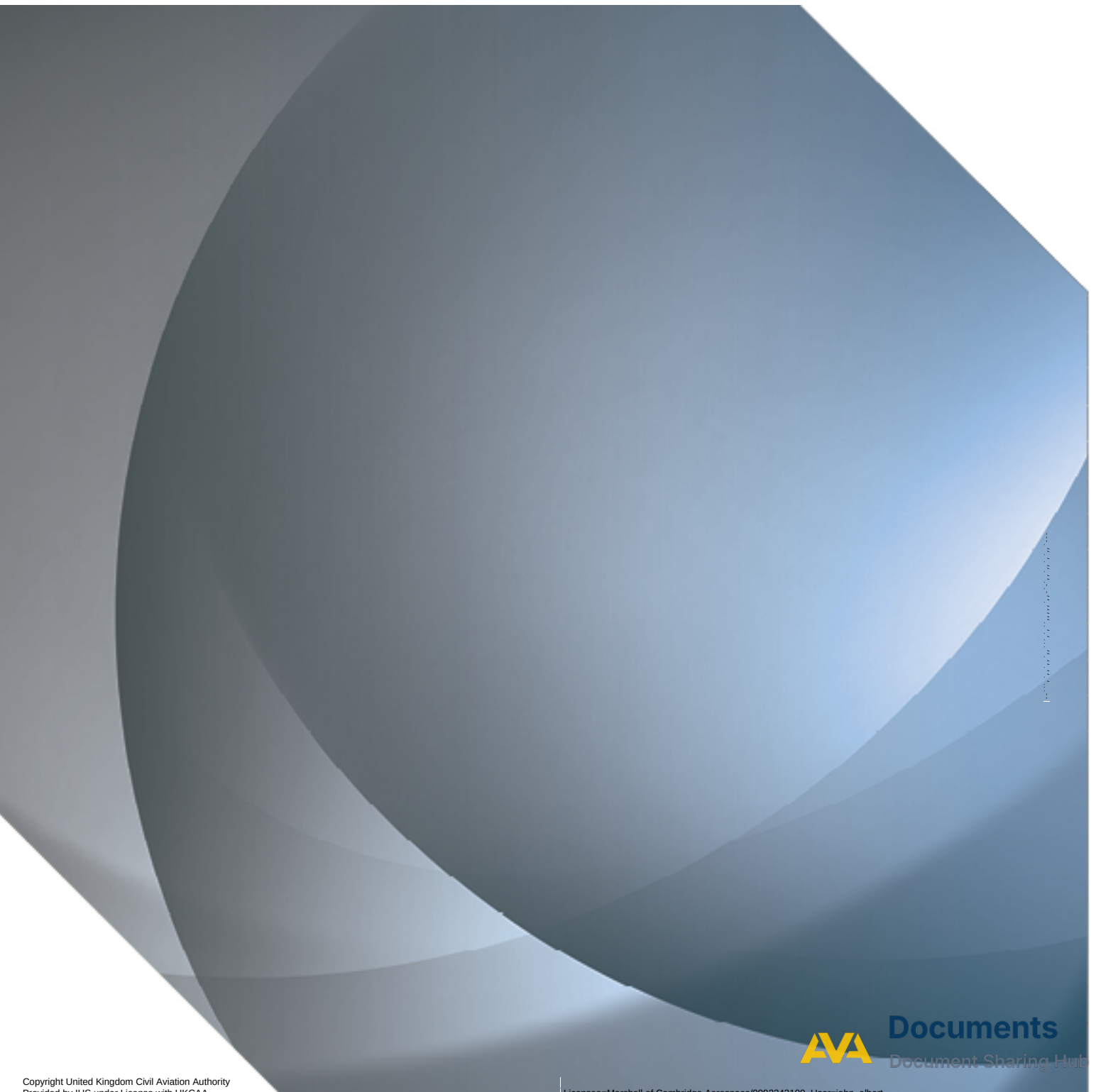


Unmanned Aircraft System Operations in UK Airspace – Guidance

CAP 722



All rights reserved. Copies of this publication may be reproduced for personal use, or for use within a company or organisation, but may not otherwise be reproduced for publication.

To use or reference CAA publications for any other purpose, for example within training material for students, please contact the CAA at the address below for formal agreement.

Previously published as DAP Unmanned Aerial Vehicle Operations in UK Airspace – Guidance, June 2001

First edition of CAP 722, 29 May 2002

Second edition, 12 November 2004

Third edition, 28 April 2008

Third Edition incorporating amendment 2009/01, 14 April 2009

Fourth Edition, 6 April 2010

Fifth Edition, 10 August 2012

Sixth Edition, 31 March 2015

The latest version of this document is available in electronic format at www.caa.co.uk

Contents

Revision History	9
Foreword	12
Abbreviations and Glossary of Terms	14

SECTION 1: GENERAL

Chapter 1: Introduction	22
Policy	22
Scope	22
Chapter 2 Legal Considerations	23
Policy	23
Law	23
Lead Agency	26

SECTION 2: APPROVALS

Chapter 1 UAS Classification System	28
Scope	28
UAS Classifications	28
Future Classification Development	29
Chapter 2 Approval Requirements Map	30
Scope	30
Basic Requirements	30
Chapter 3 Approval to Operate	33
Scope	33
Introduction	33
Approvals, Permissions and Exemptions	33
Meaning of Aerial Work	34
Operations	35
Insurance	36

UAS OSC Requirements	36
Requirements for Small Unmanned Aircraft	37
Small Unmanned Aircraft Systems in Congested Areas	38
Application Process	41
National Qualified Entities	41
Regulatory Enforcement	43
Source Documents	43
Chapter 4 Civil UAS Remote Pilot Competency	44
Scope	44
Policy	44
Small UAS - Pilot Competency Alternative Means of Compliance	45
Other Factors	Error! Bookmark not defined.46
Flight Radio Telephony Operators' Licence	Error! Bookmark not defined.46
 SECTION 3 POLICY	
Chapter 1 CAA Policy on Detect and Avoid Capability	49
Scope	49
Introduction	49
Aim	49
Policy	49
Research and Development	51
Factors for Consideration when Developing Detect and Avoid Capability	51
Chapter 2 CAA Policy on Human Factors in UAS Operations	53
Scope	53
Introduction	53
Policy	53
Design Human Factors	54
Production Human Factors	56
Operational Human Factors	57
Maintenance Human Factors	61
Future Trends	61
Source Documents	62



Chapter 3 CAA Policy on UAS Autonomy	63
Scope	63
Introduction	63
What is the Difference between Automation and Authority?	64
Potential Future Developments	65
Policy	65
Factors for Consideration when Applying for Certification of Autonomous Systems	66
Chapter 4 CAA Policy on Security Issues for UAS Operations	68
Scope	68
Policy	68
Factors for Consideration when Developing Security for UAS	68
Security Process	69
Current UAS Security Work	70
Chapter 5 CAA Policy on UAS Spectrum Issues	72
Scope	72
Introduction	72
Aim	72
Policy	73
Assignment of Frequencies	73
Allocation of Spectrum	74
Use of 35 MHz, 2.4 GHz and 5.8GHz	74
Chapter 6 CAA Policy on UAS Registration	75
Scope	75
Policy	75
Source Documents	75
Chapter 7 CAA Policy on Radar Surveillance	76
Scope	76
Policy	76
Source Documents	77
Airworthiness	78



SECTION 4 AIRWORTHINESS

Chapter 1 Certification	79
Scope	79
Lead Agency	79
Policy	80
Certification Objectives	80
Initial, Continuing and Continued Airworthiness	81
Chapter 2 General Certification Requirements	84
Scope	84
Policy	84
Certification Process	84
Certification Basis	86
Interrelationship between the Three Stages of Airworthiness Oversight	86
Chapter 3 What Level Of Certification Do I Need?	89
Scope	89
Policy	89
Aircraft Classification	89
Chapter 4 General Safety Assessment Points	92
Scope	92
Policy	92
Assessment Steps	92
Safety Assessment Considerations	93

SECTION 5 OPERATIONS

Chapter 1 Airspace Principles	96
Introduction	96
Scope	96
Policy	96
Airspace Principles for UAS Operations in the UK	97
General Principles for Remotely Piloted Aircraft Operations outside Segregated Airspace	98
Temporary Danger Areas	99

General Principles for Remotely Piloted Aircraft Operations inside Segregated Airspace	101
SUA Operating in Controlled Airspace and Aerodrome Traffic Zones	101
Source Documents	104
Chapter 2 Cross Border Operations	105
Scope	105
Policy	105
Chapter 3 ATM Procedures	106
Scope	106
Policy	106
Source Documents	107
Chapter 4 Emergency ATM Procedures	108
Scope	108
Policy	108
Source Documents	108
Chapter 5 Breaches of ATC Regulations	110
Scope	110
Point of Contact	110
Chapter 6 Aerodrome Operating Procedures	111
Scope	111
Policy	111
Source Documents	111
Chapter 7 Incident and Accident Procedures	112
Scope	112
Definitions	112
Lead Agencies	Error! Bookmark not defined.116
Policy	113
Source Documents	114
Points of Contact	115
Chapter 8 Leasing	116
Introduction	116
Aim	116

Policy	116
Lead Agency	116

APPENDICES

Appendix A: Operational Factors for SUA Flights within Congested Areas	118
Appendix B: UAS OSC Volume 1 - Operations Manual Template	123
Appendix C: UAS OSC Volume 2 - Systems Template	135
Appendix D: UAS OSC Volume 3 - Safety Assessment Template	143
Appendix E: Requirements for Approval as a UK NQE	150
Full Category	150
Restricted Category	161

Revision History

Second Edition 12 November 2004

The major changes in this document are on legal, certification, spectrum and security issues.

Details of the CAA Policy on Model Aircraft/Light UAV have also been included.

Third Edition 28 April 2008

Introduction

Following discussions at the CAA Unmanned Aircraft Systems (UAS) Working Group, held on 12 October 2006, it was considered that sufficient progress had been made in many areas of UAS work to warrant a substantial review of CAP 722. In particular, as an upsurge in UAS activity is envisaged over the coming years it is essential that both industry and the CAA, as the regulatory body, clearly recognize the way ahead in terms of policy and regulations and, more importantly, in safety standards.

With an ever increasing number of manufacturers and operators, it is vital that the regulations keep pace with UAS developments, without losing sight of the safety issues involved in the simultaneous operation of manned and unmanned aircraft. As a living document, it is intended that CAP 722 will be under constant review and that it will be revised, where necessary, to take account of advances in technology, feedback from industry, recognised best practice and changes in regulations, which are developed to meet these demands. However, it is recognised that with continual rapid developments there will inevitably be times when Chapter sponsors will have to be approached directly for further guidance.

Revisions in this Edition

The layout of the document has been amended to more clearly separate Civil and Military guidance and as such the Chapters have changed in many areas. In addition, while there are many minor textual changes to the document, a significant revision has been made in many areas and as such it is recommended that those involved in UAS operations review the entire content of the document to ensure that they are fully cognisant with the update.

Impending Changes to Regulation

The CAA is in the process of a consultation with industry over a proposal to amend the Air Navigation Order which will require operators of UAS with a UAV component of less than 7 kg mass to obtain a CAA permission, as is currently the case for UAVs with a mass of 7-20 kg. This proposal intends to ensure public safety by applying operational constraints to

UAVs of less than 7 kg mass, as deemed appropriate to the type of operation envisaged and the potential risk to members of the public.

If the consultation exercise approves the proposal, it is likely that the ANO Amendment will pass into law in December 2008. Potential operators of UAS with a UAV component of less than 7 kg must ascertain, before commencing operations, whether or not they are required to obtain a CAA permission.

Third Edition incorporating amendment 2009/01 14 April 2009

This amendment is published in order to update contact details and references throughout the document and make some editorial corrections.

Fourth Edition 6 April 2010

This edition incorporates the changes to legislation introduced in Air Navigation Order 2009 (ANO 2009) regarding the requirement for operators of small unmanned aircraft to obtain a CAA permission when their aircraft are being used for aerial work, and also in some cases for surveillance or data acquisition purposes (now termed small unmanned surveillance aircraft).

Unmanned aircraft having a mass of less than 7 kg are now covered by this new legislation, which is intended to ensure public safety by applying appropriate operational constraints, dependent on the flying operation being conducted and the potential risks to third parties. In line with this change, some guidance on the additional details to be provided within an application for permission to operate small unmanned aircraft have also been included (Annex 1 to Section 3, Chapter 1).

Expanded guidance regarding the reporting of incidents/occurrences involving the operation of unmanned aircraft has also been included; such reporting is viewed as being a vital element in the successful development of the 'fledgling' civilian UAS industry.

Finally, in line with continued developments in UAS terminology, and the principle that unmanned aircraft are still to be treated as aircraft rather than as a separate entity. In line with this, the term 'pilot' (i.e. the person who operates the controls for the aircraft) is used more frequently. The term 'Remotely Piloted Aircraft' (RPA) is also emerging in some areas, although it has not yet been wholeheartedly accepted for use in the UK.

Fifth Edition 10 August 2012

The changes at this edition primarily concentrate on updating areas where terms, definitions or procedures have evolved significantly and where details of chapter sponsors have also been changed. The specific areas to note are:

- Revised Abbreviations and Glossary (also reflected throughout the document), which reflect worldwide developments in UAS terminology.
- Introduction of a Human Factors chapter.

- A complete rewrite of the 'Civil Operations, Approval to Operate' chapter.
- Amendments to civilian Incident/Accident Procedures.
- A complete revision to Section 4 (Military Operations), which reflects the formation of the Military Aviation Authority (MAA) and the revised Military Aviation Regulatory Publications.

Sixth Edition March 2015

CAP 722 has been completely refreshed and restructured under this revision. Key changes to the document are:

- Complete restructure of the document.
- Updates to all Chapters (including Abbreviations and Glossary of Terms).
- Introduction of a Concept of Operations Approach (ConOps)
- Introduction of the UAS OSC - Unmanned Aircraft System Operating Safety Case (formerly titled Congested Areas Operating Safety Case).
- Introduction of an Approval Requirements Map.
- Removal of Military Operations Chapters.
- Addition of Alternative Means of Compliance to demonstrate Operator Competency.
- Introduction of Restricted Category Qualified Entities.

Foreword

Aim

CAP 722, Unmanned Aircraft System Operations in UK Airspace – Guidance, is compiled by the Civil Aviation Authority's Intelligence, Strategy and Policy (ISP) division. CAP 722 is intended to assist those who are involved in the development of UAS to identify the route to certification, outline the methods by which permission for aerial work may be obtained and ensure that the required standards and practices are met by all UAS operators.

Furthermore, the document highlights the safety requirements that have to be met, in terms of airworthiness and operational standards, before a UAS is allowed to operate in the UK.

In advance of further changes to this document, updated information is contained on the CAA website¹.

Content

The content of CAP 722 is wholly dependent on contributions from lead agencies; it does not replace civil regulations, but provides guidance for civil UAS operations. Wherever possible the guidance contained herein will be harmonised with the MAA and European nations.

It is acknowledged that not all areas of UAS operations have been addressed fully. It is therefore important that operators, industry and government sectors remain engaged with the CAA and continue to provide comment on this document.

Availability

The primary method of obtaining a copy of the latest version of CAP 722 is via the CAA website².

¹ www.caa.co.uk/uas

² www.caa.co.uk/CAP722

Point of Contact

Unless otherwise stated, all enquiries relating to CAP 722 must be made to:

For queries relating to the content of CAP 722:

ISP Operations Management
CAA
Safety and Airspace Regulation Group
Aviation House
Gatwick Airport South
West Sussex
RH6 0YR

E-mail: ISPOperationsManagementTeam@caa.co.uk

For matters concerning operations or approvals:

Shared Services Centre
CAA
Safety and Airspace Regulation Group
Aviation House
Gatwick Airport South
West Sussex
RH6 0YR

Telephone: 01293 573517

E-mail: uavenquiries@caa.co.uk

.....

Abbreviations and Glossary of Terms

The terminology relating to UAS operations continues to evolve and therefore the Abbreviations and Glossary of Terms sections are not exhaustive. The terms listed below are a combination of the emerging ICAO definitions and other 'common use' terms which are considered to be acceptable alternatives.

Abbreviations

A

AAIB	Air Accidents Investigation Branch
ACAS	Airborne Collision Avoidance System
AIP	Aeronautical Information Publication
ANO	Air Navigation Order
ANSP	Air Navigation Service Provider
AOC	Air Operator Certificate
ATC	Air Traffic Control
ATM	Air Traffic Management
ATS	Air Traffic Service
ATSU	Air Traffic Service Unit

B

BMFA	British Model Flying Association
BRLOS	Beyond Radio Line of Sight
BRS	Ballistic Recovery Systems
BVLOS	Beyond Visual Line of Sight

C

CA	Congested Area
CAA	Civil Aviation Authority
CAT	Commercial Air Transport

ConOps	Concept of Operations
CPL	Commercial Pilot Licence
CRM	Crew Resource Management
C2	Command and Control

D

DA	Danger Area
DAA	Detect and Avoid
DAP	Directorate of Airspace Policy

E

EASA	European Aviation Safety Agency
ERF	Emergency Restriction of Flying
EVLOS	Extended Visual Line of Sight

F

FIR	Flight Information Region
FISO	Flight Information Service Officer
FMC	Flight Management Computer
FRTOL	Flight Radio Telephony Operators' Licence

G

GCS	Ground Control Station
-----	------------------------

H

HALE	High Altitude Long Endurance
HMI	Human-Machine Interface

I

ICAO	International Civil Aviation Organisation
IFR	Instrument Flight Rules
IMC	Instrument Meteorological Conditions

J

JARUS	Joint Authorities for Rulemaking on Unmanned Systems
-------	--

M

MAA	Military Aviation Authority
MALE	Medium Altitude Long Endurance
MOD	Ministry of Defence
MOR	Mandatory Occurrence Reporting
MRP	MAA Regulatory Publication(s)
MTOM	Maximum Take-off Mass

N

NAA	National Aviation Authority
NOTAM	Notice to Airmen

R

RA (T)	Restricted Area (Temporary)
RCS	Radar Cross Section
RLOS	Radio Line of Sight
RPA	Remotely Piloted Aircraft
RPAS	Remotely Piloted Aircraft System
RPS	Remote Pilot Station
RTF	Radiotelephony
RTS	Release to Service

S

SARPs	Standards and Recommended Practices
SARG	Safety and Airspace Regulation Group
SSR	Secondary Surveillance Radar
SUA	Small Unmanned Aircraft
SUSA	Small Unmanned Surveillance Aircraft

T

TC	Type Certificate
TCB	Type Certification Basis

TCAS Traffic Collision Avoidance System

TDA Temporary Danger Area

U

UA Unmanned Aircraft

UAS Unmanned Aircraft System(s)

UAS OSC Unmanned Aircraft System(s) Operating Safety Case

UIR Upper Flight Information Region

V

VFR Visual Flight Rules

VLOS Visual Line of Sight

Glossary of Terms

A

Aircraft - 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.

Air Navigation Order - CAP 393 Air Navigation: The Order and the Regulations include the ANO and the Rules of the Air Regulations.

Autonomous Aircraft - An unmanned aircraft that does not allow pilot intervention in the management of the flight.

Autonomous Operation - An operation during which an unmanned aircraft is operating without pilot intervention in the management of flight.

C

Continued Airworthiness - The monitoring, reporting and corrective action processes used for in-service aircraft to assure they maintain the appropriate safety standard defined during the initial airworthiness processes throughout their operational life.

Continuing Airworthiness - The system of management of the aircraft and the scheduling and actioning of ongoing preventative and corrective maintenance to confirm correct functioning and to achieve safe, reliable and cost effective operation.

Command and Control Link (C2) - The data link between the remotely-piloted aircraft and the remote pilot station for the purposes of managing the flight.

Concept of Operations - describes the characteristics of the organisation, system, operations and the objectives of the user.

D

Detect and Avoid - The capability to see, sense or detect conflicting traffic or other hazards and take the appropriate action.

G

Ground Control Station (GCS) - See 'Remote Pilot Station'.

Note: RPS is the preferred term as it enables the consistent use of one term with the same meaning irrespective of its location (e.g. on a ship or in another aircraft).

H

Handover - The act of passing piloting control from one remote pilot station to another.

High Authority - those systems that can evaluate data, select a course of action and implement that action without the need for human input.

Highly Automated - those systems that still require inputs from a human operator (e.g. confirmation of a proposed action) but which can implement the action without further human interaction once the initial input has been provided.

I

Initial Airworthiness - The system used to determine the applicable requirements and establish that an aircraft design is demonstrated to be able to meet these requirements.

L

Lost Link - The loss of command and control link contact with the remotely-piloted aircraft such that the remote pilot can no longer manage the aircraft's flight.

O

Operator - 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.

P

Pilot - The person in direct control of the UA - See also 'Remote Pilot'.

R

Radio Line-Of-Sight (RLOS) - A direct radio link point-to-point contact between a transmitter and a receiver.

Remote Pilot - A person charged by the operator with duties essential to the operation of a remotely-piloted aircraft and who manipulates the flight controls, as appropriate, during flight time.

Remotely Piloted Air System - A remotely piloted aircraft, its associated remote pilot station(s), the required command and control links and any other material relevant to the operation of the remotely piloted aircraft system.

Remote Pilot Station (RPS) - The component of the remotely-piloted aircraft system containing the equipment used to pilot the remotely-piloted aircraft.

Remotely-Piloted Aircraft (RPA) - An unmanned aircraft which is piloted from a remote pilot station.

Remotely-Piloted Aircraft System (RPAS) - 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.

RPA Observer - 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.

RPAS Commander - A trained and competent person who is responsible for the conduct and safety of a specific flight and for supervising the person in direct control of the RPAS. His duties are equivalent to those of an Aircraft Commander.

S

Safety - The state in which risks associated with aviation activities, related to, or in direct support of the operation of aircraft, are reduced and controlled to an acceptable level.

Safety Management System (SMS) - A systematic approach to managing safety, including the necessary organizational structures, accountabilities, policies and procedures.

Sense and Avoid - See 'Detect and Avoid'.

Small Unmanned Aircraft (SUA) - Any unmanned aircraft, other than a balloon or a kite, having a mass of not more than 20 kg without its fuel but including any articles or equipment installed in or attached to the aircraft at the commencement of its flight.

Small Unmanned Surveillance Aircraft (SUSA) - A small unmanned aircraft which is equipped to undertake any form of surveillance or data acquisition.

U

Unmanned Aircraft (UA) - An aircraft which is intended to operate with no human pilot on board, as part of an Unmanned Aircraft System. Moreover a UA:

- is capable of sustained flight by aerodynamic means;

- is remotely piloted and/or capable of degrees of automated or autonomous operation;
- is reusable; and
- is not classified as a guided weapon or similar one-shot device designed for the delivery of munitions.

Note: RPA is considered a subset of UA.

Unmanned Aircraft System (UAS) - An Unmanned Aircraft System comprises individual 'System Elements' consisting of the Unmanned Aircraft (UA) and any other System Elements necessary to enable flight, such as a Remote Pilot Station, Communication Link and Launch and Recovery Element. There may be multiple UAs, RPS or Launch and Recovery Elements within a UAS.

V

Visual Line-Of-Sight (VLOS) Operation - An operation in which the remote pilot or RPA observer maintains direct unaided visual contact with the remotely-piloted aircraft.

SECTION 1

General

Downloaded from https://www.ukcaa.co.uk/

Chapter 1

Introduction

Policy

- 1.1 It is CAA policy that UAS operating in the UK must meet at least the same safety and operational standards as manned aircraft. Thus, UAS operations must be as safe as manned aircraft insofar as they must not present or create a greater hazard to persons, property, vehicles or vessels, whilst in the air or on the ground, than that attributable to the operations of manned aircraft of equivalent class or category.
- 1.2 In consideration of the limited aviation background of some UAS manufacturers and operators, the guidance contained herein is necessarily prescriptive. The CAA will supplement CAP 722 with further written guidance when required. Rules for Avoiding Aerial Collisions are set out in the Rules of the Air Regulations. For the purpose of UAS operations, the 'See and Avoid' principle employed in manned aircraft is referred to as 'Detect and Avoid'.
- 1.3 Edition 6 of CAP 722 introduces a Concept of Operations (ConOps) approach for UAS and moves away from a mass centric classification approach. In doing so it describes how UAS operations should be approached so that all functional areas of the operations are considered.

Scope

- 1.4 The guidance within CAP 722 concerns unmanned aircraft and UAS as they are defined in the Glossary of Terms. It primarily focuses on the aspects connected with Remotely Piloted Aircraft (RPA), whilst acknowledging the potential for autonomous operations in the future.
- 1.5 Military Systems are regulated by the Military Aviation Authority (MAA). All enquiries regarding military RPAS must be made to:
- Military Aviation Authority
Juniper Building
Abbey Wood (North)
Bristol, BS34 8QW
Email: DSA-MAA-EnquiriesMailbox@mod.uk
Internet site: www.gov.uk/government/organisations/military-aviation-authority
- 1.6 Similarly the guidance for operating model aircraft for sporting and recreational purposes is not included, this guidance is published in CAP 658: Model Aircraft: A Guide to Safe Flying.

Chapter 2

Legal Considerations

Policy

The Chicago Convention

- 2.1 As a signatory to the Chicago Convention and a member of ICAO, the United Kingdom undertakes to comply with the provisions of the Convention and Standards contained in Annexes to the Convention save where it has filed a Difference to any of those standards.
- 2.2 Article 3 of the Convention provides that the Convention applies only to civil aircraft and not to State aircraft. State aircraft are defined as being aircraft used in military, customs and police services. No State aircraft may fly over the territory of another State without authorisation. Contracting States undertake when issuing Regulations for their State aircraft that they will have due regard for the safety of navigation of civil aircraft.
- 2.3 Article 8 of the Convention provides that no aircraft capable of being flown without a pilot shall be flown without a pilot over the territory of a Contracting State without special authorisation by that State.
- 2.4 Article 8 of the Convention also requires that “each contracting State undertake to ensure that the flight of such aircraft without a pilot in regions open to civil aircraft shall be so controlled as to obviate danger to civil aircraft”.

Law

European Regulation

- 2.5 EC Regulation 216/2008 (the Basic EASA Regulation) establishes the European Aviation Safety Agency (EASA) and makes provision for Implementing Rules dealing with airworthiness certification, continuing airworthiness, operations, pilot licensing, air traffic management and aerodromes.
- 2.6 Neither the Basic EASA Regulation nor the Implementing Rules apply to aircraft carrying out military, customs, police, search and rescue, firefighting, coastguard or similar activities or services (State aircraft). EU Member States must, however, ensure that such services have due regard as far as practicable to the objectives of the EASA Regulation.
- 2.7 Certain categories of civil aircraft are also exempt from the need to comply with the Basic EASA Regulation and its Implementing Rules. These exempt categories are listed in Annex II to the Basic EASA Regulation (Annex II aircraft).

The exempt categories which are of relevance for UAS are:

- aircraft specifically designed or modified for research, experimental or scientific purposes and likely to be produced in very limited numbers;
- ex-military aircraft; and
- unmanned aircraft with an operating mass of 150 kg or less.

- 2.8 Any aircraft which is subject to the Basic EASA Regulation and Implementing Rules (e.g. an unmanned aircraft more than 150 kg which is neither experimental nor used for State purposes) will be required to have an EASA airworthiness certificate.
- 2.9 An aircraft which is not required to comply with the Basic EASA Regulation, either because it is a State aircraft or because it comes within one of the exempt categories, remains subject to national regulation so far as airworthiness certification and continuing airworthiness are concerned.
- 2.10 Implementing Rules for airworthiness certification and continuing airworthiness have been in force for some years. The Implementing Rule for pilot licensing is also now in force. The Implementing Rules for operations and aerodromes have been made and are coming into force, subject to transition arrangements, during 2014 to 2017. The Implementing Rule for air traffic management will come into force from 2015. Until the Implementing Rules are fully in force, national regulations will continue to apply in certain circumstances. The CAA's website will contain up to date information concerning this transition.
- 2.11 An Implementing Rule is also in force introducing Common Rules of the Air (SERA). These largely replace the UK Rules of the Air 2007 although certain complementary UK rules are being retained.
- 2.12 In the case of the United Kingdom, the National Regulations are as described below.

National Regulation

Civil and Military Regulations

- 2.13 In the United Kingdom, there are two regulatory regimes: civil and military. Military requirements are a matter for the Ministry of Defence. A military aircraft for this purpose includes any aircraft which the Secretary of State for Defence certifies must be treated as a military aircraft.
- 2.14 Any aircraft which is not a military aircraft must, under United Kingdom aviation safety legislation, comply with civil requirements. There is no special provision for other types of non-military State aircraft such as those carrying out police, search and rescue, fire fighting, coastguard or similar activities or services.

The Air Navigation Order 2009

- 2.15 The main civil requirements are set out in the ANO.
- 2.16 The provisions in the ANO concerning equipment requirements, operational rules, personnel licensing, aerodrome regulation and regulation of air traffic services apply to all non-military aircraft, organisations, individuals and facilities.
- 2.17 As explained above, insofar as these national requirements concern airworthiness certification or continuing airworthiness they will only apply to non-military State aircraft and Annex II aircraft. Such aircraft are exempt from the need to comply with the Basic EASA Regulation and Implementing Rules and thus remain subject to national regulation.
- 2.18 A non-military State aircraft or an Annex II aircraft registered in the United Kingdom which is outside the Basic EASA Regulation and Implementing Rules must have a certificate of airworthiness or a permit to fly issued by the CAA (or be operating under A or B Conditions) under the ANO, unless it is:
- an unmanned aircraft of mass 20-150 kg with an exemption from the ANO issued by the CAA (see paragraph 2.2); or
- a 'small unmanned aircraft' as defined in the ANO.
- 2.19 A small unmanned aircraft is defined in the ANO as any unmanned aircraft weighing not more than 20 kg. None of the above main requirements apply to such small aircraft. Instead, a set of conditions are included at Articles 166 and 167 of the ANO subject to which small aircraft may be flown without complying with airworthiness or flight crew licensing requirements. These conditions include a prohibition on flight in controlled airspace or within an aerodrome traffic zone unless in either case the permission of the Air Traffic Control (ATC) unit has been obtained, a normal maximum height of 400 ft above the surface and a prohibition on flight for the purposes of aerial work without the specific permission of the CAA. Article 167 specifically covers the use of small unmanned aircraft for surveillance or data gathering.

Exemptions and Permissions granted by the CAA

- 2.20 A UA which is subject to national regulations and which weighs more than 20 kg is not a 'small unmanned aircraft' for the purposes of the ANO so that all the requirements referred to above (certificate of airworthiness or permit to fly, licensed flight crew) must be complied with. If an aircraft cannot comply with all of these requirements the CAA may be prepared to issue an Exemption under Article 242 of the ANO 2009. To operate a UA which weighs 20 kg or less for aerial work purposes, a CAA Permission is also required as described in ANO 2009 Article 166(5).

Insurance

- 2.21 EC Regulation 785/2004 came into force on 30 April 2005 requiring most operators of aircraft, irrespective of the purposes for which they fly, to hold adequate levels of insurance in order to meet their liabilities in the event of an accident. This EC Regulation specifies amongst other things the minimum levels of third party accident and war risk insurance for aircraft operating into, over or within the EU (including UAS) depending on their Maximum Take-Off Mass (MTOM). Details of the insurance requirements can be found on the CAA website³ under “Mandatory Insurance Requirements”.
- 2.22 UK legislation which details insurance requirements is set out in Civil Aviation (Insurance) Regulations 2005⁴.
- 2.23 The EC Insurance Regulation does not apply to State aircraft or to model aircraft with an MTOM of less than 20 kg.

Lead Agency

- European Aviation Safety Agency – for civil aircraft which are not exempt from the EASA Regulation.
- Civil Aviation Authority – for civil aircraft which are exempt from the EASA Regulation.
- Military Aviation Authority – for United Kingdom military aircraft.
- Department for Transport – for insurance matters.

³ <http://www.caa.co.uk/default.aspx?catid=122&pagetype=90&pageid=4510>

⁴ <http://www.opsi.gov.uk/si/si2005/20051089.htm>

SECTION 2

Approvals

Chapter 1

UAS Classification System

Scope

- 1.1 This chapter gives guidance on the classification philosophy for UAS in the United Kingdom.

UAS Classifications

- 1.2 The current framework established and used by the CAA, and other NAAs, classifies aircraft based on simple discriminants or type (e.g. balloon, fixed or rotary wing) and mass. This reflects the historic developments in manned aviation – but is not necessarily fully appropriate for UAS hence the ConOps approach being taken by the UK. However, until such time as alternative classification protocols are agreed this system is in place.
- 1.3 Working within this means we have very simple categorisations - Table 1 describes these.

Mass Category	Mass (kg)	Responsible Regulatory Body
SUA	0-20	National Aviation Authority
Light UAS	> 20 to 150	National Aviation Authority
UAS	> 150	EASA ⁵

Table 1 - Mass Categories Relating to UAS

- 1.4 Aircraft of greater than 150kg fall within the remit of the EASA Basic Regulation, unless they are outside of this due to the exceptions defined in Annex II, or aircraft carrying out military, customs, police, search and rescue, firefighting, coastguard or similar activities or services (State aircraft). For non-military state aircraft and Annex II aircraft the CAA has based the applicable certification requirements, organisation and operational approvals on those that would be applied by EASA as this provides maximum alignment and would offer potential operating benefits within Europe.
- 1.5 For 150kg and below the assumption is that certification is a fully national process and hence, will automatically be considered for UK operational use only.

⁵ NAA - for Annex II aircraft

Future Classification Development

- 1.6 Work is ongoing within ICAO and JARUS to formulate internationally recognised classifications for UAS. These classifications will likely use mass as a discriminator but will also consider other factors including operating environment and system complexity; this is very much in line with the UK ConOps approach.

Chapter 2

Approval Requirements Map

Scope

- 2.1 This chapter gives guidance to UAS operators on the approach currently taken by the CAA to determine the level of assurance and assessment required prior to the issue of a permission.
- 2.2 This chapter is top level guidance only and is intended to give the community a starting point from which to develop understanding of the requirements. Section 2, Chapter 3 of this publication gives detailed policy and guidance on the approach to be taken when applying for a permission.

Basic Requirements

- 2.3 The CAA ConOps philosophy underpins the approval process (and thus approval requirements) and aims to ensure that the public and other airspace users are not exposed to unacceptable risk introduced by UAS commercial operations.
- 2.4 The CAA approach is to categorise UAS and the intended operations as detailed at Figure 1; all operations will fall into either category A, B or C. Category A may be extended for a higher mass dependent upon the environment and complexity of the system (for example a standard permission for 20kg or less UAS may fall into category A).
- 2.5 In Figure 1, the term 'Technical Complexity' is used to describe how complex the system is (for example number of flight control modes, flight management systems etc.); whereas the term 'Operating Environment Complexity' describes how complex the environment is (for example congested areas, complex airspace, etc.)
- 2.6 There are scenarios that are not described, which will require differing levels of assessment (for example, a very light UAS operating in a complex environment with an extremely complex flight management system). It is therefore essential that operators contact the CAA early in the developmental process to ensure that the correct approach is being taken.

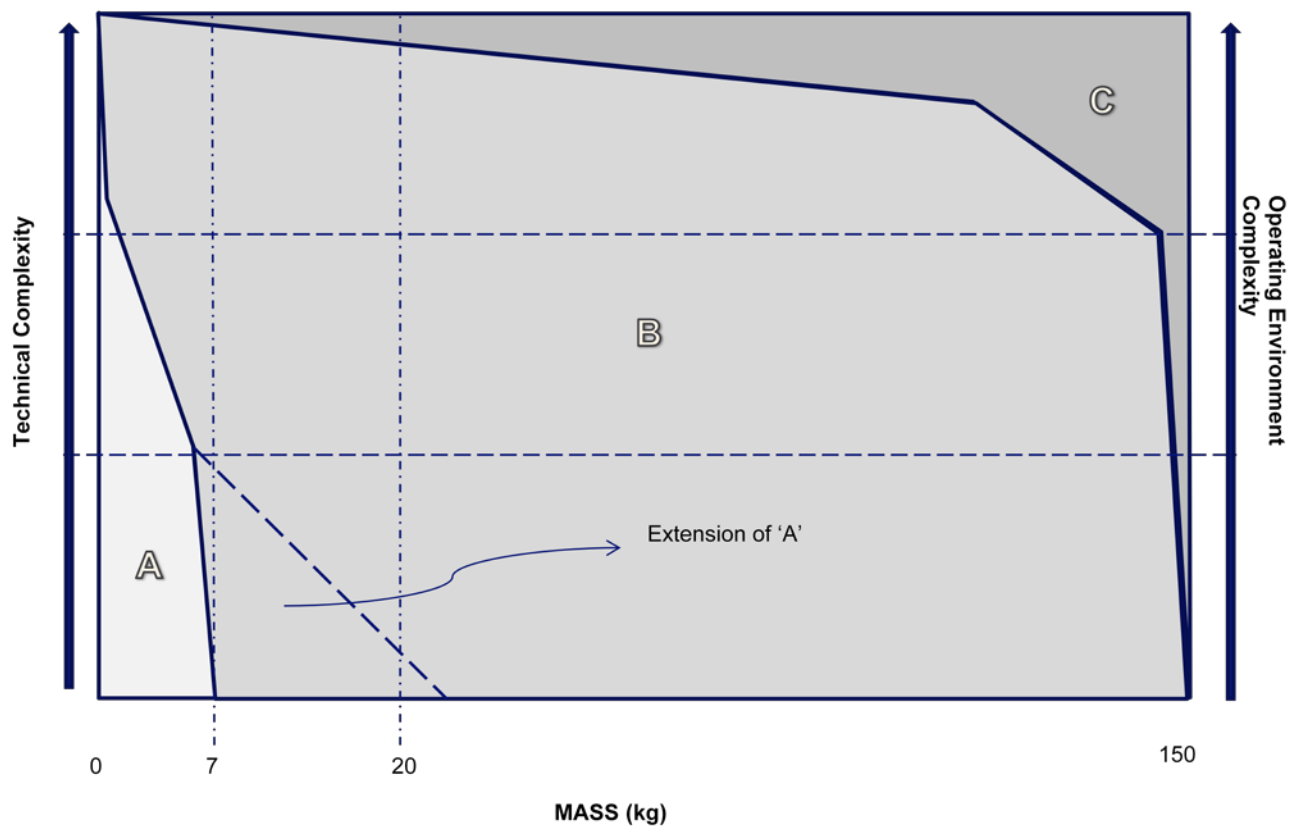


Figure 1 - Simple UAS ConOps Approvals Requirements Map

Approved for Release by NSA on 09-11-2013 pursuant to E.O. 13526

	A	B	C
Airworthiness	No Design, production or other airworthiness approval No Type Certificate (TC) or Type Certification Basis (TCB)	Airworthiness assessment based upon UAS Operating Safety Case (UAS OSC) submission (elements of design, production, continuing and continued airworthiness will be assessed) No design approval or production approval or TC or TCB	TCB agreed Possibility of requirement for TC Design and Production approval required Continuing and continued airworthiness processes assessed
Operational	No Operational Approval required; or, Approval based on UAS OSC Volume 1	Approval based upon UAS OSC Volume 1, 2 and 3 submission	Approval based upon UAS OSC and airworthiness submission; or, more rigorous assessment based loosely on AOC type assessment
Pilot Competence	For 'Standard Permission' evidence of pilot competency required	Evidence of pilot competency required	Evidence of pilot competency required
Operating Environment	Visual Line of Sight Not in densely populated areas Below 400 feet Very low risk environment	Congested Areas Complex environment where third party risks are judged to be above that of a 'standard permission'. VLOS, EVLOS	Congested Areas; and/or, High risk environment; and/or, BVLOS, BRLOS etc.; and/or, Complex airspace
Influencing Factors	Low complexity, low mass, benign operating environment	Low to medium complexity Congested areas or higher risk environment than 'A' Increased mass	Highly complex; and/or high mass; and/or, Densely populated or high risk environment Overflight of groups of people Complex flight profiles Swarming or multiple UAs under the control of one operator.

Table 2 - UAS Approval Categories

Chapter 3

Approval to Operate

Scope

- 3.1 This Chapter gives guidance on the approval application requirements and processes to operate UAS in the UK.

Introduction

- 3.2 All civil aircraft fly subject to the legislation of the Air Navigation Order 2009 (ANO) and the associated Rules of the Air Regulations. However, in accordance with its powers under Article 242 of the ANO, the CAA may exempt UAS operators from the provisions of the ANO and the Rules of the Air, depending on the UA's potential to inflict damage or injury and the proposed area of operation. Small Unmanned Aircraft (SUA) are exempted from most of the provisions of the ANO and Rules of the Air Regulations by the provisions of Article 253.
- 3.3 Changes, updates and further information are published on the CAA website⁶.

Approvals, Permissions and Exemptions

- 3.4 The CAA may issue an exemption or permission for UA to operate if the applicability criteria detailed in Table 2 are met and the CAA is satisfied that the UA will be operated within the constraints stipulated. If a UA is intended for operation outside these constraints, the applicant must submit a UAS OSC and discuss these issues directly with the CAA.

Aircraft Mass	Airworthiness Approval	Registration	Operating Permission	Pilot Qualification
20 kg and less	No	No	Yes (Note 1)	Yes (Note 1& 2)
More than 20 kg, up to and including 150 kg	Yes (Note 3)	Yes (Note 3)	Yes	Yes (Note 2)
More than 150 kg	EASA approval; or, CAA approval in certain cases (e.g. Annex 2 aircraft) (Note 3)	Yes	Yes	Yes (Note 2)

Table 3 - Prerequisites for Operating a UA

⁶ www.caa.co.uk/uas

Notes:

1. Applicable for aircraft used for Aerial Work purposes or if flown within a congested area or close to people or property.
2. Equivalent pilot experience will be considered on a case-by-case basis during application for an operating permission.
3. It may be possible to obtain certain exemptions from the airworthiness and registration requirements.

3.5 A CAA permission only addresses the flight safety aspects of the flight operation and does not constitute permission to disregard the legitimate interests of other statutory bodies such as the Police and Emergency Services, the Highway Agency, Data Commission, Transport for London or local authorities.

3.6 The following permissions and exemptions are required prior to operation:

- Operators who intend to conduct aerial work using SUA are required to apply for a permission from the CAA in accordance with ANO 2009 Article 166(5).
- Operators of unmanned aircraft over 20 kg are required to apply for an exemption from the CAA. Any aerial work aspects will also be covered within this exemption.
- Operators who intend to fly a Small Unmanned Surveillance Aircraft (SUSA) within the separation criteria of ANO 2009 Article 167(2) are required to apply for a permission from the CAA and must submit a safety case including a risk assessment of the operation.

3.7 The provision of images or other data solely for the use of controlling or monitoring the aircraft is not considered to be applicable to the meaning of 'Surveillance or Data Acquisition' covered at ANO 2009 Article 167 for SUSA.

Meaning of Aerial Work

3.8 ANO 2009 Article 259 'Meaning of Aerial Work' details that a flight is for the purpose of aerial work if valuable consideration is given or promised in respect of the flight or the purpose of the flight.

3.9 The article must be carefully consulted to determine if any flight will be considered as aerial work. An additional document 'Summary of the Meaning of Commercial Air Transport, Public Transport and Aerial Work' is also available on the CAA website⁷.

3.10 Flying operations such as research or development flights conducted 'in house' are not normally considered as aerial work provided there is no valuable

⁷ www.caa.co.uk/uas

consideration given or promised in respect of that particular flight.

Operations

Visual Line of Sight (VLOS)

- 3.11 Operating within Visual Line of Sight means that the Remote Pilot is able to maintain direct, unaided (other than corrective lenses) visual contact with the UA which is sufficient to monitor its flight path in relation to other aircraft, persons, vessels, vehicles and structures for the purpose of avoiding collisions. Within the UK, VLOS operations are normally accepted out to a maximum distance of 500 m horizontally and 400 ft vertically from the Remote Pilot. Operations at a greater distance from the Remote Pilot may be permitted if an acceptable safety case is submitted. For example, if the aircraft is large it may be justifiable that its flight path can be monitored visually at a greater distance than 500 m. Conversely, for some small aircraft, operations out to a distance of 500m may mean it is not possible to assure or maintain adequate visual contact.

Extended Visual Line of Sight (EVLOS)

- 3.12 EVLOS operations are operations, either within or beyond 500 m / 400 ft, where the Remote Pilot is still able to comply with his collision avoidance responsibilities, but the requirement for the Remote Pilot to maintain direct visual contact with the UA is addressed via other methods or procedures. It is important to note, however, that collision avoidance is still achieved through 'visual observation' (by the Remote Pilot and/or RPA Observers).
- 3.13 The operator must submit a safety case including a risk assessment for the operation. Factors taken into consideration must include:
- the procedures for avoiding collisions;
 - aircraft size;
 - aircraft colour and markings;
 - aircraft aids to observation;
 - meteorological conditions and visibility, including background conditions (cloud / blue sky);
 - the use of deployed observers; and
 - operating range limits - suitable radio equipment must be fitted in order to be able to effect positive control over the UA at all times.

Beyond Visual Line of Sight (BVLOS)

- 3.14 Operation of a UA beyond a distance where the Remote Pilot is able to respond to or avoid other airspace users by visual means is considered to be a BVLOS

operation.

- 3.15 UA intended for operation beyond visual range of the pilot will require an approved method of aerial separation and collision avoidance that ensures compliance with Rule 8 of the Rules of the Air Regulations 2007 (Rules for avoiding aerial collisions), or will be restricted to operations within segregated airspace. Note: this requirement to avoid collisions applies to all flights conducted under IFR and to flights made with an ATC clearance, as well as to flights under VFR.

Insurance

- 3.16 UAS Operators must comply with Regulation (EC) 785/2004 (Article 2) on Insurance Requirements for Air Carriers and Aircraft Operators. Operators of SUA are advised to consult the Regulation to determine a minimum suitable level of insurance (see Section 1, Chapter 2).

UAS OSC Requirements

- 3.17 Formerly known as the 'Congested Areas Operating Safety Case (CAOSC)⁸', the UAS Operating Safety Case (UAS OSC) has been devised using the ConOps methodology to give a flexible method by which the applicant can provide the CAA with a safety argument for intended operations. Each application for a permission to operate must be accompanied by a UAS OSC (templates for the separate volumes of the UAS OSC are at the Appendices).
- 3.18 Table 4 below provides UAS OSC requirements guidance when applying for a permission to operate.

⁸ All applications made using the CAOSC template prior to the publication of Edition 6 of CAP 722 will be accepted by the CAA

Mass (kg)	Operating examples	Volume 1	Volume 2	Volume 3
0-7	Standard Permission	Required	Recommended	Recommended
	<50m in CA	Required	Required	Required
>7-20	Standard Permission	Required	Recommended	Recommended
	<150m in CA	Required	Required	Required
>20-150	Low Complexity UAS and/or Rural Environment	Required	Recommended	Required
	Low Complexity UAS and/or Semi-rural ⁹	Required	Required	Required
	High Complexity UAS and/or Complex Airspace ¹⁰	Required	Required	Required

Table 4 – Aerial Work UAS OSC Approval Requirements UAS 0-150 kg

Requirements for Small Unmanned Aircraft

3.19 The table below details the applicable legal requirements in articles 166 and 167 of the ANO 2009 for the operation of any SUA dependent upon the mass of the aircraft and whether or not it is surveillance equipped¹¹.

The requirements in the ANO 2009 for SUA (Small Unmanned Aircraft of masses between 0 and 20 kg)	SUA 0-7 kg	SUA >7 kg	SUSA 0-7 kg	SUSA >7 kg
166(1)	✓	✓	✓	✓
166(2)	✓	✓	✓	✓
166(3)	✓	✓	✓	✓
166(4) (a), (b), (c)		✓		✓
166(5)	✓	✓	✓	✓

⁹ May require more formal airworthiness certification

¹⁰ Will require more formal airworthiness certification

¹¹ The CAA-issued permission may allow some exemptions against Article 167(1) and (2) dependent upon the mass of the aircraft.

The requirements in the ANO 2009 for SUA (Small Unmanned Aircraft of masses between 0 and 20 kg)	SUA	SUA	SUSA	SUSA
	0-7 kg	>7 kg	0-7 kg	>7 kg
167(1)&(2) (a),(b),(c),(d)			✓	✓
167(3)&(4)			✓	✓

3.20 The CAA-issued Permission for aerial work has been updated as follows. The current ANO Articles 166 and 167 Permission document is produced in two categories: Permission for SUA not exceeding 7 kg and Permission for SUA of greater than 7 kg but not exceeding 20 kg. Both these Permission documents list the actual type(s) (models) of aircraft that the operator intends to operate. In line with adjusting to the future structure, 'standard' permissions will not list specific types (models) but will grant permission to fly any SUA within one or more of the following classes:

- SUA multirotor with a maximum take-off mass (MTOM) not exceeding 7 kg.
- SUA multirotor with a MTOM greater than 7 kg but not exceeding 20 kg.
- SUA fixed-wing with a MTOM not exceeding 7 kg.
- SUA fixed-wing with a MTOM greater than 7 kg but not exceeding 20 kg.

3.21 Within each class, the applicant will be free to vary or add SUA as they wish without the requirement to undertake a practical flight assessment for each individual machine or when adding or changing to a new type (model). Both categories of NQE (see below) should make their recommendations to the CAA in one or more of the above classes. Existing Permissions, although currently listing individual aircraft, will automatically have the same privileges.

Small Unmanned Aircraft Systems in Congested Areas

Congested Areas

3.22 ANO 2009 Article 255 defines the meaning of 'Congested Areas'. The definition states that a 'Congested Area' means any area in relation to a city, town or settlement which is substantially used for residential, industrial, commercial or recreational purposes. Operations of SUA within congested areas may be permitted in specific locations on the basis of a UAS OSC being submitted as part of an application for aerial work. Separation distances from persons, vessels, vehicles and structures (dependent on whether or not they are under the control of the Remote Pilot) must be specified in the UAS OSC.

Protection of Third Parties

3.23 Under ANO 2009 Article 138, operators of SUA must not recklessly or

negligently cause or permit their aircraft to endanger any person or property. SUA flights within the densely-populated urban environment have a high probability of causing endangerment unless conditions are put on their use so that they reduce the risk to third parties, i.e. the general public. SUA do not currently have any recognised design, certification or other airworthiness standards and therefore operational restrictions have been established that limit the circumstances and locations at which the aircraft can be operated. Each specific limitation can only be varied or exempted in accordance with a permission or exemption granted by the CAA. For operations in congested areas, a SUA operator will need to apply to the CAA for permission to fly a camera-equipped SUA (i.e. a SUSA):

- Over or within 150 metres of any congested area.
- Over or within 150 metres of an organised open-air assembly of more than 1,000 persons.
- When not engaged in take-off or landing, within 50 metres of any person, vessel, vehicle or structure which is not under the control of the person in charge of the aircraft (during take-off or landing this may be reduced to 30 metres or less if attendant persons are under the control of the person in charge of the aircraft).

3.24 Such a permission would be suitable for those SUA operators that find they are frequently engaged in towns and cities to carry out work for film and TV productions, advertising agencies, marketing or other publicity events, photographic work for large property developments or survey or infrastructure inspections at industrial sites, etc. There is no guarantee that permission can be granted to reduce these distances.

Standard Permissions

3.25 The standard CAA permission for SUA/SUSA in the 7 kg or less category allows flight in congested areas to within 50 metres of persons, structures etc. (or within 30 metres if the persons are under the control of the person in charge of the aircraft). This category of SUA/SUSA cannot fly within 150 metres of open-air assemblies of 1,000 people or more where only a standard permission has been granted.

3.26 The standard CAA permission for SUA/SUSA in the mass category of above 7kg but not exceeding 20 kg does not normally allow flight within congested areas. An operator may apply, utilising the UAS OSC, to the CAA to have their existing permission varied.

3.27 In any circumstances or mass category, it must be noted that flights directly overhead persons and vehicles will not be allowed at any height in a congested area, or otherwise, unless these vehicles and persons are under the control of

the person in charge of the aircraft.

Person under the Control of the Person in Charge

3.28 Persons under the control of the person in charge of the aircraft can generally be defined as:

- Persons solely present for the purpose of participating in the SUA flight operation.
- Persons under the control of the event or site manager who can reasonably be expected to follow directions and safety precautions to avoid unplanned interactions with the SUA. Such persons could include building-site or other industrial workers, film and TV production staff and any other pre-briefed, nominated individuals with an essential task to perform in relation to the event.

3.29 Spectators or other persons gathered for sports or other mass public events that have not been specifically established for the purpose of the SUA operation are not regarded as being 'under the control of the person in charge of the aircraft'.

3.30 In principle, persons under the control of the person in charge of the aircraft at a mass public event must be able to:

- elect to participate or not to participate with the SUA flight operations;
- understand the risk posed to them inherent in the SUA flight operations;
- have reasonable safeguards instituted for them by the site manager and SUA operator during the period of SUA flight operations;
- not have restrictions placed on their engagement with the purpose of the event or activity for which they are present if they do not elect to participate with the SUA operation.

Note: As an example, it is not sufficient for persons at a public event to have been informed of the operations of the SUA via such means as public address systems, website publishing, e-mail, text and electronic or other means of ticketing, etc. without being also able to satisfy the points above. Permissions have, however, occasionally been granted for SUA flights at public events and these involved a segregated take-off site within the main event, with the SUA operating only vertically within strict lateral limits that keep it directly overhead the take-off site. Such flights were also limited by a height restriction and the tolerance of the SUA to wind effects and battery endurance.

3.31 Further guidance on Operational Factors for SUA Flights within Congested Areas can be found at Appendix A to this publication.

Application Process

- 3.32 In order to ensure that sufficient safety measures have been put in place, operators that are required to apply for permission from the CAA will be asked to demonstrate that they have considered the safety implications and taken the steps necessary to ensure that the UA will not endanger anybody.
- 3.33 It is important to understand that it is the operator (defined in ANO 2009 Article 255 - i.e. the person having management of the UA, and not another person who may, for example, have contracted with the operator to have work done) who must apply for an exemption or permission.
- 3.34 Applications for an exemption or permission must be made using the application form (www.caa.co.uk/SRG1320). Submission of applications for UA with an operating mass of 150 kg or less may be submitted direct to the CAA or to an appropriately approved Qualified Entity (see below). All submissions for UA over 150 kg must be submitted, in the first instance, directly to the CAA.

National Qualified Entities

- 3.35 The CAA approves National Qualified Entities (NQE) to conduct assessments of operators and make recommendations to the CAA based upon these assessments. The NQE will validate the submission and then forward a recommendation for the granting of a permission to the CAA.

NQE Application and Approval System

- 3.36 NQE approvals will be assigned in one of two categories:
- **Full Category.** A Full Category NQE approval corresponds to the pre-existing, conventional approval for an NQE to assess the full range of pilot competency and to act as a 'one-stop shop' for candidates with no existing aviation qualifications or experience. In the move to the new structure, some of the more onerous NQE organisational requirements have been eliminated and a reduced annual fee structure has been introduced. A Full Category NQE must be able to provide a full course but can also choose to offer the individual critical elements to suitable applicants as required. The approval requirements for an organisation to act as a Full Category NQE are set out at Appendix E to this document.

- **Restricted Category.** The Restricted Category NQE approval has been instituted to allow existing 'standard' permission holders to act as a restricted NQE where they will only be approved to conduct practical flying assessments in addition to their general commercial activities. Restricted Category NQE organisations/individuals must have held at least a 'standard' Permission from the CAA for a minimum of one year before they can apply for NQE status. In addition, trade, industry and permission-holder membership organisations wishing to run voluntary coaching and proficiency courses may also apply for an NQE approval, as long as their members who intend carry out practical flying assessments are current permission holders in their own right. The approval requirements for an organisation to act as a Restricted Category NQE are set out at Appendix E to this document.

3.37 NQE organisations should note that Full and Restricted Category approvals granted under this process are UK National approvals only and do not confer any form of approval under European legislation. Specifically, a UK NQE is not a Qualified Entity as defined in Regulation (EC) No. 216/2008 ('The Basic Regulation').

3.38 The CAA has not hitherto stipulated practical flight assessment standards and has allowed UK NQEs to be flexible in designing the actual test conditions. This practice is likely to continue until such time as national or European regulation defines practical test standards for SUA equivalent to those required for national or European Aviation Safety Agency (EASA) Part-FCL flight crew licences. UK NQEs should however ensure that their students are able to satisfactorily demonstrate at least the following skills during the practical flight assessment:

- Pre-flight actions including:
 - Mission planning, airspace considerations and site risk-assessment.
 - Aircraft pre-flight inspection and set-up (including flight controller modes and power-source hazards).
 - Knowledge of the basic actions to be taken in the event of an aircraft emergency or if a mid-air collision hazard arises during the flight.
- In-flight procedures including:
 - Maintaining an effective look-out and keeping the aircraft within Visual Line of Sight (VLOS) at all times.
 - Performing accurate and controlled flight manoeuvres at representative heights and distances (including flight in 'Atti' mode (non-GPS assisted) or equivalent where fitted).
 - Real-time monitoring of aircraft status and endurance limitations.

- Demonstration of a 'return-to-home' function following deliberate control-link transmission failure. Fixed-wing aircraft may demonstrate an equivalent procedure that results in a suitable automated, low-impact descent and landing.
- Post-flight actions including:
 - Shutting down/making-safe the aircraft.
 - Post-flight inspection and recording of any relevant data relating to aircraft general condition, aircraft systems, aircraft components and power-sources, controller functionality and crew health and fatigue.

3.39 It is important to note that approved NQEs offering practical flight assessments must not carry out any 'on-the-job' training or assessment of students during their own normal commercial work activity. Student attendance during such events should only be in the guise of observer status, ancillary to any employee contractual obligations. Prospective NQEs should therefore carefully consider their own legal liability under the relevant commercial and private activity legislation before exposing their students to any work-place related hazard as may be found at public and private venues, building sites, film-sets, etc.

3.40 Details of all approved NQEs can be found on the CAA website¹².

Regulatory Enforcement

3.41 The CAA takes breaches of aviation legislation seriously and will seek to prosecute in cases where dangerous and illegal flying has taken place.

3.42 More information on the regulation of SUA, including a list of operators with permission to fly SUA for commercial use, is available at www.caa.co.uk/uas.

Source Documents

- CAP 393 Air Navigation: The Order and the Regulations.
- CAP 032 UK Aeronautical Information Publication.

¹² www.caa.co.uk/uas

Chapter 4

Civil UAS Remote Pilot Competency

Scope

- 4.1 This Chapter applies to all civil UAS operations in United Kingdom airspace. State (non military) operated UAS are expected to comply with this Chapter, unless otherwise directed by the CAA.
- 4.2 UAS operations conducted for the purposes of testing or development under Design, Production or Maintenance approvals are expected to comply with this Chapter as far as is practicable. However, qualification requirements for Remote Pilots engaged in such operations will be assessed by the CAA at the point of submission for operating approval.

Policy

- 4.3 The requirements for the licensing and training of United Kingdom civil Remote Pilots have not yet been fully developed. It is expected that United Kingdom requirements will ultimately be determined by ICAO Standards and Recommended Practices (SARPs) and EASA regulations.
- 4.4 ICAO is currently developing standards for a Remote Pilot's License (RPL). However until formal licensing requirements are in place the CAA will determine the relevant requirements on a case-by-case basis. In determining whether to permit a person to act as pilot or commander of a UAS, the CAA will consider a number of factors (based upon the ConOps approach) such as pilot experience, maximum aircraft mass, flight control mode, operational control and safety assessment.

Maximum Operating Mass

- 4.5 UAS are currently classified into four categories relating to aircraft mass; the flight crew qualification requirements are related to these. Table 5 details the anticipated qualification level requirement for pilots of UAS in the relevant aircraft mass category.

Operating Mass (maximum)	Pilot Competency / Licensing Requirements
7 kg or less	None, or NQE competency assessment or AMC

Operating Mass (maximum)	Pilot Competency / Licensing Requirements
More than 7 kg to 20 kg	None, RPL,NQE competency assessment or AMC
More than 20 kg to 150 kg	RPL, NQE competency assessment or equivalent
More than 150 kg	RPL or equivalent

Table 5 Unmanned Aircraft Mass Related Pilot Competency and Licensing Requirements

UAS Flight Control Mode

- 4.6 Remote Pilots will also be required to meet training and testing requirements for each class or type of UAS they will operate. UAS type or class ratings may be determined on the basis of individual type in the case of larger aircraft, or by class for smaller ones. In seeking to determine whether a particular UAS will be rated according to type or class, the CAA will take into consideration the classification or certification of the UAS, and whether the UAS will be flown by Remote Pilots dedicated to the type.

Small UAS - Pilot Competency Alternative Means of Compliance

Grant of an SUA Permission – Critical Elements

- 4.7 The CAA has identified three critical elements which, taken together, constitute acceptable evidence of pilot competency. These three elements are:
- Adequate theoretical knowledge/general airmanship;
 - Successful completion of a practical flight assessment on the class of SUA that is being applied for; and
 - A minimum amount of recent flying experience on the class of SUA that is being applied for.
- 4.8 Although completion of all three elements constitutes acceptable evidence of pilot competency, the CAA also requires the submission and acceptance of an operations manual in each case before the Permission itself can be granted.
- 4.9 The CAA accepts recommendations from approved NQEs in order to grant a 'standard' Permission for aerial work. The traditional NQE route allows an individual with no formal pilot qualifications or experience to undertake a course which can lead to a recommendation to the CAA for a grant of a CAA Permission. The courses cover all of the critical elements mentioned in paragraph 4.7 plus an assessment of the student's operational procedures as set

out in their operations manual (Vol 1 of the UAS OSC). On successful completion of the course, the applicant will be granted a certificate by the NQE (typically the Basic National UAS Certificate – Small (BNUC-S™)/Remote Pilot Qualification (RPQ), etc). The Permission applicant is then able to apply through the NQE or directly to the CAA for the grant of a CAA Permission that will allow aerial work (flights for commercial purposes). The operations manual (ideally in electronic .pdf format) should accompany the formal application on form SRG 1320 www.caa.co.uk/srg1320, along with electronic copies of the critical evidence of pilot competency and the correct fee.

- 4.10 As the SUA industry has developed, the CAA has been increasingly asked to accept alternative qualifications and methods of demonstrating pilot competency other than those provided through the NQE route. Many recent applicants for a Permission have formal aviation qualifications, hobbyist certificates or recent flight experience that are highly relevant for fulfilling the critical elements set out in paragraph 4.7 above. An analysis of the critical elements points towards the practical flight assessment as being the single most essential of the elements as small unmanned multirotor and fixed-wing aircraft have unique flight and control systems and characteristics. Unless an applicant has already been objectively assessed by a third-party (such as through the British Model Flying Association (BMFA) certificate system), then there still exists a need for applicants to complete this critical element through an independent assessment.
- 4.11 Following this recent review of operational policy, the CAA will now accept alternative methods of satisfying the critical elements in addition to completing a full NQE course. This will necessitate changes to the NQE approval system so that although a practical flight assessment will still need to be undertaken, completion of a full course will only be generally applicable to students with no existing aviation qualifications or experience. The changes to the NQE system are set out at Section 2 Chapter 3. Acceptable alternatives to fulfil the critical elements (evidence of pilot competency) are shown at Table 5.

Other Factors

- 4.12 Prior to the implementation of formal UAS Remote Pilot licensing requirements, the CAA will consider factors such as the arrangements for operational control of a UAS, and the safety risk assessment of a proposed UAS operation, when considering whether to permit an application for a person to act as a Remote Pilot.

Flight Radio Telephony Operators' Licence

- 4.13 Remote Pilots intending to use radiotelephony must ensure that they hold a Flight Radio Telephony Operators' Licence (FRTOL) valid for the privileges intended to be exercised.

	(a)	(b)	(c)	(d)
	Existing Aviation Qualification:	Critical Element: Theoretical Knowledge Requirement / General Airmanship (no requirement for annual renewal)	Critical Element: Initial Practical Flight Assessment Requirement (no requirement for annual renewal)	Critical Element: Experience Requirement (annual renewal)
1	Nil	Completion of a Full Category NQE course		2 hours total flight experience logged within the last 3 calendar months on the class of SUA for which a Permission is sought. Pilots may self-certify through logbook entries.
2	Current EASA Fixed-Wing, Helicopter or Microlight license	Nil	Pilot flight skills assessment verified to the CAA by a Full or Restricted Category NQE in at least one of the following four classes: a) SUA multirotor with a maximum take-off mass (MTOM) not exceeding 7 kg. b) SUA multirotor with a MTOM greater than 7 kg but not exceeding 20 kg. c) SUA fixed-wing with a MTOM not exceeding 7 kg. d) SUA fixed-wing with a MTOM greater than 7 kg but not exceeding 20 kg.	
3	Current UK National Fixed-Wing, Helicopter or Microlight license	Nil		
4	UK Military pilot / remote pilot or RPAS operator qualification (applicable where basic flight training has been carried out in non-segregated UK airspace) RAF VGS Instructor qualifications commencing at G1 Instructor level are also acceptable	Nil		
5	British Gliding Association (BGA) - Bronze 'C' and above (or EASA equivalent)	Nil		
6	BMFA 'A' or 'B' Certificates	Nil	Nil. Helicopter certificate accepted for multirotors	
7	Non-UK SUA/RPAS qualification/license Other lapsed pilot licences or certificates	Case-by-case CAA assessment		

Table 5 - Pilot Competency Criteria for Small Unmanned Aircraft Permission under ANO articles 166 and 167

SECTION 3
Policy

Chapter 1

CAA Policy on Detect and Avoid Capability

Scope

- 1.1 This Chapter offers guidance to industry on how to satisfy the requirements for a Detect and Avoid functions.

Introduction

- 1.2 A significant increase in both civil and military UAS flying is anticipated, most of which will require access to some if not all classes of airspace if it is to be both operationally effective and commercially viable. To achieve this, UAS will have to be able to meet the existing safety standards applicable to equivalent manned aircraft types, appropriate to the class (or classes) of airspace within which they are intended to be operated.

Aim

- 1.3 The aim of this policy statement is to clarify the position of the CAA in respect of its role in assisting the UAS industry to find solutions to achieving a capability and level of safety which is equivalent to the existing 'see and avoid' concept. It is also recognised that the Detect and Avoid capability is only one of a number of requirements that will need to be addressed for safe operation of UAS.

Policy

General

- 1.4 The overriding principle when assessing if proposed UAS Detect and Avoid functions are acceptable is that they must not introduce a greater hazard than currently exists for manned aviation. Any proposed functions must demonstrate at least equivalence with manned aircraft safety standards and, where these standards exist, the UAS must comply with the rules and obligations that apply to manned aircraft including those applicable to separation and collision avoidance.

Separation Assurance and Collision Avoidance Elements

- 1.5 There are two distinct and potentially independent elements to a Detect and Avoid capability, as described below. It must be noted that the remote pilot could act as an element within one or both of these elements, subject to being able to affect the desired outcome.

Detect Function

- 1.6 The detect function is intended to identify potential hazards (other aircraft, terrain, weather etc.) and notify the appropriate mission management and navigation systems.

Avoid Function

- 1.7 The avoid function may be split down into two parts:

- **Separation Assurance:**

This term is used to describe the routine procedures and actions that are applied to prevent aircraft getting into close proximity with each other. Any resolution manoeuvring conducted at this stage must be conducted in accordance with the Rules of the Air. When flying in airspace where the provision of separation is the responsibility of ATC, however, the Remote Pilot must manoeuvre the aircraft in accordance with ATC instructions, in the same fashion as is done for a manned aircraft.

- **Collision Avoidance:**

This is the final layer of conflict management and is the term used to describe any emergency manoeuvre considered necessary to avoid a collision; such a manoeuvre may contradict the Rules of the Air or ATC instructions. While the Remote Pilot would normally be responsible for initiating a collision avoidance manoeuvre, an automatic function may be required in order to cater for collision avoidance scenarios where the Remote Pilot is unable to initiate the manoeuvre in sufficient time, e.g. due to command and control (C2) latency issues or lost link scenarios.

- 1.8 The Detect and Avoid (separation and collision avoidance) capabilities must be able to:

- Detect and avoid traffic (air and ground operations) in accordance with the Rules of the Air;
- Detect and avoid all airborne objects, including gliders, hang-gliders, paragliders, microlights, balloons, parachutists etc.;
- Enable the Remote Pilot to determine the in-flight meteorological conditions;
- Avoid hazardous weather;
- Detect and avoid terrain and other obstacles;
- Perform equivalent functions, such as maintaining separation, spacing and sequencing that would be done visually in a manned aircraft.