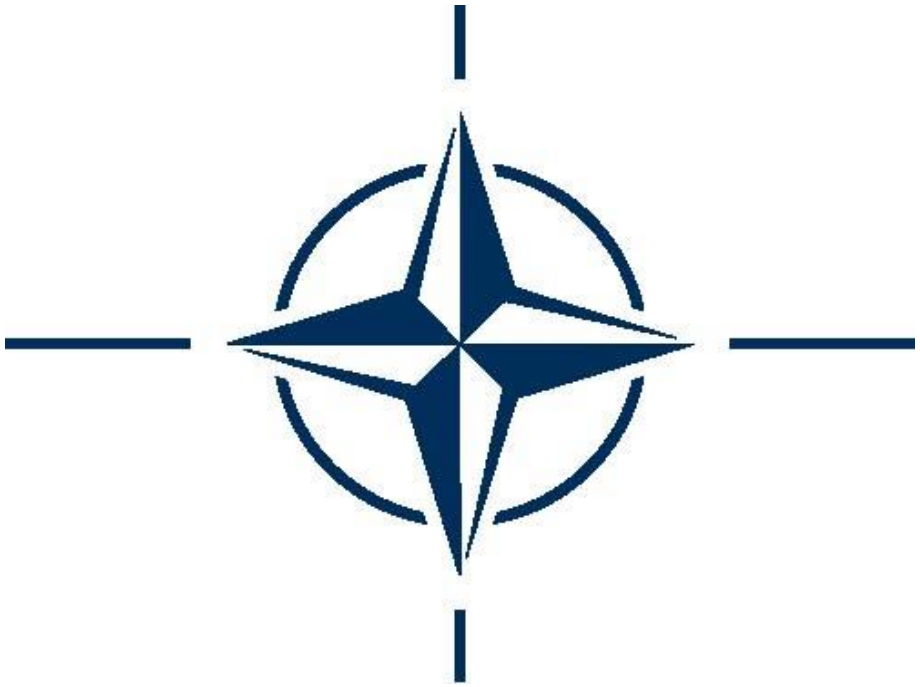
NATO STANDARD

ATP-3.3.8.1

GUIDANCE FOR THE TRAINING OF UNMANNED AIRCRAFT SYSTEMS (UAS) OPERATORS

Edition A Version 1

October 2016



NORTH ATLANTIC TREATY ORGANIZATION

ALLIED TACTICAL PUBLICATION

Published by the
NATO STANDARDIZATION OFFICE (NSO)

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NORTH ATLANTIC TREATY ORGANIZATION (NATO)

NATO STANDARDIZATION OFFICE (NSO)

NATO LETTER OF PROMULGATION

17 October 2016

1. The enclosed Allied Tactical Publication ATP-3.3.8.1, Edition A, Version 1, GUIDANCE FOR THE TRAINING OF UNMANNED AIRCRAFT SYSTEMS (UAS) OPERATORS, which has been approved by the nations in the Military Committee Air Standardization Board (MCASB), is promulgated herewith. The agreement of nations to use this publication is recorded in STANAG 4670.

2. ATP-3.3.8.1, Edition A, Version 1, is effective upon receipt and supersedes ATP-3.3.7, Edition B, Version 1, which shall be destroyed in accordance with the local procedure for the destruction of documents. There is no change in the content between ATP-3.3.7 and ATP-3.3.8.1. The ATP has been renumbered in accordance with the MCASB direction.

4. This publication shall be handled in accordance with C-M(2002)60.

Edvardas MAŽEIKIS
Major General, LTUAF
Director, NATO Standardization Office

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RECORD OF RESERVATIONS

CHAPTER	RECORD OF RESERVATION BY NATIONS
General	BEL, CAN, ESP, EST, FRA, GBR, ITA, NLD, USA
1	FRA, GBR, NLD
Annex A	NLD, USA
Annex B	USA
Note: The reservations listed on this page include only those that were recorded at time of promulgation and may not be complete. Refer to the NATO Standardization Document Database for the complete list of existing reservations.	

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RECORD OF SPECIFIC RESERVATIONS

[nation]	[detail of reservations]
BEL	BEL will continue to deliver its own training syllabi and will implement those elements of BUQ Levels III and IV she deems applicable and required.
CAN	i. Canada will not use the term Unmanned Aircraft System (UAS) Operator but instead uses Air Vehicle Operators (AVO); and ii. Canada's UAS classification scheme is not consistent with the scheme currently used by NATO. Although the classification scheme is different. Canada will implement STANAG 4670 directed training for the equivalent Canadian classification of UAS.
ESP	Spain will use the term Remotely Piloted Aircraft Systems (RPAS) when referring to UAS or UAV, and will use the former term Designated UAS Operator (DUO) when referring to Unmanned Aircraft (UAS) Operator. - Spain bases its RPAS training on Air Chief of Staff Directive 07/11, Process of implementation of the Regulatory System for Operating UAS, which establishes that all training syllabi will be based on STANAG 4670. Tables A-2 and B-2 referring NATO Class I Smalls RPAS require higher standards of subject knowledge, and task performance than is currently required in Spanish training programs. Therefore, Spain will not implement totally the STANAG when referring to the training requirements for Basic UAS Qualifications (BUQ) and the training requirements for Combined/Joint Mission Qualifications (C/JMQ) for NATO Class I Smalls RPAS, until some adjustments are made to current syllabi. - Spain is not able to provide or fulfill the training requirements for Basic UAS Qualifications (BUQ) and training requirements for Combined/Joint Mission Qualifications (C/JMQ) for NATO MALE/HALE Classes due to the lack of this capability which it is pending acquisition programs. - Spain will mutually recognize Basic UAS Qualification (BUQ) to operate specific classes in national aerospace in accordance to the present STANAG, as well as in observance of the national laws and regulations, and with evidence of accomplished specific BUQ training.
EST	Depends on acquisition of UAV/UAS capabilities.

[nation]	[detail of reservations]
FRA	France will not apply this STANAG to class I drones. The French Navy will implement this STANAG as soon as it receives the training equipment needed for its implementation. The French Army cannot implement this STANAG as it departs too much from its practices and equipment.
GBR	1. The UK has a reservation with respect to numerous BUQ metrics within the MALE/HALE Classes that are not representative of implemented and future technologies, the intended operating environment and levels of automation required to operate such systems. Examples of this include but are not limited to inclusion of BUQ for Stall Recovery, Radio-Aid Navigation, Dead Reckoning Navigation and Precision Radar Approaches. Therefore BUQs for MALE/HALE need extensive review before UK agreement to full implementation. 2. Para 104.2. The ATP recognizes the “diversity in UAS designs, missions and vehicle technology”, and states that the different classes of UAS are mapped to an appropriate Basic UAS Qualification (BUQ) level to address this. Focussing on BUQ Level III, which is applicable for T-UAS, there is still some disconnect between the training certification requirements stated in the relevant table and either the capability of the system or its method of employment, for instance: low flying which is not trained and radar navigation, which is not possible. 3. Para 104.2. Suggests that those elements that are judged not to be required may be able to be left untrained whilst still complying with the policy. The final sentence, however, suggests by referring to the BUQ, that differences have already been taken into account and hence multiple syllabuses constructed for individual classes of UAS. This is obviously a matter of interpretation, but an explicit statement allowing elements of training that are not required, or cannot be trained to be omitted would ensure clarity and compliance.
ITA	Italy will recognize Basic UAS Qualification (BUQ) to operate specific classes in national aerospace in accordance to the present STANAG, as well as in observance of the national laws and regulations, and with evidences of accomplished specific BUQ training.
NLD	Chapter 1, 0101 Administration, 3. Agreement; NLD will mutually recognize UAS operators training. Recognition and accreditation of qualifications issued by foreign Authorities is done by the NLD Military Aviation Authorities (MAA NLD) who have established a program of recognition and accreditation.

[nation]	[detail of reservations]
	ANNEX A, 2 Basic UAS Qualifications, NLD-MAA states that operating under Visual Flight Rules (VFR) is not possible at this time, however it is possible to fly under Visual Meteorologic Conditions (VMC). Table A-3 Page A-15. Emergency Procedures; NLD requires Subject Knowledge and Task Knowledge level D and Task Performance level 4.
USA	The USA bases its UAS training on Chairman of the Joint Chiefs of Staff Instruction (CJCSI) 3255.01, Joint Unmanned Aircraft Systems Minimum Training Standards, and other Service-specific training syllabi. The following reservations are sourced from this CJCSI and Service UAS training syllabi; Tables A-1 thru A-4, and B-1 thru B-3: These tables require higher standards of subject knowledge, and task performance for each Class of UAS than is generally required in USA training programs, Most ATP training items require training to Cc3 levels, whereas USA training items are often done to Bb2 and Bb3 levels. This also applies to emergency procedures and instructor training items which show Dd4 levels, but are generally accomplished to Bb3 or Cc3 levels in the USA. Operational experience has shown current USA levels of training to be adequate and effective. Tables A-1 thru A-4, and B-1 thru B-3: The USA employs a concept of remote split operations (RSO) for many of its Class III UAS, in which a launch and recovery element (LRE) crew launches and recovers the aircraft while a remotely located mission control element (MCE) crew flies the mission. Much of USA Class III UAS flight training is tailored to RSO and the specific LRE and MCE crew training requirements. As such, these crews may not accomplish all prescribed ATP training tasks, such as takeoff, approach, and landing for MCE crews.
Note: The reservations listed on this page include only those that were recorded at time of promulgation and may not be complete. Refer to the NATO Standardization Document Database for the complete list of existing reservations.	

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CHAPTER 1 DETAILS OF ALLIED TACTICAL PUBLICATION

1.1. ADMINISTRATION

1.1.1. References

A. Chairman, Joint Chiefs of Staff Instruction (CJCSI) 3255.01, Joint Unmanned Aircraft Systems Minimum Training Standards, 17 July 2009
B. AAP-03, Production, Maintenance and Management of NATO Standardization Documents, Edition J, Version 1, November 2011
C. AAP-32(B), Publishing Standards for NATO Standardization Documents, December 2014

1.1.2. Aim. The aim of this publication is to establish both:

A. A broad set of training guidelines and the skills required for operating UAS in the appropriate classes of airspace.

B. A broad set of training guidelines for employing UAS in combined and joint operations.

1.1.3. Agreement. Participating nations agree to adopt these guidelines as a basis for the training of UAS operators, adapting them where necessary to meet the specialist requirements of UAS type, mission, or role. Nations also agree to mutually recognize a UAS operator's qualification to operate a specific UAS type, if the operator is trained under the guidelines contained in this publication.

1.1.4. Terms and Definitions. Terms used in this document are defined at Annex C for the purpose of this document only.

1.1.5. Implementation. This Allied Tactical Publication is considered implemented when a nation has issued the necessary orders and instructions putting the contents of this publication into effect.

1.2. BACKGROUND

Extensive research and analysis of current UAS training and employment requirements have identified a number of critical skill sets, two of which have been applied to this document, which was formerly known as STANAG 4670.

a. The first, Basic UAS Qualifications (BUQ), defines four levels of general aviation knowledge for UAS operations (listed in Annex A). It should also be noted that, where applicable, the knowledge, skills and abilities (KSA) requirements for these BUQ levels compare to International Civil Aviation Organization (ICAO) requirements for manned aircraft.

b. The second skill set, Combined/Joint Mission Qualifications (C/JMQ), defines three levels of general mission knowledge for UAS employment (listed in Annex B). These minimum UAS training and employment qualifications are designed to streamline training efforts for the NATO UAS community, increasing efficiency and capabilities for the combined/joint force commander.

1.3. PURPOSE

1. Noting that military operations may require deviation from peacetime rules and regulations, in general, UAS shall be operated in accordance with the rules governing the flights of manned aircraft as specified by the appropriate Air Traffic Services (ATS) authority. To operate UAS in their intended classes of airspace, operators must be able to show an equivalent level of compliance with ATS regulations.

2. To produce well-trained operators, sound national training requirements are essential for safe, effective UAS operations. National authorities must continually refine these training requirements based on the data from evolving UAS doctrine and operations. Adoption of these operator training requirements by the military services, national aviation certification agencies, and the segments of the aerospace industry involved in UAS training and operation will ensure that appropriate safety levels are maintained and public trust in UAS operations is gained and maintained.

1.4. SCOPE

1. As UAS operations expand and evolve, data that is collected and experience that is gained will aid national aviation authorities in determining the best methods of certifying, controlling, and integrating UAS operations into existing procedures. However, certain basic aeronautical knowledge and skills, such as those identified in paragraph 1.7 below, are common to nearly any UAS operation, and the design and content of UAS training courses should strongly consider inclusion of those topics at a minimum.

2. The diversity in UAS designs, missions, and vehicle technology architectures makes it difficult to prescribe a standard set of universally applicable training certification requirements for the operator. For example, highly automated systems may not include manual controls and limit operator control to keyboard entry or “point and click” methods. In such cases, training certification requirements for manual control should not be imposed. Likewise, many UAS are limited to Global Positioning System (GPS) navigation and are not capable of using legacy radio aids to navigation and approaches. In such cases, training certification requirements for navigation should reflect the use of GPS skills. For this reason, the groups/categories of the UAS in Annex A are mapped and tailored to an appropriate BUQ level, if applicable. NATO UAS classifications are detailed in Figure 1.

1.5. ADDITIONAL CONSIDERATIONS

1. Operating some UAS requires a skill set that approximates that of piloting a manned aircraft. However, there are additional skills that are unique to UAS such as relying on synthetic presentations to develop situational awareness. Also, the lack of such performance indicators as physical influences such as G-forces presents a unique challenge to UAS operators. UAS control systems vary significantly; some systems use only manual flight controls while others may use a mix of manual and automated, or only automated control modes. Regardless of the type of controls, the operator must be capable of safely conducting UAS missions including precise and efficient response to emergency situations. These unique skills are especially critical when operating in conjunction with other manned and unmanned airborne systems.

2. Cost is also a significant factor in training UAS operators, especially in systems that have significantly greater endurance, altitude, airspeed, and range. For example, military personnel who operate UAS that are limited to line-of-sight ranges and altitudes of a few hundred feet do not need the breadth of training of operators of systems that are capable of intercontinental ranges using satellite relay for command and control and mission data. By using the appropriate BUQ and C/JMQ criteria in Annexes A and B, UAS operators and trainers can optimize the capabilities of their systems.

NATO UAS CLASSIFICATION						
Class	Category	Normal Employment	Normal Operating Altitude	Normal Mission Radius	Primary Supported Commander	Example Platform
Class III (> 600 kg)	Strike/ Combat*	Strategic/National	Up to 65,000 ft	Unlimited (BLOS)	Theatre	Reaper
	HALE	Strategic/National	Up to 65,000 ft	Unlimited (BLOS)	Theatre	Global Hawk
	MALE	Operational/Theatre	Up to 45,000 ft MSL	Unlimited (BLOS)	JTF	Heron
Class II (150 kg - 600 kg)	Tactical	Tactical Formation	Up to 18,000 ft AGL	200 km (LOS)	Brigade	Hermes 450
Class I (< 150 kg)	Small (>15 kg)	Tactical Unit	Up to 5,000 ft AGL	50 km (LOS)	Battalion, Regiment	Scan Eagle
	Mini (<15 kg)	Tactical Subunit (manual or hand launch)	Up to 3,000 ft AGL	Up to 25 km (LOS)	Company, Platoon, Squad	Skylark
	Micro** (<66 J)	Tactical Subunit (manual or hand launch)	Up to 200 ft AGL	Up to 5 km (LOS)	Platoon, Squad	Black Widow

*Note: In the event the UAS is armed, the operator should comply with the applicable Joint Mission Qualifications in ATP-3.3.8.1 (STANAG 4670) and the system will need to comply with applicable air worthiness standards, regulations, policy, treaty, and legal considerations.

**Note: UAS that have a maximum energy state less than 66 Joules are not likely to cause significant damage to life or property, and do not need to be classified or regulated for airworthiness, training, etc. purposes unless they have the ability to handle hazardous payloads (explosive, toxins, chemical/ biological agents, etc.).

Figure 1: NATO UAS Classification

3. UAS training criteria must consider Crew Resource Management (CRM) techniques. CRM is essential for UAS operations, and the operators must be able to communicate effectively to ensure safety.

4. UAS operators must have the ability to use and understand standard procedures and checklists throughout the mission and must understand how their system operates within the force structure and contributes to the mission goals.

5. UAS operators must understand how to coordinate with Air Traffic Services when required. Operators must have a thorough understanding of applicable flight regulations of national and international controlling authorities, as well as integration with overall military operations.

1.6. TRAINING CRITERIA

When designing UAS training programs, the military services shall ensure that operators are trained and certified to the designated BUQ level for the type of UAS and for the anticipated flight operations. This training should include both the general requirements listed in paragraph 1.7 below as well as the system-specific knowledge required to operate the UAS in a safe manner. Further, they shall ensure that operators are trained to the designated C/JMQ for their unit's anticipated mission requirements. This training should include the knowledge and capability to perform the tasks listed by UAS type in Annex B.

1.7. GENERAL KNOWLEDGE AND TRAINING CONTENT

UAS operators must complete thorough academic instruction equivalent to that undertaken by aircrew of comparable civil or military aircraft operating in similar airspace. Just as pilots of manned aircraft operating only under Visual Flight Rules (VFR) are not required to meet the qualifications required to operate under Instrument Flight Rules (IFR), the depth of knowledge required of operators will depend on the complexity of the UAS, mission, and the operating environment. The following list, which is not exhaustive, generally reflects the complete list of general knowledge requirements found in Annex A:

a. Airspace structure and operating requirements
b. ATC procedures and rules of the air
c. Aerodynamics, including effects of controls
d. Aircraft systems
e. Performance
f. Navigation
g. Meteorology
h. Communications procedures (including competent Aeronautical English, ICAO Level 4)
i. Mission preparation

1.8. FLIGHT TRAINING

UAS operators should complete a thorough practical flight training program, which may consist of both actual UA flight training and training on nationally-approved or certified simulation flight training devices. Flight training should enable operators to demonstrate control of a specific UAS throughout its performance parameters and potential operating conditions, including dealing correctly with emergencies and system malfunctions at any phase of the mission. Flight training requirements are at Annex A.

1.9. PROFICIENCY AND CURRENCY REQUIREMENTS

Generally speaking, proficiency refers to an achieved level of competence, while currency refers to maintaining that level, typically through study and practice. UAS operators shall maintain proficiency and currency to conform to minimum national requirements. All operators should be subject to periodic theoretical, practical and medical examination by designated military service examiners.

1.10. CERTIFICATION

The military services shall certify operators who successfully demonstrate satisfactory knowledge of ground and flight operations via examinations and flight checks in accordance with military service standards. The skills detailed here will be used as a baseline by the appropriate inspectors, such as a NATO Standardization Team, for appraisal of national UAS training programs to verify compliance with this publication. Foreign nations hosting UAS operations should accept the approved training certification program for their operators similar to current pilot certification agreements.

ANNEX A TRAINING REQUIREMENTS FOR BASIC UAS QUALIFICATIONS (BUQ)

A.1. RATING SCALES FOR UAS OPERATOR SKILLS

1. The knowledge and skills listed in this annex are not intended to be comprehensive. Diversity in UAS designs, missions, and vehicle technology architectures makes it difficult to prescribe a standard set of universally applicable training certification requirements for the operator—knowledge and skills, if required/accomplished, should be at the designated level of proficiency. For example, in a system requiring manual control, changing aircraft heading may require the operator to manually "fly" the aircraft to its new heading. However, a similar task in a more automated system may require the operator to "monitor" aircraft performance. In such situations, the aircraft would change headings based on pre- or reprogrammed flight plan and the operator would enter a change to the flight plan, observe the displays to understand the aircraft's subsequent action, understand the response, and take appropriate action if required.

2. **Basic UAS Qualification (BUQ)**. BUQ levels provide the foundation for UAS operation. They include a basic understanding of weather, aerodynamics, human factors, operational risk management, and flight regulations for the types of airspace in which the UAS will operate. The defined BUQ Levels are:

a. **BUQ Level I**: : Knowledge and skills required to operate under Visual Flight Rules (VFR) in ICAO Class E, F, and G, and Restricted/combat airspace below 3000 ft (900 m) AGL (Above Ground Level). NATO Class I, Micro and Mini UAS operators are to be trained to BUQ Level I.

b. **BUQ Level II**: Knowledge and skills required to operate under VFR in ICAO Class D, E, F, and G, and Restricted/combat airspace below 5000 ft (1500 m) AGL. NATO Class I, Small UAS operators are to be trained to BUQ Level II.

c. **BUQ Level III**: Knowledge and skills required to operate under VFR in all ICAO airspace except Class A below 18,000 ft (5500 m) AGL or FL180. NATO Class II, Tactical UAS operators are to be trained to BUQ Level III.

d. **BUQ Level IV**: Knowledge and skills required to operate under VFR and Instrument Flight Rules (IFR) in all airspace. NATO Class III UAS, MALE/HALE and Strike/Combat UAS operators are to be trained to BUQ Level IV.

***Note**: The BUQ levels are cumulative. Therefore, to meet BUQ Level II or higher requirements, operators must meet all the levels below it as well. The tables that follow reflect this.*

A.2. SUBJECT KNOWLEDGE LEVELS

a. **Subject Knowledge Level A**: Can identify basic facts and terms about the subject (Facts)

b. **Subject Knowledge Level B**: Can identify relationship of basic facts and state general principles about the subject. (Principles)

c. **Subject Knowledge Level C**: Can analyze facts and principles and draw conclusions about the subject. (Analysis)

d. **Subject Level D**: Can evaluate conditions and make proper decisions about the subject. (Evaluation)

A.3. TASK KNOWLEDGE LEVELS

a. **Task Knowledge Level a**: Can name parts, tools, and simple facts about the task (Nomenclature)

b. **Task Knowledge Level b**: Can determine step-by-step procedures for doing the task (Procedure)

c. **Task Knowledge Level c**: Can identify why and when the task must be done and why each step is needed (Operating Principles)

d. **Task Knowledge Level d**: Can predict, isolate, and resolve problems about the task (Advanced Theory)

A.4. TASK PERFORMANCE LEVELS

a. **Task Performance Level 1**: Can do simple parts of the task. Must be told or shown how to do most of the task (Extremely Limited)

b. **Task Performance Level 2**: Can do most parts of the task. Needs help on only the most difficult parts (Partially Proficient)

c. **Task Performance Level 3**: Can do all parts of the task. Needs only spot check of completed work (Competent)

d. **Task Performance Level 4**: Can do the task quickly and accurately. Can tell or show others how to do the task (Highly Proficient)

O = UAS operator, I = Instructor or Test Operator

Table A-1. NATO Class I Micro and Mini

BUQ Level: I **C/JMQ: A (See Annex B)**	**SUBJECT KNOWLEDGE**				**TASK KNOWLEDGE**				**TASK PERFORMANCE**			
	A	B	C	D	a	b	c	d	1	2	3	4
Mission Preparation												
Aviation Weather			O				O				O	
CRM and Communications			O				O				O	
Inflight Emergency Equipment/Procedures			O				O				O	
Aeronautical Charts-Sectional and Tactical			O				O				O	
Aircraft Performance data and Limitations			O				O				O	
Publications			O				O				O	
Departure and Arrival Planning			O				O				O	
Computerized Flight Planning Systems			O				O				O	
Mission Route Selection and Analysis			O				O				O	
Communications			O								O	
Plan and Manage communications			O				O			O		
Functions of Airborne Comm Systems			O				O				O	
Data Links			O				O				O	
Aircraft Operations			O								O	
Identify and Avoid Weather Hazards			O				O				O	
General Flight Rules			O				O				O	
Fuel Planning			O				O				O	
Operate Integrated Navigation Systems			O				O				O	
Aviation Principles			O				O				O	
Time and Course Control			O				O				O	
Basic Manual Navigation		O				O			O			
Conduct Low Level Flying		O				O			O			
Aircraft Systems and Directives			O				O				O	
Emergency Procedures			O				O				O	
Manual Flight Control Skills			O				O				O	
Air Tasking Order (ATO) / Airspace Control Order (ACO)			O				O				O	

Table A-1. NATO Class I Micro and Mini

BUQ Level: I **C/JMQ: A (See Annex B)**	**SUBJECT KNOWLEDGE**				**TASK KNOWLEDGE**				**TASK PERFORMANCE**			
	A	B	C	D	a	b	c	d	1	2	3	4
(1) BEFORE FLIGHT CATEGORY												
Plan VFR Mission			O				O				O	
Get weather data for mission planning			O				O				O	
Get ops data for mission planning			O				O				O	
Give/receive briefing on training flight			O				O				O	
Prepare maps for use during flight			O				O				O	
Plan route to destination and alternates			O				O				O	
Select en route altitudes per flight info pubs			O				O				O	
Perform preflight check			O				O				O	
Review maintenance logs			O				O				O	
Perform exterior inspection check			O				O				O	
Perform appropriate communications			O				O				O	
Perform verbal comm/radio procedures			O				O				O	
Perform GPS position check			O				O				O	
Obtain appropriate clearances before flight			O				O				O	
Perform instrument GCS check			O				O				O	
Perform before takeoff check			O				O				O	
(2) CONTACT CATEGORY												
Perform takeoff, initial climb and associated checks			O				O				O	
Accelerate to climb airspeed			O				O				O	
Establish and maintain altitude			O				O				O	
Perform all applicable in-flight checks			O				O				O	
Set, establish and maintain proper altitude/attitude throughout flight			O				O				O	
Perform level off check			O				O				O	
Establish basic area orientation			O				O				O	
Use local area map for orientation			O				O				O	
Perform each manoeuvre within assigned airspace			O				O				O	
Perform clearing			O				O				O	
Change airspeed, straight-and-level as required			O				O				O	

Table A-1. NATO Class I Micro and Mini

BUQ Level: I **C/JMQ: A (See Annex B)**	**SUBJECT KNOWLEDGE**				**TASK KNOWLEDGE**				**TASK PERFORMANCE**			
	A	B	C	D	a	b	c	d	1	2	3	4
Perform slow flight			O				O				O	
Perform basic aero manoeuvres			O				O				O	
Perform turns, climbs, descents as req.			O				O				O	
Recognize unusual attitudes and perform recoveries			O				O				O	
Recognize stalls and perform recovery			O				O				O	
Recognize departure from controlled flight and perform recovery			O				O				O	
Perform before descent check			O				O				O	
Perform descent			O				O				O	
Perform approach to field check			O				O				O	
Analyze wind conditions			O				O				O	
Perform normal traffic patterns			O				O				O	
Respond to traffic conflicts as appropriate			O				O				O	
Clear airspace in direction of turn			O				O				O	
Configure aircraft to land and perform appropriate checks			O				O				O	
Perform normal overhead and straight-in patterns as appropriate			O				O				O	
Fly final approach			O				O				O	
Initiate automatic approach and landing			O				O				O	
Perform approach to landing			O				O				O	
Perform landing and rollout			O				O				O	
Perform touch and go landing			O				O				O	
Perform go-around on final approach turn			O				O				O	
Perform go-around/missed approach check			O				O				O	
Perform go-around from final approach/flare			O				O				O	
Perform post-landing checks and procedures			O				O				O	
Demonstrate airmanship, judgment, and decision-making while operating aircraft			O				O				O	
Perform and demo GCS safety procedures			O				O				O	
Demonstrate flight line and air discipline			O				O				O	

Table A-1. NATO Class I Micro and Mini

BUQ Level: I **C/JMQ: A (See Annex B)**	**SUBJECT KNOWLEDGE**				**TASK KNOWLEDGE**				**TASK PERFORMANCE**			
	A	B	C	D	a	b	c	d	1	2	3	4
(3) INSTRUMENT CATEGORY (not used)												
(4) NAVIGATION CATEGORY												
Perform visual navigation			O				O				O	
Perform map reading			O				O				O	
Identify appropriate visual landmarks			O				O				O	
Correlate position with map			O				O				O	
Calculate actual fuel consumption			O				O				O	
Perform in-flight navigation planning			O				O				O	
Calculate / compensate for in-flight winds			O				O				O	
Calculate new estimated time of arrival			O				O				O	
Perform time and fuel management			O				O				O	
Perform lost comm /C2 link procedures			O				O				O	
(5) EMERGENCY CATEGORY												
Recognize emergency conditions				O				O				O
Maintain aircraft control during emergency conditions				O				O				O
Analyze situation, including systems for possible emergency				O				O				O
Recognize and perform all applicable emergency procedures				O				O				O
Initiate communications/declare emergency (if required)				O				O				O
Recognize and properly respond to unplanned lost C2 link events				O				O				O
Land as soon as conditions permit				O				O				O

Table A-1. NATO Class I Micro and Mini

BUQ Level: I **C/JMQ: A (See Annex B)**	**SUBJECT KNOWLEDGE**				**TASK KNOWLEDGE**				**TASK PERFORMANCE**			
	A	B	C	D	a	b	c	d	1	2	3	4
(6) AFTER FLIGHT CATEGORY												
Perform after landing check			O				O				O	
Perform engine shutdown check			O				O				O	
Perform all safety procedures for securing aircraft			O				O				O	
Perform post-landing procedures			O				O				O	
Complete maintenance logs			O				O				O	
Complete flight time logs			O				O				O	
(7) INSTRUCTOR / TEST SYSTEM CATEGORY												
Demonstrate understanding of learning theory				I				I				I
Demonstrate effective instructional presentation techniques				I				I				I
Demonstrate an understanding of courseware theory design				I				I				I
Demonstrate subject matter expertise				I				I				I
Demonstrate understanding of test plan				I				I				I
Perform system test procedures				I				I				I
Analyze test data				I				I				I

Table A-2. NATO Class I Small

BUQ Level: II C/JMQ: A (See Annex B)	**SUBJECT KNOWLEDGE**				**TASK KNOWLEDGE**				**TASK PERFORMANCE**			
	A	B	C	D	a	b	c	d	1	2	3	4
Mission Preparation												
Aviation Weather			O				O				O	
CRM and Communications			O				O				O	
Emergency Equipment/Inflight Emergency Procedures			O				O				O	
Aeronautical Charts-Sectional and Tactical			O				O				O	
Aircraft Performance data and Limitations			O				O				O	
Publications			O				O				O	
Departure and Arrival Planning			O				O				O	
Computerized Flight Planning Systems			O				O				O	
Mission Route Selection and Analysis			O				O				O	
Communications			O								O	
Plan and Manage communications			O				O			O		
Functions of Airborne Comm Systems			O				O				O	
Data Links			O				O				O	
Aircraft Operations			O								O	
Identify and Avoid Weather Hazards			O				O				O	
General Flight Rules			O				O				O	
Fuel Planning			O				O				O	
Operate Integrated Navigation Systems			O				O				O	
Aviation Principles			O				O				O	
Time and Course Control			O				O				O	
Radio Aid Navigation			O				O				O	
Basic Manual Navigation		O				O			O			
Conduct Low Level Flying		O				O			O			
Radar Navigation/Fixing		O				O			O			
Aircraft Systems and Directives			O				O				O	
Emergency Procedures			O				O				O	
Manual Flight Control Skills			O				O				O	
Air Tasking Order (ATO) / Airspace Control Order (ACO)			O				O				O	

Table A-2. NATO Class I Small

BUQ Level: II **C/JMQ: A (See Annex B)**	**SUBJECT KNOWLEDGE**				**TASK KNOWLEDGE**				**TASK PERFORMANCE**			
	A	B	C	D	a	b	c	d	1	2	3	4
(1) BEFORE FLIGHT CATEGORY												
Plan VFR Mission			O				O				O	
Get weather data for mission planning			O				O				O	
Get ops data for mission planning			O				O				O	
Compute takeoff and landing data			O				O				O	
Give/receive briefing on training flight			O				O				O	
Get clearance for local VFR flight			O				O				O	
Prepare maps for use during flight			O				O				O	
Plan route to destination and alternates			O				O				O	
Compute ground speed			O				O				O	
Select en route altitudes per flight info pubs			O				O				O	
File appropriate flight plan			O				O				O	
Perform preflight check			O				O				O	
Review maintenance logs			O				O				O	
Perform exterior inspection check			O				O				O	
Perform interior inspection check			O				O				O	
Perform appropriate communications			O				O				O	
Perform before taxi check			O				O				O	
Perform verbal comm/radio procedures			O				O				O	
Perform GPS position check			O				O				O	
Obtain appropriate clearances before flight			O				O				O	
Obtain clearance to taxi			O				O				O	
Obtain clearance for takeoff			O				O				O	
Taxi to runway			O				O				O	
Perform instrument GCS check			O				O				O	
Check operation of navigation radios			O				O				O	
Perform before takeoff check			O				O				O	
Taxi into takeoff position			O				O				O	
Perform line up check			O				O				O	
(2) CONTACT CATEGORY												
Perform takeoff, initial climb and associated checks			O				O				O	
Accelerate to climb airspeed			O				O				O	
Perform tech order climb			O				O				O	

Table A-2. NATO Class I Small

BUQ Level: II **C/JMQ: A (See Annex B)**	**SUBJECT KNOWLEDGE**				**TASK KNOWLEDGE**				**TASK PERFORMANCE**			
	A	B	C	D	a	b	c	d	1	2	3	4
Perform basic departure procedure			O				O				O	
Perform level off from tech order climb			O				O				O	
Establish and maintain altitude			O				O				O	
Perform all applicable in-flight checks			O				O				O	
Set, establish and maintain proper altitude/attitude throughout flight			O				O				O	
Perform level off check			O				O				O	
Establish basic area orientation			O				O				O	
Use local area map for orientation			O				O				O	
Perform each manoeuvre within assigned airspace			O				O				O	
Perform clearing			O				O				O	
Change airspeed, straight-and-level as required			O				O				O	
Perform slow flight			O				O				O	
Perform basic aero manoeuvres			O				O				O	
Perform turns, climbs, descents as req.			O				O				O	
Recognize unusual attitudes and perform recoveries			O				O				O	
Recognize stalls and perform recovery			O				O				O	
Recognize departure from controlled flight and perform recovery			O				O				O	
Perform before descent check			O				O				O	
Perform descent			O				O				O	
Request and receive landing clearance			O				O				O	
Perform approach to field check			O				O				O	
Analyze wind conditions			O				O				O	
Perform normal traffic patterns			O				O				O	
Respond to traffic conflicts as appropriate			O				O				O	
Clear airspace in direction of turn			O				O				O	
Configure aircraft to land and perform appropriate checks			O				O				O	
Perform normal overhead and straight-in patterns as appropriate			O				O				O	
Fly final approach			O				O				O	

Table A-2. NATO Class I Small

BUQ Level: II C/JMQ: A (See Annex B)	**SUBJECT KNOWLEDGE**				**TASK KNOWLEDGE**				**TASK PERFORMANCE**			
	A	B	C	D	a	b	c	d	1	2	3	4
Initiate automatic approach and landing			O				O				O	
Perform approach to landing			O				O				O	
Perform landing and rollout			O				O				O	
Perform touch and go landing			O				O				O	
Perform closed pattern			O				O				O	
Perform go-around on final approach turn			O				O				O	
Perform go-around/missed approach check			O				O				O	
Perform go-around from final approach/flare			O				O				O	
Perform post-landing checks and procedures			O				O				O	
Demonstrate airmanship, judgment, and decision-making while operating aircraft			O				O				O	
Perform and demo GCS safety procedures			O				O				O	
Demonstrate flight line and air discipline			O				O				O	
(3) INSTRUMENT CATEGORY (not used)												
(4) NAVIGATION CATEGORY												
Make position reports			O				O				O	
Request in-flight clearances			O				O				O	
Perform dead reckoning navigation			O				O				O	
Perform visual navigation			O				O				O	
Perform map reading			O				O				O	
Identify appropriate visual landmarks			O				O				O	
Correlate position with map			O				O				O	
Compare actual and planned ground speeds			O				O				O	
Compare actual and planned rates of fuel consumption			O				O				O	
Calculate actual fuel consumption			O				O				O	
Perform in-flight navigation planning			O				O				O	
Calculate / compensate for in-flight winds			O				O				O	

Table A-2. NATO Class I Small

BUQ Level: II C/JMQ: A (See Annex B)	**SUBJECT KNOWLEDGE**				**TASK KNOWLEDGE**				**TASK PERFORMANCE**			
	A	B	C	D	a	b	c	d	1	2	3	4
Calculate new estimated time of arrival (ETA)			O				O				O	
Perform time and fuel management			O				O				O	
Use automated terminal / weather information services, report inflight weather conditions			O				O				O	
Interpret radio weather condition report			O				O				O	
Alter navigation based on weather report			O				O				O	
Perform lost comm /C2 link procedures			O				O				O	
(5) EMERGENCY CATEGORY												
Recognize emergency conditions				O				O				O
Maintain aircraft control during emergency conditions				O				O				O
Analyze situation, including systems for possible emergency				O				O				O
Recognize and perform all applicable emergency procedures				O				O				O
Initiate communications/declare emergency (if required)				O				O				O
Recognize and properly respond to unplanned lost C2 link events				O				O				O
Land as soon as conditions permit				O				O				O
(6) AFTER FLIGHT CATEGORY												
Taxi clear of runway			O				O				O	
Perform after landing check			O				O				O	
Taxi to parking			O				O				O	
Perform engine shutdown check			O				O				O	
Perform all safety procedures for securing aircraft			O				O				O	
Perform post-landing procedures			O				O				O	
Complete maintenance logs			O				O				O	
Complete flight time logs			O				O				O	
Close flight plan with ATC			O				O				O	
(7) INSTRUCTOR/TEST SYSTEM CATEGORY												

Table A-2. NATO Class I Small

BUQ Level: II C/JMQ: A (See Annex B)	**SUBJECT KNOWLEDGE**				**TASK KNOWLEDGE**				**TASK PERFORMANCE**			
	A	B	C	D	a	b	c	d	1	2	3	4
Demonstrate understanding of learning theory				I				I				I
Demonstrate effective instructional presentation techniques				I				I				I
Demonstrate an understanding of courseware theory design				I				I				I
Demonstrate subject matter expertise				I				I				I
Demonstrate understanding of test plan				I				I				I
Perform system test procedures				I				I				I
Analyze test data				I				I				I

Table A-3. NATO Class II Tactical

BUQ Level: III C/JMQ: B (See Annex B)	**SUBJECT KNOWLEDGE**				**TASK KNOWLEDGE**				**TASK PERFORMANCE**			
	A	B	C	D	a	b	c	d	1	2	3	4
Mission Preparation												
Aviation Weather			O				O				O	
CRM and Communications			O				O				O	
Inflight Emergency Equipment/ Procedures			O				O				O	
Aeronautical Charts-Sectional and Tactical			O				O				O	
Aircraft Performance data and Limitations			O				O				O	
Publications			O				O				O	
Departure and Arrival Planning			O				O				O	
Computerized Flight Planning Systems			O				O				O	
Mission Route Selection and Analysis			O				O				O	
Communications			O								O	
Plan and Manage communications			O				O				O	
Functions of Airborne Comm Systems			O				O				O	
Data Links			O				O				O	
Aircraft Operations			O								O	
Identify and Avoid Weather Hazards			O				O				O	
General Flight Rules			O				O				O	
Fuel Planning			O				O				O	
Operate Integrated Navigation Systems			O				O				O	
Aviation Principles			O				O				O	
Time and Course Control			O				O				O	
Radio Aid Navigation			O				O				O	
Basic Manual Navigation			O				O				O	
Conduct Low Level Flying			O			O				O		
Radar Navigation/Fixing			O			O				O		
Aircraft Systems and Directives			O				O				O	
Emergency Procedures			O				O				O	
Manual Flight Control Skills			O				O				O	
Air Tasking Order (ATO) / Airspace Control Order (ACO)			O				O				O	

Table A-3. NATO Class II Tactical

BUQ Level: III C/JMQ: B (See Annex B)	**SUBJECT KNOWLEDGE**				**TASK KNOWLEDGE**				**TASK PERFORMANCE**			
	A	B	C	D	a	b	c	d	1	2	3	4
(1) BEFORE FLIGHT CATEGORY												
Plan VFR Mission			O				O				O	
Get weather data for mission planning			O				O				O	
Get ops data for mission planning			O				O				O	
Compute takeoff and landing data			O				O				O	
Give/receive briefing on training flight			O				O				O	
Get clearance for local VFR flight			O				O				O	
Prepare maps for use during flight			O				O				O	
Plan route to destination and alternates			O				O				O	
Select en route altitudes per flight info pubs			O				O				O	
File appropriate flight plan			O				O				O	
Perform preflight check			O				O				O	
Review maintenance logs			O				O				O	
Perform exterior inspection check			O				O				O	
Perform interior inspection check			O				O				O	
Perform appropriate communications			O				O				O	
Perform before taxi check			O				O				O	
Perform verbal comm/radio procedures			O				O				O	
Operate air traffic surveillance equipment (IFF/SIF/TCAS/Sense and Avoid Sensors)			O				O				O	
Perform GPS position check			O				O				O	
Obtain appropriate clearances before flight			O				O				O	
Obtain clearance to taxi			O				O				O	
Obtain IFR clearance over radio			O				O				O	
Obtain clearance for takeoff			O				O				O	
Taxi to runway			O				O				O	
Perform instrument GCS check			O				O				O	
Check operation of navigation radios			O				O				O	
Perform before takeoff check			O				O				O	
Taxi into takeoff position			O				O				O	
Perform line up check			O				O				O	
(2) CONTACT CATEGORY												

Table A-3. NATO Class II Tactical

BUQ Level: III C/JMQ: B (See Annex B)	**SUBJECT KNOWLEDGE**				**TASK KNOWLEDGE**				**TASK PERFORMANCE**			
	A	B	C	D	a	b	c	d	1	2	3	4
Perform takeoff, initial climb and associated checks			O				O				O	
Accelerate to climb airspeed			O				O				O	
Perform tech order climb			O				O				O	
Perform basic departure procedures			O				O				O	
Perform level off from tech order climb			O				O				O	
Establish and maintain altitude			O				O				O	
Perform all applicable in-flight checks			O				O				O	
Set, establish and maintain proper altitude/attitude throughout flight			O				O				O	
Perform level off check			O				O				O	
Establish basic area orientation			O				O				O	
Use local area map for orientation			O				O				O	
Perform each manoeuvre within assigned airspace			O				O				O	
Perform clearing			O				O				O	
Change airspeed, straight-and-level as required			O				O				O	
Perform slow flight			O				O				O	
Perform basic aero manoeuvres			O				O				O	
Perform turns, climbs, descents as req.			O				O				O	
Recognize unusual attitudes and perform recoveries			O				O				O	
Recognize stalls and perform recovery			O				O				O	
Recognize departure from controlled flight and perform recovery			O				O				O	
Perform before descent check			O				O				O	
Perform descent			O				O				O	
Request and receive landing clearance			O				O				O	
Perform approach to field check			O				O				O	
Analyze wind conditions			O				O				O	
Perform normal traffic patterns			O				O				O	
Respond to traffic conflicts as appropriate			O				O				O	
Clear airspace in direction of turn			O				O				O	

Table A-3. NATO Class II Tactical

BUQ Level: III C/JMQ: B (See Annex B)	**SUBJECT KNOWLEDGE**				**TASK KNOWLEDGE**				**TASK PERFORMANCE**			
	A	B	C	D	a	b	c	d	1	2	3	4
Configure aircraft to land and perform appropriate checks			O				O				O	
Perform normal overhead and straight-in patterns as appropriate			O				O				O	
Fly final approach			O				O				O	
Initiate automatic approach and landing			O				O				O	
Perform approach to landing			O				O				O	
Perform landing and rollout			O				O				O	
Perform touch and go landing			O				O				O	
Perform closed pattern			O				O				O	
Perform go-around on final approach turn			O				O				O	
Perform go-around/missed approach check			O				O				O	
Perform go-around from final approach/flare			O				O				O	
Perform post-landing checks and procedures			O				O				O	
Demonstrate airmanship, judgment, and decision-making while operating aircraft			O				O				O	
Perform and demo GCS safety procedures			O				O				O	
Demonstrate flight line and air discipline			O				O				O	
(3) INSTRUMENT CATEGORY												
Establish and maintain constant altitude, airspeed and heading during instrument flight			O				O				O	
Perform aircraft manoeuvres under instrument conditions			O				O				O	
Recognize and recover from unusual attitudes under instrument conditions			O				O				O	
Recognize improper nose low condition			O				O				O	
Operate aircraft instruments and navigation equipment			O				O				O	
Determine rate of intercept			O				O				O	
Determine angle of intercept			O				O				O	
Perform course intercept			O				O				O	

Table A-3. NATO Class II Tactical

BUQ Level: III C/JMQ: B (See Annex B)	**SUBJECT KNOWLEDGE**				**TASK KNOWLEDGE**				**TASK PERFORMANCE**			
	A	B	C	D	a	b	c	d	1	2	3	4
React to hazardous/adverse weather conditions during flight			O				O				O	
Identify weather phenomena which affect flight			O				O				O	
(4) NAVIGATION CATEGORY												
Perform strange field departure			O				O				O	
Perform strange field approaches			O				O				O	
Make position reports			O				O				O	
Request in-flight clearances			O				O				O	
Perform dead reckoning navigation			O				O				O	
Perform visual navigation			O				O				O	
Perform map reading			O				O				O	
Identify appropriate visual landmarks			O				O				O	
Correlate position with map			O				O				O	
Compare actual and planned ground speeds			O				O				O	
Compare actual and planned rates of fuel consumption			O				O				O	
Calculate actual fuel consumption			O				O				O	
Perform in-flight navigation planning			O				O				O	
Calculate / compensate for in-flight winds			O				O				O	
Calculate new estimated time of arrival (ETA)			O				O				O	
Perform time and fuel management			O				O				O	
Use automated terminal / weather information services, report inflight weather conditions			O				O				O	
Interpret radio weather condition report			O				O				O	
Alter navigation based on weather report			O				O				O	
Perform lost comm /C2 link procedures			O				O				O	
Perform low level navigation		O				O				O		

Table A-3. NATO Class II Tactical

BUQ Level: III C/JMQ: B (See Annex B)	**SUBJECT KNOWLEDGE**				**TASK KNOWLEDGE**				**TASK PERFORMANCE**			
	A	B	C	D	a	b	c	d	1	2	3	4
(5) EMERGENCY CATEGORY												
Recognize emergency conditions				O				O				O
Maintain aircraft control during emergency conditions				O				O				O
Analyze situation, including systems for possible emergency				O				O				O
Recognize and perform all applicable emergency procedures				O				O				O
Initiate communications/declare emergency (if required)				O				O				O
Recognize and properly respond to unplanned lost C2 link events				O				O				O
Land as soon as conditions permit				O				O				O
(6) AFTER FLIGHT CATEGORY												
Taxi clear of runway			O				O				O	
Perform after landing check			O				O				O	
Taxi to parking			O				O				O	
Perform engine shutdown check			O				O				O	
Perform all safety procedures for securing aircraft			O				O				O	
Perform post-landing procedures			O				O				O	
Complete maintenance logs			O				O				O	
Complete flight time logs			O				O				O	
Close flight plan with ATC			O				O				O	
(7) INSTRUCTOR / TEST SYSTEM CATEGORY												
Demonstrate understanding of learning theory				I				I				I
Demonstrate effective instructional presentation techniques				I				I				I
Demonstrate an understanding of courseware theory design				I				I				I
Demonstrate subject matter expertise				I				I				I
Demonstrate understanding of test plan				I				I				I
Perform system test procedures				I				I				I
Analyze test data				I				I				I

Table A-4. NATO Class III Medium Altitude, Long Endurance (MALE), HALE (High Altitude, Long Endurance), and Strike/Combat

BUQ Level: IV **C/JMQ: B – MALE/HALE** **C/JMQ: C – Strike/Combat** **(See Annex B)**	**SUBJECT KNOWLEDGE**				**TASK KNOWLEDGE**				**TASK PERFORMANCE**			
	A	B	C	D	a	b	c	d	1	2	3	4
Mission Preparation												
Aviation Weather			O				O				O	
CRM and Communications			O				O				O	
Inflight Emergency Equipment/Procedures			O				O				O	
Aeronautical Charts-Sectional, Tactical, Global			O				O				O	
Aircraft Performance data and Limitations			O				O				O	
Flight Operations Knowledge			O				O				O	
Publications			O				O				O	
Departure and Arrival Planning			O				O				O	
Computerized Flight Planning Systems			O				O				O	
Mission Route Selection and Analysis			O				O				O	
Communications			O								O	
Plan and Manage communications			O				O				O	
Functions of Airborne Comm Systems			O				O				O	
Satellite Communications (SATCOM)			O				O				O	
Data Links			O				O				O	
Aircraft Operations			O								O	
Identify and Avoid Weather Hazards			O				O				O	
General Flight Rules			O				O				O	
Fuel Planning			O				O				O	
Operate Integrated Navigation Systems			O				O				O	
Instrument Flight			O				O				O	
Aviation Principles			O				O				O	
Instrument Flight Procedures (IFP)			O				O				O	
Navigation Procedures			O				O				O	
Time and Course Control			O				O				O	
Radio Aid Navigation			O				O				O	

Table A-4. NATO Class III Medium Altitude, Long Endurance (MALE), HALE (High Altitude, Long Endurance), and Strike/Combat

BUQ Level: IV **C/JMQ: B – MALE/HALE** **C/JMQ: C – Strike/Combat** **(See Annex B)**	**SUBJECT KNOWLEDGE**				**TASK KNOWLEDGE**				**TASK PERFORMANCE**			
	A	B	C	D	a	b	c	d	1	2	3	4
Basic Manual Navigation			O				O				O	
Conduct Low Level Flying		O				O				O		
Radar Navigation/Fixing			O				O				O	
Aircraft Systems and Directives			O				O				O	
Emergency Procedures			O				O				O	
Manual Flight Control Skills			O				O				O	
Air Tasking Order (ATO) / Airspace Control Order (ACO)			O				O				O	
(1) BEFORE FLIGHT CATEGORY												
Plan VFR Mission			O				O				O	
Get weather data for mission planning			O				O				O	
Get ops data for mission planning			O				O				O	
Compute takeoff and landing data			O				O				O	
Give/receive briefing on training flight			O				O				O	
Get clearance for local VFR flight			O				O				O	
Prepare maps for use during flight			O				O				O	
Plan IFR mission			O				O				O	
Plan route to destination and alternates			O				O				O	
Compute ground speed			O				O				O	
Select en route altitudes per flight info pubs			O				O				O	
File DD 175/ICAO 1801 (Flight Plan)			O				O				O	
Perform preflight check			O				O				O	
Review maintenance logs			O				O				O	
Perform exterior inspection check			O				O				O	
Perform interior inspection check			O				O				O	
Perform appropriate communications			O				O				O	
Perform before taxi check			O				O				O	
Perform verbal comm/radio procedures			O				O				O	
Operate air traffic surveillance equipment (IFF/SIF/TCAS/Sense and Avoid Sensors)			O				O				O	
Perform GPS position check			O				O				O	

Table A-4. NATO Class III Medium Altitude, Long Endurance (MALE), HALE (High Altitude, Long Endurance), and Strike/Combat

BUQ Level: IV **C/JMQ: B – MALE/HALE** **C/JMQ: C – Strike/Combat** **(See Annex B)**	**SUBJECT KNOWLEDGE**				**TASK KNOWLEDGE**				**TASK PERFORMANCE**			
	A	B	C	D	a	b	c	d	1	2	3	4
Obtain appropriate clearances before flight			O				O				O	
Obtain clearance to taxi			O				O				O	
Obtain IFR clearance over radio			O				O				O	
Obtain clearance for takeoff			O				O				O	
Taxi to runway			O				O				O	
Perform instrument GCS check			O				O				O	
Check operation of navigation radios			O				O				O	
Perform before takeoff check			O				O				O	
Taxi into takeoff position			O				O				O	
Perform line up check			O				O				O	
(2) CONTACT CATEGORY												
Perform takeoff, initial climb and associated checks			O				O				O	
Accelerate to climb airspeed			O				O				O	
Perform tech order climb			O				O				O	
Perform basic departure procedures			O				O				O	
Perform level off from tech order climb			O				O				O	
Establish and maintain altitude			O				O				O	
Perform all applicable in-flight checks			O				O				O	
Set, establish and maintain proper altitude/attitude throughout flight			O				O				O	
Perform level off check			O				O				O	
Establish basic area orientation			O				O				O	
Use local area map for orientation			O				O				O	
Perform each manoeuvre within assigned airspace			O				O				O	
Perform clearing			O				O				O	
Change airspeed, straight-and-level as required			O				O				O	
Perform slow flight			O				O				O	
Perform basic aero manoeuvres			O				O				O	
Perform turns, climbs, descents as req.			O				O				O	

Table A-4. NATO Class III Medium Altitude, Long Endurance (MALE), HALE (High Altitude, Long Endurance), and Strike/Combat

BUQ Level: IV **C/JMQ: B – MALE/HALE** **C/JMQ: C – Strike/Combat** **(See Annex B)**	**SUBJECT KNOWLEDGE**				**TASK KNOWLEDGE**				**TASK PERFORMANCE**			
	A	B	C	D	a	b	c	d	1	2	3	4
Recognize unusual attitudes and perform recoveries			O				O				O	
Recognize stalls and perform recovery			O				O				O	
Recognize departure from controlled and perform recovery			O				O				O	
Perform before descent check			O				O				O	
Perform descent			O				O				O	
Request and receive landing clearance			O				O				O	
Perform approach to field check			O				O				O	
Analyze wind conditions			O				O				O	
Perform normal traffic patterns			O				O				O	
Respond to traffic conflicts as appropriate			O				O				O	
Clear airspace in direction of turn			O				O				O	
Configure aircraft to land and perform appropriate checks			O				O				O	
Perform normal overhead and straight-in patterns as appropriate			O				O				O	
Fly final approach			O				O				O	
Initiate automatic approach and landing			O				O				O	
Perform approach to landing			O				O				O	
Perform landing and rollout			O				O				O	
Perform touch and go landing			O				O				O	
Perform closed pattern			O				O				O	
Perform go-around on final approach turn			O				O				O	
Perform go-around/missed approach check			O				O				O	
Perform go-around from final approach/flare			O				O				O	
Perform post-landing checks and procedures			O				O				O	
Demonstrate airmanship, judgment, and decision-making while operating aircraft			O				O				O	
Perform and demo GCS safety procedures			O				O				O	

Table A-4. NATO Class III Medium Altitude, Long Endurance (MALE), HALE (High Altitude, Long Endurance), and Strike/Combat

BUQ Level: IV **C/JMQ: B – MALE/HALE** **C/JMQ: C – Strike/Combat** **(See Annex B)**	**SUBJECT KNOWLEDGE**				**TASK KNOWLEDGE**				**TASK PERFORMANCE**			
	A	B	C	D	a	b	c	d	1	2	3	4
Demonstrate flight line and air discipline			O				O				O	
(3) INSTRUMENT CATEGORY												
Perform auto/instrument takeoff, climb and departure			O				O				O	
Perform instrument cross check			O				O				O	
Establish and maintain constant altitude, airspeed and heading during instrument flight			O				O				O	
Perform aircraft manoeuvres under instrument conditions			O				O				O	
Recognize and recover from unusual attitudes under instrument conditions			O				O				O	
Recognize improper nose low condition			O				O				O	
Operate aircraft instruments and navigation equipment			O				O				O	
Perform course intercept			O				O				O	
Determine angle of intercept			O				O				O	
Determine intercept heading			O				O				O	
Establish and maintain appropriate heading			O				O				O	
Determine lead point			O				O				O	
Determine rate of intercept			O				O				O	
Complete intercept			O				O				O	
Perform IFR navigation			O				O				O	
Perform fix-to-fix navigation			O				O				O	
Maintain selected course, correcting for wind			O				O				O	
Establish arc			O				O				O	
Intercept arc			O				O				O	
Maintain arc			O				O				O	
Perform radial intercept from arc			O				O				O	
Perform holding / loiter			O				O				O	
Receive and understand holding instructions			O				O				O	
Perform proper holding pattern entry			O				O				O	

Table A-4. NATO Class III Medium Altitude, Long Endurance (MALE), HALE (High Altitude, Long Endurance), and Strike/Combat

BUQ Level: IV **C/JMQ: B – MALE/HALE** **C/JMQ: C – Strike/Combat** **(See Annex B)**	**SUBJECT KNOWLEDGE**				**TASK KNOWLEDGE**				**TASK PERFORMANCE**			
	A	B	C	D	a	b	c	d	1	2	3	4
Maintain position within holding pattern airspace			O				O				O	
Perform wind analysis to assist in maintaining position within holding pattern airspace			O				O				O	
Depart holding pattern			O				O				O	
Perform procedure turns			O				O				O	
Comply with standard instrument approach plate procedures			O				O				O	
Remain within procedure turn airspace			O				O				O	
Perform en route descent			O				O				O	
Determine descent gradient			O				O				O	
Perform instrument meteorological conditions (IMC) penetration			O				O				O	
Receive ATC Clearance			O				O				O	
Comply with ATC procedures			O				O				O	
Remain within cleared airspace			O				O				O	
Perform descent			O				O				O	
Perform instrument approach			O				O				O	
Perform radar pattern			O				O				O	
Follow GCA controller’s directions			O				O				O	
Turn to directed headings			O				O				O	
Maintain directed altitudes			O				O				O	
Maintain proper airspace			O				O				O	
Establish proper holding configuration			O				O				O	
Perform precision radar approach			O				O				O	
Make corrections to heading			O				O				O	
Establish landing configuration			O				O				O	
Perform non-precision radar approach			O				O				O	
Perform gyro-out instrument pattern			O			O				O		
Perform half standard-rate turns on final			O			O				O		
Perform gyro-out precision radar approach			O			O				O		
Maintain glide slope control			O				O				O	
Maintain course control			O				O				O	

Table A-4. NATO Class III Medium Altitude, Long Endurance (MALE), HALE (High Altitude, Long Endurance), and Strike/Combat

BUQ Level: IV **C/JMQ: B – MALE/HALE** **C/JMQ: C – Strike/Combat** **(See Annex B)**	**SUBJECT KNOWLEDGE**				**TASK KNOWLEDGE**				**TASK PERFORMANCE**			
	A	B	C	D	a	b	c	d	1	2	3	4
Transition from instruments to visual			O				O				O	
Calculate Visual Descent Point (VDP)			O				O				O	
Transition from glide path to runway			O				O				O	
Transition from Min Descent Altitude (MDA) to runway			O				O				O	
Perform circling approach			O			O				O		
Comply with missed approach procedures			O				O				O	
Comply with ATC missed approach clearance			O				O				O	
Complete missed approach check			O				O				O	
React to hazardous/adverse weather conditions during flight			O				O				O	
Identify weather phenomena which affect flight			O				O				O	
Obtain in-flight IFR clearance			O				O				O	
(4) NAVIGATION CATEGORY												
Perform strange field departure			O				O				O	
Perform strange field visual and instrument approaches			O				O				O	
Make position reports			O				O				O	
Request in-flight clearances			O				O				O	
Perform dead reckoning navigation			O				O				O	
Perform visual navigation			O				O				O	
Perform map reading			O				O				O	
Identify appropriate visual landmarks			O				O				O	
Correlate position with map			O				O				O	
Compare actual and planned ground speeds			O				O				O	
Compare actual and planned rates of fuel consumption			O				O				O	
Calculate actual fuel consumption			O				O				O	
Perform in-flight navigation planning			O				O				O	

Table A-4. NATO Class III Medium Altitude, Long Endurance (MALE), HALE (High Altitude, Long Endurance), and Strike/Combat

BUQ Level: IV **C/JMQ: B – MALE/HALE** **C/JMQ: C – Strike/Combat** **(See Annex B)**	**SUBJECT KNOWLEDGE**				**TASK KNOWLEDGE**				**TASK PERFORMANCE**			
	A	B	C	D	a	b	c	d	1	2	3	4
Calculate / compensate for in-flight winds			O				O				O	
Calculate new estimated time of arrival (ETA)			O				O				O	
Perform time and fuel management			O				O				O	
Use automated terminal / weather information services, report inflight weather conditions			O				O				O	
Interpret radio weather condition report			O				O				O	
Alter navigation based on weather report			O				O				O	
Perform lost comm /C2 link procedures			O				O				O	
Perform low level navigation		O				O				O		
(5) EMERGENCY CATEGORY												
Recognize emergency conditions				O				O				O
Maintain aircraft control during emergency conditions				O				O				O
Analyze situation, including systems for possible emergency				O				O				O
Recognize and perform all applicable emergency procedures				O				O				O
Initiate communications/declare emergency (if required)				O				O				O
Recognize and properly respond to unplanned lost C2 link events				O				O				O
Land as soon as conditions permit				O				O				O
(6) AFTER FLIGHT CATEGORY												
Taxi clear of runway			O				O				O	
Perform after landing check			O				O				O	
Taxi to parking			O				O				O	
Perform engine shutdown check			O				O				O	
Perform all safety procedures for securing aircraft			O				O				O	
Perform post-landing procedures			O				O				O	
Complete maintenance logs			O				O				O	

Table A-4. NATO Class III Medium Altitude, Long Endurance (MALE), HALE (High Altitude, Long Endurance), and Strike/Combat

BUQ Level: IV **C/JMQ: B – MALE/HALE** **C/JMQ: C – Strike/Combat** **(See Annex B)**	**SUBJECT KNOWLEDGE**				**TASK KNOWLEDGE**				**TASK PERFORMANCE**			
	A	B	C	D	a	b	c	d	1	2	3	4
Complete flight time logs			O				O				O	
Close flight plan with ATC			O				O				O	
(7) INSTRUCTOR / TEST SYSTEM CATEGORY												
Demonstrate understanding of learning theory				I				I				I
Demonstrate effective instructional presentation techniques				I				I				I
Demonstrate an understanding of courseware theory design				I				I				I
Demonstrate subject matter expertise				I				I				I
Demonstrate understanding of test plan				I				I				I
Perform system test procedures				I				I				I
Analyze test data				I				I				I

ANNEX B TRAINING REQUIREMENTS FOR COMBINED/ JOINT MISSION QUALIFICATIONS (C/JMQ)

B.1. RATINGS SCALES FOR UAS OPERATORS' COMBAT EMPLOYMENT SKILLS

1. The knowledge and skill levels in this annex build on the corresponding levels in Annex A, but are not comprehensive. They are grouped by the same generally accepted UAS categories used in Annex A.

2. **Combined/Joint Mission Qualification (C/JMQ)**: Provides the general mission knowledge of the objective the UAS is expected to accomplish. These skill sets are critical to ensure the crews understand their role in accomplishing a larger military objective. The defined C/JMQ levels are:

a. **C/JMQ-A**: Support tactical-level ISR and Fires tasks for the Combined/Joint Force Commander (C/JFC). NATO Class I, Micro, Mini, and Small UAS operators are to be trained to C/JMQ-A.

b. **C/JMQ-B**: Provide operational-level advanced ISR mission support for the C/JFC. NATO Class II, Tactical, and Class III, MALE/HALE UAS operators are to be trained to C/JMQ-B.

c. **C/JMQ-C**: Support strategic-level Fires and Joint Combat Search and Rescue/Personnel Rescue (JCSAR/PR) tasks for the C/JFC. NATO Class III, Strike/Combat UAS operators are to be trained to C/JMQ-C.

B.2. SUBJECT KNOWLEDGE LEVELS

a. **Subject Knowledge Level A**: Can identify basic facts and terms about the subject (Facts)

b. **Subject Knowledge Level B**: Can identify relationship of basic facts and state general principles about the subject. (Principles)

c. **Subject Knowledge Level C**: Can analyze facts and principles and draw conclusions about the subject. (Analysis)

d. **Subject Knowledge Level D**: Can evaluate conditions and make proper decisions about the subject. (Evaluation)

B.3. TASK KNOWLEDGE LEVELS

a. **Task Knowledge Level a**: Can name parts, tools, and simple facts about the task (Facts)

b. **Task Knowledge Level b**: Can determine step-by-step procedures for doing the task (Procedure)

c. **Task Knowledge Level c**: Can identify why and when the task must be done and why each step is needed (Principles)

d. **Task Knowledge Level d**: Can predict, isolate, and resolve problems about the task (Advanced Theory)

B.4. TASK PERFORMANCE LEVELS

a. **Task Performance Level 1**: Can do simple parts of the task. Must be told or shown how to do most of the task (Extremely Limited)

b. **Task Performance Level 2**: Can do most parts of the task. Needs help on only the most difficult parts (Partially Proficient)

c. **Task Performance Level 3**: Can do all parts of the task. Needs only spot check of completed work (Competent)

d. **Task Performance Level 4**: Can do the task quickly and accurately. Can tell or show others how to do the task (Highly Proficient)

***Note**: The C/JMQ levels are cumulative, so to meet C/JMQ Level B or C requirements, operators must meet Level A as well. The tables that follow reflect this.*

O = UAS operator, I = Instructor or Test Operator

Table B-1. NATO Class I Micro, Mini, and Small

BUQ Level: I (See Annex A) C/JMQ: A	**SUBJECT KNOWLEDGE**				**TASK KNOWLEDGE**				**TASK PERFORMANCE**			
	A	B	C	D	a	b	c	d	1	2	3	4
C/JMQ-A:												
Perform mission route selection and analysis			O				O				O	
Understand and apply appropriate grid reference symbols			O				O				O	
Understand and apply fire support and airspace coordination measures			O				O				O	
Perform map analysis of the mission operations area			O				O				O	
Submit target nomination			O				O				O	
Execute target planning checklist/ mission card			O				O				O	
Call for and adjust indirect fire			O				O				O	
Transmit a tactical report			O				O				O	
Understand and apply Air Tasking Order			O				O				O	
Understand and apply training rules/ rules of agreement/ rules of engagement			O				O				O	
Perform aerial observation			O				O				O	
C/JMQ-B (not used)												

Table B-2. NATO Class II Tactical and Class III, MALE/HALE

BUQ Level: II (See Annex A) C/JMQ: B	**SUBJECT KNOWLEDGE**				**TASK KNOWLEDGE**				**TASK PERFORMANCE**			
	A	B	C	D	a	b	c	d	1	2	3	4
C/JMQ-A												
Perform mission route selection and analysis			O				O				O	
Understand and apply appropriate grid reference symbols			O				O				O	
Understand and apply fire support and airspace coordination measures			O				O				O	
Perform map analysis of the mission operations area			O				O				O	
Submit target nomination			O				O				O	
Execute target planning checklist/ mission card			O				O				O	
Call for and adjust indirect fire			O				O				O	
Transmit a tactical report			O				O				O	
Understand and apply Air Tasking Order			O				O				O	
Understand and apply training rules/ rules of agreement/ rules of engagement			O				O				O	
Perform aerial observation			O				O				O	
C/JMQ-B:			O				O				O	
Perform route reconnaissance			O				O				O	
Perform zone reconnaissance			O				O				O	
Perform area reconnaissance			O				O				O	
Apply collection requirements			O				O				O	
Use all-sensor system capabilities			O				O				O	
Conduct mission planning/ briefing			O				O				O	
Perform target surveillance			O				O				O	
Track a static target			O				O				O	
Track a moving target			O				O				O	
Communicate battle damage assessment (BDA) report			O				O				O	
Be familiar with total sensor timeline and target location error analysis			O				O				O	
C/JMQ-C (not used)												

Table B-3. NATO Class III Strike/Combat

BUQ Level: III (See Annex A) C/JMQ: C	SUBJECT KNOWLEDGE				TASK KNOWLEDGE				TASK PERFORMANCE			
	A	B	C	D	a	b	c	d	1	2	3	4
C/JMQ-A:												
Perform mission route selection and analysis			O				O				O	
Understand and apply appropriate grid reference symbols			O				O				O	
Understand and apply fire support and airspace coordination measures			O				O				O	
Perform map analysis of the mission operations area			O				O				O	
Submit target nomination			O				O				O	
Execute target planning checklist/ mission card			O				O				O	
Call for and adjust indirect fire			O				O				O	
Transmit a tactical report			O				O				O	
Understand and apply Air Tasking Order			O				O				O	
Understand and apply training rules/ rules of agreement/ rules of engagement			O				O				O	
Perform aerial observation			O				O				O	
C/JMQ-B:			O				O				O	
Perform route reconnaissance			O				O				O	
Perform zone reconnaissance			O				O				O	
Perform area reconnaissance			O				O				O	
Apply collection requirements			O				O				O	
Use all-sensor system capabilities			O				O				O	
Conduct mission planning/ briefing			O				O				O	
Perform target surveillance			O				O				O	
Track a static target			O				O				O	
Track a moving target			O				O				O	
Communicate battle damage assessment (BDA) report			O				O				O	
Be familiar with total sensor timeline and target location error analysis			O				O				O	
C/JMQ-C			O				O				O	
Joint Fires			O				O				O	
Know communications for employing close air support (CAS)			O				O				O	

Table B-3. NATO Class III Strike/Combat

BUQ Level: III (See Annex A) C/JMQ: C	SUBJECT KNOWLEDGE				TASK KNOWLEDGE				TASK PERFORMANCE			
	A	B	C	D	a	b	c	d	1	2	3	4
Theater air control system coordination			O				O				O	
Understand CAS/close combat attack (CCA) planning process			O				O				O	
Understand joint air attack team briefing and provide necessary elements of information			O				O				O	
Understand NATO fighter check-in procedures			O				O				O	
Target marking			O				O				O	
Real-time battlespace coordination			O				O				O	
Perform weapons employment			O				O				O	
Communicate a BDA report			O				O				O	
Aircraft positioning			O				O				O	
Understand target weather information and pass to others			O				O				O	
Perform target handover to another aircraft			O				O				O	
Rendezvous			O				O				O	
Understand different fire support request nets			O				O				O	
Perform firing techniques			O				O				O	
Understand and correctly employ laser designation capability			O				O				O	
Weapons delivery procedures			O				O				O	
Targeting of time-sensitive target decentralized to the shooter			O				O				O	
Know capabilities and limitations of strike (surface and air) assets			O				O				O	
Conduct joint force targeting			O				O				O	
Support JCSAR/PR tasks: report, locate, support and recover			O				O				O	
Determine and maintain location of isolated personnel			O				O				O	
Perform authentication of isolated personnel			O				O				O	
Perform communication relay			O				O				O	

ANNEX C GLOSSARY OF TERMS AND ACRONYMS

TERMS

Terms used in the document are defined below for the purpose of this document only.

A

Air Vehicle Control Station. The subsystem designed to plan and control a UAS mission, including sensor employment and connectivity with the appropriate airspace controlling authority.

Air Traffic Services (ATS). The national or international authority governing flight in any airspace. For example, the FAA or ICAO.

C

Controlled Flight. Any flight that is subject to an air traffic control clearance.

F

Flight Training. Instruction normally consisting of actual flight or simulated flight and observed by a qualified instructor.

G

Global Positioning System (GPS). A system of satellites, computers, and receivers that is able to determine the latitude and longitude of a receiver on Earth by calculating the time difference for signals from different satellites to reach the receiver. (*American Heritage Dictionary*)

Ground Training. Instruction normally consisting of academic subject matter relating to flight operations. Can be instructor-led or self-paced using hard-copy manuals or computer-based instructional systems monitored by a qualified instructor.

I

Instrument Approach Procedure. A series of predetermined manoeuvres for the orderly transfer of an aircraft under instrument flight conditions from the beginning of the initial approach to a landing or to a point from which a landing may be made visually or the missed approach procedure is initiated.

Instrument Flight Rules. A set of procedures governing the conduct of flight under Instrument Meteorological Conditions. (ICAO)

N

Non-Segregated Airspace. Any airspace which does not meet the criteria of “Segregated Airspace” as defined below.

P

Preflight Inspection. Set of visual condition observations and functional procedures/tests performed prior to any launch.

Proficiency/Currency Events. The activities necessary to either achieve (proficiency) or maintain (currency) qualifications to perform as a UAS operator. May consist of actual flight time, use of an approved simulator, subject matter examinations and meeting / maintaining medical qualifications.

S

Segregated Airspace. Airspace of defined dimensions for the exclusive use of specific users. It includes Temporary Reserved Areas (TRAs), Temporary Segregated Airspace (TSAs), Danger (D), Restricted (R), Prohibited (P) Areas and any specially activated areas. (Eurocontrol)

U

UAS Operator. The individual in the Air Vehicle Control Station tasked with overall responsibility for operation and safety of the UAS. Equivalent to the pilot in command of a manned aircraft.

UAS Operator Training Course. Instruction that produces measurable improvements in performance, certified to meet national requirements. Completion qualifies and certifies an individual to assume overall responsibility for the operation and safety of a UAS from takeoff through landing, in appropriate classes of airspace.

Unmanned Aircraft (UA). An aircraft that does not carry a human operator and is operated remotely using varying levels of automated functions.
Notes:
1. Unmanned aircraft can be expendable or recoverable.
2. Unmanned aircraft may carry a lethal or non-lethal payload.
3. Cruise missiles are not considered unmanned aircraft

Unmanned Aircraft System (UAS). A system whose components include the unmanned aircraft, the supporting network and all equipment and personnel necessary to control the unmanned aircraft.

UAS Instructor. A highly qualified person with expertise in UAS operations and/or maintenance who meets the qualifications to teach others to operate UAS.

UAS Test Operator. A UAS operator who is additionally qualified to control a UAS during developmental and experimental flights.

V

Visual Flight Rules (VFR). A set of procedures governing the conduct of flight under Visual Meteorological Conditions. Under VFR, the designated operator is responsible for flight separation from other aircraft.

ACRONYMS

	A
AGL	Above Ground Level
ATC	Air Traffic Control
	B
BDA	Battle Damage Assessment
BUQ	Basic UAS Qualification
	C
C2	Command and Control
C/JMQ	Combined/Joint Mission Qualification
CRM	Crew Resource Management
	H
HALE	High-Altitude, Long Endurance
	I
IAW	In accordance with, per
ICAO	International Civil Aviation Organization
IFE	In-Flight Emergency
IFF/SIF	Identification Friend or Foe/Selective Identification Feature
IFR	Instrument Flight Rules
IMC	Instrument Meteorological Conditions
ISR	Intelligence, Surveillance, Reconnaissance
	M
MALE	Medium-Altitude, Long Endurance
MSL	Mean Sea Level
	T
TCAS	Traffic Collision Avoidance System
	U
UA	**Unmanned Aircraft**
UAS	Unmanned Aircraft System
	V
VFR	Visual Flight Rules
VMC	Visual Meteorological Conditions

ATP-3.3.8.1(A)(1)