

Recommended Practice

Terminology for Unmanned Aerial Vehicles and Remotely Operated Aircraft

AIAA standards are copyrighted by the American Institute of Aeronautics and Astronautics (AIAA), 1801 Alexander Bell Drive, Reston, VA 20191-4344 USA. All rights reserved.

AIAA grants you a license as follows: The right to download an electronic file of this AIAA standard for temporary storage on one computer for purposes of viewing, and/or printing one copy of the AIAA standard for individual use. Neither the electronic file nor the hard copy print may be reproduced in any way. In addition, the electronic file may not be distributed elsewhere over computer networks or otherwise. The hard copy print may only be distributed to other employees for their internal use within your organization.

Recommended Practice

Terminology for Unmanned Aerial Vehicles and Remotely Operated Aircraft

Sponsored by

American Institute of Aeronautics and Astronautics

Abstract

The purpose of this Recommended Practice is to aid in promoting understanding of the vocabulary and acronyms, currently in use, among many different groups within the UAV/ROA community. It contains approximately 400 terms and more than 1100 acronyms culled from a number of authoritative sources on unmanned aviation. This document is intended to be a living document and will be updated periodically to reflect changes in the terminology of a developing technology.

Library of Congress Cataloging-in-Publication Data

Recommended practice : terminology for unmanned aerial vehicles and remotely operated aircraft / sponsored by American Institute of Aeronautics and Astronautics.

p. cm.

"R-103-2004."

Includes bibliographical references.

ISBN 1-56347-706-8 (hardcopy) -- ISBN 1-56347-707-6 (electronic)

1. Drone aircraft--Terminology. I. American Institute of Aeronautics and Astronautics.

TL509.R373 2004

623.74'69'014--dc22

2004005431

Published by

American Institute of Aeronautics and Astronautics
1801 Alexander Bell Drive, Reston, VA 22091

Copyright © 2004 American Institute of Aeronautics and Astronautics
All rights reserved

No part of this publication may be reproduced in any form, in an electronic retrieval system or otherwise, without prior written permission of the publisher.

Printed in the United States of America

CONTENTS

Foreword.....iv

1 Terminology 1

2 Symbols, Acronyms, and Abbreviations.....33

3 References and Sources.....84

Downloaded by Siavash Sohrab on April 21, 2015 | http://arc.aiaa.org | DOI: 10.2514/4.477072

Foreword

The Charter of the AIAA Committee on Standards for Unmanned Aerial Vehicle / Remotely Operated Aircraft Systems states (in part) that “the committee will develop, coordinate and publish the standards necessary for unmanned aircraft system flight and ground safety in all types of civil airspace and airfield conditions. Because not all unmanned aircraft systems can be treated the same, classes will be defined and standards developed for each class. Classes will be based on a combination of aircraft weight, size and altitude of operation.

Every effort will be made to use currently accepted standards consistent with each class of system. The committee will also make use of all approved documentation that exists, such as the OSD [Office of the Secretary of Defense] Unmanned Aerial Vehicle Roadmap and the Joint Aviation Authority/EuroControl UAV Task Force Report. The design, manufacture, operation and support of unmanned aircraft systems will be addressed. Security issues in all aspects of unmanned aircraft system phases will also be addressed.

The first task will document a standard set of terminology.”

This document is a product of that first task, to be completed, according to the Charter, “...as soon as possible, but no later than the end of CY 2003.” However, the intent of the Committee is that this should be a “living document” subject to periodic review and enhancement.

The format for each lexicon entry is as follows:

Term (Acronym)	Definition(s), with source(s) and/or reference(s) [source and/or reference website], followed, if appropriate, by a discussion, e.g., in the case that two referenced definitions are in conflict (see Section 3 for reference numbers).
-----------------------	--

Example:

Unmanned Combat Aerial Vehicle (UCAV)	A UAV that carries a lethal payload for attacking sea, air or ground targets [1]
--	--

The AIAA UAV/ROA Lexicon Working Group is led by Steve Kobiela of The Boeing Company in Hampton, VA. Comments about the present text of the Lexicon should be directed to him: stephan.g.kobiela@boeing.com.

The AIAA UAV/ROA Committee on Standards is chaired by Dick Wagaman of The Boeing Company in Keswick, VA. Suggestions for the work of this important, new Committee on Standards may be directed to him: richard.t.wagaman@boeing.com.

At the time of publication, the members of the AIAA UAV/ROA Committee on Standards were:

Richard Wagaman, Chair	The Boeing Company
Geoff Bland	NASA Wallops Flight Facility
Jack Browne	United States Air Force
Lawrence Camacho	NASA Dryden Research Center
Gary Dale	Air Force Research Laboratory
Scott Dann	General Atomics Corporation
Kirk Falk	ARINC Engineering Services
Don Greenlee	SAIC
Dave Grilley	SRA International, Inc.
Christine Haissig	Honeywell, Inc.
Steve Kobiela	The Boeing Company

Mike Lazar	Northrop Grumman
Gerry Marsters	AeroVations Associates
Don McKeown	Rochester Institute of Technology
Laurence Newcome	SRA International, Inc.
John Price	United States Air Force
R. Ganesh Rajagopalan	Iowa State University
John Taylor	ARINC Engineering Services
Doug Young	NASA Wallops Flight Facility

The committee members would like to gratefully acknowledge the following individuals for their valuable contributions to this document:

Jeff Bauer	NASA Dryden Research Center
Steve Hottman	New Mexico State University
Marco Sterk	Federal Express
Cheryl Yuhas	NASA Headquarters

The committee would also like to extend a further thank you to Mr. Steve Kobiela of The Boeing Company for his dedication to seeing this project through to completion.

The AIAA UAV/ROA Committee on Standards (Mr. Richard Wagaman, Chairman) approved the document for publication in January 2004.

The AIAA Standards Executive Council (Mr. Phil Cheney, Chairman) accepted the document for publication in January 2004

It is intended that this document will be updated periodically to reflect changes in technology and accepted terminology. Beneficial input (recommendations, additions, deletions) from users of this document is welcomed and appreciated. An improvement proposal form is included at the end of the document. For an electronic version of this form, please contact Craig Day at craigd@aiaa.org. Hardcopy submissions should be sent to:

AIAA Standards Program
 1801 Alexander Bell Drive, Suite 500
 Reston VA 20191-4344
 Fax: 703-264-7551, ATTN: Standards Program Manager

Any proposed changes will be subjected to AIAA consensus procedures prior to inclusion in this document.

The AIAA Standards Procedures provide that all approved Standards, Recommended Practices, and Guides are advisory only. Their use by anyone engaged in industry or trade is entirely voluntary. There is no agreement to adhere to any AIAA standards publication and no commitment to conform to or be guided by a standards report. In formulating, revising, and approving standards publications, the Committees on Standards will not consider patents which may apply to the subject matter. Prospective users of the publications are responsible for protecting themselves against liability for infringement of patents or copyrights, or both.

1 Terminology

<u>Term</u>	<u>Definition [source]</u>
Acceptance flight	A flight made to accept a contractor-produced aircraft, or one on which a contractor or Army depot has performed maintenance or contract modification before return to the operational inventory. It can also be a flight made by the receiving unit upon transfer of aircraft between components and/or units. [6]
Access 5	A partnership between government and industry structured to open the nation's airspace safely and seamlessly for routine high altitude, long endurance (HALE) ROA operations.
Accident	An undesired and unplanned (but not necessarily unexpected) event that results in (at least) a specified level of loss. [4]
Active air defense mission	One or more aircraft, which in the interest of national security or flight safety are employed for the purpose of recognition and determination of the intentions of an airborne object. [1]
Adapt to failures and flight conditions	An unmanned system experiencing either system failures or operational conditions that prevent it from continuing its optimal mission profile will react within the confines of its capabilities. Adaptation with respect to capabilities includes hover, orbit, stop, and station keeping. This response is taken while operator intervention is performed or until the condition is cleared. System requirements may mandate that the unmanned system continue to perform the mission in a degraded mode. [7]
Administrator, FAA	The Federal Aviation Administrator or any person to whom he has delegated his authority in the matter concerned [5]
Advanced Concept Technology Demonstration (ACTD)	A strategy for development and acquisition that provides a streamlined method for working closely with the user to rapidly demonstrate and field a new capability in limited quantity.
Advanced General Aviation Transport Experiments (AGATE)	NASA program, launched in 1994 to revitalize GA; 70-plus member alliance draws from government, industry and academia. [http://agate.larc.nasa.gov]
Aerobatic flight	Intentional maneuvers involving an abrupt change in an aircraft's altitude, and abnormal attitude, or abnormal acceleration not needed for normal flight. This does not include a maneuver that conforms to the aircraft flight manual such as a 'break' or a tactical or training maneuver when part of an approved training exercise [6]
Aerodynamic coefficients	Non-dimensional coefficients for aerodynamic forces and moments [5]

Aeronautical Radio, Inc. (ARINC)	Chartered by the Federal Radio Commission (later to become the Federal Communications Commission) to serve as the airline industry's "single licensee and coordinator of radio communication outside of the government."
Aerospace Expeditionary Force (AEF)	US Air Force term for their ability to deploy worldwide.
Air Accident Investigation Branch (AAIB)	UK equivalent of NTSB [www.aaib.dft.gov.uk]
Air carrier	A person who undertakes directly by lease, or other arrangement, to engage in air transportation [5]
Air commerce	Interstate, overseas, or foreign air commerce or the transportation of mail by aircraft or any operation or navigation of aircraft within the limits of any Federal airway or any operation or navigation of aircraft which directly affects, or which may endanger safety in, interstate, overseas, or foreign air commerce [5]
Air Defense Identification Zone (ADIZ)	U.S. national security provision
Air Tasking Order (ATO)	US Military method to detail and distribute flight events.
Air traffic	Aircraft operating in the air or on an airport surface, exclusive of loading ramps and parking areas [5]
Air traffic clearance	An authorization by air traffic control, for the purpose of preventing collision between known aircraft, for an aircraft to proceed under specified traffic conditions within controlled airspace [5]
Air Traffic Control (ATC)	A service operated by appropriate authority to promote the safe, orderly, and expeditious flow of air traffic [5]
Air Traffic Control assigned airspace	Airspace of defined vertical/lateral limits, assigned by ATC, for the purpose of providing air traffic segregation between the specified activity being conducted within the assigned airspace and other IFR traffic. [3]
Air traffic incident report	Report on incidents that adversely affect the FAA air traffic service facilities in providing safe, orderly, and expeditious movement of air traffic. [6]
Air Traffic Organization (ATO)	A division of FAA that manages air traffic services

Air transportation	Interstate, overseas, or foreign air transportation or the transportation of mail by aircraft [5]
Aircraft	A device that is used or intended to be used for flight in the air [5]
Aircraft engine	An engine that is used or intended to be used for propelling aircraft. It includes turbo super chargers, appurtenances, and accessories necessary for its functioning, but does not include propellers [5]
Aircrew Training Manual (ATM)	A publication that contains Army training requirements for Army flight crew members and programs for qualification, refresher, mission, and continuation training in support of the aircrew training program [6]
Aircrew Training Program (ATP)	Army aviation aircrew standardized training and evaluation program [6]
Airframe	The fuselage, booms, nacelles, cowlings, fairings, airfoil surfaces (including rotors but excluding propellers and rotating airfoils of engines), and landing gear of an aircraft and their accessories and controls [5]
AIRMET	Airman's Meteorological Information
Airplane	An engine-driven fixed-wing aircraft heavier than air, that is supported in flight by the dynamic reaction of the air against its wings [5]
Airport	An area of land or water that is used or intended to be used for the landing and takeoff of aircraft, and includes its buildings and facilities, if any [5]
Airport Movement Area Safety System (AMASS)	Radar system designed to prevent runway incursions
Airports Council International (ACI)	Geneva-based organization representing some 544 airports and airport authorities in 165 countries [http://www.airports.org/]
Airship	An engine-driven lighter-than-air aircraft that can be steered [5]
Airworthiness	Comprises a set of formal processes and activities designed to assure that an aircraft attains and is maintained in an airworthy state, that is, a state that is fit and safe for flight and in conformity with its type design. The airworthiness processes encompass initial Airworthiness Certification of the aircraft type design by the cognizant aviation regulatory authority, followed by manufacture of each aircraft of the type in conformance with that design – and maintenance and operation of each airworthy aircraft of the type within a Continuing Airworthiness program approved by the cognizant aviation regulatory authority
Airworthiness Directive (AD)	An FAA regulatory notice.

Airworthy	1) In respect of an aeronautical product, means in a fit and safe state for flight and in conformity with its type design [5], 2) An aircraft is airworthy if it is in compliance with all the applicable airworthiness requirements as specified by the Authority which issues the Certificate of Airworthiness (C of A) or other permission for flight. [UK CAA “working definition”], 3) When an aircraft or one of its component parts meet its type design approval or properly altered condition, and is in a condition for safe operation.
Alert area	An alert area is established to inform pilots of a specific area wherein a high volume of pilot training or an unusual type of aeronautical activity is conducted [5]
Alternate airport (ALTN)	An airport at which an aircraft may land if a landing at the intended airport becomes inadvisable [5]
Altitude engine	A reciprocating aircraft engine having a rated takeoff power that is producible from sea level to an established higher altitude [5]
Amplitude Modulation (AM)	A RF carrier signal’s amplitude is “modulated” or varied to encode the information (versus FM)
Anti-torque rotor	A rotor that serves either to counteract the effect of the main rotor torque on a rotorcraft or to maneuver the rotorcraft about one or more of its three principal axes
Appliance	Any instrument, mechanism, equipment, part, apparatus, appurtenance, or accessory, including communications equipment, that is used or intended to be used in operating or controlling an aircraft in flight, is installed in or attached to the aircraft, and is not part of an airframe, engine, or propeller [5]
Area navigation (RNAV)	A method of navigation that permits aircraft operations on any desired course within the coverage of station-referenced navigation signals or within the limits of self-contained system capability [5]
Area navigation high route	An area navigation route within the airspace extending upward from, and including, 18,000 feet MSL to flight level 450 [5]
Area navigation low route	An area navigation route within the airspace extending upward from 1,200 feet above the surface of the earth to, but not including, 18,000 feet MSL [5]
Area of Interest (AOI)	That area of concern to the commander, including the area of influence, areas adjacent, and areas extending into enemy waters or territory to the objectives of current or planned operations. This also includes areas occupied by enemy forces that could jeopardize the mission.
Area standardization committee	A committee established within a non-defined geographical area composed of units too small to effectively set up their own standardization committee. The committee may be formed from various commands with aviation assets [6]

Armed Forces	The Army, Navy, Air Force, Marine Corps, and Coast Guard, including their regular and reserve components and members serving without component status [5]
Army aviation disaster, search, and rescue unit	A temporarily organized unit employed during an emergency. The unit equips, supplies, safeguards, maintains, and operates Army aircraft during a disaster, an air search, or rescue [6]
Army aviation standardization	The use of uniform tested procedures and techniques to attain a high level of readiness and professionalism in the operation and employment of Army aircraft. This is achieved through standardized publications and training literature, a disciplined instructor pilot force, tests, flight checks, and command supervision. Standardization includes aviator cockpit, performance, aircrew teamwork, tactics, maintenance, and safety [6]
Army aviator	An aeronautical designation awarded to members of the U.S. Army by the Secretary of the Army or designated officers [6]
Automatic	A vehicle capable of operating without human intervention
Automatic Direction Finder (ADF)	A navigation radio receiver
Autonomous	A vehicle that has some decision making capability
Autonomous operation	The method whereby the control of the UAV is accomplished by an onboard self-contained flight-management control system without human intervention
Autonomy	A system's own ability of, sensing, perceiving, analyzing, communicating, planning, decision-making, and acting, to achieve its goals as assigned by its human operator(s). [7]
Autorotation	A rotorcraft flight condition in which the lifting rotor is driven entirely by action of the air when the rotorcraft is in an unpowered descent.
Aviation Digital Data Service (ADDS)	An experimental weather service funded by FAA and hosted by NWS computer system. [http://adds.awc-kc.noaa.gov/]
Aviation officer	An Army or DA civilian aviator who commands an aviation unit or is a member of a commander's staff and advises or supervises Army aviation functions [6]
Azimuth (AZ)	Angular measurement in horizontal plane
Balloon	A lighter-than-air aircraft that is not engine driven, and that sustains flight through the use of either gas buoyancy or an airborne heater [5]
Basic area navigation (B-NAV)	Concept of easing congestion in European airways by requiring aircraft to be fitted with equipment that will allow more direct routings by ATC

Basic Operating Weight (BOW)	Empty weight typically equipped, plus unusable fuel and trapped liquids, plus payload
Battle Damage Assessment (BDA)	An assessment of target damage. Feedback supports a warfighter's immediate restrike requirements.
Battlespace	All aspects of air, surface, and subsurface, land, space, and the electromagnetic spectrum that encompass the area of influence and area of interest
Battlespace dominance	The degree of control over the dimensions of the battlespace that enhances friendly freedom of action and denies the enemy freedom of action. It permits power projection and force sustainment to accomplish the full range of potential missions.
Beacon Collision Avoidance System (BCAS)	Forerunner of TCAS
Beyond Line-of-Sight (BLOS)	Transmitter and receiver are not in direct, point-to-point contact
Brake horsepower	The power delivered at the propeller shaft (main drive or main output) of an aircraft engine [5]
Built in Test (BIT)	Equipment or software embedded into operational components or systems, as opposed to external support units, which perform a test or sequence of tests to verify mechanical or electrical continuity of hardware, or the proper automatic sequencing, data processing, and readout of hardware or software systems. [7]
Buyer-Furnished Equipment (BFE)	Not supplied as standard equipment by airframe manufacturer; selected by customer
Calibrated airspeed (CAS)	The indicated airspeed of an aircraft, corrected for position, instrument errors and pressure source. Calibrated airspeed is equal to true airspeed in standard atmosphere at sea level. [5]
Canard	Means the forward wing of a canard configuration and may be a fixed, movable, or variable geometry surface, with or without control surfaces [5]
Canard configuration	A configuration in which the span of the forward wing is substantially less than that of the main wing [5]
Canard Rotor/Wing (CRW)	Vertical takeoff and landing (VTOL) aircraft with the high subsonic cruise speed of a fixed-wing aircraft
Catastrophic	1) An event causing death, system loss or severe environmental damage, 2) Failure conditions which would prevent continued safe flight and landing

Catastrophic Failure Condition	Expected to result in multiple fatalities of the occupants, or incapacitation or fatal injury to a flight crewmember normally with the loss of the airplane.
Category	1) As used with respect to the certification, ratings, privileges, and limitations of airmen, means a broad classification of aircraft. Examples include: airplane; rotorcraft; glider; and lighter-than-air; and 2) As used with respect to the certification of aircraft, means a grouping of aircraft based upon intended use or operating limitations. Examples include: transport, normal, utility, acrobatic, limited, restricted, and provisional [5]
Category A	With respect to transport category rotorcraft, means multiengine rotorcraft designed with engine and system isolation features specified in Part 29 and utilizing scheduled takeoff and landing operations under a critical engine failure concept which assures adequate designated surface area and adequate performance capability for continued safe flight in the event of engine failure [5]
Category B	With respect to transport category rotorcraft, means single-engine or multiengine rotorcraft that do not fully meet all Category A standards. Category B rotorcraft have no guaranteed stay-up ability in the event of engine failure and unscheduled landing is assumed [5]
Category II operations (CAT II)	With respect to the operation of aircraft, means a straight-in ILS approach to the runway of an airport under a Category II ILS instrument approach procedure issued by the Administrator or other appropriate authority [5]
Category III operations (CAT III)	With respect to the operation of aircraft, means an ILS approach to, and landing on, the runway of an airport using a Category III ILS instrument approach procedure issued by the Administrator or other appropriate authority [5]
Category IIIa operations (CAT IIIa)	An ILS approach and landing with no decision height (DH), or a DH below 100 feet (30 meters), and controlling runway visual range not less than 700 feet (200 meters) [5]
Category IIIb operations (CAT IIIb)	An ILS approach and landing with no DH, or with a DH below 50 feet (15 meters), and controlling runway visual range less than 700 feet (200 meters), but not less than 150 feet (50 meters) [5]
Category IIIc operations (CAT IIIc)	An ILS approach and landing with no DH and no runway visual range limitation [5]
C-Band	Frequency range between 4,000-8,000 MHz
Ceiling	The height above the earth's surface of the lowest layer of clouds or obscuring phenomena that is reported as "broken", "overcast", or "obscuration", and not classified as "thin" or "partial". [5]

Certificate of Waiver or Authorization (COA)	Operators of aircraft that are unable to meet the regulatory criteria specified for flight operations in the NAS may request relief from the FAA. The grant of a Certificate of Waiver or Authorization (FAA Form 7711-1) by the FAA constitutes relief from the specific regulations stated, to the degree and for the period of time specified in the certificate, but does not waive any state laws or local ordinances. [3]
Civil aircraft	Aircraft other than public aircraft [5]
Class	1) As used with respect to the certification, ratings, privileges, and limitations of airmen, means a classification of aircraft within a category having similar operating characteristics. Examples include: single engine; multiengine; land; water; gyroplane; helicopter; airship; and free balloon, 2) As used with respect to the certification of aircraft, means a broad grouping of aircraft having similar characteristics of propulsion, flight, or landing. Examples include: airplane; rotorcraft; glider; balloon; landplane; and seaplane [5]
Clear Air Turbulence (CAT)	High altitude turbulence encountered where no clouds are present
Clearway	An area beyond the runway, of defined dimensions, under the control of the airport authorities. [5]
Climbout speed	With respect to rotorcraft, means a referenced airspeed which results in a flight path clear of the height-velocity envelope during initial climbout [5]
Collaboration or Cooperation	The process by which multiple unmanned systems jointly work together by sharing data, such as coordinates of their maneuver(s), or by acquiring intelligence to perform a mission synergistically, i.e., perform better than each could have alone. [7]
Collaborative Decision-Making (CDM)	A joint government/industry initiative aimed at improving air traffic management through increased information exchange among the various parties in the aviation community and improved automated decision support tools. The program is one of five core technologies in the FAA's Free Flight program and includes participants from the FAA, air carrier industry, private industry, and academia.
Command and Control (C2)	The exercise of authority and direction by a properly designated commander over assigned and attached forces in the accomplishment of the mission. Command and control functions are performed through an arrangement of personnel, equipment, communications, facilities, and procedures employed by a commander in planning, directing, coordinating, and controlling forces and operations in the accomplishment of the mission
Command and control communication link	The two-way communication link between the UAV's flight controller and the UAV's flight-management control system that is used to control and monitor the health and status of the UAV. [3]
Command/staff aviation officer	A special staff aviator designated by the commander to provide advice or manage aviation assets, aviation standardization, and aviation safety [6]

Commercial operator	A person who, for compensation or hire, engages in the carriage by aircraft in air commerce of persons or property [5]
Communications Intelligence (COMINT)	Technical and intelligence information derived from foreign communications by other than the intended recipients.
Concept of Operations (CONOPS)	A verbal or graphic statement, in broad outline, of a commander's assumptions or intent in regard to an operation or series of operations. The concept of operations frequently is embodied in campaign plans and operation plans; in the latter case, particularly when the plans cover a series of connected operations to be carried out simultaneously or in succession. The concept is designed to give an overall picture of the operation. It is included primarily for additional clarity of purpose. Also called commander's concept.
Contingency	An emergency involving military forces caused by natural disasters, terrorists, subversives, or by required military operations. Due to the uncertainty of the situation, contingencies require plans, rapid response, and special procedures to ensure the safety and readiness of personnel, installations, and equipment
Control or Mode of Control	Human operator's ability to interact with an unmanned system to perform the operator assigned missions. There are the following modes of control: fully autonomous, semi-autonomous, teleoperation, and remote control. [7]
Control Station	The equipment from which the UAV operator, or pilot, directs and monitors the flight and mission activity of the UAV.
Controlled airspace	An airspace of defined dimensions within which air traffic control service is provided to IFR flights and to VFR flights in accordance with the airspace classification. Note - Controlled airspace is a generic term that confers Class A, Class B, Class C, Class D, and Class E airspace [5]
Controlled firing area	A controlled firing area is established to contain activities, which if not conducted in a controlled environment, would be hazardous to nonparticipating aircraft [5]
Controlling element	The part of an unmanned system that provides a method for a human to control it remotely. [7]
Coordination	The ability for unmanned systems to work together harmoniously through common data such as mission or task plans, coordinates of maneuver(s), etc. A common way is for a superior to coordinate the task execution of the subordinates to accomplish the missions. [7]
Critical	Severe injury, severe occupational illness, major system or environmental damage.

Critical altitude	The maximum altitude at which, in standard atmosphere, it is possible to maintain, at a specified rotational speed, a specified power or a specified manifold pressure. Unless otherwise stated in 14 CFR, the critical altitude is the maximum altitude at which it is possible to maintain, at the maximum continuous rotational speed, one of the following: 1) The maximum continuous power, in the case of engines for which this power rating is the same at sea level and at the rated altitude, 2) The maximum continuous rated manifold pressure, in the case of engines, the maximum continuous power of which is governed by a constant manifold pressure [5]
Critical engine	The engine whose failure would most adversely affect the performance or handling qualities of an aircraft [5]
Cross-country flight	A flight extending beyond the local flying area or within the local flying area which is planned to terminate at a place other than the place of origin [6]
Decision Height (DH)	With respect to the operation of aircraft, means the height at which a decision must be made, during an ILS or PAR instrument approach, to either continue the approach or to execute a missed approach [5]
Deduced Reckoning/ "dead reckoning" (DR)	Navigational method by which ships, and later aircraft, can locate themselves by reasoning (reckoning) from a known position and factoring in speed, direction and elapsed time to deduce current position
Designated Engineering Representative (DER)	As applicable to the FAA: An individual appointed by the FAA, who holds an engineering degree or equivalent, possesses technical knowledge and experience, and meets the qualification requirements set forth by the FAA.
Detect, See, and Avoid	The ability of onboard Remotely Operated Aircraft (ROA) enabling technology to determine when other aircraft are operating within certain vertical and horizontal parameters of the ROA and then autonomously maneuvers the ROA to avoid any conflict or provides the ROA operator with data that is used to determine whether or not it is necessary for the operator to maneuver the ROA to avoid a conflict [2], a mechanical equivalent to "see and avoid"
Detection range	The distance from the aircraft where traffic is first detected by the sensor.
Direct Exchange (DX)	A supply term used to denote a change of an unserviceable part for a functioning replacement part.
Discerns range	The distance from the aircraft where the sensor is able to provide the distance.
Distance Measuring Equipment (DME)	Distance measuring equipment compatible with TACAN [5], 2) (DME/N=Normal; DME/P=Precision)
Double Sideband (DSB)	An AM signal with the carrier removed

Due regard	1) With respect to functional attributes of a see and avoid capability, the ability to meet international requirements to insure "due regard for the safety" of other air traffic is essential, 2) An ICAO requirement to operate safely in International Airspace outside of positive control areas.
Early Operational Test and Evaluation (EOT&E)	Conducted during pre-production R&D to identify issues with the current state of the design and enable users to develop tactics, techniques, and procedures for future operational doctrine.
Electronic Flight Bag (EFB)	Concept by which laptop computer technology replaces air navigation charts, approach plates and a/c technical manuals
Electronics Intelligence (ELINT)	Technical and geo-location intelligence derived from foreign non-communications electromagnetic radiations emanating from other than nuclear detonations or radioactive sources.
Employment	The strategic, operational, or tactical use of forces.
Environment	Used as a general reference, environment includes the generic, natural conditions; e.g., weather, climate, ocean conditions, terrain, vegetation, etc. Modified environment can refer to specific induced environments; e.g., dirty battlefield environment, nuclear-chemical-biological environment, etc. Environment includes those conditions observed by the system during operational use, standby, maintenance, transportation, and storage. Mission environment includes threat situation or Electronic Order of Battle (EOB), Rules of Engagement (ROE), Emission Condition (EMCON), etc. [7]
Equal Time Point (ETP)	Halfway there, by time
Equivalent airspeed (EAS)	The calibrated airspeed of an aircraft corrected for adiabatic compressible flow for the particular altitude. Equivalent airspeed is equal to calibrated airspeed in standard atmosphere at sea level
Error	1) An omission or incorrect action by a crewmember or maintenance personnel. Or a mistake in the requirements, design or implementation, 2) A design flaw or deviation from the desired or intended state [4]
Eurocontrol	European organization charged with safety of air navigation and operations [http://www.eurocontrol.be/]
European ATC Harmonization and Integration Programme (EATCHIP)	Project aimed at creating seamless Europe-wide ATC system [http://www.eurocontrol.be/dgs/publications/brochures/eatchip/eatchip5.html]

European Organization for Civil Aviation Electronics (EUROCAE)	European avionics certification agency, equivalent of RTCA. EUROCAE documents are primarily used by engineers in the design and manufacture of avionics such as collision avoidance equipment, navigation instrumentation, landing approach equipment, and air-to-ground communications. These publications also help aircraft manufacturers specify avionics. [www.eurocae.org]
Event	An occurrence, which causes a change of state.
Extended over-water operation	1) With respect to aircraft other than helicopters, an operation over water at a horizontal distance of more than 50 nautical miles from the nearest shoreline, 2) With respect to helicopters, an operation over water at a horizontal distance of more than 50 nautical miles from the nearest shoreline and more than 50 nautical miles from an off-shore heliport structure [5]
External load	A load that is carried, or extends, outside of the aircraft fuselage [5]
External-load attaching means	The structural components used to attach an external load to an aircraft, including external-load containers, the backup structure at the attachment points, and any quick-release device used to jettison the external load [5]
Extremely improbable	1) Regarding a failure condition, these failure conditions that are so unlikely that they are not anticipated to occur in the entire operational life of all airplanes of the type. For commuter category airplanes this implies a probability of less than one in one billion, 2) Catastrophic failure conditions must be extremely improbable. These must have a probability of occurrence on the order of 1×10^{-9} or less.
Failure	1) An occurrence that affects the operation of a component, part, or element, such that it can no longer function as intended, 2) The non-performance or inability of the system or component to perform its intended function for a specified time under specified environmental conditions [4], 3) A loss of function, or malfunction, of a system or part thereof
Fault	An undesired anomaly in the functional operation of an equipment or system.
Fault tolerance	The ability of a system or component to continue normal operation despite the presence of hardware or software faults. [7]
Fédération Aéronautique Internationale (FAI)	World air sports federation founded in 1905. It is a non-governmental and non-profit. [http://www.fai.org]
Field elevation pressure (QFE)	A method of setting the ALT to compensate for changes in barometric pressure and runway elevation such that ALT will read zero at touchdown on the runway

Fire resistant	1) With respect to sheet or structural members means the capacity to withstand the heat associated with fire at least as well as aluminum alloy in dimensions appropriate for the purpose for which they are used, 2) With respect to fluid-carrying lines, fluid system parts, wiring, air ducts, fittings, and power plant controls, means the capacity to perform the intended functions under the heat and other conditions likely to occur when there is a fire at the place concerned [5]
Fireproof	1) With respect to materials and parts used to confine fire in a designated fire zone, means the capacity to withstand at least as well as steel in dimensions appropriate for the purpose for which they are used, the heat produced when there is a severe fire of extended duration in that zone, 2) With respect to other materials and parts, means the capacity to withstand the heat associated with fire at least as well as steel in dimensions appropriate for the purpose for which they are used [5]
First Article Inspection (FAI)	A manufacturing milestone
Flame resistant	Not susceptible to combustion to the point of propagating a flame, beyond safe limits, after the ignition source is removed [5]
Flammable	With respect to a fluid or gas, means susceptible to igniting readily or to exploding [5]
Flap extended speed	The highest speed permissible with wing flaps in a prescribed extended position [5]
Flash resistant	Not susceptible to burning violently when ignited [5]
Flight crew station	A station in aircraft at which flight crew member occupies to perform their flight duty; for example, pilot stations specified in operator's manuals [6]
Flight engineer	A flight engineer is responsible for maintaining his assigned aircraft and performing non-rated crew duties. He is the supervisor and primary trainer for the crew chief and mechanics assigned to the aircraft. The commander selects NCM's to perform FE duties based upon proficiency, experience, and rank. [6]
Flight level	A level of constant atmospheric pressure related to a reference datum of 29.92 inches of mercury. Each is stated in three digits that represent hundreds of feet. For example, flight level 250 represents a barometric altimeter indication of 25,000 feet; flight level 255, an indication of 25,500 feet [5]
Flight management control system	A system onboard a UAV that performs the flight control actions received from the operator via the C2 link or from previously inserted data.
Flight plan	Specified information, relating to the intended flight of an aircraft, that is filed orally or in writing with air traffic control [5]
Flight surgeon	Medical officer who has graduated from an approved military course in aviation medicine. References to flight surgeons include aeromedical physician's assistant [6]

Flight team member	Any individual whose duties could affect the safe outcome of the flight [3]
Flight termination	Ending of the flight, other than a landing of the UAV at an airport under controlled conditions. Flight termination may be accomplished by activation of the UAV's flight termination system, if one exists, or controlled/uncontrolled flight into the surface. [3]
Flight termination system	A device or pre-planned course of action that can be initiated by the flight controller or autonomously by the Flight Management Control System and that is used to terminate the flight whenever safety is jeopardized or continuation of the flight is impossible. [3]
Flight time	1) Pilot time that commences when an aircraft moves under its own power for the purpose of flight and ends when the aircraft comes to rest after landing, 2) For a glider without self-launch capability, pilot time that commences when the glider is towed for the purpose of flight and ends when the glider comes to rest after landing [5]
Flight visibility	The average forward horizontal distance, from the cockpit of an aircraft in flight, at which prominent unlighted objects may be seen and identified by day and prominent lighted objects may be seen and identified by night [5]
Foreign air carrier	Any person other than a citizen of the United States, who undertakes directly, by lease or other arrangement, to engage in air transportation [5]
Foreign air commerce	The carriage by aircraft of persons or property for compensation or hire, or the carriage of mail by aircraft, or the operation or navigation of aircraft in the conduct or furtherance of a business or vocation, in commerce between a place in the United States and any place outside thereof; whether such commerce moves wholly by aircraft or partly by aircraft and partly by other forms of transportation [5]
Foreign air transportation	The carriage by aircraft of persons or property as a common carrier for compensation or hire, or the carriage of mail by aircraft, in commerce between a place in the United States and any place outside of the United States, whether that commerce moves wholly by aircraft or partly by aircraft and partly by other forms of transportation [5]
Forward wing	A forward lifting surface of a canard configuration or tandem-wing configuration airplane. The surface may be a fixed, movable, or variable geometry surface, with or without control surfaces [5]
Frequent	Likely to occur frequently, or continuously experience in the fleet or inventory.
Full Authority Digital Engine (or Electronic) Control (FADEC)	A computer (system) hooked up to various sensors at key points of the engine, which feed data on temperatures, pressures and other variables. The computer then optimizes all the factors that keep an engine operating

Fully autonomous	A mode of control of an unmanned system wherein the unmanned system is expected to accomplish its mission, within a defined scope, without human intervention. Note that a team of unmanned systems may be fully autonomous while the individual team members may not be due to the needs to coordinate during the execution of team missions. [7]
Fusion	Also referred to as Information Fusion or Data Fusion. Information processing that deals with the association, correlation, and combination of data and information from single and multiple sources to achieve refined position and identity estimation, complete and timely assessments of situations and threats, and their significance in the context of mission operation. The process is characterized by continuous refinement of its estimates and assessments, and by evaluation of the need for additional sources, or modification of the process itself, to achieve improved results. [7]
Glider	A heavier-than-air aircraft, that is supported in flight by the dynamic reaction of the air against its lifting surfaces and whose free flight does not depend principally on an engine [5]
Go-around power or thrust setting	The maximum allowable in-flight power or thrust setting identified in the performance data [5]
Ground Control Station (GCS)	A control station on the earth's surface.
Ground visibility	Prevailing horizontal visibility near the earth's surface as reported by the United States National Weather Service or an accredited observer [5]
Gyrodyne	A rotorcraft whose rotors are normally engine-driven for takeoff, hovering, and landing, and for forward flight through part of its speed range, and whose means of propulsion, consisting usually of conventional propellers, is independent of the rotor system [5]
Gyroplane	A rotorcraft whose rotors are not engine-driven, except for initial starting, but are made to rotate by action of the air when the rotorcraft is moving; and whose means of propulsion, consisting usually of conventional propellers, is independent of the rotor system [5]
Hazard	A state or set of conditions of a system (or an object) that, together with other conditions in the environment of a system (or object) that will lead inevitably to an accident (loss event) without corrective action.
Hazard Avoidance	Similar to Obstacle avoidance except that the subjects are not limited to physical objects but also include adversarial situations, as either assessed by the unmanned system's perception functions or provided through the HRI, that are to be avoided. [7]
Heading (HDG)	The direction with respect to Magnetic or True North that the longitudinal axis of the aircraft is pointed.

Helicopter	A rotary wing aircraft that depends on its engine-driven rotors for vertical and horizontal motion
Heliport	An area of land, water, or structure used or intended to be used for the landing and takeoff of helicopters
Hertz (Hz)	Cycles per second
High Altitude Endurance (HAE)	A vehicle capable of operating at High Altitudes for periods greater than 12 hours
High Altitude Long Endurance ROA (HALE)	An ROA capable of performing the mission objectives at an altitude of 45,000-foot mean sea level (MSL) or higher over a period of at least 24 continuous hours [2]
High altitude operations	UAV/ROA Flight above 40,000 Feet (Upper FAA Positive Controlled Airspace)
High Frequency (HF)	3-30 MHz
High Frequency Data Link (HFDL)	Low-cost, low-capacity link generally used in oceanic and other remote areas
High-Energy Radio Frequency or High-Energy Radiated Fields (HERF)	Dense electromagnetic fields created by radio/TV transmitters -- possible source of interference for electronic instruments
Human assisted	During which human interactions are needed at the plan and behavior levels, i.e., during the execution of a task. [7]
Human delegated	The type HRI that refers to situations during which human interactions are mainly at the task level. [7]
Human operated	The type HRI that refers to remote control or teleoperation. [7]
Human supervised	The type HRI that refers to situations during which human plays the monitoring role and human interaction are mainly at the mission level. [7]
IDENT	A request for a pilot to activate the aircraft transponder identification feature. This will help the controller to confirm an aircraft identity or to identify an aircraft.
Identification (IDENT)	The action of an aircraft's transponder by which it transmits an identification code.
Idle thrust	The jet thrust obtained with the engine power control level set at the stop for the least thrust position at which it can be placed [5]

IFR conditions	Weather conditions below the minimum for flight under visual flight rules [5]
Imagery intelligence (IMINT)	Intelligence derived from the exploitation of collection by visual photography, infrared sensors, lasers, electro-optics, and radar sensors such as synthetic aperture radar wherein images of objects are reproduced optically or electronically on film, electronic display devices, or other media.
Improbable	So unlikely that it can be assumed occurrence may not be experienced, or unlikely to occur, but possible in the fleet or inventory.
Incident (or near miss)	An event that involves no loss (or minor loss) but with the potential for loss under different circumstances. [4]
Indicated airspeed (IAS)	The speed of an aircraft as shown on its pitot static airspeed indicator calibrated to reflect standard atmosphere adiabatic compressible flow at sea level uncorrected for airspeed system errors [5]
Indications and Warning (I&W)	Those intelligence activities intended to detect and report time-sensitive intelligence information on foreign developments that could involve a threat to the United States or allied military, political, or economic interests or to US citizens abroad. It includes forewarning of enemy actions or intentions; the imminence of hostilities; insurgency; nuclear/non-nuclear attack on the United States, its overseas forces, or allied nations; hostile reactions to United States reconnaissance activities; terrorists' attack; and other similar events.
Inertial Navigation System (INS)	Self-contained dead reckoning system that senses acceleration along three axes and calculates distance traveled
Information	The meaning that a human assigns to data by means of the known conventions used in their representation.
Instructor Pilot (IP)	An aviator who conducts training and evaluation of pilots and other crewmembers in designated aircraft and promotes safety among aviators. Training and evaluation include aircraft operation, qualification, unit employment, visual and instrument flight, and crew performance [6]
Instrument	A device using an internal mechanism to show visually or aurally the attitude, altitude, or operation of an aircraft or aircraft part. It includes electronic devices for automatically controlling an aircraft in flight [5]
Instrument Examiner (IE)	An aviator qualified to give instrument flight examinations and conduct instrument flight training. [6]
Instrument Flight Rules (IFR)	Rules governing the procedures for conducting flight under instrument meteorological conditions (IMC) instrument flight.

Instrument Meteorological Conditions (IMC)	Weather conditions below the minimums prescribed for flight under Visual Flight Rules (VFR).
Intelligence (INT)	The product resulting from the collection, processing, integration, analysis, evaluation, and interpretation of available information concerning foreign countries or areas.
Intelligence Preparation of the Battlefield (IPB)	A survey of areas of interest in preparation for battle or amphibious assaults and landings. Significantly enhances Indications and Warning (I&W) capability
Interstate air commerce	The carriage by aircraft of persons or property for compensation or hire, or the carriage of mail by aircraft, or the operation or navigation of aircraft in the conduct or furtherance of a business or vocation, in commerce between a place in any State of the United States, or the District of Columbia, and a place in any other State of the United States, or the District of Columbia; or between places in the same State of the United States through the airspace over any place outside thereof; or between places in the same territory or possession of the United States, or the District of Columbia [5]
Interstate air transportation	The carriage by aircraft of persons or property as a common carrier for compensation or hire, or the carriage of mail by aircraft in commerce: (1) Between a place in a State or the District of Columbia and another place in another State or the District of Columbia; (2) Between places in the same State through the airspace over any place outside that State; or (3) Between places in the same possession of the United States; Whether that commerce moves wholly by aircraft or partly by aircraft and partly by other forms of transportation [5]
Intrastate air transportation	The carriage of persons or property as a common carrier for compensation or hire, by turbojet-powered aircraft capable of carrying thirty or more persons, wholly within the same State of the United States [5]
Joint Airworthiness Requirement (JAR)	Requirements issued by JAA
Joint Aviation Authorities (JAA)	Aviation Authorities Associated body of the European Civil Aviation Conference (ECAC) representing the civil aviation regulatory authorities of a number of European States who have agreed to co-operate in developing and implementing common safety regulatory standards. In 1992, the JAA and the FAA made a commitment to harmonize to the maximum extent possible, 14 CFR and JAR requirements. Originally the (European) Joint Airworthiness Authority - founded in 1970 to develop a unified European approach to aviation safety. [http://www.jaa.nl]
Kalman Filter (KF)	An algorithm that improves navigation computer and autopilot performance
Kilohertz (kHz)	1000 hertz or cycles-per-second

Kite	A framework, covered with paper, cloth, metal, or other material, intended to be flown at the end of a rope or cable, and having as its only support the force of the wind moving past its surfaces [5]
Knot (KT)	Nautical miles/hour (KTS=knots)
Landing gear extended speed	The maximum speed at which an aircraft can be safely flown with the landing gear extended
Large airplanes	Aircraft of more than 12,500 pounds, maximum certificated takeoff weight [5]
L-Band	RF band from 390-1,550 MHz
Letter of Agreement	A document that is negotiated by ATC facilities and other persons/facilities/organizations for a variety of purposes. For UAV operations, the letter of agreement would normally be established to define airspace areas and associated operating procedures. [3]
Life Cycle	A generic term covering all phases throughout the life of an item or a product from concept to disposal [1]
Lighter-than-air aircraft	Aircraft that can rise and remain suspended by using contained gas weighing less than the air that is displaced by the gas [5]
Line Replaceable Unit (LRU)	A readily accessible system unit normally consisting of subassemblies or modules, designed for ease of replacement and capable of being handled and changed, preferably by one person within the time laid down and as identified by the equipment specification [1]
Line-of-Sight (LOS)	Direct, point-to-point contact between a transmitter and receiver.
Load factor	The ratio of a specified load to the total weight of the aircraft. The specified load is expressed in terms of any of the following: aerodynamic forces, inertia forces, or ground or water reactions [5]
Long-range communication system (LRCS)	A system that uses satellite relay, data link, high frequency, or another approved communication system which extends beyond line of sight [5]
Long-Range Navigation (LORAN)	Electronic pulse system for oceanic navigation
Long-range navigation system (LRNS)	An electronic navigation unit that is approved for use under instrument flight rules as a primary means of navigation, and has at least one source of navigational input, such as inertial navigation system, global positioning system, Omega/very low frequency, or Loran C [5]

Main rotor	The rotor that supplies the principal lift to a rotorcraft [5]
Major alteration	An alteration not listed in the aircraft, aircraft engine, or propeller specifications—(1) That might appreciably affect weight, balance, structural strength, performance, powerplant operation, flight characteristics, or other qualities affecting airworthiness; or (2) That is not done according to accepted practices or cannot be done by elementary operations [5]
Major repair	A repair: (1) That, if improperly done, might appreciably affect weight, balance, structural strength, performance, powerplant operation, flight characteristics, or other qualities affecting airworthiness; or (2) That is not done according to accepted practices or cannot be done by elementary operations [5]
Manifold pressure	Absolute pressure as measured at the appropriate point in the induction system and usually expressed in inches of mercury. [5]
Manned Aircraft	Aircraft that are piloted by a human onboard. [3]
Marginal	Minor injury, minor occupational illness, or minor system or environmental damage.
Markers (physical or electronic)	A visual or electronic aid used to mark a designated point for such tactical purposes as route following, determination of bearings, courses, or location, and key items or points of interest, including landmine markers, minefields markers, and area NBC decontamination markers. [7]
Mean Time Between Failures (MTBF)	Total flying hours divided by number of failures during specified period of time.
Medical certificate	Acceptable evidence of physical fitness on a form prescribed by the Administrator [5]
Medium Altitude Endurance (MAE)	A vehicle capable of operating at altitudes between 15,000 ft and 40,000 ft mean sea level (MSL) for periods greater than 12 hours
Medium altitude operations	UAV/ROA Flight between 15,000 and 40,000 Feet Lower FAA Positive Controlled Airspace
Methods of control	The interface, either software or hardware, such as joystick, waypoint selection via a map interface, natural language, hand signals, etc., that operators use to control a unmanned system. [7]
Military operations area (MOA)	Airspace established outside Class A airspace to separate or segregate certain non-hazardous military activities from IFR Traffic and to identify for VFR traffic where these activities are conducted [5]

Minimum descent altitude (MDA)	The lowest altitude, expressed in feet above mean sea level, to which descent is authorized on final approach or during circle-to-land maneuvering in execution of a standard instrument approach procedure, where no electronic glide slope is provided [5]
Minor alteration	An alteration other than a major alteration [5]
Minor repair	A repair other than a major repair [5]
Mishap	An unplanned event, or series of events resulting in death, injury, occupational illness, or damage to or loss of equipment or property, or damage to the environment. An Accident.
Mission	The highest-level task assigned to the unmanned system. [7]
Mission area	Airspace of defined horizontal dimensions within which the sensor or other applications are exercised and the flight path of the UAV normally requires changes of course for mission objectives that are not associated with the flight route between the departure and arrival airport(s) [3]
Mission planning	The process to generate tactical goals, a route (general or specific), commanding structure, coordination, and timing for one or teams of unmanned systems. [7]
Mission route	That portion along the route where sensors or other applications are exercised and course changes normally would adversely affect the mission objectives [3]
Mobility	The capability of an unmanned system to move from place to place, with its own power and while under any mode or method of control. [7]
Multinational	An alliance, coalition, or other international arrangement.
Multiple sectors	With respect to functional attributes of a see and avoid capability, "Sectors" are arbitrary but a system needs to detect contacts at multiple aspect angles simultaneously
Multi-service	Two or more Services in coordination.
National Airspace System (NAS)	All of the airspace above the surface of the earth over the United States and its possessions
Nautical Mile (NM)	1.15 statute miles or 6,076 feet or 1000 fathoms; 60 nm = 1 degree of Earth's polar circumference
Navigable airspace	Airspace at and above the minimum flight altitudes prescribed by or under this chapter, including airspace needed for safe takeoff and landing [5]