SPORT Aerobatics
January 2018
OFFICIAL MAGAZINE of the INTERNATIONAL AEROBATIC CLUB

Restoring Daisy

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"At this stage it was monkey see and then monkey see again as Mark showed me the way. Eventually I progressed to monkey do."

— Doug Jenkins

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Doug Jenkins' restoration of *Daisy* nears completion, far later than planned. Photo by Doug Jenkins.

SPORT Aerobatics
OFFICIAL MAGAZINE of the INTERNATIONAL AEROBATIC CLUB

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Coming in February, we're going to get you ready to be an IAC judge. Aerobatic contests live and breathe through their judges. If you have a desire to get more involved, becoming a judge is one of the best possible ways. If you're a competitor keen on improving your game, we'll talk about how to get a good score in the face of those judges, too.

To prepare, sign up for one of these judges schools already on the 2018 calendar. Visit *www.IAC.org/judges-school-calendar* for the latest schedule and registration details.

February 10–11: Santa Ana, California. Brian Howard instructor.
February 24–25: Dallas, Texas. Tony Wood instructor.
March 17–18: Aurora, Oregon. DJ Molny instructor.
March 24–25: Denver, Colorado. DJ Molny instructor.

SUBMISSIONS: Photos, articles, news, and letters to the editor intended for publication should be e-mailed to *editor@iac.org*. Please include your IAC number, city, and state/country. Letters should be concise, polite, and to the point. All letters are subject to editing for clarity and length.

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President's Page

The Beginning of a New Year

MIKE HEUER, IAC PRESIDENT, IAC 4

As we open a new year on the sport aviation and aerobatic calendar, it is always an exciting time for all of us as we look forward to the wonderful activities the IAC has to offer. There is no substitute for becoming involved — in a chapter, as a pilot, as a volunteer, and in all cases, as someone who enjoys this very special realm of flying and the people who populate our organization.

When the 2017 contest season came to a close, a total of 439 pilots had flown in IAC-sanctioned competitions, and 166 of those were in the Sportsman category. These numbers have been fairly stable over the years with little change. Though we always hope and plan for our contests to grow, much of that responsibility falls to our chapters, who are responsible for a calendar of 38 regional competitions. We are always looking at ways to improve contest participation and welcome your ideas at any time. An influx of new people is always healthy for any organization, but it is also important to retain the participants we already have, and that needs improvement.

The IAC is a very transparent and open organization — a tradition that dates back to our foundation. At the bottom of this page you will find my e-mail address. You can also find any officer's, director's, or committee chair's contact information on our website. It is important to share your input with your organization's leaders as so many of the improvements we make come from the bottom up.

I really enjoy my phone calls and e-mails with members, and it is great to stay in touch with friends from all over the world. As I have often written, the IAC brought so many experiences and people into my life that would never have been possible had I just pursued my career as an airline pilot and not immersed myself in sport aviation. When you venture into EAA's other affiliated organizations, you open up even more doors. That is one of the most significant values of being a part of the EAA family of organizations. AirVenture in Oshkosh is where we all come together in one place at one time.

Speaking of AirVenture, it goes without saying that planning for IAC's involvement and participation in the world's largest and most important aviation event is a year-round project. In 2018, our theme will center on the 25th anniversary of the test flight of the DR-107 One Design. Three pilots — Adam Cope, Krysta Paradis, and Pablo Branco — flew this beautiful aircraft at the U.S. Nationals in September, and its creator, Dan Rihn, will assist us in contacting owners and pilots of his design, and we hope for a large turnout in July in Oshkosh. Dan has been a member of the IAC since 1976 and formerly flew a Pitts S-1 in competition. In fact, he and his father, Dick Rihn, were the only father-son combination who flew in Unlimited together at the same time. Dick was president of the IAC from 1996 to 1998 and also a very good friend and strong supporter of aerobatics in California for decades. It will be a very special celebration for everyone.

Accompanying the One Design gathering will be a special exhibit inside the IAC pavilion that has become one of our hallmarks. Why is this important? Why do we focus on anniversaries and certain aircraft types? There are several answers to this.

First, airplanes like the Pitts, Eagle, and EXTRA have made their mark in aerobatics, and without these creative and successful designs, there would be a much smaller aerobatic sport today. These types number in the hundreds and can be found in dozens of countries around the world. The One Design is noteworthy because of Dan's intent to create an airplane that would be flown in a single category of its own, putting performance differences aside in determining winners. While it was a great idea, it did not take off, and rules for a single-design category were eventually deleted from our rules. That said, many of these types are flying in the hands of very satisfied owners and pilots. It moved our sport forward in its own way and generated a great deal of debate and discussion as to the direction competition was taking at the time.

What all of these airplanes share is an ancestry in the experimental amateur-built movement — the very heart of EAA. Some were totally plans-built, others were constructed from kits, and some like the EXTRA are factory-built and certified airplanes whose ancestors were homebuilt airplanes like the Laser and Stephens Akro. What could be more appropriate than celebrating these outstanding aircraft at EAA AirVenture?

My best wishes to everyone for a healthy, safe, and happy new year!

Please send your comments, questions, or suggestions to *president@iac.org*.

2018 U.S. Nationals to Return to Oshkosh

By a majority vote of the IAC board of directors in a special meeting on Wednesday, December 6, the decision was to return the U.S. National Aerobatic Championships to Oshkosh, Wisconsin, in 2018. The dates for the championships will be Saturday, September 22, to Friday, September 28, 2018. The contest director was also appointed by the board and will be John Smutny, IAC 25010, of Auburn, Washington. John previously directed the 2013 Nationals.

Jack J. Pelton, chairman and CEO of EAA, has pledged full support of the event and has pledged to the IAC board of directors personally that the issues that arose during the 2017 event will be corrected. The contest director is also working with local and regional representatives to make the event as smooth and as successful as possible. These changes, upgrades, and improvements to the 2018 Nationals will be announced in the weeks ahead. In the meantime, planning has already begun.

Giles Henderson

BY MIKE HEUER, IAC 4

I am sad to report that Giles Henderson, IAC 159 of Charleston, Illinois, lost his life in a sky-diving accident on Saturday, December 2. If you have been around the IAC for any length of time at all, you knew who Giles was — a real icon in our sport and the quintessential Sportsman pilot.

I met Giles in about 1968 as he was an Illinoisan like our family. He is the only IAC pilot who flew in both our first IAC-sanctioned contest in May 1970 at Lansing, Illinois, all the way up to the recent U.S. National Aerobatic Championships in Oshkosh. Though known mostly for his award-winning flights in his Clipped Wing Cub N6620H, in recent years he flew his Cassutt N429PM, which was originally built and owned by Pete Myers, an air show pilot for many years in the Chicago area and a mentor to Giles.

Giles was the winner of the L. Paul Soucy Trophy on four occasions — 1971, 1975, 1986, and 1988. In 2012, he was inducted into the International Aerobatic Club Hall of Fame. Very active for all those decades since he joined our organization in 1970, Giles flew in 35 contests in the last 11 years alone. If there was ever a grassroots pilot and IAC member, it was Giles.

EAA produced a video of Giles' life and career when inducted into the International Aerobatic Club Hall of Fame, and it can be viewed at *www.EAAVideo.org/detail/video/1973974915001*.

On behalf of the IAC's officers and directors, I offer our condolences to all of Giles' friends and family.

Luke Penner receives Canada's David Charles Abramson Memorial Flight Instructor Safety Award

The 2017 recipient of Canada's David Charles Abramson Memorial Flight Instructor Safety Award is Luke Penner (IAC 437639), chief flight instructor at Harv's Air of Winnipeg, Manitoba.

Luke is a true aviator and an accomplished pilot, a Class I flight instructor, and a Class I aerobatic instructor. It is his strong belief that even some aerobatic experience can make a pilot more competent and much safer.

Penner states, "I personally have pushed myself to experience the full flight envelope through my competitive aerobatic flying. I pursue disciplined precision flying with the hopes of inspiring others to reach for their true potential and ultimately become safer pilots."

Geeks'R'Us

Everything you ever wanted to know about the IAC Technical Committee

by Tom Myers, IAC 16830

I am going to tell you about the IAC Technical Committee — what we do and who we are. The easiest way to explain it is to give you a short history of the committee.

In the early days of IAC, contest scoring was done by calculator, paper, and pencil. You can only imagine how laborious and time-consuming the process was. In the late 1970s and early 1980s, though, personal computers became much more common, and there was an immediate call for automating contest scoring. During this era, many people involved in international competition were also greatly dissatisfied with what was perceived as blatant judging bias. Computers gave us a way to statistically analyze scores and identify judging bias. Messieurs Tarasov, Bauer, and Long came up with the first algorithm for use at aerobatic contests. It identified and smoothly reduced the effects of outlying scores based on how far outside the norm they were. It became known as the TBL algorithm.

A Brazilian software engineer named Rudy Penteado wrote a DOS-based aerobatic contest scoring program for the IBM PC that incorporated the TBL algorithm. The program became known as the TBLP, as Rudy added additional features. CIVA adopted it for use at international contests. IAC adopted it for use at our national and regional contests.

IAC paid for Rudy's computer expenses related to IAC. However, Rudy and the IAC had a disagreement over who owned the software. Rudy was unwilling to provide the IAC with the source code so that we could make changes and upgrades. When Rudy moved on from the sport, we had a problem.

The scoring program would be named JaSPer, short for "Java Scoring Program."

As an engineer on the IAC board, I had served as the technical liaison between Rudy and the IAC. I volunteered to write (and donate) a separate program for the IAC that intercepted and captured printer data sent out by TBLP. Instead of being sent to a printer, the captured data was stored in a file using a format that could be opened and processed by spreadsheet software. My reward for this good deed was the creation of the IAC Technical Committee, which had one (!) member. I'm sure you can guess what the Technical Committee's first responsibility was: compiling and maintaining the big spreadsheet with all the contests results and statistics.

Enter Bob Buckley. Bob is a visual systems software engineer who started competing in 1983. Upon completing grad school in the early '90s, he took a look at TBLP and recognized an opportunity for improvement. With the support and encouragement of IAC presidents Gerry Molidor and Vicki Cruse, Bob volunteered to write a brand-new scoring program. The source code would be written in the hardware-independent Java programming language, whose unofficial motto, according to Bob, is "write once, crash everywhere!"

The IAC would own and be provided with the source code. The scoring program would be named JaSPer, short for "Java Scoring Program." The Technical Committee had now doubled in size.

Meanwhile, the compiled statistics from TBLP showed that the TBL algorithm worked well at large national and international contests that featured large data sets, but it wasn't an ideal fit for the small data sets typical of U.S. regional contests. Thus, the IAC decided to use straight multiply-and-add "linear" scoring at regional contests and TBL "statistical" scoring at the U.S. Nationals. Around this time, Britain's Nick Buckenham wrote an updated version of TBLP for CIVA called ACRO. IAC's JaSPer became the standard at U.S. regional contests,

and ACRO became the standard at the U.S. Nationals. Bob has been updating, supporting, and maintaining JaSPer ever since.

Enter Randy Owens. Randy is a software engineer who runs his own software company. Randy volunteered to build a database that would automatically compile the vast amounts of scoring data that JaSPer produced. The database was called Dexter. The program that gathered and crunched the data was called Manny. Randy hosted Dexter and Manny on a local server, and IAC paid the server costs.

Enter Doug Lovell, an IBM software engineer. Now that IAC had a big online scoring database, Doug saw an opportunity to do an extensive statistical analysis of the judges' performance. The results of that analysis were published in a series of articles in *Sport Aerobatics*. The articles concluded that IAC judges do a reliable job of rank-ordering pilot performance at contests.

As the EAA's IT resources grew, the organization decided to move remote IT resources onto the EAA servers. The moves would allow for greater cross-functionality between the various software systems and eliminate the outside hosting costs. Doug volunteered to move Dexter and Manny to the EAA servers and integrate their functionality into the IAC website. In doing so, he created the IAC Contest Database, or IACCDB. The IACCDB stores, analyzes, and displays all IAC contest and regional series results.

When contests are completed, the results are uploaded from JaSPer to the IACCDB. Doug checks the integrity of the incoming data and occasionally takes care of issues such as different pilots having identical names and IAC member numbers getting swapped. Doug has also written a data-format translator that allows the results from ACRO at the U.S. Nationals to be uploaded to the IACCDB.

Doug recognized that the IAC would also benefit from having a web-based system for pilots to preregister for contests in which they were planning to compete. Doug wrote and hosted the original ACRS, or Aerobatic Contest Registration System.

A significant challenge in adding Doug's new features to the IAC website was the ancient state of the site at that time. A complete overhaul was sorely needed. Then IAC President Doug Bartlett wanted the IAC to develop and maintain the website in-house moving forward. The IAC formed a working group to make the overhaul happen: Wayne Roberts and Jim Ward led the group. The legacy content migration team, led by Lorrie Penner, included Lynn Bowes, Trisha Roberts and Trish Deimer-Steineke. Designing the look and feel of the website was Laurie Zaleski and Rafael Soldan, and DJ Molny did lots of the heavy lifting.

Enter DJ. DJ is a software developer, website architect, and Giles G-200 pilot. He is the IAC's webmaster and the principal force behind keeping the website airworthy. Navigate around the IAC website for a while and you will get a sense of the superior quality and enormous scope of DJ's work. This commitment often involves daily attention to assure that the website is up to date.

Enter Brennon York, our new committee member. Brennon is a software engineer specializing in network security. When the IAC lost access to the outside system that was hosting the original ACRS, Brennon volunteered to build a new ACRS that will be integrated into the IAC website. The plan is for the new ACRS to offer functionality and features that improve upon the original ACRS. Brennon's goal is to have the new ACRS up and running for the 2018 contest season.

Much of the software described in this article has been developed with open source. There are software tools in place that allow volunteers to join in and write new code to add features. If you have ideas and are interested, please let us know. Log into the members area of the IAC website. Go to About: Leadership: IAC Directors, Officers, and Committees. The contact information for all IAC committee members is listed there.

So there you have it. That's who we are and what we do through the IAC Technical Committee. In short, we are good with computers and math and like to fly airplanes upside-down. *IAC*


Bob Buckley


Brennon York


DJ Molny


Doug Lovell


Tom Myers

Restoring *Daisy*

A Tale of Aircraft Rebirth

by Doug Jenkins
IAC 436255

When we last spoke (a long time ago) I had taken my beloved Pitts S-1 (aka *Daisy*) apart and embarked on the much-needed and long-delayed restoration process. At that time I naively speculated that I would be back in the game for the 2016 contest season.

Ha! If I had known then what I know now, one of two things would have happened: 1) I would have never undertaken the project or 2) the project would have gone *much* more smoothly because I would have known about all the rookie mistakes I was going to make. My money's on option two. For those who may have forgotten how we got here, or are new to the saga, you can read the original two articles in the September and December 2015 editions of *Sport Aerobatics* to see how this all began.

Remember from the December 2015 article that, after much gnashing of teeth and difficult decision-making, I had elected to order a set of prebuilt "superwings." In particular I decided on Wolf Wings built by Chris Murley of Griggs Aircraft. This would prove to be the right choice for me. This is not an advertisement or an endorsement. I am certain that other people and other products are equally amazing. All I can say is that I never regretted my choice, and I'd make it again. From the first e-mail and phone call until well after I had flown the airplane again, Chris answered every question honestly and accurately, and demonstrated a genuine commitment to getting me back in the air. The product he provided was beyond impeccable. I would do business with him again in a heartbeat.

You will also recall my statement that I was a flyer and not a builder. Please note the past tense. Having exceeded my laughably ill-conceived original budget for the entire project on the wings alone (by about a multiple of three), it was intuitively obvious that I was not going to be able to afford to pay someone else to do things that I had even a snowball's chance in Hades of doing myself. So began a long, steep, and painful learning curve. And here, I suppose, is the true purpose behind this article: If I can do this, so can you. In June 2015, I quite literally possessed none of the skills required to restore a Pitts. I certainly do now.

Daisy 2.0.

February 2016: Covering in progress.

A secondary reason for writing this article is to make your restoration experience a little less painful than mine by passing along some hard-earned lessons. You're welcome. As I said earlier, if I knew then what I know now, the project would have gone much more smoothly.

By the end of July 2015 I had ordered the wings from Chris. He had predicted a November 2015 delivery date. This timeline drove the pace of my work at the Bulverde, Texas, hangar where the pieces of the airplane I still had were collected. My goal was to get the fuselage/tail/everything else done before the wings arrived so that I could dive right in when they did show up.

I was still working my real job (I had to pay these massive bills somehow), but I had managed to get my schedule shifted to start around 5:30 a.m. each day. After my mandatory eight hours as a U.S. government employee I would proceed to the hangar and commence airplane work, usually starting by around 2:30 p.m. or

so. I would then work on the airplane until I got hungry, and then I'd go home, eat, sleep, and start the whole thing over again the next day.

Over the course of the project I said many times that "any idiot can take an airplane apart; it's the putting it back together again that gets challenging." This was very true. I had indeed been "any idiot" and taken my Taylorcraft apart on multiple occasions. I had always ended up paying someone to put her back together. Not with the Pitts. Once *Daisy* was apart the only way she was going back together was if I got it done myself. This is not to say I was self-taught or on my own. The shop I was in was run by Mark Julicher and Vick White, with Steve Zurcher helping out as well, and they ably guided me through the process.

Mark (aka Yoda) is one of those rare souls who truly loves what he does and loves to teach as well. He patiently talked me through each new skill, demonstrated those skills, and then watched as I made a mockery of what he had described. Probably the most valuable thing Mark told me early on in the project was, "Doug, there's nothing you can do that I can't fix." That gave me the confidence I needed to press on.

While waiting for the wings, I took care of the dozens of small projects that needed doing. I learned how to rivet as I installed new engine baffling and new hardware throughout the entire forward fuselage. I learned how to work with plexiglas as I made a new windshield. I learned how to work with metal as I made new bungee and gear fairings. I learned how to soda-blast parts to remove old paint. I learned how to replace bungees, order the proper parts after getting the wrong thing a couple of times, and paint as I refurbished the cockpit interior and instrument panel. But most importantly for the rest of the project, I learned how to cover airplane parts in fabric and paint them.

I began with the traditional baby steps by working on the elevators and horizontal tails. At this stage it was monkey see and then monkey see again as Mark showed me the right way to do things. Eventually I progressed to monkey do, and I would tentatively attempt something before immediately seeking approval from Mark. This got tiresome for both of us, and I eventually decided that two of Richard Bach's life-philosophy quotes, which I had always shared with my kids, were actually true:

"Argue for your limitations and you get to keep them."

"If you say that something is impossible a thousand times over, does that make it any easier?"

Once I internalized these concepts and applied them to myself, the project picked up steam. I realized that saying over and over that "I'm a pilot, not a builder" was just keeping me from trying to do something that scared the heck out of me. So I set my fears aside and trusted that there was nothing I could screw up that Mark couldn't fix. It was kind of a liberating feeling. And as it turned out, once I just decided that "I can" instead of "I can't," I actually could. Freaky, right?

The tails got covered, and then I moved on to the fuselage, which just turned out to be the same process on a bigger canvas. There were inevitable errors and corrections, but things moved forward. Some days featured more progress than others, but there was always some small amount of forward momentum. I realized that I had truly turned a corner when I went to the hangar to work on (and even paint) the airplane by myself, with no security blanket to consult. Just me, some tools, and my airplane carcass.

Once the fuselage and tails were covered and painted, I turned my attention to the sheet metal up front. Here is a *big* lesson learned from my experience. I initially tried to soda-blast the parts myself. It rapidly became apparent that, given the blaster and compressor that Mark had, I was going to burn through a *lot* of soda (which is not cheap), so I decided to farm out that project to an outside shop. Good call. However, once the metal got back to me it was pretty well curled up from the blasting process. Even though we used soda instead of sand, it was still not a gentle process, and the metal showed that when I tried to attach it to the airplane. It just didn't want to fit quite right. So here is my time-machine hint number one: If I could journey back in time I would never blast any of the metal parts; I would simply chemically strip the paint. Many readily available paint strippers are quite easy and safe to use. Use them.

Getting the sheet metal back to its old shape was one of the more frustrating aspects of the project early on. Eventually, after many special words were said, I made it work and got the parts repainted and reinstalled. This retelling does not begin to capture the frustration I endured. Please strip — *do not blast* — the paint off your sheet metal.

Next were some small items: bungee replacement, relining the brakes, installing new brake lines, installing new spark plugs and an upgraded ignition harness, fabricating a new windshield (an adventure in learning patience with a Dremel tool), wiring in a new battery, etc. I wrapped up all this stuff and had the fuselage complete by mid-November. Of course, this being aviation, I was now destined to "hurry up and wait" as the lower wings continued to be assembled. They eventually arrived in Texas (on a great big FedEx truck) in early January 2016. It was like a late Christmas as I opened the crate. The wings were beautiful. I said at the time that it seemed a shame to

May 2016: A LOT of stitches and tapes done.

June 2016: Masked, ready for yellow.

June 2016: Finished yellow and white. Chrissy did all of the stripes.

cover them because they were like works of art. Having seen now how I covered them, I still feel that way. But wings generate a lot more lift if they are covered.

Here is my second time-machine moment: When I got the wings, I naturally wanted to make sure that they fit my fuselage. So I enlisted some muscle power and worked the wings into the fuselage attach fittings, where I proceeded to "pin" them in place with dowels. They fit great! Notice what I did *not* do. I did *not* "bolt" them in place with actual AN hardware; I pinned them in place with pins. Why? I don't know. "Rookie mistake" is the only valid answer. This would turn out to be a *big* issue a few months down the road when I finally wanted to attach the now-covered wings for real.

What I would discover then is that with actual AN bolts in place, there was no way my precision-built 2016 wings were going to fit my 1989 plansbuilt fuselage. But I am getting ahead of the story. Suffice it to say that you should *always* bolt any and all pieces together with the actual prescribed hardware as early in the process as possible to ensure a correct fit.

Believing that my lower wings fit great, I began to cover them, which I already knew how to do. Except for rib-stitching. Rib-stitching the tail surfaces was the one task that prompted me to throw my hands up and walk away, proclaiming, "I can't possibly do this." For whatever reason, ropes/knots have always eluded my understanding. I just don't see how they work.

Fortunately, there were not too many stitches on the tail, and the "Rib Stitch Fairy" (read that as Mark and Steve) took care of most of them one evening after I left. To add insult to injury, Mark taught my wife, Chrissy, how to stitch, and she wrapped up the last elevator for me. The wings required a *lot* more stitching, and no Rib Stitch Fairy was going to be forthcoming for that much work. I dutifully watched several online

videos. They didn't help. Mark tried to teach me, but I just couldn't grasp the concept. Finally, Steve took pity on me. He spent about an hour showing me, in über-slow motion, exactly what needed to be done. For some reason, the light bulb finally went on. I got it! As long as I followed my script (left over right, under then through, etc.), which I actually wrote out on the wing for easy reference — and as long as I didn't think too much — I could rib-stitch! Please believe me. If I can be taught to rib-stitch, there is no skill in the world that you can't master.

The lower wings got covered and painted, and they didn't look too awful — from 10 feet away or so. Once they got wrapped up in March, I fit them to the lower fuselage using the same technique as before. They still fit! Ah, hindsight. Then I hit another work stoppage. It seems that covering wings goes a lot quicker than building wings. Who knew? While I had been covering the lower wings, Chris had been building the top wing. When it arrived in May 2016, it promptly got set on the airplane and, you guessed it, "pinned," *not* "bolted," in place.

In this case, this was doubly bad. Not only did this make me believe that the lower wings and top wing fit, it also convinced me that my I-struts fit as well. With all the wings pinned in place, there was enough slop to allow everything to move around just enough to line up the I-struts. Would you care to guess what is going to happen when I finally bolt all the wings in place? Again, I am getting ahead of the story.

I removed the still-uncovered top wing and proceeded to embark on a marathon two-week stint of airplane work. Truly believing that I was near the finish line (in June 2016, *ha!*), I took two weeks off work and spent that time just working on the airplane. Unfortunately, in the middle of those two weeks was a five-day window of rain and high humidity that prevented painting. But I still got it done. Again, the

June 7 2016: The day we were going to put her back together.

Okay — we have a problem.

October 2016: The next time I thought we were going to put her back together.

Missed it by that much!

wing looked okay — from 10 feet away. My eventual mantra on the covering and paint was that I was not trying to win an award at OSH for the appearance of the airplane; I was trying to win awards for how well we flew.

Accepting that "good enough" was actually "good enough" was another huge burden lifted. So here is another lesson learned. *You* will know where every flaw is in the airplane because *you* created it or watched the spider walk across the paint, etc. Most casual observers will be completely oblivious to this stuff. Just make it safe and be sure to meet your own personal standards. Another useful Markism that I adopted was, "It's not a flaw; it's a feature." Too true.

With the top wing covered and painted, and all the minor stuff completed, it was time to move on to final reassembly. This was still in June 2016. It was time for the chickens to come home to roost. I got all the airplane pieces in one place and began the "tab A into slot B" process, with the real hardware this time. As I already stated, it did not go well. The lower right wing went on fine. The lower left wing — not so much. With the AN bolts in place, there was a clear misalignment between the rear spar and the fitting. Back to the drawing board.

This resulted in about a four-month work stoppage while Chris and I thrashed out a solution. Sigh. So in September 2016, the lower left wing fit and the top wing went on with no problems (*what!?*). Now it was time to put the I-struts in. With all the wings now securely bolted in place, the I-struts were nowhere close to fitting. Shocking. Who could have possibly foreseen that? So I ordered a kit to build new I-struts. It would take six weeks to ship the kit, they said. It was closer to two months, but who's counting? Again, I can't stress strongly enough that had I simply correctly assembled the airplane parts when I got them, all of this would have been avoided. Had I invested a single day (or maybe two) on the front end of the project, I could have saved six long months on the back end. But that's not how it worked out. So now we needed to fabricate I-struts on wings that were already covered. Not ideal, but after some trial and error and more error and a little more error, they got done.

After that it was a simple matter of installing flying and landing wires and rigging. That process actually went fairly smoothly. Finally, in January 2017, almost 18 months after our last flight, we were ready to take wing again. There were no more excuses — the work was done, the paperwork was done, the weather was glorious, and the spectators were present. And so we flew.

I will tell you, unequivocally, that the new wings are worth every penny. The roll rate is astounding and the slow-speed performance is unbelievable. The extra aileron area pays off on the top of an Immelmann when the folks on the ground drop their jaws at how fast she whips around. They are further astounded when I tell them that I am only using three-quarters stick deflection so that I can actually stop the roll when/where I want. The extra wing area and dramatically improved aerodynamics show up in the slow-speed performance. I am no test pilot. I can just tell you what is different with my airplane now.

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Back home after a long awaited and satisfying first flight.

On our way home from her first practice day.

Chrissy, Daisy and Me.

Your mileage may vary.

My stall speed decreased by at least 15 mph. This translates to the acro performance and the traffic-pattern performance. In terms of acro, the accelerated stall is so far down the scale that you can demand a *lot* more of the airplane before she lets go. She still talks to me just like she always did; she just waits a *lot* longer to speak up. In the traffic pattern, I knocked 15 mph off all my old speeds. I now do 90 around the final turn and 80-85 on final. These may still be a little on the fast side, and I might drop them further as I get more experience.

So let me tie this all up. On a technical level, please heed my lessons learned. If you have any specific questions that I did not address here, please contact me at *bagsf15@yahoo.com* and I will do everything in my power to help you.

On a personal level, there were good days and bad days. The good days were good, and the bad days were really bad. When I thought, in June 2016, that I was two weeks away from flying and was going to make it to Hammerfest and Nationals, I was thrilled. To have that snatched away (admittedly because of my own mistakes) was soul-crushing. There were multiple points along the way where I wanted to just quit. I remember a half-dozen days when I drove home

Daisy's crew, from left to right: Vick, Mark, me, my dad, and Steve.

just screaming at the top of my lungs to release the rage and frustration I felt. Blood, sweat, and tears went, in almost equal measure, into the project throughout. But ...

Each time I wanted to quit, Chrissy reminded me of the quiet promise we made to *Daisy* on the ramp at Lone Star in June 2015. We promised her that we would heal her and that she would fly again. And so we did.

Thank you to everyone out there who made that possible. You guys are the best. **IAC**

Taxi Papa, Papa-two to Parking

Giles Henderson in his Cassutt Racer returns from a practice flight at his last contest, the 2017 U.S. Nationals in Oshkosh. Photo by Evan Peers.

Owning a Legacy

Dre

and a am

The original Herb Andersen Pitts

BY PAT BARRETT
IAC 431591

For me, looking for a Pitts single-place was a long and time-consuming endeavor, taking years to accomplish. I traveled to Canada and down to the southern states, then out west. I knew I wanted a Pitts single-place, but where is a good one? I was resigned to the fact that I would know it immediately once I saw it. That day happened after I answered an ad for a 1973 Pitts S-1S and went to a small airport down in Pennsylvania. I walked down a taxiway ramp and stopped — I saw a beautiful red Pitts sitting outside the hangar. "I think that's it," I remember saying to my friend John, my sidekick, as we walked down to take a closer look. She really looked beautiful after all these years.

I began looking into the background of the airplane. I examined the title and all pertinent paperwork. I found the name E.H. Andersen, Afton, Wyoming, as the builder in the paperwork and on the data plate in the airplane. After an extensive search, I found a telephone number for Andersen and gave him a call.

E.H. "Herb" Andersen told me that he had orders for airplanes but could not build them because the factory was not yet certified by the FAA. So he built her as an experimental. He recalled N2999 and the fellow he built it for. "Dick Xander — he was a pretty good stick," said Herb. "He was an airline captain who flew DC-3s." Herb went on to tell me the whole story of his company (CallAir) and how he and Curtis Pitts agreed to begin making airplanes in his factory in Afton.

I was convinced this was the Pitts I wanted. After a period of time, I wanted to find out more about Dick Xander. So I contacted the staff members at the airport, and they gave me the last telephone number they had for his daughter. I contacted her and asked her to help out with this story. This is what she had to say:

"Dick Xander, crop duster, military flight instructor, airline pilot, and aerobatic air show pilot, was the original owner of N2999. In the early 1970s, he contacted Herb Andersen (who, with Curtis Pitts, started the Pitts factory in Afton, Wyoming) and had him build

Pitts S-1S, N2999, serial no. 0001. I remember sitting at the kitchen table as a young girl in Sewickley, Pennsylvania, helping my dad color in the blank drawings for N2999's colorful paint scheme. Dad insisted on red (his favorite color) with white stripes and checkerboard on the elevator and rudder (a nod to the 1930s racers). He also insisted on a Pennsylvania Dutch 'hex' sign on the top wing (a lucky star), a nod to his Pennsylvania Dutch heritage and upbringing in eastern Pennsylvania. Once completed in March 1973, N2999 was delivered to Homestead, Florida, where my dad went to pick her up. After some dual with the great Bill Thomas, he flew her home to Beaver County Airport (KBVI) where she lived and flew for about 15 years until she 'retired' when dad bought a new Pitts S-1T. Locals used to call the airport and complain about the 'Red Baron' flying over their house, doing 'loop d' loops.'" — Karen Xander, EAA 80684

After I purchased her, I was eager to fly. She has an O-360-A4A with a Sensenich 76-56 fixed prop. I vividly recall 10 years ago now the first time I flew her. I had flown different varieties of the Pitts (S-2A, S-2B, and S-2C) on several occasions and in IAC competitions before, but this was the first time for me in a single-place. I was keenly familiar with all of the warnings of many and made sure I had plenty of practice just a few days prior. I remember leaving my wallet on the dresser and a short note just in case something did not go as planned.

The day had come. Mild wind and my confidence was up. I knew I was ready. Let's go. I slowly put the power on to the stop. I was surprised how light it was and how fast it literally leaped into the air. Before I knew it, I was past a thousand feet and still climbing. Woo. Pulling the power back, I made a left turn to downwind. As I looked down, I saw the crowds from the airport were all gathering, some in golf carts, apparently to see my first flight with this Pitts. I made my left turn to base and pulled the power off, and she

started to sink rapidly. Woo ... keep calm. Keeping the 100-by-5,000-foot runway in sight on the left side, I came in power-off at 90 mph. I remember hearing this scraping sound of sorts of the tail wheel touching. I just kept slowly pulling the stick back until it was fully back. I knew I was on the ground now on all three wheels — whizzing down the runway. She wanted to go to the right; I immediately added left rudder, keeping the stick full back. Keep off the brakes, I told myself, and keep it straight, no sudden moves. Slowly after passing the intersecting runway (2,500 feet), it began to slow. Wow, I knew I had it made. I taxied in, pulling the canopy back, pleased but grateful. The line boy pulled up in the golf cart with some onlookers. "Hey, that looked great," he said. "You gonna go up and do it again?" I said, "Ah — I don't think so. I am just going to relax a while, I think." Whew, I thought. Talk about some stress.

I packed her up and put her in the hangar, and I thought for a while — my little sweetie. Turning off the light, I said — and still do to this day — "Good night, sweetheart," after flying. What a wonderful airplane to fly. Sometimes I think of Dick Xander sitting in the same seat as me; I'm seeing the same things in his Pitts as he did back then.

By the way, I was going to tell you: Karen mentioned one other thing to me. "Dad loved the little plane, giving her the nickname *Schatzi* (German for sweetie)."

Maybe Dick's up there now — keeping a watchful eye on his little sweetie, too. IAC

IAC Stars and Smooth Achievement Awards

The IAC Aerobatic Achievement Awards program is formulated to promote and advance sport aerobatics. The IAC sanctions many regional aerobatic contests every year, but at the same time realizes that all pilots who fly aerobatics may not wish to enter competition, yet deserve recognition of their own abilities.

The program provides the mechanism through which competition and non-competition pilots can work to reach the desired level of proficiency, under strictly controlled conditions, and always with an eye on safety. Aerobatic competitions benefit as more people are encouraged to enter; aerobatic education is more widely disseminated; and, aerobatics as a sport will grow as more people learn of the enjoyment, fun, and comradeship that is aerobatics.

These awards are not easy to achieve and a high level of skill is required. They are, however, within the reach of every pilot. When an award is earned, it is truly something of which to be proud.

Smooth Awards

Smooth Awards are earned in a non-contest environment. Each level in both power and glider categories has a designated set of figures which must be successfully completed. These figures may be flown in either one flight or on multiple flights, on different days, or in different aircraft. Each figure must earn a grade of 5.0 or higher. There is no overall score or presentation grade as this is not a sequence, nor is a marked performance zone required. Contest practice days are appropriate occasions to earn Smooth Awards.

Stars Awards

Stars Awards are earned through competition at an IAC sanctioned contest. A minimum raw grade of 5.0 or higher must be awarded on each figure and on presentation for all flights completed in a contest with four or more judges, except one grade on each figure and on presentation may be less than 5.0. In a three judge contest, all grades must be 5.0 or higher. Intermediate, Advanced and Unlimited levels must fly at least two flights to qualify for a Stars Award. A contest that is able to fly only one flight for these categories cannot qualify a competitor for a Stars Award. A competitor must fly and qualify in all flights available at a contest in their category. Qualifying flights are confirmed in the official posted scores on the IAC website with a * (star) preceding the score.

All-Five and All-Ten Awards

A unique All-Five patch is awarded upon earning all five Smooth Awards within either power or glider categories, and a unique All-Ten patch is awarded to pilots earning all five Smooth Awards *and* all five Stars Awards within either power or glider categories.

How to Apply

An applicant for an IAC Aerobatic Achievement Award must be a member in good standing of the International Aerobatic Club. The awards are international in scope, as is the IAC. All IAC members in good standing from all countries may achieve the awards. Complete requirements can be found in Appendix 5 of the *IAC Official Contest Rules*.

Aerobatic maneuvers may only be performed in compliance with the civil aviation rules and regulations of the country in which the flight takes place. Waivered airspace may be required.

A frameable certificate is issued for each award, and distinctive patches, pins and decals are available for purchase if desired.

Applications for achievement awards can be obtained from the achievement awards chairperson, from the registrar at a sanctioned contest, or downloaded from the IAC website, *www.iac.org/legacy/achievement-awards.* IAC

2017 Achievement Awards

Primary Smooth

1215	Heather Kelly
1216	Chung Ping Sonny Yeung
1217	Dionys Beek
1218	Jonathan Apfelbaum
1219	Justin Thomas
1220	Jane Thomas
1221	Malcolm Pond
1222	Zinnia Kilkenny

Primary Stars

741	Brennon York
742	Oliver Spatscheck
743	Brian Chesebro

Sportsman Smooth

921	Eric Hubin
922	Chung Ping Sonny Yeung
923	Zinnia Kilkenny
924	Malcolm Pond

Sportsman Stars

1548	Diana Neuman
1549	Mathieu Barbin
1550	Brennon York
1551	Oliver Spatscheck
1552	Brian Roodvoets
1553	Daniel Unger
1554	Phillip Colmer
1555	Eric Hubin
1556	Malcolm Pond

Intermediate Smooth

512	Malcolm Pond

Intermediate Stars

741	Michael Neuman
742	Mathieu Barbin
743	Ron Hill
744	Jean Pemoulie
745	Wayne Buescher
746	Dan Radke
747	Malcolm Pond
748	Aaron McCartan
749	Philip Joseph

Advanced Smooth

288	Wayne Roberts
289	Malcolm Pond

Advanced Stars

341	Mark Stewart
342	Malcolm Pond
343	Aaron McCartan

Unlimited Smooth

199	Malcolm Pond

Unlimited Stars

119	Klaus Mueller

ALL FIVE

172	Malcolm Pond

ALL TEN

41	Malcolm Pond

2017 IAC Regional Series Results

		Northeast			Southeast	
Primary				1st	Walter Driggers	62.79%
Sportsman	1st	Glen Becker	81.13%	1st	Wayne Asplundh	83.23%
	2nd	Adam Messenheimer	79.88%	2nd	Shaun Brautigan	82.87%
	3rd	Greg Stringer	78.95%	3rd	Peter Nassar	81.19%
Intermediate	1st	Eric Anderson	78.95%	1st	Kevin Campbell	81.46%
	2nd	Daniel Bond	76.34%	2nd	Mark Budd Jr	80.74%
	3rd	Lawrence Macon	76.33%	3rd	Mark Budd Sr	79.87%
Advanced	1st	Jason Flood	73.93%	1st	Stanley Moye	79.72%
	2nd	David Taylor	72.43%	2nd	Martin Flournoy	78.53%
	3rd	F Russo	69.29%	3rd	Mark Fullerton	76.30%
Unlimited	1st	Eric Sandifer	67.87%			
	2nd	Krysta Paradis	57.64%			
	3rd	Adam Cope	53.94%			

		Mid-America			South Central	
Primary	1st	Giles Henderson	85.97%	1st	Brooks Dickerson	85.92%
				2nd	Samuel Robinson	83.58%
				3rd	Vibeke Gaard	83.46%
Sportsman	1st	Larry Ernewein	89.06%	1st	Doug Jenkins	85.99%
	2nd	Jason Noll	81.84%	2nd	Craig Fitzgerald	81.37%
	3rd	Paige Wild	66.12%	3rd	Mike Arensmeyer	81.02%
Intermediate	1st	William Ludwig	82.00%	1st	Erik McDaniel	80.17%
				2nd	Antonio Davila	78.43%
				3rd	Jim Murray	75.79%
Intermediate Glider				1st	Matthew Correa	70.94%
				2nd	Kaitlyn Brown	60.46%
Advanced	1st	Andy Ernewein	82.98%	1st	Mike Forney	68.73%
	2nd	Michael Wild	77.85%			
Unlimited	1st	Klaus Mueller	78.89%			
	2nd	Hugo Ritzenthaler	42.42%			

		Northwest			Southwest	
Primary						
Sportsman	1st	Jeff Seaborn	80.86%	1st	Karl Gashler	80.23%
	2nd	Diana Neuman	76.48%	2nd	Victor Birtalan	76.41%
	3rd	Ann Follinger	74.26%			
Intermediate	1st	Neil Harris	79.67%	1st	Michael Mohn	77.99%
	2nd	Mike Numan	78.77%	2nd	Barrett Hines	76.41%
	3rd	Ben Rose	75.56%			
Advanced	1st	Jerzy Strzyz	83.96%	1st	A.J. Wilder	78.94%
	2nd	A.J. Wilder	79.10%	2nd	Mattew Dunfee	78.42%
	3rd	Miles Crane	74.60%	3rd	Tom Myers	71.79%
Unlimited	1st	Jim Bourke	70.71%	1st	Hiroyasu Endo	72.73%
	2nd	Dave Watson	70.67%	2nd	Jim Bourke	70.27%

California Point Series 2017 Results

BY TOM MYERS, IAC 16830

The four California IAC chapters that host regional contests (26, 36, 38, and 49) collectively award trophies to the winners of the point series for each contest season. There are usually five California contests in a season. Each contest pays $5 per competing (non-patch) pilot into a fund to pay for the trophies. The responsibility for obtaining and presenting the trophies rotates to each of these chapters once every four years. The trophies are usually awarded at the responsible chapter's regional contest the following season. Since Chapter 38 is responsible for the 2017 season trophies, they will be awarded at the 2018 Coalinga regional contest.

To be eligible for a trophy, a pilot must fly in a minimum of three California contests in a particular category. That is the only requirement. The best three contests by percent of possible points are counted for a pilot who flies in more than three California contests in a season. A pilot's overall series percent of possible points is calculated by dividing the sum of the earned points by the sum of the maximum possible points. The trophies go to the top three pilots by overall series percent of possible points for the five competition categories.

Here are the winners of the 2017 California Point Series.

Sportsman

1 Karl Gashler	80.23%
2 Vic Birtalan	76.41%

Intermediate

1 Barrett Hines	76.41%

Advanced

1 Matt Dunfee	77.91%
2 Tom Myers	71.79%

Unlimited

1 Hiroyasu Endo	72.73%

IAC Competition Rule Changes for the 2018 Contest Year

by Brian K. Howard, IAC 18414
Chairman, IAC Rules Committee

Seven rule proposals were received by the IAC Rules Committee prior to the published deadline of July 1, 2017. The committee's evaluation of those proposals resulted in five proposals approved to put forward to the board of directors. At the November IAC board of directors meeting, the board approved two and rejected three. The approved rule proposals are adopted into the 2018 IAC Official Contest Rules, effective January 1, 2018. The Rules Committee and the board of directors are confident that adoption of the approved proposals will improve the quality, safety, and efficiency of IAC competition.

The following shows the approved and rejected rules; the changed or added rule text is shown in *italics*.

The full text of the proposals — including the rationale provided by the original submitter and the rationale for acceptance or rejection by the IAC Rules Committee — may be viewed online at *www.IAC.org/files/minutes/Agenda 10-1 - Rules Proposals for 2018.pdf*. Submitted member comments may also be viewed at *www.IAC.org/files/minutes/Agenda 10-1a - Member Comments - Rules Proposals - V4.pdf*. Both of these documents are contained in the *Pubs/Archives: Governance Docs: Board of Directors Meeting Minutes & Documents* section of the IAC website.

Proposal 2018-04: Approved (with modifications)

Subject: Wind limits
4.19.3 Wind

Contest flight will not be conducted if the cross wind component for the active runway exceeds 20 knots or the *steady* wind velocity at the surface exceeds 25 knots from any direction. *The Jury shall use the best data available to determine if contest flights can be safely conducted or not.*

Proposal 2018-07: Approved

Subject: Conduct of judge conferences
7.3.5 Conduct of Judge Conferences

The Chief Judge may call a conference of judges whenever there is doubt concerning a matter-of-fact, as indicated by a mix of numeric and HZ marks. Conferences may not be called when the opinion of the judge panel is unanimous, when only matters-of-perception are involved, or there is a mix of zeros and Averages only. Conferences are not mandatory in every case of conflict. If possible, any conferences should be held at the next possible break such that the issue may be discussed without any pilot holding in the air or with the engine running on the ground.

The conduct of judge conferences will be as follows:

The Chief Judge shall begin the conference by assembling the panel of judges. To reduce possible extraneous influence, only the grading judges should attend, not Assistants or Recorders.

The Chief Judge shall inform the judges panel of the matter-of-fact(s) to be discussed. Under no circumstances will there be any discussion of matters-of-perception. The four possible matters-of-perception are:

- *Whether or not a snap roll autorotated*
- *Whether or not a spin autorotated*
- *Whether a tail slide slid the required distance (power and glider)*
- *Whether or not a rolling turn contained a snap roll*

The Chief Judge shall return the scoresheets (Form A) to their respective judge.

The judges shall confer with each other to their individual satisfaction. The Chief Judge may assist the grading Judges to ascertain the facts, but shall remain a neutral arbiter and will not indicate an opinion regarding the proper mark or any other aspect of a competitor's flight during a flight program and in no way attempt to influence the judges with his or her own opinion.

Following discussion, each judge shall take one of the following actions:

They may leave their scoresheet as originally marked. They may revise their mark to an HZ. For this option, the judge must cross out the original mark, leaving it legible, and write "HZ" with their initials next to the new mark.

They may change an HZ mark to a "C" (Conference Average), to signify the grade resulted from a conference discussion of the facts. For this option, the judge must cross out the HZ, leaving it legible, and write "C" with their initials next to the new mark. No other type of change is allowed.

The Conference ends when the judges have made their decisions or the Chief Judge determines that the discussion has run its course.

The Chief Judge will collect and review each scoresheet for compliance with the rules stated above prior to turning the forms over to the Scoring Director.

Proposal 2018-01: Rejected by Board of Directors

Subject: Giving the Chief Judge authority to penalize low-altitude infringements during the 4-Minute Freestyle

The board considered the penalty assignment should remain with a majority of the judges.

Proposal 2018-02: Rejected by Board of Directors

Subject: Presentation K-factors

The board considered that raising the K-factors without addressing a method of measuring the presentation score is premature. It considered that a clear method of grading presentation should be developed first.

Proposal 2018-03: Rejected by Board of Directors

Subject: Chief Judge authority to terminate flight

The board considered this to be redundant as monitoring a flight for safety limits is already a Chief Judge's responsibility and the CJ has the ability to direct the pilot to break off the sequence.

Proposal 2018-05: Rejected by Rules Committee

Subject: Deductions for looping lines

This proposal addressed some confusion over the deductions to be made on looping lines which resulted from two somewhat redundant rules addressing the same criteria. It was determined that by simply deleting one of the redundant rules, there was no loss to the criteria and the confusion factor was eliminated. Therefore, this proposal became moot.

Proposal 2018-06: Rejected by Rules Committee

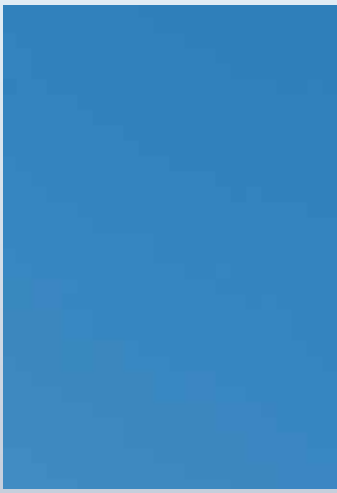
Subject: Judge's currency requirements

This proposal addressed the real issue of the declining number of judges at IAC contests. However, the approach it thought would increase the number of judges eliminated the need to obtain any form of currency beyond taking the annual Revalidation and Currency Exam. For judging, like flying, currency is the highest priority for quality performance. The committee felt that reducing the currency requirements is a path toward lower quality without necessarily even increasing the numbers.

Although this proposal is not the solution, the committee did recommend that the issue of increasing the number of judges, while maintaining a high level of competence, be put on the board's fall agenda. *IAC*

Sights from the 2017 U.S. National Aerobatic

PHOTOS BY EVAN PEERS



Color

Championships, Oshkosh, Wisconsin

Commentary

Aerobatics and Shoelaces

The law of unintended consequences

BY TOM MYERS
IAC 16830

One aspect of the sport of aerobatics I love the most is learning about the endless details that go into it. For instance, I have vivid memories of a former U.S. Unlimited Aerobatic Team member discussing at glorious length how much she would have to over- or underrotate vertical rolls based on where she was in the box relative to the judges, the wind, and the sun. If the sun was low on the horizon and behind the judges, the wind was light, and the plane was in the front third of the box at the upwind end, she could tell you the adjustments she would make to an upward vertical half-roll so it appeared to the judges to be perfect. It is the attention to these sorts of details that often determines who gets hardware and who doesn't at contest banquets.

To an even greater extent, attention to details applies to safety. Conversely put, our sport has unfortunately seen how the inattention to detail has led to bad outcomes. This principle has a scientific name: the law of unintended consequences. It means that the most important detail to which attention is not paid is the one that leads the way to failure. Many people may also think of Murphy's law in this case.

Please take a moment to make a mental picture of the footwells in your plane. Better yet, put your head in your plane and take a good look at the spaces that your feet and legs occupy. If it's like any other plane I've seen, there are all sorts of little innocuous projections, fittings, and hardware that are ready, willing, and able to snag anything they possibly can.

Now, let's think about shoelaces. Specifically, let's think about shoelaces just after you jettisoned your canopy or door, undid your harnesses, and are in the process of hurling yourself and your parachute out of what's left of your plane as it descends with great velocity. According to the law of unintended consequences, when is the most likely time that the loops in your shoelaces will snag around something in your not-quite-a-whole-plane-anymore as you are trying to exit with furious conviction? Now.

So, what details can we pay attention to beforehand to help assure this particular failure mode does not transpire? Personally, I tuck the shoelaces into my Nomex boots as shown in the accompanying photograph. For those of you with traditional laces, you may want to try tucking them in as shown in the other photograph.

Nomex boots.

Traditional laces.

The real purpose of this article is to encourage you to spend time thinking about the details of safety with the same or even more urgency than the details of winning trophies. We all know missing details like points in a roll can mean the difference between a trophy and a sigh. The IAC is truly serving its purpose, though, if we all train ourselves and each other not to overlook the details that really matter, those that mean the difference between just another flight and just another statistic. IAC

Winter Acro: Getting Started

BY EMERSON STEWART

Winter is on its way, bringing colder temperatures. With a little patience we can enjoy some of our best flying days as well as increased performance without abusing our aircraft.

In cool weather we need to be careful during start to avoid an induction fire. Overpriming and repeat attempts at starting the engine are usually the causes of this, making engine preheating a necessity.

Lycoming recommends preheating your engine when it is below 30 degrees, although at Stewart's Aircraft Service (SAS), Waynesville, Ohio, we often do not preheat until 20. Remember that you need to warm up the entire engine to avoid excessive wear. You should be able to feel warmth in the aluminum of the crankcase, perhaps even condensation, but be careful not to blister paint or melt wires!

The oil systems of many aerobatic aircraft have many lines and check valves in addition to a lot of oil to warm up. Switching to either a multi-grade or at least lighter weight oil can be beneficial. A frozen check valve would cause loss of oil pressure and excessive oil loss during inverted flight. It is also extremely important that your airplane have a hole in the breather line near the engine. This is to avoid excessive pressure in case it freezes up. At SAS we bring the J-3 Cub breather line inside to melt ice between *every* flight.

If an induction fire should occur, it will start with a hollow pop. If you believe this is happening, keep cranking the engine to pull the fire back into the engine and extinguish the fire. It is a good idea to have someone standing close by with a fire extinguisher in case the battery dies while cranking. At SAS this is a requirement and has saved many airplanes. Dry chemical is corrosive, abrasive, and extremely hard to clean up, but it will save your plane!

Finally, in your winter aerobatics, take your time getting started, be careful, and have fun! IAC

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