Photo by Tom Hoffmann

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Pilot-in-*Control*

Avoiding Loss of Control Accidents

It can happen to anyone. Although the final report is still in development, data from the "black boxes" recovered from the 2009 crash of Air France flight 447 strongly points to loss of control-inflight (LOC-I) as the cause of this tragic accident. And, sadly, LOC-I accidents do occur on a much-too-frequent basis, especially in general aviation (GA). According to a recent Accident Data Set prepared by the General Aviation Joint Steering Committee (GAJSC), LOC-I was the dominant cause of fatal general aviation accidents over the last decade.

When we talk about loss of control, we are referring to accidents resulting from situations in which the pilot should have either maintained or regained control of the aircraft, but did not. Loss of control is divided into two types: Loss of Control-Ground (LOC-G), and Loss of Control-Inflight (LOC-I).

Forty percent of the fatal accidents during the period 2001-2010 were categorized as LOC-I, outpacing the number two fatal accident category, Controlled Flight Into Terrain (CFIT), by a three-to-one margin. LOC-I events were further subdivided into twelve phases of flight. As shown in Figure 1, most fatal LOC-I accidents happened during the maneuvering phase, occurring about 1.4 times as often as accidents during the approach and en route phases, and 26 times more frequently than accidents during both emergency landing phases combined.

The GAJSC data regarding maneuvering flight in particular are consistent with findings published by the AOPA Air Safety Institute where nearly 27 percent of all fatal accidents occurred during maneuvering flight. Moreover, 41 percent of those fatal accidents ended with a stall/spin. Realize, too, that for each LOC-I accident we can readily analyze, a significantly greater number of related and mostly uncounted incidents and hazards have also transpired. The goal, then, is to reduce not only the number of LOC-I accidents, but also the much larger group of near-accidents.

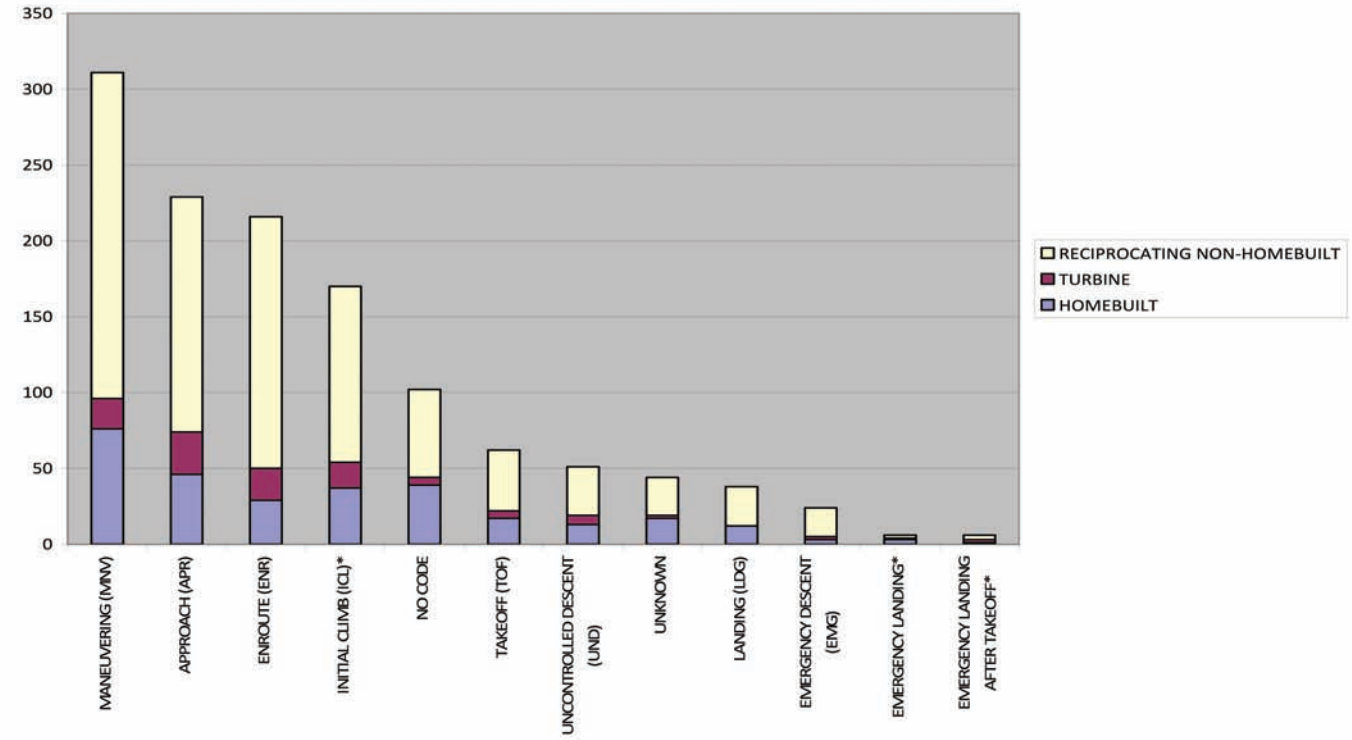
Unlike the wings-level, one-G stalls practiced for check rides, most inadvertent stalls are of the less benign, accelerated variety.

The obvious takeaway is this: We need to get better at maneuvering our aircraft. And "we" means each and every one of us. LOC-I does not discriminate. LOC-I happens to low-time and high-time pilots, to student pilots and airline transport pilots alike. Many factors can drive an LOC-I event: inadequate preflight, poor decision-making, faulty risk management, inexperience, complacency, distraction, surprise. But the final act in the accident sequence usually comes down to a misapplication of the controls by the pilot.

Don't Be Surprised

We can and should build a multi-layered defense against LOC-I through better training in the mental skills needed to avoid LOC-I in the first place, coupled with better training in the stick-

Fig.1 Loss of Control – Inflight (LOC-I) Events by Flight Phase 2001- 2010



and-rudder skills needed to prevent and recover from LOC-I scenarios. For example, too few pilots consider what they would or could do to fly an aircraft that has jammed controls. Slips and slipping turns are the necessary piloting skills to counteract stuck ailerons, a stuck rudder, and split flaps. Be aware that practicing such techniques should be accomplished during training sessions with sufficient altitude and preferably with an instructor who is comfortable with the subject of cross-controlled stalls. The same might apply during an asymmetric thrust event in a twin-engine aircraft as well. Many pilots are also unaware that, in the event the elevator control somehow becomes disconnected, certificated aircraft are required to be controllable through landing by using only trim and power adjustments. Of course, it takes training with a qualified instructor to be able to fly, much less land an aircraft without using its primary pitch control.

Build a multi-layered defense against LOC-I through better training in the mental skills needed to avoid LOC-I, coupled with better training in the stick-and-rudder skills needed to prevent and recover from LOC-I scenarios.

Stalls and spins continue to be a significant part of LOC-I. Unlike the wings-level, one-G stalls practiced for check rides, most inadvertent stalls are of the less benign, accelerated variety. Indeed, one study found that turning and/or climbing flight preceded 85 percent of fatal stall-only accidents; in other words, while the pilots were maneuvering. Another study found that 93 percent of accidental spins began at or below traffic pattern altitude. Maneuvering in the traffic pattern demands keen stall and spin awareness skills at all times.

During any unexpected or unusual event, it is important (if not cliché) to "fly the airplane" no matter what. This begins by immediately regaining control of the aircraft; or if control has not been lost, by not taking subsequent actions that could cause a loss of control. We can only bring the appropriate flying skills to bear, however, if we maintain control over ourselves first. Our rational brains must override the emotions and natural instincts that are often counterproductive to surviving an inflight emergency. We must be able to work our way through emergency situations by thinking and acting purposefully. This can only be accomplished through repeated and controlled exposure to scenario-based training exercises.

With the airplane under control, avoid becoming absorbed with what is wrong to the exclusion of the bigger picture. Maintain your situational awareness and take inventory of what is going right and what resources are available to you. For example, can you hold altitude? How much fuel remains? Is an airport or suitable off-airport landing site nearby? Whom can you enlist to help: passengers, ATC? And don't let the natural urge to get the aircraft back on the ground ASAP drive subsequent actions. Taking a few deep breaths and some time to think can bring greater clarity to an otherwise tense situation and just might reveal better options as you formulate a plan.

Top Three Tips on LOC-I

We asked Rich to provide three key points pilots should remember about loss of control. Here's what he said:

1. Prevent with the PAVE checklist: Awareness and prevention of conditions that could lead to LOC-I are by far the best strategies; LOC-I typically occurs at low altitude, so relying on the ability to recover to the exclusion of awareness and prevention often proves problematic. PAVE = Pilot, Aircraft, EnVironment, and External Pressures.

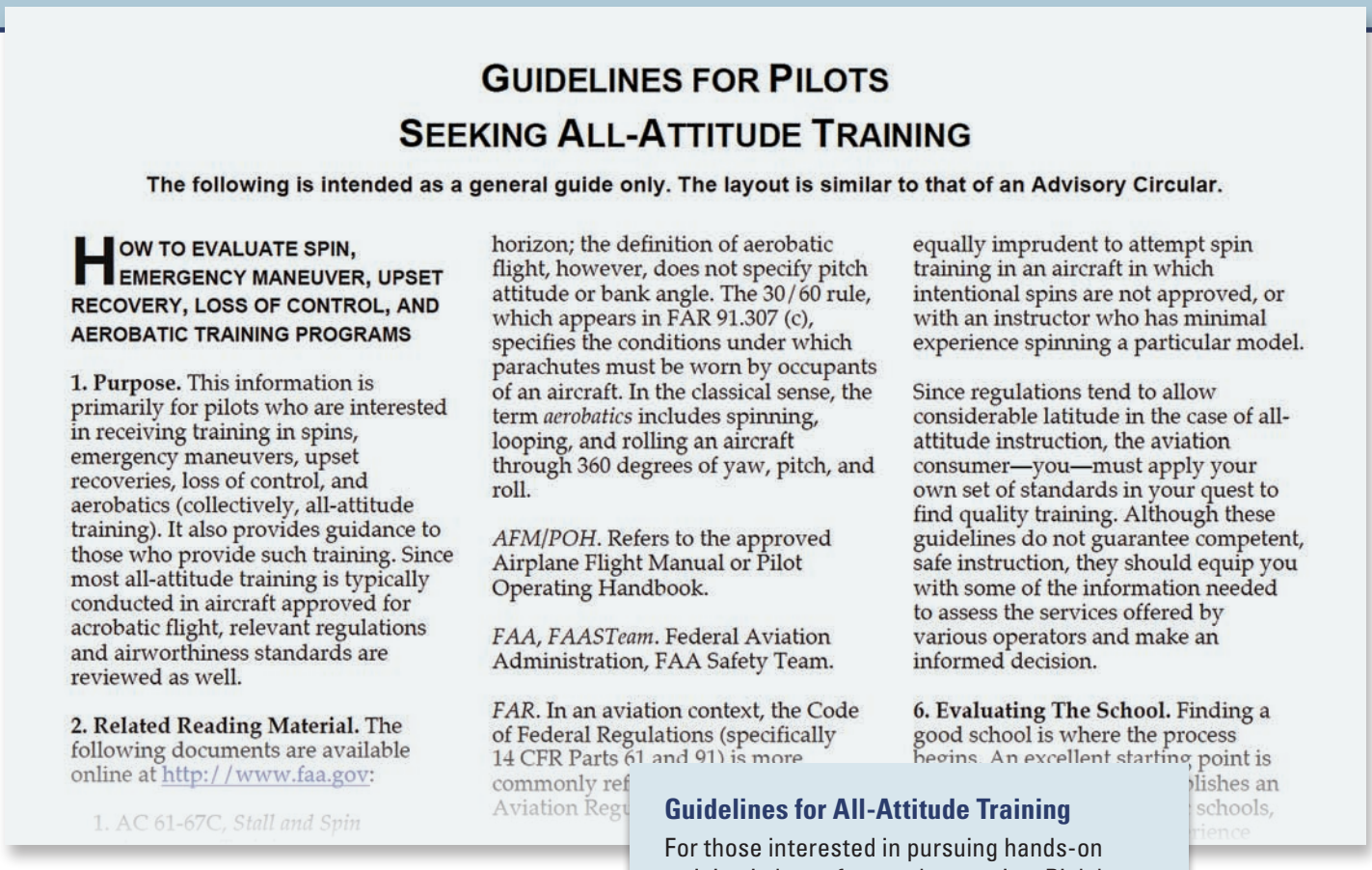
2. Heed the Warnings: LOC-I rarely occurs in a vacuum. Recurrent, scenario-based training not only highlights the warning signs that often precede loss of control events, but also reinforces appropriate mitigation strategies.

3. Learn to Recover: LOC-I recovery actions tend to be contrary to our natural instincts; appropriate recovery responses must be learned well, and because these skills are perishable, they must be rehearsed and/or relearned periodically.

Be Prepared

To reduce the threat of LOC-I resulting from mishandling the controls:

- Keep your mental and physical skills sharp.
- Review and rehearse emergency procedures often.
- Participate in the FAA WINGS and other safety programs.
- Treat the Flight Review not as a biennial chore, but as a great opportunity to learn something new, or to simulate accident scenarios and polish rusty skills.



GUIDELINES FOR PILOTS SEEKING ALL-ATTITUDE TRAINING

The following is intended as a general guide only. The layout is similar to that of an Advisory Circular.

HOW TO EVALUATE SPIN, EMERGENCY MANEUVER, UPSET RECOVERY, LOSS OF CONTROL, AND AEROBATIC TRAINING PROGRAMS

1. Purpose. This information is primarily for pilots who are interested in receiving training in spins, emergency maneuvers, upset recoveries, loss of control, and aerobatics (collectively, all-attitude training). It also provides guidance to those who provide such training. Since most all-attitude training is typically conducted in aircraft approved for acrobatic flight, relevant regulations and airworthiness standards are reviewed as well.

2. Related Reading Material. The following documents are available online at http://www.faa.gov:

1. AC 61-67C, *Stall and Spin*

horizon; the definition of aerobatic flight, however, does not specify pitch attitude or bank angle. The 30/60 rule, which appears in FAR 91.307 (c), specifies the conditions under which parachutes must be worn by occupants of an aircraft. In the classical sense, the term *aerobatics* includes spinning, looping, and rolling an aircraft through 360 degrees of yaw, pitch, and roll.

AFM/POH. Refers to the approved Airplane Flight Manual or Pilot Operating Handbook.

FAA, FAASTeam. Federal Aviation Administration, FAA Safety Team.

FAR. In an aviation context, the Code of Federal Regulations (specifically 14 CFR Parts 61 and 91) is more commonly ref... Aviation Regu...

equally imprudent to attempt spin training in an aircraft in which intentional spins are not approved, or with an instructor who has minimal experience spinning a particular model.

Since regulations tend to allow considerable latitude in the case of all-attitude instruction, the aviation consumer—you—must apply your own set of standards in your quest to find quality training. Although these guidelines do not guarantee competent, safe instruction, they should equip you with some of the information needed to assess the services offered by various operators and make an informed decision.

6. Evaluating The School. Finding a good school is where the process begins. An excellent starting point is ...blishes an ... schools, ...rience

Guidelines for All-Attitude Training

For those interested in pursuing hands-on training in loss of control scenarios, Rich has prepared a document entitled, *Guidelines for Pilots Seeking All-Attitude Training*. The document is available for download from the SAFE website at http://www.SafePilots.org/documents/Guidelines for All Attitude Training.pdf.

- Consider enrolling in a spin, emergency maneuver, or upset prevention and recovery training course at some point in your flying career as well.

Note, however, that even though this training typically involves the use of aircraft approved for aerobatic flight, it is not traditional aerobatic training. It is one thing to learn how to perform intentional loops, rolls and other maneuvers with precision, but quite another to develop an awareness of situations that can lead to LOC-I and to learn the altogether different skills needed to recover from unexpected departures from controlled flight. Equally important, quality unusual attitude training creates a unique environment in which to learn how to override the potentially debilitating mental inertia that accompanies the normal shock of an unexpected loss of control.

The context in which unusual attitude training is provided is also critical. For it to be effective, unusual attitude training must be done in the context of typical accident scenarios; otherwise, the training will lack relevance and will prove of little practical value for loss of control prevention and recovery.

Common LOC training scenarios include stalls and spins, especially as they relate to maneuvering flight. For instance, consider scenarios such as the skidding base-to-final turn or the mishandled turnback to the runway following an engine failure soon after takeoff. Other training scenarios may include wake turbulence and other environmentally induced rolling upsets, spirals under the hood, and alternative ways of controlling an aircraft should any of the primary or secondary controls become inoperative.

Ultimately, applying the triad of good preflight habits, solid aeronautical decision-making, and sharp piloting skills on every flight will increase your margin of safety against a near-accident or accident attributable to an inflight loss of control.

Rich Stowell is serving as a subject matter expert during the 2012 FAA Safety Standdown. He is an internationally-recognized authority on loss of control prevention and recovery. A seven-time Master Instructor and charter member of the Society of Aviation and Flight Educators (SAFE), Stowell has been providing unusual attitude training for twenty-five years, including performing more than 32,400 spins. He is also the 2006 National Flight Instructor of the Year.