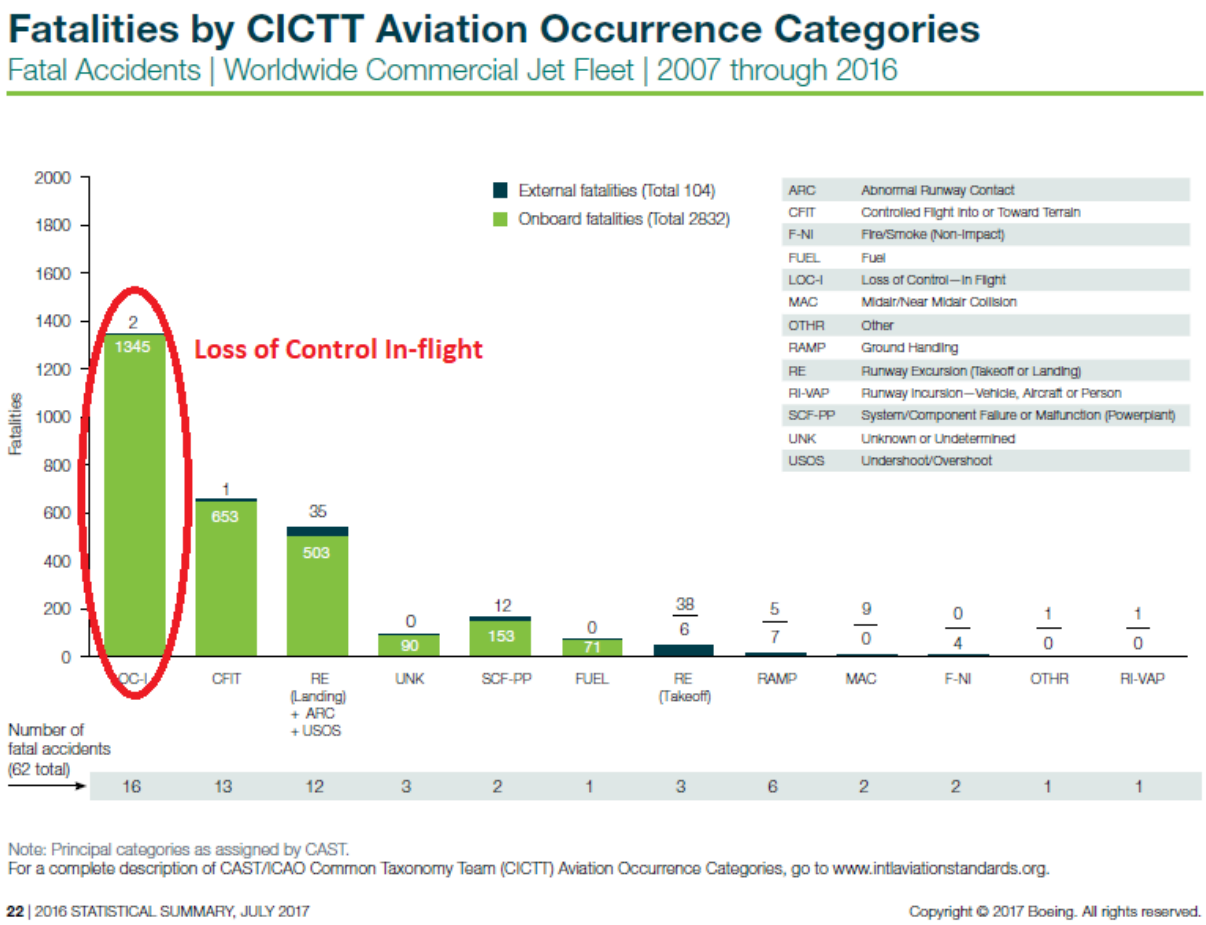
Olde Thyme Aviation
Prevention and Recovery of Loss of Control Experience

The Problem and Industry Reaction



The identification of **Loss of Control In-flight (LOC-I) as the leading cause of fatalities in all sectors of aviation** by ICAO, the NTSB, EASA and others has led to increasing calls for the delivery of modernized industry compliant UPRT. The FAA now requires UPRT for all candidates for the Airline Transport Pilot (ATP) rating as part of the ATP Certification Training Program. EASA is now requiring UPRT in initial and recurrent simulator training and will add an on-aircraft requirement in the near future. US airlines have been required to implement this training since 2019.

There is a difference between unusual attitude recovery taught for many years as part of private and commercial pilot programs and upset training. The lack of understanding of the difference between existing training requirements and what is required by comprehensive UPRT is the essence of the problem, and is one of the reasons that ICAO-compliant UPRT is so necessary to reduce the threat of LOC-I.

Here is a partial definition of an airplane upset from the Airplane Upset Recovery Training Aid available on the FAA's website: "An airplane in flight unintentionally exceeding the parameters normally experienced in line operations or training."
In other words, the airplane is not doing what it was commanded to do and is approaching unsafe parameters. While specific values may vary among airplane models, the following unintentional conditions generally describe an airplane upset:

- Pitch attitude greater than 25°, nose up.
- Pitch attitude greater than 10°, nose down.
- Bank angle greater than 45°."

That will look a lot like the definition of an unusual attitude to most pilots. Specifically, those parameters were created for swept wing jet airliners with 100 seats or more, so results for lower performing aircraft will vary significantly. Oddly, the FAA has no *precise* definition of what an "unusual attitude" is.
The difference between unusual attitudes and upsets is that *the definition does not stop there*. It goes on to state:
"Within the above parameters, *but flying at airspeeds inappropriate for the conditions*," and that phrase includes stalls, which involve airspeeds inappropriate for the conditions. Many pilots have no idea that the term "upsets" includes stalls as well as unusual attitudes.

What does all this mean to General Aviation? The airlines and jet aviation have recognized that throughout your training you have not been exposed to radical aircraft attitudes and how to recover from them. Even with the stall recovery training which is separated from unusual attitude training the check ride guides have been emphasizing recovery from the approach to the stall.

General Aviation Oriented UPRT

In general aviation we are having the same trend of loss of control. Many of our LOC-I accidents have different root causes than those in the airlines and cooperate jet operations. While different the solution is similar. We need pilots to experience radical aircraft attitudes and understand that in most cases the airplane is still recoverable. The second goal of our experience is to show pilots those common accident profiles of low altitude LOC-I that are not recoverable, why, and how to avoid them.

PARE
Prevention and Recovery Experience

Summary
Upset Recovery provides a ground school and flight training curricula that includes unusual-attitude/upset recovery and as required an introduction to aerobatics for use in recoveries for, flight instructors, and individual pilots of all experience levels. Our ground school features a review of aerodynamics for an understanding of aircraft response to maneuvering. In the air, we first demonstrate upset aerodynamics, introduce aerobatics useful to recoveries and recovery skills. We use a Citabria 7GCAA aircraft.

Course duration is typically three days, but can be extended over a longer period. Total flight time is approximately four hours. Students receive a training record for insurance purposes and credit for the FAA Wings program. The course can also include a Biennial Flight Review with additional time.

Pilots will gain:

- Increased understanding of maneuvering aerodynamics.
- The ability to recognize and track aircraft motion paths and energy during unusual attitudes.
- Inverted-flight experience under real g forces.
- Control skills necessary to recover from unusual attitudes and different energy states.
- Prevention of Spins and Upsets
- Strategies for dealing specific General Aviation trouble spots according to actual accident reports.
- Enhanced confidence and safety.

Ground School Topics

- Differences between unusual attitudes and upsets
- Upset Causes
- Basic Aerobatic Maneuvers and Techniques
- Spin Aerodynamics
  - Stall and deep stalls
  - Spin prevention
  - Departure, incipient phase, steady state, recovery
  - Aircraft recovery techniques.

Accidents

Many of the training tasks in our program are drawn from both recent and historically typical unusual-attitude accidents. Some examples are essentially aerodynamic, like vortex encounters, traffic pattern stalls, and spins. Other accidents stem from mechanical or control system failures. Although the engineering causes of system failures might be specific to aircraft type, there's usually an accompanying aerodynamics lesson that's applicable in general.

When we practice intentional unusual attitudes, briefed and prepared, it's easy to forget how unintentional attitudes often happen. Sudden catastrophes aside, they evolve. They're often the culmination of a chain of events that typically starts while the aircraft is still under normal control. Problems appear, the workload goes up, the pilot enters an overload state and fails to monitor attitude, and a departure from the normal envelope begins. Pilots who've experienced the alarming physical sensations of spatial disorientation can almost always look back and trace the bad decisions that set the seeds.

The National Transportation Safety Board's website www.ntsb.gov contains statistics on loss of control accidents, updates on current investigations, and detailed final reports. We will use many of these as real examples of the maneuvers and upsets we use in training.

Unusual-Attitude versus Aerobatic Training

In typical aerobatics courses you'll learn to fly a standard set of maneuvers: roll, loop, hammerhead, Cuban-eight, Immelmann, spin, etc. It's valuable training and worth encouraging, but not always the best approach for a pilot whose first concern might be to learn unusual-attitude aerodynamics and recovery skills for use in non-aerobatic aircraft.

One problem is that aerobatic training focusing on perfecting standard maneuvers tends to be inherently aircraft-biased in the way muscle memories are developed. Although the basic aerobatic techniques aren't appreciably different between aircraft, if you want to keep your instructor happy, and get the maneuvers right, you'll have to match your control inputs to the characteristics of the trainer you fly. In a very responsive aerobatic aircraft, such as an Extra or a Pitts, a little bit of input will produce a lot of maneuvering. You'll learn a light touch—otherwise you'll have a rough ride.

Unfortunately, those light control forces (which include the initial breakout force necessary to deflect controls from neutral) can lead a pilot to an unrealistic set of motor skills and response expectations if applied to less nimble, non-aerobatic aircraft in unusual-attitude situations. There a light touch might take a long time getting noticed.

Another drawback to standard aerobatic training is that the maneuvers, properly taught and flown, don't present all of the control issues that an unusual attitude program really needs to address. Although the attitudes may be new to the pilot, if the aerobatic maneuvers have been entered correctly the aircraft will be in an energy state well within the envelope of positive and immediate control. The pilot will have seen only part of the problem.

As a matter of fact, you have to fly aerobatic maneuvers badly in order to take them to the regions of the attitude/energy envelope where they start to provide the most complete training opportunities for unusual-attitude recovery. In a standard aerobatics course, a good instructor will set up bad maneuvers for just that reason. Even so, the experience may still be somewhat off the mark as unusual-attitude training, because the attitude emergencies a student will face in cross-country flying won't originate from a botched hammerhead or a sloppy Immelmann, but typically from such things as turbulence, ice, wake encounter, or systems and control failures.

During PARE you will experience a wide degree of attitude, energy, and basic upset response more completely than a typical spin-loop-roll aerobatics course, using an aircraft chosen to relate as well as possible to the general aviation fleet. You'll start with stability and control demonstrations which will begin to develop unusual attitude recovery skills needed. You will

finish with the ability to identify and recover from all attitudes and energy states. You will not be a skilled aerobatic pilot, but a safe and aware pilot.

Syllabus of Prevention and Recovery Experience

DAY 1

Ground School (2 Hours)

Review of basic aerodynamics
Aerodynamics and energy state discussion
Review of accidents germane to this training

Flight (1.5 Hours)

Aircraft Familiarization
Basic Flight skills and ground reference maneuvers
Stability Control Demonstrations
Stalls, Deep Stalls, and Spin Prevention
Introduction to radical attitudes

Flight (1.5 Hours)

Stalls, Deep Stalls, and Spin Prevention
Full Developed Spin and Recovery
Radical Upset attitudes and recoveries
Demonstration of Traffic Pattern LOC-I accident Scenarios