

Chapter 4: Back to School

I was always afraid of dying. Always. It was my fear that made me learn everything I could about my airplane and my emergency equipment, and kept me flying respectful of my machine and always alert in the cockpit.

— General Chuck Yeager, *Yeager, An Autobiography*

Like most other complex tasks, the pursuit of mastery in flying airplanes is the achievement of a series small steps or plateaus. For the student pilot, it is the first solo. For the private pilot, it is the instrument and commercial ratings. Beyond this, advanced flight training options depend upon the various aviation career paths the pilot chooses to pursue, e.g., military aviation, airlines, and corporate flying.

Regardless of one's ultimate purpose in flying, there is one task common to all aviators. This is called recurrent training. Without recurrent training, the hard fought skills required for a particular rating either stagnate or degrade precipitously over time to a point where we become a hazard to ourselves or others in the sky or on the ground.

It was not long after the federal government began issuing pilot licences in the 1940s that it set forth minimal recurrent training requirements to maintain one's privilege to fly. Bi-annual flight reviews, for example, require that pilots receive a minimum of one hour of ground training and one hour of flight training every two years from a certificated flight instructor. Protecting the safety of passengers, the FAA requires pilots to perform three takeoffs and landings every 90 days before they can take others aloft. Instrument rated pilots must complete six instrument approaches and related course interceptions and holding pattern work every six months. Military, corporate, and airline pilots have far more demanding recurrent training requirements. In short, pilots either maintain their flying skills or they stop flying, or as history tragically reveals, they and others die.

Like most private pilots, I have been fairly diligent in meeting my recurrent training responsibilities. Moving up the pilot rating ladder from private pilot to instrument, to commercial, to certificated flight instructor, and on to certificated instrument flight instructor, I have received sufficient recurrent training to keep myself and my passengers alive and my insurance company happy. As I advanced up the rating ladder, I received additional training endorsements to fly complex, high performance, and tail wheel aircraft. As a flight instructor, I continually repeat nearly all of my own recurrent training requirements vicariously through the process of guiding other pilots through their own recurrent training needs.

So what's left for me to do? I pondered that question recently while sitting at home by the fireplace on a cold winter evening. Am I *really* where I want to be as a pilot? Can I assure my family, friends, flight students, and colleagues consummate safety in the skies? Are there flying situations I might encounter that I would not be prepared to handle? What would happen, for example, if I were caught in the potentially deadly wingtip wind vortices or wake turbulence created by a heavy airliner? Or, could I safely recover or, better yet, prevent a stall and spin caused by one of my students making a slow, skidding turn from the base to final leg in the landing sequence? What about an untimely encounter with a thunderstorm that suddenly turns the airplane inverted, then sends it spewing out the other side with control surface damage? Pretty serious stuff, I thought. Would I live or die?

While I have never had a problem with my own self-concept, I knew that I was never the sharpest arrow in the quiver. NASA recruiters never came looking for me to fly the next space shuttle. Pilots far smarter and more experienced than me have met an untimely end in an airplane. My own frequent readings of National Transportation Safety Board (NTSB) accident reports convinced me that very smart and highly experienced pilots continue to do well intended but dumb things.

Coupling this realistic self-assessment with the reality of my own advancing age and predictable dimming of mental function, I knew that I had to push my own level of recurrent training to an even higher plateau. But where to go from here?

Despite current media attention to the terrorist threat to aviation, most airplane crashes still result from some form of pilot error or oversight. In a sudden, emergent situation, the hapless pilot either does too much, too soon . . . or too little, too late. Or he simply does not know what to do.

A recent air disaster involving a USAir Boeing 737 near Pittsburgh illustrates this point. The flight data recorder showed the control column pulled fully back as the 737's bank angle reached 90 degrees where it remained as the aircraft rolled fully upside down. Inverted, this incorrect aft pulling of the control column caused the plane to enter into a diving spin just before striking the ground.

In a similar scenario near Colorado Springs, a United Airlines Boeing 737 entered into what accident investigators believed to be wake turbulence, causing the airplane to suddenly roll inverted. The NTSB report suggested that the pilots' reactions were not timely nor appropriate. Pulling the control column fully aft while inverted caused the aircraft to dive directly downward.

A much higher profile accident occurred several years ago off the coast of Martha's Vineyard when John F. Kennedy, Jr., his wife, and sister-in-law lost their lives in a Piper Saratoga. Young Mr. Kennedy, a minimally trained private pilot, found himself in worsening weather conditions. Instead of returning to better weather behind, he ventured on into instrument meteorologic conditions (IMC) where visual references to both the ground and the horizon were lost.

Despite his satisfactory demonstration of basic instrument flying skills, he apparently allowed the airplane to enter an uncommanded descending turn or slow spiral. Suddenly noting the unwinding of his altimeter, Kennedy pulled back on the yoke. Not realizing he was going into a steepening turn, the rearward pressure on the yoke caused the turn to tighten along with an even faster rate of descent. Further tugs on the yoke in a vain effort to retard the descent caused the airplane to enter the classic "graveyard" spiral. Radar tracks confirmed that Kennedy's plane hit the water nose down at nearly

300 miles per hour!

In each of these cases, both professional airline pilots and trained private pilots flying sophisticated equipment flew perfectly good airplanes into the ground because of incorrect control inputs necessitated by sudden, unexpected events. If this could happen to them, could it happen to me?

Recurrent training required by federal aviation regulations focus upon the preservation of basic skills necessary to maintain a particular pilot rating or to operate a particular type of aircraft. Inherent in this training is maintenance of piloting skills necessary to extricate one from the common vagaries of weather and mechanical malfunction. In this context, I knew my flying skills were adequate. But what about the non-typical vagaries of weather or freak encounters such as tailplane icing that renders empennage control surfaces inoperable, or wake turbulence encounters the result in uncommanded rolls or inverted flight, or simple control cable malfunction leaving the airplane with no ailerons, elevator, or rudder? Ask any pilot from student to a senior captain flying Boeing 777s if he or she is confident in their abilities to handle these atypical events. Few honest pilots will say yes.

Okay, I thought to myself. I can proceed with my flying career banking on the odds that I will not encounter atypical flying events. After all, the odds of normalcy are nearly 99 percent in any pilot's favor. But the fact that I've never encountered a rolling upset or control surface failure offers little consolation. Stuff happens . . . and I wanted to be prepared for it. What I needed, I thought, is realistic training that pushes an aircraft to the edge of its performance envelope and beyond.

My past efforts to receive this training had been frustrated somewhat by the lack of realism. In one three day effort of simulator training conducted by Flight Safety International in Wichita, Kansas, I learned how fast bad things in airplanes can happen. But it was simulator training, in a big white box secured safely to the ground. Useful? Yes. Realistic? For me, not really, simply because I knew I could quit the exercise at any point and walk into the hallway.

In another situation, I hired an aerobatic instructor to provide me with real airplane experience. We did a few rolls in a Cessna 150 Aerobat along with a couple of spins, then landed. The experience was much better than the simulator, but it was short on theory. My instructor explained how to bail out and operate my parachute in the event something bad happened, but my lessons were a bit short on *why* airplanes find themselves in inverted spins. I wanted to know why things happened and why perfectly good airplanes sometimes crash.

It was when I was sitting by the fireplace on that cold winter evening that I uncovered a source for the training I was looking for. I found it while reading a recent issue of FLYING Magazine. An article written by Jay Hopkins spoke of an organization located in Mesa, Arizona called Fighter Combat International (FCI). Founded in 1986 by two ex-Canadian CF-18 fighter pilots, Paul "Pitch" Molnar and Paul "BJ" Ransbury, FCI provides as-real-as-it-gets extreme aircraft maneuvers training using four Extra-300L unlimited performance aerobatic aircraft. Its instructor pilots are all graduates of the Fighter Weapons Training (Top Gun) School, each having hundreds of flight hours in F-16s and F-18s. There are no civilian trained flight instructors at FCI.

This is exactly what I am looking for, I thought to myself. I immediately picked up the telephone and called FCI to request further information about their program. This call introduced me to

Ron Saxton, FCI's director of training, who spoke with me at length about my particular needs and FCI's ability to address them. That was the beginning of what I will describe below as the most exciting flight training experiences I have ever had.

Through some careful travel planning, I coordinated my planned three day FCI training in Mesa, Arizona with a business engagement I had in Reno, Nevada. This reduced my out-of-pocket travel expenses for the Mesa portion of my itinerary.

Because of limited time and the travel distances involved, this would be one of the very few occasions where I traveled on commercial airlines. This experience, alone, rekindled my enormous respect for general aviation and the privilege I enjoy to fly my own airplane wherever and whenever I choose. Like so many other aspects of daily living that we use to take for granted, the September 11 terrorist attack dramatically altered commercial airline travel. Recently imposed airline security precautions have subjected commercial air travelers to humiliating multiple body searches, public exposure of personal suitcase contents, and long waits in check in lines. Most annoying is the federal requirement that all passengers remain in their seats until an aircraft lavatory facility becomes available. No more walking the isles or taking a much needed stretch by standing in line waiting for an occupied lavatory to become free. But this is another story.

Finishing my business appointment in Reno, I felt a sense of eager anticipation as I boarded my Southwest Airlines flight to Phoenix. There I would pick up a rental car for the 45 minute trip to Phoenix's eastern suburb community of Mesa. It was late in the afternoon as I drove directly to FCI's operational headquarters at the Mesa Airport, arriving just in time to attend a flight training seminar led by one of America's foremost experts on emergency maneuvers techniques. His name is Rich Stowall. Rich had been invited by FCI to spend three days working with their flight instructors in their own particular form of recurrent training. It was, indeed, my good fortune to be scheduled for my training concurrently with Rich's work with the FCI pilots.

Little did I know it at the time, but I was to serve as proverbial guinea pig flight student for this three day training exercise! Part of Rich's mission was to critique the ground and flight training skills of FCI's pilots and they needed a real live student for this exercise. Thus, I was the only student in a program that otherwise works with five or six students at a time.

My actual training began with a ground school session at 8am the next morning. My feelings of apprehension rose rapidly as I entered the briefing room where I again met Rich Stowell along with two FCI pilots who would be serving as my instructors for the next three days. All three were attired in desert tan flight suits. My lead instructor also serves as FCI's chief pilot. His call sign was "Schlimmer," which is simple variation of his full name, Karl Schlimm. My other instructor's call sign is "O.P.," which is short of Paul Oppenheimer. Both of these individuals were high time F-16 pilots with combat experience in the Gulf War. Each also served as instructors at the U.S. Navy's Fighter Weapons Training (Top Gun) School.

Here I am, a middle age business pilot in the midst of one of America's top ranked aerobatic pilots and two Navy jet jockies whose sole purpose over the next three days was to see how they could teach me about unusual flight attitudes and emergency maneuvers recovery. To say I was

anxious at that moment is a gross understatement. I was, frankly, a bit scared, almost to the point of reconsidering my decision to pursue this kind of training. I could see the competitive dynamics taking place between these two ex-military jet pilots and the civilian aerobatics expert. Measurable testosterone levels in that room were beginning to soar, and I saw myself as the direct object of their competitive egos. Either Rich, the civilian pilot or Schlimmer and O.P., the jet jocks, were about to make aerial mince meat out of me. At worst, I would die. At best, I would be tossing by breakfast, lunch, and dinner for the next three days. Neither option seemed very appealing to me.

The initial ground briefing probed the depth of my understanding of basic aeronautics. As a flight instructor, I had developed a fairly detailed understanding of the four forces of flight, Newton's Third Law, and Bernoulli's Principles of Lift. I soon discovered that the forces that maintain straight and level flight begin to interact in sometimes unpredictable, leastwise to the unknowing pilot that is, when serious unusual flight attitudes occur. I learned, for example, that swept wings experience stalls first at the wing tip then move inward, while the straight wing civilian aircraft we fly develop stall forces from where the wing attaches to the fuselage, then move outward to the wing tip.

My new found understanding of this difference formed the basis of one of many lessons I learned this weekend that might very well save my life or the lives of my students. This particular discovery revealed to me precisely what happens during a low, slow moving skidding turn that typically occurs when turning from base leg to final in the approach to landing. Excessive inside rudder pressure causes the airplane to yaw to the inside of the turn. This yawing causes the inside wing to assume a swept wing position in relationship to the relevant wind or slipstream. Now acting like a swept wing, the stall forces begin at the wing tip. The buffeting normally generated by a wing stalled at the fuselage and striking the tail surfaces are no longer present. In such, the hapless pilot receives no buffet warning of impending stall.

Without immediate pilot induced control corrections, the stall problem instantly worsens as the effective remaining lifting surface of the inside wing is diminished by the stalled wingtip. With decreasing wing lift, the overall center of lift on the aircraft moves dangerously ahead of the aircraft's center of gravity. This causes the nose to suddenly pitch upward. As the nose pitches upward, the gyroscopic effect of the spinning propeller causes the nose to yaw momentarily to right. The little remaining airspeed decreases rapidly, both wings now stall, the nose suddenly slices downward through the horizon, as the aircraft enters a left turning descending spin. When all this occurs at 300 feet above the ground as in the approach to landing sequence, the incident is 100 percent unrecoverable with fatal results in every instance.

As a student pilot and through my preparation to become a flight instructor I had always been taught not to skid the airplane, otherwise bad things could happen. And that is exactly what I have been teaching my students. My FCI ground instruction session that particular morning taught me precisely what those bad things were and how, in a stepwise fashion, they developed.

Okay, with the initial two hour ground briefing session completed, it was now time to take to the skies. Fairly solid in most stressful situations, I now felt my knees wobbling as one of FCI's ground crewman strapped the obligatory parachute on my back.

Ever used one of these things before, he asked?

No. Do you think I might need it today, came by quick retort?

It all depends on how these guys fly. If they bend a wing or run into each other, you will find this thing to be your best friend. Anyway, if you have to bale out, simply reach over with your right hand and give this “D” shaped ring a real hard tug. Breath normally and wait for the ambulances to pick you up.”

Whoa, baby . . . I’m really beginning to feel a bit uptight here. But there’s no turning back. Operating exclusively on raw determination in the presence of testosterone oozing from all sides, and in the absence of any remaining rational thought, I climbed into the front seat of the bright red and white aerobatic aircraft with the image of sharks teeth artistically painted on the nose. “Schlimmer” climbed into the backseat. I pulled the leather helmet with attached earphones down over my head, adjusted the five point seatbelt harness, then drew it all tight using a ratchet device that snugs you very tightly into the seat.

To get out in a hurry, simply release this connector, then this connector, unplug your earphones, slip out of the harness, push open the canopy, skinny out of your seat, climb out on the left wing, turn your back to wind, and push off. Those were the final words I heard from the ground crewman.

Cool. This sound easy in theory while sitting on the ground. How does one perform these simple escape steps when the airplane is in an inverted spin, nose down at 300 miles per hour?

The Extra 300L is a mighty aircraft. It’s the plane of choice for most competitive airshow pilots. Comprised of a 300 horsepower, Lycoming IO540 engine pulling an airplane with an empty weight of less than 1,400 pounds is like putting an automobile engine on the front of your bicycle. It has fairly short straight wings with no stabilizing dihedral. The bubble canopy allows for easy view in all directions. The aircraft is equipped with four video camera lenses, one on each wing tip, on the tail, and one inside the cockpit.

Contact, yells Schlimmer in a World War I flying ace tone of voice. *Clear right, clear left. Let’s roll,* he shouts in military disciplined fashion.

This was to be a formation takeoff with Rich and O.P. in a blue and white Extra 300L sitting next to us on the ramp. They would be serving as the formation flight leader. We were the wingmen.

We taxied in standard “S” turn fashion used by all tail wheel pilots. After a quick run up, O.P. called the tower.

Williams Tower, Combat Three, flight of two ready for departure, runway 30.

Roger, Combat Three. You are cleared for take off, runway 30.

Schlimmer slowly advanced the throttle. At that point, I had a sudden urge to take control. The airplane gained speed slowly at first, then as the tail rose off the ground I could feel the large four bladed prop grab the onrushing wind. Pulling faster and faster, our Extra 300L literally leaped off of the concrete runway below. Looking to my left I saw O.P.’s smiling face in the adjoining aircraft flying barely three feet off our wing tip. Using hand signals known only to Navy fighter pilots, O.P. and Schlimmer were engaged in some form of supposedly meaningful dialog. I knew it all meant something,

but I didn't ask.

The surrounding sky was indescribably clear. You could see forever in all directions. Looking up through my plastic bubble canopy, I could see the deepening blue sky as it extended into outer space. Turning my head left and right, I smiled before the running video cameras mounted in the cockpit, wingtips, and tail.

The Mesa area from an airplane looks like a reclaimed desert surrounded by pyramid shaped mountains rising 5,000 feet up on all sides. I could not imagine a more suitable environment to conduct aerobatic training flight. The bright sun served as our personal spotlight as we prepared to practice our scheduled maneuvers before our imagined spectators below. Heck, we even had smoke to turn on for added visual impact!

Bob, you okay, came Schlimmer's considerate question?

Yeah, I'm with you. God, this is beautiful, spectacular.

Okay, let's get moving here. Schlimmer and O.P. agreed to break formation, with us flying southward and O.P. going to the north.

Let's start with a couple of warm up "Dutch Rolls. Like so many other terms and phrases in aviation, I had heard the term "Dutch Roll" many times but never paid much attention to what it meant. I soon learned. There are simple 60 degree coordinated banks, left and right, with the nose held to a specific point on the horizon. This exercise teaches the pilot how to balance rudder and stick inputs when rolling. It took me a few minutes to get the hang of this maneuver.

Ready of 360 degree roll, Bob," came Schlimmer's next question.

Ready, I said, while quickly adjusting the electronic airsick prevention band I strapped to my right wrist before take off. I grabbed another chewable non-drowsy Dramamine just in case.

Okay, we're rolling to the right. Stay with me on the controls, Bob. I'll raise the nose 20 degrees above the horizon using slight rearward pressure on the stick. Stay with me, here. Bob.

I felt the stick slide back less than one quarter inch. The nose pitched upward. Instantly, Schlimmer pulled the stick three inches or so to the right and held it there until we were passing through knife-edge, wings vertical flight. At that point, I felt Schlimmer push the stick forward to hold the nose upward while we were momentarily in the inverted position. To me, the sky above was now below in my forward field of view as the earth rotated magically around our axis. The stick moved back slightly as we returned to an upright attitude.

Easy isn't, Bob. You give it a try. Go to the left this time, said Schlimmer.

I strained hard to remember the sequence of control inputs that Schlimmer described only moments ago. Let's see, apply back pressure on the stick, then push the stick sharply to the left, release back pressure in the roll, then ease the stick forward during the inverted phase, finally neutralize stick pressures as we return to level flight. Don't forget to tap left rudder to keep things coordinated throughout the roll. Piece of cake, right? Yeah, right!

My turn. I gave the stick a gentle tug that lifted the nose suddenly upward. A sharp tug to the left caused the plane to roll instantly through the inverted phase. My mind screamed to pull back on the stick to get the rapidly rising ground out of my face. Recalling the instructions of my mentors, however,

I held the stick to the left, eased it forward, then neutralized things as we rolled upright.

Okay, nice job, said Schlimmer. *Let's move on to the inside loop. I'll demonstrate, then you follow. Stay with me on the controls as we do this.*

After shouting, *ready*, Schlimmer gave a gentle forward pressure that lowered the nose, added full power. The airspeed rose quickly to 140 knots. This was followed immediately by a rearward tug on the stick. The plane responded by pitching upward, 30 degrees, 50 degrees, 80 degrees, higher and higher until all I saw was blue sky.

Look out the left window, shouted Schlimmer. We were momentarily inverted at the top of the loop. Like that instant in the roll, what was up was now down, and what was down was now up.

Look up and behind you, said Schlimmer. As I did, I could see the horizon slowly emerging from the top of my view. Now on our backs, I looked “up” (really down) and observed the houses below suddenly grow larger in size. The altimeter was unwinding at over 4,000 feet per minute. Again, my brain yelled for me to PULL UP to arrest the descent. As Schlimmer began to do this, I was instantly pressed against my seat with forces greater than I had ever felt before.

The “G” forces reach four times our natural weight as we rolled out into straight and level flight. This made me 800 pounds (200lbs x 4) in the seat. With blood rushing out of my brain and into the lower half of my body, I began to feel light headed, almost faint. Our earlier ground school briefing warned me about this condition. The solution is to flex one's leg and abdominal muscles, thereby forcing blood back up into the brain.

Feeling a four “G” pull was instructive to me. Had I placed my own Cessna 210 into a four “G” pull, I would have exceeded its airframe design limitations of 3.8 “Gs.” which, in turn, could cause the wings to collapse or separate from the airframe. This is not a good thing.

Again, nice job, were the comforting words I received from Schlimmer as we returned to upright, straight and level flight.

Ready for an “Immelman, asked Schlimmer?

An Immelman is a rolling maneuver from inverted to upright flight at the top of the loop as opposed to a “Split S” which is the rolling maneuver from inverted to upright flight at the bottom of an outside loop. The remaining portion of this flight was dedicated to Immelmans and Spit-S's. My stomach soon began to beg for mercy.

Here we go, Bob. As before, stay with me on the controls. Then you'll do one by yourself. We'll do an Immelman first,” came Schlimmer's quick pre-maneuver briefing.

Ready, now.

Schlimmer's pull on the stick caused the aircraft to enter an ever-steepening climbing attitude. Reaching the top of the loop, hanging upside down by the seat restraint system, Schlimmer tugged the stick to the right, and the plane suddenly rolled upright.

Piece of cake, he said. *You do it.*

One thing I learned thus far in my training was a hatred from “G” forces. Anything beyond three “G”s seems to put my brain in my stomach with an uncontrollable reflexive impulse to spew both brain and stomach contents all over the control panel of the airplane. It is not a pleasant feeling.

I've got the controls, I shouted to Schlimmer signifying a clear understanding of precisely *who* is flying this airplane at this moment in time. As in the loop before, I applied gentle forward pressure and added full power to increase airspeed to 140 knots, then I applied back pressure. The nose rose quickly but smoothly above the horizon. Trying to avoid fixating on my deteriorating stomach condition and trusting that my anti-air-sick wristband batteries were still working, I held back pressure until reaching the top of the loop, then leaned the stick right causing the airplane to roll from inverted to an upright flight attitude.

Wow, neat. I love it, but take me home, now, was my earnest message to Schlimmer.

Roger, that, Bob. Back to the ranch.

Upon landing and a thorough debriefing session using the video tapes recorded during the flight, we broke for lunch, each in our separate directions. I got in my car and drove several miles down the road to a fast food restaurant. I pulled into their parking lot, leaned my head backwards on the headrest and fell fast asleep. The previous hours in the air proved to be more physically and emotionally intense than I had anticipated. Waking suddenly almost one hour later, I started the car and drove back to the airport for another two hour ground briefing.

On the platform now was "O.P.", a seasoned F-16 pilot/instructor who does handstand pushups each morning before coming to work. Like Schlimmer, "O.P." was as knowledgeable as he was skillful. With a college major in physics and an F-16 instructor pilot, O.P. demonstrated a superb command of aeronautics and an equally effective manner of imparting this knowledge to students.

Now having a clearer understanding of the aerodynamics of coordinated flight, our topic transitioned to unusual attitudes and emergency maneuvers. We spent two hours talking about why good pilots fly good airplanes unintentionally out of the sky. Learning this was my ultimate purpose for attending this course. Would there be situations that I might encounter in my own airplane that would spell my fate if I entered the wrong control inputs? I knew the answer to this question was yes. What I didn't know, however, were the situations that might cause such incorrect action.

So it was up in the sky we went again. This time, our mission was to deliberately fly our airplane into strange and bizarre flight attitudes, then apply both the wrong and right control inputs to rectify the matter. This would be another workout that would test the limit of my anti-air-sick wrist strap and my chewable, non-drowsy Dramamine.

The takeoff was the same as earlier today. We flew in formation up to 6,000 feet, then broke off in two different directions. Schlimmer was still my "GIB" (guy in the back). Most of these exercises began from an approach to stall flight condition in a slow, high angle of attack flight attitude such as typically encountered when making an approach to landing. We slipped, skidded, pitched, and banked the airplane aggressively from various stalled attitudes. In several notable incidents, intentionally incorrect control inputs caused us to roll inverted, descend into spirals, flat spins, and tail slides. All performed high up is safe. Having these things happen close to the ground is deadly.

Having gained a fair measure of mind over matter self-control, I began to feel more relaxed on the controls. While pulling over three "Gs" was still unpleasant, my initial fears turned to pleasure with each subsequent maneuver. I enjoyed my new found freedom to allow the airplane to depart from the

flight attitude restrictions associated with my Cessna 210. Most importantly, I grew confident that I could skillfully recover from virtually any flight attitude I found myself in. That is, as long as I had enough altitude.

As before lunch, our flight ended with a comprehensive debriefing session. It was here that the reality of my maneuver responses were confirmed and evaluated by four angle video tape. What a powerful teaching tool, I thought as Schlimmer documented the strengths and weak points of my flying skills. Great stuff, and I learned a lot.

Our first full day's session, which began at 8am ended at 7pm. I returned to my hotel room exhausted and hungry. I grabbed a quick supper at a neighboring Mexican Restaurant (wrong choice), then hit the sheets at about 9pm.

The next day began just like the last with a comprehensive briefing about control surface failures. Could we fly the airplane with an inoperative elevator, or aileron, flap, or rudder? Could we fly out of unusual attitudes with a jammed or broken rudder cable? This would be the topic for most of this day. And so it went. Through the morning and afternoon, each flight followed by a thorough debrief. Dinner, then directly to bed.

Our training curriculum took on a somewhat different appearance as I entered the last day of training. Here, our attention would be focused exclusively upon spin training, followed by an exploration of the aerobatic maneuvers envelope. Our examination of spins went far beyond the typical private, commercial, instructor training curriculum. No more incipient spins followed by recovery. Our spins would all be fully developed, with yaw and roll coupled in aerodynamic harmony. Each spin would take us through six complete rotations, some more, before corrective control inputs would be allowed. Most challenging to me was the inverted, flat spin where the airplane gives the appearance of falling pancake style out of the sky.

From spins, we moved on to the more insidious spirals. Unlike spins which occur at very slow airspeeds, fully developed spirals are high speed maneuvers. In their most sedate condition, spirals are simply turning maneuvers with a simultaneous altitude change, either up or down. To the unwary pilot, the spiral is can be a very dangerous, often lethal flight condition. As was later hypothesized in the JFK, Jr. accident, a descending turn results in a downward movement of the altimeter. The spiral was shown also to be a likely scenario in USAir's Boeing 737 loss near Pittsburgh several years ago as well as many other aviation disasters over the years.

In a descending spiral, the pilot is often overwhelmed by the appearance of the ground filling the windshield. Seeing the rotating earth below rushing upward, the pilot instinctively pulls on the stick to arrest the descent. Not working, he pulls harder and harder in a vain effort to pull up into a level or climbing flight attitude. What he is doing, however, is severely worsening the condition in a process that causes an ever-tightening spiral attitude. As the aircraft banks beyond 45 degrees, the elevator, connected to the stick, functions as an aileron.

What is the proper diving spiral recovery technique? Simple. Reduce power and relax back pressure on the stick. This unloads the pressure on the wings. This also removes the turning force

caused by the elevator. Next, neutralize the ailerons. Voila'. The earth suddenly stops spinning, the altimeter stops descending, and the horizon once again begins to fill the windshield.

My spiral recovery training left me with the distinct impression that if all pilots had this training, the number of tragic air disasters, from Piper Cubs to Boeing 777s, could be reduced significantly. The aviation insurance industry will one day figure this out and will offer its policy holders deep discounts for completing this training.

One of my objectives on this final day of training was to have my picture taken while flying inverted. To do this, of course, requires formation flight with my plane flying inverted while the chase plane maneuvers to within about 15 feet of our wing. Smile and shoot. This aircraft positioning process takes a few minutes to complete. Thus, I found myself hanging up-side-down by my seat harness for longer than I wanted. Its difficult to describe the feeling one gets in this position, particularly with a clear plastic canopy providing an unhindered view of the ground moving by 4,000 feet below. Aside from an overwhelming sense of falling out of the airplane, the maneuver itself is fairly sedate.

After reviewing more spins, we moved next into my choice of competitive aerobatic maneuvers. We performed several. One is called the Hammerhead. This maneuver incorporates a vertical climb with smoke on. Eventually, the airplane reaches a point where it can climb no higher. Slowly coming to a stop, the airplane stands momentarily on its tail. A sharp kick on the the rudder causes the nose to quickly slice laterally downward, pointing earthward through the column of smoke left on earlier climb upward. With the airplane racing straight down, a gentle four "G" tug on the stick returns it to straight and level flight.

Our next maneuver was the Lomcevek. This is a combination rolling maneuver that includes several rapid tail over nose tumbles that causes the ground and sky to alternatively race over the canopy. If this maneuver convinces you of nothing else, it convinces you that given sufficient altitude, airplanes can be recovered from any unusual flight attitude.

I felt a sudden sense of sadness as the wheels of the Extra 300L touched down on the Mesa Airport runway for my last time. It had been three days of intense flying - the most intense flying anybody would ever do short of actual combat. We had pushed the airplane into the world of unlimited, unrestricted flight, where the best-of- the- best pilots try to make better pilots out of people like me. It was a truly great experience!