

UAS Operations Manual

As employed by

Tom Baker



T O M B A K E R
photography

This Operations Manual must be used in conjunction with a Quick Reference Handbook (QRH) appropriate to the UAS being used.

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PART A: SAFETY AND OPERATIONS MANAGEMENT

A1: Acronyms and Definitions (that may be seen in this Operations Manual or related documents)

Acronym	Definition
Authorised Representative (AR)	Has overall responsibility for operations and is point of contact with the CAA.
AGL	Above ground level – referring to height in feet
AMSL	Above mean sea level – referring to altitude in feet
ANO	Air Navigation Order
ATC	Air Traffic Control
ATZ	Aerodrome Traffic Zone
CAA	Civil Aviation Authority
Congested area	In relation to a city, town or settlement; congested area means any area which is substantially used for residential, industrial, commercial or recreational activities.
ECCAIRS	European Co-ordination Centre for Accident and Incident Reporting Systems
ESC	Electronic speed controller
EVLOS	Extended Visual Line of Sight
GPS	Global positioning system
IMU	Inertial Management Unit
MOR	Mandatory Occurrence Report
MTOM	Maximum take-off mass
NOTAM	Notice to Airmen
OC	Observer/Crew: An individual, deemed competent by the Remote Pilot, whose main role is to assist the RP to maintain VLOS on the UAS and to monitor the surrounding area for aerial and ground incursions.
OpA	Operational Assessment

Operations Manager (OM)	The Operations Manager is responsible for the day-to-day planning of flight operations.
Payload operator (PO)	Person with responsibility for operation of the aircraft payload
PfCO	Permission for Commercial Operations
RP	See Remote Pilot
PPE	Personal Protective Equipment (hard hat, high visibility jacket etc.)
QRH	The Quick Reference Handbook contains information pertinent to each UAS type employed by The SUA Operator
Remote Pilot (RP)	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.
RTH	Return to home system employed by the UAS in case of Tx signal loss or used manually in the event of RP incapacitation
Rx	Receiver
SUA	Small Unmanned Aircraft
SUA Operator	The legal entity ("person") holding the Permission for Commercial Operations (PfCO) held in Appendix D.
SUSA	Small Unmanned Surveillance Aircraft
Technical Manager	The technical manager has responsibility for maintaining the UAS in an airworthy state.
Tx	Transmitter
UAS	Unmanned aircraft system
VLOS	Visual line of sight

A2: Referenced Documents

1. [CAP 393: Air Navigation: The order and the regulations \(version 5.3 27/03/2018\)](#)
2. [CAP 1687: The Air Navigation \(Amendment\) Order 2018 - Guidance for small unmanned aircraft users](#)
3. [CAP 722: Unmanned Aircraft System Operations in UK Airspace – Guidance \(6th edition 24/03/2015\)](#)
4. [CAP 382: The Mandatory Occurrence Reporting Scheme \(10th edition 12/2016\)](#)
5. [EU 2015/1018: EU mandatory reporting guidance \(29/06/2016\)](#)

A3: Legal Entity Details

A3.1: Legal Entity (The SUA Operator)

Legal entity name: Tom Baker

Insurance Information:

The SUA Operator has 3rd Party Public Liability Insurance as outlined in **Appendix E**.

A3.2: Commitment of Authorised Representative

Tom Baker is committed to operating Unmanned Aircraft Systems (UAS) safely in UK airspace in line with this operations manual and any CAA permission granted. Tom Baker will ensure that operating procedures and equipment are fit for purpose and used appropriately. Tom Baker will ensure that all personnel are appropriately trained before being allowed to operate UAS on commercial operations.

Signed:



Authorised Tom Baker

Representative:

Owner

For and on behalf of: Tom Baker

Enquiries regarding the content of this document should be addressed to:

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A3.3: Purpose

The purpose of this document is to detail the items to be covered for the safe operation of UAS by Tom Baker personnel. From this point forwards, Tom Baker will be referred to as "The SUA Operator".

A3.4: Scope

This operations manual applies to all personnel involved in the safe operation of UAS.

A3.5: Nominated Personnel

Name	Roles (see A6 for descriptions)
Tom Baker	AR, OM, TM, RP, PO, OC

RPs	Practical Certification MTOM and class
Tom Baker	0-20 Kg Helicopter/Multicopter

A4: Safety

A4.1: Safety policy

The SUA Operator will use UAS commercially, in accordance with the operating procedures detailed in this Operations Manual and the PfCO issued by the CAA (appendix D). The SUA Operator will follow the rules of the air detailed in the relevant CAA documentation (CAP393 (specifically articles 94, 94A-G, 95 and 241 and CAP 722)) and ensure EC 785/2004 compliant insurance is in place to cover activities carried out under the PfCO.

A4.2: Safety goals

The SUA Operator aims to carry out UAS operations in a way that minimises the risk of damage to property or injury to persons.

The goal of the SUA Operator is zero reportable occurrences.

All Remote Pilots must ensure that they are familiar with the contents of this manual and adhere to all operational, risk assessment, logging and reporting procedures contained in this manual. This manual must be available for reference along with the appropriate QRH for use in operations.

A4.3: Safety assurance

The Authorised Representative has overall responsibility for the safety of all UAS operations and acts as the first point of contact with the CAA.

The Operations Manager is responsible for organisation of operations and ensuring that safety guidelines have been followed up to the point of deployment.

The Technical Manager is responsible for ensuring that the UAS is airworthy at the point of deployment.

The RP is responsible for safety during UAS operations.

Specific responsibilities of the Authorised Representative, Operations Manager, Technical Manager, Remote Pilot and Observer/Crew are detailed in section A6.

A4.4: Safety training

The SUA Operator will actively train its staff in safety requirements and procedures required for UAS operations and will retain a record of all internal and external training conducted.

A5: Document control and amendment procedure

The most up-to-date electronic version of all manuals will be held in a folder accessible to all personnel involved in UAS operations.

The most up-to-date paper version of all manuals will be held in an Operations Documents folder if paper versions are kept.

Revisions must be approved by the Authorised Representative.

A6: Responsibilities

A6.1: Authorised Representative (AR)

The Authorised Representative has overall responsibility for the safety of all UAS operations and acts as the first point of contact with the CAA.

A6.2: Operations Manager (OM)

The operations manager is responsible for the organisation of operational requirements including:

1. Liaison with clients and landowners
2. Liaison with other entities to ensure that safety guidelines are met
3. Deployment of an appropriately experienced RP for the operation

A6.3: Technical Manager (TM)

The technical manager is responsible for maintaining operational capability of the UAS used by The Operator, including:

1. Coordinating UAS maintenance routines.
2. Ensuring logs and records are maintained up-to-date.
3. Carrying out aircraft firmware updates.

A6.4: Remote Pilot (RP)

The RP has full responsibility for safe operation of the UAS whilst on operations. With reference to this Operations Manual, the RP's responsibilities include:

1. Ensuring a site survey and risk assessment are in place
2. Taking responsibility for the go/no go decision for each operation
3. Ensuring that appropriate permissions have been obtained and CAA regulations are adhered to
4. Ensuring that risk assessments have been completed and approved
5. Defining safe working areas and cordoning if necessary
6. Deployment of appropriate support crew to facilitate the operation
7. Liaison with crew, client and public before flight to brief fully and ensure that they understand the need to be compliant with requests or orders of the RP.
8. Pre-flight aircraft checks
9. Flight procedures
10. Post-flight checks
11. Operating the UAS in a safe, responsible and professional manner
12. Completing all logs and documentation
13. On completion, correct shutdown the UAS and equipment and checking site to ensure all equipment is collected and the site is left as found
14. Incident management as detailed in **QRH section F11**
15. Reporting of incidents as detailed in section **A13**

A6.5: Payload Operator (PO)

1. To carry out reasonable duties as requested by the RP.
2. To assist the RP in ensuring the aircraft payload is correctly set up and secure
3. To assist the RP with pre-flight checks
4. To operate the payload for the duration of the flight where required
5. To assist the RP with post-flight checks

A6.6: Observer/Crew (OC)

1. To carry out reasonable duties as requested by the RP
2. To remain under the control of, and in communication with, the RP at all times during flight, observing the airspace and public to facilitate the flight operation.
3. To inform the RP of any airspace incursion or any issues with public entering the flight area.
4. To assist the RP with briefing and controlling crew members and the public.
5. To assist the RP with the preparation, checks and repacking of the UAS.

A7: Aircraft system and technical description

For clarity, technical and operational details specific to individual aircraft types are maintained in the corresponding aircraft **QRH** which are contained in appendix F.

A8: Types of Operation

The SUA Operator will carry out commercial operations. The RP should ensure that the UAS is appropriate to the operation.

Potential areas of operation include anywhere in the UK as long as operations are carried out in accordance with the ANO and the PfCO (**appendix D**).

A9: Operating limitations and conditions

Unless exempted, or additionally limited in the PfCO, the following conditions will apply:

Vertical distance: Within VLOS to a maximum of 4500ft AMSL (maximum height 400ft AGL)

Horizontal distance: Within VLOS to a maximum of 500m from the RP

A10: Software and firmware update policy

Firmware and associated flight software will be updated in line with manufacturer recommendations. Firmware updates will be overseen by the Technical Manager. After updates, the aircraft will be flown at a test location to ensure that any updates have not affected the operational performance of the aircraft. The Technical Manager will ensure that all Remote Pilots are aware of changes caused by firmware updates.

A11: Maintenance principles and regime

The UAS will be inspected by the RP using the procedures in the appropriate **QRH** before and after every flight. Routine maintenance will be carried out by the Technical Manager.

Maintenance regimes will be different for individual aircraft and are detailed in the Maintenance File in **Section M of the QRH**. Each QRH must have a maintenance regime that includes details for maintenance of the following, as a minimum:

- Airframe
- Lift surfaces and/or control surfaces
- Propulsion systems
- Payload
- Electronics

Other systems appropriate to individual aircraft as detailed in the **QRH**

Regular maintenance will be logged and parts replaced/repared as appropriate.

A12: Supervision of UAS operations

The RP has full responsibility for supervising UAS operations.

The RP should ensure that the procedures in the appropriate QRH are used at relevant stages of operations to ensure that all steps are followed.

A13: Incident investigation and MOR / ECCAIRS procedures

Any significant incidents that occur during an operation must be logged. If necessary, incidents must be reported to the CAA using the guidance in CAP 382 (Mandatory Occurrence Reporting). With reference to Section 5 Chapter 7 of CAP 722 it is important that all incidents that occur during flight are logged and, if necessary reported to the CAA, using the contact details in chapter 7 of CAP 722.

Incidents that are likely to need reporting include "any incident which endangers or which, if not corrected, would endanger an aircraft, its occupants or any other person"

Examples are included in CAP 382 "The Mandatory Occurrence Reporting Scheme" and EU 2015/1018 Annex 5. In short, any occurrence relating to the UAS operation that results in injury or the potential of injury to crew members, client or members of the public should be reported. Any occurrence resulting in a collision or near miss with another aircraft should be reported.

Reporting can be completed through the ECCAIRS system at: <http://www.aviationreporting.eu>

A14: Flight team composition

For most operations, the flight team will compose of the RP. If correctly briefed, any person(s) judged competent by the RP may act as Observer/Crew.

The role of the Observer/Crew will be directed by the RP and will depend on the circumstances of the operation. Observer/Crew, when used, must be briefed by the RP before the first flight of the operation in accordance with the appropriate QRH.

If a Payload Operator is used, they must be fully briefed in the failsafe systems of the UAS and how to initiate failsafe in the event of the RP becoming incapacitated. The Payload Operator must follow the instructions of the RP. They may give instructions to the RP to enable them to obtain the data they require; it is the responsibility of the RP to ensure that manoeuvres requested by the Payload Operator are able to be safely carried out.

A15: Operation of multiple UAS

If multiple aircraft are flown during a single operation, a RP must be nominated to have oversight of the operation and each aircraft must have a dedicated Remote Pilot.

A16: Crew competency requirements

All Remote Pilots must have evidence of theoretical competency and practical competency for the type of aircraft they are operating. RPs must operate only in accordance with The SUA Operator's PfCO (see Appendix D). RPs must have completed familiarisation training on the use of the UAS, to ensure familiarity with all settings and failsafe options.

A17: Crew Health

If any member of crew does not feel they are fit for operations then they must inform the RP as soon as possible. If the RP does not feel physically and mentally fit to carry out flights then the operation must be postponed. The RP must not operate the UAS under the influence of alcohol or recreational drugs. If necessary, medical advice should be obtained before operating the UAS whilst using prescription drugs.

A18: Logs and records

Logs and records should be kept to ensure compliance with the PfCO.

The Site survey and risk assessment (Appendix B) must be completed by the RP. This includes site information and survey, operational details, risk assessment and permissions.

A log must be maintained giving details of flight times, RP, UAS and incidents. Online logging is acceptable as long as it records the above details

PART B: OPERATING PROCEDURES

B1: Flight planning and preparation

The tasks in B1 should be ideally carried out before the day of the operation and may need significant time to implement depending on the complexity of the operation.

B1.1: Determination of the intended tasks and feasibility

Feasibility of all potential operations should be assessed against:

1. The current PfCO
2. The operational envelope of the UAS (see **QRH**)
3. Other applicable legislation

Appendix A can be used to assist with determining feasibility.

B1.2: Operating site location and assessment

The RP must carry out a site survey and risk assessment as detailed in appendix B. The operation must not proceed until all relevant areas have been completed.

B1.3: Risk management

A full risk assessment must be completed using the procedure in appendix B. This should be as specific to the site as possible. Whilst there is always a degree of acceptable risk, this should be minimized to ensure the operation is as safe as possible.

B1.4: Advance communications

Relevant authorities and other relevant local bodies who need to be advised of the operation to be identified in appendix B.

B1.5: Airspace check and pre-notification

During the completion of the site survey and risk assessment it should be established if the operation falls into controlled airspace, flight restriction zones or prohibited, restricted or danger areas. If necessary, the relevant ATC, local authorities and the Police should be contacted and provided with contact details to prevent issues during the operation. ATC and CAA permission may be required for flights in flight restriction zones and reference should be made to article 94B of ANO (2018).

B1.6: Site permission

Before commencing the operation, the Remote Pilot must be satisfied that all relevant permissions have been obtained. RPs must be aware of their responsibilities regarding operations from private land and any requirements to obtain the appropriate permission before operating from a particular site. In particular, they must ensure that they observe the relevant trespass laws and do not unwittingly commit a trespass whilst conducting a flight.

B1.7: Advance weather check

Detailed weather forecasts ideally should be checked before the day of the operation. If necessary, the flight should be postponed. Even if the operation involves a fixed-date event the RP should not feel pressured to continue if it is felt that safety is being compromised. Weather should be checked using an appropriate and accurate weather service.

B1.8: NOTAM check

NOTAMs should be checked using www.notaminfo.com or an appropriate app. Any relevant NOTAMs should be noted and, if necessary, clarified with local ATC.

B1.9: Preparation and serviceability of equipment and UAS

The pre-deployment checklist in section F6 of the aircraft QRH should be used to ensure the equipment has been fully checked prior to commencing the operation.

B2: On Site Procedures and Pre-flight Checks

Section B2 involves the use of appendix B along with the checklists in the aircraft QRH.

B2.1: Site survey

A site survey should be carried out to confirm the findings of the initial risk assessment. Any additional hazards should be identified and included in the risk assessment. Access should be agreed and areas identified for parking, equipment assembly and launch.

B2.2: Selection of operating area and alternate landing areas

A safe launch area should be identified and the RTH area for the UAS cleared and, if necessary, marked to avoid people entering it. An area appropriate to the UAS take-off and landing requirements (minimum 3 metres) around the take-off point should be identified and, if necessary, cordoned appropriately. It may be appropriate to use existing boundaries (e.g. fences) as part of this cordon.

The RP should clearly identify the operating area and any safe alternative landing areas.

B2.3: Observer/Crew briefing

Any Observer/Crew and, if appropriate, persons who are to be under the control of the RP must be briefed on site by the RP before the first flight of the operation in accordance with the appropriate QRH. 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 aircraft.

B2.4: Cordon procedure

In the event of an operation that involves members of the public it is best practice to use at least one member of Observer/Crew. If it is possible to cordon a launch area this may be done using appropriate materials. At launch the UAS must be at least 30 metres from any person not under control of the RP and after launch, 50 metres. If a cordon is not used, sufficient crew must be employed to maintain the landing areas clear at all times.

The Observer/Crew should ensure that members of the public do not enter the landing area and that the RP is not disturbed during flight.

B2.5: Operational Communications

If appropriate, communications should be maintained with local ATC. It is best practice to notify the ATC before the operation and after all flights are complete.

Communications with Observer/Crew will normally take place face to face. If the distance between crew members is too great to facilitate this, an appropriate and legal two-way radio system must be used.

B2.6: Final weather checks

The RP and any Observer/Crew should be vigilant for any changes in weather which should be checked on the day of operation using an appropriate and accurate weather service. A final wind speed check should be carried out using an anemometer if appropriate.

B2.7: Battery changes and charging

Batteries should be changed as appropriate to allow a reasonable amount of redundancy in the event of an incident. Battery and fuel management specific to the UAS is contained in the QRH where necessary.

On battery replacement, the UAS should be given a brief pre-flight check before a new flight is started.

B2.8: Preparation and assembly of the UAS

The UAS must be carefully assembled and checked using the pre-flight checklist in section F7 of the QRH. If necessary, reference should be made to the UAS manual. The RP will have been trained in correct assembly and should recheck the UAS between flights.

B2.9: Loading of equipment on the UAS

Equipment to be loaded onto the UAS should be carefully attached in line with the manufacturer's guidelines and the training received on the different configurations of the UAS. This will include correct connection of the payload mount to the airframe and flight computer as well as correct connection of the payload to the mount. Secondary fixings for payloads should be used where appropriate to ensure that the payload cannot separate from the aircraft.

All equipment should be checked for functionality before the operation commences. The centre of gravity of the aircraft must be checked before the operation commences.

B3: Flight Procedures

Flight procedures for each UAS used by The SUA Operator are contained in section F8 of the QRH for that aircraft type in Appendix F.

B4: Emergency Procedures

Emergency procedures appropriate to each UAS used by The SUA Operator are contained in section F10 of the QRH for that aircraft type in Appendix F.

B4.1: Fire

The RP must have access to some form of firefighting equipment or an appropriate procedure if firefighting equipment is not available or not permitted. If the UAS is damaged in a crash the flight battery, if possible, must be disconnected, removed and placed in an open area away from flammable objects. The battery should be monitored for swelling and the crew warned to stay clear. In the event of a fire, the extinguisher/blanket should be used to minimize spread of flame. If an extinguisher/blanket is not available or not permitted then the fire services should be contacted. If possible the battery should be allowed to burn itself out.

B4.2 Incident management

In the event of an incident the RP should follow the emergency procedures in section F11 of the aircraft QRH.

Part C: Additional Operating Procedures

C1: Night operation procedures

C1.1: Overview

When an operation is required outside of daylight hours an additional set of procedures as outlined in this section will be adhered to. Please note these are in addition to the standard procedures outlined in this manual. All night operations will be flown by Line of Sight. Before all night operations, a daylight recce must be carried out.

C1.2: Adequate Ground Lighting

Lighting in the set up area will be provided by work lamps. All ground equipment (and the UAS during pre-flight checks) will be kept in the set up area to ensure that it does not become a safety hazard or inadvertently damaged.

The primary and the alternative landing zone will be marked out with appropriate lighting where necessary. The area around the landing zones will be illuminated with work lamps where ambient lighting is not sufficient.

C1.3: Ground Safety

If the area around the landing zone does not naturally restrict access then a cordon will be erected.

Apart from the RP there will be at least one additional ground crew to ensure that no unauthorised persons are near the UAS during take-off and landing. Additional Observer/Crew will be used if deemed necessary following the site assessment.

C1.4: Flight Paths

Given the night conditions, the flight paths will be planned during daylight hours at the site assessment. The flight paths should be maintained as simple as possible

C1.5: Lighting for night Operations

Any aircraft used for night operations will be illuminated. The standard aircraft illumination may be sufficient but extra LEDs may be employed to increase visibility to the Remote Pilot.

The illumination is present to assist the RP with orientation and flight rather than to enable other air users to see the UAS. In the event of an airprox incident it is likely that a pilot would perceive the UAS as a distant aircraft. As a result, standard operating procedures for spotting other air users are of utmost importance during night operations.

Appendices

Appendix A: Initial Feasibility Check

INITIAL FEASIBILITY FORM	
Main Contact Details	
Name	
Company	
Address	
Postcode	
Telephone	
Mobile phone	
Email	

Site Details	
Site address (if different to above)	
Postcode	
Permissions	
Brief description of site	

Operation Overview	
Brief description of operation	

Operation Details	
Detailed description of operation requirements and tasks	
Timescale of operation (fixed date, variable date)	
Additional Notes	

Potential Hazards and Risks	
Description of Potential Hazards and Risks	

Feasibility	
Are requirements in section B1.1 of the Operations Manual met?	Check
Operation is feasible under the terms of the SUA Operator's PfCO	
Operation is within the operational envelope of the UAS to be used	
Operation is feasible under other applicable legislation	

If the above conditions are met the full Site Survey and Risk Assessment must be completed before the operation is carried out.

Appendix B: Site Survey and Risk Assessment

SITE SURVEY FORM	
1) Operation Details	
Name/Company	
Reference No.	
Planned Date(s) and times	

2a) Site Inspection			
Site address			
Postcode or 6 figure grid ref.		Elevation (AMSL)	
Latitude		Longitude	

<p>Paste map of general area below to identify major hazards (towns, ATZ etc.)</p>

Site Details

Paste detailed site map (where flights will take place) below. Mark to show obstacles, hazards, public access, parking, objective, proposed take-off area and secondary landing areas and any other points of interest. Mark any areas that need to be cordoned. Add risks to risk assessment if appropriate (see below).

Required Equipment	
Aircraft	
Payload	
Extra Equipment (in addition to the standard equipment as specified in the QRH relating to the above aircraft)	

Final Checks			
Weather Forecast		Date Checked	
Airspace details		Date Checked	
NOTAMs		Date Checked	
Permission Details (ATC, Location other authorities)			

RISK ASSESSMENT FORM				
Risk Matrix Legend				
Probability:		Severity:		
5	Very Likely	5	Fatality	Major Env. Incident
4	Likely	4	Major Injury	Severe damage
3	Probable	3	Medical Injury	Damage
2	Possible	2	Minor Injury	Small Impact
1	Very Unlikely	1	No Injury	No Env. Impact

The risk score, the value entered into the green, yellow or red boxes under Initial Risk Score and Final Risk Score, is a multiple of Probability x Severity.

If a Risk Score is 1 to 5 (Green) then no further control measures are required.

If a Risk Score is 6 to 10 (Yellow) then further control measures are required.

If a Final Risk Score is greater than 12 (Red) then the risk is unacceptable and operation should not proceed.

Hazard		At Risk		Initial Risk Score							
				Probability	5						
					4						
					3						
					2						
					1						
					0	1	2	3	4	5	
						Severity					
Control Measure				Final Risk Score							
				Probability	5						
					4						
					3						
					2						
					1						
					0	1	2	3	4	5	
						Severity					

Hazard		At Risk		Initial Risk Score						
				Probability	5					
					4					
					3					
					2					
					1					
					0	1	2	3	4	5
					Severity					
Control Measure					Final Risk Score					
				Probability	5					
					4					
					3					
					2					
					1					
					0	1	2	3	4	5
					Severity					

Hazard		At Risk		Initial Risk Score						
				Probability	5					
					4					
					3					
					2					
					1					
					0	1	2	3	4	5
					Severity					
Control Measure					Final Risk Score					
				Probability	5					
					4					
					3					
					2					
					1					
					0	1	2	3	4	5
					Severity					

Hazard		At Risk		Initial Risk Score						
				Probability	5					
					4					
					3					
					2					
					1					
					0	1	2	3	4	5
					Severity					
Control Measure					Final Risk Score					
				Probability	5					
					4					
					3					
					2					
					1					
					0	1	2	3	4	5
					Severity					

Hazard		At Risk		Initial Risk Score						
				Probability	5					
					4					
					3					
					2					
					1					
					0	1	2	3	4	5
					Severity					
Control Measure					Final Risk Score					
				Probability	5					
					4					
					3					
					2					
					1					
					0	1	2	3	4	5
					Severity					

Hazard		At Risk	Initial Risk Score						
			Probability	5					
				4					
				3					
				2					
				1					
				0	1	2	3	4	5
				Severity					
Control Measure				Final Risk Score					
			Probability	5					
				4					
				3					
				2					
				1					
				0	1	2	3	4	5
				Severity					

Hazard		At Risk	Initial Risk Score						
			Probability	5					
				4					
				3					
				2					
				1					
				0	1	2	3	4	5
				Severity					
Control Measure				Final Risk Score					
			Probability	5					
				4					
				3					
				2					
				1					
				0	1	2	3	4	5
				Severity					

Appendix C: Records for each flight

Aircraft and Remote Pilot logs will be maintained using a suitable manual or automatic logging system. As a minimum this will include:

- Details of RP
- Flight location
- Flight duration
- Any significant incidents

All flight records will be kept using Airdata UAV and will be made available to the authority on request.

Appendix D: CAA Permission and Exemptions

In hard copies, a copy of the up-to-date PfCO for the SUA Operator follows this page.

In digital copies, a copy of the up-to-date PfCO for the SUA Operator will be in the same folder as this Operations Manual.

Appendix E: Insurance Details

In hard copies, insurance details follow this page.

In digital copies, insurance details will be in the same folder as this Operations Manual.

Appendix F: Aircraft Quick Reference Handbooks

A QRH for each type of UAS used by the SUA Operator follows this page.

Quick Reference Handbook

DJI Mavic Pro Platinum

Section	Content
F	Field File
F1	Brief description of UAS
F2	Link to full specification and manual
F3	Operational envelope
F4	Likely outcome of failure of motor, propeller or ESC
F5	Battery Management
F6	Pre-deployment checklist
F7	Pre-flight procedures
F8	Flight procedures
F9	Post-flight procedures
F10	Emergency procedures
F11	Incident management
M	Maintenance File
M1	Full aircraft specification
M2	Remote Controller LCD Screen Menu Information
M3	Aircraft-specific maintenance details

Section F: Field File

This document is intended for quick reference during operations. Any Remote Pilot (RP) operating the DJI Mavic Professional Platinum must ensure they are fully familiar with manufacturer operating manuals and the capabilities of the UAS.

F1: Brief description of UAS

The DJI Mavic Pro Platinum is produced by DJI. It is one of the smallest quadcopters with a fully featured stabilised camera. It is piloted using a dedicated transmitter in conjunction with either manufacturer or third-party apps that may be accessed using an Android or iOS phone.

F2: Link to full specification and manual

Full aircraft specifications

DJI Mavic Pro Platinum: <https://www.dji.com/mavic/info>

User Manuals

DJI Mavic Pro Platinum: <https://www.dji.com/mavic/info#downloads>

F3: Operational envelope

Parameter	Limitations
Maximum wind speed	10 m/s - 22.4 mph - 19.4 kt
Maximum service altitude	16,404 feet AMSL (5000m)
Maximum aircraft speed	17.9m/s – 40mph – 34.7kt
Operating temperature range	0°C to +40°C
Maximum ascent rate	16.4 ft/s (5 m/s) in Sport mode
Maximum descent rate	9.8 ft/s (3 m/s)
Operating frequency	2.4-2.483 GHz
Maximum take-off mass (MTOM)	734g
Flight time	Approx. 27 minutes

F4: Likely outcome of failure of motor, propeller or ESC

The DJI Mavic Pro is a quadcopter. As a result, there is no redundancy in the event of propeller or ESC failure and the aircraft is likely to enter uncontrolled vertical descent.

F5: Battery Management

Battery details for the DJI Mavic Pro Platinum are as follows:

Item	Detail
Battery type	Intelligent lithium polymer battery
Number required for flight	1
Battery capacity	3830mAh
Battery voltage	11.4V
Watt hours	43.6Wh
Charger type	DJI smart charger
Charge instructions	Site the charger in a safe location on a non-flammable surface. Attach batteries to smart charger. Observe batteries initially to ensure that charge initiates.
Additional instructions	Batteries must be periodically discharged to below 5% as directed within the DJI app. The charger should only be set up by a crew member who is familiar with its use and the battery being charged should be monitored. Lithium-polymer batteries can become unstable. The two main causes of this are damage during a crash and improper charging. Any battery that is noticeably swelling should be placed in a safe place. There have been occasions when lithium polymer batteries have burst into flame. If a battery is involved in a crash, it should not be used for the remainder of the operation until it has been checked by the Technical Manager even if it appears undamaged and the UAS is operational.

F6: Pre-deployment checklist

Item	Check
UAS	All components in case – no open defects in log
Spare propellers	Present
Batteries	All present and charged
Chargers	All present
Camera(s)	All present including filters
Media Cards	All present, functional and formatted
Tablet/phone	Present, charged, correct APPs installed and functional
USB cable	Present, functional
Laptop	Present if appropriate and charged
PPE	Present
Cordon equipment	Present if appropriate
Anemometer	Present
Fire extinguisher/blanket	Present and functional
First aid kit	Present and stocked where needed

F7: Pre-flight procedures

Stage	Item	Check
1	Ensure all crew members and participants are briefed	
1	Attach tablet/phone to transmitter	
2	Power transmitter and ensure app initiates	
3	Insert aircraft battery – ensure secure	
4	Unfold arms and ensure secure	
6	Ensure SD card inserted	
7	Check airframe for damage	
8	Check sonar sensors and optical flow system clean	
9	Check motors for resistance and bearing damage	
10	Remove camera cover and retainer	
11	Move aircraft to launch location	
12	Unfold propellers and check for damage and stress lines	
13	Call " power on "	
14	Power aircraft	
15	Check C2C link	
16	Carry out compass calibration if necessary	
17	Check camera control and settings	
18	Check flight mode (P, S)	
19	Check GPS strength (app)	
20	Check Tx and AV signal strength (app)	
21	Check battery level, cell balance and low battery settings (app)	
22	Check home point is correct (app)	
23	Check failsafe and geofencing set appropriate to operation (app)	
24	Ensure all crew members and participants are ready	

F8: Flight Procedures

Stage	Item
	Start-up procedures
1	Call " starting motors "
2	Final 360 check, call " taking off "
3	Use combined stick command or auto take off to start motors
4	Ensure motors are all running
	Take-off procedures
5	Raise throttle and settle aircraft at 2 metres height
6	Check UAS response to all stick movements
7	Commence operational flight
	Flight procedures
8	Maintain VLOS at all times
9	Monitor aircraft for position relative to structures and people
10	Monitor aircraft status
11	Monitor flight time
	Landing procedures
12	At a safe altitude, return to landing point.
13	Call " landing "
14	Check landing point is clear
15	Slowly descend UAS to land
16	Hold throttle down to cut motors
	Shut-down procedures
17	Ensure propellers are static
18	Turn off UAS
19	Call " safe "

F9: Post-flight Procedures

Stage	Item	Check
1	Check propellers for damage and fold	
2	Check airframe for damage	
3	Remove (and back up) SD card if required	
4	Replace camera retainer and cover	
5	Remove aircraft battery	
6	Ensure all components are turned off	
7	Repack components and UAS	
8	Check site is clear and left as found	

F10: Emergency Procedures

RPs should take the time to review this section before flight and to understand the procedures to implement in different emergency situations.

10.1: Mitigation Measure - DJI failsafe

This UAS uses the DJI failsafe return-to-home system. In the event of Tx signal loss it will carry out the following:

1. hover for 3 seconds
2. ascend to user defined height (or remain at current height if already above defined height)
3. move to a position over the "home" point
4. descend at a rate of 0.5 m/s and auto-land
5. switch off motors after 3 seconds

The UAS can then be shut-down.

This procedure can also be initiated from the APP or by holding the return-to-home (RTH) button on the Tx.

10.2: Mitigation Measure – DJI geofencing

All DJI systems can be restricted to preset distance limits to reduce the risk of fly-away. It is recommended that the distance and height limit are set to the minimum distance required to carry out each project.

10.3: Crew warning

If at any time the craft descends in an uncontrolled measure the RP should shout "HEADS" to warn crew members. The briefing should include what action any crew should take on hearing the shout. The response may vary by operation.

10.4: Responses to emergency situations

Loss of primary control frequency including Transmitter battery failure
In the event of loss of control frequency, including Tx failure or Tx battery failure, the aircraft will enter failsafe as described above. At this point it is the responsibility of the RP/crew to maintain the take-off area clear.
Malicious or accidental interference with control frequency
In the event of interference with the control frequency, it is highly likely that the aircraft will enter failsafe and return to base. If that is not the case, then the incident should initially be treated as a fly-away as described below. Once the aircraft is safely recovered, the cause of the interference should be investigated and reported appropriately.

Loss of power or aircraft battery failure
In the event of power loss to the flight controller or motors, the aircraft may crash, normally vertically. As a result it is important that the area below the aircraft is maintained clear and that people in the area are aware of the potential risk. If possible the "HEADS" warning should be given.
Remote Pilot incapacitated
In the event of the RP becoming incapacitated whilst the UAS is in flight the aircraft will remain in hover and descend vertically to land under low battery voltage. If crew or observer are used, instructions can be given on how to initiate RTH in the event of RP incapacitation.
Aircraft incursion
If another aircraft is seen and appears to be entering or approaching the operating area the RP should descend the UAS until it is clear there is no risk and may then continue the operation or land in the take-off area and wait if necessary. If possible "AIRCRAFT" warning should be given.
Propeller or motor failure
On loss of a propeller or motor it is likely the UAS will enter uncontrolled descent. In this case the priority is the safety of the public, client and crew so the key mitigation is avoiding the presence of crew or public immediately below the flight path. If possible the "HEADS" warning should be given.
Total electronic failure
If this occurs it is likely that the UAS will enter uncontrolled descent. If possible the "HEADS" warning should be given. If injury occurs it should be ascertained if emergency services are needed and first aid carried out as necessary. As soon as is appropriate the UAS must be made safe by disconnecting the flight battery. Once the situation has been dealt with the incident must be logged and reported appropriately.

"Fly-away"

Fly away is heavily mitigated by the distance limiting feature of the DJI flight controller. The RP should ensure that an appropriate maximum distance and height are programmed for each operation up to a maximum of 500m horizontally and 400 feet (122m) altitude.

In the event of a "fly-away" the RP should attempt to regain control:

Attempt atti mode flight if GPS has been lost

Attempt RTH

Attempt to force failsafe by turning off transmitter

Turn transmitter back on and if appropriate attempt to cut motors (CSC)

If above fails, log the direction, speed, altitude and estimated flight time of the UAS and immediately contact the Police and local ATC to inform them. If safe to do so the UAS should be tracked until it lands under second-level low battery protection.

Fire in the air

If control is still possible, attempt to land the aircraft away from crew and on a non-flammable surface. Follow procedures below.

Fire on the ground

Allow the battery fire to burn out.

Prevent the spread of flame if necessary using the fire extinguisher/blanket. Avoid smoke inhalation as the smoke is toxic.

If necessary, contact fire services.

F11: Incident management

In the event of an incident the RP should follow the procedures below. In the event of injury, the casualty is the priority. If necessary, emergency services should be contacted.

In the event of an incident causing injury or fatality		
Stage	Item	Check
1	Make the UAS safe by removing flight battery if possible	
2	Administer first aid as necessary	
3	Contact emergency services if necessary	
4	Any injured person remains the priority until they are stabilized and if necessary paramedics have taken control	
5	Take witness statements if appropriate	
6	Photograph the scene to show position of the UAS	
7	Ensure any footage is retained to show as evidence	
8	Repack components and UAS	
9	Log the details of the accident and report as necessary	

In the event of an incident not causing injury or fatality		
Stage	Item	Check
1	Make the UAS safe by removing flight battery if possible	
2	Monitor flight battery for swelling and/or fire	
3	Take witness statements if appropriate	
4	Photograph the scene to show position of the UAS	
5	Ensure any footage is retained to show as evidence	
6	Log the details of the accident and report as necessary	

After any accident or incident, the RP should ensure that all appropriate logs are completed and that, if appropriate, the incident is reported. No further flights should be carried out until the cause of the incident is established and any risk of re-occurrence is mitigated.

A mandatory occurrence report can now be raised online at:

<http://www.aviationreporting.eu/>

Section M: Maintenance File

M1: DJI Mavic Pro Platinum - Full specification

Aircraft	
Weight	1.62 lbs (734 g)
Weight (including gimbal cover)	1.64 lbs (743 g)
Dimensions	83 x 83 x 198 mm (folded)
Diagonal Length (propellers excluded)	335 mm
Max Ascent Speed	16.4 ft/s (5 m/s) in Sport Mode
Max Descent Speed	9.8 ft/s (3 m/s)
Max Speed	40.4 mph (65 kph) in Sport Mode without wind
Max Service Ceiling Above Sea Level	16404 feet (5000 m)
Max Flight Time	27 minutes (0 wind at a consistent 15.5 mph (25 kph))
Max Hovering Time	24 minutes (0 wind)
Avg. Flight Time	21 minutes (general flight, 15% battery left)
Max Flight Distance	8 mi (13 km, 0 wind)
Operating Temperature	32° to 104° F (0° to 40° C)
Satellite Positioning Systems	GPS/GLONASS
Gimbal	
Controllable Range	Pitch: -90° to +30°, Roll: 0° or 90° (Horizontally and vertically)
Forward Vision System	
Sensing Range	Precision measurement range: 2 ft (0.7 m) to 49 ft (15 m) Detectable range: 49 ft (15 m) to 98 ft (30 m)
Operating Environment	Surfaces with clear patterns and adequate lighting (lux > 15)
Downward Vision System	
Velocity Range	≤ 22.4 mph (36 kph) at 6.6 ft (2 m) above ground
Altitude Range	1 - 43 feet (0.3 - 13 m)
Operating Range	1 - 43 feet (0.3 - 13 m)
Operating Environment	Surfaces with a clear patterns and adequate lighting (lux > 15)
Camera	
Sensor	1/2.3" CMOS Effective pixels: 12.35 Megapixels (Total pixels: 12.71 M)
Lens	78.6° FOV, 28 mm (35 mm format equivalent) f/2.2 Distortion < 1.5% Focus from 0.5 m to ∞
ISO Range	100 - 3200 (video), 100 - 1600 (photo)
Electronic Shutter Speed	8 s to 1/8000 s
Max Image Size	4000x3000
Still Photography Modes	Single shot
	Burst shooting: 3/5/7 frames
	Auto Exposure Bracketing (AEB): 3/5 bracketed frames at 0.7EV Bias
	Interval
	HDR

Video Recording Modes	C4K: 4096x2160 24p, 4K: 3840x2160 24/25/30p 2.7K: 2720x1530 24/25/30p FHD: 1920x1080 24/25/30/48/50/60/96p HD: 1280x720 24/25/30/48/50/60/120p
Video Storage Bitrate	60 Mbps
Supported File Systems	FAT32 (≤ 32 GB), exFAT (> 32GB)
Photo	JPEG, DNG
Video	MP4, MOV (MPEG-4 AVC/H.264)
Supported SD Cards	microSD™. Max capacity: 64GB Class 10 or UHS-1 rating required.
Remote Controller	
Operating Frequency	2.400 GHz to 2.4835 GHz
Max Transmission Distance	FCC Compliant: 4.3 mi (7 km); CE Compliant: 2.5 mi (4 km) Unobstructed and free of interference.
Operating Temperature	32° to 104° F (0° to 40° C)
Battery	2970 mAh
Transmitter Power (EIRP)	FCC: ≤ 26 dBm; CE: ≤ 20 dBm
Operating Voltage	950 mA @ 3.7 V
Supported Mobile Device Size	Thickness supported: 6.5 - 8.5 mm, Max length: 160 mm Supported USB port types: Lightning, Micro USB (Type-B), USB Type-C™
Charger	
Voltage	13.05 V
Rated Power	50 W
Intelligent Flight Battery	
Capacity	3830 mAh
Voltage	11.4 V
Battery Type	LiPo 3S
Energy	43.6 Wh
Net Weight	Approx. 0.5 lbs (240 g)
Operating Temperature	41° to 104° F (5° to 40° C)
Max. Charging Power	100 W

M2: DHI Mavic Pro Platinum - Remote Controller Screen Menu Information



Remote Controller LCD Screen Menu Information

Remote Controller Status	
BAT xx PCT	Remote Controller battery level.
SHUTDOWN_	Remote controller is powering off.
CHARGING_	Remote controller is charging.
USB PLUGGED	Mavic Pro has been connected to a computer.
FC U-DISK	Flight Controller is reading data.
UPGRADING	Upgrading.
BINDING	Aircraft is binding with the remote controller.
Before Flight	
CONNECTING_	The remote controller is connecting to the aircraft.
SYS INITING	System is initiating.
READY TO GO	Ready to take off.
Flight Mode	
BEGINNER	In Beginner Mode.
GPS MODE	In P-GPS Mode
OPTI MODE	In P-OPTI Mode
ATTI MODE	In P-ATTI Mode
SPORT MODE	In Sport Mode
Flight Status	
TAKING OFF	Taking off
LANDING	Landing
GOING HOME	Returning to Home
NAV GOHOME	Returning to home.
NAV LANDING	Landing
MAX ALT.	Aircraft has reached maximum altitude.
MAX RADIUS	Aircraft has reached maximum radius.
OBSTACLE	Obstacle detected.
NO FLY ZONE	Aircraft is in a No Fly zone.
Intelligent Flight Mode Status	
TRIPOD	In Tripod Mode.
ACTIVETRACK	Using ActiveTrack.
TAP FLY	Using TapFly.
COURSE LOCK	In Course Lock Mode
HOME LOCK	In Home Lock Mode
POI MODE	In Point of Interest Mode
WAY POINT	In Waypoints Mode.
FOLLOW ME	In Follow Me Mode
TERRAIN	In Terrain Follow Mode
System Warning and Error Information	
SYS WARNING+CHECK APP	System Warning. See DJI GO app for more information.
UNACTIVATED+CHECK APP	Aircraft not Activated. See DJI GO app for more information.
COMPASS ERR+ CHECK APP	Compass Error. See DJI GO app for more information.
BATTERY ERR+CHECK APP	Battery Error. See DJI GO app for more information.
SD ERR+CHECK APP	Micro SD Card Error. See DJI GO app for more information.
CALIBRATING	IMU Calibrating/Did not restart aircraft after calibration is complete.

STICK ERR+RE-CTR STCK	Control stick is not centered. Re-center it.
WHEEL ERR+RE-CTR WHEL	Left Dial on the remote controller is not centered. Re-center it.
MECH ERR	Remote Controller Error. Contact DJI support.
STICK EMI+PLS RETURN	Control Stick are experiencing severe electromagnetic interference. Return to home as soon as possible.
SD FULL SD	Micro SD Card is full.
NO PROP	No propellers attached.
BAT TEMP HI	Intelligent Flight Battery is too hot.
BATTERY ERR	Intelligent Flight Battery error
BAT TEMP LO	Intelligent Flight Battery is too cold
LOW BATTERY	Intelligent Flight Battery low battery.
RC LOW BAT	Remote Controller low battery.
NO RC SIGNL	Remote Controller signal lost.
RC TEMP HI	Remote Controller too hot.
STICK EMI	Control stick is suffering electromagnetic interference.
STICK ERR	Control Stick Error
NO RTH	Aircraft cannot Return to Home



M3: Aircraft-Specific Maintenance details

Following the maintenance instructions of most DJI quadcopters, Remote Pilots must ensure that the aircraft continues to offer optimal performance and to ensure flight safety. It is recommended that comprehensive maintenance be performed after every 200 flights or 50 flight hours.

this manual is intended to help users maintain their aircraft and maximize its continued reliability.

	Battery checks	Checked
	Check battery for damage or deformities	
	Check battery connections are clean	
	Check Mavic internal power connectors are clean	
	Check battery casing	
	Check inside battery compartment for damage and debris	
	Check battery health using appropriate app	

	Airframe checks	Checked
	Confirm all screws are adequately tightened	
	Check airframe for cracks or damage	
	Visually and gently tug check exposed wiring	
	Clean airframe if appropriate	

	Motor and propeller checks	Checked
	Check motor screws are tight	
	Check for bearing movement (clicking when moving motor bell)	
	Remove propellers and run motors briefly. Check there is no excessive vibration	
	Check motor bell for deformities	
	Check propellers for chips, stress lines and tip wear	

	IMU check	Checked
	Use the DJI Go App to check IMU calibration	
	Place the aircraft on a flat, stable surface and run advanced IMU calibration	

	Control and Video transmission system checks	Checked
	Check antennae in landing gear are secure and free from bending or damage	
	Check transmitter antennae for damage	
	Check all sticks and switches are secure and functional	
	Clean transmitter if necessary	

	Camera and gimbal checks	Checked
	Check rubber mounts and retainers	
	Check gimbal	
	Check ribbon cables for damage	
	Check for resistance to movement when unpowered	
	Confirm gimbal self-stabilises fully when powered	
	Ensure camera lens is clean and free from dust	

	Vision positioning system checks	Checked
	Check and clean downward facing camera	
	Check and clean sonar sensors	