

Departure From Straight and Level



by Mike Dwyer

I climbed out of my rental car at the FlightSafety Academy in Vero Beach with mixed emotions. On the plus side, Florida weather in February beats the Northeaster that was burying my Connecticut home in snow on the day of my airmanship training. Then there is also a special thrill to a campus environment that is dedicated to training young students

enrolled in the professional pilot program. The Academy is the flight school arm of the world's largest training organization. For anyone who takes flight training seriously, this is the Mecca of the world's largest commercial school. There were also butterflies that were in anticipation of tackling what I expected to be a challenging program. Lastly, there was the

excitement of knowing I would have the chance to fly a great airplane with a great pilot. So I started my day expecting to be out of my natural element: humbled, thrilled and come away a better pilot. I was right on every count.

I went planning to evaluate three things: the curriculum, the airplane and the instructors. I

came away believing that the three most important components of the training are the instructor, the instructor and the instructor. Before I discuss my instructors and the wildest 1.3 hours in my logbook, let me back up and give some background for the upset recovery course at FlightSafety and why you should pursue it. In a sentence, the course in airmanship wants you to be able to maintain aircraft control under **any** circumstance.

Several airframe manufacturers, airlines, government agencies and instructional companies such as FlightSafety have collaborated on training aids to address Airplane Upset Recovery. The following **unintentional** conditions generally describe an airplane upset:

- Pitch attitude greater than 25 degrees, nose up;
- Pitch attitude greater than 10 degrees, nose down;
- Bank angle greater than 45 degrees;
- Within the above parameters, but flying at airspeeds inappropriate for the conditions.

Statistical analysis between 1994 and 2003 reveal 32, in-flight,

loss-of-control accidents that resulted in more than 2,100 fatalities. The NTSB statistics show that the number one cause of fatal accidents is in-flight loss of control.

The FlightSafety Academy has four components to the Upset Recovery Instructional Course:

1. Academic Class	2 hours
2. Spatial Disorientation Training	4 hours
3. Flight Briefings	6 hours
4. Dual Instruction Zlin 242	4 hours
	16 hours

The ground school for the course, as I mentioned in the introduction, is advanced aerodynamics with a measure of aerospace engineering included. You get much deeper into a number of definitions than you did in your training for your ratings. Here is one example. Prior to attending the Academy, if you asked me define an unusual attitude, my response after a great deal of thought, would have been, “an attitude that isn’t usual.” I might have replaced the word usual with, normal or typical, in an effort to sound slightly less moronic.

Today, I could give you the following reply, an excerpt from the FSI materials. “It is fair to call an

unusual attitude anything that a pilot can’t immediately recognize: that is, when there’s a loss of correspondence between what the aircraft is doing and what the pilot perceives. This disconnection can be essentially cognitive, where the pilot just can’t figure out what he is seeing, or take the form of spatial disorientation provoked by the vestibular system where the pilot can’t believe what he/she is seeing because of conflicting motion cues.

Of course all *Twin & Turbine* subscribers know what the vestibular system is, but for the benefit of any young readers or fellow airplane salesmen that have picked up this article, I will give a short definition. The vestibule is the central chamber of the inner ear. The purpose of the vestibular system is to keep tabs on the position and motion of your head in space. There are really two components to monitoring motion. You must be able to detect rotation, such as what happens when you shake or nod your head. In physics, this is called angular acceleration. You must also be able to detect motion along a line — such as what happens when the elevator drops beneath you, or on a more subtle note, what happens when your body begins to lean to one



FlightSafety's Zlin 242



The GAT (General Aviation Trainer) is a miniature simulator that has a generic cockpit with very simple controls.

side. This is called linear acceleration. Essentially the vestibular system keeps you balanced. If you think vestibular was hard, take the course to learn about oculogyral illusions, nystagmus, somotogyral, coriolis and autokinesis.

The aerodynamic component of the class will apply the old faithful Bernoulli principle and what happens to lift, gravity, thrust and drag when you have departed from normal flight. In an unusual attitude, there's also typically an unusual relationship going on around the aircraft axes. It's unusual in the sense that the opposing moments around the axes start to shift in ways that produce divergent results.

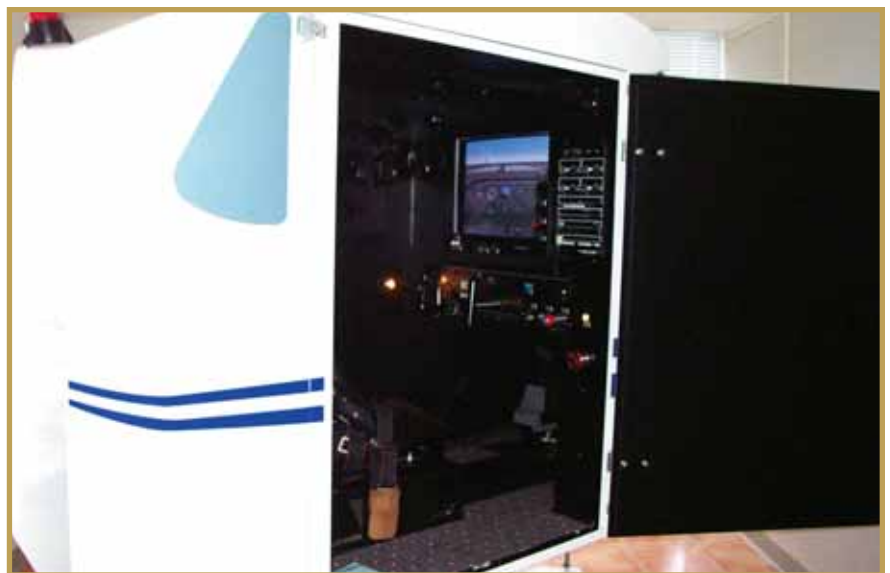
In the engineering component of the class, there is a discussion of G force and how it relates to the construction of the airplane and the injury or failure of that structure. There is also discussion of how the G limits are arrived at for each category aircraft.

I know some of you might be saying, that's all interesting, but how does the bookwork make me fly better. I don't need to understand wiring diagrams to operate the radios. Here's one example. When discussing the stall characteristics of a straight wing and a swept wing, one significant difference is where the stall begins. In a straight wing, the stall starts at the root, a swept wing starts at the tip.

That is one reason that most jet stall training stops at the stick shaker or recognition of the stall. The stall is more sudden and there is no aileron control to help in the recovery. A straight wing stall starts at the root and we have lots of notice of what is about to happen. Did you know that in a slip, the straight wing on the side of the slip assumes the characteristic of a swept wing and will stall before the opposite wing? We all know that when one wing stalls before the other, we spin. Slipping on final can be an effective way to lose altitude but a deadly way to overcorrect a late turn to final since the stall could happen suddenly with no warning.

This is just a sample of what you will get in ground school and flight briefings. Before getting to the flying piece of the school, I want explain the Spatial Disorientation segment of the course. Cliff Loar, your instructor, has developed a program that teaches the terminology, science and recognition of optical illusions that contribute to spatial disorientation. Once you recognize the illusion, you are then taught techniques to maintain aircraft control by either instrument or visual references.

To help in the training, Cliff uses a GAT (General Aviation Trainer). This is a miniature simulator that has a generic cockpit with very simple controls. What distinguishes the GAT from the more typical Class D simulator that FlightSafety uses for type ratings is the smaller size and greater range of motion. The GAT can spin 360 degrees, pitch up down and roll. Think of an enclosed mechanical bull with a instrument panel while you are wearing headsets in the dark. This is a great tool that has a unique ability to quickly simulate a number of very real illusions. False horizons, black hole approaches, graveyard spiral, the leans and runway width illusions are just some examples of the disorientation training that you will receive. Once again, the format of the ground school, the science of what



The Interior of the GAT simulator.

you are experiencing, the pre flight briefing, the flight session and the debrief, are all geared to maintaining aircraft control under any and all flight conditions.

Now let's get to the airplane part of the program. The aircraft is a Zlin 242. Built in Czechoslovakia, the side-by-side, two-seat trainer, has a 200-hp engine with inverted fuel and oil systems allowing sustained, inverted flight. The airplane is a tri-cycle gear that is a relief for those of us without a tail wheel endorsement. There is a stick instead of a yoke and of course, most fun of all, a large, clear canopy.

I went to the school with a bias against piston trainers vs. turbine because of course we couldn't duplicate what we would experience if upset in a jet as it relates to airspeed, roll rates and thrust. Every airplane will also have slightly different recovery techniques as well. I am now convinced that since we are not going to take our entry-level turbine aircraft upside down, the Zlin is a great place to start. G's are G's, and there are enough universal aerodynamic characteristics to all airplanes that any training aircraft of this kind is beneficial.

Keep in mind that the goal of the training is not just to teach correct control inputs. Before that happens you have to overcome the "Oh S#@*!" response so that you keep your wits and then allow your training to take over. In most instances, an incorrect input response aggravates an upset condition that ultimately leads to an unrecoverable situation. Any aerobatic airplane is sufficient to help you overcome the IQ shrinkage that makes a bad situation even worse.

So finally, let's meet the instructor, Marcel Moraru, in whose hands I encourage you to place your life. Marcel is a compact, energetic man that comes from the same country as the Zlin. Hmm..., I wonder if that is a coincidence. Marcel has flown everything from

Mig fighters to large transport aircraft to the Zlin 242. You have to pay attention to his middle European accent but that is easy for two reasons. First, given the topic, I found myself hanging on every word. Second, Marcel has a great ability to simplify complex concepts into short and sweet analogies. He likes the KISS approach and that is very helpful when you are on a steep learning curve.

As Marcel starts the walk-around, you start to see several things. His mastery of the material is obvious as he moves quickly but with great thoroughness. I think it would be exhausting to be around Marcel for any extended length of time. The students all greet him affectionately and he agrees to add a CFI student to his already busy schedule in just the time it takes to walk from the lobby to the plane.

We taxi out and depart the pattern and like all great instructors, before even the first maneuver, you know everything will be just fine. This man flies an airplane like I pull into a parking spot. Once we are going through the routine, Marcel has a great sense for the pace and degree of difficulty that he can throw at you. You warm up with an aileron roll and loop, both fairly forgiving maneuvers. First, Marcel demonstrates and then I try to imitate him. The course will include all of the typical aerobatic maneuvers and also link them to the common situations that can lead to your needing the maneuver to correct an upset.

Let me also put you at ease about losing your stomach. Marcel won't let you. I know you should never say never, but let me put it in this context. I love aerobatics and roller coasters and I let Marcel know to just let her rip during our flight. In part because Marcel was running me through all the maneuvers for the article that you typically do in four flights, and in part because I don't do aerobatics regularly. I was just starting to consider my options about my breakfast and how not to decorate the cock-

pit with it. Naturally, due to typical masculine insecurity and a John Wayne mentality, I would never let my new fighter pilot buddy, Marcel, know how I felt. The good news is that he just knew. He has done this long enough to adjust your air for you, have you look at the horizon and stay straight and level for the flight back from the practice area. I am sure Marcel has developed a fine sense of this over time. After all, it is a side-by-side cockpit and mi breakfast is su breakfast.

I don't want to spend a lot of time on the actual maneuvers, the course will do that. I do want to finish the flight section with what was my greatest nugget. Precision. You have to do the right thing in the right sequence. If you don't, you don't recover. Every flight I have made since my trip to Vero Beach has been more precise. More correct, better planned and in short, flown more safely. This sounds silly, but just watching Marcel perfectly coil the tie down ropes after he has untied the airplane gives you a sense of not only how he flies but more importantly, how he expects you to fly.

Once last comment on my two instructors, Cliff Loar and Marcel Moraru. Upset training for commercial operators is still a fairly new and growing field. Both Cliff and Marcel were tasked by Larry Kennedy, the Director of Training at Vero Beach, to create these programs. They both have a passion for it that is contagious. They own their course materials, which are still developing in concert with the whole industry. This is an exciting time and place to be in a field that should, I believe, be an integral part of your training.

The Academy recommends four days for the course. This may seem like a lot of days to someone that thinks of a 16-hour curriculum as a long day. For newcomers to aerobatics, one flight per day is not a bad way to measure your physiological response to being tumbled in an airplane. Keep in

mind that the typical Academy student is a full time enrollee that is in Vero Beach for the entire professional pilot course. You can easily condense the course to three days or less if you are comfortable with your ability to withstand G's.

The Academy is very co-operative with the corporate jet syllabus. Contact Jay Elder, Director of Marketing for Vero Beach or Larry Kennedy, Director of Training. They can both be reached at (800) 800-1411. On a financial note, this entire course is a tremendous value. The entire program is less than \$2,000.

In closing, the FlightSafety course will do the following:

- Increase your understanding of aerodynamic departure from normal flight;

- Familiarize you with the stimulus environment generated by unusual attitudes;

- Develop the control skills for recovery.

Along the way you will meet some great teachers who are dedicated to making your flying more precise and a great deal safer. I think we should all attend upset training on a regular, recurring basis. So I did end up being out of my natural element, humbled and thrilled. And I certainly came away a better pilot. Come on, treat yourself to a departure from straight and level. It's an adventure.



Mike Dwyer is the president of Guardian Jet, a consulting and brokerage firm that offers maintenance oversight and pilot services along with an umbrella of services for light jet operators. Mike has held sales positions at Mooney Aircraft, Cessna Citation and Gulfstream Aircraft before starting Guardian Jet with a team of specialists. He is an ATP with 2,500 hours of which about 2,000 has been spent demonstrating aircraft to new owners. Mike earned a CitationJet type rating in 1994. For more information, visit www.guardian-jet.com or call (203) 458-2500.