



# DICTIONARY OF AERONAUTICAL TERMS

SEVENTH EDITION

# DATA

A large, semi-transparent blue watermark of the word 'DATA' is centered on the cover. Below the watermark, the white wing and tail of an aircraft are visible against a blue sky with clouds.

BASED ON THE ORIGINAL COMPILATION BY

**DALE CRANE**

Over 12,000 entries

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AERONAUTICAL  
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AVIATION SUPPLIES & ACADEMICS  
NEWCASTLE, WASHINGTON

*Dictionary of Aeronautical Terms*

Seventh Edition

by the ASA Editorial Staff, based on the original compilation by Dale Crane

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# Preface to the Seventh Edition

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There is no aspect of modern technology that encompasses so many disciplines as aviation: physics, chemistry, aerodynamics, thermodynamics, structural and fluid mechanics, electronics, acoustics, reciprocating and turbine engine technology, meteorology, navigation, and human factors. In addition, aviation is governed by an extremely complex set of federal regulations.

Each discipline and regulation has its own unique vocabulary, and it is difficult to find a single reference source that includes terms specific to the aviation application of these fields. To this end, ASA's editors have searched aviation periodicals, aviation-related textbooks, service manuals, manufacturers' literature, engineering reports, military training manuals, and especially all of the publications produced by the FAA for applicable terms.

The seventh edition of ASA's *Dictionary of Aeronautical Terms* is more than a lexicon; it explains as well as defines over 12,000 accurate, aviation-specific terms and includes nearly 500 illustrations and four appendices. Expanded coverage for this edition reaches into terms associated with human factors, aerodynamics, air carriers, and other developments in the industry, plus changes to regulations and procedures including ADS-B and drone operations. Especially helpful is the list of acronyms and abbreviations in the Appendix; for an unfamiliar acronym go there first to find the fully spelled-out term, and then look up the definition in the main text.

The officially recognized definitions for many of the aviation terms are included in 14 CFR Part 1 *Definitions and Abbreviations*. In all instances where a definition in this dictionary is taken directly from this document, it is identified by the prefix 14 CFR Part 1:, and the definition is in quotation marks. In addition, there are now terms from 14 CFR §401.5, *Commercial Space Transportation – Definitions* and these are identified in the same manner.

The information contained here is as accurate and up-to-date as it has been possible to make it, but because of the speed with which changes are taking place in aviation, some of the terms are taking on new meanings, and their relative importance is changing. Because of this, and because of ASA's dedication to working together for excellence, we will appreciate any criticism, or suggestion you have that will make subsequent revisions of this work more useful for you.

**Editor's Note:** If you do not find a word or acronym you were looking for in the *Dictionary of Aeronautical Terms*, please email ASA at [cfi@asa2fly.com](mailto:cfi@asa2fly.com) and we will try to find the definition for you. Also, be sure to visit the "Reader Resource" webpage for this book ([asa2fly.com/reader/dat](http://asa2fly.com/reader/dat)) to check for updates as new terms and definitions are collected in between book printings.

**AAM (air-to-air missile).** A missile carried on an aircraft for use against other aircraft. The missile is guided to its target by radar or infrared sensors.

**A&B hydraulic brake system.** A form of backup brake system used in some large aircraft multiple-disk power brake installations. Wheels using the A&B system have several small actuating cylinders built into the brake housing. Half of the cylinders are actuated by fluid from the A-hydraulic system and the others by fluid from the B-system. The brakes operate normally with either system.

**A&P mechanic.** A person who holds an aircraft mechanic certificate with both the airframe and powerplant ratings. This certification is issued by the Federal Aviation Administration under the provisions of 14 CFR Part 65.

Mechanic certification with an A&P rating is now referred to as Aviation Maintenance Technician (AMT) certification.

**AAR (airport acceptance rate) (air traffic control).** A dynamic input parameter specifying the number of arriving aircraft which an airport or airspace can accept from the ARTCC per hour. The AAR is used to calculate the desired interval between successive arrival aircraft.

**AAS (airport advisory service).** A service provided by FAA Flight Service Stations located at airports not served by a control tower.

AAS provides information to arriving and departing aircraft concerning wind direction and speed, favored runway, altimeter setting, pertinent known traffic, pertinent known field conditions, airport taxi routes, traffic patterns, and authorized instrument approach procedures. AAS information is advisory in nature and does not constitute an ATC clearance.

**abampere.** A basic unit of electrical current in the electromagnetic-centimeter-gram-second system. One abampere is equal to 10 amperes in the absolute meter-kilogram-second-ampere system. The abbreviation for abampere is aA.

**A-battery.** A dry-cell battery used in vacuum tube radios to supply power to the heaters, or filaments, of the tubes.

A-batteries usually have a voltage ranging between 1.5 to 6.0 volts and are capable of supplying a reasonable amount of current.

**abbreviated briefing.** In meteorology, this is a shortened weather briefing to supplement the widely-disseminated aviation weather data.

**abbreviated IFR flight plan (air traffic control).** An authorization by ATC requiring pilots to submit only that information needed for the purpose of separation and control. An abbreviated flight plan includes only a small portion of the usual IFR flight plan information which may be only aircraft identification, location, and pilot request.

Abbreviated flight plans are frequently used by aircraft which are airborne and desire an instrument approach, or by aircraft which are on the ground and desire a climb to VFR-On-Top.

**abcoulomb.** A basic unit of electrical charge in the electromagnetic-centimeter-gram-second system. One abcoulomb is equal to 10 coulombs in the absolute meter-kilogram-second-ampere system. The abbreviation for abcoulomb is aC.

**abeam.** A relative location approximately at right angles to the longitudinal axis of an aircraft. When an object is beside the aircraft, it is said to be abeam of it.

**abeam fix.** A fix, NAVAID, point, or object positioned approximately 90 degrees to the right or left of the aircraft track along a route of flight. Abeam indicates a general position rather than a precise point.

**abfarad.** A basic unit of electrical capacitance in the electromagnetic-centimeter-gram-second system. One abfarad is equal to  $10^9$  farads in the absolute meter-kilogram-second-ampere system. The abbreviation for abfarad is aF.

**abhenry.** A basic unit of electrical inductance in the electromagnetic-centimeter-gram-second system. One abhenry is equal to  $10^{-9}$  henries in the absolute meter-kilogram-second-ampere system. The abbreviation for abhenry is aH.

**ability bias.** The belief that one is better than most people when it comes to personal virtues, skills, and abilities.

**abmho.** A basic unit of electrical conductance in the electromagnetic-centimeter-gram-second system. One abmho is equal to  $10^9$  mhos in the absolute meter-kilogram-second-ampere system. The abbreviation for abmho is  $(a\Omega)^{-1}$ . An abmho is also known as an absiemens, aS.

**abort.** To terminate an operation prematurely when it is seen that the desired results will not be obtained.

**aborted start (gas turbine engine operation).** Termination of the start procedures in a gas turbine engine when it is seen that normal combustion has not taken place within the prescribed time limits.

**aborted takeoff.** A takeoff terminated prematurely when it is determined that some condition exists which makes takeoff or further flight dangerous.

**abradable seal (gas turbine engine component).** A general term for a knife-edge seal inside a gas turbine engine that wears away (abrades) slightly to produce an extremely close fit between a rotating and a stationary part of the engine.

**abradable shroud (gas turbine engine component).** A special shroud ring built into the outer turbine case of a gas turbine engine. The shroud fits tightly around the outside of the turbine wheel, which is equipped with special knife edges around its periphery.

If the turbine blades creep (grow in length because of heat and high centrifugal loads), the knife edges will wear away the abradable shroud and do no damage.

**abradable strip (gas turbine engine component).** A strip of material in the compressor housing of some axial-flow gas turbine engines. The tip of the compressor blade touches the abradable strip and actually wears, or abrades, a groove in it. This groove ensures that the blade operates with the minimum amount of tip clearance.

**abradable tip (compressor blade tip).** The tip of some axial-flow compressor blades made in such a way that it will abrade, or wear away, when it contacts the compressor housing. The abradable tip wears away to allow the engine to have a minimum amount of tip clearance between the blade and the housing.

**abrade.** To wear away a surface or a part by mechanical or chemical action. A rough surface may be made smooth by mechanically abrading it with sandpaper. Extremely smooth surfaces may be roughened enough for paint to adhere by rubbing the surface with abrasive paper or by chemically abrading it with an etching solution.

**abrasion.** A form of damage to a surface made by roughening or wearing it away with scratches or gouges. Abrasion is often caused by foreign matter trapped between two surfaces having relative motion between them.

**abrasion resistant.** The ability of a material to resist damage by abrasion.

**abrasive.** A material containing minute particles of a hard substance used to wear away a softer surface. Aluminum oxide, silicon carbide, and glass beads are abrasives commonly used in aircraft maintenance.

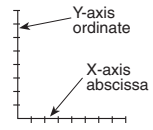


**abrasive blasting.** A method of removing carbon and other contaminants from machine parts. In abrasive blasting, the parts are sprayed with a high-velocity blast of air containing fine particles of abrasive material such as sand, aluminum oxide, or glass beads.

**abrasive tip (turbine blade).** A turbine blade with a hardened insert at the tip that is able to cut into the turbine shroud ring. *See* abradable shroud.

**abscissa.** A coordinate representing the distance from the Y-, or vertical, axis in a plane Cartesian coordinate system.

The abscissa is measured along the X-, or horizontal, axis and the ordinate along the Y-, or vertical, axis.



**abscissa**

**absolute accuracy.** The ability to determine present position in space independently, most often used by pilots.

**absolute altimeter.** An electronic altimeter used to indicate the exact height of an aircraft above the terrain. *See* radio altimeter.

**absolute altitude.** The actual distance between an aircraft and the terrain over which it is flying. Absolute altitude is measured with an electronic altimeter.

**absolute ceiling.** The altitude at which an aircraft has no excess of power, and only one speed will allow steady, level flight. Consequently, the absolute ceiling of an aircraft produces zero rate of climb.

**absolute humidity.** The actual amount of water vapor present in a specific volume of air. If one cubic meter of air contains 100 grams of water, the absolute humidity of the air is 100 grams per cubic meter.

**absolute instability (meteorology).** The state of a layer of air within the atmosphere in which the vertical distribution of temperature is such that a parcel of air, if given an upward or downward push, will move away from its initial level without further outside force being applied.

**absolute pressure.** Pressure measured relative to zero pressure, or a vacuum. Absolute pressure is measured with a barometer, and in aviation usage is often expressed in inches of mercury. Manifold pressure in a reciprocating engine is an example of an absolute pressure.

**absolute pressure controller (reciprocating engine control).** A type of turbocharger controller which limits the maximum discharge pressure the turbocharger compressor can produce while the aircraft is flying below its critical altitude.

**absolute pressure gage.** A pressure measuring instrument that measures pressure referenced from a vacuum. An aneroid barometer is one of the more accurate types of absolute pressure gages. It measures the changes in the dimensions of an evacuated bellows as it is affected by the pressure of the ambient air.

**absolute pressure regulator (pneumatic system component).** A regulator valve at the compressor inlet in an aircraft high-pressure pneumatic system. Regulating the inlet air pressure prevents excessive speed variation and/or compressor overspeeding.

**absolute temperature.** Temperature referenced from absolute zero, the temperature at which all molecular movement has ceased.

There are two absolute temperature scales, Kelvin and Rankine. The Kelvin scale uses the same size increments as the Celsius scale, and the Rankine scale uses the same size increments as the Fahrenheit scale. *See* temperature.

**absolute value.** The numerical value of a number without considering whether its sign is plus or minus. For example, positive eight (+8) has the same absolute value as negative eight (−8).

**absolute vorticity (meteorology).** The swirling motion, or vorticity, imparted to the atmosphere by the combination of the rotation of the earth and the circulation of the air relative to the earth.

**absolute zero.** The temperature at which all molecular movement inside a material stops. Absolute zero is 0° Kelvin, 0° Rankine, -273° Celsius, and -460° Fahrenheit.

**absorptance (electromagnetic radiation).** The ratio of the total unabsorbed radiation to the total amount of radiation falling on the object whose absorptance is being measured.

**abstractions.** Words that are general rather than specific. Aircraft is an abstraction; airplane is less abstract; jet is more specific; and jet airliner is still more specific.

**abvolt.** A basic unit of electromotive force in the electromagnetic-centimeter-gram-second system. One abvolt is equal to  $10^{-8}$  volts in the absolute meter-kilogram-second-ampere system. The abbreviation for abvolt is aV.

**AC (Advisory Circular).** Information published by the FAA explaining the Federal Aviation Regulations and describing methods of performing certain maintenance and inspection procedures. Compliance with ACs is not mandatory, and the information in the ACs is not necessarily approved data.

**AC (alternating current).** Electrical current in which the electrons continually change their rate of flow and periodically reverse their direction.

**ACARS (aircraft communication addressing and reporting system).** A two-way communication link between an airliner in flight and the airline's main ground facilities.

Data is collected in the aircraft by digital sensors and transmitted to the ground facilities. Replies from the ground may be printed out so the appropriate flight crew-member can have a hard copy of the response.

**ACC (active clearance control).** A system for controlling the clearance between tips of the compressor or turbine blades and the case of high-performance turbofan engines.

When the engine is operating at maximum power, the blade tip clearance should be minimum, and the ACC system sprays cool fan-discharge air over the outside of the engine case. This cool air causes the case to shrink enough to decrease the tip clearance. For flight conditions not requiring such close clearance, the cooling air is turned off, and the case expands to its normal dimensions. Control of the ACC system is done by the FADEC, or Full-Authority Digital Electronic Control.

**accelerate.** To increase the speed of an object, or make it move faster.

**accelerated flight.** A condition in which the forces acting on an aircraft are not balanced and a net acceleration exists.

**accelerated-life test.** A form of operational test of a system or component in which unusual conditions are used to cause a premature failure. An accelerated-life test is used to locate weak points and predict the service life the system or component will likely have under normal operating conditions. The test conditions used in an accelerated-life test are much more severe than will ever be encountered in normal operation.

**accelerate-go distance.** For multi-engine flying, the distance required to accelerate to  $V_1$  with all engines at takeoff power, experience an engine failure at  $V_1$ , and continue the takeoff on the remaining engine(s). The required runway length includes the distance required to climb to 35 feet by which time  $V_2$  speed must be attained.

**accelerate-stop distance (aircraft performance).** The length of runway needed for an aircraft to accelerate to a specified speed, and then, in case of engine failure, be able to stop on the runway.

**accelerating agent.** A component or substance used to hasten a chemical action or change.

**accelerating pump (carburetor component).** A small pump in a carburetor used to produce a momentarily rich fuel-air mixture to the engine when the throttle is suddenly opened.

The fuel supplied by the accelerating pump prevents the hesitation that would otherwise occur between the time the engine stops operating on the idle metering system and the time there is enough air flowing through the carburetor for it to supply fuel through the main metering system.

**acceleration.** The amount the velocity of an object, measured in feet per second, is increased by a force during each second it is acted upon by that force. Acceleration is normally expressed in terms of feet per second, per second (fps<sup>2</sup>).

**acceleration caused by gravity.** The acceleration of a freely falling body caused by the pull of gravity. Acceleration caused by gravity is expressed as the rate of increase of velocity over a given unit of time. This rate, in a vacuum, near sea level at a location of 40° north latitude is 32.2 feet, or 9.8 meters, per second, per second. This acceleration decreases with an increase in altitude until it becomes zero outside of the earth's gravitational field.

**acceleration check (gas turbine engine maintenance check).** A maintenance check of a gas turbine engine in which the time required for the engine to accelerate from idle RPM to its rated-power RPM is compared with the time specified for this acceleration by the engine manufacturer.

**acceleration control unit.** *See* ACU.

**acceleration error (magnetic compass error).** An error in the indication of a magnetic compass that shows up when the aircraft accelerates or decelerates while flying on an easterly or westerly heading.

The float in an aircraft magnetic compass is unbalanced to compensate for the downward pull of the vertical component of the earth's magnetic field (dip error), and the inertia caused by a change in speed acts on this unbalanced condition.

When the aircraft accelerates on an easterly or westerly heading, the compass indicates that the aircraft is turning to the north, and when it decelerates on either of these headings, the compass indicates that the aircraft is turning to the south.

**acceleration switch.** A switch in a piece of airborne electronic equipment actuated by an abnormal acceleration. Emergency Locator Transmitters (ELTs) have an acceleration switch that causes them to begin transmitting if the aircraft crashes and subjects the ELT to an abnormally high longitudinal acceleration. Acceleration switches are also called inertia switches.

**acceleration well (carburetor component).** An enlarged annulus around the discharge nozzle of some float-type carburetors. The acceleration well fills with fuel when the engine is idling, and when the throttle is suddenly opened, this additional fuel discharges into the engine through the main discharge nozzle.

**accelerator (plastic resin component).** A substance added to a catalyzed resin to shorten the time needed for the resin to cure.

**accelerator system (carburetor system).** A system in an aircraft carburetor used to supply additional fuel to the engine when the throttle is suddenly opened. If an acceleration system were not used, the engine would get a momentarily lean mixture until enough air is pulled through the carburetor to meter the correct amount of fuel into the cylinders.

**accelerator winding (voltage regulator component).** A series winding on the voltage regulator coil in a vibrator-type generator control unit.

Current flowing through the accelerator winding produces a magnetic field which helps hold the points tightly closed against the force of a spring. As soon as the points begin to open, this field collapses, and the spring snaps the points open quickly.

**accelerometer.** A sensitive instrument that measures the amount of force exerted on an object because of its acceleration. Accelerometers are calibrated in G-units (Gravity units). One G-unit is a force equal to the weight of the object.

**acceptable data.** Data found in such aviation maintenance documents as manufacturer's maintenance manuals, service bulletins and letters, and AC 43.13-1 and 43.13-2. Acceptable data may be submitted to the FAA for a particular repair or alteration, and it may or may not be approved, depending upon its applicability to the specific job.

**acceptable risk (risk assessment, aeronautical decision making).** A result of risk assessment, when a pilot determines that a certain level of risk or hazard is manageable and acceptable for a certain flight. As the first task of system safety, all possible hazards or risks are identified within practical limitations; then those risks are assessed as to their manageability in flight, or whether they can be reduced through some other prior action. The resultant level of risk is then subject to a decision as to whether or not to expose oneself to that level of risk; this decision is the pilot's responsibility and affects the "go or no-go" of each flight. *See* unacceptable risk and residual risk.

**acceptance test.** A test made by a person who buys equipment to be sure the equipment is exactly as specified in the purchase contract. All large and expensive aircraft are given extensive acceptance tests before the customer accepts them.

**acceptor atom (solid state electronics).** An atom of a chemical element alloyed with silicon or germanium to give the material a deficiency of electrons, making the material into a P-type material. *See* acceptor impurity.

**acceptor impurity (solid state electronics).** A trivalent chemical element alloyed with a semiconductor material to produce atoms that accept free electrons to complete their covalent bond.

Boron, aluminum, gallium, and indium are elements commonly used as acceptor impurities.

**access door.** A door which provides access to the inside of an aircraft structure.

**accessories (engine components).** Devices used with an aircraft engine that are not parts of the engine itself. Magnetos, carburetors, generators, and fuel pumps are commonly installed engine accessories.

**accessory drive gearbox.** A portion of an aircraft engine containing the drive gears to operate such accessories as fuel pumps, air pumps, and generators. These accessories mount on pads on the accessory-drive gearbox.

**accessory drive shaft.** A shaft used in some gas turbine engines to drive the accessory gearbox. The accessory drive shaft is driven by bevel gears from the compressor shaft.

**accessory end.** The end of a reciprocating engine away from the propeller on which many of the accessories are mounted. The accessory end is also called the antipropeller end.

**accessory gear train.** A group of gears that drive an accessory from the crankshaft of a reciprocating engine or from the compressor drive shaft of a gas turbine engine.

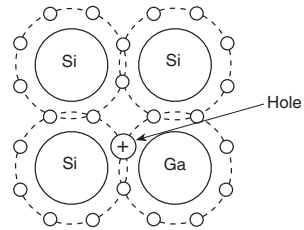
**accessory section (reciprocating engine).** The portion of an aircraft engine crankcase on which such accessories as magnetos, carburetors, generators, fuel pumps, and hydraulic pumps are mounted.

**access panel.** An easily removable panel that allows access to some portion of an aircraft structure for inspection and maintenance.

**accident.** An event that happens by chance or from some unknown cause. An accident is usually thought to be an unfortunate situation or event.

**accommodation.** The process of the eyes' focusing. It is also a binocular cue to depth perception.

**accountable organization.** In a safety management system (SMS), the accountable organization is responsible for accurately reporting the condition considered to be a hazard or potential hazard to flight operations. Reporting the condition must be accomplished by ensuring that procedures are developed to establish NOTAM origination and coordination responsibilities.



**acceptor atom**

# DICTIONARY OF AERONAUTICAL TERMS

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Dale Crane's ultimate reference book contains more than 12,000 accurate, aviation-specific definitions and acronyms. This edition collects all of the terms in Title 14 of the Code of Federal Regulations, glossaries from FAA handbooks, advisory circulars, the Aeronautical Information Manual (AIM) and Pilot/Controller Glossary, as well as definitions not found in government publications. Nearly 500 illustrations further define and aid visual recognition of the terms, and useful tables and lists are included in appendices.

In an industry of acronyms and technical language, this comprehensive dictionary is an essential reference book for anyone involved with aviation and space organizations—administrators, pilots, maintenance technicians, drone operators, colleges and universities, air traffic controllers, manufacturers, engineers, government agencies, airlines, and corporate flight departments—as well as newcomers to the industry, and those who speak English as a second language.

The *ASA Dictionary of Aeronautical Terms*, now in its seventh edition, is a vital reference tool that belongs on every aviation bookshelf.



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