

## Managing Component Failures

Fatal general aviation accidents often result from inappropriate responses to unexpected events. Planning, training, and preparation can promote more effective and timely responses to emergencies, such as total aircraft system failures, and give you the skills and knowledge you need to appropriately manage the chain of events that can often lead to disaster.

### Expect the Unexpected

Every pilot needs to prepare for the unexpected. Emergencies, such as total aircraft system (component) failures, can occur at any time. Loss of aircraft control is a common factor in accidents that would have been survivable if control had been maintained throughout the emergency. In some cases, pilot skill and knowledge have not been sufficiently developed to prepare for the emergency. In others, an inappropriate reaction can start a chain of events that lead to disaster. Pilots are not always in the habit of revisiting and practicing how they will handle abnormal and emergency situations, except during flight reviews or other recurrent training.

A look at accident data from Oct 2009 to May 2022 shows that 2,041 (17%) of the 11,682 total aircraft-related causal factors were systems related.



Here's a breakdown of the top four causes:

- Landing Gear Systems (49%)
- Fuel Systems (21%)
- Flight Control Systems (13%)
- Electrical Power Systems (5%)

Unexpected events often result from a configuration change and occur while close to the ground, leaving little to no time to think, let alone use a checklist. Your chances of a safe outcome are greatly improved when you immediately accept that the unexpected has happened and then take action.

## Plan, Prepare, and Practice

Plan, prepare, and practice in advance how you would respond to an unexpected event. Try chair flying to review, visualize, and practice in your head how you would handle a surprise component failure such as a problem with your landing gear, your fuel or electrical systems, or your flight controls.

Apply the following objectives to your plan:

- 1) Get out of the emergency alive
- 2) Prepare for landing

Here's a scenario — imagine the latch fails and your cabin door suddenly pops open just after takeoff. What can you do to prevent this “failure” from becoming an “emergency” and possibly an accident? Review, visualize, and practice your response, and commit it to memory.

Better yet, sit in your aircraft, visualize the onset of a problem, and then follow the step by step process of recovery while speaking out loud, as you reach out and touch the controls or instruments you need. Mental drills like this in a non-stressful environment (like your favorite chair at home!) will help you develop a pre-planned course of action and test your mastery of your abnormal and emergency checklists.

And if you're ready to test out your new and/or revised procedures, consider getting together with a CFI and practice them on a training flight. If you sign up for the WINGS proficiency program, you can even have those hours count towards a WINGS level.

Flight simulation is another great tool to help you plan and prepare for emergency procedures. With the assistance of a qualified instructor, you can experience an engine failure after takeoff, or practice your reaction to a primary or multi-function flight display failure. Your instructor can also give you practice with electrical failures, control-system failures, and more.

Flight simulation software on your home computer or personal electronic device can also help you practice handling a variety of malfunctions and failures. Some of these programs will let you set up random failures during a flight and let you experience them as you would in real-world flying.

One of the biggest benefits of practice is the ability to experience both sudden and subtle failures, become familiar with their early indications, and practice overcoming the natural human tendency toward denial (“this can't be happening to me”) and rationalization (“it's probably just a gauge problem”).



## Three Keys to Success

1. *Plan what you'll do in emergency situations.* For takeoffs, know the runway length and calculate accelerate/stop distance. Also know where you'll go if you can't make it back to the departure airport. For multi-engine airplanes, know your best single-engine climb speed ( $V_{Yse}$ ). This will be your target airspeed after engine failure.
2. *Review your plan before you fly.* Professional crews brief every takeoff, approach, and landing. You should do the same. Reviewing what you'll do before you do it can improve the likelihood of a timely and correct response.
3. *Practice with a flight instructor.* It's the best preparation for a successful emergency response.

## Resources

- ♦ **GAJSC Fly Safe Fact Sheet — Startle Response**  
[bit.ly/3LLnynk](https://bit.ly/3LLnynk)
- ♦ **FAA Safety Briefing: “Emergency” (Sep/Oct 2019)**  
[bit.ly/FAASB-Arc](https://bit.ly/FAASB-Arc)

