General Aviation Common Safety Challenges 2005

How am I affected by the high number of GA accidents and why is the FAA publishing General Aviation (GA) safety information for me to review?

No one likes a fatal GA accident, or any GA accident at all, including the FAA, as a member of the GA flying community. The FAA is responsible for the safety of the flying public; this includes both commercial and general aviation. The FAA goals for the GA community are to:

1. Reduce the total number of fatal GA accidents each year,
2. Reduce the total number of non-fatal GA accidents each year, and
3. **Keep you from adding to our GA accident list**.

Why tell me this now? Summer and early autumn are typically the peak seasons for general aviation (GA) flying. Consequently, it shouldn't be any surprise that it is also the peak time for GA accidents. Flying safety awareness is most effective when the pilots are able to practice flight safety, rather than just reading or talking about flight safety in the comfort of our favorite chair during the off season. Basically, we remember the most recent knowledge.

The FAA promotes pilot safety awareness by tracking, analyzing, and highlighting GA accidents so we can learn from other's mistakes. Most pilots want to be safe and minimize their risks. Reviewing the causes of most common accidents allows pilots to focus their training where it counts. It also may help their judgment prior to and during their flights.

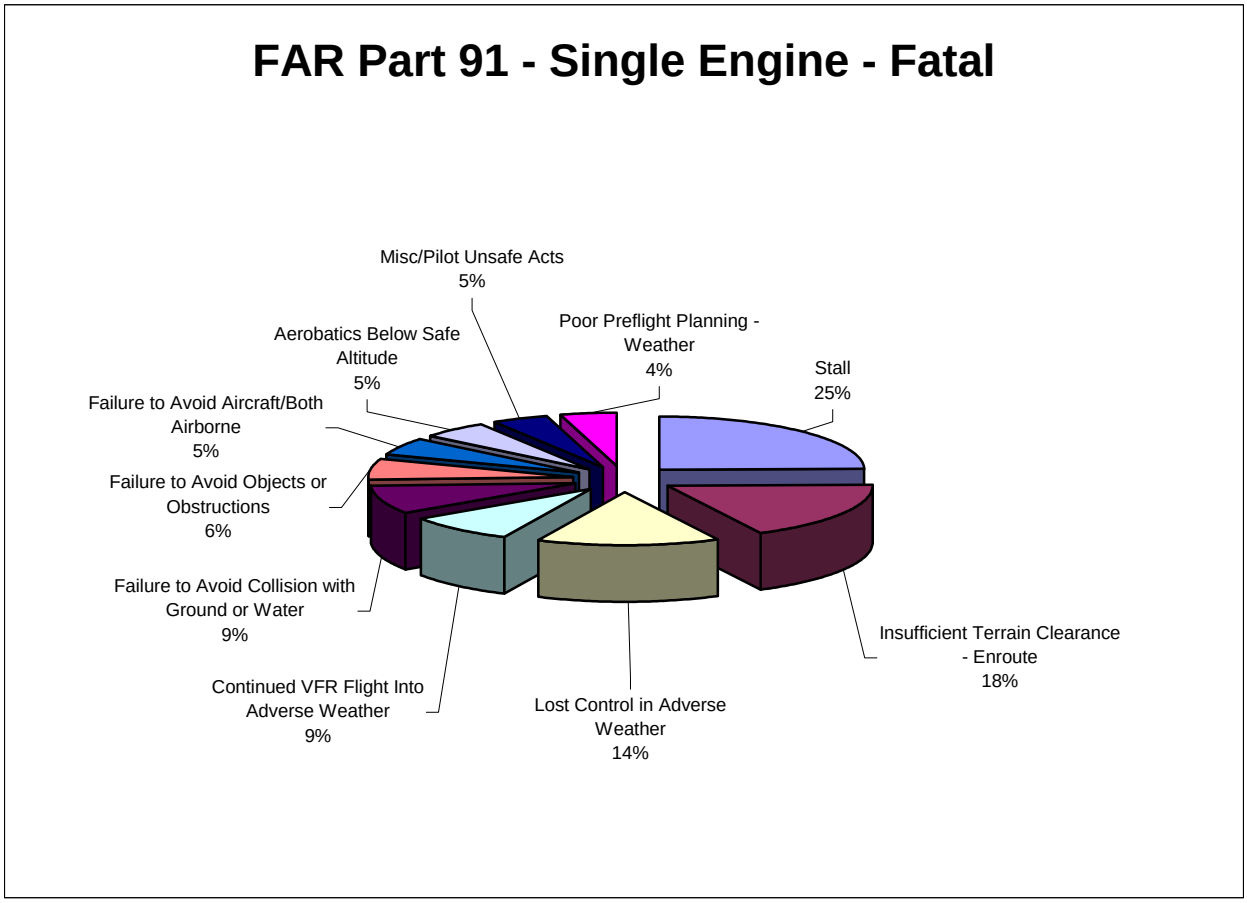
What are the leading causes of fatal GA accidents?

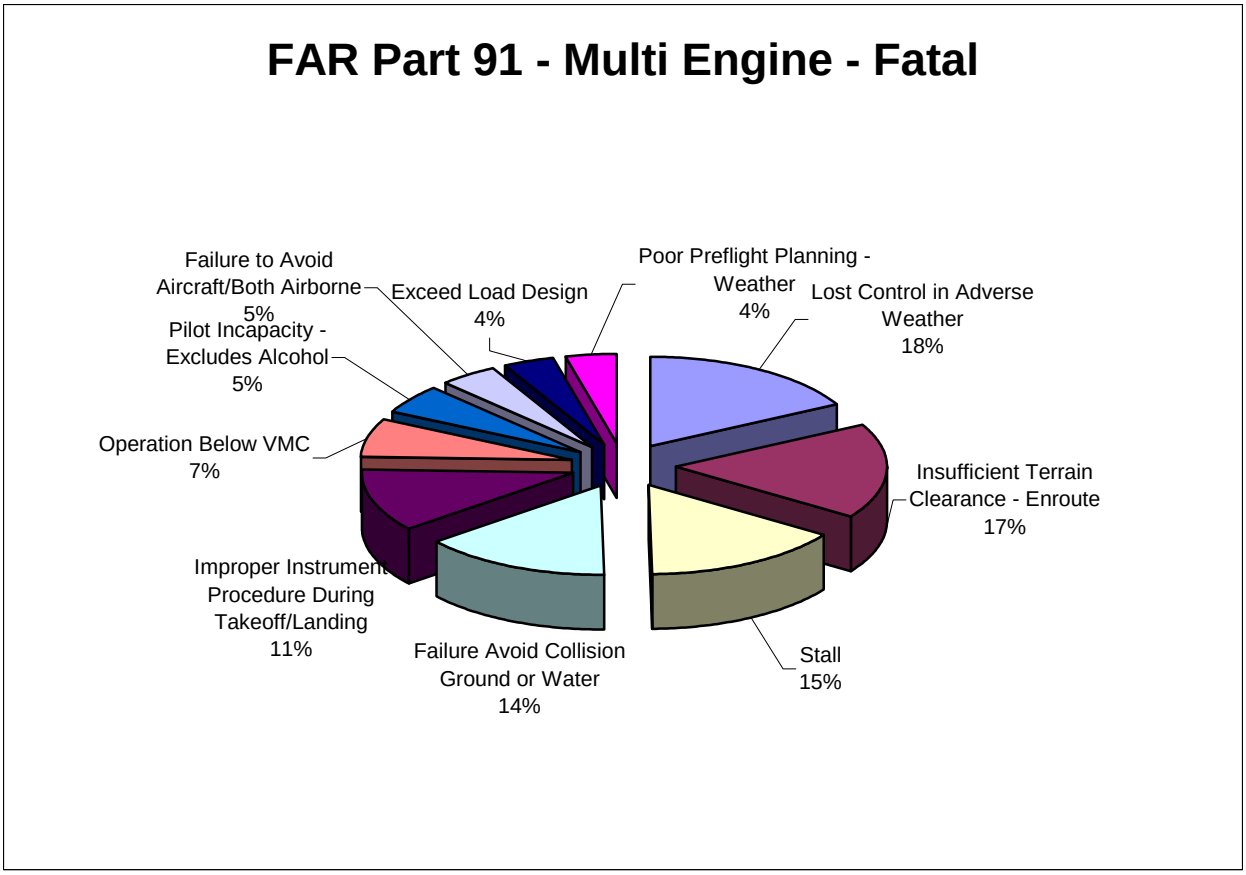
According to AOPA Air Safety Foundation's 2004 Nall Report; "the top trouble spots remain: too many takeoff and landing accidents due to poor skill and too many fatal maneuvering flight / stall accidents due to lack of either skill or judgment. Weather accidents, particularly pilots attempting to maintain VFR into instrument meteorological conditions, still occupy a significant portion of the fatalities. Time after time, post-accident analysis shows that had the pilot diverted to an alternate or changed course even a few minutes earlier, it would have made a huge difference."

Specifically, here are the flight regimes that pilots need to watch out for. The FAA's Small Airplane Directorate just completed an accident study looking at causal

factors all the way back to 1984. This study included just over 57,000 part 91 accidents and just fewer than 5000 part 135 accidents. The study included both non-fatal and fatal accidents. Since part 91 accidents dominate, all data presented here are for part 91 operations.

The FAA's findings mirror those in the AOPA Air Safety Foundation's Nall Report. Here are the top causes for fatal accidents in both single engine and multi engine part 23 airplanes.





As a pilot, what can you do to avoid becoming another fatal GA accident statistic?

You can see from the pie charts that the leading causes of Part 91 fatal accidents are stalls and loss of horizon.

#1: Why do stall accidents occur? The usual recipe for a stall is the following scenario:

- The airplane is slow and close to the ground.
- The pilot will increase the elevator backpressure in order to stay away from the ground; this is known as 'ground aversion'.
- The airplane performance begins to decay rapidly as the wing reaches its critical angle of attack.
- The wing stalls, the nose of the airplane drops, and the pilot does not have sufficient altitude to recover.

A stall occurs when the wing exceeds its critical angle of attack (AOA). This can happen at any speed but typically is when the airplane is slow. The aerodynamic portrayal of the wing's stall behavior is shown below in the FAA Airplane Flying Handbook figure 4-2:

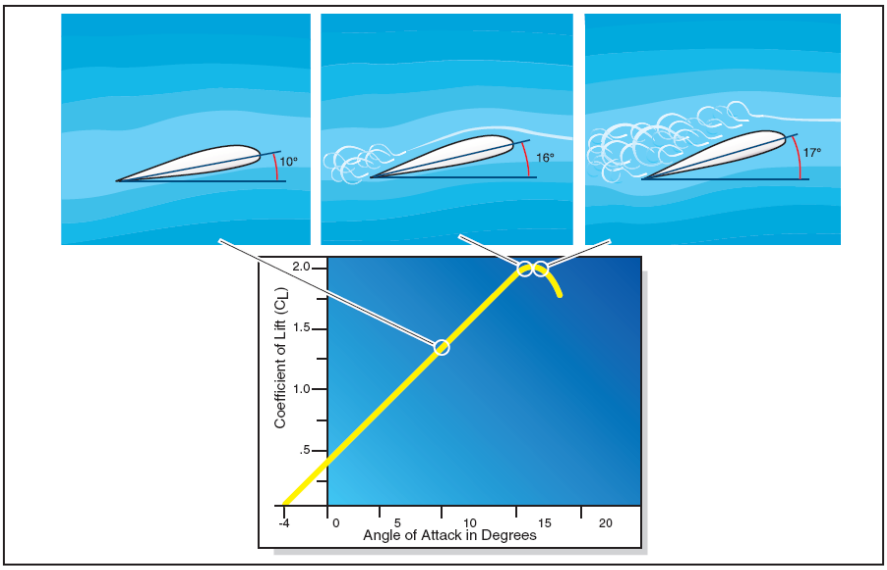


Figure 4-2. Critical angle of attack and stall.

Since the basic cause of a stall is always an excessive angle of attack, the cause must first be eliminated by releasing the elevator back- pressure or by moving the elevator control forward. This lowers the nose and returns the wing to an effective angle of attack. Figure 4-3 shows the basics of stall recognition and recovery.

Figure 4-3. Stall recognition and recovery.

Here are some tips that will help reduce the instances of stall related accidents:

- Know your aircraft's performance. It sounds simple; however, a heavy airplane on a hot day performs much differently than a light airplane on a cold day. Airplane configuration can have a dramatic impact on performance; some light airplanes cannot climb in the landing configuration.
- Know your airplane's weight and balance limitations. Don't try to take off when the airplane is over gross weight.
- **MAINTAIN YOUR AIRSPEED DURING TAKEOFF, APPROACH, AND LANDING.** Don't get 'low and slow' during takeoff and landing. Do not exceed 30 degrees of bank in the traffic pattern.

#2: Why do loss of horizon accidents occur?

A loss of horizon condition is when there is no visual reference to the horizon available outside of the aircraft for the pilot to use to judge the aircraft's attitude. The pilot is solely reliant upon the aircraft's flight instruments for maintaining the aircraft attitude. Loss of horizon can occur during flight in the following situations:

- Flight in instrument meteorological conditions (IMC),
- Hazy conditions, especially over water or over sparsely inhabited terrain,
- Flight at night, and
- Blowing snow or dust

Controlled flight into terrain (CFIT) is a common occurrence when there is a loss of horizon. There are several cases where an airplane impacted a ridge just below the top. Also, pilots can rapidly become spatially disoriented when they can't see the horizon. The pilot senses that the aircraft is turning or rolling, applies opposite correction and the aircraft departs controlled flight. The FAA Instrument Flying Handbook figure 5-39 shows a nose high unusual attitude and its associated flight instrument indications.

Figure 5-39. *Unusual attitude—nose high.*

As can be seen from figure 5-39, the attitude indicator shows a right turn, the altitude is increasing, the vertical speed is positive, the directional gyro and the turn coordinator show a right turn, and the airspeed is decreasing.

Figure 5-40 shows a nose low unusual attitude and its associated flight instrument indications.

Figure 5-40. *Unusual attitude—nose-low.*

As can be seen from figure 5-40, the attitude indicator shows a left turn, the altitude is decreasing, the vertical speed is negative, the directional gyro and the turn coordinator show a left turn, and the airspeed is increasing.

Here are some tips that will help reduce the likelihood of loss of horizon related accidents:

- Check the weather before you go flying. If you are not an instrument rated pilot, a day with a forecast of 600 ft ceilings and ½ mile visibility is not the day to take off on your long cross country flight from Denver to Salt Lake City. Day VFR minimums for class G airspace, 1 mile and clear of clouds, is legal, but not prudent.
- If you are an instrument rated pilot, keep up your instrument flying skills and proficiency. There is a difference between being current and being proficient.
- **SET PERSONAL MINIMUMS**. Know when it's time to stay on the ground. Use judgment to keep you out of situations where exceptional pilot skill is required. The FAA offers pilots a Personal Minimums Checklist tool to develop their own personal minimums. This tool is available on the FAA's website (address is provided at the end of this article).

What are the leading causes of non-fatal GA accidents and what does that mean to me?

The 20-year study that the FAA's Small Airplane Directorate just completed shows that the top two categories for GA non-fatal accidents are:

1. Failure of the landing gear retraction/extension system along with failure to extend the gear.
2. Loss of directional ground control due to improper use of the flight controls or brakes.

#1: Are you flying a retractable gear airplane? For the non-fatal airplane related accidents, landing gear issues were a primary cause for accidents of both single and multi-engine accidents. Failure of the retraction/extension system along with failure to extend the gear accounted for 12% of all part 91 accidents. Here are some tips that will help reduce the likelihood of landing gear related accidents:

- You might want to spend more time inspecting the landing gear during your preflight. Look for anything that is out of the ordinary: leaking fluids, cracks, loose linkages, obvious signs of wear, worn tires, etc.
- Keep your landing gear rigged and properly maintained. The cost for a gear up landing can easily exceed the value of an older aircraft.
- Know how your retractable landing gear works. Is the gear manual, electric, hydraulic, electro-hydraulic? Knowing how the landing gear works can greatly aid in troubleshooting when the landing gear fails to extend.

- Know the emergency landing gear extension procedures. Learning the emergency landing gear extension procedure while on short final is not a good situation.
- **MAKE SURE THE LANDING GEAR IS DOWN PRIOR TO LANDING**. This item, while most obvious, is the number one contributor to gear up landings. Make sure you use your airplane's checklists. Ensuring that the *Before Landing Checklist* is accomplished prior to landing is a simple way to prevent a gear up landing.

#2: Why are pilots losing directional control on the ground?

Loss of directional ground control due to improper use of the flight controls or brakes were another leading causal factor for non-fatal accidents. 6,108 events (11%) of part 91 accidents were due to improper use of the flight controls or brakes during ground operations. Included in the list of top causes are improper crosswind technique and improper brake operation.

The loss of directional control on the ground during a crosswind landing can look somewhat like the Airplane Flying Handbook figure 8-39:

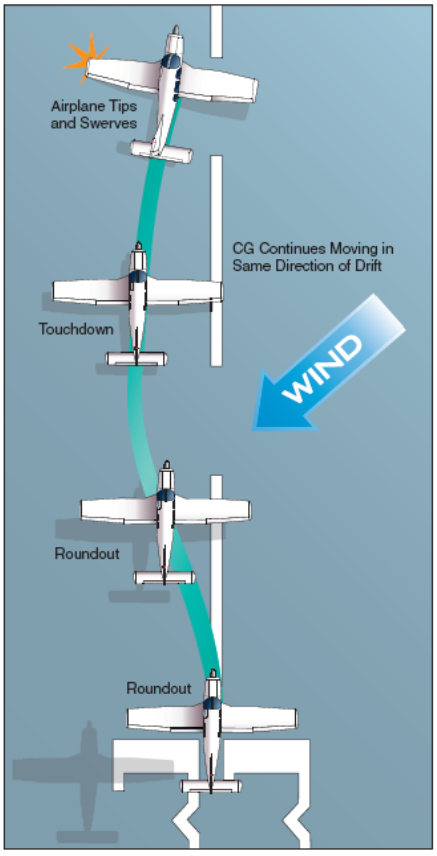


Figure 8-39. Start of a ground loop.

Figure 8-39 shows how a normal landing approach can turn into a ground loop very quickly, if proper aircraft control is not maintained.

Figure 8-38 shows the drift during touchdown, and the associated forces. This figure is also applicable to the takeoff regime.

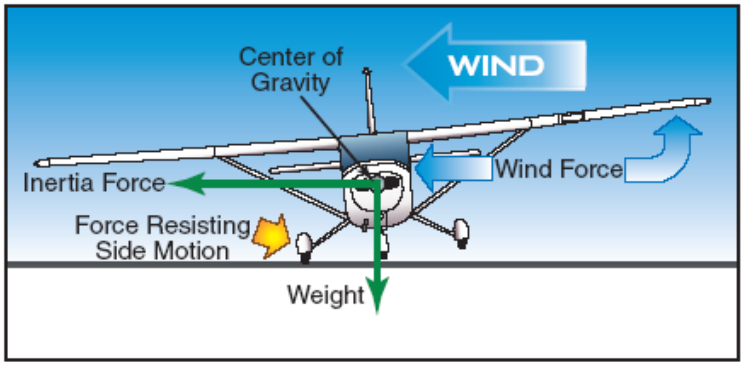


Figure 8-38. Drifting during touchdown.

Figure 5-4 shows the proper crosswind corrections during takeoff and landing.

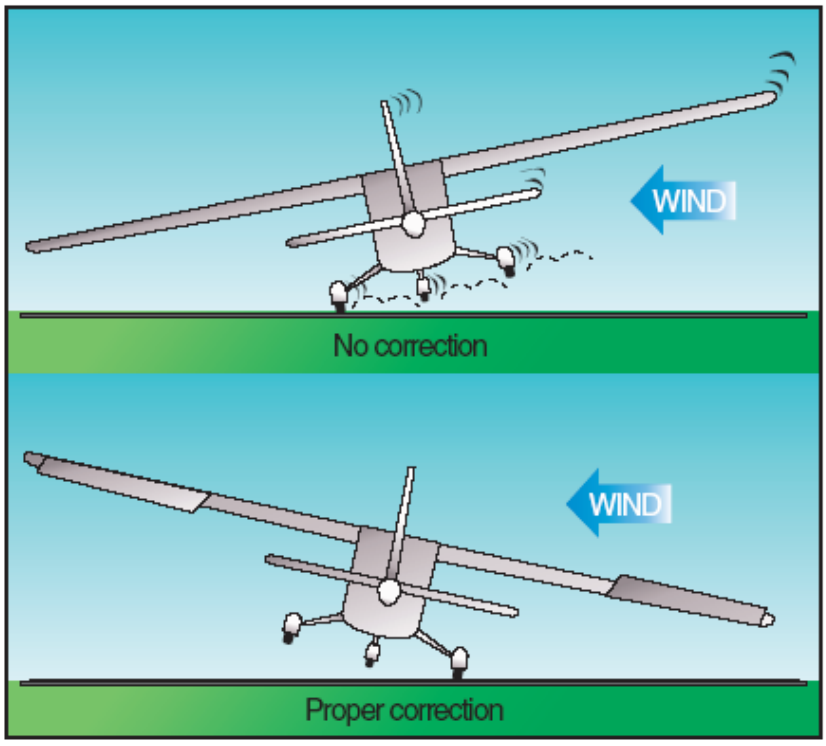


Figure 5-4. Crosswind effect.

Proper flight control position during taxi is shown in figure 2-10:

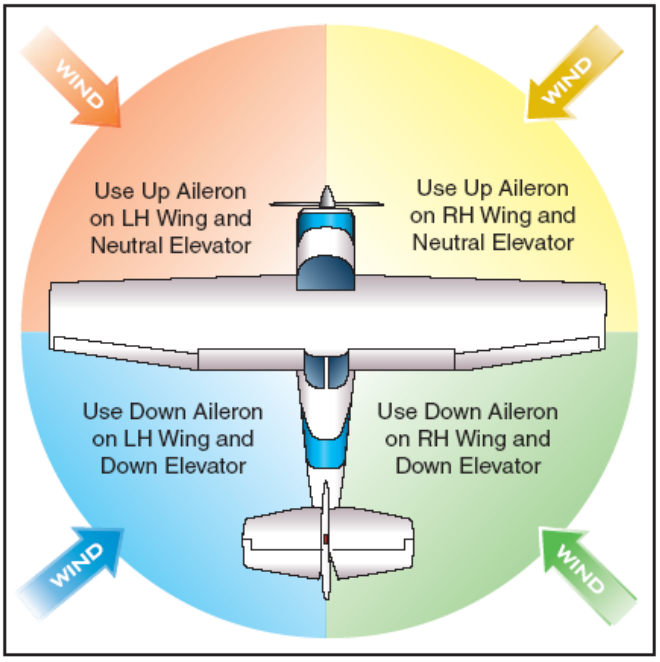


Figure 2-10. Flight control positions during taxi.

Using the brakes is a common method of directional control. Some airplanes use differential braking as a method of steering while on the ground. Imagine needing to make a tight left turn and your left brake isn't working: what do you do?

Here are some things that will help reduce the instances of loss of directional ground control accidents:

- Know how to properly use the controls during crosswind operations.
- You might want to spend more time inspecting the wheels and brakes during your preflight. Look for anything that is out of the ordinary: leaking fluids, cracks, excessive brake pad or disc wear, worn tires, etc
- **DON'T OVERCONTROL THE AIRCRAFT**. Apply the appropriate amount of control necessary to make the airplane do what you want. If you use too much control input, then you will have to apply an opposite control input to correct for the first control input.

Where can a pilot go for more safety information?

Pilots can access a wealth of safety knowledge available on the Internet. Besides the FAA, several private and government organizations also track aircraft accidents and measure the progress towards safer flying.

The following websites are just a few of the resources available free to pilots to keep them informed on safety related topics to help them fly safely.

Accident awareness

- The Nall Report provides analysis of GA accident statistics and is available through the AOPA Air Safety Foundation website at: http://www.aopa.org/asf

- The Aviation Safety Network website (http://aviation-safety.net/index.shtml) contains accident reports and statistics.

- The National Aviation Safety Data Analysis Center (http://nasdac.faa.gov/) allows access to several of the principal aviation safety data and information sources the Federal Government uses for various purposes.

- The AOPA Air Safety Foundation website (http://www.aopa.org/asf/) provides accident statistics and safety related information.

Pilot Decision Making

- The Personal Minimums Checklist and Personal Weather Risk Assessment Guide are tools that help pilots make better decisions about flying as part of their preflight planning. Information is available at the FAA's website (www.faa.gov/education_research/training/fits/guidance). This site provides other evaluations and training to assist pilots in determining their skills and weaknesses to assist in managing their risk.

- The May/June issue of the FAA Aviation News contains the article, Practical Risk Management in Flight Training. The article describes the Perceive-Process-Perform framework and offers tips for practical risk management. (http://www.faa.gov/library/aviation_news/2005/media/MayJune2005Issue.pdf)

- FAA's Direct User Access Terminal service provides free aviation weather and flight planning for certified pilots in the US. http://www.duats.com

- The Aviation Digital Data Service (ADDS) provides aviation related weather data, analysis, and planning forecasting at http://adds.aviationweather.gov/.

FAA Handbooks

- The Airplane Flying Handbook, FAA-H-8083-3A: http://afs600.faa.gov/srchFolder.asp?Category=traininghandbook

- The Instrument Flying Handbook, FAA-H-8083-15: http://afs600.faa.gov/srchFolder.asp?Category=traininghandbook

FAA Online Resources For Pilots

- The FAA Safety Program at http://www.faasafety.gov/.