

Federal Aviation Regulations and the Aeronautical Information Manual (FARs and AIM)

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All pilots must know and be able to apply Federal Aviation Regulations and know the authoritative information found in the Aeronautical Information Manual (AIM) published by the Federal Aviation Administration (FAA). The regulations and the AIM are frequently updated and you must access the FAA website faa.gov. Although it is possible that the website address for the FAA could change, it is unlikely to change because it is the main portal to authoritative information from the FAA. The Aeronautical Information Manual (AIM) and many other publications can be found and downloaded from this online portal to the FAA.

The system of aviation regulations is part of the Code of Federal Regulations (CFR), not state regulations like for automobiles. As a pilot or anyone working in aviation you will frequently use the Electronic Code of Federal Regulations or “e-CFR.” This online electronic database of federal regulations, including aviation regulations, is updated every day for changes. Therefore, the latest current regulations can be found using e-CFR. The aviation regulations that we use as pilots are almost entirely found under Title 14 Aeronautics and Space. There are a few regulations that affect pilots listed under a different part that will be pointed out later. Most regulations do not change very often but you do not want to take a chance that a regulation has changed and end up with an unsafe flight or a violation on your record. Get familiar with the e-Data search engine to find the most current changes to the regulations that affect your flying. The FAA has established a process for changing the regulations that includes getting input from pilots and concerned citizens about the impact of a proposed change in a regulation. The FAA must publish a Notice of Proposed Rule Making (NPRM) for each proposed rule and review comments before the rule can be adopted except when a rule change is needed immediately because of safety concerns.

Title 14 is subdivided into parts, and the first one to become familiar with is Part 1 Definitions and Abbreviations. You will discover as you study regulations that the definition of key terms is very important to be able to properly interpret and apply a particular regulation correctly. Also, this first part contains the meaning of many aviation contractions. There are many definitions, terms and abbreviations that you will need to look up to understand other regulations. In this lecture let me cover some of the definitions and abbreviations you will need to be able to understand regulations covering private pilot operations. Nighttime is an important definition because the pilot requirements change at night from what they are during the day. Nighttime is defined in FAR Part 1 Section 1 (1.1) as the time between the end of evening civil twilight and the beginning of morning civil twilight. Night has to be totally dark. Technically, you are not flying at night one minute before the official published end of civil twilight if you have just a few photons of light striking your face. As we get into some of the other regulations you will see how important this exact definition is. Another important definition that illustrates the need for you to constantly check the definitions part when studying regulations is the meaning of preventive maintenance. *Preventive maintenance* means simple or minor preservation operations and the replacement of small standard parts not involving complex assembly operations according to FAR 1.1. Private pilots can do preventive maintenance on the aircraft they fly according to

another regulation, but does replenishing hydraulic fluid in the hydraulic reservoir on your airplane fit the definition of preventive maintenance? The answer to this question is not found in FAR 1.1 alone. You have to go to FAR 43, Appendix A and find a detailed list of items and conditions that most accurately defines preventive maintenance. Looking in FAR 43 Appendix A – Paragraph (c)(8) you will find that replenishing fluid in a hydraulic reservoir is considered to be preventive maintenance if no complex disassembly is needed to get to the reservoir. Even FAR 43 Appendix A may not provide the complete answer to similar questions about what is considered preventive maintenance. In some cases you may have to consult your Aircraft Manufacturer's Pilot Operation Manual for your aircraft or contact a mechanic, a flight instructor, or even a Principle Operations Inspector (POI) of the FAA to find the correct interpretation of a particular regulation and how it might apply.

So far we have seen just two examples of why it is important to use Part 1 and other parts of the regulations to get accurate definitions. As stated before, you will need to look up definitions as you delve into more regulations. The meanings of contractions or abbreviations are also important. You will pick up some contractions, such as VFR or IFR, in conversations with other pilots or your flight instructor. Special abbreviations for airspeeds that are used in flying aircraft legally and safely are called V-Speeds. To fly any airplane you must know the V-Speeds for your aircraft to use in different situations. There are many V-Speed definitions, but I will cover some of the more important definitions that you will need to understand regulations and procedures as a private pilot. The "V" stands for velocity and the speed that is used expressed in units of nautical miles per hour or simply knots. VSO is the stalling speed or minimum steady flight speed in a landing configuration. Landing configuration is with the gear extended and the flaps fully extended. VFE represents the maximum flap operating speed. Therefore, the flap operating range is from VSO at 60 knots to the VFE at 100 knots as shown by a white arc on an airspeed indicator. VS1 is the stalling speed or minimum steady flight speed in the specified configuration of gear and flaps retracted. The range of speed for Normal Operations in cruise configuration is from VS1 up to and including VNO, the maximum speed for Normal Operations also known as Maximum Structural Cruise Speed. This range is colored green for normal cruise flying. Note that normal operations include flying in and up to moderate air turbulence. The VNE speed shown by a single red radial line is the Never Exceed speed above which you become a test pilot. The Caution Range is the yellow arc and technically it has no beginning and ending V-speed designation. The Caution Range is simply above Maximum Structural Cruising speed and below the Never Exceed speed. You can only operate in the Caution Range if you have smooth air. VA is maneuvering speed where you can use full abrupt travel on the controls without overstressing the airplane; however, the speed varies with gross weight and is therefore not depicted on an airspeed indicator. VA has to be somewhere above VFE and at or below VNO.

Part 61 of the FARs covers the certification of pilots, flight instructors, and ground instructors. In this course we will look at the certification of private pilots; however, many of the regulations apply to all pilots at multiple levels. While operating an aircraft as pilot in command, you must have both your medical certificate and your pilot certificate in your personal possession or readily accessible in the aircraft per FAR 61.3. When acting as a required crewmember, such as being a safety pilot while another pilot is flying under the hood on instruments, also requires that you carry your pilot certificate and medical certificate. Pilot and medical certificates originally started out in paper form and when national

security became an issue pilots were also required to carry a photo ID driver's license. Check current regulations and the FAA website for the most current requirements for pilot ID which is expected to change as technology changes. The same officer who may ask to see your driver's license could ask to see your pilot certificate at the airport.

How big of an airplane can a private pilot fly with a private pilot certificate having only the authorization of airplane single or multi-engine land class rating? The answer is that the airplane must have a gross weight of 12,500 pounds or less. Flying aircraft weighing over 12,500 pounds requires the pilot to hold a type rating which is a separate certification for a specific make and model of large aircraft. Also, turbojet powered aircraft require a type rating. A Private Pilot does have some limitations, however, that must be noted. A private pilot may share the pro rata share of the operating expenses of the flight with a passenger. The regulations do permit a private pilot to act as pilot-in-command of an aircraft used in a passenger-carrying airlift sponsored by a charitable organization, and for which the passengers make a donation to the organization. No additional pilot certificate rating is required for high performance single and multi-engine airplanes if the pilot holds the appropriate category and class rating and the aircraft is 12,500 pounds or less and other than a turbojet powered airplane. For example, no additional rating is required for a private pilot with Airplane Single-Engine Land Category and Class rating to be able to transition from a Cessna 172 four-place single with a 150 horsepower engine to a Cessna 210 six-place with a 285 horsepower engine. However, a pilot needs training and a one-time endorsement in their logbook to fly an airplane that has at least one engine with a sea level rated horsepower rating of greater than 200. The Piper Seneca I on the left has two engines each rated at 200 HP for a total of 400 HP. The Cherokee Six on the right has one engine rated at 265 HP. Only the Cherokee Six is considered a high performance aircraft. Airplane #1, the 265 HP Cherokee Six, is high performance but not considered complex even though it has a controllable propeller and flaps, because it has a fixed landing gear. Airplane #2, a Piper Arrow has retractable landing gear, flaps, and a controllable propeller and is complex but not high performance because the powerplant is only 200 horsepower. Airplane #3, a later model Piper Arrow, has a 201 horsepower powerplant making it also high performance. Airplane #4 is complex only because each engine is rated at only 200 HP. The high performance definition is not based on how much power is produced total for the airplane but whether or not it has an engine that requires special care to operate because it is over 200 horsepower.

The private pilot certificate does not expire; however the pilot must complete a flight review every 24 calendar months to be able to exercise the privileges of the private pilot certificate. If a pilot has not received a flight review within the preceding 24 calendar months, they must go up with a flight instructor to receive dual instruction and a logbook endorsement before they do any flying as pilot-in-command. Calendar month means you have to the end of the month to complete the requirement. For example, if you completed your last flight review or you earned your initial private pilot certificate on January 15th of this year; you have until midnight January 31st two years later to complete the review to avoid being grounded. The flight review requirement can be met with several different activities. If you earn a new additional rating completing a practical test in an aircraft you have met the flight review requirements and start over on counting the months towards 24. Dual instruction with a certified flight instructor authorized to give instruction in an airplane used to complete the flight review is the second

type of activity that can be used to meet the flight review requirement. The flight instructor determines what maneuvers and procedures to cover in the dual instruction. The regulations require that the instructor provide a minimum of one hour of ground instruction and one hour of flight instruction. The instructor must be satisfied that you can still safely fly the airplane before signing off your logbook showing completion of a flight review. An interesting point about the flight review dual instruction is that the pilot can use any airplane they are rated in to complete the requirement. A pilot who normally flies a high performance twin could complete the flight review in two-seat single engine training airplane. Another activity that can be used to meet the flight review requirement is to complete some type of approved pilot proficiency training program. Like other activities, the successful completion of the proficiency program must be documented with an instructor endorsement in the logbook that includes the completion date to establish the next 24 month period. All pilots, even commercial and airline transport pilots must meet the flight review requirements. Pilots involved in commercial operations can use the required proficiency flight checks in their company to count as a flight review. An example would be a private pilot holding a current medical certificate and a private pilot certificate but has not flown for a year. If the last flight review or flight test was completed within the preceding 24 calendar months the pilot can fly solo but is not permitted to carry passengers because the regulations require a pilot to have made three takeoff and landings within the preceding 90 days in the same category and class of the airplane being flown to be able to carry passengers. For tri-cycle gear airplanes, the takeoff and landings can be touch and goes but conventional or tail wheel airplanes require that the three takeoff and landings be to a full stop. For example, a pilot has completed three full stop takeoff and landings and two touch and goes in the twin-engine Seneca I but has only completed two full stop takeoff and landings in the conventional gear Stinson tail wheel airplane within the preceding month. The pilot would have to complete at least one full stop landing solo before taking up passengers in the Stinson but would already be legal to take passengers in the twin. The twin Seneca I is a multi-engine land class airplane while the Stinson is a single-engine land class airplane.

When you move and change your permanent mailing address, you must notify the FAA Airmen Certification Branch of the change within 30 days or you cannot exercise the privileges of the pilot certificate. The FAA must know an address where they can send you critically important information that might affect safety and legality of flight. In order for a certificated pilot to tow gliders, the pilot must have logged at least 100 hours as pilot-in-command pilot flight time in powered aircraft. To act as pilot-in-command of an aircraft towing a glider, a person is required to have made within the preceding 12 months at least three actual or simulated glider tows while accompanied by a qualified pilot.

FAR Part 43 is the set of regulations governing aircraft maintenance. Certificated mechanics and pilots may perform certain types of preventive maintenance if the work does not require complex disassembly and is defined in Part 43 as preventive maintenance and permitted by the aircraft manufacturer's flight manual. Of course, all persons working on an aircraft must have the required skills and facilities and equipment to do the work correctly. When preventive maintenance is done on an aircraft, the signature, certificate number, and kind of certificate held by the person approving the work must be entered in the aircraft maintenance records. Always consult current regulations and all authoritative information about maintenance before attempting to complete preventive maintenance.

One very important regulation in FAR Part 91 establishes who has the final authority in flying an aircraft. The pilot-in-command is the final authority as to the operation of an aircraft. The pilot-in-command decides what runway to use at a busy airport, not ATC. If the pilot cannot accept the ATC instructions the pilot-in-command must request an alternate clearance or instructions right away. The pilot-in-command is directly responsible for the pre-launch briefing of the passengers for the flight. In an emergency the pilot-in-command even has authority to deviate from the FARs to the extent required to handle the emergency. A written report is not required after such a deviation unless specifically requested by the FAA. You may find it hard to believe, but a pilot can drop an object as long as precautions are taken to avoid injury or damage to persons or property on the surface. One piece of advice is to drop light, low density objects such as a piece of balsa wood with a streamer.

There is zero tolerance for pilots using any substance including prescriptions, illegal drugs, alcohol, and even smoking that adversely affects safe flight. Any pilot cannot fly if they are under the influence of any substance including alcohol and in addition, the regulations specify that no person may serve as a crewmember within eight hours of the consumption of an alcoholic beverage and with .04 percent by weight or more alcohol in the blood. Regulations also prohibit the carriage of a passenger who is obviously under the influence of drugs, including alcohol, except for an emergency, or if the person is a medical patient under proper care. Like in autos, occupants in aircraft are required to use safety belts and shoulder harnesses. Specifically, flight crewmembers are required to keep their seat belts and shoulder harnesses (if installed) fastened during takeoff and landings. Safety belts must stay fastened while enroute. In addition the pilot-in-command must brief passengers on the use of safety belts and notify them to fasten their safety belts during taxi, takeoff, and landing. Passengers must have their safety belts fastened during taxi, takeoffs, and landings. In addition to being able to drop objects if it can be done safely, a person may operate an aircraft in formation flight if the pilot-in-command of each aircraft has made arrangements before the flight. Seaplanes represent two of the four sub-classes under the category of airplane on pilot certificates. For those who add the seaplane rating to their private pilot or higher grade pilot certificate, need to know that while on the body of water an aircraft or vessel must yield right-of-way to the aircraft or vessel approaching from their right.

Above 10,000' MSL there is no airspeed limit except that aircraft cannot break the speed of sound without special authorization. However, below 10,000' MSL, where there could be a mix of small General Aviation traffic as well as large aircraft, there is a speed limit of 250 knots indicated airspeed. Aircraft operating within Class B airspace have the same speed limit of 250 knots and have those limits regardless of altitude. However, the speed limit under the ledge of Class B airspace and not in the defined limits of the Class B airspace, the speed limit is 200 knots. Any VFR corridor going through Class B airspace also has the 200 knot speed limit. In Class C airspace there is the 200 knot indicated airspeed limit from the surface to 2,500' above ground level within 4 nautical miles of the center of the airport. Notice that the speed limit area does not fill all of the Class C airspace. In Class D airspace there is the 200 knot indicated airspeed limit from the surface to 2,500' above ground level within four nautical miles of the center of the airport. Notice that the speed limit area, like in Class C airspace does not fill all of the Class D airspace, but nearly so. When a pilot receives an ATC clearance the pilot cannot deviate from that clearance unless the pilot requests and obtains an amended clearance. The only exception to

this rule is when the pilot has an emergency and deviation is necessary to handle the emergency. A pilot who deviates from a clearance, and is given priority by ATC because of the emergency must submit a report of that emergency within 48 hours to the manager of the facility, but only if requested by ATC. The normal traffic pattern at non-towered airports is a rectangular pattern with all left turns. The FAA establishes the correct traffic pattern procedure at some non-controlled airports that all pilots are expected to use. The Airport and Facility Directory (AFD) contains information on FAA established traffic patterns. For day VFR flight in an airplane, there must be enough fuel (estimating the wind and forecast weather conditions) to fly to the first point of intended landing and fly thereafter for 30 minutes at normal cruising speed. Flying VFR at night is the same but the reserve increases to 45 minutes. IFR flying requires a 45 minute reserve whether day or night and if an alternate is required, enough fuel to fly from the planned first landing point to the alternate in addition to the 45 minute reserve.

The classic method to remember the aircraft documents that must be carried on an aircraft is using the word "ARROW." "A" is for the Airworthiness Certificate that must be displayed for passengers to see as they enter the cabin for seating. The first "R" is the national aircraft Registration Certificate and the second "R" is for a Radio Station License that may be required by the Federal Communications Commission for some types of operations, usually involving flight outside the United States. Note that the FCC license is an FCC requirement in some cases but not an FAA requirement and may not be referenced in the FAA Private Pilot Knowledge Test. "O," the Operating Limitations are usually contained in the Pilot Operating Handbook or Approved Flight Manual for the aircraft. Weight and Balance data "W" is often incorporated with some flight manuals; the data must be available in some form so that the pilot can figure weight and balance for safe flight.

An Emergency Locator Transmitter (ELT) is required in aircraft, with certain exceptions, to help find aircraft that have gone down. The regulations require that when the ELT has been in use for more than one cumulative hour or 50 percent of the useful battery life expires, the batteries must be replaced or recharged. Inspection of the ELT unit in the aircraft must be completed every 12 calendar months in addition to or part of the annual inspection. Position lights, sometimes called navigation lights, are required on aircraft and consist of steady green, red, and white lights. The green light is placed on the right side of the aircraft or the right wing tip of an airplane, the red light is on the left side or left wing tip, and the white light projects rearward from the tail. At night the color locations indicate what direction an aircraft is traveling in respect to your flight. For example, you see a red light on the left and a white light on the right out your front windshield you know that the aircraft is moving away from you and from right to left crossing your current flight path. If you see a green light on the left and a red light on the right out your front windshield, the aircraft is on a collision course with your aircraft and you should take evasive action. Regulations require that you operate position lights from sunset to sunrise rather than officially night so that you can see other aircraft and be seen by other aircraft during the twilight transition to day or night. In Alaska, the use of position lights is dependent on the position of the sun on the horizon rather than the sunset or sunrise. Do not confuse the position light requirement with pilot night qualification. The pilot must qualify for night flying to carry passengers by completing three takeoff and landings to a complete stop in total darkness at least one hour after sunset to one hour before sunrise and you would want position lights on long before total darkness.

The regulations require that pilot and other required crewmembers use supplemental oxygen if the air pressure in the cabin gets too low. Crewmembers should use supplemental oxygen long before reaching such a high altitude that the FARs take effect. The cabin pressure altitude relates to the air pressure in the cabin in terms of the standard atmospheric table or the International Standards Atmospheric (ISA) table. Even pressurized aircraft could possibly reach a high enough flight level that the cabin altitude exceeds the values requiring supplemental oxygen. In an unpressurized airplane your cabin pressure altitude is basically the same as the altitude you are flying at. The regulation requiring supplemental oxygen requires the crew to use supplemental oxygen when the flight is ABOVE a cabin pressure altitude of 12,500' MSL up to and including 14,000' MSL after flying a cumulative 30 minutes above 12,500' MSL up to and including 14,000' MSL. A crewmember could fly in an aircraft 15 minutes at 12,500'; 15 minutes at 13,500'; 15 minutes at 10,500', and then fly another 15 minutes at 13,500 before having to use supplemental oxygen. The time at 12,500' does not count because the aircraft is not above 12,500'. Once the aircraft is flown above 14,000' MSL the crew must use supplemental oxygen continuously. Above 15,000' MSL all occupants must be provided with supplemental oxygen.

Acrobatic flight is any kind of maneuvering not required for normal flying and includes stalls and spins and steep banked turns. When in acrobatic flight you must not be over any congested area of a city, town or settlement. Acrobatic flight is also prohibited in Class D and Class E designated for Federal Airways. Acrobatic flight must be done above 1,500 feet above the ground and the flight visibility must be 3 statute miles. The parachute regulation is a requirement for occupants to wear parachutes when intentionally exceeding 30 degrees pitch up or down; however, flight training maneuvers required for pilot certification are exempted. A parachute with natural canopy, shroud, and harness components must have been packed by a certificated and appropriately-rated parachute rigger within the preceding 60 days. A parachute with synthetic canopy, shroud, and harness components must have been packed by a certificated and appropriately-rated parachute rigger within the preceding 180 days. Flight over densely populated areas in restricted category aircraft is prohibited. An aircraft that has an experimental certificate is also restricted from flying over densely populated areas or in a congested airway unless specific authorization has been obtained.

The owner/operator of an aircraft is responsible to maintain the aircraft in an airworthy condition. The owner/operator must also make sure that the maintenance personnel make the appropriate entries in the aircraft maintenance records, indicating the aircraft has been approved for return to service. The owner/operator must maintain aircraft maintenance records and transfer those records to the new owner if the aircraft is sold. In order to be allowed to operate an aircraft under Part 91 the aircraft must have had an annual inspection within the preceding 12 calendar months. To determine the date of the last annual inspection refer to the aircraft maintenance records. The maintenance record entry must indicate that the aircraft was returned to service. If an alteration or repair substantially affects an aircraft's operation in flight, that aircraft must be flown by an appropriately rated private pilot and approved for return to service before being operated with passengers aboard. The required inspections for rental aircraft that are used for flight instruction are the annual and 100-hour inspections. The regulations state that no person may operate an aircraft carrying any person for hire, or give flight instruction for hire in an aircraft, which that person provides, unless within the preceding 100 hours of

time in service, the aircraft has received an annual or 100 hour inspection. The aircraft may be flown beyond the 100 hours if it is being transported to a place where the service will be finished. The time flown over in this unique situation is counted in the next 100 hour cycle so that the inspection is within 100 hours of the original expiration time. An Airworthiness Directive is like a factory recall to fix your car. The FAA issues an Airworthiness Directive when there is a problem with any aircraft or anything that affects the airworthiness of an aircraft. All ADs that have been issued for your aircraft must be complied with and documented in the aircraft maintenance records. The owner/operator of an aircraft must also keep a record of the current status of any applicable airworthiness directives in the aircraft maintenance records. Pilots must be able to determine if an airworthiness directive has been complied with. Some ADs are a onetime fix while others reoccur as inspections or further actions at regular time intervals in the future until a permanent fix is found. ATC transponders are required above 10,000' MSL and in and above Class C airspace. An ATC transponder is required within 30 nautical miles of the primary airport of Class B airspace up to 10,000' MSL. The transponder must have 4096 codes Mode A and automatic altitude reporting referred to as Mode C encoding. The regulations require that an ATC transponder be inspected, tested, and found to comply with standards every 24 calendar months.

The National Transportation Safety Board is an independent federal agency charged with the investigation of transportation accidents involving aircraft to determine probable cause. Immediate notification is required to the nearest NTSB field office in these situations: An accident has occurred resulting in substantial damage to the aircraft; a flight control system malfunction or failure incident has occurred; a flight fire incident has occurred; an aircraft is overdue and is believed to be involved in an accident. The owner of an aircraft that has been involved in an accident is required to file an accident report within 10 days. The operator of an aircraft that has been involved in an incident is required to submit a report to the nearest NTSB field office when requested. Aircraft wreckage may be moved prior to the time the NTSB takes custody, but only to protect the wreckage from further damage.

The Aeronautical Information Manual (AIM) is not regulatory but provides a wealth of information to help pilots and other aviation personnel to conduct safe operations. Regulations and the contents of the AIM are constantly being changed and pilots are responsible to check the faa.gov website to find and become knowledgeable of the changes affecting flight. The Explanation of Changes page is the starting point in using the AIM. The AIM is divided into chapters and each chapter is subdivided into sections. The page numbering system uses chapter, section, and page to help the user to zero in on the topic they are looking for. For example, Chapter 1. Air Navigation contains "Section 1. Navigation Aids." Within "Section 1" there are specific page references for the various navigation aids. To find information about the VOR Receiver Check you go to page 1-1-4 which is Chapter 1, Section 1, and page 4. The entire AIM can be downloaded in the form of PDF files from the faa.gov website which gives you the advantage of knowing that you have the latest accurate publication. A subscription of a paperback AIM may still be available from the Superintendent of Documents. Check the current AIM for subscription information. The more knowledge you have about current regulations and specific technical and operational information in the AIM the safer you can be in your flying.