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SAFETY ISSUE

MAY 2009

SPORT *Aerobatics*

OFFICIAL MAGAZINE OF THE INTERNATIONAL AEROBATIC CLUB

Design Limits: G's Break Airplanes; Skill Wins Contests

- Skydiving is Flying too
- A Near Miss
- Christen Oil Separator





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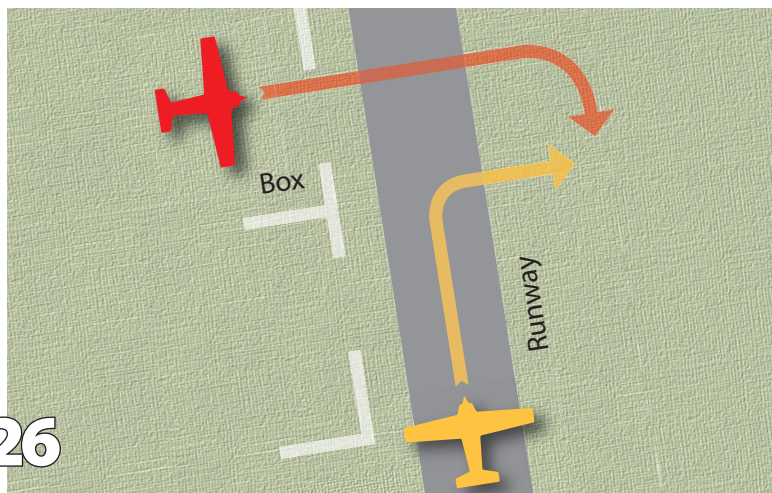
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Tim Just, rocketing skyward in his Extra 330S.
—Photo by Tyson Ringer

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LETTER from the EDITOR

by Reggie Paulk

May is Safety Month

For 14 years, the International Aerobatic Club has focused on safety for the May issue. The competition season is beginning to move into full swing, and it's a good time of year to be reminded of the importance of vigilance. Aerobatic airplanes, by their very nature, are subject to stresses normal category airplanes can't even imagine. Cracked tubes, broken turnbuckles, frayed cables, and other maladies frequent these airplanes more often just by the very nature of the higher stresses imposed upon the components. Staying ahead of the wear and tear is important to maintain safety.

I received a story from Steve Haslup, an IAC member who decided to learn to sky dive. His motivation to try out the sport was interesting. He didn't want to be in the unenviable position of being in a crippled plane and having to bail out and have both experiences be first-time events. His story in these pages is in keeping with the adage, "Practice, practice, practice!" The things we do are learned better than the things we're taught. Mr. Haslup has the right attitude.

Tom Myers provided a story about a close call that occurred at a contest because of two pilots who weren't

following the rules. Pilot briefings, like preflight inspections, are an integral component of the safety chain. If we treat them as routine events or obstacles to overcome before our flight, it's much easier to end up in an incident of our own making. Staying on top of the things we *can* control helps us better handle the things we *can't*.

Paying attention to our airplane's behavior goes a long way toward making flying safer. From troubleshooting abnormal oil loss to discovering the cause of engine failure, our pilots have kept their heads cool to ensure they live to fly another day. If you own your own airplane, or fly the same one often, make sure to keep notes of the airplane's behavior so any deviations from the norm may be quickly discovered and remedied.

Rich Stowell's feature on design limits exposes some of the lesser-known aspects of aircraft design as it pertains to the stresses endured during aerobatics. In addition, he includes the voices of experienced competition pilots

to make the point that winning contests is less about pulling g's and more about finesse. Unlimited aerobatics does not equate to unlimited g's!

*"The things we
do are learned
better than the
things we're
taught."*

Please submit news, comments, articles, or suggestions to: reggie.paulk@gmail.com

PRESIDENT'S PAGE

by Vicki Cruse • IAC 22968
E-mail: vcruise@earthlink.net



Vicki Cruse

The IAC Categories of Competition

There is no shortcut to the top

The annual safety issue gives us pause to reflect on issues that have been in place within the International Aerobatic Club for a long time. The current structure of the competition categories has been in place from the beginning of IAC, though details have changed slightly through the years. For instance, what we now call Primary used to be known as Basic. The IAC didn't always mimic the CIVA (the Federation Aeronautique Internationale's world body that governs aerobatics) rules for the Advanced and Unlimited categories. And as time passes, changes are made to the figures allowed in the categories; for instance, the Sportsman category previously included snap rolls.

The category structure within IAC is a good one. One can argue that specific figures should or shouldn't be allowed in individual categories, but for the most part the progressive structure of the categories has withstood the test of time. Most pilots start out in Primary and move up as they feel comfortable or as fellow competitors sing the "Move Up" refrain after they have a few wins under their belt. Some pilots choose to start in Sportsman and fly this category until they have a few wins or have progressed to the best of their ability.

Most competitors choose to fly a year or two per category and move up depending on their wish to chal-

lenge themselves. Other competitors stay where they are because resources don't permit a more time-consuming practice schedule or a higher horsepower aircraft, required for the higher categories. The categories and the figures within them provide a good basis for training and the competition that follows, much like the progression in the figures required for the smooth achievement award. There are important lessons to be learned in each category.

There seem to be more pilots flying a few contests in a category and moving up before anyone, but they think they are ready. This has the potential for disaster or, at the very least, embarrassment at the next contest. There are probably several reasons for this. It could be an ego issue or perhaps a self-imposed pressure to move through the categories as quickly as possible, which makes no sense. The IAC has no requirement that says you must stay in a category for a certain period of time; you are your own judge, unlike other competition sports such as dancing or professional sports such as baseball.

All of the Unlimited pilots I know have "done their time" in the lower categories, spending at least one year in each category flying several

contests before making the move up. Some have spent longer, until they could win a category. They used the time in the lower categories to learn the basics, such as how to finesse the figures, work the wind, fly what the judges want to see, and learn altitude gains and losses for each figure they fly, to name a few. Experience is gained by spending time learning, not skipping the steps for your own ego gratification.

For those pilots aspiring to move up the ranks, take your time and learn everything you possibly can at each level. Talk to pilots in the upper categories who have flown for years (they are still out there and

easily identified by the oil spots in front of their hangars) and ask them about their journey, how they practice, their little black book of figures, and anything else you can to better help you in the category you fly. They will help you in any way they can. When they tell you your freestyle isn't going to work; trust them, they know better than you. The veterans have probably made every mistake you have made and will make in the future. Take your time and enjoy the journey. Aerobatics isn't about shortcuts. 🛩️

"Veterans have probably made every mistake you have made or will ever make."

NEWSBRIEFS

First Quarter 2009 IAC Achievement Awards

Pilots can earn IAC Achievement Awards that signify the level of proficiency obtained in aerobatic flight. Two types of achievement awards are available, smooth and stars. Smooth awards are earned by flying a designated set of figures in front of a judge listed on the current IAC Approved Judges list, which can be found on the IAC members-only site at <http://Members.IAC.org>. Star awards must be earned while flying competition aerobatics at an IAC-sanctioned contest. Awards are available for powered aircraft and gliders. The following achievement awards were earned the first quarter of 2009:

Mike Newman - Stars Award: Primary and Sportsman

Kyle Helbing - Stars Award: Sportsman

Andrew Slatkin - Stars Award: Primary

Mike Newman - Smooth Award: Intermediate

For more information on the IAC Achievement Awards program, visit www.AerobaticsUSA.org/schools, go to the resources page in the Additional Articles section, or contact Achievement Awards Chairman Lorrie Penner at penn.lorr@yahoo.com. For a complete list of awards and recipients, visit www.IAC.org/programs/achievement.html.

IAC Chapter Practice Day Guidelines

Any IAC chapter hosting an event that involves its members flying for practice, such as a critique day or an achievement award day, is now required to follow the guidelines for these events to ensure insurance coverage. The document is posted in the members-only section of the IAC website. Chapters will be required to notify EAA Risk Management of such events at least five business days prior to the event to assure that chapter insurance will cover the event. A link is provided in the document for the registration form available on the EAA website. This form may be faxed or e-mailed back to EAA. The requirements are straightforward and similar to those currently required for competitions. An FAQ document is also posted on the IAC website for further clarification. For more information, please see the members-only section of the IAC website and direct any questions to our IAC manager, Trish Deimer, at tdeimer@eaa.org.

Nominations Sought for IAC Nonflying Awards

Each year at the U.S. Nationals, the IAC presents four special nonflying awards. The nomination period is now open for IAC members to submit nominations for the Robert L. Heuer Award (judging excellence), the Frank Price Cup (outstanding individual in aerobatics), the Harold E. Neumann Award (excellence as a chief judge), and the Kathy Jaffe Volunteer Award. These four prestigious awards will be presented at the U.S. Nationals awards banquet. Nominations are based on the significant contribution of individuals for their achievements according to the criteria of the award in the previous contest year (2008). A complete history of each award may be found on the IAC website (www.IAC.org/trophies/nonflying_awards.html), along with the list of past recipients, pictures of the master trophies, and the nomination petition. Nominations are welcome from either individual members or collectively as a chapter. Chapter meetings are good places to discuss potential candidates. The nomination deadline is June 15. For more information, please visit the above website or contact the awards chairman, Allyson Parker-Lauck, at aplauack@gmail.com.

IAC Board of Directors Elections

Once again it is time for elections of officers and directors to the IAC board of directors. Up for re-election this term are two officer positions—president and vice president—along with three director positions—Northwest, Northeast, and Southeast regions. Ballots will be sent out to IAC members, giving you the opportunity to vote for your candidates. All ballots need to be returned to IAC headquarters as soon as possible, but no later than three days prior to the annual meeting, which will be held in Oshkosh, Wisconsin, on July 31. All newly elected officers and directors will be announced at this time. Last year approximately 1,000 members voted, and we hope to exceed that number this year. We have a great group of candidates who have volunteered their time to assist the IAC for the next two years. Don't forget to return your ballot.



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NATIONAL - Your One Last Chance!

14th
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design Limits

G's break airplanes;



skill wins contests

*“Even airframes
certified for 6 G
can only stand
so much.”*

Rich Stowell, MCFI-Aerobatic

A critical need to discuss aerobatic airplane design limits resurges every few years. The discussion in 1995 centered on the Pitts S-2B. A widely circulated letter from Aviat began, “Pitts pilots have always taken comfort and peace of mind from the universal conclusion that ‘you cannot pull a Pitts apart’ [however] in the past there have been a number of cracked fuselage longerons in S-1 aircraft...there have been three similar instances in S-2Bs.” The S-2Bs in question:

1. A 1986 model with 900 hours’ total time (TT).
2. A 1991 model with 920 hours’ TT: “For three weeks prior to the incident the various pilots had heard popping sounds while flying the airplane.”
3. Another 1991 model with 830 hours’ TT.

In addition to similarities in locations of the cracks and hours on the airframes, at least one was flown in Unlimited category competition; another, in Advanced. One flew air shows and was used for instruction.

The focus then shifted to spar failures in the Beech T-34. Three in-flight wing separations occurred between 1999 and 2004. The accident aircraft had all been used for mock air combat. Total times on the airframes ranged from 3,200 hours to 9,320 hours. In the first case, the wing separated during a simulated air combat sortie. The pilot and the participant: killed. The other two accidents occurred during upset recovery training flights. Two instructors and two trainees: all dead.

A 2005 Aviation Safety article about the T-34 accidents reiterated, “It’s no secret that airframes exposed to persistent high-G flight wear out faster than those flown inside a more benign envelope.” The article correctly concluded, “Even airframes certified for 6 G can only stand so much.”

In 2008, a series of seemingly inexplicable events occurred with a flight school’s Super Decathlon. The airplane, available for competition use, experienced the following setbacks during a single contest season in Sportsman: the skylight blew out once and lifted up on two occasions; the windscreen cracked; and the engine mount cracked—twice!

The clustering and repetition of such potentially serious issues had never occurred before in the school’s various Decathlons. For 21 years, the primary focus of the aerobatic department had been spin, emergency maneuver, and basic aerobatic training. Contest flying, though encouraged, was cyclical and represented a small percentage of the overall activity. For the previous couple of contest seasons, however, a core group of enthusiastic pilots had been subjecting the airplane to a steady diet of competition-style aerobatics. It was discovered that some in the group had ratcheted up entry speeds and g’s, convinced that this was the path to better scores.

Whether it's competition aerobatics, air shows, or mock air combat, the common thread seems to be a tendency to creep ever closer to design limits. But it's not just the g's; cycles matter, too. A typical ultimate limit load factor, for instance, is at least 50 percent higher than the design limit load. An airplane with a 6g design limit would thus have an ultimate limit load of 9g's. How many times do you think you'd be able to impose 9g's? Once, maybe? Contrast this with the near-infinite service life available at 1g.

FATIGUE LIFE

The T-34 crashes spawned test and research protocols that modeled the life cycle of the metal wing spar. Following a computerized finite element analysis, the results were fed into a second program that used a statistical analysis to predict crack propagation based on specified load levels.

Further illustrating the point, the Aviat letter mentioned earlier noted that the Zlin 526A "is certified for +6 and -3g with a service life of 2200 hours. If the same aircraft is flown to competition standard aerobatics of +8 and -6g airframe life is reduced to 100 hours!" Stretching the 526's g envelope 60 percent decreased the service life by a factor of 22!

The Aviat letter further advised, "There are many very spectacular airshow [sic] performers who include...extremely vigorous gyroscopic maneuvers.... most of these performers disassemble and rebuild their aircraft after every season—the aircraft is not allowed to accumulate hundreds of hours when being continually used in aggressive, high stress maneuvers."

Aviation Safety magazine concluded, "one hour of high-g aerobatics—between 5g and 6g—is equivalent to seven hours of less vigorous flying, and perhaps more."



Decathlon g-meter after a Sportsman flight.

"Barring corrosion or other insults," the Aviation Safety article reported that the T-34 spar "would essentially last forever, with some 880,000 hours required to reach a 50-percent failure rate if flown in a low-G profile. But when...pushed frequently to nearer its structural limit, spar life declined to...6000 hours."

MOVING TARGETS

Remember that published design limits vary based on many factors. Aviat: "symmetrical load limits are generally well known and understood...but the limits for unsymmetrical loadings are not as clear or widely known." Unsymmetrical loads are imposed whenever simultaneously rolling and pulling/pushing or whenever simultaneously yawing and pulling/pushing. Think barrel and snap rolls. Certification standards mandate unsymmetrical design limits that are at least two-thirds of the symmetrical design limits. Both Pitts and Decathlon literature are clear about the different design limits: +6g symmetrical and +4g asymmetrical.

Keep in mind, too, that not all of the components of an airplane may have the same limitation. For example, the wing on an Edge 540 has a design limit of +/- 23g's. The Lycoming engine mounts on the same airplane, however, are limited to +/- 10g's. And some components have the potential to experience variable load-

ings. Fuel tanks and seats are good examples—the load depends on the gallons of fuel and the weight of the pilot. Those 6g seats in a Decathlon, for instance, assume a pilot-plus-chute weight of 190 pounds. But with a combined weight of 250 pounds, you're now sitting on a 4.5g seat.

CHOOSING GOOD ROLE MODELS

Our sport has many wonderful role models. Vicki Cruse and Dan Matejczyk are emblematic (see sidebar). They were asked about the target g's they shoot for when practicing and when at contests:

VC: Flying Unlimited I usually hit 7 to 7.5 positive and 4 to 5 negative, with slightly more in contests depending on the Unknown sequence. In the Edge, I've found that around +7g's tends to give the most vertical. Any more than that and you're inducing a lot more drag, which shortens the vertical.

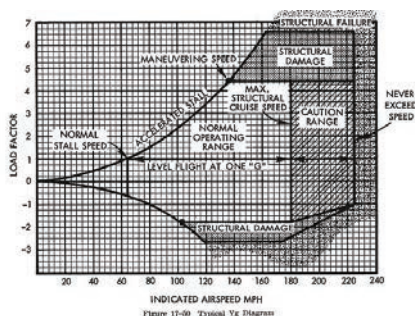
DM: In Advanced, my maximum g targets were +5.5 and -4.5. When flying very well, I think this is where I was. When I started scoring really well, the g's came down a little bit. I believe that during one or more of my superior contest flights, the maximum g was clearly below +5.5.

How these and other top athletes master the complex skills associated with their sport has been the subject of much research. In his excellent book *Peak Performance for Aerobatics*, retired IAC competitor Fred DeLacerda noted, “motor learning is the mental process, associated with practice of a physical skill, that results in the permanent learning of a movement or physical activity.” And the “single most important factor in learning a physical skill is practice,” DeLacerda wrote, “but the practice cannot be random...the athlete must be focused, the practice must have planned content, and this content must be organized.” Detailed note taking is one manifestation of an organized approach to competition aerobatics. Vicki and Dan were asked about the significance of their note binders:

VC: I started keeping notes back when I was flying the Eagle. I would put entry speeds and altitudes in it. This was where I began to make note of altitude loss and gain for various figures so that Unknowns became much simpler to calculate. My notes for the Eagle were organized much like the Aresti catalog, but when I started flying Advanced and the figures got more complicated, I went to a small notebook. I now have two small notebooks that I take with me to training camps and contests. In them I have notes from every coaching session with everything from entry speeds, figure techniques, and things learned from specific sequences. When old habits creep back in, I can go look to see how I fixed them previously.

DM: I have notes on virtually every practice flight I ever flew. I think the main purpose and value are to close the loop between the physical flying and the perception and understanding of flying. The notes binder evolved over the years, but always included:

- (a) A monthly calendar for seeing the big picture of practice flights, topics for work, progress, and goals;
- (b) Daily notes pages for each practice day, with objectives, critique, and thoughts; and,
- (c) Flight sequence cards and notecards. I believe there is high value in holding and marking up the cards that you use in flight. This very effectively makes the connection between the mental flying and the physical flying.



CA V/g diagram graphically depicts an airplanes' acceptable design limits.



VICKI CRUSE AND DAN MATEJCZYK

Competitors and should-be role models. Vicki Cruse and Dan Matejczyk share some things in common:

- **Methodical**—They worked their way up through the various categories; they maintain detailed competition binders filled with copious notes; and they devote considerably more of their training time to mental preparation than to actual flying.
- **Detailed**—They are true students of the sport, talking in terms of such refinements as adjusting the g's based on ambient air temperature and developing tables of optimum speed-g combinations for looping maneuvers.
- **Longevity**—They have flown competition aerobatics for at least 10 years.
- **Accomplished**—They have earned the IAC All-Ten Achievement Award (only 33 pilots have reached this pinnacle).

Indisputable Results:

- Among numerous other awards, **Vicki Cruse** is a four-time member of the U.S. Women's Aerobatic Team, 2007 U.S. Aerobatic Champion, 1999 and 2000 Champion of the Americas, and 1998 Sportsman National Champion.
- Flying the Advanced category in eight contests over a two-year period, against an average field with eight other competitors, **Dan Matejczyk** came away with four first-place trophies and two second-place trophies. Dan's average margin of victory was nearly four percentage points; his greatest margin of victory, 8.1 percentage points. And in two of his first-place finishes, Dan reached the 90 percent plateau. Not just a single flight, but two full contests, back-to-back, completed at a 90 percent level.

Masterful!

PRACTICING SMARTER, NOT HARDER

"Most experts agree," DeLacerda observed, "that as much as 90 percent of success in any sport is due to mental factors." In fact, "research has shown that a training schedule of 25 percent physical training and 75 percent mental training is more effective than 100 percent physical training." The training regimens followed by Vicki and Dan compare favorably to this 3-to-1, mental-to-actual training ratio:

VC: Mental time can include a lot of things, but I'd say I spend almost twice as much time working out all of the mental things than I do actually flying. I always know what I am going to fly before I go out to practice. I create practice cards with pieces of the new Known, and then I'll eventually fly it as a whole. I also do this with my Free and will eventually fly the whole thing. Inter-mixed on these cards are mini sequences of Unknown figures.

DM: I estimate at least 80 percent mental work, 20 percent actual flying. This mental work does not include informal thinking while driving or time preparing the plane or doing maintenance. My mental work includes work with a pen, notes, and sequence cards in hand, and consists of the following:

- (1) preflight planning;*
- (2) post-flight debrief; and,*
- (3) related study of particular areas needing work and understanding.*

The ability to self-critique one's flying seems to be part of the formula for success as skill level improves. Vicki and Dan were asked about the percentage of training time that is critiqued by someone else:

VC: Most of my time now is not critiqued because I generally know what I am doing wrong or what I need to work on. I usually use a coach three times a year, with two of those sessions at the beginning of the season to get a handle on the new Known sequence. I used to use a coach much more often because of the learning curve for new categories. I would highly recommend using a coach in the lower categories because it can help you break bad

habits early. Learning good techniques early will help you save a lot of time in the long run.

There's also a big difference between critiquing and coaching. A critiquer tells you what things look like, whereas, a coach tells you how to fix problems. Be very careful in choosing the person who critiques your flying. Make sure the critiquer is a respected judge and has higher category competition experience, especially if you are flying a higher category as well. The worst thing you can do is take advice from someone who doesn't know what he or she is talking about, which can cause you to take several steps backward.

DM: I believe that I may not have been critiqued a single time during the last two of the three years that I flew in Advanced. My main critiquing occurred while flying Sportsman and Intermediate. It seems to me that once one learns how to see and critique lines from the cockpit,



then coaching needs to involve learning how to execute the Advanced maneuvers. This requires flying, study, and (if possible) coaching from a more-skilled pilot or from a knowledgeable observer.

I used my contest feedback as a critique, spending a lot of time comparing my self-critique with the judges' scores and comments. And by self-critique, I mean the rigorous post-flight grading of each element of each figure. Doing this after practice flights is important. The pilot may have the best vantage point for critiquing; he or she just needs to learn how to do this while being pre-occupied with flying. It helps one to see better and also to dig deeper into understanding particular maneuvers.

CONCLUSION

We continue to see Sportsman pilots blowing the rib stitching in their Pitts, flying their Extras at 8g's, and stressing their Decathlons up to 6g's because they've been led to believe that pulling harder yields better scores. Faster/harder isn't the solution. The verticality of an upline, for instance, has little to do with how hard you pull; either it's vertical, or it isn't. The path to success in aerobatics clearly lies in

developing and refining skills, focusing on mental aspects of the maneuvers, and learning to practice more efficiently. Listen to the right people. Emulate the mind-set and training patterns of consistently good competitors, not the numbers you see on g-meters as you stroll the ramp.

Ultimately, those who have their own airplanes can really do whatever they choose to do—free will. But those who share their airplanes have moral and ethical obligations beyond themselves. They have the added responsibility to ensure that all of the relevant information that can be known about the airplane is made known to others who may be using the same airplane. Others must be given the opportunity to make informed go/no-go decisions as to the airworthiness of the airplane. Over speed, over g, and even the number of cycles at higher g are relevant to those who may subsequently fly the airplane. It's a safety of flight issue. (Even those who own their own airplanes should feel morally obligated to give an honest accounting of the airplane's history when it comes time to take a passenger for a ride or to sell the airplane.)

Recommendations offered by Aviat back in 1995 bear repeating: "Do not cancel the 'g' meter at the end of each flight. Let the next pilot know what the aircraft has gone through to let him [or her] have a chance to investigate it if he [or she] wishes." And remember, "No matter what you fly you cannot ignore the numbers, for your own safety's sake." 

Rich Stowell has provided 7,500 hours of flight instruction, primarily teaching spins, emergency maneuvers and aerobatics. He has the IAC's All-Five Achievement Award and the Primary through Intermediate Stars Achievement Awards.



NOTE TO COMPETITORS AND JUDGES:

The comment "short" has absolutely no place in the evaluation of lines whose lengths are not required to be compared to other lines. On vanilla spins, hammerheads, and P-loops, for example, the rules require that the vertical lines be of perceptible length, period. The decision tree regarding such lines is quite simple:

Was there a perceptible line? No—score it a zero. Yes—was the line at the proper angle? Score it accordingly.

Convincing competitors, especially those in the lower categories, that they must draw longer lines to receive better scores increases the potential for higher speeds and higher g's, greater stresses on the airplane, and reduced margins for error.

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Steve Haslup

“Why are you doing this?”

Steve, the videographer for my first parachute jump, posed this question to me as he videotaped me while I sat on a bench waiting to walk out to the airplane. I gave him my pat answer: “I wear a parachute while flying aerobatics, and if I have to leave my airplane in the air, which I can’t practice, I don’t want the parachute part to be an additional first-time event for me.” It was a true answer, but as I discovered after my first jump, it was not the most important reason I was “doing this.”



The saga of parachuting and me actually began in 1973 when I was a flight instructor at Ohio State University while completing my undergraduate degree. One of the instructors was an active sky diver, and he convinced two other instructors and me that we needed to experience skydiving and take the one-day course that results in a first jump that same day. But two days before the jump day I injured my knee playing rugby, which made me unable to take the training, and I had to cancel. My two instructor compatriots decided that my circumstance was a prophetic message to them to cancel also. We never rescheduled the jump, and three months later I moved to Atlanta, Georgia.

The skydiving course I took 32 years later at the Monroe Airport near Atlanta is called Accelerated Free Fall (AFF). No longer is sport parachuting a static line jump where your parachute is opened by a cord attached to the airplane—learning to free fall is an integral part of being a sky diver. There are seven levels in the AFF training, each consisting of targeted skills to be demonstrated by the student. Level 1 through Level 3 jumps are done by the student with two instructors; Level 4 through Level 7 jumps are done with one instructor. Skydiving instructors are certified by the United States Parachute Association. Upon completion of the AFF course, you earn the equivalent of a student pilot solo endorsement—qualified to free-fall jump alone with instructor supervision. Similar to airplane flying, there are currency regulations every sky diver must satisfy.

Fortunately, you do not have to learn how to pack your chute—someone with plenty of experience does that.



The Skydive Monroe Beech 99 jump plane on the ramp at the Monroe, Georgia airport.

The first portion of the AFF training was all on the ground—classroom instruction and practice with ground mock-ups beginning at 8:30 a.m. and ending at about 2:30 p.m. The first task was signing all the forms. Several waiver forms are required—you are responsible for your own actions and safety during every jump. My instructor for the ground training was John, a former Army officer who took up skydiving after his Army service and had made more than 1,400 jumps. The course was very comprehensive, including equipment, procedures, hand signals, flying the parachute, malfunctions, how to fix

malfunctions, the “traffic pattern,” landing, and preparing the parachute for the walk back to the jump hangar. Fortunately, you do not have to learn how to pack your chute—someone with plenty of experience does that.

The “jump flow” procedures are drilled into you before each training jump. For the first AFF Level 1 jump, these procedures can be categorized as 1) leaving the airplane, 2) free fall, 3) canopy opening, 4) flying the parachute, and 5) landing.



Photos courtesy Steve Haslup

The Skydive Monroe hangar is a constant buzz of parachute repacking activity.

JUMP TIME

A Beech 99 turboprop was my transport to 14,000 feet above ground level (AGL). We had eight jumpers in the plane, a relatively light load (capacity is about 16). Four of the jumpers were associated with me, including my two instructors—Russel, with 2,500-plus jumps, and Joe, with 5,500-plus jumps—and my videographer (Steve). On the way up we told funny stories, and then I repeated the jump flow. To leave the airplane, I stood in the large opening for jumpers with my back to the sky, my left leg dangling out in the air, and instructors on my left and in front of me. “Check in, check out, look at prop, lift up on the right leg, then down, then step out and release, and *arch, arch, arch* (meaning arch your back in the free fall). Arm and leg position are important for a stable free

To leave the airplane, I stood in the large opening for jumpers with my back to the sky, my left leg dangling out in the air, and instructors on my left and in front of me.

fall, but *arching* is *king* to stability. I found myself a little wobbly at first, as I worked at training my body to react properly to this new form of flying.

The free-fall procedures kept me busy and masked most of my recognition that I was soon falling at 120 mph, or about 10,000 feet per minute! First the circle of awareness—check heading, check altitude, check with left-side instructor, check with right-side instructor. Then I demonstrated practice parachute-opening pulls: arch, reach, pull, relax—three times. Next is one more circle





Steve (in blue) working on maintaining stability during the freefall from 14,000 feet, with two instructors close by.

of awareness. After that I had time to look around the horizon and the ground, give a thumbs-up to Steve for the video, and generally enjoy the sensations of flying without an airplane.

At 6,000 feet AGL I locked my sight onto the altimeter on my wrist, and at 5,000 feet AGL, after a 50-second free fall, it was time to do a real pull to open the parachute. This is accomplished not with a conventional ripcord, but by grasping a small pilot chute from the bottom of the parachute pack, pulling it out to arm's length to the right, and, releasing it. The pilot chute catches air and by its cord attachment to the pack, opens the main parachute. From here on, I was solo!

I counted four seconds, then looked up and checked the parachute canopy for square, stable, and steerable. I was stuck on square for a few seconds as I waited for the front left cell of the canopy to fully inflate. I grabbed the steering toggles, identified my position in relation to the ground, and headed to the designated "play area" (upwind from the landing area). At the play area I practiced left and right 360-degree turns and stalls. The canopy flies very much like an airplane wing, except when you turn you cannot compensate with more power or pitch to maintain altitude as with an airplane, so you really do feel an increase in your rate of descent. Stalls, important for landing, are accomplished by pulling both steering toggles from above your head straight down in front of you below your waist. Relax the toggles and the canopy is flying again with a forward airspeed of about 15 mph.

The canopy flies very much like an airplane wing, except when you turn you cannot compensate with more power or pitch . . .

Now I really had a chance to enjoy the view—puffy white clouds, the airport, the homes next to the airport, scanning for traffic, the other jumpers on the ground, and my feet. Positioning for landing is similar to airplanes: downwind leg at about 1,000 feet AGL, then base leg, and final into the wind for the slowest groundspeed at landing. My final approach was down an unused grass runway, to which I found myself perfectly aligned except for the windsock pole directly ahead of me. It is a bad idea to turn at low altitude, and a quick assessment of my rate of descent told me I would easily pass over the pole. At about 8 feet off the ground I pulled both steering toggles to the stall just above the ground and touched the ground with my feet; however, I did not engage my feet to run fast enough to compensate for the forward motion at landing, and I fell gently forward to my knees. But the jump was complete and the experience was exhilarating. After a review of the jump with Russell and his logging of the Level 1 jump in my new logbook as "passed," I began training for the Level 2 jump.

I completed the rest of my AFF jumps, demonstrating 360-degree turns, forward and backward tracking, forward and backward somersaults, and rollovers to hover in free fall. Now cleared to jump by myself, I continued to be entranced by the maneuvers I could perform during free fall and the thrill of doing those maneuvers while descending through the air without an airplane around me. I made 10 solo jumps; then the skydiving business closed and I realized that with limited "hobby time," my first priority was flying my airplane, and I concluded my skydiving activities for now.

So what was the most important reason for "doing this" that I discovered after my first jump? It is that flying is, in all its forms, constantly the thrill of challenging one of the few, enduring frontiers on this earth—the air that surrounds it. Even after several thousand hours of flying airplanes and participating in competition aerobatics, skydiving has made me more complete in my relationship with the air. 

Steve Haslup is a member of the International Aerobatic Club (IAC), and IAC Chapter 3 in Atlanta. He has participated in aerobatics as a competitor, contest director, and judge, and he is a part-time certificated flight instructor-instrument/multiengine instructor based out of the Toccoa-Stephens County Airport (KTOC), where he hangs his Atlantis II aerobatic airplane. His full-time job involves technology planning at AT&T. Steve can be contacted by e-mail at acro867@bellsouth.net.



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INSIDE THE BEAST

The dissection of a Christen 803 oil separator

Tom Myers, IAC 16830

This is a report on my quest to figure out where too much of my oil was going during aerobatic flights. I, like most of us, have the Christen model 801 inverted oil system. It is an excellent system and has performed well in the 38-plus-year life of my 1970 Stephens Akro. Like everything in this world, it is simply not immune to the aging process and thus benefits from regular maintenance. The system is now being manufactured by Aviat. As you will read below, the replacement Aviat component solved my oil loss problem, and the system now continues to work as expected.

I was going through anywhere from 1/2 to 1-1/4 quarts of oil during a three-sequence (Advanced) practice flight. I had long since learned that oil residue in the Christen model 803 oil separator could slow down the ball bearing valve and result in an increase in the amount of oil that is vented from the separator every time the plane transitions from a positive *g* to a negative *g* flight regime. Twice a year, I would remove the separator from the plane and flush it thoroughly with solvent. This procedure was no longer reducing my oil losses.

My cowling, oil hoses, and engine were showing no evidence of having any leaks significant enough to account for this much oil loss. The security of all fittings was confirmed, and a quick borescope inspection of the cylinders was performed. No gushers were found. The breather vent out of the separator was the most likely culprit at that point, so I bought a new Aviat separator from Aircraft Spruce and installed it. My oil consumption dropped to about one-third of a quart for a three-sequence practice flight when taking off with about 6-1/2 quarts in the sump.

My engine is the 200-plus-hp Lycoming AEIO-360-C1E6. My experience with Lycoming IO-360s is that they tend to toss more oil inverted when above 6 quarts in the sump than when below 6 quarts in the sump. I like to have plenty of margin in this regard, so I take off with well more than 6 quarts in the sump and accept the slightly higher oil loss that comes with it. Thus, at about a third of a quart of oil loss, I considered the problem solved.

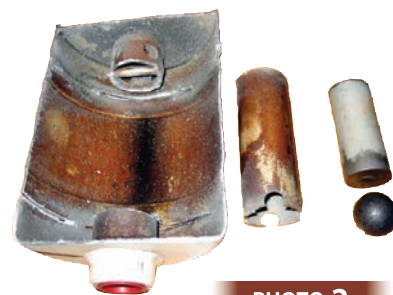
However, I wanted to understand why the old separator had vented so much oil. The use of a Dremel tool with a fiberglass-reinforced cutoff wheel provided the answer. Any light-colored dust in the following photos was produced from cutting open the case with the Dremel tool.

Photo 1 shows the case of the model 803 separator split in two. One-half of the case has been cleaned with solvent to clearly show the amount of oil residue that collects on the inside of one of these units. The most recent flushing had been about six months earlier. The breather vent is seen on the case half that has been cleaned. The intact sliding ball valve assembly is seen on the case half that has not been cleaned. **Photo 2** shows the disassembled sliding ball valve assembly. The ball bearing and slug

PHOTO 1



PHOTO 2



from the valve assembly have been removed. **Photo 3** shows a close-up of the ball bearing and the slug. As far as I know, this unit has been installed since the plane was built, so you are looking at about 38 years of accumulated wear.

The dimple in the top of the slug shows the wear from pounding onto the ball bearing every time the plane is inverted. The key discovery, however, is the heavily pitted surface of the ball bearing. The ball bearing started its life with a shiny smooth surface, but the bearing is now heavily rutted and looks like the surface of the moon. The purpose of the ball bearing is to form a seal against a smooth seat in the separator case to prevent the oil in the engine sump from flowing out of the breather vent when the plane is inverted. The pitted surface of the old ball bearing was allowing a significant amount of oil from the sump to leak directly to the breather vent.

“...the bearing looks like the surface of the moon.”

When the aircraft is upright, any oil that accumulates in the separator drains back into the sump because the ball valve does not create a seal in the upright position. A post that runs through the valve assembly assures the clearance for proper draining and may be clearly seen in **Photo 2**. As a result, the ball bearing spends most of its life exposed to combustion gases from the crankcase and the atmosphere.

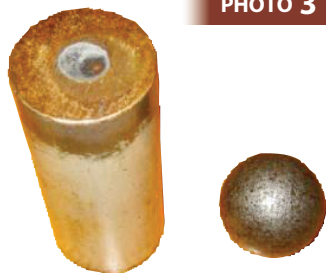


PHOTO 3

Photos by Tom Myers

Since combustion gases contain sulfur and water vapor, the ball bearing is routinely exposed to a weak solution of sulfuric acid. Over the years, the acid, moisture, and pounding of the slug simply ate away the surface of the ball bearing and allowed it to leak. Some days, the pitted ball would seal a little better than others, so the amount of oil loss was quite erratic.

The ball bearing is normally visible from the outside of the separator through the top port. Unfortunately, my separator has a right-angle fitting attached to the top port that prevented me from inspecting it. Now I know to remove the fitting and inspect the ball for signs of wear when I clean the separator.

The Christen inverted oil system also contains a model 802 oil flow valve assembly. This assembly determines whether the flow of return oil into the oil pump comes from the bottom (when upright) or the top (when inverted) of the engine crankcase. The flow valve assembly contains two ball bearings, two valve seats, two springs, and no slugs. The flow valve assembly sits below the surface level of the oil in my engine sump and thus spends most of its life submerged in oil, and not exposed to the atmosphere.

Therefore, it was no surprise that when I opened up the ports to my flow valve to inspect the inside, both ball bearings were smooth and shiny and looked brand new. The combination of the springs to cushion their movements and the constant presence of oil to protect them from moisture and combustion gases resulted in the ball bearings showing no evidence of the deterioration that the ball bearing in the separator showed.

To summarize, it is probably a good idea to flush out any accumulated residue from your separator, inspect the condition of the ball bearing in your separator, and confirm the good condition of the ball bearings in your flow valve.

For those who would like additional information on the inverted oil system, a Google search of “Christen inverted oil system” will yield a wealth of web pages, including those with PDFs of the original Christen catalog pages and component descriptions. 

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Oil pressure loss caused by paint chips

Norm DeWitt

In late August, I ran into a problem with my engine losing oil pressure. In fact, the oil pressure went to zero after about eight minutes of flying. Up until this time the oil pressure had been fine, but I had noticed small red flecks in my filter every time I changed oil for the last several years. No one could tell me what was producing these flecks.

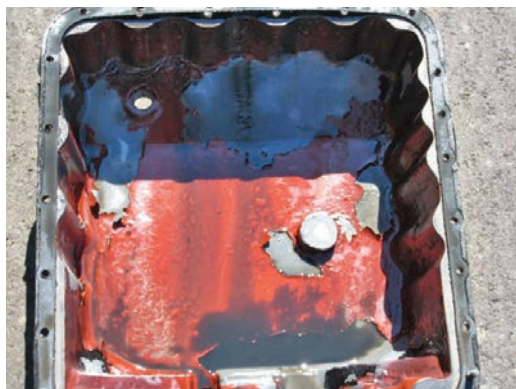
My local airframe and powerplant mechanic (A&P) offered to help troubleshoot the situation. One of the first things he did was to pull the finger screen in the back of the sump. It was packed full of red chips. It was packed so tightly that it took an ice pick to remove the chips from the screen. After this discovery, it was decided to remove the sump. After the sump was off, one could immediately see where the flecks and chips had come from (see the attached pictures). The rebuilder had installed a Monty Barrett sump that someone had painted with Glyptal (interested readers should Google this). The paint had deteriorated over time and clogged the finger screen, causing a loss of oil pressure.

The hoses, oil cooler, Christen inverted system, and prop governor were all checked and flushed. In the meantime, I made the decision to have the engine overhauled since it had approximately 900 hours since major. The new engine runs fine, and its internal surfaces are protected with oil!

What was learned:

1) If you are seeing any mysterious flecks in your oil filter, you need to determine what they are—especially if someone has painted any internal engine parts.

2) At every oil change, check the finger screen to make sure paint chips or metal is not present. My A&P had never removed this screen because



ABOVE: The oil sump showing the red paint. RIGHT: Paint chips removed from the finger screen.





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he believed that all it did was stop the metal with part numbers on it. He has since changed his mind, and he will check it more frequently.

3) In flight, keep a watchful eye on your oil pressure.

The oil pressure was going to zero after about eight minutes of flying."

4) For the last 15 years, when landing at my home field, I've closed the throttle overhead at 1,200 feet above ground level. Traffic permitting, I am always able to bleed off altitude and airspeed to land just past the numbers. (My airplane has a counterweighted propeller.) When I lost oil pressure over the field, I closed the throttle, was told by the tower that I was number two to land, declared "I am going to land ... **now**," then almost went into the fence at the far end of the runway. With no oil pressure, the prop goes into coarse pitch, and the propeller that used to be a speed brake isn't one any longer. 🇺🇸

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Norm DeWitt
President, Unlimited Aerobatics USA Inc.



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Near Miss

Tom Myers, IAC 16830

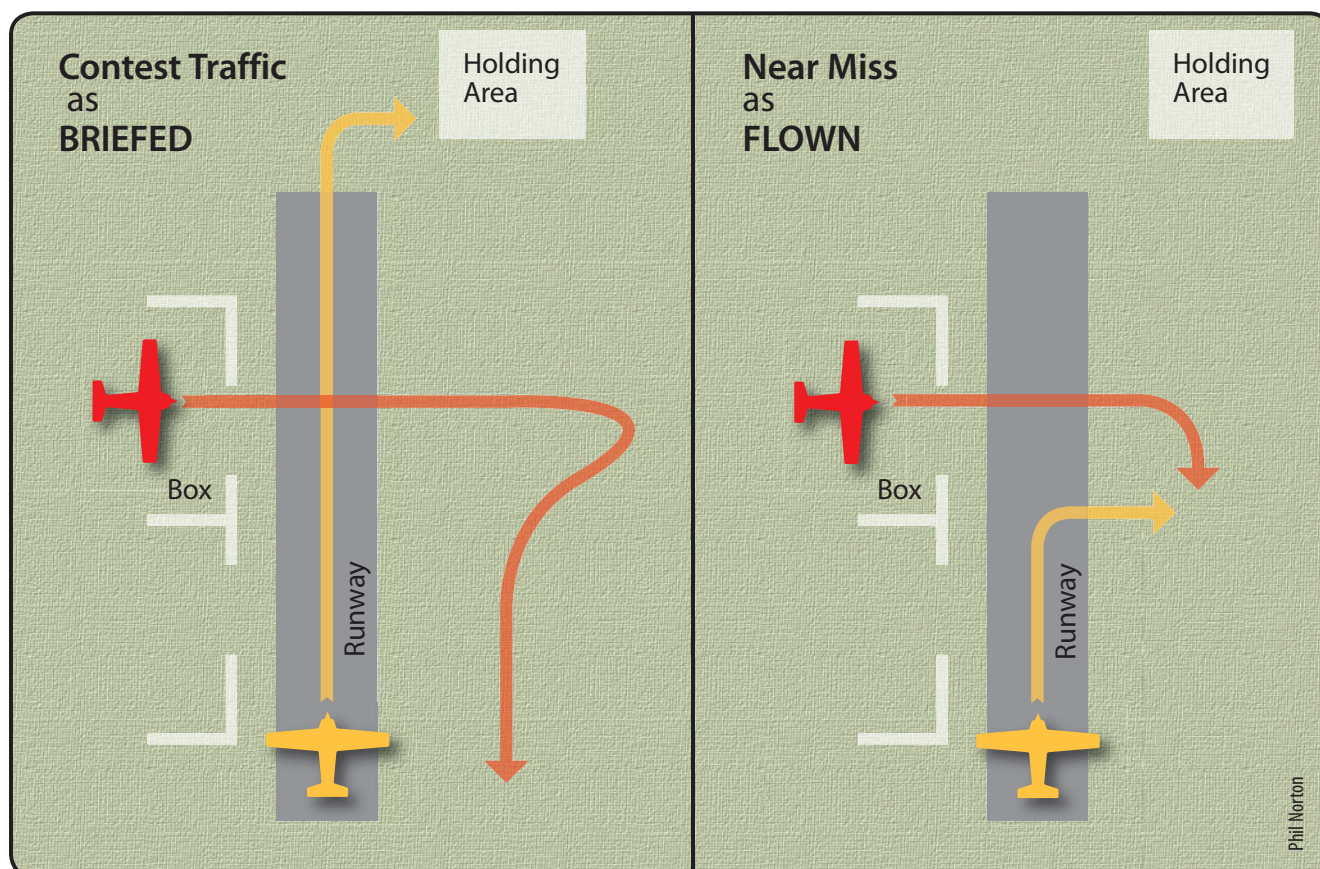
Why it's important to follow briefed contest operating procedures

We had a very near miss between two contestants at a recent IAC contest. In order to protect their identities, the who and where details have been omitted. The point of this article is not to point fingers or assign blame but to prevent a recurrence by educating everyone about how and why the incident occurred.

Pilots taking off were briefed to fly an upwind leg followed by a right turn into the holding area when clear of the runway. They were instructed not to perform "zooming" (an extended ground effect followed by a steep rapid climb) takeoffs. Takeoffs were to be made at flat enough climb angles to maintain visibility of the pattern and box and not encroach the bottom of the box. Pilots exiting

the box were briefed to pass well above or around the traffic pattern before joining a normal right 45 pattern entry. Please see figure on left for a diagram.

The incident pilot taking off performed a zooming takeoff during which he performed a sharp steep-banked 90 degree right turn at approximately mid-field. Upon rolling out of the turn, the pilot



continued to climb at a steep angle on a flight path that intersected the downwind leg corridor.

The incident pilot exiting the box did so at the bottom of the box while descending. The pilot flew over the runway inside the upwind end of the runway at approximately pattern altitude, and then executed a tight right hand 90 degree turn. Upon rolling out of the turn, the pilot was on a close-in downwind leg approaching midfield.

The collision courses of the two aircraft were visible to most people at the contest because the impending point of impact was almost directly above the flight line.

With approximately 100 feet between the aircraft, the pilot on the downwind leg suddenly pulled up and to the right to avoid the

"The collision courses of the two aircraft were visible to most people at the contest..."

collision. The pilot of the crosswind leg did not alter his course until the downwind leg aircraft passed almost above him. Please see figure on right side of diagram.

The aircraft on the downwind leg was a biplane. That the downwind pilot was able to see and avoid

the crosswind aircraft was an act of amazing skill. I paraphrase an old aviation saying: the superior judgment of an aerobatic pilot is what keeps him or her from relying upon his or her superior skill to stay out of harm's way.

As aerobatic pilots, we are amongst the pinnacle of skilled aviators. As an organization of aerobatic pilots, our goal should be to always conduct ourselves in a manner that is an example for and the envy of other aviators. Where there is an aerobatic contest, there should be pilots marveling at the decorum of our well oiled machine. That is not possible unless everyone practices the superior judgment that sets a superior pilot apart from a pilot with merely superior skills.

The primary goal of contest organizers is to send everyone home in the same number of pieces that they showed up in, namely one. Over the last 40 or so years, the IAC has learned a great number of lessons about how to, and how not to, accomplish this. We will be the beneficiaries of these lessons when we all follow the procedures that these lessons have taught us.

It only takes one pilot flying outside of the established contest procedures to create a risky situation. When we have two pilots flying outside the limits, we get either an article like this one, or possibly one even worse. Please make it your personal goal to do your part to make sure another article like this is never necessary. We all thank you. 

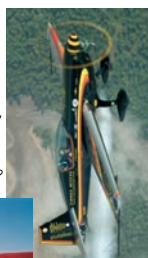


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Calendar of Events

If hosting a contest, let the world know by posting it.
For complete and up-to-date information, visit www.IAC.org.

Sebring Aerobatic Contest (Southeast)

Thursday, May 7 - Saturday, May 9, 2009

Practice/Registration: Tues., May 5 - Wed., May 6

Power: Primary through Unlimited

Location: Sebring (SEF): Sebring, FL

Contest Director: Hubie Tolson

Phone: 252-670-9370

Website: www.iac23.com/

E-Mail: hubie@uhfdevelopmentgroup.com

Carolina Boogie (Northeast)

Friday, May 29 - Sunday, May 31, 2009

Practice/Registration: Wed., May 27 - Friday, May 29

Power: Primary through Unlimited

Location: Lumberton (KLB): Lumberton, NC

Contest Director: Bryan Taylor

Phone: 910-391-1030 • **Website:** iac19.org/

E-Mail: Michael.Davis@areva.com

Ben Lowell Aerial Confrontation (South Central)

Saturday, May 30 - Sunday, May 31, 2009

Practice/Registration: Friday, May 29

Glider Categories: Sportsman Intermediate

Power: Primary through Unlimited

Location: U.S. Air Force Academy Field (AFF):

Colorado Springs, CO USA

Contest Director: Capt. Patrick Smiley

Phone: (719) 333-9868 • **Website:** www.iac12.org

E-Mail: patrick.smiley@usafa.af.mil

Northern California Gleaming of the Box (Southwest)

Friday, June 5 - Saturday, June 6, 2009

Practice/Registration: Thursday, June 4

Power: Primary through Unlimited

Location: Paso Robles (PRB): Paso Robles, CA

Contest Director: Tom Myers

Phone: 650-799-6854

E-Mail: tom.myers@stanfordalumni.org

Website: www.iac38.org/paso2009.htm

Robert L. Heuer Classic (Mid-America)

Saturday, June 6 - Sunday, June 7, 2009

Practice/Registration: Friday, June 5

Power: Primary through Unlimited

Site: Greater Kankakee Airport (KIKK):

Kankakee, IL

Contest Director: Jim Klick

Phone: 815-609-7165 • **Website:** iacchapter1.com

E-Mail: jimklick@sbcglobal.net

Southeast Aerobatic Open (Southeast)

Friday, June 12 - Saturday, June 13, 2009

Practice/Registration: Thursday, June 11

Rain/Weather: Sunday, June 14

Power: Primary through Unlimited

Site: Treea Field (4A7): Atlanta (Hampton), GA

Contest Director: Marty Flournoy

Phone: 706-326-4877 • **Website:** iac3.org

E-Mail: marty.flournoy@fcrealtors.com

Lone Star Contest (South Central)

Friday, June 12 - Saturday, June 13, 2009

Practice/Registration: Thursday, June 11

Rain/Weather: Sunday, June 14

Power: Primary through Unlimited

Site: North Texas Regional Airport (GYI): Denison, TX

Contest Director: Jeremy Humphreys

Phone: 940-564-6673 • **Website:** www.iac24.org

E-Mail: jjhumphreys@airtractor.com

Ohio Aerobatic Open (Mid-America)

Friday, June 19 - Saturday, June 20, 2009

Practice/Registration: Fri., June 19 - Sat., June 20

Power: Primary through Unlimited

Site: Union County (MRT): Marysville, OH

Contest Director: Chris Keegan/Jeff Granger

Phone: 513-265-5640 • **Website:** www.iac34.com

E-Mail: cke8009542@aol.com

or jgranger@columbus.rr.com

Apple Cup (Northwest)

Friday, June 19 - Saturday, June 20, 2009

Practice/Registration: Wed., June 17 - Thurs., June 18

Power: Primary through Unlimited

Location: Ephrata (EPH): Ephrata, WA

Region: Northwest

Contest Director: Jerry Riedinger

Phone: 425-985-9469

E-Mail: jriedinger@perkinscoie.com

Wildwood AcroBlast (Northeast)

Friday, June 26 - Sunday, June 28, 2009

Practice/Registration: Thurs., June 25 - Fri., June 26

Power: Primary through Unlimited

Site: Cape May County Airport (KWWD):

Lower Township, NJ

Contest Director: Craig Wisman

Phone: 717-877-8933 • **Website:** www.iac52.org

E-Mail: cwisman@aol.com

Midwest Aerobatic Club Challenge (South Central)

Saturday, June 27 - Sunday, June 28, 2009

Practice/Registration: Friday, June 26

Power: Primary through Unlimited

Location: Seward Municipal (KSWT): Seward, NE

Contest Director: Doug Roth

Phone: 402-432-7124 • **E-Mail:** AcroD@AOL.com

11th Annual Okie Dust Devil (South Central)

Friday, July 10 - Saturday, July 11, 2009

Practice/Registration: Thursday, July 9 - Friday, July 10

Rain/Weather: Sunday, July 12

Power: Primary through Unlimited

Location: Weatherford-Stafford Airport (KOJA):

Weatherford, Oklahoma

Contest Director: John Creswell

Phone: 580-774-9176

E-Mail: creswell@classicnet.net

Green Mountain Aerobatic Contest (Northeast)

Friday, July 10 - Sunday, July 12, 2009

Practice/Registration: Thursday, July 9 - Friday, July 10

Power: Primary through Unlimited

Location: Hartness State Airport (KVSF):

North Springfield, VT

Contest Director: Weston Liu

Phone: 603-673-6538 **E-Mail:** weston.liu@charter.net

Website: www.iac35@aerobaticsweb.org

Michigan Aerobatic Challenge (Mid-America)

Saturday, July 11 - Sunday, July 12, 2009

Practice/Registration: Thursday, July 9 - Friday, July 10

Power: Primary through Unlimited

Location: Reynolds Field (JXN): Jackson, MI USA

Contest Director: Robb Butts

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Name: Kathy Howell **City, State:** Palmdale, California

Occupation: Flight operations engineer (primarily unmanned aircraft systems) at NASA Dryden Flight Research Center.

Family: Married 33 years to John (a pilot), sons Christopher (a pilot) and Jeffrey (aircraft owner and aspiring pilot), daughter Jennifer (not a particular fan of flying), and three grandkids.

Pilot Certificate: Commercial with an instrument rating. My fourth anniversary of becoming a private pilot is coming up in April; I'll have a little more than 800 hours by then.

Aircraft Flown: Mostly small Pipers (140, 150, 151, 161, 181, 200, 201) with a handful of others (C-152, 7KCAB, Pitts S-2B, SF.260, BE76, Yak-52, T-34) and the Extra 300.

What experience drew you to flying? *My father was an aeronautical engineer who built and flew radio-controlled airplanes. Growing up, my family went on regular outings to air shows and Air Force base open houses. I liked watching the planes fly far better than looking at them when they were on the ground! The fact that I married a pilot had more to do with it! John drew me to flying! I'd still be sitting on my hands if he hadn't been encouraging!*

What was your first experience with aerobatics? *The first "real" aerobatic experience was when John and I were considering buying a Pitts S-2B with Mike Hartenstine. Mike took me for my first real aerobatic flight! I couldn't talk to him while we were flying—I was laughing too hard! I couldn't talk to John either when we landed. It's really hard to talk when you're grinning ear-to-ear and laughing! Eventually, I got that under control! And we did buy the Pitts!*

What got you into competition? *The truth? I didn't think John and Mike were taking my interest in aerobatics seriously. I felt I needed a better reason to fly than "Because I want to." So, the excuse was that I needed to practice, practice, practice so I could compete. Why do I compete? Because I want to! And THAT is really the best reason to be doing anything!*

Tell me about your airplane. *Mike, John, and I (by default and my good fortune) own an Extra 300 mid-wing. The guys prefer to think the plane is "purple" and blue. It's pink, or perhaps fuchsia, and blue but definitely not purple. It's unique, not the same red, white, and blue color scheme as so many others. Pink makes it easy to find at competitions!*

How did you obtain this airplane? *Before I had my certificate, Mike and John bought a Pitts S-2B. Mike was competing and wanted a higher-performance airplane. He did all the*

homework and found the plane. I wasn't really pleased about trading up to the Extra. I barely had my certificate. The Pitts was really cute, and I wasn't ready to learn another new plane. Fortunately for me, the learning curve was pretty short! Now, I wouldn't have it any other way!

What is your most memorable contest moment? *I've competed in only five contests this past year, but each one of them was comprised of multiple memories and stories. Since I'm new at this, each contest, and each flight, was full of brand new experiences. I can't possibly narrow the past year's experiences down to one memorable moment!*

What is your favorite part of a contest? *I have really enjoyed getting to know the aerobatic community. I'm not really comfortable with crowds, so it's taking me a while. Everybody has been extremely kind and generous, tremendously open and supportive! So my favorite part of the contest is between flights when I can say "Hi" and catch up with the friends I've already made and maybe meet someone new, too!*

Where would you like to see yourself going in the sport? *My goal is to keep learning while having fun. Since there's more to learn than I can currently comprehend, and most, if not all, of the pilots I've met like to have fun, I should be on this road for a while.*

What food would you most wish to see served at a contest banquet? *The company is great and the reason I attend the banquets. The food is irrelevant! But I'll eat most anything (slowly as many have noted)—but please no sushi at a contest (or any other) banquet!*

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