MINISTRY OF DEFENCE

Joint Doctrine Note 3/10

Unmanned Aircraft Systems: Terminology, Definitions and Classification

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JOINT DOCTRINE NOTE 3/10

UNMANNED AIRCRAFT SYSTEMS: TERMINOLOGY, DEFINITIONS AND CLASSIFICATION

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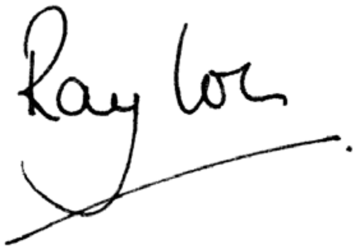

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JOINT DOCTRINE PUBLICATIONS

The successful conduct of military operations requires an intellectually rigorous, clearly articulated and empirically-based framework of understanding that gives advantage to a country's Armed Forces, and its likely partners, in the management of conflict. This common basis of understanding is provided by doctrine.

UK doctrine is, as far as practicable and sensible, consistent with that of the North Atlantic Treaty Organization (NATO). The development of national doctrine addresses those areas not covered adequately by NATO; it also influences the evolution of NATO doctrine in accordance with national thinking and experience.

Endorsed national doctrine is promulgated formally in JDPs.[1] From time to time, Interim JDPs (IJDPs) are published, caveated to indicate the need for their subsequent revision in light of anticipated changes in relevant policy or legislation, or lessons arising out of operations.

Urgent requirements for doctrine are addressed through Joint Doctrine Notes (JDNs). To ensure timeliness, they are not subject to the rigorous staffing processes applied to JDPs, particularly in terms of formal external approval. Raised by the DCDC, they seek to capture and disseminate best practice or articulate doctrinal solutions from which this can be developed for operations and training.

Details of the joint doctrine development process and the associated hierarchy of JDPs are to be found in JDP 0-00 *Joint Doctrine Development Handbook*.

[1] Formerly named Joint Warfare Publications (JWPs).

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PREFACE

1. **Purpose**. Joint Doctrine Note (JDN) 3/10 *Unmanned Aircraft Systems: Terminology, Definitions and Classification* defines Unmanned Aircraft System (UAS) phraseology for use within the UK military and describes the classification methodology to be used when discussing such systems.

2. **Context**. The rapid, at times almost chaotic, development of UAS over the last 10 years has led to a range of terminology appearing in both military and civilian environments. As a result, some legacy terminology has become obsolete, while differing national viewpoints have made it difficult to achieve standardisation on new terms. The North Atlantic Treaty Organization (NATO), has yet to adopt standard phraseology, although the Joint Unmanned Aerial Vehicle Panel[2] (JUAVP) has now made firm recommendations to the Air Operations Working Group (AOWG) on the way ahead within NATO. Similarly, Unmanned Aircraft (UA)-related concepts such as *autonomous* and *automated* suffer from widely differing definitions, even within the UK, and no single Joint UK classification system of unmanned aircraft by type has been agreed before now. All of these areas have the potential to cause confusion or misunderstanding when unmanned aircraft issues are discussed between military, industrial and academic audiences. This JDN outlines the standard UK military terminology and classification to be used when describing unmanned and remotely piloted aircraft within UK Defence and when working with NATO and other international partners. UK based academia and industry are encouraged to adopt the standard to improve interoperability.

3. **Structure**. JDN 3/10 has 2 Chapters:

a. Chapter 1 details terminology and definitions.

b. Chapter 2 describes a methodology for unmanned aircraft classification by type.

LINKAGES

4. JDN 3/10 supports and updates the terminology in a range of Air Publications including JDN 2/06 *Countering the UAV Threat* and AP3000 (4th Edition) *British Air and Space Power Doctrine.* It is also a precursor to a forthcoming DCDC Joint Concept Note on *UAS Development and Utilisation* and pre-empts the inclusion of UAS issues in the next edition of AJP-3.3(B) *Allied Joint Doctrine for Air and Space Operations.*

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[2] Held March 2010.

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UNMANNED AERIAL SYSTEMS TERMINOLOGY, DEFINITIONS AND CLASSIFICATION

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CHAPTER 1 – TERMINOLOGY AND DEFINITIONS

SECTION I – OVERVIEW

101. The origins of unmanned aircraft can be traced back to World War I; but it is the last decade that has seen extraordinary development and progress in unmanned aircraft technology and capability. Much of the original terminology has, as a result, become outdated and manufacturers and operators have created a new descriptive language for the aircraft, their capabilities and consequent issues. As systems have matured, there is an increasing requirement for standardised terminology. This Joint Doctrine Note (JDN) represents the current UK Joint position. It should be noted that much existing manned aircraft terminology remains equally relevant to unmanned aircraft operations.

102. The term Unmanned Aerial Vehicle (UAV) has been used extensively in the UK, although its use is no longer aligned with North Atlantic Treaty Organization (NATO) and US thinking and, in the interests of interoperability, UAV should now be considered a legacy term.[3] A recent NATO Joint Unmanned Aerial Vehicle Panel (JUAVP)[4] was tasked to re-examine unmanned aircraft related terminology from first principles and to make recommendations on the way ahead; JDN 3/10 largely reflects the outcome of that discussion and subsequent recommendations, noting that it is UK policy to adopt NATO doctrine whenever practicable.[5]

103. As unmanned aircraft grow in numbers comparable to, or in future exceeding, manned aircraft, nations will increasingly operate mixed fleets. When building a descriptive taxonomy to describe such mixed systems, it is logical to use the same root word, aircraft,[6] for both. Appropriate prefixes or suffixes might then be added, for example to indicate how they are controlled, or to indicate a specific role, capability or environment. The generic term 'unmanned aircraft' is defined in Section II.[7]

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[3] It is acknowledged that the acronym Unmanned Aerial Vehicle (UAV) has considerable 'momentum' behind its usage and that it will take time to disappear from the lexicon.

[4] JUAVP held March 2010.

[5] JDP 0-01 *British Defence Doctrine* paragraph 408d.

[6] An aircraft is defined by the International Civil Aviation Organisation (ICAO) as '*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*'.

[7] Similarly, phraseology such as Unmanned Combat Air Vehicle (UCAV) and Operational Unmanned Aircraft System (OUAS) are legacy terms related to specific programmes: such usage should be replaced by Unmanned Aircraft (UA) or Remotely Piloted Aircraft (RPA) over time. When specific system terminology is required in the future, it will be generated by adding appropriate prefixes to the existing root 'Unmanned Aircraft' (or RPA). For example a generic 'Mobility' aircraft might be termed as a 'Mobility Unmanned Aircraft' (MUA) – but such terms would have to be staffed and agreed jointly on an as-required basis.

SECTION II – TERMINOLOGY AND DEFINITIONS

Unmanned Aircraft

An Unmanned Aircraft (sometimes abbreviated to UA) is defined as an aircraft that does not carry a human operator, is operated remotely using varying levels of automated functions, is normally recoverable, and can carry a lethal or non-lethal payload.

Note: In the UK, cruise and ballistic missiles are not considered to be unmanned aircraft.[8]

104. **Unmanned Aircraft System**. The totality of the aircraft and supporting components is defined as follows:

Unmanned Aircraft System

An Unmanned Aircraft System (UAS) is defined as a system, whose components include the unmanned aircraft and all equipment, network and personnel necessary to control the unmanned aircraft.

105. **Remotely Piloted Aircraft and Remotely Piloted Air(craft) System**. Although unmanned aircraft is the preferred term in a military environment, there are occasions when such a generic term is unhelpful. The term 'unmanned' can cause confusion or uncertainty over the actual level of human control and has led to safety and legal[9] concerns being raised, particularly with regard to the employment of weapons, and flight in non-segregated[10] airspace. These concerns can be addressed in part by using terminology that describes the level of human control of such aircraft as being equivalent to that of piloted aircraft; the pilot is simply physically remote from the aircraft itself. Consequently, it may be appropriate to use the term Remotely Piloted Aircraft (RPA) to describe the actual aircraft, and Remotely Piloted Air(craft) System (RPAS)[11] to describe the entirety of that which it takes to deliver the overall capability. Future RPA might carry

[8] 'Smart' weapons, such as Paveway IV and SLAM, are not considered to be Unmanned Aircraft. If a system is designed principally for warhead delivery and is not designed to be recoverable, then it is not considered to be an Unmanned Aircraft. Each UK weapon system undergoes a legal review and its status is determined at an appropriate point in the procurement cycle.

[9] Lord Bingham, former senior Law Lord, was reported in the Daily Telegraph to have likened 'drones' to cluster munitions and landmines. http://www.telegraph.co.uk/news/newstopics/politics/defence/5755446/Unmanned-drones-could-be-banned-says-senior-judge.html, Accessed 21 May 10.

[10] Segregated airspace structures within the UK Flight Information Regions/Upper Information Regions are established to provide protection to other airspace users from activities that cannot be conducted in accordance with the normal Rules of the Air.

[11] The use of Aircraft in RPAS implies a centrality of the RPA within the system. However, use of Air in RPAS may be more appropriate when considering either generic or futuristic systems. Both terms are acceptable.

passengers but not pilots to, for example, provide medical evacuation or tactical troop transport. Such systems would be manned, but remotely piloted.[12] RPA and RPAS are defined as follows:

Remotely Piloted Aircraft

A Remotely Piloted Aircraft is defined as an aircraft that, while it does not carry a human operator, is flown remotely by a pilot, is normally recoverable, and can carry a lethal or non-lethal payload.

Remotely Piloted Air(craft) System

A Remotely Piloted Air(craft) System is the sum of the components required to deliver the overall capability and includes the Pilot, Sensor Operators (if applicable), RPA, Ground Control Station, associated manpower and support systems, Satellite Communication links and Data Links.

SECTION III – OTHER TERMINOLOGY ISSUES

106. **Pilot and Piloted**. The use of the terms pilot and piloted can cause confusion when trying to equate unmanned with manned aircraft operations. Some unmanned aircraft are required to be controlled by personnel who are already qualified to pilot manned aircraft, while most are not. By the standard Concise Oxford English Dictionary (COED) definition,[13] the use of the terms pilot and 'piloted' is only technically correct where the remote operator is operating the flying controls, which is not the case for all unmanned aircraft. An alternative description of 'operator' may be used instead, if appropriate.[14] As with manned aircraft, where pilots will be qualified to different standards, unmanned aircraft pilots may be qualified to fly only certain classes of unmanned aircraft or to undertake certain mission types. Qualification to act as an unmanned aircraft pilot or operator does not imply qualification as a manned aircraft pilot.[15]

[12] The RPA concept becomes difficult at small scale, where it is possible that 'remotely operated' is a better description of how an aircraft is controlled than 'remotely piloted'. The concept paper that follows on from this JDN will consider in greater detail the relevance of terms such as 'remotely operated', 'remotely controlled' and 'remotely commanded' and make recommendations for additional terminology if appropriate.
[13] *Pilot – a person who operates the flying controls of an aircraft. Piloted – act as a pilot of (an aircraft or ship)*, *Concise Oxford English Dictionary (COED)* Eleventh Edition, Revised.
[14] The alternative term, 'operator', may cause confusion and should be used with care. In civilian unmanned aircraft usage the term 'operator' specifically refers to '*the legal entity (organisation) operating a civil UAS.* By this reasoning, the operator of a military unmanned aircraft is the Ministry of Defence. Additionally, the term gives no clear indication as to which aircraft functions are controlled by an operator and which are automated. The issue of which is the best terminology to use in this context will be examined further in the follow on Unmanned Aircraft Systems (UAS) Concept Paper, which may lead to slight amendment of this paragraph.
[15] Nor do manned aircraft pilot qualifications imply qualification as a unmanned aircraft operator/pilot.

107. **Sense and Avoid**. It is a fundamental tenet of flight safety in manned flight that, at the most basic level, pilots are able to maintain safe separation from other aircraft by the situational awareness created by their physical presence in the cockpit and the ability to see and avoid when operating in visual flight rule conditions. Clearly this is not possible in an unmanned aircraft, since the pilot cannot physically see around the aircraft, although they will normally gain situational awareness of other airspace users in the vicinity of the unmanned aircraft through procedural means or access to the recognised air picture.[16] The unmanned aircraft equivalent of see and avoid is termed 'sense and avoid', whereby sensors on the unmanned aircraft detect adjacent air users and alert either an automated on-board system or the remote pilot of their presence and the potential need to take avoiding action. Approved sense and avoid systems do not yet exist[17] and so the use of unmanned aircraft within 'non-segregated' (i.e. manned and unmanned mixed) airspace is normally prohibited, requiring the establishment of segregated airspace such as danger areas or restricted areas (temporary) for unmanned aircraft operations.[18] In operational theatres, much of the airspace may be under military control and it is a simpler task to maintain separation between manned and unmanned, and military and civilian airspace users through the use of procedural and coordination measures. In future expeditionary operations, this may not always be the case. Considerable work is being undertaken to integrate unmanned aircraft safely into manned airspace, but it is likely to be a number of years before the issues are resolved satisfactorily and hence it is likely that the military use of unmanned aircraft will be limited to operational theatres or specifically designated airspace.

108. **Automation and Autonomy**. There are many different industry and academic descriptions of what comprises an automatic or autonomous unmanned aircraft. Confusingly, the 2 terms are often used interchangeably even while referring to the same aircraft; consequently, companies may describe their systems to be autonomous even though they would not be considered as such under the military definition. The following definitions have been chosen to be as simple as possible, while making clear the essential differences in meaning between the two:

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[16] With a more benign working environment and without the physical stresses of flying, the unmanned aircraft pilot/operator may even develop better situational awareness than the pilot of a manned equivalent – what is commonly lacking is peripheral vision, depth perception, and the 'seat of the pants' feeling.

[17] A 'sense and avoid' system is probably achievable with current technology, but formal agreement with civil agencies as to what would constitute an acceptable system has not yet been reached.

[18] The regulations vary by country and may be modified depending on the weight of the unmanned aircraft. In the UK, use of and access to airspace by unmanned aircraft is regulated by the Civil Aviation Authority and detailed instructions are detailed in CAP 722 *Unmanned Aircraft System Operations in UK Airspace – Guidance*.

Automated System

In the unmanned aircraft context, an automated or automatic system is one that, in response to inputs from one or more sensors, is programmed to logically follow a pre-defined set of rules in order to provide an outcome. Knowing the set of rules under which it is operating means that its output is predictable.

Autonomous System

An autonomous system is capable of understanding higher level intent and direction. From this understanding and its perception of its environment, such a system is able to take appropriate action to bring about a desired state. It is capable of deciding a course of action, from a number of alternatives, without depending on human oversight and control, although these may still be present. Although the overall activity of an autonomous unmanned aircraft will be predictable, individual actions may not be.

109. An analysis of automated and autonomous UAS issues provides the following deductions:

a. Any or none of the functions involved in the operation of an unmanned aircraft may be automated. Examples include: take-off and landing; navigation/route following; pre-programmed response to events such as loss of a command and communication link; and automated target detection and recognition.[19] Unmanned aircraft which execute some elements of their operation without relying on human intervention or control may be described as partially automated.[20] Those which carry out their entire mission from take-off to landing without human intervention may be said to be fully automated. At the moment, all but the very simplest and most limited of unmanned aircraft missions will be partially automated with a human controlling most aspects.

b. Autonomous systems will, in effect, be self-aware and their response to inputs indistinguishable from, or even superior to, that of a manned aircraft. As such, they must be capable of achieving the same level of situational understanding as a human. This level of technology is not yet achievable and so none of the currently fielded or in-development unmanned aircraft can be correctly described as autonomous. As computing and sensor capability increases, it is likely that many systems, using very complex sets of control rules, will appear and be described as

[19] For major functions such as target detection, only some of the sub-functions may be automated, requiring human input to deliver the overall function.

[20] When describing a system as 'partially automated' it is useful to describe which functions are automated (and by implication, which are not)

autonomous systems, but as long as it can be shown that the system logically follows a pre-written set of rules or instructions and is not capable of human levels of situational understanding, then they should only be considered to be automated.

c. The distinction between autonomous and automated is important as there are moral, ethical and legal implications regarding the use of autonomous unmanned aircraft. Any unmanned aircraft, regardless of whether it is automated or autonomous, must only be used in a lawful manner. While there are procedures for providing legal clearance for the military use of automated systems, there may be difficulties, under existing law, in providing similar clearances for autonomous systems as their actions may not be easily or reliably predicted. It should be noted that in many scenarios, advanced systems should be able to make superior responses than humans as they will not forget rules or orders, nor suffer from distraction and stress.

d. It is an over-arching principle that, whatever the degree of automation, an unmanned aircraft should provide at least the same, or better, safety standard as a manned aircraft carrying out the same task.

CHAPTER 2 – UNMANNED AIRCRAFT CLASSIFICATION

SECTION I – OVERVIEW

110. An unmanned aircraft classification system is required for many reasons, notably in the supporting Defence Lines of Development. For example, trainers and medics need an agreed system to develop their own doctrine and Tactics, Techniques and Procedures (TTPs) such as agreed training standards or medical employment for each class or sub-class. Similarly, further progress on integration of unmanned aircraft into controlled airspace is likely to stall until a standardised classification and licensing system can be agreed. There has been great difficulty in reaching a consensus on which unmanned aircraft characteristics should be used as the primary factors in determining the structure of a classification system. Proposals have included weight, size, task and operating altitude, amongst others. Given the diversity of unmanned aircraft and their capabilities, there is no one-size-fits-all system. For example, small unmanned aircraft, that might be expected to operate only in lower airspace and have short ranges, have already demonstrated transatlantic capability;[21] what may be considered primarily as tactical unmanned aircraft, frequently exert operational or strategic effect. Whichever system is adopted, it is inevitable that there will be some unmanned aircraft that do not fit neatly within a single class or sub-class.

SECTION II – CLASSIFICATION METHODOLOGY

111. The following classification system[22] has been proposed and endorsed by the Joint Unmanned Aerial Vehicle Panel (JUAVP) and the Joint Capability Group on Unmanned Aerial Vehicles (JCGUAV) and is currently being submitted to the appropriate higher level North Atlantic Treaty Organization (NATO) bodies for formal ratification. Since it is UK policy to implement NATO doctrine where possible, it is intended that the UK will agree to formally ratify and implement this system as UK doctrine. Given the pressing need for the UK to standardize on a single unmanned aircraft classification system and the fact that NATO ratification can take some considerable time, the following is adopted as UK Joint doctrine now, whilst acknowledging that a minor update may be required in the future. Early formal UK adoption of the system will also give the proposal additional momentum and legitimacy within the NATO ratification process.

[21] For example, in 1998 Aerosonde Limited flew its 30 lb 'Laima' unmanned aircraft from Newfoundland to Benbecula on a 2031 nautical miles flight using only 1.25 gallons of fuel.
[22] Further details of the classification system can be found in the Joint Air Power Competence Centre's *Strategic Concept of Employment for Unmanned Aircraft Systems in NATO* which is available for download at www.japcc.org.

112. Unmanned aircraft categories are based on an aircraft's maximum gross take-off weight and normal operating height or altitude. Categories start with weight classes, which are further divided on the basis of the operational altitude of the unmanned aircraft as follows:

a. **Class I**. Less than 150 kg (further sub-divided based on normal operating altitude).

b. **Class II**. 150 kg to 600 kg.

c. **Class III**. More than 600 kg (further sub-divided based on normal operating altitude).

General Capabilities and Limitations of Unmanned Aircraft by Class

113. **Class I**. These are typically hand-launched, self contained, portable systems employed at the small unit level or for force protection/base security. They are capable of providing 'over the hill' or 'around the corner' type reconnaissance and surveillance. Payloads are generally fixed Electro-optical/Infrared (EO/IR), and the system has a negligible logistics footprint. A Class I Unmanned Aircraft typically operates within line of sight at low altitudes, generally less than 5,000 feet Above Ground Level (AGL) and has a limited range/endurance.

114. **Class II**. These unmanned aircraft are typically medium-sized, often catapult-launched, mobile systems that usually support brigade-level, and below, Intelligence, Surveillance, Target Acquisition and Reconnaissance (ISTAR) requirements. These systems generally operate at altitudes below 10,000 feet AGL with a medium range. They do not usually require an improved runway surface. The payload may include a sensor ball with EO/IR and a LASER range finding or designation capability. A Class II Unmanned Aircraft is typically employed within tactical formations and usually has a small logistics footprint. It is likely, however, to require a high degree of coordination and integration into military and civilian airspace.

115. **Class III**. These are typically the largest and most complex unmanned aircraft, operating at high altitude with, typically, the greatest range, endurance and transit speeds of all Unmanned Aircraft. Normally, they will require a prepared surface for takeoff and landing. They can perform specialised missions including broad area surveillance and penetrating attacks. Payloads may include sensor ball(s) with EO/IR, radars, lasers, Synthetic Aperture Radar (SAR), communications relay, Signals Intelligence (SIGINT), Automatic Identification System (AIS), and weapons. Most Class III Unmanned Aircraft will require improved areas for launch and recovery and may be piloted from outside the Joint

Operating Area via a satellite control link; lack of satellite communications would prevent use when being operated Beyond the line of Sight (BLOS). The logistics footprint may approach that of manned aircraft of similar size and they typically have the most stringent airspace coordination requirements. Endurance, which may be measured in days, may be reduced when carrying weapons due to a decrease in fuel load capability and increased aerodynamic drag from external hard points.

UNMANNED AIRCRAFT CLASSIFICATION TABLE

Class	Category	Normal Employment	Normal Operating Altitude	Normal Mission Radius	Civil Category (UK CAA)	Example Platform
Class I < 150 kg	MICRO < 2 kg	Tactical Platoon, Sect, Individual (single operator)	Up to 200 ft AGL	5 km (LOS[23])	Weight Classification Group 1 (WCG) Small Unmanned Aircraft (<20 kg)	Black Widow
	MINI 2-20 kg	Tactical Sub-Unit (manual launch)	Up to 3000' AGL	25 km (LOS)		Scan Eagle, Skylark, Raven, DH3
	SMALL > 20 kg	Tactical Unit (employs launch system)	Up to 5000' AGL	50 km (LOS)	WCG 2 Light UAV (20><150 kg)	Luna, Hermes 90
Class II 150 – 600 kg	TACTICAL	Tactical Formation	Up to 10,000' AGL	200 km (LOS)	WCG 3 UAV (>150 kg)	Sperwer, Iview 250, Hermes 450, Aerostar, Watchkeeper
Class III > 600 kg	MALE[24]	Operational/ Theatre	Up to 45,000' AGL	Unlimited (BLOS)		Predator A & B, Heron, Hermes 900
	HALE	Strategic/ National	Up to 65,000' AGL	Unlimited (BLOS)		Global Hawk
	Strike/ Combat	Strategic/ National	Up to 65,000' AGL	Unlimited (BLOS)		

Table 1 – Unmanned Aircraft Classification Guide

[23] Line of Sight (LOS)

[24] Although endurance is not generally a discriminator for determining which category a unmanned aircraft is in, MALE (Medium Altitude, Long Endurance) and HALE (High Altitude, Long Endurance) remain in common usage in the unmanned aircraft community (particularly in the USA) and provide useful sub-category breakpoints within Class III.

116. In Table 1, the category and normal employment columns contain terminology that is not necessarily consistent, but reflects common usage. Conflicts in unmanned aircraft classes are resolved by reference to an aircraft's respective weight class. For example, an unmanned aircraft weighing 15 kg that operated up to 6000' AGL would still be considered a Class I UAS.

LEXICON

PART 1 - ACRONYMS AND ABBREVIATIONS

AGL	Above Ground Level
AIS	Automatic Identification System
AOWG	Air Operations Working Group
BLOS	Beyond Line of Sight
DCDC	Development, Concepts and Doctrine Centre
EO/IR	Electro-optical/Infrared
HALE	High Altitude, Long Endurance
ICAO	International Civil Aviation Organization
ISTAR	Intelligence, Surveillance, Target Acquisition and Reconnaissance
JCGUAV	Joint Capability Group on Unmanned Aerial Vehicles
JDN	Joint Doctrine Note
JDP	Joint Doctrine Publication
JUAVP	Joint Unmanned Aerial Vehicle Panel
LOS	Line of Sight
MALE	Medium Altitude, Long Endurance
MOD	Ministry of Defence
NATO	North Atlantic Treaty Organization
NSO	National Signals Intelligence Organisation
OUAS	Operational Unmanned Aircraft System
RPA	Remotely Piloted Aircraft
RPAS	Remotely Piloted Air(craft) System
SAR	Synthetic Aperture Radar
TTP	Tactics, Techniques and Procedures
UA	Unmanned Aircraft
UAS	Unmanned Aircraft System
UAV	Unmanned Aerial Vehicle
UCAV	Unmanned Combat Air Vehicle

PART 2 – TERMS AND DEFINITIONS

Unmanned Aircraft
An Unmanned Aircraft (UA) is defined as an aircraft that does not carry a human operator, is operated remotely using varying levels of automated functions, is normally recoverable, and can carry a lethal or non-lethal payload. (JDN 3/10)

Note: In the UK, cruise and ballistic missiles are not considered to be unmanned aircraft.

Unmanned Aircraft System
An Unmanned Aircraft System (UAS) is defined as a system, whose components include the unmanned aircraft and all equipment, network and personnel necessary to control the unmanned aircraft. (JDN 3/10)

Remotely Piloted Aircraft
A Remotely Piloted Aircraft (RPA) is defined as an aircraft that, while it does not carry a human operator, is flown remotely by a pilot, is normally recoverable, and can carry a lethal or non-lethal payload. (JDN 3/10)

Remotely Piloted Air(craft) System
A Remotely Piloted Air(craft) System (RPAS) is the sum of the components required to deliver the overall capability and includes the pilot, sensor operators (if applicable), RPA, ground control station, associated manpower and support systems, satellite communication links and data links. (JDN 3/10)