A glossary of terms, abbreviations, acronyms and slang related to drones / remotely piloted aircraft / unmanned aerial vehicles

Updated June 22, 2019
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<td>ADS-B</td>
<td>Automatic Dependent Surveillance—Broadcast</td>
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<td>AGL</td>
<td>Above Ground Level</td>
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<td>ALT</td>
<td>Vertical distance from ground.</td>
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<td>ARF</td>
<td>Almost Ready to Fly [also ARTF]</td>
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<td>AUVSI</td>
<td>Association for Unmanned Vehicle Systems International</td>
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<td>BCI</td>
<td>Brain-Computer Interface</td>
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<td>COA</td>
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<td>COTS</td>
<td>Commercial off the Shelf</td>
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<td>Detect and Avoid</td>
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<td>DPE</td>
<td>Designated Pilot Examiner</td>
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<td>Detect, Sense and Avoid</td>
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<td>DSA</td>
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<td>EASA</td>
<td>European Aviation Safety Agency</td>
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<td>EP</td>
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<td>Flight controller</td>
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<td>FFF</td>
<td>Fast Forward Flight</td>
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<td>FLIR</td>
<td>Forward Looking Infrared</td>
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<td>FMRA</td>
<td>FAA Modernization and Reform Act of 2012</td>
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<td>FOV</td>
<td>Field of View</td>
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<td>Flight Plan</td>
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<td>First Person View</td>
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<td>FSDO</td>
<td>Flight Standards District Office</td>
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<td>GCS</td>
<td>Ground Control Station</td>
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<td>GPS</td>
<td>Global Positioning System</td>
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<td>HC</td>
<td>Hexacopter</td>
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<td>Hexa</td>
<td>Hexacopter</td>
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<td>HL</td>
<td>Hand Launched</td>
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<td>IACRA</td>
<td>Integrated Airmen Certification and/or Rating Application</td>
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<td>ICAO</td>
<td>International Civil Aviation Organization</td>
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<td>IMU</td>
<td>Inertial Measurement Unit</td>
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<td>IOC</td>
<td>Intelligent Orientation Control</td>
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<td>ISR</td>
<td>Intelligence Surveillance Reconnaissance</td>
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<td>Kp-Index</td>
<td>Global geomagnetic activity</td>
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<td>L&amp;R</td>
<td>Launch and Recovery</td>
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<td>LAANC</td>
<td>Low Altitude Authorization Notification Capability</td>
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<td>LOS</td>
<td>Line of Sight</td>
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<td>LRPAS</td>
<td>Light Remotely Piloted Aircraft System</td>
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<td>LZ</td>
<td>Landing Zone</td>
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<tr>
<td>MAV</td>
<td>Micro Air Vehicle / Mini Air Vehicle</td>
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<td>MOC</td>
<td>Mobile Operations Center</td>
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<td>MSA</td>
<td>Minimum Safe Altitude</td>
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<td>MSL</td>
<td>Mean Sea Level</td>
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<td>NAS</td>
<td>National Airspace System</td>
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<td>Naza</td>
<td>Autopilot system (Registered trademark of DJI Innovations)</td>
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<td>NMAC</td>
<td>Near Mid Air Collision</td>
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<td>NOTAM</td>
<td>Notice to Airmen</td>
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<td>OC</td>
<td>Octocopter</td>
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<td>Octo</td>
<td>Octocopter</td>
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<td>OEM</td>
<td>Original Equipment Manufacturer</td>
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<td>PIC</td>
<td>Pilot in Command</td>
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<td>POI</td>
<td>Point of Interest</td>
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<td>QC</td>
<td>Quadcopter</td>
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<tr>
<td>Quad</td>
<td>Quadcopter</td>
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<td>RC</td>
<td>Radio Controlled / Remote Controlled [also R/C]</td>
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<td>RLOS</td>
<td>Radio Line of Sight</td>
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<td>ROA</td>
<td>Remotely Operated Aircraft</td>
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<td>RocDocs</td>
<td>Recent domestic drone crashes</td>
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<td>Region of Interest</td>
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<td>Route Plan / Remote Pilot</td>
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<td>RPA</td>
<td>Remotely Piloted Aircraft</td>
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<td>RPAS</td>
<td>Remotely Piloted Aircraft System</td>
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<td>RPS</td>
<td>Remote Pilot Station</td>
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<td>RTF</td>
<td>Ready to Fly</td>
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<td>RTH</td>
<td>Return to Home</td>
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<td>RTL</td>
<td>Return to Launch</td>
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<tr>
<td>Rx</td>
<td>Receiver</td>
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<td>SA</td>
<td>Situational Awareness</td>
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<td>SAA</td>
<td>Sense and Avoid</td>
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<td>SUA</td>
<td>Small Unmanned Aircraft</td>
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<td>sSUAS</td>
<td>small Unmanned Aircraft Systems</td>
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<td>SUSA</td>
<td>Small Unmanned Surveillance Aircraft</td>
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<td>TO</td>
<td>Take-Off</td>
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<td>Tri</td>
<td>Tricopter</td>
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<td>Tx</td>
<td>Transmitter / radio controller</td>
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<td>UA</td>
<td>Unmanned Aircraft</td>
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<td>UAS</td>
<td>Unmanned Aircraft System</td>
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<td>UAV</td>
<td>Unmanned Aerial Vehicle / Uninhabited Aerial Vehicle</td>
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<td>UCAV</td>
<td>Unmanned Combat Aerial Vehicle</td>
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<td>UTM</td>
<td>UAS Traffic Management System</td>
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<td>VLOS</td>
<td>Visual Line of Sight</td>
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<td>VO</td>
<td>Visual Observer</td>
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<td>VRS</td>
<td>Vortex Ring State</td>
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<td>VTOL</td>
<td>Vertical Take-Off and Landing</td>
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<td>VTx</td>
<td>Video Transmitter</td>
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<td>WP</td>
<td>Waypoint</td>
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2.4 Gigahertz (Ghz)
The is the radio frequency rate most commonly used for UAS radio control.

above ground level (AGL)
[see altitude]

absolute altitude
[see altitude]

aircraft
Any contrivance invented, used, or designed to navigate, or fly in, the air.

aircraft principle axes
An aircraft in flight is free to rotate in three dimensions: pitch, forward (nose) up or down about an axis running from left to right, yaw, forward (nose) left or right about an axis running up and down; and roll, rotation about an axis running from front to back (nose to tail). [see graphic]

airfoil
[see graphic]

altitude (ATTI)
The height measured from directly above ground (AGL) is the absolute altitude. The height measured from mean sea level (MSL) is the true altitude.

ATTI mode
Flight mode where the altitude is set, but lateral movement is not stabilized when the controls are released. [see flight modes]

Automatic Dependent Surveillance—Broadcast (ADS-B)
surveillance technology in which an aircraft determines its position via satellite navigation and periodically broadcasts it, enabling it to be tracked.

autonomous aircraft
An aircraft that does not require pilot intervention in flight operations. [see graphic]

autopilot
The component of an aircraft that is capable of guiding movement of the aircraft without real-time human guidance

avionics
The science and technology of electrical and electronic devices in flight. [see graphic]

binding
The receiver needs to be 'bound' to the transmitter before it can receive signals from it. The process involves the receiver (Rx) identifying a unique code being emitted from the transceiver (Tx), and then the two components lock together on an available frequency.

Brain-computer interface (BCI)
Device that creates a pathway between the brain and an external device, such as a drone, computer or prosthetic limb.

carbon fiber (CF)
Carbon fiber is a material consisting of extremely small fibers. The properties of carbon fibers, such as high stiffness, high tensile strength, low weight, high chemical resistance, high temperature tolerance and low thermal expansion, make them very popular in remotely piloted aircraft. [also graphite fiber and carbon graphite]

ceiling
Height above ground or water of the base of the lowest layer of cloud below 20,000 feet
Certificate of Waiver or Authorization (COA)
The terms “certificate of waiver” and “certificate of authorization” mean a Federal Aviation Administration grant of approval for a specific flight operation. [FAA]

collision avoidance
Action taken to prevent flying into a fixed object or another aircraft. [see detect and avoid and flight modes]

command and control (C2)
The exercise of authority and direction by the pilot.

command and control link
Spectrum and associated equipment used to fly the aircraft from the control station.

command and control range
Distance between ground control station and aircraft at which positive control of the aircraft can be maintained.

commercial operation
An aircraft operation conducted for business purposes (mapping, security surveillance, wildlife survey, aerial application, etc.) other than commercial air transport, for remuneration or hire.

connectivity aircraft
A drone of similar aircraft outfitted with networking equipment that enables it to provide internet access to the area over which it flies.

corrective lenses
Spectacles or contact lenses. [FAA]

course lock
[see intelligent orientation control and flight modes]

creative pattern
[see formation]
detect, sense and avoid (DSA)
DSA can be defined as: Detect-is something there? Sense-is it a threat/target? Avoid-maneuver to miss. (also detect and avoid D&A, and sense and avoid)
disorientation
When the orientation and direction of the aircraft cannot be determined because of distance, obstruction or low light levels.
drone
Unmanned aircraft. Also:
- bird (slang)
- craft (slang)
- eye in the sky / spy in the sky (slang) [surveillance drone]
- flying machine
- flying robot
- micro aerial vehicle (MAV)
- mini aerial vehicle
- remotely operated aerial vehicle (ROAV)
- remotely operated aircraft (ROA)
- remotely piloted aerial vehicle (RPAV)
- remotely piloted aircraft (RPA)
remotely piloted aircraft system (RPAS) [EASA]
remotely piloted vehicle (RPV)
small unmanned aircraft (SUA)
small unmanned aircraft system (sUAS)
small unmanned surveillance aircraft (SUSA)
uncrewed aerial vehicle (UAV)
uninhabited aerial vehicle (UAV)
unmanned aerial system (UAS)
unmanned aerial vehicle (UAV)
unmanned aircraft (UA)
unmanned aircraft system (UAS) [FAA & ICAO]
unmanned flying machine
drone park
Large area dedicated to UAS recreation and/or research and open to the public for free or a usage fee.
electronic speed controller (ESC)
An electronic device that takes the power from the battery pack and the signal from the receiver and measures a certain amount of power to the motor.
envelope
The maximum performance parameters of an aircraft.
failsafe function
If a lost link occurs, the aircraft enters failsafe mode in it either returns to launch or lands autonomously.
Federal Aviation Administration (FAA)
The division of the United States Department of Transportation that inspects and rates civilian aircraft and pilots, enforces the rules of air safety, and installs and maintains air-navigation and traffic-control facilities.
firmware
Firmware is the control program for the aircraft. ‘Software for hardware.’
first person view (FPV)
A technique that enables an operator to assume a cockpit view using a display screen or video goggles, with a wireless, real-time connection to an on-board video camera.
FPV mode
The first person view mode setting “freezes” the gimbal so the camera tilts with the aircraft rather than stabilizing horizontally. It creates more of the sensation of flying. [see flight modes]
fixed-wing aircraft
An aircraft capable of flight using forward motion that generates lift as the wing moves through the air. [also airplane, aeroplane or plane. See rotary-wing aircraft] [see graphic]
flight modes
Flight modes [also stabilization modes] include:
- aerobatic, acro, agility, manual, rate (non-self-leveling)
- air mode (zero throttle)
- altitude hold, ATTI mode, baro (barometric altitude mode) (non-GPS)
- auto mode, autonomous flight, programmed flight, waypoints
- collision avoidance & brake mode
- course lock
- first person view (FPV)
- follow me
- geofencing & safe circle
GPS hold, loiter mode
home lock, carefree, head free, headless, heads-up, simple, smart mode [see headless mode]
horizon, stable mode (aerobatic with self-leveling)
hover mode [see hover mode]
magnetic (mag) mode
sport mode (rate controlled stabilize plus altitude hold)
standard, angle, free flight, normal, self-level, stabilize mode (GPS or non-GPS)
point of Interest, orbit, circle mode
return to home (RTH), auto return, GPS home, return-to-launch (RTL)
throw mode [see failsafe function]
[see graphic]

flight plan (FP)
The operator’s plan for the safe conduct of the flight based on considerations of aircraft performance, other operating limitations and relevant expected conditions on the route to be followed. [also operational flight plan]

flyaway
Unintended flight outside of operational boundaries (altitude/airspeed/lateral) as the result of a failure of the control element or onboard systems, or both. Flyaways do not have or do not initiate failsafe mode to return to launch [also fly away]

flyaway protection system
A system that will return the aircraft safely to the surface, or keep the aircraft within the intended operational area when the command and control link between the pilot and the aircraft is lost. [see failsafe function]

formation
Flying several drones or swarm that form a shape or pattern. When flown close together, this is a tight formation. [also creative pattern]

frangible
Designed to break, distort or yield on impact so as to present minimum hazard.

goofence
A virtual barrier indicating how far a GPS quadcopter can fly from its home point. Geofence settings are usually height above ground as well as total distance from the home point. [see flight modes]

gimbal
A mechanism, typically consisting of rings pivoted at right angles (3-axial stabilized), for keeping a camera or other instrument horizontal during flight.

Global Positioning System (GPS)
A global system of U.S. navigational satellites developed to provide precise positional and velocity data and global time synchronization for air, sea, and land travel.

GPS mode
Flight mode where the craft will remain in the altitude, position and orientation that it is in when the controls are released. Also necessary for automatic return to home. [see flight modes]

grades
Drones are generally graded according to their size and use.
Toy grade—Small (mini/nano) and inexpensive UAVs primarily for novice, indoor flyers. These are typically less than $100.
Hobby grade—Mid-size UAVs with some additional features (e.g. camera) primarily for
Drone Dictionary

novice, indoor and outdoor flyers. These are typically less than $500. This grade includes **racing drones** that are small, fast, agile and designed for first person view (FPV) racing, and **selfie drones** that are easily portable and have a programmable camera.

**Consumer or commercial grade**—Commercial (non-model) drones have sophisticated avionics, programmability and equipment, and can cost thousands of dollars depending on size and equipment. They are typically less than $10,000 with an average price of around $2,500. Consumer grade drones dominate the non-model sector with approximately a 95 percent share.

**Professional grade**—Drones used primarily for government agencies or large corporations. These are for specific applications such as disaster response, border security, and military. Professional grade drones are typically more than $10,000 with an average price of $25,000.

**ground control station (GCS)**
[see ground station and remote pilot station]

**ground effect**
Described as an increase of performance near the ground. Which means, near the ground your blades produce more lift.

**Gyro**
A device used to help stabilize the yaw of a helicopter or multi-rotor.

**headless mode**
When you take off with the drone pointing in the front, algorithms inside of the drone’s micro-controller ensure that any directional change is compensated. In other words, even when you turn your drone 90 degrees to the left, it’ll still go forward when you push the rudder forward (on a non-headless mode drone, this would make the drone go left). [see flight modes]

**Hexacopter**
An aircraft with six (6) main rotors. [see graphic]

**Hobbyist**
Non-commercial, recreational model aircraft pilot. [also aeromodeller]

**home lock**
[see intelligent orientation control and flight modes]

**homing**
[see failsafe function, flyaway protection system, return to launch, and flight modes]

**hover mode**
An aircraft maintaining a specified altitude and position via GPS. Hover mode is often related to a point of interest. [see flight modes]

**hybrid**
An aircraft made by combining two different elements. Common hybrid drones combine VTOL with fixed wing; or electric and gas engines.

**inertial measurement unit (IMU)**
An electronic device that measures and reports on a craft’s velocity, orientation, and gravitational forces, using a combination of accelerometers and gyroscopes, sometimes also magnetometers.

**International Civil Aviation Organization (ICAO)**
The International Civil Aviation Organization (ICAO) is a United Nations specialized agency that works with 191 nations, global industries and aviation organizations to develop
international *Standards and Recommended Practices* which are then used by the nations when they develop their legally-binding national civil aviation regulations.

**incident**
An occurrence, other than an accident, associated with the operation of an aircraft which affects or could affect the safety of operation.

**intelligent orientation control (IOC)**
Usually, the forward direction of a flying multi-rotor is the same as the nose direction. By using intelligent orientation control, wherever the nose points, the forward direction has nothing to do with nose direction: In *course lock* flying, the forward direction is the same as a recorded nose direction. In *home lock* flying, the forward direction is the same as the direction from home point to the multi-rotor.

**LAANC Low Altitude Authorization Notification Capability**
LAANC is the Low Altitude Authorization and Notification Capability, a collaboration between FAA and Industry. It directly supports UAS integration into the airspace.

**light remotely piloted aircraft**
Remote piloted aircraft with a mass less than 150 kilograms [330 pounds].

**line of sight (LOS)**
Many small aircraft are line-of-sight machines, meaning the person controlling the device must be in direct sight of the aircraft so that radio signals can be transmitted back and forth. Most larger aircraft are not line-of-sight aircraft because the radio signals that control them are bounced off of satellites or manned aircraft.

**line of sight command and control link**
Aircraft system operating within visual/radio range.

**lost link**
Loss of command and control link contact with the remotely piloted aircraft such that the remote pilot can no longer manage the aircraft’s flight.

**micro air vehicle (MAV)**
An aircraft weighing less than 2 pounds [1 kilogram]. [also *micro UAV*]

**minimum safe altitude (MSA)**
The public domain for airspace starts at the minimum safe altitude (MSA). In general, people’s property ends at the highest of the underlying land’s trees, buildings, fences, or how high the owner can use the airspace in connection with the land.

**mission plan**
The route planning, payload planning, data link planning, and aircraft emergency recovery planning for a flight.

**model aircraft**
An unmanned aircraft that is:
- Capable of sustained flight in the atmosphere
- Flown within VLOS of the person operating the aircraft; and
- Flown for hobby or recreational purposes [FAA]

**multi-rotor**
An aircraft with two or more main rotors. [also *multicopter*] [see graphic]
National Airspace System (NAS)
The common network of U.S. airspace; air navigation facilities, equipment and services, airports or landing areas; aeronautical charts, information and services; rules, regulations and procedures, technical information, and manpower and material.

No Fly Zone
Areas where drones are prohibited by government regulation.

non-collaborative things
Moving and stationary objects in the air (such as balloons and birds) and on the ground that are not electronically communicating with the aircraft for collision avoidance.

octocopter
An aircraft with eight (8) main rotors. [see graphic]

omnihelicopter
A heavier-than-air aircraft supported in flight chiefly by the reactions of the air on planes to which a flapping motion is imparted.

operational control
The exercise of authority over the initiation, continuation, diversion or termination of a flight in the interest of safety of the aircraft and the regularity and efficiency of the flight.

payload
All elements of a remotely piloted aircraft that are not necessary for flight but are carried for the purpose of fulfilling specific mission objectives.

permanent areas
The term “permanent areas” means areas on land or water that provide for launch, recovery, and operation of small unmanned aircraft. [FAA]

permanent deformation
A condition whereby an aircraft structure is altered such that it does not return to the shape required for normal flight.

person manipulating the controls
A person other than the remote pilot in command (PIC) who is controlling the flight of an sUAS under the supervision of the remote PIC. [FAA]

pilot
The person in direct control of the aircraft. [also remote pilot]

pilot-in-command (PIC)
An aircraft that is flying in a state of direct control by an aircraft operator (i.e. not in autonomous flight). In this instance, the operator can also be referred to as the Pilot in Command.

pitch
[see aircraft principle axes, see graphic]

point of interest (POI)
A target location for the capture of remotely sensed data by an aircraft’s sensors (i.e. video, still or multi-spectral imagery). [also region of interest] [see flight modes]

prop guards
A light frame extending beyond the radius of the rotors as a protection measure.

propeller
A mechanical device for propelling the aircraft, consisting of a revolving shaft with two or more broad, angled blades attached to it. [see rotor]
public unmanned aircraft system
The term “public unmanned aircraft system” means an unmanned aircraft system that meets the qualifications and conditions required for operation of a public aircraft. [FAA]
quadcopter
An aerial vehicle with four (4) main rotors. [also quadrocopter, see graphic]
radio line of sight (RLOS)
A direct electronic point-to-point between a transmitter and receiver.
range extender
A communication device on the remote controller that links the aircraft to another device such as a smart-phone or tablet.
rate mode
[see flight modes]
recreational model aircraft hobbyist
[see hobbyist]
remote controlled aircraft
[also remote controlled airplane, remote controlled helicopter] [see remotely piloted aircraft]
remote controller
The handheld device used to operate the UAV and typically consisting of a radio transceiver, GPS and flight controls. Remote controllers may also include FPV screens and camera controls.
remote pilot (RP)
The person who manipulates the flight controls of a remotely-piloted aircraft during flight time.
remote pilot station (RPS)
[see ground control station]
remote Pilot in Command (remote PIC)
A person who holds a remote pilot certificate with an sUAS rating and has the final authority and responsibility for the operation and safety of an sUAS operation conducted under part 107. [FAA]
remotely operated aircraft (ROA)
[see remotely piloted aircraft]
remotely piloted aircraft (RPA)
An aircraft which is piloted from a remote pilot station. The term remotely piloted aircraft is preferred by the International Civil Aviation Organization over unmanned aerial vehicle. [see unmanned aerial vehicle]
remotely piloted aircraft system (RPAS)
A set of configurable elements consisting of a remotely-piloted aircraft, its associated remote pilot station(s), the required command and control links and any other system elements as may be required, at any point during flight operation. Remotely piloted aircraft systems weigh less than 150 kilograms [330 pounds].
Note: The term remotely piloted aircraft system and all associated terms are recommended by the International Civil Aviation Organization over unmanned aircraft systems and related terms. [see unmanned aircraft system]
return to home
[see return to launch and flight modes]

return to launch (RTL)
The return of an aircraft to its original launch location. Also known as homing and often performed as a safety procedure in the event of a technical malfunction or emergency. [also return to home] [see flight modes]

roll
[see aircraft principle axes, see graphic]

rotary-wing aircraft
A heavier-than-air flying machine that uses lift generated by wings, called rotor blades, that revolve around a mast. [see fixed-wing aircraft]

rotor
A hub with a number of radiating airfoils (blades) that is rotated in an approximately horizontal plane to provide the lift for a rotary-wing aircraft. [see propeller]

rotorcraft
[see rotary-wing aircraft]

route plan (RP)
A set of waypoints for the aircraft to follow.

sense and avoid capability
The term “sense and avoid capability” means the capability of an unmanned aircraft to remain a safe distance from and to avoid collisions with other airborne aircraft. [FAA] [see detect, sense and avoid]

settling with power
[see vortex ring state] [see graphic]

situational awareness (SA)
An all-encompassing term for keeping track of what’s happening when flying.

small unmanned aircraft (UA)
An unmanned aircraft weighing less than 55 pounds, including everything that is onboard or otherwise attached to the aircraft, and can be flown without the possibility of direct human intervention from within or on the aircraft. [FAA]

small unmanned aircraft system (sUAS)
A small unmanned aircraft and its associated elements (including communication links and the components that control the small UA) that are required for the safe and efficient operation of the small UA in the National Air Space. [FAA]

small unmanned surveillance aircraft (SUSA)
[see remotely piloted aircraft]

sonar obstacle avoidance
Active sonar (sound navigation and ranging) uses acoustic measurement to detect and avoid obstacles such as trees and buildings.

stabilization mode
[see flight modes]

stick
A flight control feature on the remote controller. Typically there are two sticks to control throttle (power), orientation (left stick) and direction (right stick).

test range
The term “test range” means a defined geographic area where research and development are conducted. [FAA]

tip path
The path in space traced out by the tips of the rotor blades.
track
Actual flight path of aircraft above ground.

translational lift
Additional lift provided by lateral movement as opposed to hovering. Translational lift also helps prevent vortex ring state.

tricopter
An aircraft with three (3) main rotors. [see graphic]

true altitude
[see altitude]

unmanned aerial vehicle (UAV)
An unmanned aerial vehicle, commonly known as a drone and referred to as a remotely piloted aircraft by the International Civil Aviation Organization, is an aircraft without a human pilot aboard. Its flight is controlled either autonomously by onboard computers or by the remote control of a pilot on the ground or in another vehicle. The typical launch and recovery method of an aircraft is by the function of an automatic system or an external operator on the ground. Military versions are unmanned combat aerial vehicles (UCAVs).

unmanned aircraft (UA)
An aircraft operated without the possibility of direct human intervention from within or on the aircraft. [FAA]

unmanned aircraft system (UAS)
The term “unmanned aircraft system” means an aircraft and associated elements (including communication links and the components that control the aircraft) that are required for the pilot in command to operate safely and efficiently in the national airspace system.

[FAA] [also remotely piloted aircraft system]
Note: remotely piloted aircraft system is the recommended term for the International Civil Aviation Organization.

Unmanned Aircraft System Traffic Management (UTM)
While incorporating lessons learned from the well-established Air Traffic Management (ATM) system, which grew from a mid-air collision over the Grand Canyon in the early days of commercial aviation, the UTM system would enable safe and efficient low-altitude airspace operations by providing services such as airspace design, corridors, dynamic geofencing, severe weather and wind avoidance, congestion management, terrain avoidance, route planning and re-routing, separation management, sequencing and spacing, and contingency management. [NASA]

vertical take-off and landing (VTOL)
The capability of an aircraft to take off and land vertically, transferring to or from forward motion at heights required to clear surrounding obstacles. Generally applied to rotary-wing aircraft although also possible by some fixed-wing aircraft.

visual line of sight (VLOS)
Unaided (corrective lenses and/or sunglasses excepted) visual contact between a pilot in command and an unmanned aircraft sufficient to maintain safe operational control of the aircraft, know its location, and be able to scan the airspace in which it is operating to see and avoid other air traffic or objects aloft or on the ground. [see graphic]

visual observer (VO)
A person acting as a flight crew member who assists the small UA remote PIC and the
person manipulating the controls to see and avoid other air traffic or objects aloft or on the ground. [FAA]

**vortex ring state (VRS)**

Air vortices can form around the main rotor of a helicopter, causing a dangerous condition known as vortex ring state (VRS) or "settling with power". In this condition, air that moves down through the rotor turns outward, then up, inward, and then down through the rotor again. This re-circulation of flow can negate much of the lifting force and cause a catastrophic loss of altitude. Applying more power (increasing collective pitch) serves to further accelerate the downwash through which the main-rotor is descending, exacerbating the condition. [also settling with power, recirculation and wobble of death] [see graphic]

**waypoint (WP)**

A specified geographical location used to define an area navigation route or the flight path of an aircraft employing area navigation. [see flight modes]

**X8**

Multicopter with eight (8) motors and shaped in an “X” with four (4) motors on top and four (4) motors on bottom. [see graphic]

**Y6**

Multicopter with six (6) motors and shaped in a “Y” with three (3) motors on top and three (3) motors on bottom. [see graphic]

**yaw**

[see aircraft principle axes, see graphic]

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Airfoil and Lift

Upper Streamline
Low Pressure
High Velocity

Lower Streamline
High Pressure
Low Velocity

Airfoil

Lift

Airfoils

- blackbird wing (6cm)
- turbine blade (8cm)
- sailboat sail (4m)
- propeller blade (15cm)
- ultralight aircraft wing (1m)
- airliner wing (6m)
- turbofan blade (80cm)
- supersonic wing (2m)
Aviation autonomy refers to the transition from onboard and remote human-piloted aircraft to fully autonomous aircraft without human pilots.

This transition coincides with the 4th Industrial Revolution’s introduction of cyber physical systems, the Internet of Things (including ADS-B), networks, urban air mobility (UAM), and airspace integration.

We are rapidly approaching the tipping point where more aircraft operations are autonomous than pilot-controlled.

2nd Industrial Revolution
Mass production, assembly line, electrical energy, aviation

3rd Industrial Revolution
Automation, computers and electronics, unmanned aircraft systems

4th Industrial Revolution
Cyber physical systems, Internet of Things, networks, urban air mobility, airspace integration

5th Industrial Revolution
Cyber-biological systems, artificial intelligence

Tipping Point
Transition from human pilots to autonomous aircraft

Human - Machine

The pilot-in-command must control all aspects of flying.

The pilot-in-command is assisted by the aircraft performing specific functions such as autopilot.

The pilot-in-command must monitor the aircraft while it performs multiple, combined functions such as autoland.

A partially autonomous aircraft performs most flight functions and may require the human pilot-in-command to intervene.

An optionally piloted aircraft may operate without a human pilot in specific environments and/or conditions.

An autonomous aircraft may operate without a human pilot in all environments and conditions.
Fixed Wing Drones

“Airplane”

“Flying Wing”

Quadcopter Axes & Motions

Front View

Rear View

Left Side View

Top View

Elevation (Climb)

Roll (Right)

Pitch (Forward)

Yaw (Rotate Right)
Quadcopter Vortex Ring State
Settling with Power

Downwash

Rapid Descent

Typical Drone Sizes

Quadcopter
Hexacopter
Octocopter
Fixed Wing
RC Helicopter

Drone Dictionary
<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
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</thead>
<tbody>
<tr>
<td><strong>acro mode</strong></td>
<td>Acrobatic mode [see flight modes in glossary]</td>
</tr>
<tr>
<td><strong>air pocket</strong></td>
<td>Transient jolt of turbulence.</td>
</tr>
<tr>
<td><strong>ARC</strong></td>
<td>Almost Ready to Crash. An aircraft that knows something that the pilot is just about to find out. [from ARF Almost Ready to Fly]</td>
</tr>
<tr>
<td><strong>barnstormer</strong></td>
<td>Reckless, low-level, stunt pilot.</td>
</tr>
<tr>
<td><strong>bending plastic</strong></td>
<td>Crash.</td>
</tr>
<tr>
<td><strong>bent</strong></td>
<td>Damaged, broken, or inoperative.</td>
</tr>
<tr>
<td><strong>bingo</strong></td>
<td>Minimum battery charge for a safe return to home.</td>
</tr>
<tr>
<td><strong>bird</strong></td>
<td>Unmanned aerial vehicle.</td>
</tr>
<tr>
<td><strong>Boola-Boola</strong></td>
<td>When an angry person knocks down or shoots down a remotely piloted aircraft (RPA).</td>
</tr>
<tr>
<td><strong>brain fade</strong></td>
<td>A mental condition where the person flying the aircraft, suddenly forgets which way to move the controls, or which control to move at all. This can happen for no apparent reason, even when you think you’re comfortable at flying.</td>
</tr>
<tr>
<td><strong>Bravo Zulu</strong></td>
<td>Praise for a good job.</td>
</tr>
<tr>
<td><strong>bringing the mail</strong></td>
<td>Flying at high speed to return home. [also carrying the mail]</td>
</tr>
<tr>
<td><strong>bubbas</strong></td>
<td>Fellow pilots of the same aircraft.</td>
</tr>
<tr>
<td><strong>build</strong></td>
<td>[noun] Homebuilt drone.</td>
</tr>
<tr>
<td><strong>bush pilot</strong></td>
<td>A pilot flying in remote areas.</td>
</tr>
<tr>
<td><strong>cameraship</strong></td>
<td>A multicopter built with photography as a primary purpose.</td>
</tr>
<tr>
<td><strong>CAVOK</strong></td>
<td>Ceiling and Visibility OK. [see CAVU and severe clear]</td>
</tr>
<tr>
<td><strong>CAVU</strong></td>
<td>Ceiling and Visibility Unlimited: the best possible flying weather. [see CAVOK and severe clear]</td>
</tr>
<tr>
<td><strong>Cherubs</strong></td>
<td>Altitude under 1,000 feet, measured in hundreds of feet (“cherubs two” means 200 feet).</td>
</tr>
<tr>
<td><strong>Cleanup in aisle 5</strong></td>
<td>Messy indoor crash.</td>
</tr>
<tr>
<td><strong>colorful actions</strong></td>
<td>Showing off, or otherwise ignoring safe procedures while flying. [see flathatting]</td>
</tr>
<tr>
<td><strong>Centurion</strong></td>
<td>A pilot with over 100 missions.</td>
</tr>
<tr>
<td><strong>conversion</strong></td>
<td>Severe crash. Converting an aircraft to pieces of plastic and metal.</td>
</tr>
<tr>
<td><strong>corkscrew</strong></td>
<td>Slang</td>
</tr>
</tbody>
</table>
Descending in a spiral to avoid ring vortex state.

craft
Aircraft.
dead stick
An emergency landing due to a power loss when a motor quits.
Delta Sierra
Phonetics for “dumb sh*t”: describes a stupid action, and erases all previous Bravo Zulus and Sierra Hotels.
departure
Departure from controlled flight. [see flyaway in Glossary]
ditching
The forced landing of aircraft on water.
driver
Pilot (e.g. Phantom driver).
Drone Ranger
Pilot who assists with anti-poaching and/or park monitoring.
Dronejacking
The hijacking of a drone, either by physically capturing the device or by compromising its navigation system.
droneport
An airport or hub designed for or dedicated to drones.
Dronestagram
A photo or video shot from a drone.
Dronie
[see sky selfie]
droning
Flying a drone or UAV (unmanned aerial vehicle) for recreational purposes.
drop in for lunch
Crash near people.
eye in the sky
Aircraft with camera.
feet dry / feet wet
Over land / over water.
field box
Container for equipment related to the remotely piloted aircraft system. [also flight box]
fisheye lens effect
The distortion caused by a very wide angle lens.
flathatting
Unauthorized low-level flying and stunting. [see colorful actions]
flock
[see swarm]
floor
Ground. [see ceiling in Glossary]
flyin...
FM
Abbreviation for “f*cking magic”: very high-tech; used to describe how something you don’t understand actually works. [Also PFM Pure F*cking Magic]

FOD
Foreign object damage. Typically when objects hit the rotor.

four fan trash can
Poorly designed quadcopter. [also six fan trash can hexacopter, eight fan trash can octocopter]

Fox 4
High-speed mid-air collision. Note: Fox 1, 2 and 3 are types of missiles.

Fox 5
High-speed crash. [see Fox 4]

garage queen
An aircraft that may look pretty, but never flies.

George
Auto-pilot.

Ginsu knives
Carbon fiber propellers.

gizmo
A piece of technical gear.

go for a spin
Recreational flying.

goo
Bad weather.

GPS/compass dance
Rotating the aircraft to locate satellites and determine magnetic north.

graveyard spiral
Maneuver that goes badly wrong and the aircraft spirals out of control. [see vortex ring state in glossary]

gripe
A mechanical problem with the aircraft.

grounded
Unable to fly.

hop
A mission or flight.

IFE
In Flight Emergency.

jink
Drastic, violent maneuver to avoid a collision.

jail break software
Computer program that overrides drone geo-fencing.

jello
The visual effect of drone vibration on the video image.

jock
Pilot (e.g. Phantom jock).

LIPO
Lithium polymer battery.

loiter mode
[see flight modes in glossary]

mid-air
Mid-air collision.

mod
Modification to a drone.

no joy
Failure to make visual sighting or to establish radio communications.

**pancake**
To crash so hard as to flatten the aircraft.

**park flyer**
The general name given to any aircraft that can be safely flown in a public park / school yard / parking lot / sports field etc.

**personal protection drone**
A weaponized drone that accompanies a person and can respond to attacks or threats.

**pirouette**
A maneuver described as a high yaw rate in which the aircraft spins.

**plastic bag**
The thing used to take home the pieces that was once your beloved aircraft, before you failed to keep it airborne at the wrong moment, or didn’t manage to pull off the best of landings, or tried to perform an aerobatic maneuver too close to the ground...

**plumber**
An inept pilot.

**Popeye**
Pilot flying in bad weather or visibility.

**prang**
To bump, crunch or break an aircraft.

**prop**
Propeller.

**prop wash**
The air behind a running propeller or below a running rotor.

**proximity event**
Near collision.

**puke**
Someone who flies a different kind of aircraft than you.

**pushing the envelope**
Flying near the edge of disaster. [see envelope in Glossary]

**quad**
Quadcopter.

**quick disassembly**
Crash resulting in the drone being reduced to all its parts.

**quick fix**
Stop-gap measure to repair an aircraft quickly.

**rotorhead**
Multicopter pilot.

**RTC**
Ready to Crash. [from RTF Ready to Fly]

**satellite/compass dance**
Rotating the craft to detect satellites and/or compass orientation.

**sats**
GPS satellites.

**scud**
Low clouds or rain.

**scud running**
Flying at low altitude.

**severe clear**
No clouds and unlimited visibility. [see CAVOK and CAVU]

**Sierra Hotel**
Phonetic abbreviation for “sh*t hot,” high
praise; the pilot’s favorite and all-purpose expression of approval.

**sky selfie**
Self photo taken by a drone. [Also “dronie”]

**slop**
Imprecision of a control system.

**smash**
Airspeed.

**smoking hole**
An aircraft crash site.

**socked in**
Grounded by bad weather.

**soup**
Overcast weather or thick fog. [also pea soup]

**spaxel**
Space pixel. A swarm of LED-equipped quadcopters that can fly in precise formation and thus “draw” three-dimensional images in midair.

**speed of heat, warp one**
Very, very fast.

**spotter**
Another term for visual observer.

**spy in the sky**
Remotely piloted aircraft used for surveillance by law enforcement.

**stick-throttle interconnect**
Mock-tech term for a pilot.

**swap paint**
Mid-air or ground collision with another man-made object.

**swarm**
Multiple drones flown in formation or used collectively to perform a task. [also flock]

**sweet**
Up and working.

**Tally Ho**
Aircraft in sight. [see no joy]

**Tango Uniform**
Polite phonetics for “t*ts up”; broken, not functioning.

**tiger**
An aggressive pilot.

**toilet bowl effect**
Condition where the drone spirals rather than hovers. This may be caused by a malfunctioning flybar or uncalibrated compass.

**totaled**
Complete wreck. [see plastic bag]

**tree trimmer**
Pilot or aircraft flying near trees or crashing in a tree. [see weed wacker]

**tumbleweed**
Pilot who is disoriented or who has lost situational awareness. [see situational awareness in glossary]

**tweak**
To fine tune or adjust.

**uncontrolled landing**
Crash landing.

**Unmanned Aerial Veg-o-matic**
In reference to the rotor blades: “It slices! It dices!” Especially for carbon fiber props.
VRS death plunge
[see vortex ring state in Glossary]

“Watch this!”
The two most dangerous words in aviation.
(similar to “Hold my beer.”)

weed wacker
Pilot or aircraft flying extremely low or crashing in the weeds.

wobble of death
[see vortex ring state in Glossary]

WOT
Wide Open Throttle. Full power.

zebra striping
Pattern created in pilot underpants during a flyaway, collision or crash.
<table>
<thead>
<tr>
<th>Language</th>
<th>Translation</th>
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<tbody>
<tr>
<td>CHINESE</td>
<td>无人驾驶飞机</td>
</tr>
<tr>
<td>DUTCH</td>
<td>onbemand luchtvaartuig (drone)</td>
</tr>
<tr>
<td>FINNISH</td>
<td>miehittämättömiä ilma</td>
</tr>
<tr>
<td>FRENCH</td>
<td>aéronef sans pilote (drone)</td>
</tr>
<tr>
<td>GERMAN</td>
<td>Drohne</td>
</tr>
<tr>
<td>GERMAN</td>
<td>ferngesteuertes Flugzeug</td>
</tr>
<tr>
<td>GERMAN</td>
<td>ferngesteuertes Luftfahrtsystem</td>
</tr>
<tr>
<td>GERMAN</td>
<td>unbemannnte Luftfahrzeuge</td>
</tr>
<tr>
<td>GERMAN</td>
<td>unbemanntes Fluggerät</td>
</tr>
<tr>
<td>GREEK</td>
<td>μη επανδρωμένα αεροσκάφη</td>
</tr>
<tr>
<td>ITALIAN</td>
<td>aeromobili pilotaggio remoto (APR)</td>
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<tr>
<td>ITALIAN</td>
<td>drone</td>
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<tr>
<td>ITALIAN</td>
<td>aéronef sans pilote (drone)</td>
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<td>ITALIAN</td>
<td>petit véhicule aérien sans pilote (drone)</td>
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<tr>
<td>ITALIAN</td>
<td>drona</td>
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<tr>
<td>JAPANESE</td>
<td>無人機</td>
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<tr>
<td>JAPANESE</td>
<td>mu-in hang-gong-gi siseutem</td>
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<tr>
<td>KOREAN</td>
<td>무인 항공기 시스템</td>
</tr>
<tr>
<td>NORWEGIAN</td>
<td>ubemannede fly</td>
</tr>
<tr>
<td>POLISH</td>
<td>bezzałogowego samolotu</td>
</tr>
<tr>
<td>RUSSIAN</td>
<td>беспилотные летательные аппараты</td>
</tr>
<tr>
<td>RUSSIAN</td>
<td>bespilotnye letatel'nyye apparaty (BPLA)</td>
</tr>
<tr>
<td>SPANISH</td>
<td>vehículo aéreo no tripulado (VANT)</td>
</tr>
<tr>
<td>SWEDISH</td>
<td>obemannat luftfordon</td>
</tr>
</tbody>
</table>