course adjust height and position to avoid collision. If required, bring Drone back to the take-off / landing area if safe to do so. **On ground:** Hold position, take precautions necessary incase other airspace user flies within close proximity of the take-off / landing zone.	**In flight:** Monitor other airspace user and give any position / direction help to RP as required. If safe to do so, approach other airspace user RP and ask them their task and duration. Note details of other user for Airprox report. **On ground:** Monitor other airspace user and give any position / direction help to RP as required. Prepare for other airspace user Drone to fly within close proximity of the take-off / landing area. If safe to do so, approach other airspace user RP and ask them their task and duration.	The other airspace user may be oblivious to the presence of the commercial operation taking place so it must be assumed they may fly within close proximity of the take-off / landing area including the RP and operations staff. Submit CA1094 Airpox reporting form if required.

4.15.8 Drone Fire

Symptom/Issue	Warning	Pilot Action	Crew Action	Remarks
Drone Fire	**N/A**	**In flight:** If time permits, land Drone as soon as safely possible in designated landing zone. Adjust flight path as not to fly over any combustible materials i.e. dry grass etc. If no risk of explosion, administer fire extinguisher and cover Drone with fire blanket. **On ground:** If no risk of explosion, administer fire extinguisher and cover Drone with fire blanket.	**In flight:** Verbally warn any spectators / pedestrians in the Drone area to keep clear of landing zone. Put on safety glasses / fire gloves & prepare fire extinguisher and blanket ready to be deployed. Cordon off crash area if time available after landing.	A battery fire may lead to an explosion. A fire and /or explosion will give off toxic fumes that may render the RP & Operations Assistant unconscious. Only tackle the fire if you are sure that no risk of explosion or fume inhalation is present. If in doubt, and the grounded Drone is not a risk to its surroundings it can be left to burn out. Dispose of battery in accordance with safety guidelines Reportable accidents will be reported using the ECCAIRS European Reporting Portal.

4.15.9 Section 9 – Loss of Navigation Lights (at night)

Symptom	Warning	Pilot Action	Crew action	Remarks
Loss of Navigation Lights	**N/A**	**In flight:** Centralise control levers and enter a GPS mode hover. Yaw SUSA slowly if integral LED flash is not visible until LED visible. Enter 'Home Lock' and fly SUSA directly back to landing area. Land and diagnose fault. If LED not visible enter RTH and ensure SUSA is illuminated by torch. **On ground:** Do not take-off	**In flight:** Verbally warn any spectators / pedestrians in the RPA area to keep clear of landing zone. Call CLEAR LANDING Shine torch in direction of SUSA initially to help find its location. Follow RP instructions. Illuminate SUSA on its route home if RP cannot see any lighting from SUSA.	

5 Appendix

5.1 Technical Specifications – Phantom 4 Pro

AIRCRAFT

Weight (Battery & Propellers Included)	1388 g
Diagonal Size (Propellers Excluded)	350 mm
Max Ascent Speed	S-mode: 6 m/s P-mode: 5 m/s
Max Descent Speed	S-mode: 4 m/s P-mode: 3 m/s
Max Speed	S-mode: 45 mph (72 kph) A-mode: 36 mph (58 kph) P-mode: 31 mph (50 kph)
Max Tilt Angle	S-mode: 42° A-mode: 35° P-mode: 25°
Max Angular Speed	S-mode: 250°/s A-mode: 150°/s
Max Service Ceiling Above Sea Level	19685 feet (6000 m)
Max Wind Speed Resistance	10 m/s
Max Flight Time	Approx. 30 minutes
Operating Temperature Range	32° to 104°F (0° to 40°C)
Satellite Positioning Systems	GPS/GLONASS
Hover Accuracy Range	Vertical: ±0.1 m (with Vision Positioning) ±0.5 m (with GPS Positioning) Horizontal: ±0.3 m (with Vision Positioning) ±1.5 m (with GPS Positioning)

VISION SYSTEM

Vision System	Forward Vision System Backward Vision System Downward Vision System
Velocity Range	≤31 mph (50 kph) at 6.6 ft (2 m) above ground
Altitude Range	0 - 33 feet (0 - 10 m)
Operating Range	0 - 33 feet (0 - 10 m)

GIMBAL

Stabilization	3-axis (pitch, roll, yaw)
Controllable Range	Pitch: -90° to +30°
Max Controllable Angular Speed	Pitch: 90°/s
Angular Vibration Range	±0.02°

INFRARED SENSING SYSTEM

Obstacle Sensory Range	0.6 - 23 feet (0.2 - 7 m)
FOV	70° (Horizontal), ±10° (Vertical)
Measuring Frequency	10 Hz
Operating Environment	Surface with diffuse reflection material, and reflectivity > 8% (such as wall, trees, humans, etc.)

REMOTE CONTROLLER

Operating Frequency	2.400 - 2.483 GHz and 5.725 - 5.825 GHz
Max Transmission Distance	2.400 - 2.483 GHz (Unobstructed, free of interference) FCC: 4.3 mi (7 km) CE: 2.2 mi (3.5 km) SRRC: 2.5 mi (4 km) 5.725 - 5.825 GHz (Unobstructed, free of interference) FCC: 4.3 mi (7 km) CE: 1.2 mi (2 km) SRRC: 3.1 mi (5 km)
Operating Temperature Range	32° to 104°F (0° to 40°C)
Battery	6000 mAh LiPo 2S
Transmitter Power (EIRP)	2.400 - 2.483 GHz FCC: 26 dBm CE: 17 dBm SRRC: 20 dBm MIC: 17 dBm 5.725 - 5.825 GHz FCC: 28 dBm CE: 14 dBm SRRC: 20 dBm MIC: -
Operating Current/Voltage	1.2 A@7.4 V

5.2 Technical Specifications – M200

AIRCRAFT

Model	M200
Package Dimensions	31.1×15.4×11.4inch (790×390×290mm)
Dimensions (unfolded)	34.9×34.6×14.9 inch (887×880×378 mm)
Dimensions (folded)	28.2×8.7×9.3 inch (716×220×236 mm)
Folding Method	Folded Inward
Diagonal Wheelbase	25.3 inch (643 mm)
Number of Batteries	2
Weight (TB50)	Approx. 3.80 kg
Weight (TB55)	Approx. 4.53 kg
Max Takeoff Weight	6.14KG
Max Payload (2 TB50)	Approx.2.34kg (with two standard batteries)
Max Payload (2 TB55)	Approx.1.61kg (with two standard batteries)
Hovering Accuracy (P-mode with GPS)	Vertical: ±1.64 feet (0.5m) or ±0.33 feet (0.1m, Downward Vision System enabled) Horizontal: ±4.92 feet (1.5m) or ±0.98 feet (0.3m.Downward Vision System enabled)
Max Angular Velocity	Pitch: 300° /s；Yaw: 150° /s
Max Pitch Angle	P Mode: 30°（Forward Vision System enabled: 25°）；A Mode: 35°；S Mode: 35°
Max Ascent Speed	16.4 ft/s (5 m/s)
Max Descent Speed	Vertical: 9.8 ft/s (3 m/s)
Max Speed	S Mode: 51.4mph (82.8kph) P Mode: 38mph (61.2kph) A Mode: 51.4mph (82.8kph)
Max Service Ceiling Above Sea Level	1.86 mi (3000 m)
Max Wind Resistance	39.4 ft/s (12 m/s)
Max Flight Time(No Payload, with TB50)	27min
Max Flight Time(No Payload, with TB55)	38min
Max Flight Time(Full Payload, with TB50)	13min
Max Flight Time(Full Payload, with TB55)	24min
Motor Model	DJI 3515
Propeller Model	1760S
Operating Temperature	-4° to 113° F (-20° to 45° C)
IP Rating	IP43

GIMBAL

Compatible Gimbals	Zenmuse X4S Zenmuse X5S Zenmuse Z30 Zenmuse XT Zenmuse XT2 SLANTRANGE 3PX Sentera AGX710

REMOTE CONTROLLER

Model	GL6D10A
Operating Frequency	2.400-2.483 GHz 5.725-5.850 GHz
Max Transmitting Distance(unobstructed, free of interference)	2.4 GHz: 4.3 miles (7 km, FCC); 2.2 miles (3.5 km, CE); 2.5 miles (4 km, SRRC) 5.8 GHz: 4.3 miles (7 km, FCC); 1.2 miles (2 km, CE); 3.1 miles (5 km, SRRC)
EIRP	2.4 GHz: 26 dBm (FCC); 17 dBm (CE); 20 dBm (SRRC) 5.8 GHz: 28 dBm (FCC); 14 dBm (CE); 20 dBm (SRRC)
Video Output Ports	USB, HDMI
Power Supply	Built-in battery
Charging	DJI charger
Dual User Capability	Host-and-Slave connection
Mobile Device Holder	Tablet or Smart Phone
Max Mobile Device Width	170 mm
Output Power	9 W (Without supplying power to smart device)
Operating Temperature	-4° to 104° F (-20° to 40° C)
Storage Temperature	Less than 3 months: -4° to 113° F (-20° to 45° C) More than 3 months: 72° to 82° F (22° to 28° C)
Charging Temperature	32° to 104° F (0° to 40° C)
Battery	6000mAh 2S LiPo
USB Supply Power	iOS: 1 A @ 5.2 V (Max); Android: 1.5 A @ 5.2 V (Max)

BATTERY (OPTIONAL)

Model	TB55
Capacity	7660 mAh
Voltage	22.8V
Battery Type	LiPo 6S
Energy	174.6Wh

5.3 Technical Specifications – M600

STRUCTURE

Diagonal Wheelbase	1133 mm
Aircraft Dimensions	• 1668 mm x 1518 mm x 759 mm (Propellers, frame arms and GPS mount unfolded) • 640 mm x 582 mm x 623 mm (Frame arms and GPS mount folded)
Package Dimensions	620 mm x 320 mm x 505 mm
Intelligent Flight Battery Quantity	6
Weight (with six TB47S batteries)	9.1 kg
Weight (with six TB48S batteries)	9.6 kg
Max Takeoff Weight	15.1 kg

PROPULSION SYSTEM

Motor Model	DJI 6010
Propeller Model	DJI 2170

OTHER

Supported DJI Gimbals	Zenmuse X3; Zenmuse X5 series; Zenmuse XT; Ronin-MX; Zenmuse Z15 series HD gimbals: Z15-A7, Z15-BMPCC, Z15-5D III, Z15-GH4
Retractable Landing Gear	Standard
Operating Temperature	14° to 104° F (-10° to 40° C)

CHARGER

Model	A14-100P1A
Voltage Output	26.3 V
Power Rating	100 W

BATTERY (OPTIONAL)

Model	TB48S
Capacity	5700 mAh
Voltage	22.8 V
Type	LiPo 6S
Energy	129.96 Wh

PERFORMANCE

Hovering Accuracy (P-Mode, with GPS)	Vertical: ±0.5 m, Horizontal: ±1.5 m
Max Angular Velocity	Pitch: 300°/s, Yaw: 150°/s
Max Pitch Angle	25°
Max Speed of Ascent	5 m/s
Max Speed of Descent	3 m/s
Max Wind Resistance	8 m/s
Max Flight Altitude above Sea Level	2500 m
Max Speed	18 m/s (No wind)
Hovering Time (with six TB47S batteries)*	No payload: 35 min, 6 kg payload: 16 min
Hovering Time (with six TB48S batteries)*	No payload: 40 min, 5.5 kg payload: 18 min * The hovering time is based on flying at 10 m above sea level in a no-wind environment and landing with 10% battery level.

FLIGHT CONTROL SYSTEM

Model	A3

REMOTE CONTROLLER

Operating Frequency	• 920.6 MHz to 928 MHz (Japan) • 5.725 GHz to 5.825 GHz • 2.400 GHz to 2.483 GHz
Max Transmission Distance (unobstructed, free of interference)	• FCC Compliant: 3.1 miles (5 km) • CE Compliant: 2.1 miles (3.5 km)
EIRP	• 10 dBm @ 900 M/li> • 13 dBm @ 5.8 G • 20 dBm @ 2.4 G
Video Output Port	HDMI, SDI, USB
Dual Users Capability	Master-and-Slave control
Mobile Device Holder	Supports smartphones and tablets
Output Power	9 W
Operating Temperature	14° to 104° F (-10° to 40° C)
Storage Temperature	• Less than 3 months: -4° to 113° F (-20° to 45° C) • More than 3 months: 72° to 82° F (22° to 28° C)