



Do The Right Thing: Decision Making for Pilots

Aeronautical Decision Making. If you've been around aviation very long, you've almost certainly heard the term. Perhaps you've wondered what it actually meant. Or perhaps you've looked at the literature on the subject and struggled to make sense of all the information. If so, you're not alone. For pilots accustomed to concrete answers, the concept of Aeronautical Decision Making seems a bit too academic—too “fuzzy.”

The goal of decision making is really very simple: doing the right thing, at the right time. In this Safety Advisor, we'll look at some practical ways to achieve that goal.

Why Decision Making?

Why should you care about decision making? The numbers speak for themselves. Poor decision making is the root cause of many—if not most—aviation accidents. Year after year, the NTSB attributes approximately 75 percent of all aircraft accidents to pilot error, with a very large number the direct result of poor decisions.

General Aviation Accidents, 1996-2005

MAJOR CAUSE	All Accidents	Fatal Accidents
Pilot	74.7%	77.9%
Mechanical/ Maintenance	15.3%	8.8%
Other/Unknown	10.0%	13.4%

You don't have to be a high-time pilot to make consistently good decisions about flying. New private pilots already know most of the things that are likely to get them into serious trouble: weather, maneuvering flight, strong winds, etc. A major portion of primary flight training is devoted to teaching the dangers inherent in these things. But the key to applying that training—and the thing that seems to cause pilots the

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most difficulty—is recognizing potential hazards and taking timely action to avoid them.

Broadly speaking, in most accidents that stem from bad decisions, at least one of the following factors is involved: utility, ability, or fun.

Utility: Attempting to squeeze too much utility out of the airplane. Flight into icing conditions; overloading; trying to stretch range; etc. The desire to get the most out of the airplane leads to a situation that exceeds its design limitations.



Know and respect your limits, and those of your aircraft. Do you really need all that luggage?

Ability: Pushing the limits of pilot skill or experience. The classic (and often fatal) example is a noninstrument-rated pilot continuing into instrument conditions.



Don't let the desire to have fun overwhelm your better judgment.

Fun: Trying to have too much fun in the airplane. This shows up in accident reports as buzzing, low-level flight, improper aerobatics, etc.

"Superior pilots use their superior judgment to avoid situations requiring the use of their superior skills."
-Anonymous

Most of the time, the really tough decisions don't just "sneak up" on pilots. In fuel exhaustion accidents, for example, virtually all the pilots knew that they were cutting into their fuel reserves when they still had a chance to divert. *Good decision making is about **avoiding** the circumstances that lead to really tough choices.*

Go/No-Go?

It may seem obvious, but some of the best aeronautical decisions are made on the ground. A prudent *preflight* choice can eliminate the need to make a much more difficult *in-flight* decision.

Such choices are easy to make when conditions are obviously poor, or obviously good. In the real world, though, the situation is often less clear-cut. When conditions are marginal, the go/no-go decision has a curious way of becoming a perfect storm of complicating factors—time, money, emotions, personal commitments, professional obligations, etc. These are powerful motivators, and even the most safety-conscious of pilots can find it extremely difficult to "just say no" to a flight, particularly when getting there is important and conditions don't clearly argue for staying on the ground.

The best way to avoid temptation is to prepare a contingency plan. General aviation aircraft can be superb



Prepare a contingency plan for situations like this.

traveling machines, but if you absolutely have to be there on time, be prepared to drive, or buy an airline ticket.

Beware the “mission” mindset

“Mission” is a military term: It implies failure, defeat and (possibly) death if a task is not completed successfully. As civilian pilots, we take “trips” or “flights”—not missions. The real danger comes not from failing to get where we’re going, but from getting into a mission mindset when the rewards don’t justify the risks.

Still, there are times when pilots are justified in going up to “take a look.” Let’s be realistic: Anyone who expects to get much utility out of an airplane, but who’s only willing to fly when conditions are perfect, will find general aviation a frustrating endeavor. With that in mind, let’s take a look at how to stay out of trouble once you’ve decided to take off.

Beyond Go/No-Go

So you’ve decided to go. Once in the air, you should enter a *continuous decision making cycle*. Take the knowledge and information you already have, combine it with the new information you’re gathering as you fly, and actively decide how to proceed. Of course, the more (and more *pertinent*) information you’ve gathered *before* flight, the better off you are *in* flight.

The active decision making process can be broken down into three basic steps: *Anticipate*, *Recognize* and *Act*. Let’s look at each of these in detail.

Anticipate: What could go wrong?

Effective decision making begins with anticipation—thinking about what *could* go wrong before it actually does. If you’ve already considered the problems most likely to arise, you’re thinking like a professional, which puts you ahead of the game.

This isn’t to suggest paranoia in the cockpit, but rather to stress the importance of maintaining an active mental “lookout” for potential problems before and during flight. As an example, think about the takeoff and initial climb. Have you *actively* considered the possibility of an engine failure on takeoff and thought about the required response? You’ll be much better prepared to handle the actual emergency if it arises.

Hope for the best, expect the worst

Although optimism may be an admirable quality, pilots are well advised to take a somewhat more pessimistic view of the aviation world. For example, if there’s a chance that the weather will be worse than forecast, assume that it will be. If your pessimistic appraisal proves correct, the contingency plan is ready and waiting. If the forecast was right, be pleasantly surprised!

Different phases of flight call for different degrees of anticipation. Consider again the example of an engine failure shortly after takeoff. In this case, the pilot must recognize the problem and react within seconds in order to avoid dire consequences. Being “spring-loaded” to take action—rather than having to spend precious seconds recognizing what’s happened and contemplating a response—can make the difference between a successful forced landing and something much worse.



For critical situations—engine failure on takeoff, for example—think about your reactions ahead of time.

On the other hand, an engine failure over open countryside, at altitude, affords considerably more time, and thus requires less detailed forethought.

Recognize: Has something gone wrong?

Avoid problems in flight by *paying attention*! The sooner you recognize a problem (or potential problem) and start thinking about how to handle it, the better.

Alert Codes

Think of yourself as being at one of three levels of alertness at all times during a flight:

- Code White: Alert, but relaxed

Example: cruise flight

- Code Yellow: A heightened level of alertness

Examples: climb and descent

- Code Red: Poised for immediate action

Examples: takeoff, landing and traffic pattern

Some problems are obvious. A broken crankshaft will make itself known immediately. But smaller, more insidious problems can be difficult to detect if you're not paying close attention. Deviations from the weather forecast can be quite subtle. Trouble with the aircraft—a failing electrical system, for example—can easily be overlooked.



Some problems are easy to overlook.

The key is to stay alert and look for things that don't seem normal, or don't fit with expectations. *Pay attention to anything that gives you "cause to pause."* These are signals that the situation is changing—possibly for the worse—and that you may need to take action.

Act: Evaluate your options and choose one.

Here's where many pilots fail. They recognize the problem, but don't do anything to confront it. Why? It's inconvenient. It means a major change in plans, and it may mean making a difficult or unpleasant choice.

Regardless, once you've recognized a problem, or potential problem, there is a choice to be made. That choice depends upon a number of factors—the type

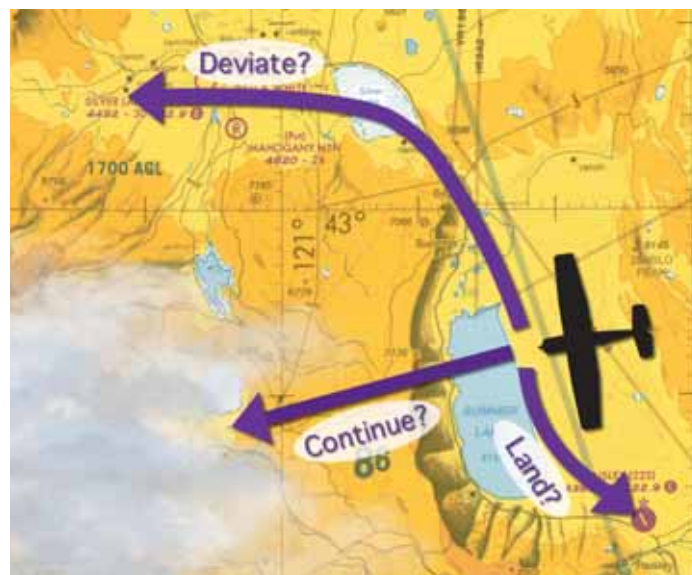
Take note of:

- Changes in cloud type or coverage
- Winds or temperature aloft different than forecast
- Ceiling or visibility deteriorating
- Amended forecasts
- Abnormal engine indications or sounds
- Changes in control response
- Abnormal electrical system behavior
- Unusual aircraft sounds

Don't ignore or "brush off" something that doesn't seem quite right.

and seriousness of the problem, the rate at which the situation is deteriorating and the available alternatives. Be prepared to act without delay, should the situation warrant it. Pilots sometimes tend to enter a state of denial when faced with a problem. That tendency can be deadly.

At the risk of oversimplifying, the basic options available when a problem arises are as follows: 1) Continue the flight as planned, paying very close attention to whatever is causing the problem; 2) Continue the flight, deviating from the plan as necessary; or 3) Get the airplane on the ground as soon as practical.



Basic options available when a problem arises.

The more serious the problem—or the more limited your *understanding* of its seriousness—the more conservative the choice should be, and the more you should lean toward a precautionary landing.



Use ALL the resources at your disposal—ATC, Flight Watch, other pilots (including those on the radio), passengers, etc. Don't hesitate to declare an emergency if you're in trouble. ATC has many resources, and may be able to assist in a number of ways. And please: Don't believe the old myth that declaring an emergency means filling out reams of paperwork, or

Political affiliations aside, there's no shame in being a cockpit conservative.

A timely choice provides many more alternatives. In a rapidly deteriorating situation, every passing minute robs you of options—options that likely won't come back. Remember: The really tough decisions usually don't "sneak up" on us. They arise because we either fail to recognize a problem soon enough, or fail to take action while there are still viable alternatives. Search the ASF Accident Database (www.aopa.org/asf/accident_data) and read a few reports, looking for points at which the accident chain could have been broken. In most cases, the number of missed opportunities is disturbing.

The Forgotten Step—Evaluation

Once you're on the ground, it's a good idea to spend a few minutes going over the flight in your head. What went right? What went wrong? Were there problems, or potential problems? Could you have anticipated and recognized them sooner? Score yourself. Be as objective as possible, and don't grade on the curve. If you do this consistently, you'll soon find yourself catching problems earlier and dealing with them more effectively.

Emergencies

Suppose that, despite good intentions, everything goes wrong and you're faced with a critical decision. The absolute, number one priority should be **getting on the ground alive and unharmed**. In some cases, that might mean making a precautionary off-airport landing, even if it involves damaging or destroying the aircraft. That's why we have aircraft insurance. Airplanes can be replaced—people cannot.

attracting unwanted attention from the FAA. That's simply not the case; and even if the FAA takes a special interest in your situation, it's not worth the extra risk just to avoid meeting with an inspector.

Priorities

Immediate Priorities:

- 1) Aviate
- 2) Navigate
- 3) Communicate

Large-Scale Priorities:

- 1) Surviving unharmed
- 2) Saving the aircraft
- 3) Reaching your intended destination

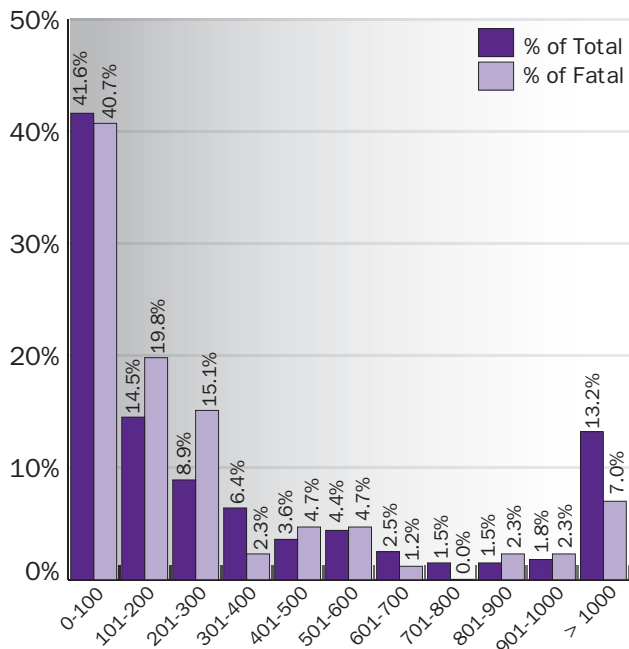
Personal Minimums

Flying is a highly individual activity. As pilots, we each bring a unique mix of experience, knowledge, skill and proficiency to the cockpit, and operations that are perfectly safe for one pilot may be quite hazardous for another.



In a critical situation, help is as close as your radio.

Accident Rates by Time in Type



For Part 91 operations, the FAA has taken a fairly pragmatic approach to pilot decision making. The FAA tells pilots that they have to maintain a degree of proficiency, fly a mechanically sound aircraft, plan flights thoroughly, maintain a certain distance from terrain/obstructions, and fly only in weather that meets basic criteria. Beyond that—and so long as they are not “careless or reckless”—pilots are left to make their own choices about what’s prudent.

Personal Minimums Checklist and Recommendations

(For use when acting as pilot in command)

General Aircraft Experience

Single-engine fixed-gear: ___ hours in past ___ months

FAA requires: None

ASF recommends: Three hours in any make/model within previous three months.

Single-engine retractable-gear: ___ hours in past ___ months

FAA requires: None

ASF recommends: Three hours in any retractable-gear make/model within previous three months.

Multiengine: ___ hours in in past ___ months

It’s all up to you. For that reason, it’s a good idea to develop a set of personal minimums. Unfortunately, there’s no easy formula to help you do this: The best advice is simply to be honest with yourself. Think of the things that would make you uncomfortable in an airplane. Would you feel safe flying VFR with a 1,500-foot ceiling and four miles visibility? If not, how much would the weather have to improve before you did? *To help you get started, we’ve provided a worksheet with some basic recommendations. Consider this purely as a starting point for developing your own, personalized list. **For some pilots, our recommendations may be far too conservative—for others, not conservative enough.***

As a general rule, the more experience a pilot has, the more aggressive he or she can be. In practice, though, experienced pilots usually become more conservative as they rack up flight hours. They’ve made mistakes, and seen the consequences of bad decisions.

Use your personal minimums list as a tool to help you anticipate the factors that might affect your flight. Avoid the pressure to decrease your minimums for a particular flight, but bear in mind that the list should be a living document—one that changes to reflect your current skills and experience. It’s also important to keep the “big picture” in mind. If several factors are close to, but not below, minimums, it’s probably wise to stay on the ground. Alternately, if a single factor is slightly below minimums while everything else is perfect, it may be safe to go.

FAA requires: None

ASF recommends: Three hours in same or similar make/model within previous three months.

Operational Currency / Proficiency

Flight review within previous ___ months

FAA requires: 24 calendar months (FAR 61.56c)

ASF recommends: 12 calendar months. If instrument rated, the flight review should include an instrument proficiency check, regardless of legal instrument currency.

Day landings: ___ landings in previous ___ days

FAA requires: Three landings in previous 90 days when carrying passengers (FAR 61.57a) Tailwheel — three full stop landings in any tailwheel make/model within previous 90 days.

ASF recommends: One landing in previous 30 days, in addition to the FAA requirement. Tailwheel—three full-

stop landings in any tailwheel make/model within previous 30 days.

Night landings: ___ night landings in previous ___ days

FAA requires: Three full-stop night landings in previous 90 days when carrying passengers (FAR 61.57b).

ASF recommends: One full-stop night landing in previous 30 days, in addition to the FAA requirement. Tailwheel—three full-stop landings at night in any tailwheel make/model within previous 30 days.

IFR: ___ instrument hours and ___ instrument approaches in the past ___ days/months

FAA requires: Six instrument approaches, intercepting, tracking and holding in previous six calendar months (FAR 61.57c).

ASF recommends: In addition to the FAA requirement, one hour of actual or simulated instrument flight and one instrument approach in previous 30 days. Also, an instrument proficiency check (IPC) within the previous six calendar months.

Weather Conditions

**VFR Weather: Ceiling ___ feet
Visibility ___ miles**

FAA requires: Airspace-dependent—no less than clear of clouds, one mile visibility (FAR 91.155).

ASF recommends: Outside traffic pattern—no less than 2,000 foot ceiling and five miles visibility. Within traffic pattern—1,500 foot ceiling and three miles. Use caution in mountainous terrain.

**IFR Weather - Departure: Ceiling ___ feet
Visibility ___ miles**

FAA requires: None

ASF recommends: Local instrument approach minimums, so that an immediate return can be made. If the airport has no instrument approach, use minimums from the nearest suitable airport with an instrument approach within 15 minutes.

**IFR Weather - Arrival: Ceiling ___ feet
Visibility ___ miles**

FAA requirement: Instrument approach minimums
ASF recommends:

- Precision approach: 400 feet and one mile
- Non-precision approach: Lowest minimums applicable plus 200 feet and one-half mile (i.e., if approach minimums are 450 feet and one mile, personal minimums would be 650 feet and 1.5 miles)
- Circling approach: Published minimums or 1,000 foot ceiling and three miles, whichever is higher

Crosswind component: No more than ___ knots

FAA requires: None

ASF recommends: 75 percent of maximum demonstrated crosswind. Example: 16 (knots max demonstrated crosswind) \times .75 = 12 knots recommended crosswind component. Tailwheel—no more than 10 knots of crosswind.

Fuel Reserve

**Fuel Reserve: Day VFR: ___ minutes/hour(s)
Night VFR: ___ minutes/hour(s)
IFR: ___ minutes/hour(s)**

FAA requires:

Day VFR: 30 minutes

Night VFR: 45 minutes

Day or Night IFR: 45 minutes

(FAR 91.151, 91.167)

ASF recommends: Minimum 60 minutes for all, assuming that all contingencies have been accounted for (diversions, holding, headwinds, etc.). In other words, the airplane should land with at least one hour of fuel in the tanks.

Other:

Rest: ___ hours of rest (sleep and relaxation) in previous 24 hours

FAA requires: None

ASF recommends: 10 hours

Summary

There's no real secret to making good aeronautical decisions:

- Leave yourself an "out" before the flight in order to avoid external (or self-imposed) pressure to go.
- In the air, actively anticipate the things most likely to go wrong.
- Maintain an active mental and physical lookout for things that have gone wrong, then act quickly and conservatively to remedy the situation.

There will always be some risk in flying, and it's possible to encounter a problem that you could not have foreseen. Such situations, however, are statistically rare. If you pay attention to the things that are most likely to cause trouble (weather, maneuvering flight, crosswinds, etc.), and then handle them in a timely fashion, you're unlikely to become a statistic.

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The AOPA Air Safety Foundation
421 Aviation Way
Frederick, MD 21701-4798
1.800.638.3101



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421 Aviation Way, Frederick, MD 21701
800-638-3101
www.asf.org
asf@aopa.org

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