HANDY INFORMATION FOR GENERAL AVIATION PILOTS

10/10/2025

This document is a compilation of inputs from many CFIs over several years. To the user of this document – this is a reference compilation of nice to know information. Nothing in this document supersedes Federal documents, aircraft or supplemental documents for aircraft systems.

-Remember the golden rule: physically flying the aircraft / actively monitoring the autopilot has priority over *every other* task you must do as a pilot

"If in doubt, fly it out"

You, as pilot in command, are the **final authority** for the operation of the aircraft. In any in-flight emergency requiring immediate action the PIC may deviate from any rule **to the extent** required to meet that emergency

If you make an **off-airport landing**, HOW you land can be more important than WHERE you land. Do NOT sacrifice control of the aircraft trying to reach a runway OR to fix a problem when at low altitude. FOCUS on the landing to a complete stop, wherever that might be…

Don't arrive at your destination in your mind's eye before engine start at the departure point. **"Get-there-itis"** can be fatal. Enroute, concentrate on the task at hand, to include diverting or landing short of final destination if necessary

Learn about **all of the systems** in the aircraft you fly. You do not need to be "mechanically minded" however in any emergency understanding the basics of these systems can be a matter of survival

-Before you fly remember **"I-M-SAFE"**

Illness?	**M**edication?	**S**tress?
Alcohol?	**F**atigue?	**E**ating?

Check yourself before each flight

-**DECIDE**

Detect the need for a decision
Evaluate your decision options
Choose the option that best meets your goals
Implement that decision
Detect the change(s) as a result of your decision
Evaluate the results and your need to make further decisions

For inspections and currencies – remember the mnemonic "one who **EATS ARROWS**, **P**lease, **P**lease **B**e **C**are **F**u**L"**

-required inspections - **"EATS"**
ELT inspection - required every 12 months, requires an entry in the airframe logbook or other retained record for the aircraft. FAR 91.207
Annual inspection - required every 12 months. Experimental category aircraft get on-condition inspections. **100-hour inspections** are required if carrying persons for hire. Flight instruction in an aircraft owned by the student or rental of an aircraft to a private pilot not carrying persons for hire does not require 100-hour inspections. Flight instruction in an aircraft provided by the instructor or the flight school does require 100-hour inspections FAR 91.409
Transponder inspection - required every 24 months; includes inspection of the altitude-encoding device (if installed) FAR 91.413. ADSB Out or IN systems do not require a specific ground inspection; every flight is monitored by ATC so the systems are continually checked
Static system and altimeter inspection - required every 24 months. Required to operate IFR not required for VFR flight FAR 91.411

-preflight the paperwork: **"ARROWS"**
Airworthiness certificate (FAA form 8100 series) - no expiration date. Must be in the aircraft and displayed near the entrance to the aircraft. FAR 91.203
Radio station license - not required for any aircraft operating within the United States
Registration certificate (FAA forms 8000 series)- changes with ownership. Must be in the aircraft. Must be renewed every seven years
Operating limitations – As required by FAR 21.5, this may be a Pilot's Operating Handbook (POH) for make and model of aircraft (aircraft built before 1976) or an Aircraft Flight Manual (AFM) which is airframe specific and will include any supplemental type certificate information or notes required to operate any additional equipment such as the autopilot. Some aircraft built before 03/01/1979 only require placards posted at specific points in the aircraft instead of an AFM or POH. Must be in the aircraft

Weight and balance - airframe specific and the most recent measured or calculated W&B. PIC must prove W&B was calculated for the flight. FAR 91.103
State registration (some states only)

- Requirement to act as PIC - "**Please, Please Be Careful (P-P-B-CFL)"**
Photo ID – carried when serving as a crew member or CFI - FAR 61.3a(2)
Physical - current & correct class, for the type of flying. FAR 61.23. Basic Med, glider, ultralight and light sport aircraft crewmembers are not required to hold medical certificates
Biennial flight review - completed within the last 24 months. FAR 61.56
Currency - 3 takeoffs & landings if carrying passengers or in a multi-crew aircraft. Instrument currency within the last 6 months to file and fly IFR. FAR 61.57
Flying endorsements – tailwheel / complex/ high performance / high altitude as required FAR 61.31
License - correct category, class, and type rating or type specific training for the aircraft to be flown FAR 61.31

-On the runway before takeoff - verify your heading indicator with the runway heading markings. Remember **lights-camera-action -** landing / recognition **lights** on for takeoff, **camera** – transponder / ADSB OUT on, **action** - mentally review departure instructions and abort procedures. Calculate an MSL altitude that will permit a safe return to the airport if the engine(s) falter or quit. Check engine performance via engine gauges early in the takeoff roll - do not analyze, abort for any abnormal indication

-Good landings are more than a smooth touchdown – you must manage height, speed, and alignment with **touchdown in the first third of the runway** when runway length is a limiting issue. Obstructed approach paths and gusty or crosswinds complicate. **If you are "behind the aircraft", too high or low, too fast or slow, or not aligned – be willing to execute a go-around and try again or use a different runway**

Smooth touchdowns are pleasant, however if the runway is wet, icy, or has gusty crosswinds, a firm touchdown is useful to assure wheel braking

-**50-50 rule** – use ½ of the takeoff or landing distance over a 50-foot obstacle and add this to the POH value for the takeoff or landing distance contemplated. Example: You anticipate an obstacle-free approach and landing on a short runway. The POH no obstacle landing distance is 1240 feet. The landing distance over a 50-foot obstacle is 1650 feet. Take ½ X 1650 = 825 feet + 1240 feet = 2065 feet. Consider this your minimum runway length – allows for unforeseen factors

-70-50 rule for short field takeoffs - you must attain 70% of your fly off speed by 50% of the runway length. If not, abort the takeoff

-Maintain **VOR reception** enroute. Your primary means of navigation may be GPS; however good airmanship includes using all navaids. GPS can, and does on occasion, “blink out”

-**Rule of 60** - 1 degree of arc equals 1NM at a distance of 60 NM

-**Reciprocal headings** - add 200, subtract 20 / subtract 20, add 200

-Know your **speed** in miles per minute:
60 KGS = 1 mile / minute 180 KGS = 3 miles / minute
120 KGS = 2 miles/minute 240 KGS = 4 miles / minute
you may interpolate between these values

-**Cross winds** - winds 10 degrees off runway heading – divide velocity by 5 for direct X/W velocity. Winds 20 degrees off runway heading – divide by 3. Winds 30 degrees off runway heading – divide by 2. A wind 45 degrees to the runway heading has a direct X/W velocity equal to ¾ of the total wind velocity. Wind gusts – you may practically use a value of ½ of the gust value to estimate wind velocity. Example – a wind of 15 knots gusting to 25 knots – this is 25-15 = 10 knots. ½ this value is 5 knots + 15 knots steady state wind = 20 knot wind

-An approximate conversion from **Celsius to Fahrenheit** - double the Celsius value and add 30. 15 Celsius equals 59 Fahrenheit: 15 Celsius X 2 = 30 + 30 equals 60 Fahrenheit. Note this is only an approximation. A more accurate method - double the Celsius value, subtract 10% of this and add 32. 15 Celsius X 2 = 30 - 10% = 30 - 3 = 27 + 32 = 59 Fahrenheit

-The difference between your **IAS and TAS** is approximately 2% of your IAS times your pressure altitude. 120 KIAS at 6,000 pressure altitude - 120 x 2% = 2.4 x 6 = 14.4 + 120 = 134.4 KTAS

-If the **wind aloft** is 10% of your TAS, you need a 4-degree drift correction angle for a wind 45 degrees to your nose or tail. You need a 6-degree drift correction angle for a wind 90 degrees to your nose or tail

-**Standard rate turn**: use a bank angle equal to 15 % of your TAS. 120 KTAS x .15 = 18 degrees of bank

-**Enroute descents**: for a 500 FPM descent, double your altitude and begin descent that many minutes from destination. Cruising at 6000 AGL, begin descending at 500 FPM when 12 minutes from destination (6 x 2 = 12)

-Descent rate for a **3-degree approach to a runway**: 5 times your groundspeed. Example – your GS on the approach is 90K. 5 X 90 = 450. Your stable descent rate is 450 feet / minute

-Pitch + power = performance determine and learn power settings and pitch angles for each phase of flight - climb / cruise / descent / maneuvering / landing

Fuel Tips

The rules (FAR 91.151) require you PLAN to land with a minimum of 45 minutes fuel remaining at night, 30 minutes fuel remaining day, 20 minutes fuel remaining for helicopters

-Fixed wing accident statistics show running out of fuel and fuel mismanagement (fuel onboard but not routed to the engine) are significant factors. Therefore, increased awareness planning may prevent unknown or unplanned circumstances causing a fuel emergency. Consider the following as a sample personal standard for fuel management:

- ✓ Plan to land with **1 ½ hour's fuel** on board for flights beyond the traffic pattern but when maximum range is not necessary (local area flights; short cross countries). Refuel as necessary to insure this reserve

- ✓ Plan to land with **1 hour's fuel** remaining for long cross-country flights

- ✓ Only plan to land with **45 minutes fuel** on daytime cross-country flights when the weather is well above VFR minimums and you have one or more alternate landing sites along your route of flight, you are experienced in the aircraft, and you know the accuracy of the fuel indicators in THAT aircraft

- ✓ Always on-load the maximum amount of fuel your aircraft can legally carry, considering weight and balance and performance needs. The price of fuel at any given location must not influence your decision to limit fuel

-Fuel usage: remember **time in your tanks** - when flight planning, the most significant element is the time aloft, *not* trip length. Regardless of the distance traveled, find a suitable airport when you have flown the time out

-**Fuel management:** feed the right fuel tank(s) when the minute hand of an analog clock is between 12 and 6. Feed the left fuel tank(s) when the minute hand is between 6 and 12.

-Fuel awareness: when topping the fuel tanks, estimate the number of gallons or pounds you will take on. If the actual fuel load varies by 10% or more than your estimate, investigate

-Visually **inspect the fuel** in the aircraft ***every*** **time** you fly. Look in the tanks, measure the quantity with a dip stick (available from pilot shops) or learn to accurately visually estimate the fuel in the tank. Check the condition of the fuel caps and seals. Drain as needed. If you get water or other contaminates, continue to drain until the fuel is pure. Check all drain valves are closed and not leaking

-The most reliable field method to check for jet fuel or other **contamination** in avgas is to take a piece of white bond paper, drizzle a few drops of fuel onto the paper, allow to air dry. ANY stain, ring, or discoloration indicates jet fuel or other contamination. Some auto fuel additives will cause a stain

-Engine oil quantity in air cooled engines– common practice shows that filling an engine with a wet sump (oil stored within the engine) to the maximum will usually burn or blow out 1 or 2 quarts of oil rapidly. This seems to stem from required performance standards. **FAR 33.39** states "*…The lubrication system of the engine must be designed and constructed so that it will function properly in all flight attitudes and atmospheric conditions in which the airplane is expected to operate. In wet sump engines, this requirement must be met when only one-half of the maximum lubricant supply is in the engine."* Most 4-cylinder air cooled engines require 4 quarts to meet 33.39. Twice 4 is 8 quarts marked on the dip stick. Engine designers know a full sump raises internal pressures and oil will blow out or burn. Thus, it is a typical practice to operate 1 to 2 quarts below maximum. 6-cylinder air cooled engines typically require 6 quarts to meet 33.39. **Do not operate with less than the minimum oil quantity (typically 4 or 6 quarts)**

-**100 Low Lead** avgas is blue. Avgas mixed with any other fuel, such as auto fuel, jet fuel, 94 octane, or alternate 100 octane aviation fuels will result in a color change

-**Fuel planning**: you may allow ½ gallon of consumption for each engine cylinder for start, taxi out, run up, and takeoff roll. For most 4-cylinder aircraft, typically allow 2 gallons, 3-gallons for 6 cylinder aircraft

-Fuel systems: Study the fuel system in your aircraft. Know the ***usable*** **fuel load**. Often you cannot use all the fuel in the tanks. Do not solely rely on the fuel gauges. General aviation aircraft fuel gauges are not required to read accurately until empty - many older gauges are very inaccurate between full and near

empty. If you have a fuel flow gauge, check THAT system's accuracy before you rely on it for fuel management

94 Octane no Lead Aviation Fuel – you may use and mix this fuel with 100LL fuel to any extent; the aircraft must be rated for 87 – 94 octane fuel

Pilot Training and TSA

If you are seeking your initial pilot rating, instrument rating, or multiengine rating you are required by federal law to show the flight school or independent flight instructor proof of your citizenship. Your current passport or birth certificate and a current government issued photo ID are required

If you are not a US citizen and seek the above initial ratings, then you must go through a clearance process with the Transportation Security Administration (TSA) before any training. See https://www.fts.tsa.gov/home Title 49, Code of Federal Regulations, Part 1552

The National Airspace System (NAS)

The NAS in the USA is the result of a series of adjustments that have taken place over many years. The airspace is a compromise to meet the needs of the user, the requirements of the air traffic control system, and the definitions of the International Civil Aviation Organization (ICAO). Very broadly, the US airspace system is divided into controlled and uncontrolled airspace. A "working definition" can be as follows:

Controlled airspace - airspace in which **ATC may *legally* provide** sequencing, separation, or other services to aircraft FAR 1.1. In Class E controlled airspace, a VFR flight in VMC weather need NOT necessarily communicate with nor receive services from ATC. ATC will provide flight following on request from the PIC and ATC workload permitting

Uncontrolled airspace - ATC may ***not* normally provide** services as above

In both of these cases, there are degrees of flexibility. Different ATC facilities around the USA provide different degrees of service particularly in respect to uncontrolled airspace. An example of one common scenario that may cause confusion is an IFR arrival at an airport in class G uncontrolled airspace. ATC will terminate radar /ADS-B tracking service as you leave controlled airspace. This IFR flight remains on a procedural IFR clearance until the flight plan is closed or cancelled

This concept is important because it is the main reason we have surface based controlled airspace (class B, C, D, E surface areas) the Continental Control Area (class E airspace above 14, 500 'MSL) transition zones (class E airspace starting at 700 'AGL) and keyway extensions to surface area airports with instrument approaches. A key point: aircraft carrying people for hire (such as FAR 135 / 121 operations) must remain in controlled airspace from takeoff to landing or hold a waiver from the FAA to this requirement. If you study the way the US airspace system is organized with the idea in mind that controlled airspace is mainly there to accommodate air carriers, the structure of controlled airspace makes more sense

If you call for ATC services while you are in uncontrolled airspace (class G), you will hear the following (example): ATC - *"Cessna 1234ME, climb to 4000, squawk 4546, enter controlled airspace heading 260."* This may at first appear that ATC is providing services while you are in class G airspace. In fact, ATC anticipates you to climb into controlled airspace (class B, C, D, or E) and then abide by any additional instructions given ("enter... heading 260"). ATC will not refuse to provide radar service; but will place you in controlled airspace so they may provide radar service

A comment about airspace altitudes:

Most (but not all) **FAR's regulating airspace** are **written reference to AGL**.

Altitudes displayed on **aviation charts are MSL** unless noted otherwise

The following can help learn the letter designations (US airspace)

Class A - **a**ll **a**bove (18,000' MSL to FL 600)

All aircraft must have an IFR clearance. Soaring aircraft and other special cases may open temporary VFR windows in class A airspace. Additionally some MOAs extend into class A airspace by letter of agreement between the military and ATC

Class B - **b**iggest and **b**usiest airports

An inverted "wedding cake" starting at the surface around the primary airport(s) and going to (typically) 10,000' AGL. All aircraft, IFR or VFR, must have a clearance to enter and will receive positive separation and sequencing from other aircraft. The minimum weather in class B airspace when you are VFR is 3 SM visibility and clear of clouds. Speed is limited to 250 KIAS in class B airspace; 200 KIAS in VFR corridors through class B airspace or class D, E, or G airspace directly under class B airspace. ATC may waiver any of these speeds on a selective basis

VFR aircraft entering **class B, C, or D** airspace may **fly any heading and altitude** unless a heading / altitude is assigned by ATC. If ATC does assign a heading / altitude / speed, **you must then comply**. You may wish to inform ATC you are changing heading / altitude, but you are not required to do so unless these are specifically assigned by ATC or you are requested to inform ATC of any heading / altitude change

Class C - **c**ommon **c**ommercial airports

An inverted "wedding cake" with the inner ring a 5 NM radius from the primary airport, surface to 4,000' AGL. The outer concentric ring is from 5 NM to 10 NM from the primary airport, 1,200' AGL to 4,000' AGL referenced to the elevation at the primary airport. You must only communicate with ATC to enter class C airspace. You must be acknowledged by call sign and not specifically denied entry. For example: *"Cessna 1234ME, standby".* If you (N1234ME) receive this reply from ATC as you call to enter, this does constitute communication with ATC and you may enter the class C airspace. On the other hand - *"Cessna 1234ME (or all aircraft on this frequency) remain clear of the class C airspace".* You (as N1234ME) must remain clear of the class C airspace until otherwise authorized by ATC to enter. Only IFR aircraft will receive separation and sequencing. VFR aircraft will be sequenced for landing and will receive separation from other aircraft as ATC's work load permits

Outer area - from 10 NM to usually 20 NM concentric to the class C airspace. The approach control for the class C airspace will handle all participating traffic within this (outer area) class E airspace. This arrangement is done through a letter of agreement with the adjacent Air Route Traffic Control Center (ARTCC). Additionally, although not designated as part of the outer area, the airspace directly above the class C airspace to (usually) 10,000' AGL is handled by the class C airspace approach control on letter of agreement with ARTCC. In effect, this makes the working airspace for the class C approach control out to 20 NM and up to 10,000' AGL. The difference is, when you are VFR in this outer area or above the class C airspace, you need not talk to approach control, but you may. If you are within the class C airspace, you must talk to approach control and not be denied entry into the class C airspace

To **enter class A or B** airspace, you must receive a specific **clearance to enter from ATC**

To **enter class C or D** airspace, you must only communicate with ATC and not receive a **clearance limit <u>not</u> to enter from ATC**

Class D - **d**ialogue required with the control tower

The requirement to enter class D airspace is similar to class C airspace. You must be acknowledged by call sign and not specifically denied entry into the class D airspace. Typically, towers at non air carrier airports will not provide radar service to aircraft. However, these towers often use radar / ADS-B OUT to facilitate traffic sequencing, and are only responsible to visually sequence aircraft for takeoff and landing. The control tower must be open for the class D airspace to be in effect. When the control tower is closed, this becomes class E airspace. If the keyway extension for the class D airspace is a blue dotted line on the sectional chart this is class D airspace. If the keyway is magenta this is class E airspace. You may enter the keyway without necessarily communicating with the tower. The class D airspace and the keyway are controlled airspace; you must meet cloud clearances and visibility for such or obtain a special VFR clearance / IFR flight plan to enter

Class E - **E**very other controlled airspace

This is general controlled airspace starting at 700' AGL, 1,200' AGL, or as otherwise marked. All airspace is class E starting at 14,500' MSL. Exception; if you are 1,500' AGL or less and at 14,500' MSL or higher you remain in class G airspace. This is a clue to the basic purpose for general controlled class E airspace. You may consider class E airspace as two varieties: **class E aloft** and **class E surface areas.** Class E airspace aloft starts at 700' AGL, 1,200' AGL, or as otherwise marked. Radar coverage is provided but participation is optional. A key difference between class E airspace at the surface and aloft is you may ask for and receive a **special VFR** clearance in a class E, B, C, and D surface areas but may not operate special VFR in controlled airspace that does not start at the surface. While in controlled airspace aloft you may request and receive a clearance to enter surface based controlled air space under special VFR

Class G - **g**eneral, uncontrolled airspace

The AIM states "*Class G airspace (uncontrolled) is that portion of airspace that has not been designated as Class A, Class B, Class C, Class D, or Class E airspace*." On sectional charts class G airspace is not specifically marked but is implied below 700' AGL (within magenta tint) or 1,200' AGL (beyond the magenta tint). When class G airspace extends above 1,200' AGL, a blue tint will be used to mark this from the area where class G airspace stops at 1,200' AGL. Class G airspace is uncontrolled in the sense that ATC may not legally provide sequencing or separation services. However, all of the rules within FAR 91 and other pertinent regulation apply equally in uncontrolled as well as controlled airspace

Airspace hierarchy - when two or more classes of airspace seem to overlap the following rules apply: class A airspace preempts all other airspace/ class B preempts C, D, E, G / class C preempts D, E, G / class D preempts E and G / class E preempts G. In no case may two classes occupy the same airspace at the same time. The same airspace may change class but may represent only one class of airspace at a time

Who Controls the Airspace?

The federal government holds exclusive control of the airspace in the USA. When any aerial vehicle is one inch or higher above the surface it is **federal control**. States, counties, cities, and others may petition for overflight restrictions; the FAA or other federal agencies make the final decision. Local control can place limits on surface-based operations (a typical limit might be no helicopter landings off airport / heliport within city limits) Title 49, US Code 40103

Special Use Airspace (SUA)

Special use airspace is managed by various agencies of the federal government and imposes varying limits on flight therein by civil aircraft. When you are IFR, ATC assumes responsibility to keep you clear of any SUA. Listed here are the main types. Understand the FAA can create and impose unique airspace restrictions in specific situations

Prohibited Areas - marked on Sectional and low IFR charts. No flight into prohibited areas except for those flights specific to the purpose the prohibited area was established. Prohibited areas are almost always continuous and are not released to the adjoining FAA ARTCC

Restricted Areas - marked on charts as above. The controlling agency may or may not release restricted areas to ARTCC. Review the legend on the sectional chart, NACO low IFR charts or on the map adjacent to the SUA on Jeppesen low IFR charts. Note many restricted areas are active intermittently. You may ask ARTCC if the restricted area is "hot" (active) or "cold" (inactive). If inactive, you may fly through the area. Restricted areas noted as "no a/g" (no air to ground communications) are not released to ARTCC and must be considered "hot" at all times

Alert Areas - marked as above. Areas typically for intense military activity such as student pilot training. No restriction to operate through these areas VFR. ATC usually does not monitor specific activity in these areas

Warning Areas - marked as above. These are outside the 3 NM limit of U.S. airspace. They are overwater areas wherein activity may be as intense as restricted areas, alert areas, or MOAs. No restriction to operate in these areas VFR. Check with ATC before entering; ATC is often aware of activity in these areas. Some (but not all) warning areas have military controllers known as Fleet Area Control and Surveillance Facilities (FAC SFAC) that monitor the warning areas. Ask ARTCC for a VHF frequency for a specific warning area

Military Operating Areas (MOAs) are marked as above. MOAs are designated for military training. All MOAs top out at 18,000 feet MSL. Some MOAs do extend up into class A airspace on letter of agreement between the military and ATC. There is no restriction on operating in MOAs VFR. IFR traffic may be routed through MOAs on request if separation standards can be guaranteed. Usually, you must request a direct off airways clearance to proceed through a MOA when you are IFR. Call ARTCC, ask for activity in the MOA. All military operations in MOAs are IFR procedural and must talk to ARTCC while in the MOA

Temporary Flight Restrictions – are established by NOTAM and authorized by FAR 91.137 through 91.145. The area of coverage of some repeating TFRs is shown on aeronautical charts. Most TFRs are NOT charted. All TFRs are activated and designated by FDC NOTAM. Information on TFRs is available from Flight Service (ASK for any TFRs in the vicinity of your flight), via 1800WXBRIEF, or <http://tfr.faa.gov> This FAA site updates frequently and has both maps and texts. Charted Prohibited or Restricted areas may be temporarily enlarged in width and height by NOTAM

National Security Areas - NSAs vary in size; they are at locations where there is a requirement for increased security and safety of ground facilities. You are requested to voluntarily avoid flying through the depicted NSA. NSAs may become TFRs by FDC NOTAM. NSAs are marked on sectional charts with dashed magenta lines and are accompanied by text of dimensions and / or height limitations

D.C. Special Rules Area – FAR 91.161. This requires one-time training for pilots operating VFR within 60 NM of the DCA VOR/DME. This VOR is located at the Regan National airport (KDCA). This one-time training is available at www.faasafety.gov - Activities, Courses & Seminars & Webinars - DC SFRA

National Marine Sanctuaries – These surface-based NMS areas are off the west coast of the USA from southern California up to the Olympic peninsula in Washington State. They are marked on Sectional charts with solid magenta lines and dots. NMS are NOT under control of the FAA but are controlled by the National Oceanic and Atmosphere Administration. Altitude limits are typically

shown for each area. Penetration of an NMS can result in severe fines. See http://sanctuaries.noaa.gov/flight 15 CFR 922.

Controlled Firing Areas - military areas used for limited ground to ground shooting practice. A ground observer will cease firing operations if an aircraft enters the area. These areas are mostly small firing ranges. They are not marked on aviation charts

Military Training Routes (MTRs) - low flying routes used by military and other government aircraft for training. MTRs are marked on sectional and low altitude IFR charts. These aircraft operate at speeds up to 600 knots TAS and at altitudes between 100' AGL to not higher than 1,500' AGL for routes with four-digit ID (example: VR 1621). Routes with 2-or-3-digit IDs may be flown above 1,500' AGL. Routes labeled IR may be flown IMC on an IFR flight plan or VFR VMC. VR routes may only be flown VMC. There are low speed low level routes used by some military aircraft. These routes are only flown VMC and speeds do not exceed 250k indicated

GPS and Wide Area Augmentation System (WAAS)

Air navigation in the USA uses the US owned Global Positioning System (GPS) satellites. These satellites are visible worldwide – typically your GPS navigator will see multiple GPS satellites with 5 required for IFR navigation. GPS does have some error factors with unaided GPS adequate for enroute and terminal navigation and horizontally-only guided instrument approaches. WAAS increases accuracy both horizontally and vertically – thus permitting GPS vertical guidance for instrument approaches

WAAS corrects the errors within GPS signals. WAAS does this by having 38 ground stations that are in the Contiguous United States (CONUS), Alaska, Canada, Mexico, Hawaii, and Puerto Rico. These WAAS ground stations compare the GPS position they receive to their own highly accurate surveyed know position and creates a correction value. This correction is transmitted real time to communication satellites (NOT GPS satellites) which then transmits this correction factor to your onboard GPS navigator. GPS navigators typically show an indication of WAAS reception - GARMIN systems display a "D" for differential WAAS reception

Loss of Satellite Navigation – Alternate Positioning, Navigation, and Timing

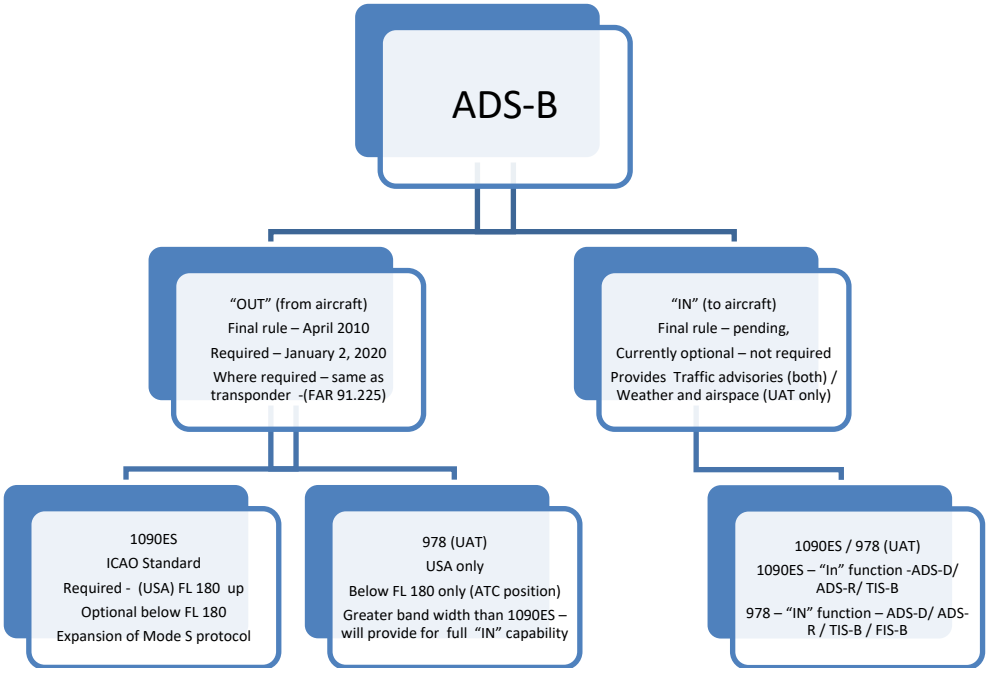
Loss of GPS and other satellite-based navigation could occur due to extreme solar flaring or ground or airborne-based interference. The FAA's backup plan for general aviation is to provide high power VORs which are feeder fixes to airports with ground-based approach aids (VOR and / or ILS). If you are 5,000' AGL or higher, you are guaranteed to be within 100 NM of a VOR. VOR reception might be limited at 5,000 AGL in mountainous regions. Separation services from ATC will revert to radar or procedural. High density airspace such as hub airports in class B or C airspace will have radar and other non-GPS based means to separate and sequence traffic such as multilateration, pseudo satellites and other systems, all of which are ground based

Next Generation ATC (NextGen)

NextGen is several development programs to modernize the ATC system. Currently for pilots the most important is the Automatic Dependent Surveillance and Broadcast (ADSB) system. The ADSB system is composed of aircraft avionics and ground infrastructure. Onboard avionics determine the position of the aircraft by using IFR WAAS GPS and transmit this position along with additional information about the aircraft to ground stations and other aircraft for use by ATC and other ADSB services. This information is transmitted at a rate of approximately once per second. ADSB OUT is the aircraft transmitting its position to ATC and other aircraft. ADSB IN is data link from the ground or other traffic to the receiving aircraft. ADSB OUT supplies ATC with the aircraft's ID, position, speed, heading, and vertical component. ADSB IN provides three sources of aircraft traffic and one source of flight information such as weather, NOTAMs, and special use airspace

ADSB is not required by law at or below 10,000 MSL, beyond class B or C airspace, or in any aircraft not originally equipped with an electrical system. If you are within 2,500' AGL and above 10,000' MSL, ADSB is not required

OUT and IN are referred to as functions in this document. Either of these functions can be accomplished by one of two available frequencies as the carrier wave. These frequencies and associated equipment, 1090 Extended Squitter (1090 ES) and 978 Universal Access Transceiver (978 UAT) are referred to as protocols in this document:

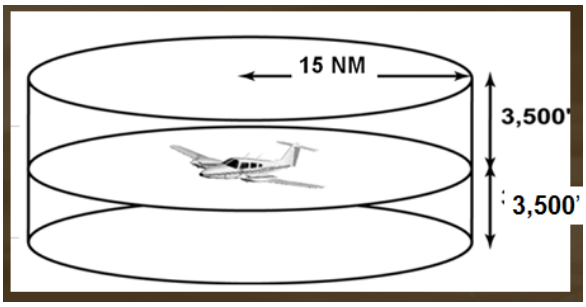


Note that the OUT function has been required by FAR 91.225 since 1/2/2020. This means as a minimum you must be capable of transmitting a position derived from a WAAS enabled IFR certified GPS navigator to ATC using either protocol. There are self-contained systems that have both GPS / WAAS receivers and a transmit capability for VFR or IFR aircraft not panel equipped with WAAS GPS. The 1090 ES protocol is required in class A airspace or outside of the USA at any altitude. The IN function is not required by FAR, however IN will provide traffic near your aircraft by three methods:

ADS-Direct - If you have receive capability (IN function) using either or both protocols then you may display traffic within line-of-sight range of your aircraft, that traffic transmitting (OUT function) using the same protocol as your IN function. Note you may receive this **direct traffic** on both protocols if you are equipped to receive both

ADS-Rebroadcast – If you have receive capability (IN function) using either, but only one of the protocols, then you may display traffic that is transmitting (OUT function) on the protocol opposite to your receive protocol (i.e. you receive 978, traffic transmits 1090 or vice-versa). This is by means of immediate retransmission by an FAA operated remote ground site. These ground sites relay aircraft OUT information to ATC as well as IN information back up to aircraft. Ground sites will rebroadcast aircraft positional information on opposite protocol (i.e. 1090 is rebroadcast as 978 and 978 is rebroadcast as 1090). The OUT aircraft and your IN aircraft must be within line of sight and in range of the same ground site for ADS-Rebroadcast to work

Traffic Information Services-Broadcast (TISB) – TISB lets you display the same radar / ADSB traffic picture ATC sees. You must be both OUT and IN equipped using either protocol to see a relevant traffic picture with any FAA ground base transmission protocol. To create a valid traffic area for your aircraft, you must first query ("ping") an FAA ground site with your OUT function which includes your aircraft ID. This ground site will then display only that traffic which is within the area shown in this diagram:



Note your aircraft is always centered on this "wheel of cheese" shaped airspace that moves with your aircraft. **If you have the IN function only (no OUT capability)** you will see random traffic based any other OUT / IN aircraft in range. **This random traffic you see will NOT be based on your position in the sky but the position of other OUT / IN aircraft near you.** To receive a useful and complete traffic picture via any of the above methods, you need both the OUT and IN functions, using either protocol. Your on-board system displays traffic by evaluating aircraft-to-aircraft, rebroadcast, and TIS-B inputs and displaying the single most current position and revelant traffic. Direct traffic is not limited by height or distance from your current position; software onboard your aircraft puts reasonable limits on displayed traffic. For example, if you are at 4500 feet, an airline above you at FL350 need not be displayed. Rebroadcast & TIS-B are limited to 15 NM and + or - 3500 from your current position / altitude. **Direct aircraft-to-aircraft traffic is not limited by the above 15NM / +- 3500' limit. If you see an N number, this is a direct traffic display.** Traffic is shown with a direction arrow with arrow length indicating relative groundspeed. Altitude separation between you and the other traffic is shown in hundreds of feet, with + or – indicating if the traffic is above or below you. For example, a traffic display showing +400 means this traffic is 400 feet above your current altitude. These separation heights are GPS / WAAS derived between you and the other aircraft and not necessarly your altitude as shown on your pressure altimeter. A dual function direct traffic receiver (1090 & 978) is most useful here; the greatest concentration of aircraft is typically in or near the traffic pattern. Most non-towered airport patterns are below ground site coverage so rebroadcast & TIS-B traffic displays would not available

If traffic is not seen visually but via ADSB only, advise ATC when queried (for example) **"traffic ADSB, looking visually"** for clarity. Stating only "I have the

traffic" to ATC implies you have the traffic visually. **ATC may only assign visual separation limits if the traffic is seen visually**

ATC and YOU – Each aircraft that is ADSB OUT equipped is assigned unique codes. These are Base 8 Oct or Base 16 Hex codes; this to accommodate different ground based receiver systems. If an N number changes, the associated ADSB codes must be changed. If ATC reports your ADSB OUT is not coded correctly, have the avionics shop check you have your correct assigned codes loaded into the system. Find your aircraft's codes at www.faa.gov – quick search – N number format – Aircraft Description. There are 649 FAA ground sites providing rebroadcast and TISB traffic as well as weather to aircraft. ADSB codes for use by ATC for tracking go through radar service sites as well as these 649 ground sites

Flight Information Services Broadcast (FISB) – Aircraft equipped with the IN protocol operating on 978 may display weather and airspace products in the cockpit at no cost. Note FISB is only available via the 978 protocol. The following products are data linked to aircraft using the IN protocol on 978.

FIS–B Over UAT Product Update and Transmission Intervals

Product	Update Interval[1]	Transmission Interval (95%)[2]	Basic Product
AIRMET	As Available	5 minutes	Yes
AWW/WW	As Available, then at 15 minute intervals for 1 hour	5 minutes	No
Ceiling	As Available	10 minutes	No
Convective SIGMET	As Available, then at 15 minute intervals for 1 hour	5 minutes	Yes
D-ATIS	As Available	1 minute	No
Echo Top	5 minutes	5 minutes	No
METAR/SPECI	1 minute (where available), As Available otherwise	5 minutes	Yes
MRMS NEXRAD (CONUS)	2 minutes	15 minutes	Yes
MRMS NEXRAD (Regional)	2 minutes	2.5 minutes	Yes
NOTAMs-D/FDC	As Available	10 minutes	Yes
NOTAMs-TFR	As Available	10 minutes	Yes
PIREP	As Available	10 minutes	Yes
SIGMET	As Available, then at 15 minute intervals for 1 hour	5 minutes	Yes

Product	Update Interval[1]	Transmission Interval (95%)[2]	Basic Product
SUA Status	As Available	10 minutes	Yes
TAF/AMEND	6 Hours (±15 minutes)	10 minutes	Yes
Temperature Aloft	12 Hours (±15 minutes)	10 minutes	Yes
TWIP	As Available	1 minute	No
Winds aloft	12 Hours (±15 minutes)	10 minutes	Yes
Lightning strikes [3]	5 minutes	5 minutes	Yes
Turbulence [3]	1 minute	15 minutes	Yes
Icing, Forecast Potential (FIP) [3]	60 minutes	15 minutes	Yes
Cloud tops [3]	30 minutes	15 minutes	Yes
1 Minute AWOS [3]	1 minute	10 minutes	No
Graphical-AIRMET [3]	As Available	5 minutes	Yes
Center Weather Advisory (CWA) [3]	As Available	10 minutes	Yes
Temporary Restricted Areas (TRA)	As Available	10 minutes	Yes
Temporary Military Operations Areas (TMOA)	As Available	10 minutes	Yes

[1] The Update Interval is the rate at which the product data is available from the source

[2] The Transmission Interval is the amount of time within which a new or updated product transmission must be completed (95%) and the rate or repetition interval at which the product is rebroadcast (95%)

[3] The transmission and update intervals for the expanded set of basic meteorological products may be adjusted based on FAA and vendor agreement on the final product formats and performance requirements

Textual terminal WX (METARS, TAF) are limited to **airports within 500 NM** of your current inflight position

Simply Stated – The most flexible and useful setup for full advantage would be OUT on 1090ES and IN on both 1090ES and 978UAT. You will receive all transmitting traffic directly plus weather / NOTAM/ SUA products and you meet the ADSB out requirement beyond the USA

Be aware that some aircraft below 10,000 MSL may not be ADSB equipped and will NOT display in the cockpit. Look outside for ALL traffic

Weather Minimums for VFR Flight (FAR 91.155)

Student pilots have different minimums from private or higher pilots. See FAR 61.89 (a) (6) & (7). Sport Pilots or any licensed pilot operating to Sport Pilot limits have different minimums. See FAR 61.315 (c) (12) & (13)

For private pilot or higher: Basic VFR in controlled airspace below 10,000 MSL is 3 SM visibility and your aircraft 1,000 above, 500 below, 2000 horizontal from clouds. Additionally, within **surface based controlled airspace, you must have at least a 1,000 ceiling**

Remember **"3 Cessna 152s"** or **3-152**: **3** statue miles visibility and cloud clearance of **1,**000 above, **5**00 below, and **2,**000 horizontally

Basic VFR in controlled airspace above 10,000 MSL is 5 statue miles visibility and 1,000 above, 1,000 below, and 1 sm horizontally from clouds

Remember **"5 F-111's"**: **F**lying above 10,000'MSL, **5** statue miles visibility and **1**,000 above, **1**,000 below and **1** sm horizontally from clouds

The above requirements apply specifically to:

Class A air space: all aircraft are on an IFR flight plan; the requirements for cloud clearance and visibility do not apply. Exception: gliders, balloons, and other aircraft with prior permission may enter a specific window in class A airspace VFR while communicating with ATC. In this case, these aircraft must maintain cloud clearances and visibility for controlled airspace above 10,000' MSL

Class B air space: 3 SM and clear of clouds. All traffic, VFR or IFR, in class B air space receives sequencing and separation service from ATC. You need not maintain a minimum distance from clouds to have time to see other traffic; ATC is providing separation services. Still, you are always the final authority for collision avoidance when you are in clear air, VFR or IFR, in any air space

Class C and class E air space below 10,000' MSL: 3 SM and 1000' above, 500' below, 2000' horizontally

Class E air space at or above 10,000' MSL: 5 sm and 1000' above, 1000' below, 1 SM horizontally

The following applies to all aircraft except helicopters:

Class G airspace **within 1,200'** of the surface: **day:** 1 SM and clear of clouds. **Night:** 3 SM and 1000 above, 500' below, 2000 horizontally

Class G airspace **above 1,200'** AGL and **below 10,000'** MSL (both conditions must be met): 1 SM and 1000 above, 500 below, 2000' horizontally

Class G airspace **above 1,200'** AGL and **at or above 10,000'** MSL (both conditions must be met): 5 SM and 1000 above, 1,000 below, 1 SM horizontally

In summary Fixed wing: you are legal VFR with 1 SM visibility and clear of clouds only when 1,200 AGL or less in class G airspace, day time; night time only when within ½ mile of a runway. Helicopter: ½ SM daytime, 1 SM nighttime unless within ½ SM of the runway or helipad of intended landing, then ½ SM visibility

Special VFR: (FAR 91.157) Case by case permission to operate in **surface based controlled air space** when the weather is below VFR minimums. Some class B and class C air space prohibit special VFR for fixed wing aircraft. Refer to the airport chart supplement and on sectional charts, look for the term "NO SVFR" near the primary airport. You must be at least a private pilot to receive special VFR. You may request and receive a special VFR clearance immediately before entering or immediately before taking off from within surface based controlled air space. **ATC will not offer special VFR; you must ask for it.** ATC will not issue a specific altitude but may require you to remain below or above a given altitude. You are responsible for terrain clearance per FAR 91.119 (see). Example: *"Cessna 1234ME is cleared out of the class C air space. Maintain special VFR. Maintain at or below 3000 until clear of the class C airspace"*

Special VFR flights to/from **non towered airports** that have ASOS or AWOS weather reporting should advise the controlling ATC agency they have "one minute weather" and state their intentions prior to operations in controlled airspace. Notice that special VFR may only be used in controlled air space that is surface based. **You may not operate special VFR in any controlled airspace that does not start at the surface**. You must exit the surface based controlled air space into class G airspace and have 1 SM visibility and clear of clouds (fixed wing) or request and receive an IFR clearance, or meet the weather minimums for controlled airspace aloft. Also note that you may operate special VFR **within the lateral boundaries of surfaced based controlled air space up to 10,000' MSL**, even if the upper limit of the surface based air space stops below 10,000' MSL

Day: 1 SM visibility (reported ground visibility, if available. Otherwise, flight visibility) and **clear of clouds**

Night: 1 SM visibility and **clear of clouds.** The PIC must be **instrument rated** and current; the aircraft must be **instrument capable** and current

Weather for Flight

FAR 91.103 states the pilot in command is required to become familiar with all available information, including weather and forecasts, when IFR or flying beyond the vicinity of an airport. The nature of flight is such that no single guideline easily applies concerning how much weather information you should have and how good (or poor) weather conditions will affect your flight. The following are proven methods to safe flying concerning weather

Check the weather before every flight. Check the weather on each leg of a trip and in flight as often as necessary

A local flight in the vicinity of an airport may need nothing more than a considered visual scan of the sky and check of the wind sock. This often is an adequate weather briefing for the type of flying contemplated. Other flights deserve a more formal weather briefing. Think of weather for aviation as a cycle - you start with an overview (big picture) before a decision to go, receive a formal briefing of detailed information to permit a final go/ no-go decision; acquire updates in flight to permit a timely decision to continue to destination, divert enroute, or reverse course and return to the point of departure. Finally, you consider actual versus forecast weather encountered during flight to complete the cycle

The National Weather Service (NWS) and the FAA: The NWS is responsible for weather products for flight. The FAA is charged with disseminating weather products via Flight Service Stations (FSS), Aviation Weather Observation Systems (AWOS), Aviation Surface Observation Systems (ASOS), Automatic Terminal Information Services (ATIS), Enroute Flight Advisory Service and other outlets. FSS and EFAS specialists are trained by the NWS to make short period forecasts. Otherwise, all weather *forecasting* is a direct function of the NWS. See www.1800wxbrief.com

THE BIG PICTURE ----FORMAL BRIEFING ----UPDATES

	AFSS standard briefing	
Internet wx sites	private aviation weather	ARTCC
AFSS outlook briefing	service (FAA sanctioned)	PIREPS
Private service wx maps	AFSS phone briefing	AIRMET/SIGMET
www.1800wxbrief.com	www.aviatonweather.gov	
AWOS/ASOS/ATIS		

The above lists are the most common ways to complete the weather cycle for each flight

The Big Picture - You must know what major weather fronts are affecting the continent and your area before you can appreciate a formal briefing. You will receive a weather synopsis as part of a National Weather Service (NWS) standard briefing; a textual description of the major weather fronts is difficult to visualize. You should seek a visual depiction of the major fronts at the surface *and aloft* to gain a firm grasp of what weather features will affect you. The Aviation Digital Data Service (ADDS) www.aviationweather.gov/ is an excellent source here. Ideally, you may start a review of the big picture 24 hours prior, but you should also review this again within 8 hours of the proposed take off time

Formal Briefing – Internet weather briefings are most common; you may get a telephone briefing from FSS if desired. If so, tell the briefer the following up front: your call sign / IFR or VFR / departure airport / destination airport / departure time / route of flight / initial altitude / time en route. If you are a student pilot, so state. The FSS specialists will provide you a standard briefing in the following sequence: adverse conditions (AIRMETS and SIGMETS and other severe weather warnings) / VFR flight not recommended if, in the briefer's judgment, the weather is such / synopsis of the "big picture" affecting weather for your route of flight / current conditions / en route forecast / destination forecast / winds aloft / NOTAMs / ATC delays (if any). If you receive a 1800WXBRIEF briefing**:** This federally funded program will provide a FAA approved briefing and is retained to establish that you received a weather briefing prior to flight. Either the FSS or 180WXBRIEF online service will ask you if you want a **standard**, **abbreviated**, or **outlook** briefing

Standard briefing - the most complete briefing. You will receive, in sequence, those items listed above

Abbreviated briefing - You will receive only those weather reports you ask for. The abbreviated briefing is intended as an update to follow a previous standard briefing

Outlook briefing - You will receive a forecast of conditions typically **beyond 6 hours of the time of briefing**. The outlook briefing is best used as a big picture tool before you receive your standard briefing

Updates - Update briefings are received inflight or at intermediate stops on a cross-country. When should you update? Every time the weather is not as forecast enroute; any time you need to make a weather-related decision about the progress of your flight, each time you approach a cross country destination (approximately one hour from destination), and as many times as necessary to have a full understanding of the weather picture and what the weather will do in the short term. **If the winds aloft, cloud cover, or temperature are NOT as predicted in the initial briefing, the forecasted weather is usually wrong. Update**

Weather Data Link – You may receive data linked weather in the cockpit. Systems are either transmitted from ground stations from FAA contractors (FISB) or from satellites. XM Corp. provides XM WX through vendors to several receiver options, along with other satellite private service vendors

Automatic Dependent Surveillance and Broadcast (ADSB) Weather – Flight Information Services-Broadcast (FISB). Aircraft equipped with the IN protocol operating on 978 MHz may display in the cockpit 12 weather and airspace products at no cost. Note FISB is only available to the 978 protocol. (See "NextGen", previous)

Unintended VFR Flight from Visual Conditions to Instrument Conditions

General aviation statistics show many accidents involving unintended VMC into IMC. Pilots who are not instrument rated or are not instrument current are at greater risk than current instrument rated pilots. Guidelines that can be used in the event of inadvertent VMC into IMC in normal category aircraft include:

The following are proven techniques for VFR only or non-current IFR pilots. Your FIRST goal is to ensure control of the aircraft on instruments; so...

- ✓ Transition immediately to the instruments. Go to the attitude indicator and level the wings. Trust what you see, ignore what you feel.
- ✓ Center the slip-skid ball. Note your heading
- ✓ Stop the rate of climb or descent. The vertical speed indicator will give you instant pitch trend information
- ✓ Set power for low cruise speed (the low end of the green arc is fine).
- ✓ Trim for level flight
- ✓ Engage the autopilot (if available) for straight and level flight.
- ✓ Apply carburetor heat or alternate air, & pitot heat on

Your next goal is to avoid spatial disorientation

- ✓ Do not move your head rapidly. Look at the instruments. If you drop something, ignore it and fly the aircraft. If you are task loaded, ignore the radio. Remember, you must FLY THE AIRCRAFT first

Your final goal is to exit back to VMC

- ✓ Assess your situation. One of several options are available:

- ✓ Fly straight and level on instruments until you to return to VMC, OR,
- ✓ A climb or descent may put you into VMC. Wings level, raise or lower the nose of the aircraft on the attitude indicator – ½ to no more than 1 dot width up / down. You are targeting typically for no more than a 300 to 500 FPM climb or descent, ball centered. Do not attempt to turn and climb / descend at the same time. Turn / climb or descend separately OR
- ✓ A careful turn to reverse course may return you to VMC conditions. Note the heading at the bottom of the DG. If you turn, make only ½ standard rate turns – typically 5 to no more than 10 degrees of bank, ball centered. Do not attempt to turn and climb / descend at the same time. Turn / climb or descend separately
- ✓ If you enter a diving spiral (increasing airspeed and increasing bank) level the wings FIRST then raise the nose to control speed. Lower landing gear and / or go to high RPM (controllable propeller) to help slowing. In some aircraft, partial flap extension will add enough drag to assist in slowing the aircraft

When you exit to VMC conditions, return to a landing and assess your situation

This list is not all inclusive and is intended only as an example of the serious nature of VFR into IMC. When able, consider declaring an emergency with ATC so you can receive priority handling and assistance. You may practice these procedures in VFR flight. Wear a vision limiting devise and have a safety pilot to clear traffic and act as PIC. You need not be an instrument rated pilot to practice this

Avoid VFR into IMC in the first instance…

In-Flight Icing and the GA Pilot

The FARs do not specifically state Flights Into areas of Known Icing (FIKI) are prohibited. However, most small GA aircraft have either no or limited anti-icing capability, typically limited to heated pitot systems and alternate / heated air for the engine intake systems. Deicing boots and deicing propellors are on some smaller aircraft. Airframe or engine icing can occur quickly and predicting ice-free altitudes is not an exact science. If the aircraft is certificated for flights into FIKI, understand there are limits for these systems

If you are unsure of the flight, DO NOT GO

Meteorology

-In the Northern Hemisphere, winds move clockwise around **H**igh pressure zones and counter clockwise around **L**ow pressure zones. Additionally, visualize the wind moving inward to a low and outward from a high

-You may estimate the standard Celsius temperature at altitude thus: double your altitude - divide by 1000 - subtract 15. Above 8000 feet, the temperature is a minus value

-A standard atmosphere decreases in temperature by approximately 2.2 degrees Celsius per 1000 feet of altitude increase. This rate promotes a relatively stable atmosphere. Note that this rate of change is simply a base line reference rate. Many physical conditions determine this actual rate of change

-If the temperature decreases at a lesser rate than the standard atmosphere rate as the altitude increases, then the atmosphere is more stable. This leads to strata type clouds and obstructions to visibility such as haze (low moisture in the atmosphere) or drizzle (high moisture in the atmosphere). Warm fronts are associated with a more stable atmosphere

-If the temperature decreases at a greater rate than the standard atmosphere rate, this makes the atmosphere less stable. This leads to cumliform type clouds and clear air between clouds (low moisture conditions) or rain showers / thunderstorms (high moisture conditions). Cold fronts are associated with an unstable atmosphere

-Clouds form in the atmosphere at the level where the temperature and dew point meet. Ground fog is a cloud at the surface

-Compare the national surface weather chart with the winds aloft for 18,000 feet (500 millibar). Winds at this level influence movement down to the surface. If a surface low is supported at 18,000 feet, the low will most likely strengthen

-A low pressure area aloft that is a complete loop (closed) will strongly influence the weather below. Poor weather is usually to the east –northeast of the aloft low and this low will slow frontal movement at the surface

-Compare the temperature and winds aloft to the forecast. If significantly different, the forecast weather for the trip will most likely be incorrect. Get an update

-If you are flying VFR on top and are flying toward a frontal zone or an intense low pressure area, plan on the cloud tops becoming higher as you approach the front. As you fly away from a front or low area, the tops will lower

-Airframe icing is often found in the most recently formed clouds and often on the north and east side of a warm front. Icing in cumuli formed clouds is more often found in the tops of the clouds

-If the temperature and dew point are within 5 degrees f (2 degrees c), the surface winds are calm or less than 5 knots and there are clear skies, there is a good chance of ground (radiation) fog forming. Forecasts of the breakup of fog conditions are difficult to make accurately. Use caution when flying to a destination with these conditions. File or plan for an alternate and allow appropriate fuel reserves

-Wind 25 knots or greater at the surface will create mechanical turbulence that includes some up-down eddies as well as horizontal sheer

-Wind 40 knots or greater perpendicular to a mountain or hill will create wave turbulence. Avoid the lee (down wind) side of the mountain to avoid down drafts

-Without on-board real time weather avoidance equipment, you must be able to see weather development. Do not fly in thunderstorm areas at night or if thunderstorms are embedded, day or night, when you fly IFR. Realize the radar presentation available via XM services or FIS-B may be up to 15 minutes old

-Avoid thunderstorms by at least 20 NM. If you pass between two thunderstorms, you need at least 40 NM between cells

-Do not try to out climb a thunderstorm: do not try to out run a thunderstorm, i.e. land at or take off from an airport in front of a fast-moving thunderstorm or a thunderstorm within 5 SM of the airport. Severe wind shear will be encountered in clear air on all sides of a thunderstorm

-If you accidentally enter a thunderstorm or extreme turbulence- tighten seat belts/ disengage the auto pilot/ note the temperature, descend if necessary to avoid icing / wings level on the attitude indicator - let the altitude and airspeed vary if necessary/ pitot heat and carburetor heat or alternate air on / slow to maneuvering speed or weather penetration speed / reversing heading is NOT always recommended - use radar or ask ARTCC for the shortest path out of the storm / secure all loose items/ if dark, turn up full cockpit lights to prevent flash blindness from lighting

BasicMed

You may fly as a required crew member under BasicMed if:

- You held a non-revoked medical on or after July 15, 2006. A special issuance medical qualifies. These medicals may be expired. BasicMed goes by days, not months
- You have had a medical exam by a state licensed physician in the last 4 years
- You are under the care of a doctor if you have a condition that affects your ability to act as a required crew member
- Your doctor completes a comprehensive medical checklist every 4 years (see Appendix A in AC 68-1) and keeps this completed and signed checklist on file
- You complete an on-line medical tutorial and exam every 24 months https://basicmedicalcourse.aopa.org/ offers this tutorial to all
- You hold a valid and current state, territory, or federal US driver's license
- See FAR 68 1 to 68.11 for specifics on Basic Med
- Aircraft limits for BM: certified takeoff maximum weight 12,500 #
- 7 seats, maximum 6 passengers
- Maximum 18,000 feet MSL and 250 KIAS, VFR or IFR
- Only within the USA

If you are a required crew member under BasicMed, you must ACT as the pilot in command. This requirement holds BasicMed pilots only to aircraft that are certificated for single pilot operation. The only exception is a pilot wearing a vision limiting device must have a safety pilot. In this case, both pilots may be BasicMed and the safety pilot will act as PIC. The pilot under the vision limiting device logs the time but is not necessarily a required crew member. Flight instructors who fly under BasicMed may be paid for flight instruction

Sport Pilot (SP)

See FAR 61.301 – 61.331

Effective Oct 22, 2025 Sport Pilot may:

- Fly airplanes, gliders, weight-shift control, powered parachutes, balloons, airships, gyroplanes,
- Helicopters, and powered lift aircraft with simplified controls
- Up to four seats, only one passenger
- No speed or weight limits,
- Maximum, stall speed – airplanes 59 KCAS (no flap), gliders and weight shift – 45 KCAS

- Fixed, adjustable, or variable pitch propellors (additional training rqd)
- Fixed or retractable wheels (additional training rqd)
- Night operations: requires medical or Basic Med and additional training required

- If you are a private or higher rated pilot, you MAY act as PIC in a light sport aircraft (LSA) using a valid state driver's license (Medical or Basic Med, for night ops), and

- If you do NOT have any pending FAA medical issues or limits to Basic Med preventing night operations

- A & P mechanics are authorized to do maintenance on LSAs with no specific additional training

Light Sport Aircraft (LSA)

The definition of LSA will be removed from 14 CFR 1.1 on **July 24, 2026.** As a result, special airworthiness certificates issued to aircraft qualifying as LSAs after this date; these will be certificated as "light-sport category aircraft." The removal of the LSA definition in FAR 1.1 allows separation of the sport pilot and the light sport aircraft regulations. See the parameters for Light Sport pilot as an indication of aircraft that will qualify for a revised LSA certificate

The Pilot, the FAA, and the Law

Just as preflight is a prevention and preparation process, a working knowledge of the airman appeal process is useful

If you receive a written notice from the FAA of an alleged violation you have committed or if you are approached in person by a FAA official, you are best served if you comply with any reasonable request

If notified in writing and you choose to respond, do so in writing within the allowed time. Do not rush your reply, think carefully first. Do not admit or confirm any allegation made until you have conferred with legal council. If ATC requests you call a telephone number after you have landed, understand you are not legally compelled to call. If you think this request is the result of an honest mistake on your part or there was some confusion about a clearance, you may be best served by making the call. Realize that the call will be recorded and anything you say could be used against you in further proceedings

NASA Aviation Safety Report System - This program is intended to keep records of human and system errors relating to flight operations. Note the FAA may investigate any possible violation of which it learns though a source other than ASRS. NASA will not release, nor may the FAA seek, ASRS reports for use in an enforcement action (FAR 91.25). However, if the FAA thus finds a person guilty and this person correctly filed an ASRS report within 10 days of the event, the FAA may not assess a civil penalty nor impose a certificate suspension if:

- The violation was inadvertent and not deliberate
- The violation did not involve a criminal offense, an aircraft accident or action under section 44709 (see below)
- The person filing has not had a FAR violation in the last five years

You may file a NASR as often as you deem necessary. There are limits on how often you may invoke the protection of the NASR system. See FAR 91.25 and AC 00-46. Obtain copies of NASA forms or file online at https://asrs.arc.nasa.gov/

If approached in person, do show any required documents the official (any federal, state, or local FAA or law enforcement person) asks to see. You must carry on your person or in the aircraft a state or federally issued photo ID, your pilot certificate, medical certificate (if required for the aircraft you are flying), and flight instructor certificate (if giving instruction). The required documents for flight ("ARROWS") must be displayed in the aircraft. Any other document(s) requested, such as the aircraft maintenance records, or your logbook need not be produced on the spot. Previous interpretation of the rules allow that you have reasonable time (to include the following day or longer) to go to the place where the document(s) are kept and show the documents to the official at another time

Do not permanently surrender any document to the official. If requested, show the document and insist it be returned at that time. They may make a copy of or photograph the document. In the vast majority of cases, you will find that the official only wants to see that you are in compliance with the rules and that is the end of the matter. On the other hand, if you are accused of a violation, there are five levels of action that can be brought against you:

-Administrative action – administrative letter, warning notice, letter of correction, remedial training
-Reexamination - a retest for the pilot certificate you now hold
-Certificate Action - suspension or revocation of the certificate you now hold
-Civil Penalty – monetary fines for each violation cited
-Criminal Action - penalty such as incarceration

A typical flow chart of events is as follows--------one of the five above actions apply: you receive a warning notice or letter of correction and you accept remedial training / you choose to submit to re-examination / suspension or revocation / civil penalty. OR, you request an informal conference with the FAA if you feel there are mitigating circumstances--------You appeal to a National Transportation Safety Board (NTSB) judge--------You appeal to the full NTSB board----------You appeal to the U.S. Board of Appeals. Note that you may accept the FAA or NTSB action or ruling at any point. Very few cases go to the U. S. Board of Appeals, but you do have the right to do so if you choose.
If you are an AOPA member or choose to join, AOPA can assist with guidance in your particular case with their legal services plan. Note extra expense may be incurred for this service

If you are unsure, seek legal guidance from a qualified aviation lawyer before you interact with the FAA. Know your rights

Under title 49, U.S. Code section 44709 any official cannot suspend, revoke, or retain your license on the spot. The official must follow the above procedures. Emergency revocation is a process to revoke a certificate to prevent immediate further use of this certificate. Justification by the FAA for emergency revocation must be compelling. Even if you file a NASA ASRS report, you may receive an administrative letter from the FAA. This letter will be removed from your records after 24 months as long as you have no further intervening issues. Remedial training under 44709 (709 ride) is NOT the same as reexamination

If you have an accident or Incident…….

Your first responsibility is, of course, to take immediate action to protect people and property. The National Transportation Safety Board (NTSB) is the agency tasked to investigate accidents. This is confusing sometimes because the NTSB may ask the FAA to conduct a particular accident investigation. Regardless, the NTSB, not the FAA, is the agency to contact in this case. To file online, go to www.ntsb.gov You will file NTSB form 6120.1 within 10 days. See 49 CFR part 830

Dates

04/15/1991 - Pilot in command time in **tail wheel**/ tail skid aircraft prior to this date or a one-time check out with a flight instructor required. See FAR 61.31

04/15/1991- Pilot in command time in **high altitude aircraft** prior to this date or a one-time check out with a flight instructor required. See FAR 61.31

3/11/1996 - Aircraft certificated after this date must display **anti-collision lights** (if so equipped) both day and night. See FAR 91.205 (b) (11)

08/04/1997- Pilot in command time required in **high performance** aircraft, approved simulator, or approved flight training device prior to this date or a one-time check out by a flight instructor. See FAR 61.31 (2) (f) (1)

08/04/1997- Pilot in command time required in **complex** aircraft, approved simulator, or approved flight training device prior to this date or a one-time check out by a flight instructor. See FAR 61.31 (2) (f) (2). Single lever FADEC aircraft may qualify as complex aircraft

09/01/2004 – **Sport Pilot** rule in place

01/18/2005 – **CFIs** and flight schools must receive **annual security training** starting this date

07/14/2006 to present – Date pilot must have held a valid FAA medical to qualify for **BasicMed** without an additional medical required

08/31/2007 **–** Last day **experimental light-sport airworthiness** certificate issued to unlicensed ("fat") ultralight aircraft that exceed FAR 103 standards

07/24/2008 – **Medical certificate** duration **extended for pilots under 40 years** of age. See FAR 61.23

02/01/2009 – **Termination date** for 121.5 / 243.0 MHz **ELT** satellite monitoring

02/09/2009 – Pilots on **VFR flights within 60 NM** of the Washington DC VOR/DME (**DCA**) must have **one-time certificated training** before flight. See FAR 91.161. Training at www.faasafety.gov (Activities, Courses & Seminars).

03/05/2009 – **Pilot certificates** must state "**English Proficient"** for operations outside of the USA. See www.faa.gov – Licenses & Certificates

03/31/2010 – **Pilot certificates** must be **plastic credit card style** by this date See www.faa.gov – Licenses & Certificates

10/31/2012 – Requirement for certain multi seat **experimental turbojet** aircraft require a pilot **proficiency check** after this date. See FAR 61.58

10/01/2010 to 12/31/2013 – FAA **Re-registration** of all **"N" registered aircraft** rule (FAR 47.40) in effect

03/31/2013 – **Mechanic, Dispatcher, Navigator**, and all other rating certificated issued by the Airman's Branch must be plastic credit card style by this date. See www.faa.gov - "licenses and certificates:" link

04/01/2016 – plastic style indefinite **student pilot certificates** issued

08/27/2019 – ICAO format flight plans now required in the USA

01/02/2020 –Date for aircraft to be **ADS-B "out" equipped** in the following airspace - In class **A, B, or C airspace** / the class **E airspace ABOVE** class B or C up to 10,000 feet MSL / Within the **30 NM mode C ring** around hub airports (Appendix D to FAR part 91) / Class E airspace above 10,000 feet MSL (excluding any location that is 2,500 feet AGL) / Over the Gulf of Mexico in class E airspace at or above 3000 feet MSL within 12NM of the US coast line. Non Out equipped aircraft that need to fly through ADS-B required airspace must request approval on the ground in advance via sapt.faa.gov/adapt-start.php

02/25/2021 – Sectional charts will go from a 6 month to a 56 day reissue cycle

10/22/2025 – Revised rules for **Sport Pilot** in effect

07/24/2026 – Revised rules for **Light Sport Aircraft** in effect

Time

The following events are **valid to the last day of the month**, regardless of the day of the month of issue: all **medical certificates / flight instructor certificates / flight reviews / instrument currency / instrument proficiency checks**. Other time currency events expire on a given day of the month

8 hours minimum time from alcohol consumption to flight. See FAR 91.17

48 hours report deviations to ATC instructions (within). See FAR 91.123

10 days file NASA aviation safety report. See FAR 91.25 and AC 00-46
file NTSB form 6120.1 for accident report (within). See NTSB reg 830

30 days change of address due to FAA (within) / VOR check currency for IFR

60 days report drug/ DWI convictions to the FAA (within) / duration of a FAX or e-mail from the FAA for a physically lost or destroyed license or medical / report motor vehicle action to FAA (within). See FAR 61.15

90 days landing currency to carry passengers (day/ night)/ student pilot solo currency/ duration of a temporary radio station license or temporary aircraft registration/ limit to operate an aircraft with the ELT removed. See FAR 91.207

120 days duration of a temporary airman's certificate / nominal packing currency for most modern personal parachutes

6 months 1st class medical certificate duration for pilot over 40

12 months 1st class medical certificate duration for pilots under 40 / 2nd class medical certificate duration / CFI TSA mandated security training / airframe and power plant annual inspection currency/ ELT inspection currency

24 months 3rd class medical duration for pilots over 40 / flight review duration / duration for a flight instructor's certificate / transponder & altitude encoder currency/ altimeter & static system currency / duration for BasicMed online tutorial training

60 months 3rd class medical duration for pilots under 40

4 years BasicMed pilot must visit a state licensed physician, every

7 years cycle for aircraft Certificate of Registration. See FAR 47.40 (a)

10 years duration for an FCC aircraft radio station license. The FCC operator's license issued to the individual does not expire

Altitudes (feet)

0 height a **QFE** altimeter setting reads on the ground (ICAO)

125 tolerance for **altitude reporting** feature of transponder (24 months test)

300 reporting tolerance for ATC to use **mode C** altitude read out (within)

500 AGL. **VFR traffic separation**/ minimum aircraft height in open areas

700 AGL. lower limit, transition area (**class E** airspace)

1000 AGL. minimum height over **congested areas** (airplanes)

1200 AGL. nominal lower limit, **class E** airspace

1500 AGL. minimum height, **turbine /heavy acft** in **class B, C, D** surface area

2000 AGL. **MEA** in **mountainous areas**/ nominal minimum height over national parks, wild life refuges/ recreational pilot exemption to a 10,000 foot altitude limit / sport pilot may operate above 10,000 feet MSL if within

2500 AGL. upper limit, **class D** surface area/ exemption to no mode C 10,000 foot limit

4000 AGL. upper limit of **class C** airspace (referenced to primary airport elevation)

5000 AGL. Minimum height to guarantee reception of a feeder VOR to a safe harbor airport (loss of satellite navigation signals) for most air space in the USA

8000 MSL. **recommended** limit, **no oxygen** (night)

10000 MSL. VFR limits change/ maximum height for a recreational pilot/ maximum height for a sport pilot unless within 2,000 AGL/ **mode C** required above

12500 MSL. **oxygen** required for **flight crew** above this height; time **beyond 30 minutes**

14000 MSL. **oxygen** required for **flight crew at all times** / holding inbound leg 1+30 minutes

14500 MSL. **upper limit of class G**; becomes class E airspace

15000 MSL. **oxygen** must be **offered to passengers**

18000 MSL (FL 180), **class A** airspace starts

25000 MSL (FL 250), must operate a pressurized aircraft above for **high altitude endorsement** (FAR 61.31)

29000 MSL (FL 290), Reduced Vertical Separation Minimum (**RVSM**) required above

41000 MSL (FL 410), upper limit for **RVSM**

60000 (FL 600), upper limit for **class A** airspace

Distances

500 ft minimum non formation **inflight separation**/ min stagger separation between departing aircraft on parallel runways less than 2500 feet apart (towered airports)

1200 ft maximum separation between parallel runways for ATC to issue instrument approach with **side step**

3000 ft (remaining) instrument runway; **center line lights** go from white to white & red/ area to determine touch down zone elevation (first 3000 feet of runway)

4300 ft minimum parallel runway separation for ATC to assign visual approaches with both runways in use

1 SM class G airspace visibility for VFR (day)/ class E, D, C, B visibility (special VFR)/ within ½ NM of runway at night

3 SM minimum class E, D, C airspace visibility for VFR/ minimum class G airspace visibility for night

3 NM nominal IFR lateral separation provided by ATC when co-altitude aircraft are within 40 NM of the ground radar antenna/ minimum separation for successive aircraft on the same localizer/ lateral separation from provided obstructions by minimum vectoring altitudes/ recommended distance to avoid special use airspace when on a direct clearance

3-5 NM nominal day time range for VASI lights

4 NM ATC assigned turbulence separation when co-altitude to 1000 feet below: between heavy jet and heavy jet, small aircraft behind a large aircraft

5 SM minimum visibility for class E airspace10,000’ and above, MSL

5 NM nominal IFR lateral separation provided by ATC when co-altitude aircraft are more than 40 NM from the ground radar antenna/ ATC assigned turbulence separation: large aircraft behind a heavy jet / minimum ARTCC lateral separation; co-altitude to 1000 feet vertically

6 NM minimum separation, small aircraft behind a heavy aircraft

10 NM max allowable ADIZ reporting point crossing error/ recommended distance from non tower airport to listen and call UNICOM or CTAF/ range of glide slope signal/ limit of outer ring of class C airspace

20 NM limit of designated outer area of class C airspace/ nominal range of VASI system (night)

25 NM range (service volume) for a terminal power VOR

30 NM radius of mode C veil around class B airspace; referenced to primary airport

100 NM range between altimeter settings when below 18,000 feet

130 NM range (service volume) for en route VOR (FL 180 to FL 450)

199 NM maximum range for DME

Speeds

200 KIAS maximum in airspace underlying class B airspace or a VFR corridor through class B airspace/ when at or below 2500 feet AGL and within 4 NM of primary airport in class C and class D surface areas/ max turbojet holding to 6,000' MSL

250 KIAS maximum below 10,000 feet MSL/ maximum in class B airspace / maximum for an aircraft to qualify for Sport Pilot operation (eff 7/24/26)

Degrees

0.3 Require Navigation Performance (RNP) level nominal accuracy for LNAV / VNAV or LPV type approaches. One side full deflection of the CDI is 0.3 NM (2,418 feet) on the approach final segment. See AIM 1-2-1

1.0 RNP level nominal accuracy RNAV (including GPS) for terminal air space (within 30 NM of departure or arrival airport, USA). One side full deflection of the CDI is 1.0 NM (6080 feet). See AIM 1-2-1

2.0 RNP level nominal accuracy RNAV (including GPS) for enroute air space (more than 30 NM from departure or arrival airport, USA). One side full deflection of the CDI is 2.0 NM (12,160 feet)

10 maximum VOR OBS angle, center to full deflection/ recommended heading correction increments to capture the localizer before passing the FAF

15 maximum angle-off between runway heading and final approach segment inbound course for an IAP to qualify for a vertically guidance (15 degrees +/-)

30 maximum non aerobatic pitch angle

60 maximum non aerobatic bank angle

VHF Frequencies

108.0 to 118.0 Aviation **navigation** (VOR, ILS)
118.05 to 137.0 Aviation **communications**

121.5 ICAO civil in-flight **emergency frequency**

122.7 Common Traffic Advisory Frequency, **CTAF**
122.725
122.8
122.975
123.0
123.05
123.075

122.75 **air-to-air** communications / private airport communications
123.025 **air-to-air** communications **helicopter**

122.9 **MULTICOM** for airports without a designated CTAF

122.925 **MULTICOM** for forestry, fire suppression, EPA monitoring
122.95 **MULTICOM** for airports with control towers

123.3 **Glider, hot air balloons**, aviation instruction (not advisory)
123.5

FAR SYNOPSIS

THE FOLLOWING IS A SYNOPSIS OF SOME OF THE FARs WHICH AFFECT YOU AS A PART 91 GENERAL AVIATION PILOT. THIS SYNOPSIS IS NOT A SUBSTITUTE FOR A COMPLETE REVIEW OF THE FARs. REFER TO THE FARs FOR ALL INFORMATION AFFECTING FLIGHT. (www.faa.gov)

43.3 [g] and Appendix A[c] Authorizes private pilots or higher to perform specifically listed **preventative maintenance** items on aircraft they own or operate and are not flown commercially. See also FAR 91.403

61.1 Aeronautical experience means pilot time obtained in an aircraft, flight simulator, or flight training device for meeting the appropriate training and flight time requirements for an airman certificate, rating, flight review, or recency of flight experience requirements of this part. **Cross-country time** means time acquired during flight conducted by a person who holds a pilot certificate; conducted in an aircraft; includes a landing at a point other than the point of departure (note: for rated pilots there is no distance requirement); and involves the use of dead reckoning, pilotage, electronic navigation aids, radio aids, or other navigation systems to navigate to the landing point. Commercial, ATP, and certain military pilots may fly 50 NM from point of departure & return to point of departure with no intermediate landing to gain cross county time. Cross county time to qualify for a rating – see FAR 61.101. **Pilot time** is time in an aircraft for which you are rated, simulator, or flight training device. To gain pilot time you must act as a required crew member or give training as an authorized instructor

61.2 You may **not exercise the privileges** of a certificate, rating, or endorsement if it has been surrendered, suspended, revoked by the FAA, or has expired for those privileges that are time limited

61.3 You must carry on your person or have readily available in the aircraft your **photo ID** (driver's license, passport, military ID, state issued ID) **pilot certificate** and **medical certificate** (if required) when you are acting as a required crew member. **Flight Instructors** giving instruction (signing a logbook) must carry their CFI certificate

61.15 Notify the FAA: AFS-760, www.faa.gov – Pilots and Airmen – Medical Certification – within **60 days of any motor vehicle action for DUI/DWI**. Any conviction, ever, involving **illegal drugs** may suspend or prevent issue of a pilot certificate for up to one year

61.19 A plastic **student pilot certificate** is valid indefinitely unless revoked by the FAA or surrendered by the applicant

61.23 Medical certificates: 3rd class -valid for 24 months. For persons less than 40 years old at time of issue, 60 months. 2nd class - valid for 12 months. 1st class - valid for 6 months. For persons less than 40 years old at time of issue, 12 months. No medical certificate is required to act as a **glider pilot, balloon pilot** (some limits, see), **light sport pilot or flight instructor**

61.31 To act as Pilot in Command (PIC) in any **high-performance aircraft** (more than 200 HP per engine) or to act as PIC in a **complex aircraft** (retractable gear, flaps, controllable propeller; flap and propeller only for seaplanes) you must receive flight instruction from an authorized instructor. These are one-time requirements and are good for all high performance / complex aircraft that do not otherwise require a type rating or FAA mandated type specific training. Pilots who have logged PIC time in high performance or complex aircraft prior to **8/4/1997** are "grandfathered" and exempt from these requirements. To act as PIC in any **tail wheel** (includes tail skid) or, to act as PIC in a **high altitude** (pressurized, capable of operations above FL 250) aircraft, you must receive flight instruction from an authorized instructor. Pilots who have logged PIC time in tail wheel or high altitude aircraft prior to **4/15/1991** are "grandfathered" and exempt from these requirements. Note these are separate requirements

61.51 Logging pilot time: You must log that time necessary to obtain a license or rating or to show currency. All other flight time may be logged for your own records. Your log book (any written or electronic form acceptable to the Administrator) must include: date/ total time of flight and or ground instruction/ place of departure and arrival (simulator or FTD location) / type of aircraft and identity (N number)/ type of pilot time (PIC, SIC, dual from a flight instructor.
You may log both PIC and dual on a flight if you qualify in both categories / flight conditions (day or night, actual or simulated instruments), and the name of the safety pilot for simulated instrument flight. **Pilot in Command** As a private or commercial pilot, you may log as PIC only that time you are the sole manipulator of the controls of an aircraft for which you are rated or when acting as PIC in an aircraft that requires more that one pilot. **ATPs** may log PIC when operating on a flight that requires an ATP rating. **Flight Instructors** may log PIC when giving flight instruction. **Second in Command** (SIC): flight time in an aircraft for which you are rated wherein the type aircraft or company regulations require

more than one pilot. **Safety Pilot** for another pilot flying wearing a vision limiting device may be logged as PIC time. Note that there is a clear distinction between **acting as PIC and logging PIC.** To act as PIC, you must meet all requirements for currency (**P**hoto ID, **P**hysical (if required), **B**iennial flight review, **C**urrency – 6 month instrument and 90 day landing, **F**lying endorsements or "grandfathered" for high performance / complex / high altitude / tail wheel, **L**icense – appropriate category and class). You may log PIC if you are the sole manipulator of the controls in an aircraft for which you are rated or are the sole occupant of the aircraft (no other requirements necessarily need be met). **With the exception of multi crew aircraft, ATPs, and flight instructors, only the person manipulating the controls may log PIC time.** Log books: you must present your log book (or any other required document) to the FAA, NTSB, state or local law official, and in many states, the airport manager, upon reasonable request. This has been interpreted to mean you have reasonable time to go to the place where the document is kept and then present it. Additionally, you do not have to surrender any document at that time. **Student pilots** must carry their log book and any other required documents with them on solo cross county flights to show evidence of required endorsements. **Recreational pilots and Sport Pilots** must carry their log book on any flight that requires a specific endorsement

61.53 You may not act as a required crew member any time you know or have reason to know you have a **medical deficiency** that prevents you from meeting the minimum standards of your **medical certificate,** including **BasicMed**, or operating any aircraft that do not require a medical certificate or only require a **driver's license** in a safe manner for those operations

61.56 Flight Review (FR) Required every 24 months to act as PIC. Note that you may fly in some other crew positions without a flight review. The FR requires a minimum of 1 hour of ground instruction and 1 hour of flight instruction (see requirements for gliders) from an authorized instructor(s). You must review the contents of FAR part 91 and any other areas deemed necessary by the conducting authorized instructor. The ground and flight portions of the FR may be given at separate times by separate instructors. The instructor giving the FR does not have pass / fail authority; you either receive a flight review endorsement or just dual flight instruction given if the FR is not completed. A successful check ride for any pilot or instructor license, rating or privilege given by the FAA, Designated Examiner, or US armed forces check airman will act in leu of a FR. The FAA considers that a FR given by a flight instructor does constitute flight instruction. To this end, FR may not be given in single seat aircraft. Aircraft with single flight controls** or "throw over" single yoke controls may be used for a FR only when the applicant can act as PIC for the flight

**Wheel brakes are not a flight control in this context. Wheel brakes are not required for the instructor administering the FR

61.57 Flight Currency: Three takeoffs and landings every 90 days as the sole manipulator of the controls to act as PIC if you are carrying passengers or if you have a safety pilot (or other required pilot crew member) with you. This must be in the same category (airplane, helicopter, etc.) and class (single engine land, multi engine land, etc.) and type, if so required. **Night PIC currency** requires three takeoffs and landing to a full stop within the period of one hour after sunset to one hour before sunrise. **Tail wheel aircraft** require full stop landings for currency as above. **Instrument currency:** within the last six calendar months you must fly six published instrument approaches (any type), enter one turn in holding, and capture and track a NAVAID bearing or radial in the category of aircraft you intend to fly. Alternatively, you may use an FAA approved simulator or flight training device representing the same category of aircraft you intend to fly. Fly the full approach to landing or MAP. Holding - cross a holding fix and fly at least one turn in the holding pattern. Track NAVAID - flying an approach will satisfy this requirement. Note you have a total of 12 calendar months to self renew for currency. After the 12th month, you must take an instrument proficiency check in the category of aircraft (simulator, or flight training device) you intend to fly with an instrument flight instructor, an FAA examiner or designated examiner, a company check pilot for FAR 121, 125, or 135 operations, or a U.S. armed forces check pilot

61.60 Change of Address: within 30 days of moving your permanent mailing address, send a change of address notice to: FAA, Airman Certification Branch, AFS 760. www.faa.gov – Pilots and Airman – Airman certification. Include your name, date of birth, airman certificate number and new address. If your new address is a post office box, rural route, or anything other than a "drive up" street address, include a signed and dated map to your new address. New airman certificates will not automatically be issued for address changes only

61.195 Flight Instruction Limits: A CFI may only provide **8 hours of instruction** in any consecutive 24 hour period. A CFI giving instruction must be **seated at a set of controls** as described in 91.109

61.303 Sport Pilot: Sport pilots, recreational pilots, and private pilots and higher may **act as PIC** in an aircraft that meets Light Sport Aircraft (LSA) criteria using either an FAA medical or a **valid U.S. driver's license**.

Recreational or private pilots or higher that have unresolved medical issues from a previously issued FAA medical certificate must resolved these issues to be able to use a driver's license in lieu of a medical certificate. A special issuance medical certificate does resolve any issues, and is limited only by any conditions placed on this special issuance certificate

61.315 Sport Pilot Limits: Sport pilots may **not act as PIC** in an LSA for hire or compensation. This includes any compensation, such as barter / to further a business / to demonstrate an aircraft for sale if a sales person / carry a passenger for a charitable organization / carry more than one passenger / in class A, B, C or D airspace, to or from an airport in class B, C or D airspace / at an airport with an operating control tower (see also 61.325) / above 10,000 feet / at night / when the inflight or surface visibility is less than 3 SM / without visual reference to the surface of the earth. Also, you may not act as PIC if there are limits placed on your driver's license that would prohibit operation of an aircraft

61.325 Sport Pilot Added Privileges: Sport pilots may **receive additional training** from an instructor to be able to act as PIC in class A, B, C or D airspace or to / from an airport in class B, C or D airspace or at an airport with a operating control tower

68.1 Basic Med pilots may act as a required crew member without holding a medical certificate issued under FAR part 67

91.3 The person **acting as PIC** is the final authority for the operation of the aircraft. In any inflight emergency requiring immediate action the PIC may deviate from any rule to the extent required to meet that emergency

91.7 The PIC is responsible for determining if an **aircraft is in a condition for safe flight**. This includes mechanical condition, required inspections, maintenance endorsements, and required documents on board the aircraft. Maintenance personnel, when completing work on an aircraft, do certify the aircraft is in a condition safe for flight AT THE TIME OF MAINTENCE RELEASE. When the PIC accepts the aircraft for flight, he / she must determine the aircraft is in a condition safe for flight. Any PIC determination otherwise will override the maintenance release

91.9 The PIC must ensure that any required **Pilot's Operating Handbook** or **Flight Manual** is in the aircraft for flight. Aircraft without a type certificate such as experimental, amateur built must comply with the requirements in the operating limits letter issued for that aircraft

91.13 No person may operate an aircraft in a **careless or reckless** manner so as to endanger the life or property of another

91.15 The PIC may not permit any **object to be dropped** from an aircraft that creates a hazard to persons or property

91.17 You may not act as a crew member within eight hours of consumption of **alcohol**, if you are under the influence of alcohol, or if your blood alcohol content is.04 percent or higher, by weight. If you are **using any drug** that affects your ability in any way contrary to safety you may not act as a required crew member.

91.19 You may **not carry any narcotic drug**, marihuana, depressant, stimulant or and other substance defined in federal or state laws as illegal, Exception – the above does not apply to any carriage of narcotic drugs, marihuana, and depressant or stimulant drugs or substances authorized by or under any Federal or State statute or by any Federal or State agency.

91.25 The FAA may not use reports submitted to the **NASA Aviation Safety Reporting Program** in any enforcement action except accidents and criminal offenses wholly excluded from the ASRP program

91.103 **Preflight actions** required before flight - **for all flights**: review the runway lengths at the airports of intended use; calculate the takeoff and landing distances from the aircraft flight manual or other reliable information relating to the aircraft performance under the expected flight conditions. **For all IFR flights or flights not in the vicinity of an airport-** become familiar with all information concerning the flight; weather reports and forecasts, fuel requirements, alternate airports when the flight to the planned destination can not be completed, known traffic delays when advised by ATC. “Advised by ATC” implies that a review of Distant (D) and Flight Data Center (FDC) NOTAMs are made as well as any delay advised in an ATC clearance

91.105 Required flight crew members must keep their **seat belt** fastened at all times they are at their flight crew station. If so equipped, **shoulder harnesses** must be fastened for takeoff and landing

91.107 The PIC may not allow the aircraft to taxi, takeoff, or land until each person on board is notified to fasten their **seat belt** and **shoulder harness**, if installed. Persons less than two years old do not require a seat.

The floor of the aircraft may be used as a seat when carrying individuals involved in **sports parachuting**

91.109 Flying **simulated instruments** requires a vision limiting device and a safety pilot. The **safety pilot** must be at least a private pilot with the appropriate category and class license and current medical status including BasicMed, and a current flight review. A pilot wearing a vision limiting device is NOT PIC; the safety pilot must fill this requirement. The safety pilot must be seated in the other control seat, have adequate forward and side visibility, and have duplicate full functioning controls or a throw over" yoke. **Throw over yoke aircraft** may only be used when in single engine aircraft and the pilot flying is at least a private pilot with appropriate ratings. A CFI may only give instrument instruction in a throw over yoke single engine aircraft if he / she is qualified to act as PIC on that flight, and has 25 hours PIC time in that make and model of aircraft

91.113 **Right-of-Way** rules. The least maneuverable aircraft (balloon) has the most right-of-way; the most maneuverable aircraft (helicopter) has the least right-of-way. An aircraft in distress has right-of-way over all other traffic. Towing aircraft have right-of-way over all other engine driven aircraft. When aircraft are on crossing paths inflight the aircraft to the right has right-of-way. Aircraft will alter course to their right when approaching head on. If overtaking an aircraft, the overtaken aircraft has the right-of-way. When landing, the lower aircraft has the right-of-way and a landing aircraft has reasonable right of way over landed or not yet departed aircraft. Anytime you are VMC, the PIC has final authority and responsibility for the **separation of aircraft**

91.117 **Aircraft speeds:** below 10,000 feet MSL and within class B airspace, 250 KIAS maximum. In the airspace directly under class B airspace or a VFR corridor through class B airspace, 200 KIAS maximum. Within 4 NM of the primary airport in class C or D airspace when at or below 2500 feet AGL, 200 KIAS maximum. Note that ATC may authorize a higher speed in controlled airspace

91.119 **Minimum safe altitudes, airplanes:** Except for takeoff and landing, do not fly lower than a height from which you can make an emergency landing without undue hazard to people or property on the surface. Do not fly within 1000 feet vertically and 2000 feet horizontally of the highest obstacle when over congested areas. Do not fly lower than 500 feet AGL when over other than congested areas. Do not fly within 500 feet of any person, vessel, structure or object when over open water or sparsely populated areas. **Helicopters and powered parachute / weight**

shift LSA: Helicopters may operate at less than 500 feet in congested areas or within 500 feet in non-congested areas undue hazard to people or property on the surface

91.121 Altimeter setting: below 18,000 feet MSL, use the altimeter setting reported by ATC or received by a station along the route of flight and within 100 NM of your aircraft. When departing from an airport that does not have an approved altimeter source use the setting received from ATC or the field elevation. At and above 18,000 feet, use 29.92 inches / 1013 millibars

91.123 ATC clearances: When you have received and accepted an ATC clearance you must comply with that clearance. You may deviate from your clearance only in an emergency or in response to a Traffic Alert and Collision Avoidance System (TCAS) resolution advisory. Tell ATC you are deviating from your clearance as soon as possible. If you are uncertain as to the meaning of a clearance, request clarification from ATC. If you deviate from an ATC clearance you must submit a detailed report on the circumstances within 48 hours only if requested to do so by ATC. If you request **VFR flight following** radar services from ATC or sequencing from an ATC tower do understand which services ATC will provide. If you receive a discreet transponder code and flight following, this in no way alters your status as a VFR flight. ATC will provide traffic advisories and other services on request. You are responsible for terrain and special use airspace clearance and are the final authority for the separation of aircraft. Unless ATC states specific headings, altitudes, and airspeeds you may maneuver your aircraft as you need to. This is true when in class C, D or E airspace. Advise ATC of changes only if they ask you to. When communicating with an **ATC tower**, you will receive sequencing services. You must remain VMC if you are VFR and you are responsible for the separation of aircraft. You must comply with ATC instructions. The tower controller must separate traffic at the runway as well as sequence traffic in the surface area but you, the PIC, are the final authority for the separation of aircraft

91.126, 91.127 When landing at **non towered airports** in **class G, E**, or **C airspace**, make all turns to the left unless your chart, other references, or visual markings indicate right turns

91.129 Helicopters will avoid the flow of fixed wing traffic. **Tower controlled airports** in class D or C airspace: you must establish communications with the tower prior to entry into the class D or C airspace. “Establish communications” has been interpreted to mean the appropriate ATC facility acknowledges you by call sign. You must comply with the instructions issued by the tower (see

FAR 91.123). In the event of **radio failure** you may land at the tower controlled airport if the weather is at or above basic VFR minimums, visual contact is maintained with the tower, and a clearance to land (light signal) is given. When approaching to land on a runway served by a **visual approach slope indicator,** you must remain at or above the glide slope until a lower altitude is necessary for a safe landing. When departing non towered satellite airports in **class D or C airspace**, establish communications with the primary airport tower or appropriate ATC facility as soon as practicable after takeoff

91.130 When operating in **class C airspace**, you must establish radio communications with the ATC facility controlling that airspace

91.131 You must be at least a private pilot to operate without restriction in **class B airspace.** Student pilots and sport pilots (no other pilot rating) must have specific ground and flight training in class B airspace and current log book endorsements from a flight instructor to operate in that class B airspace (student pilots) and operate from any airport in the class B airspace. See FAR 61.95 and 61.325. The minimum equipment to operate in class B airspace is a two-way VHF radio, a transponder with altitude reporting, and ADSB OUT. When operating VFR, no specific navigation equipment is required; a VOR, TACAN, or RNAV receiver is the minimum required when IFR. If your transponder or altitude encoder is inoperative, you may receive clearance to enter / operate in class B airspace from ATC. See FAR 91.215(d)

91.133 You may enter **Prohibited** and **Restricted areas** only with permission of the controlling agency for that area. See Airspace, previous

91.137 **Temporary flight restrictions** near **disaster / hazard areas** will be announced by FDC NOTAM. Do not operate into or through these TFRs unless ATC routes you through or directly to / from an airport within a TFR. If there is no other clearly practicable means to operate VFR to and from an airport within this TFR, including limitations imposed by terrain or weather you may operate VFR in the TFR with ATC approval. You must notify the FSS or ATC facility listed in the NOTAM prior to flight and receive advisories on any other operation within the restricted area and you must not hamper any official operations within the restricted area. You may not exercise this privilege simply to observe disaster operations within the temporary restricted area. See https://tfr.faa.gov

91.139 The FAA may **limit the air traffic control system** operations to meet the level of safety and efficiency required by using emergency air traffic rules**.** FDC NOTAMs will be filed for these conditions

91.141 President and other party TFR You may not operate an aircraft over or in the vicinity of any area to be visited or traveled to by the President, Vice President, or other public figures. FDC NOTAMS will establish restrictions. See https://tfr.faa.gov

91.146 Charity Flights You may act as PIC for a charity flight only four times in a calendar year. **See the full text of 91.146 for additional information. Young Eagle** flights are exempt under certain conditions

91.151 Fuel reserves VFR – daytime. You must plan, considering the known winds aloft and any known ATC delays, to fly to the first point of intended landing and be able to fly for 30 minutes thereafter at normal cruising speeds. Night; as above but you must plan to have fuel to fly for 45 minutes thereafter. Rotorcraft operating VFR (day or night) must plan for 20 minutes fuel. You must PLAN for these fuel reserves. If winds are not as forecast or you encounter previously unknown ATC delays you may legally land with less than the above reserves if there was no suitable airport available at the time the above reserves were reached

91.153 If you file a **VFR flight plan** you must cancel this flight plan with Flight Service or ATC facility upon completion of the flight

91.155 Weather minimums, VFR - see weather minimums section, previous

91.157 Special VFR - see weather minimums section, previous

91.159 VFR enroute altitudes when in level flight and more than 3000 feet AGL maintain the following altitudes: On a magnetic course (NOT heading) of 000 to 179 degrees any odd thousand foot increment plus 500 feet (5,500, 7,500, 9,500, etc.). On a magnetic course of 180 to 359 degrees, any even thousand foot increment plus 500 feet (4,500, 6,500, 8,500, etc.). This applies up to 18,000 feet MSL. Below 3000 feet AGL or when climbing, descending, or in a holding pattern of two minutes or less, you may fly at any altitude

91.161 VFR flights with 60 NM of the DCA VOR requires you have completed a one-time certificated training course. See www.faasafety.gov - courses

91.203 Required certificates - a current airworthiness certificate and appropriate certificate of registration. The airworthiness certificate must be

carried in the aircraft and displayed near the entrance in view of the aircrew and passengers. If a fuel tank is installed in the cabin or baggage compartment you must carry a FAA form 337 in the aircraft documenting the tank installation. See FAR 47.40 for **periodic re-registration of aircraft**

91.205 Minimum standard equipment required for flight operations in powered civil aircraft. **FOR ALL FLIGHTS:** airspeed / altimeter / magnetic compass / tachometer for each engine / oil pressure / oil temperature for each air cooled engine / coolant temperature for each liquid cooled engine / manifold pressure for each turbocharged or supercharged engine / fuel gauge for each tank / landing gear position indicator for retractable gear / approved safety belt for each occupant over two years old / shoulder harness for each front seat In small aircraft manufactured after July 18, 1978 / emergency locator transmitter (see FAR 91.207) / anti-collision light now required for day and night operation in aircraft certificated after March 11, 1996. Aircraft certificated prior to this date require for night operations only. The following is additionally required for **NIGHT OPERATIONS:** approved position lights / approved anti-collision light, / landing light (aircraft for hire only). The following is additionally required for all **IFR OPERATIONS:** a two-way radio and navigation equipment suitable for the route to be flown / gyro rate of turn / slip - skid indicator / sensitive (adjustable) altimeter / clock with hour, minutes, seconds display / generator or alternator of adequate capacity / artificial horizon / directional gyro / DME or suitable RNAV equipment for flights at or above FL 240

Note: not stated in FAR 91.205, but by policy, the FAA does not dictate what kind or currency of aviation aids (charts) you have in the aircraft for FAR part 91 VFR flight operations. The PIC is responsible for the safety of the flight; you may not be remanded for carrying **out of date aeronautical charts,** paper or electronic, in the aircraft. Understand that if you are involved in an airspace violation due to out-of-date charts, this would be a factor in the FAA's evaluation

91.207 Emergency Locator Transmitters: You must have a properly installed ELT in the aircraft. ELTs must be inspected every 12 months and an airframe log book endorsement made. The following exceptions do not require an ELT on board:

-single seat aircraft
-training flight within 50 NM of the departure airport
-any non turbojet aircraft operated under FAR part 91 - for 90 days maximum, provided the aircraft log book is endorsed for the removal of the ELT and a placard is placed in view of the PIC showing "ELT removed"

As of 2/1/ 2009, COPAS – SARSAT **satellite no longer monitor 121.5 or 243.0 frequencies**. You may continue to fly with a VHF (121.5) ELT installed

before 6/21/1995. Other ICAO countries now require 406 MHz frequency ELTs. Short term flights to the Bahamas, Mexico, or Canada does not currently require 406 MHz equipment for US registered aircraft

91.209 Position lights: You must display position lights (red/green/white) between sunset and sunrise. You must display position lights or well illuminate an aircraft if parked or being moved on the ground in dangerous proximity to night flight operations areas

91.211 Oxygen requirements: When the CABIN altitude is above12,500 and at or below 14,000 feet MSL, the required crew member(s) must use supplemental oxygen when at these altitudes for more than 30 minutes STARTING with the 31st minute. Above 14,000 feet, the required crew must use oxygen at all times. At 15,000 feet and above, the crew must offer oxygen to passengers (use of oxygen is optional). In pressurized aircraft above FL 250, regardless of cabin altitude, the crew must provide a 10 minute supply of oxygen to each person, in the event of loss of cabin pressure

91.213 Inoperative equipment and instruments: You must either have an approved Minimum Equipment List (MEL) for the aircraft and you follow the directives therein OR you may remove or deactivate and placard inoperative equipment and instruments in small (less than 12,500 # CERTIFIED take off weight) rotor craft or non turbine airplanes and the equipment is NOT:

-Part of the day VFR equipment or instruments required by the type certificate data sheet for the aircraft
-Indicated as required in the aircraft's equipment list for kinds of operations conducted
-Required by FAR 91.205 (minimum standard equipment for flight operations) or any other rule in FAR 91 for the specific kind of flight operations being conducted
-required to be operational by an air worthiness directive

91.215 Transponder requirements: If you have a transponder and it meets the 24 months system check, you must operate the transponder and altitude reporting feature on the code assigned by ATC. Transponders with altitude reporting are required in class A, B, and C airspace; within 30 NM of the primary airport(s) in class B airspace and when at and above 10,000 feet MSL (except when you are at/above 10,000 feet MSL AND within 2,500 feet AGL). If you do not have altitude reporting capability, or it is inoperative, you may request a waiver to enter airspace requiring such at ANY time. If you have a transponder but it is inoperative, you may request a waiver to enter airspace requiring such at ANY time. If you do not have a transponder on board, you must request a waiver at least one hour before the proposed operation

91.217 The **altitude reporting** feature of your transponder must be tested to an125 foot accuracy. When ATC asks for your altitude read out, ATC must see a displayed altitude within 300 feet that which you verbally report. If you report an altitude greater than 300 different from your readout, ATC may not use your altitude reporting function for separation purposes. ATC hand book 7110.65

91.221 If your aircraft is equipped with an approved, operable Traffic Alert and Collision Avoidance (**TCAS**) system, you must operate that system inflight

91.225 Automatic Dependent Surveillance Broadcast OUT - Starting on 1/2/2020 ADSB OUT (aircraft to ground, aircraft to aircraft) is required for all operations in Class A, within 30 NM of, and in, class B, Class C airspace, at and above 10,000' MSL, class E, at and above 3000' MSL, the Gulf of Mexico, and within 12NM of the coastline

91.303 Aerobatic flight: Defined as any intentional maneuver involving an abrupt change in an aircraft's attitude, an abnormal attitude, or abnormal acceleration not necessary for normal flight. You may not perform aerobatic flight if: over a congested city, town, or settlement / over an open air assembly of persons / within the lateral boundaries of surface based class B, C, D, or E airspace designated for an airport (this does not include the concentric, non surface based rings to class B or C airspace) / within four NM of the centerline of an airway / below 1,500 feet AGL / when flight visibility is less than three SM

91.307 Parachutes: If carried for emergency purposes, they must be FAA approved and repacked as required. Refer to the specific make parachute for packing currency (specifies 180 day or 60-day limits for certain types of materials). If carrying another person other than a crew member you may not exceed 60 degrees of bank or 30 degrees of pitch unless all occupants of the aircraft are wearing a current, approved parachute. Exceptions: a flight test for a certificate or rating / spins and other flight maneuvers performed by an ATP instructing an ATP candidate or a flight instructor instructing a student for a certificate or rating. Note: further clarification was published in the Federal Register referencing FAR 91.71 (now 91.307). "…regardless of what certificate or rating the applicant is seeking, an aerobatic maneuver required for any pilot certificate or rating (even one not presently sought by the applicant) may be performed **without parachutes** when done by, or at the direction of, a certified flight instructor

91.319 Experimental Aircraft: No person may operate an experimental certificated aircraft for other than the purpose for which the certificate was issued. For a newly certificated aircraft, you may not operate

outside of a designated area until it is shown that the aircraft operates normally and has no hazardous operating characteristics or design features. You must operate day VFR only and may not operate over densely populated areas or on a congested airway unless so authorized in the special operating limitations. You may not carry persons for compensation or hire. *The FAA has granted EAA, NAFI and SAMA an exemption from FAR 91.319(a). This exemption allows owners of experimental "crew training" (FAR 21.191(c)), "exhibition" (FAR 21.191(d)), amateur-built (FAR 21.191(g)) or kit-built (FAR 21.191(h) aircraft to rent, or lease their aircraft to other rated pilots for the purpose of providing aircraft specific transition training and flight reviews (FAR 61.56).*
You must notify control towers that you are an experimental aircraft. Experimental aircraft, by convention, use the term “experimental” on initial contact to all ATC agencies. Normally, a letter, “experimental operating limitations” (FAA form 8130-1) accompanies the special airworthiness certificate (FAA form 8130-7) issued. The above letter states the conditions and limitations for operations for the aircraft

91.403 The owner or operator of an aircraft is primarily responsible for maintaining that **aircraft in an airworthy condition**. Only individuals authorized in FAR part 43 may work on aircraft (mechanic or repairman) except for specific preventative maintenance which may be performed by the aircraft owner. See FAR 43.3. You may not fly an aircraft that has not complied with all manufacturer’s required inspections, parts repair, or replacement

91.405 The owner or operator of an aircraft must ensure the aircraft receives the required **maintenance inspections** and the person performing these inspections makes appropriate entries to return the aircraft to service in the airframe, engine, and propeller log books. The owner or operator is responsible to have inoperative equipment removed or placarded before flight. FAR 91.213

91.407 The owner or operator of an aircraft may not fly that aircraft after maintenance, alteration, or rebuilding unless it has been approved for **return to service** by a person authorized under FAR 43.9 or 43.11. If an aircraft receives alteration that may have appreciably changed the flight characteristics or substantially affected its operation in flight, only crew members may fly for an operational check of the aircraft. The PIC must be at least a private pilot. The PIC makes an operational check of the maintenance performed or alteration made. If satisfactory, the PIC makes an entry in the maintenance log book(s) to return the aircraft to service

91.409 No person may fly an aircraft unless and **annual inspection** or **on condition inspection** for experimental category aircraft was performed within the last 12 calendar months. No PIC may carry a person other than a crew

member for hire and no person may give flight instruction in an aircraft he / she provides unless the aircraft has a current **100 hour inspection**. 100 hour inspections may go 10 hours over the 100 hour limit if the aircraft is enroute to a place where the 100 hour or annual inspection can be performed

91.411 The **altimeter** and the **static system(s)** must be inspected every 24 calendar months to operate IFR

91.413 The **transponder** and **altitude encoder**, if installed, must be inspected every 24 calendar months

AIM EXTRACTS

THE FOLLOWING EXTRACTS FROM THE AERONAUTICAL INFORMATION MANUAL (AIM) AND OTHER SOURCES WILL ASSIST YOU IN FLIGHT OPERATIONS. SOME ITEMS ARE REWORDED FOR BREVITY. THIS IS NOT A COMPLETE REVIEW OF THE AIM. SEE THE AIM FOR ALL INFORMATION FOR FLIGHT OPERATIONS

1-1-17 IFR APPROACHES

You must have a current data base to fly the approach. You may practice a GPS approach with an out-of-date data base as long as the data has not changed and you do not file IFR. If you ask for an approach, your TSO 129C receiver will look at the data base for the information to move it to the usable memory. If the data base is out of date, your receiver will retrieve the data, but requires you to acknowledge the data base is not current. This is to load an out-of-date approach for VFR practice or under emergency conditions if IFR / IMC

1-2-2 Required Navigation Performance (RNP) – Area Navigation **(**RNAV, includes GPS) with on−board navigation monitoring and alerting. RNP is also a statement of navigation accuracy necessary for operation within a defined area of the airspace. A critical component of RNP is the ability of the aircraft navigation system to monitor its own navigation performance and to identify to the pilot whether the necessary accuracy in navigation is or is not being met. This on−board performance monitoring and alerting capability therefore allows less reliance on air traffic control intervention (via radar monitoring, automatic dependent surveillance, multilateration, or communications) and / or route separation to achieve the overall safety of the operation

4-1-9 At **non towered airports**, use the following communications procedures: arrival – listen first when approximately 10 NM from the airport. Then call to request an airport advisory on UNICOM or state your intentions on CTAF. Report entering downwind, base, final, and leaving the runway. The following chart shows recommended radio calls. While it is appropriate to make additional short, direct transmissions for immediate safety of flight (example: “Middle Muni traffic, Cessna 34ME is downwind, runway 18, number two behind the red and white Arrow, Middle Muni”). Do not use nonstandard radio terminology

TBL 4-1-1

Summary of Recommended Communication Procedures

			Communication/Broadcast Procedures		
	Facility at Airport	Frequency Use	Outbound	Inbound	Practice Instrument Approach
1.	UNICOM (No Tower or FSS)	Communicate with UNICOM station on published CTAF frequency (122.7; 122.8; 122.725; 122.975; or 123.0). If unable to contact UNICOM station, use self-announce procedures on CTAF.	Before taxiing and before taxiing on the runway for departure.	10 miles out. Entering downwind, base, and final. Leaving the runway.	
2.	No Tower, FSS, or UNICOM	Self-announce on MULTICOM frequency 122.9.	Before taxiing and before taxiing on the runway for departure.	10 miles out. Entering downwind, base, and final. Leaving the runway.	Departing final approach fix (name) or on final approach segment inbound.
3.	No Tower in operation, FSS open	Communicate with FSS on CTAF frequency.	Before taxiing and before taxiing on the runway for departure.	10 miles out. Entering downwind, base, and final. Leaving the runway.	Approach completed/terminated.
4.	FSS Closed (No Tower)	Self-announce on CTAF.	Before taxiing and before taxiing on the runway for departure.	10 miles out. Entering downwind, base, and final. Leaving the runway.	
5.	Tower or FSS not in operation	Self-announce on CTAF.	Before taxiing and before taxiing on the runway for departure.	10 miles out. Entering downwind, base, and final. Leaving the runway.	

4-1-11 Airports that do not have a published UNICOM or CTAF may use **multicom** (122.9) to announce traffic intentions. Use 122.75 (airplanes) or 123.025 (helicopters) for **air to air communications** or when operating at a **private airport** not open to the public

4-2-3 Contact procedures: When making **the initial call to any ATC** controller or FSS specialists, use the following format:

-Name of the facility you are calling
-Your FULL call sign
-Your type of message or your full request, if it is short
-Term over as necessary, to end your transmission

4-2-4 Note ATC may **abbreviate your call sign** to your prefix and last three identifiers. Once ATC has abbreviated your call sign, you may continue to use this shortened call sign with THAT controller. If another aircraft with a similar sounding call sign comes up on frequency, either you or the ATC controller should initiate use of your full call sign in the interest of flight safety. On initial contact to a new controller, always use your full call sign. Example: *Houston Center Cessna 1234ME four thousand, direct Memphis* (reply from Center) *Cessna 4ME, roger*. Use the “N” prefix to your call sign only when flying outside of the USA. Acknowledge all calls from ATC, either verbally or through actions observable by the controller. Example: *"Cessna 4ME, squawk 4523 and ident"*. ATC will observe your reply via the squawk and ident you give. Always reply verbally if ATC's instructions are not clear. Use of standard abbreviation such as "roger" (I understand your transmission) "wilco" (I understand your transmission and will comply with your instructions) "affirmative" and "negative" are encouraged to reduce transmission time

4-3-3 It is recommended you fly the **traffic pattern** at **non-towered airports** as crosswind, downwind, base, and final. The only requirement in the FARs is **direction of turns** (91.126-130). Helicopters will avoid the flow of fixed wing traffic

4-3-11 ATC may authorize **takeoffs and landings on multiple intersecting runways.** Takeoff: the tower will issue an intersection takeoff clearance. Example:

“Cessna 1234ME, intersection Mike, cleared for takeoff runway 14”

You may request usable runway distance remaining from the tower.
Landing: the tower will issue a land and hold short clearance. Example:

"Cessna 1234ME, cleared to land runway 14, hold short runway 03"

You may request usable runway distance available for landing from the tower. You need not accept a land and hold short (LAHSO) clearance if you are unwilling or unable to comply

4-4-1 An **ATC clearance** is NOT permission to deviate from any rule, regulation, or minimum altitude nor conduct unsafe operations in your aircraft at any time. If ATC issues a clearance that would cause you to deviate from a rule or regulation, or in your opinion, would place the aircraft in jeopardy, it is your responsibility to request an amended clearance. If you take action that differs from your ATC clearance, you must inform ATC accordingly

4-4-4 You may request an **amended clearance** from ATC if you feel you have information that would make a different course of action more practicable or if your equipment or operating limitations would prohibit compliance with the clearance issued

4-4-6 **Special VFR** clearances: see Special VFR in "Weather Minimums for VFR Flight", previous

4-4-7 **Pilot Responsibility upon Clearance Issuance** Write down your clearance or use electronic clearance delivery when received from ATC. With the initial clearance, read back the complete text or acknowledge electronically. Airborne aircraft should read back / acknowledge those parts of an ATC clearance containing altitude assignments and / or headings. It is your responsibility to accept or reject an ATC clearance at the time it is issued

4-4-9 **VFR / IFR Flights** A pilot departing VFR, either intending or needing to obtain an IFR clearance en route, must be aware of the position of the aircraft and the relative terrain/obstructions. When **accepting a clearance below the MEA / MIA / MVA / OROCA**, **pilots are responsible for their own terrain & obstruction clearance** until reaching the MEA / MIA / MVA / OROCA. If the pilot are unable to maintain terrain / obstruction clearance, the controller should be advised and pilots should state their intentions

4-4-13 **Runway Separation:** Tower controllers establish the sequence of arriving and departing aircraft by requiring them to adjust flight or ground

operation as necessary to achieve proper spacing. They may "HOLD" an aircraft short of the runway to achieve spacing between it and an arriving aircraft; the controller may instruct a pilot to "EXTEND DOWNWIND" in order to establish spacing from an arriving or departing aircraft. At times a clearance may include the word "IMMEDIATE." For example: "CLEARED FOR IMMEDIATE TAKEOFF." In such cases "IMMEDIATE" is used for purposes of *air traffic separation.* It is up to the pilot to refuse the clearance if, in the pilot's opinion, compliance would adversely affect the operation

4-4-14 **Visual Separation** is used by ATC to separate aircraft in terminal areas and enroute airspace. Two methods are employed to affect this separation:

a.

1. The tower controller sees the aircraft involved and issues instructions as necessary to ensure that the aircraft avoid each other

2. A pilot visually sees the other aircraft involved and on instruction from the controller provides separation by maneuvering the aircraft to avoid the other aircraft. When a pilot accept responsibility to maintain visual separation, they must maintain constant visual surveillance and not pass the other aircraft until it is no longer a factor. *Traffic is no longer a factor when, during the approach phase, the other aircraft is in the landing phase of flight or executes a missed approach. During departure or enroute, when the other aircraft turns away or is on a diverging course*

b. A pilot's acceptance of instructions to follow another aircraft or provide visual separation from another aircraft is an acknowledgment that the pilot will maneuver the aircraft as necessary to avoid the other aircraft or to maintain in-trail separation. In operations conducted behind heavy jet aircraft, it is also an acknowledgment that the pilot accepts the responsibility for wake turbulence separation. *When a pilot has been told to follow another aircraft or to provide visual separation, the pilot should promptly notify the controller if visual contact with the other aircraft is lost or cannot be maintained or if the pilot cannot accept the responsibility for the separation for any reason*

c. Scanning the sky for other aircraft is a key factor in collision avoidance. Pilots and copilots (or the right seat passenger) should continuously scan to cover all areas of the sky visible from the cockpit. Pilots must develop an effective scanning technique which maximizes one's visual capabilities. Spotting a potential collision threat increases directly as more time is spent looking outside the aircraft. One must use timesharing techniques to effectively scan the surrounding airspace while monitoring instruments as well**. Be aware that not all aircraft below 10,000' MSL may show on your ADSB IN traffic display.**

d. Since the eye can focus only on a narrow viewing area, effective scanning is accomplished with a series of short, regularly spaced eye movements that bring successive areas of the sky into the central visual field. Each movement should not exceed ten degrees, and each area should be observed for at least one second to enable collision detection. Although many pilots seem to prefer the method of horizontal back-and-forth scanning every pilot should develop a scanning pattern that is not only comfortable but assures optimum effectiveness. Pilots should remember, however, that they have a regulatory responsibility (14 CFR Section 91.113 (a)) to see and avoid other aircraft when weather conditions permit

4-4-15 Use of Visual Clearing Procedures Before Takeoff Prior to taxiing onto a runway or landing area in preparation for takeoff, pilots should scan the approach areas for possible landing traffic and execute the appropriate clearing maneuvers to provide them a clear view of the approach areas. **Climbs and descents -** During climbs and descents in flight conditions which permit visual detection of other traffic, pilots should execute gentle banks, left and right at a frequency which permits continuous visual scanning of the airspace about them. **Straight and level -** Sustained periods of straight and level flight in conditions which permit visual detection of other traffic should be broken at intervals with appropriate clearing procedures to provide effective visual scanning. **Traffic pattern -** Entries into traffic patterns while descending create specific collision hazards and should be avoided. **Traffic at VOR sites -** All operators should emphasize the need for sustained vigilance in the vicinity of VORs and airway intersections due to the convergence of traffic. **Training operations -** Operators of pilot training programs are urged to adopt the following practices: Pilots undergoing flight instruction at all levels should be requested to verbalize clearing procedures (call out "clear" left, right, above, or below) to instill and sustain the habit of vigilance during maneuvering. **High-wing airplane -** Momentarily raise the wing in the direction of the intended turn and look. **Low-wing airplane -** Momentarily lower the wing in the direction of the intended turn and look. Appropriate clearing procedures should precede the execution of all turns including chandelles, lazy eights, stalls, slow flight, climbs, straight and level, spins, and other combination maneuvers

4-5-7 Automatic Dependent Surveillance and Broadcast (ADSB) is a surveillance technology deployed throughout the National Airspace System. The ADSB system is composed of aircraft avionics and a ground infrastructure. Onboard avionics determine the position of the aircraft by using the GNSS and transmit its position along with additional information about the aircraft to ground stations for use by ATC and other ADSB services. This information is transmitted at a rate of approximately once per second. ADSB OUT is the aircraft transmitting its position to ATC. ADSB IN is data link information from the ground to the aircraft. (see “NextGen”, previous)

4-5-8 Traffic Information Service Broadcast TISB

TISB is NOT intended to be used as a collision avoidance system and does not relieve the pilot's responsibility to “see and avoid” other aircraft in accordance with 14 CFR 91.113b. TISB must not be used for avoidance maneuvers during times when there is no visual contact with the intruder aircraft. TISB is intended only to assist in the visual acquisition of other aircraft.
No ADSB in-cockpit traffic displays in general aviation aircraft are certificated as traffic avoidance systems – they are aids for the visual acquisition of traffic. *(*see “NextGen”, previous*)*

5-1-3 Notice to Airman (NOTAM) Domestic NOTAM (D) are disseminated for all navigational facilities that are part of the National Airspace System, all public use aerodromes, seaplane bases, and heliports listed in the Chart Supplement. Flight Data Center NOTAMs (FDC) are issued when it is necessary to disseminate regulatory information, such as Temporary Flight Restrictions, limits to ATC capacity, other.
The FAA is in the process or revising the NOTAM system

5-5-1 Pilot and controller roles and responsibility The **pilot-in-command** of an aircraft is directly responsible for, and is the final authority as to the **safe operation of that aircraft**. In an **emergency** requiring immediate action, the pilot-in-command **may deviate from any rule** in the General Subpart A and Flight Rules Subpart B in accordance with 14 CFR Section 91.3. The **air traffic controller** is responsible to give **first priority** to the **separation of aircraft** and to the issuance of radar safety alerts, second priority to other services that are required, but do not involve separation of aircraft and third priority to additional services to the extent possible. In order to maintain a safe and efficient air traffic system, it is necessary that each party fulfill their responsibilities to the fullest. The responsibilities of the pilot and the controller intentionally overlap in many areas providing a degree of redundancy. Should one or the other fail in any manner, this overlapping responsibility is expected to compensate, in many cases, for failures that may affect safety. The following, while not intended to be all inclusive, is a brief listing of pilot and controller responsibilities for some commonly used procedures or phases of flight. More detailed explanations are contained in other portions of this publication, the appropriate CFRs, ACs and similar publications. The information provided is an overview of the principles involved and is not meant as an interpretation of the rules nor is it intended to extend or diminish responsibilities

5-5-8 See and avoid: when you are in visual meteorological conditions (VMC) you are the final authority for the separation of aircraft

5-5-15 Minimum fuel advisory: If you are in contact with ATC, advise them of your minimum fuel status any time you can not accept any delay when reaching destination. Example: *"Approach, Cessna 1234ME, minimum fuel"*
Note that this is not an emergency condition, but *advises* ATC you have a mitigating condition. You may not necessarily receive traffic priority unless you declare an emergency. If requested state your fuel remaining in minutes. Example: *"Approach, Cessna 1234ME estimates 15 minutes fuel remaining"*

6-1-1 Pilot Responsibilities and Authority In an emergency requiring immediate action, the pilot in command may deviate from any rule in 14 CFR Part 91, Subpart A, General, and Subpart B, Flight Rules, to the extent required to meet that emergency

6−1−2 Emergency Condition− Request Assistance Immediately An emergency can be either a *distress* or *urgency* condition as defined in the Pilot / Controller Glossary. Pilots do not hesitate to declare an emergency when they are faced with *distress* conditions such as fire, mechanical failure, or structural damage. However, some pilots are reluctant to report an *urgency* condition when they encounter situations which may not be immediately perilous, but are potentially catastrophic. An aircraft is in at least an *urgency* condition the moment the pilot becomes doubtful about position, fuel endurance, weather, or any other condition that could adversely affect flight safety. This is the time to ask for help, not after the situation has developed into a *distress* condition