

# SPORT **Aerobatics**

SEPTEMBER 2020

OFFICIAL MAGAZINE OF THE INTERNATIONAL AEROBATIC CLUB



- ▶ FLYING WITH LEGENDS – STEVE WOLF
- ▶ GAME ON! HIGH PLANES HOTPOXIA FEST

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▶ TRIMMING FOR AEROBATICS





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### COVER

**ON THE COVER:** U.S. Advanced Glider Team member Mallory Lynch in the front, practicing at Williams Soaring Center in the center's MDM-1 FOX. Passenger was a fellow instructor from Holland who wanted to ride through the sequence.  
 Photo courtesy of Mallory Lynch.

**ABOVE:** Competitors prepare to fly at the 2015 U.S. National Aerobatic Championships.  
 Photo courtesy of IAC Archives.

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# Your Passion and Ideas – Put Them to Work

BY JIM BOURKE, IAC 434151

**AS I TYPE THIS**, I'm a couple of days away from assuming the position of IAC president. My thanks to everyone who participated in the election regardless of who you voted for. Voter turnout was especially high this year, which is fantastic news.

I'm delighted to report that contest activity has started up. I think aerobatics is a great way to pass the time during a pandemic. I can't think of a sport that offers more social isolation than solo aerobatics. So hopefully you are all getting some great practice time in even if there are no contests near you. I bet your rivals are putting the time to good use.

The widespread shutdowns across the nation have of course impacted our operations in a number of ways. The cancellation of our U.S. National Aerobatic Championships is a hard blow to many of us, but absolutely necessary due to the logistical challenges we would have faced. The board met and discussed the pros and cons and decided it simply couldn't happen this year. This decision has some side effects such as the qualifications for the prestigious L. Paul Soucy award, which includes a requirement that one of the scores used for the total be taken from the U.S. Nationals. Another side effect is a hit to our pocketbook. The IAC thankfully has a large reserve due to the careful planning of past administrations, but this year we will be dipping into it at a level we never dreamed. I will be working with the

finance committee to reduce our losses as much as possible in 2020 and to plan for a lean 2021 as well. While the situation around the country may seem pretty dim, frustrating, and overly politicized at times, the future for aerobatics is bright and vibrant. We will get through this and come out the other side with a newfound vigor for our passions. There is always good news to be found if we look for it, so take heart and maintain a balanced media diet.

During my trip to France last year as part of the U.S. Unlimited Aerobatic Team attending the World Aerobatic Championships, I took some time to visit with one of France's flying clubs near Amiens. France's focus on flying clubs is a proven solution to the problems many of us face in the United States as we struggle to independently acquire, insure, and maintain our aircraft. This month Bruce Mamont shares with us Part 2 of his article on flying clubs. Flying clubs and partnerships make so much sense for aerobatic enthusiasts because of the way we use our planes: There aren't going to be any scheduling conflicts to worry about if you and your partners are mostly flying 20 minutes at a time. I think flying clubs will only grow in popularity, so now is a great time to learn all about this exciting option. EAA has a Flying Club Resource Center on its website that will give you all of the details Bruce couldn't fit into the space we gave him.

Another exciting development for the IAC is the new Mastery of Flight Achievement Award. Our Achievement Award co-chairs, Dave Watson and Brittane Lincoln, came

up with a real winner of an idea. They wrote up a proposal, submitted it to the board, and patiently worked out improvements in committee before gaining the board's approval. They've shown everyone that positive change happens when you are willing to roll up your sleeves and dig in! The Mastery of Flight award adds a new award at the highest level of the Achievement Award tier, accessible only to those who have successfully mastered both powered aircraft and gliders. I am a big fan of glider aerobatics having just received my glider rating this spring, and I hope to be one of the first to obtain this new award!

IAC Director Bob Freeman also approached the board with an idea, creating a new award that will sit in the IAC trophy case at our pavilion in Oshkosh. The National Championship Point Series, nicknamed the Leo Award, is a new award named after Leo Loudenslager, with his family's permission, that will encourage our members to travel outside of their region to earn points. This is a great way to reward people for spending the time and money it takes to campaign across the nation with their aircraft. I expect it to become a highly competitive award.

Let me close by saying that the IAC needs you. It needs your passion. It needs your ideas. It needs your vision. It needs your labor. It needs you no matter what your income or skill level. This is an organization built by and for you. The IAC will change and grow with your help. If you have an interest in pitching in to preserve us, change us, or build something new, please reach out to me at [president@iac.org](mailto:president@iac.org). I'd love to hear from you. **IAC!**



► Please send your comments, questions, or suggestions to [president@iac.org](mailto:president@iac.org).



# Go Outside and Fly!

BY LORRIE PENNER, IAC 431036

**BEING OUTSIDE IS GOOD** for us and one of the safest places to be right now. With airports operating regularly, by which I mean with all the COVID-19 safeguards in place, being outside and in the fresh air can help us relax and feel less stressed. Even more importantly endorphins can be triggered by loops, rolls, spins, and laughter. Yes, laughter. I don't know about you, but the pure joy of aerobatics can still make me laugh, giggle, whoop, and snort.

Someone asked me recently how having an aerobatic contest could really be any fun without the camaraderie we have all become accustomed to. With only one contest under our collective IAC belts at the time of this writing, which I did not attend, I could only give my glider club as an example. We have been flying through June and July with masks, plenty of hand sanitizers, and physical distancing. Although no hugs are allowed, we've gotten pretty good at elbow bumps and talking a little louder so we can hear each other six feet away. There is still joy and sometimes hilarity; the face masks have ranged from all sorts of animal faces to strange dental features (think missing teeth). So, yes, we can still have fun.

In this month's issue Doug Jenkins gives us a write-up from the first IAC sanctioned contest of the season, the High Planes Hotpoxia Fest contest. In spite of all that is going on in the world, Doug said, "Was it fun? You bet it was!" If your chapter is thinking of holding a contest and it can be done within practical and safe guidelines, to quote Doug, "Game on!"

Elsewhere in this issue, Gordon Penner takes a look at setting trim for aerobatic flight. If you follow the ACRO Exploder, you will often see conversations about all sorts of aerobatic subjects. In April someone innocently asked, "Is there a consensus on where to set the elevator trim for a monoplane flying Intermediate and up?" As you can imagine a rousing discussion ensued. I asked Gordon to review the thread and apply some of his personal experience to the question. The resulting article is very thorough, and he quoted from a number of sources including books by David Robson, *Skydancing: Aerobatic Flight Techniques*; Neil Williams, *Aerobatics*; Alan Cassidy, *Better Aerobatics*; and Eric Müller and Annette Carson, *Flight Unlimited 95*.

In the Safety Series Keith Doyne, our IAC safety director, delves into Lycoming service bulletins. In past issues of *Sport Aerobatics* this had been a regular column and much appreciated by aircraft owners. On this occasion, Lycoming Service Instruction No. 1009 BE issued April 24, 2020, *Time Between Overhaul (TBO) Schedules*, and the May 25, 2017, Lycoming Service Bulletin No. 480 F, *Oil Servicing, Metallic Solids Identification After Oil Servicing and Associated Corrective Action*, are the two subjects covered. Keith will be reviewing these service bulletins/instructions quarterly so you will see them once again on a regular basis. Thank you, Keith! **IAC+**

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# THE TALE OF TWO LLCs, PART 2

**Financial commitments and insurance**  
BY BRUCE MAMONT, IAC 432407



# H

aving formed the LLC, we made an appointment to open an LLC bank account and learned that we needed an employee identification number (EIN) from the IRS (even though we wouldn't have employees). The sequence should have been: Form the

LLC (in our state, an easy and quick online process), get the EIN (also online, and for the IRS, blisteringly fast), and then open a checking account.

We also got an LLC credit card, which was essential when our engine ate a piece of the alternate air intake valve, suffering cylinder damage. We had to make a 50 percent deposit for the engine inspection and repair. While we had the cash (and insurance ultimately covered the engine damage repair), having the credit card with a high enough limit accelerated the process.

We ultimately added members to the bank account to provide redundancy. The bank we chose waived monthly fees because I'm a veteran; the money we saved pays for our chute repack/inspections. Account features (like Chase QuickPay with Zelle) make automatic payments of hangar rent and other expenses easy. Members also make online deposits. Using the business credit card was a good deal (especially when replacing four engine cylinders); the card has a cash-back benefit and no fees. However, one of the members (me, initially) had to apply for the card and be vulnerable to any credit-rating issues that might arise.



Prospective share buyer in N148PC Jessie Paradise.

We had four members with the cash and commitment, had formed the LLC, and set up our bank accounts. We started shopping for a Super Decathlon. The story of our shopping effort probably isn't too different from most airplane shopping experiences. We looked online, posted to the ACRO Exploder (aka [aerobatics@googlegroups.com](mailto:aerobatics@googlegroups.com)), and generally beat the bushes. I had continued to accost pilots of aerobatic airplanes who pulled up to the self-service pump immediately adjacent to the flight school at which I instruct. My question changed from "Are you looking for a partner?" to "Are you interested in selling your airplane?" One of the refueling pilots put us into contact with two Super D owners at our field who hadn't yet started advertising but might be open to an offer.

As we started looking for an airplane, we started shopping for insurance. Teri Branstitre, IAC Chapter 77 president, was an ideal choice for our insurance broker. She immediately educated us on what it would take to insure a group like ours, including two pilots who didn't have a tailwheel endorsement, let alone aerobatic training. The great job that Teri did for us in finding insurers was made clear when we filed claims for our engine repair. We enjoyed great service throughout the process (contrary to the horror stories we sometimes hear).

We looked at both Super Decathlons at our home field and bought one. On October 10, 2017, escrow on the purchase closed. I drove to the seller's hangar on our home field and taxied our "new" 2005 Super Decathlon to its new nest. I was the only pilot of the four LLC members who satisfied the make and model experience required by our insurance policy. I was able to help the other members satisfy the requirements fairly quickly. One member had a tailwheel endorsement; he only needed make/model experience (8KCAB) dual. Another member earned his endorsement flying an Aeronca Champ at a local school and then flew with the other flight instructor. The fourth member had some Super Decathlon time, but earned his endorsement in a Cessna 170 available for flight instruction at our home field. He and I then flew together until he satisfied the dual make/model requirement.



N26BY Super Decathlon is owned by SnohoAcro LLC, a two-member group.



Trips to practice camps and contests are blocked out in advance on the schedule. Otherwise the LLC group members fly on a first-come, first-reserved approach.

We knew there would be additional costs to purchase an airplane, beyond our shares of the purchase price we negotiated with a seller. We didn't know exactly what they would be and applied the idea of "assessing" ourselves to pay for the additional costs. Members of homeowners associations are familiar with assessment; for example, the condo complex needs new roofs, so the members are assessed to pay for the cost that isn't covered by their association dues. Our assessments covered the prepurchase inspection, escrow and title fees, state use tax, and the first quarter insurance premium. We financed the first year's premium, which we paid off over the next three quarters.

We pay LLC operating expenses from two contribution buckets, one for fixed costs and one for costs that are a function of flying time. We each pay a monthly charge for hangar rent and to save for budgeted expenses that included ADS-B Out installation, the next annual inspection, next year's insurance premium (based on our first year's insurance premium), quarterly payments for the first-year insurance premium, and a miscellaneous reserve for small expenses and fees. These miscellaneous fund dollars pay for chute repack/inspections (the airplane came with two chutes with aerobatic harnesses), an annual state airplane registration fee (tax), and other costs.

Members pay an hourly charge, based on hours flown in a previous month, to a couple of reserve funds. The overhaul reserve collects enough to pay for propeller and engine overhauls. Oil changes (that we perform), tailwheel replacements, and other small costs that result from flying the airplane are paid from the consumables reserve. Our hour rate of \$50/tach hour allocates \$38 to the overhaul reserve. When we bought the airplane, it had about 590 (tach) hours since new; we've assumed 1,000 hours of operation, during which we'll save enough for our overhauls.

We tried to strike a compromise in determining the charge amounts. We wanted enough in reserve funds to pay budgeted expenses, but not so much that a member might feel abused if he decided to sell his share and leave the group. We also rejected a model where members would agree to pay big costs when incurred, for example, for an annual instead of saving up for it. We based our decision on affordability and risk; rather than save too much, we saved what we could afford. If the LLC incurred an unbudgeted expense, we'd assess ourselves a contribution to cover the cost. We were worried about insurance premium increases, for example. Should we assume a 15 percent premium increase and save accordingly, or save based on our first-year premium, assuming the risk that we'd have to dig into our wallets if that premium increase arrived? We decided to assume risk. This paid off in year two; our premium was \$1,000 less than the first year. However, occasionally we have an unbudgeted expense for which we each pay an equal share or one that we prorate based on how much each of us has flown the airplane.



The various reserve funds described above were not saved to individual bank accounts. LLC accounting can be a challenge if you're not a bookkeeper (I'm not). I learned (some) double-entry journal bookkeeping, establishing a chart of accounts. The journal enables tracking amounts allocated to the reserve funds in accounts. Monthly and flying charges are allocated to the reserve fund accounts. Expense payments are charged in an Excel spreadsheet to each fund account. Tracking reserve fund account balances and individual member balances is more complicated than keeping a check register. One of the other members in the first LLC helped set up the ledger/journal, providing examples of generating pivot tables to show how much money is available at any point in time in each of the reserve fund accounts. I used a free trial of nonprofit accounting software, but discovered it was overkill for an LLC of our size. At some point, it might still be a good idea to bring "the books" to an accountant to make sure that I'm not fooling us all.

We had been a little worried about how many people we should include in the group. We needed at least four, because the FAA restricts our Designated Australian from owning more than 25 percent of the airplane. Another fun fact: Insurance rates become much more expensive for more than five members. The members of groups with more than five members literally don't have as much of a stake in airplane operation and maintenance as a group with five or fewer members. Some members worried that a bigger group would limit airplane availability. So far, the airplane isn't much used for cross-country trips (except to camps and contests). Camp and contest participation are blocked in advance. Otherwise, our operating agreement allocates scheduling priority, but a first-come, first-reserved approach has usually worked.



N26BY waiting in Florida for the ferry flight to its new home at Paine Field, north of Seattle.

The month after we started operating in the fall of 2017, we were approached by a pilot who is an IAC member in our chapter but didn't have an airplane. He bought a 20 percent share in the airplane for cash. The original four members were reimbursed accordingly.

The scarcity of aerobatic airplanes for rent correlates with scarcity of instructors and maintainers. The LLC solved the problem of airplane availability, but getting instruction remains a challenge. Even though we operate a certified airplane, finding experienced Super Decathlon or fabric airplane maintainers can be an expensive challenge. While not specific to an aerobatic LLC, the situation that drives an aerobatic LLC solution will also have these problems. We're very fortunate to be a short drive from Para-Phernalia Inc., who maintains our chutes.

In Part 3, I wrap it up, including how I ended up owing 20 percent of a Decathlon and 50 percent of another. *IAC*

**BRUCE MAMONT** is a retired U.S. Army infantry officer and retired Boeing software development manager. He worked part-time at Sunrise Aviation and has been a full-time instructor at Regal Air since 2015. His total time is over 2,800 hours. Bruce is a proud member of IAC Chapter 67 in the Pacific Northwest. He has been flying Super and standard Decathlons for aerobatics.

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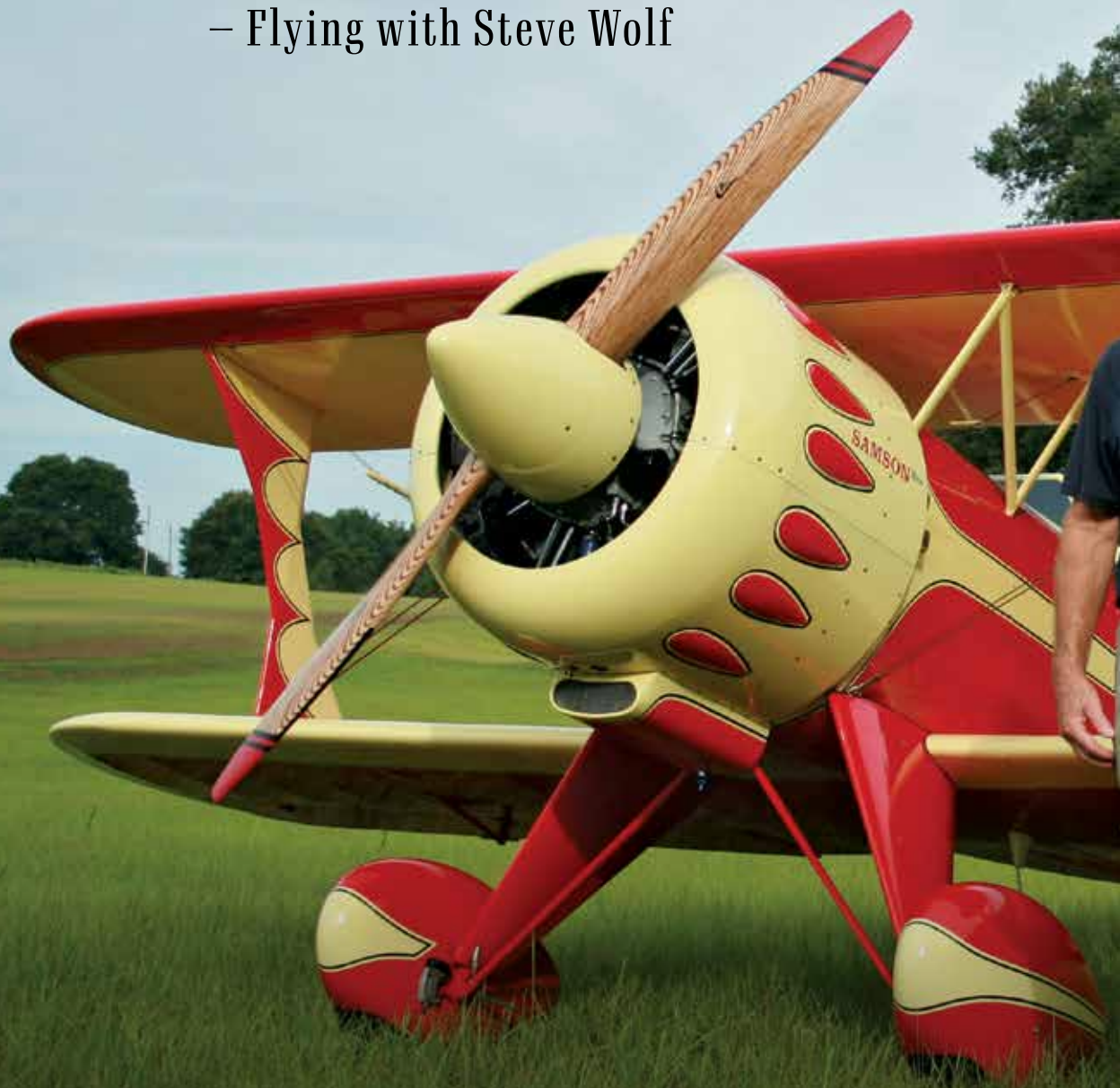
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# AVIATION HOT ROD DEPARTMENT

– Flying with Steve Wolf





# H

ow would I ever know that this adventure in aviation would create a sequence of events that led me to have the privilege of flying with legendary pilots?

My first flight was with a very accomplished pilot, James (Ted) Sorensen, who now flies commercial with an airline in Canada. His real love is aerobatics, and he competes in his Christen Eagle. Although Ted and I never suspected it, our flights together started the slow burn of my love of aviation and aerobatics.

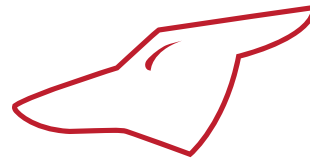
Since my flight experience with Ted, 30 years have passed, and I had the opportunity to fly with three legendary pilot instructors back to back. I did not do a search or have any knowledge that this would happen. Each time it happened, I felt as if some unknown guide took me by the hand, asked me to ask, and ... the opportunities were handed to me.

Over a period of three years since I took my first Pitts S-2A ride, time has passed at lightning speed. I now own my own Hatz biplane and two Pitts Specials, an S-1C and an S-1S. Boy, am I enjoying the journey! Every morning and every evening, and a few times in between, I give thanks that I have been so fortunate and I am truly grateful.

## Flying with legends

BY ANDREA MCGILVRAY,  
IAC 440477

Steve built the Samson Mite in 2018.



# AVIATION HOT ROD DEPARTMENT

My first “legends” opportunity was an unexpected scholarship presented by Figure 1 Foundation to learn to fly aerobatics with Patty Wagstaff. Sometime later, I got the privilege to fly with Budd Davisson and then Steve Wolf. I did not know anything about Steve. I knew the name “Wolf” since a friend of mine had “Wolf Wings,” but that was it. I am embarrassed to not have known more about him. I had not done any reading or research prior to calling him.

Matt, the previous owner of my Pitts, told me about Steve Wolf, so I asked if he was accepting new students. Steve is now retired, so why I got this privilege to fly with him is still unknown. Matt gave me Steve’s phone number, and I called right then and there. When I called and asked if he had time to fly “today,” preferably in a few hours or as soon as I could get to him, he said yes and I was shocked he had the time.

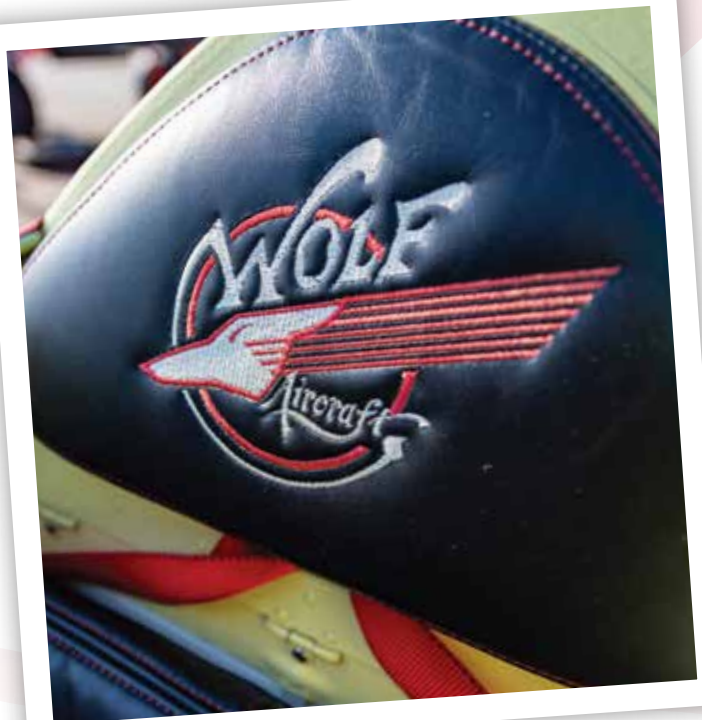
At the time, I was looking at my little S-1C prior to purchase. I canceled my flight from Tampa to go back home and rent a car, but they only had an 18-passenger bus, which I ended up driving to Steve’s location two hours north. Steve asked if I was too tired to fly, and I replied, “Absolutely not.” I said if he was good to go, I would be, too. He recognized my enthusiasm to get going on my Pitts training experience. He later said that my enthusiasm reminded me of his wife Kathy’s enthusiasm for aviation.

We flew Steve’s Pitts Special S-2B in maneuvers I already knew about, and ones I couldn’t even imagine, in all possible attitudes and then recovered from them. I giggled and screamed with joy. This was too good to be true. And since I never woke up, either I was still dreaming or it was for real. To be 100 percent honest, I was never scared; I was having so much fun that fear could not enter in.

Performing recoveries from unusual attitudes was important to me. During our training I would close my eyes and ask Steve to put the airplane into unexpected attitudes — upside down, inverted spins, and anything else he could think of. While he got the plane into those unusual attitudes, I had my hands off the controls until I heard him say, “Okay, it is yours.” I did all of the recoveries under his direction, and I felt so enlightened and much more confident, as if I had done this before. He would talk me through all the maneuvers in a very calm voice. He had an instruction style that was easy to follow.

We did upright spins, inverted spinning, aggravated ones, with power and forward stick. Some of these maneuvers made me a bit dizzy, especially the aggravated spins. We went around at least five to 10 times. I am not certain how many times I performed those recoveries because I was not counting. We also flew upside down — hammer-heads, snap-rolls, and more.

We played “lawn darts,” a completely a new concept for me. The idea was to get the airplane into any kind of upright or inverted attitude, stall it, let go of the stick, and all I had to do was reverse the ensuing spin and recover before the airplane became a lawn dart. I had read an excellent book talking about spin recoveries: *Spins in the Pitts Special* by Gene Beggs.



Embroidered Wolf Aircraft logo.

In three hours of flight with Steve, I did 28 unassisted takeoffs and landings. Each one took two and a half to three minutes for each pattern or circuit. We did one go-around. Three of my landings were back at Steve's own field, which was a 50-foot downhill slope with houses and trees at both ends of the runway. Yikes. I was never comfortable, but Steve was there and it calmed me.

The ability of a Pitts Special S-2B was unbelievable — so much power compared to my Hatz biplane. When you put the throttle forward on the takeoff, the only thing you have to deal with is the *yeehaw* feeling and right rudder. Pull the nose up to severe attitude, which felt like a 45-degree line, then pull into a turn and try to stop smiling, which was the hardest thing for me to do. Once you are clear of the runway, up, and away, get to altitude, 1,100 feet preferred. Set up for the landing and pull power off at the numbers as it snorts and rumbles, get it to 100 mph, left rudder. Don't forget that left rudder! The amount of left rudder will be more impressive than you expect. Or you will be slipping and descend faster than expected. Normal rate of descent is 2,000 fpm, and 5,000 fpm if you slip.

Round-out is about 15 feet and that feels high, but the aircraft does not float and it is easier to break the arrival a few extra feet with a bit extra speed, so that helps to quench the ground rush. Add power if needed; trust me, it sinks like a rock.

Then keep a close eye on where you are in relation to the edge of the runway. Once you touch down, and below flying speed (it all happens in a few seconds), full stick back, keep it straight with your rudders, tail is down, pump the brakes like a mouse, gently, and when slowed down, repeat. This airplane will make a believer out of you, that some angels do have fabric wings.

So now you are not as uneducated as I was. But trust me, if you have an opportunity to fly in an S-2A, -B, or -C models, *take it*. It will change your life! The best advice that Steve gave me was to always do three takeoffs and landings every time I go out to fly. I have done this ever since our lesson. Also, the bit about pumping the brakes like they are a little mouse was great advice. You don't want to stomp on those brakes.

After I came home, I did some reading and searching about Steve Wolf. He is famous in many ways. He has been building airplanes his whole life. He says he has built between 20 and 25 airplanes. A few famous ones: He built the replica Gee Bee (<https://youtu.be/4f9UOgFmZIo>), first one flying since 1932! And he built The Samson (<https://youtu.be/StTd3MwGnuc>), among others. But besides an airplane builder, he is an amazing pilot and teacher.

Because he misses his full-scale Samson, which he sold to Bobby Younkin, he built himself a Samson Mite in 2018. The one-of-a-kind aircraft is a 3/4-scale aircraft of the original Samson built by Curtis Pitts in 1948 (<https://youtu.be/j9fUoxLREy0>).



Andrea McGilvray with Steve Wolf — all smiles after training.

They say you should live in the now, and that is what I am doing. Results from my research and training are progressing quicker than I could have anticipated. The rate that things are falling into place, I would expect to have my flight school open in a couple years or less. There are amazing people in my life who are making the difference. I feel like I'm on a magic carpet ride. **IAC+**



The interior of the Samson Mite.

# Game ON!

## High Planes Hotpoxia Fest

BY DOUG JENKINS, IAC 436255

**WELL, WE DID IT.** We held the first aerobatic contest in 2020. Why is this remarkable? Because, like anything else, aerobatic contests don't exist in a bubble, and given the totality of circumstances, we need to be mindful of balancing the risks and rewards of participating in our favorite sport. It seems that we may have successfully done that in Fort Morgan, Colorado, with the first aerobatic contest of this year: High Plains Hotpoxia Fest (which truly lived up to its name).

So, how did this happen? As usual, hard work by a lot of folks made the contest possible, but that was even more obvious this year given the uncertain and ever-changing environment and the world around us. Contest Director Duncan Koerbel and IAC Chapter 12 leadership weighed all the factors and decided that it would be safe to have their contest if plenty of safety protocols were put in place and followed. Here are the precautions they came up with:

Airplanes on the ramp – all anxious to get the first contest of the season going.





- 1.** Briefings held in a large hangar with fans and open doors to provide ventilation and allow plenty of space for physical distancing.
- 2.** Providing masks so everyone had one.
- 3.** Rotating the box 90 degrees so judges line personnel could walk to their positions instead of crowding into a van and driving out.
- 4.** Using the IAC website to post scores to eliminate crowding around paper.
- 5.** Using email to distribute orders of flight to eliminate crowding around paper.
- 6.** No formal group dinner or awards banquet.
- 7.** Participants were welcome to travel home each night and be back for the briefings to ease concern about staying in a hotel and transiting to and from the hotel.
- 8.** On the judges line, accommodating requests to wear a mask. It meant that if your judge, recorder, or assistant would like you to wear a mask, then this request was honored.
- 9.** Hand sanitizer at the hangar, judges line, starters tent, and FBO.
- 10.** Disposable gloves available.
- 11.** Temperature checks prior to each morning briefing.
- 12.** Reminding everyone to please stay home if you don't feel well.

So, then the question became, if you offer it, will they show up? In this case, the answer was yes, they will. Nineteen pilots, three nonflying judges, and the usual crew of other indispensable volunteers decided to take the plunge and participate in an aerobic contest, believing it could be done safely given the countermeasures listed above.

I am certainly not speaking for everyone who showed up, but I know that I personally wrestled with whether or not to participate. I did not want to be “that guy” who went out in the midst of a global pandemic to partake of some totally unnecessary activity and then made the situation worse. On the other hand, if I could safely attend, I really wanted to fly. What to do? I did research. And what I finally decided was that given the circumstances — outdoor event, no large crowd assembled, physical distancing very practical, etc. — it seemed safe. I talked with my wife and she agreed, so off I went. I am glad I did.

On to the details of the event. First, remember above when I mentioned that the contest lived up to its name? There is good reason for that. Practice day was Friday, July 17. The high temperature in Fort Morgan that day was an even 100 degrees. And don't forget the field elevation is 4,595 feet! On contest day one, Saturday, the 18th, it cooled off to 99 degrees. We really caught a break on Sunday when it topped out at 93! These were challenging density altitudes to fly aerobatics, to say the least.





Competitors and volunteers group shot – the only time all weekend we were less than 6 feet apart.

The heat was not the only challenge out there; on Saturday, some rogue thunderstorms cooked up nearby and kicked off wicked crosswinds with three pilots in the air. In a display of what the aviation industry calls crew resource management, all three pilots got themselves and their airplanes back on the ground safely. The chief judge, contest director, and some other experienced pilots assessed each pilot's fuel state and comfort level. They then recommended a game plan. After attempting to land on the paved runway and wisely electing to go around, a Decathlon pilot landed on a grass crop duster runway more closely aligned with the wind. A Pitts driver made the same call. A home-based GameBird pilot finally landed on the paved runway after the winds subsided somewhat. It was good work by all involved, given the circumstances, and a phenomenal example of teamwork under pressure.

The folks at IAC 12 could not have handled the contest better. From being clear upfront about what the requirements to participate were, to putting common-sense safety protocols in place, to getting information out to participants, to conducting the event wisely, they were top-notch. Additionally, host FBO Scott Aviation went above and beyond. It had three crew cars available (thanks!), more hangar space than we could possibly need, and cheap fuel. Well done by all!

Finally, on to the actual flying. Due to the wind delays on Saturday, the contest was complete after two flights for each category.

Primary and Sportsman saw the Metropolitan State University – Denver team provide the lion's share of the pilots. It is great to be around these young men and women; it gives you hope for the future of the sport.

## PRIMARY RESULTS

**FIRST PLACE:** Josh Gregg flying a Super Decathlon ... 79.60% (Grass Roots Medal)

**SECOND PLACE:** Ryan Tierney flying an Xtreme Decathlon ... 79.38%

**THIRD PLACE:** Colin Armistead flying an Xtreme Decathlon ... 78.17%

**FOURTH PLACE:** Aaron Nahale flying an Extra 330LX ... 76.73%

**FIFTH PLACE:** Daniel Wilmoth flying an Xtreme Decathlon ... 74.38%

## SPORTSMAN RESULTS

**FIRST PLACE:** Kyle Scott flying a GB1 ... 84.85% (First-Time Sportsman)

**SECOND PLACE:** Landon Dietrich flying an Xtreme Decathlon ... 82.69%

**THIRD PLACE:** Roger Belleau flying an Xtreme Decathlon ... 82.19%

**FOURTH PLACE:** Greg Allyn flying a Firebolt ... 77.41%

**FIFTH PLACE:** Charlie Riesselmann flying a Starduster SA-100 ... 72.93%

**SIXTH PLACE:** Wayne Forbes flying a Super Decathlon ... 72.91%





## INTERMEDIATE RESULTS (AKA "THE HZ GANG")

FIRST PLACE: Jared Hulse flying an Extra 330LX ... 79.05%

SECOND PLACE: Doug Jenkins flying a Pitts S-1E ... 78.33%

THIRD PLACE: Nick Slabakov flying an Extra 330LX ... 74.64%

FOURTH PLACE: Jamie Treat flying a Treat Super Solution SS-300 ... 42.85%

FIFTH PLACE: James Grenfell flying a Pitts S-1S ... 41.60%

It seemed like the hypoxia was real for this group as the HZs (hard zeros) were flying fast and furious!

## ADVANCED RESULTS

FIRST PLACE: Mike Forney flying a Pitts S-1T ... 75.95%

SECOND PLACE: Duncan Koerbel flying an Extra 300L ... 71.63%

THIRD PLACE: Jim Murray flying a Pitts S-1SE ... 63.09%



Competitors on the ramp try to stay cool in the 93- to 100-degree temperatures.

And there you have it. The first contest of 2020 somehow happened in spite of all that is going on in the world. Was it fun? You bet it was! Would I do it again? Also, yes.

To those of you thinking about hosting or attending a contest this year – it can be done. Just make sure you think through all of the issues and adhere to any national/state/local guidance. There is also no shame in calling a time-out and leaving it to next year if your personal comfort level is not met. Every situation/life is different.

Be safe, and for the love of food, fly your wedge before your quarter clover. That's a bit of an inside joke, on me. See you out there! **IAC+**



Precautionary items in line with COVID-19 local guidelines.

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# Aerobatic Aircraft Design

IAC 50th anniversary spotlight

BY LORRIE PENNER, IAC 431036

**DURING THE 1980S**, a new column titled “Aerobatic Aircraft Design” emerged in *Sport Aerobatics*. The first article was written by Jim Young, president, and Dan Rihn, chief engineer of Worldclass Aerobatics Inc. Their article was specifically about aircraft CG and mean aerodynamic chord. Dan Rihn, IAC 3836, was honored in 2018 with the Curtis Pitts Memorial Trophy for his design and work on the DR-107 One Design aerobatic monoplane.

While Dan’s design was quite popular with over 600 sets of plans sold since 1995, there have been many other aircraft designs or modifications to grace the pages of *Sport Aerobatics* over the years, but they did not fare as well or were only intended to be one of a kind. In this article, we look at a few of those.



Buck Goodman and the Davis-Dutton Special.



Phil Kraft’s aerobatic monoplane, the Super Fli.

On the back cover of the July 1973 issue of *Sport Aerobatics* appeared a photo of W.L. “Buck” Goodman shown kneeling next to his 150-hp Davis-Dutton Special. The airplane started out life as a J-3, but it neither looked like nor flew like one. Buck competed in his first contest in 1972 and intended to become a regular competitor. He accomplished a number of Achievement Awards in the plane, including Primary, Sportsman, and Intermediate Smooth as well as Sportsman Stars.

Specs were not found on this aircraft; however, based on the 150-hp engine performance, it may have been similar to an early Citabria model with a 150-hp engine. But the overall feel would be nimbler and lighter with a lower gross weight.

Basic 1975 Bellanca 7GCAA Citabria “A” package specs include an empty weight of 1,110 pounds, gross weight of 1,650 pounds with a Lycoming 150-hp engine, cruise speed of 126 mph, stall speed of 51 mph, rate of climb of 1,120 fpm, and a rating for +5/-2g.

In the early 1970s, world-champion model builder and radio-controlled system manufacturer Phil Kraft used his know-how to design and construct Super Fli. The low-wing cantilever monoplane was featured on the cover of the 1975 June issue of *Sport Aerobatics*. The wings had a wooden structure, skinned in plywood, while the fuselage and empennage were built from steel tube, the fuselage skinned in aluminum and the tail in fabric. The design reflected guidelines normally applied to model aircraft, particularly in its wing design, areas, and moments.

N5PK was flown at Fond du Lac, Wisconsin, by Randall Wilson out of San Diego in 1976. Randy finished sixth out of 10 competitors in the Unlimited category. The plane was flown for over 13 years in air shows from Oshkosh to Reno, and even at the Mojave Air Races.

The Super Fli was powered by a 200-hp Lycoming AEIO-360. Empty weight was 1,060 pounds and max gross weight 1,450 pounds. Other performance numbers include a cruise speed of 135 mph, stall speed of 48 mph, climb rate of 1,800 fpm, ceiling of 12,000 feet, takeoff run of 800 feet, and landing roll of 1,000 feet.

Canadian aerobatic champion and airline pilot Gordon Price entered into the aircraft design world with his "Ultimate Aircraft." Gordon decided to take up the challenge of increasing performance of the biplane while at the same time making it more affordable. The prototype Ten-Dash Two Hundred Ultimate aircraft made its debut at EAA AirVenture Oshkosh in 1986.

Gordon founded Ultimate Aircraft Corp. where he and his team designed and built the Ultimate 10-100, 10-200, and 10-300 series of aircraft featuring a swept lower wing, an integrated control system, and some other aerodynamic improvements over the Pitts.

Specifications for the Ten-Dash Two Hundred include a 200-hp Lycoming IO-360 powerplant, constant-speed Hoffman or MT composite propeller, empty weight of 925 pounds, cruise speed of 170 mph, stall speed of 60 mph, and rate climb of 2,000 fpm.

BELOW: Gordon Price's Ultimate Aircraft.

# ULTIMATE

## Super Acro Zenith

### ... a builder's point of view ...

**EDITORS NOTE:** Jay Hunt of Aerovolt Aircraft in Canada writes that he has received correspondence from the first builder to complete a Super Acro Zenith from a kit and this aerobatic monoplane in the correct and forthright and objective manner. Maier hopes to compete in the Advanced category throughout this season in both Canada and the U.S. According to Hunt, three Super Acro Zenith kits are nearing completion — or in progress, may be completed. They are in the country of France, the Canadian province of British Columbia and the state of Alaska. The following is in the words of Maier himself.

By Kim A. Maier  
IAC #8547  
15 Castlefall Grove NE  
Calgary, Alberta  
CANADA T2J 1L1

I have just recently (August 1984) become the first assembler to complete the Super Acro Zenith kit. I wish to give my honest and unbiased opinion of the aircraft's merits both as a homebuilt and as an aerobatic performer.

Firstly, the finished product:

- 1) Basic weight - 905 lbs. with oil - approximately 70 on tailwheel.
- 2) Aerobatic weight - add 200 for pilot and chute and 60 fuel - total at 1160 lbs., 200 HP.
- 3) Cost to complete (Canadian): \$18,000 for kit  
\$8,000 for lowtime uncertified IO-360 A1B  
\$900 for instruments  
\$800 for radio  
\$2,000 for metal fixed pitch prop  
\$2,000 for painting  
\$800 for miscellaneous hardware and equipment mostly firewall forward

(K2,200 Total  
For new kits add cost of basic Christen system.)

Construction time - 900 hours which included 1/2 week not presently in the manual. Time saved 5.5 months from start to first flight.

It's been said that Curtis Pitts' pioneer efforts in designing, developing and marketing the strong, agile biplane that bears his name did wonders for our sport. Pitts' aircraft in all their derivatives helped sport aerobatics mushroom throughout our nation.

Then escalating costs and high performance monoplanes began to push ever increasingly onto the scene. Many talk about the era of the biplane being over at the world competition level. Herdes and higher priced threat of higher and higher priced machines taking their toll, making it more difficult and maybe even near impossible for competitors to enter and/or remain in the sport.

Enter a new pioneer — Gordon Price, a Canadian aerobatic champion and airline pilot and now president of Ultimate Aircraft. Price decided to take up the challenge of increasing the performance of the biplane while

Mix & matchable combos of power & design make for more affordable acro fun & competitiveness

at the same time making it more affordable. He cataloged excuses people had for avoiding aerobatics and his aircraft and then he set out to erase them one by one.

According to his firm's advertising brochure, he had always felt: "One of the supreme challenges in recreational or competition flying is maximizing the performance of your airplane. One of the greatest pleasures

is building your own plane." What eventually evolved from these beliefs is a line of aircraft kits and accessories to meet these demands while increasing flying pleasure.

Years ago he explains he started looking for ways to increase the performance of his own Pitts Special. The deduced larger engines were not the answer and instead "went back to something he's learned in the design of a new wing." Named the Ultimate Wing, it first emerged in the competitive acro scene in the early eighties. He believed he really had something here — roll rates of 360 degrees per second and the climb capabilities of five vertical rolls and takeoff.

He and his wife, Sandy, marketed the wing and other aerobatic accessories through a company they formed in 1981 called Ultimate Aerobatics. As he began to tackle the design of an

Secondly, the construction manual and kit: The kit was very satisfactory. I received all materials required either initially or by prepaid freight if missing. The manual as I received it was poor. I was a first-time builder and as such had no knowledge of high strength aluminum alloys and other materials required for aircraft construction. In fact, I had never done any work on any experienced builder especially one with metal aircraft construction experience. The details were not specific enough in most areas and errors in dimensions as well as inconsistency between details were common. I found dealing with two companies at times frustrating.

I believe the problems with the kits stem from two areas. (1) Chris Heinz (Zenair Ltd.), supplier of the kit, (Aerovolt Aircraft), distributor of the kit, did not do much of the construction on his prototype and could not relate a sense of urgency to market the airplane. As well as there manual and a copy has been sent to me. I have reviewed the construction manual to his prototype and could not relate further advance it by including all the details, proper sequence for construction and all information that I have learned from experience to aid other builders.

I believe that now the airplane is finally worthy as a low cost aerobatic contender. With combined effort the kit in 1985, it will be able to live up to all expectations by February and enough information will be available so that an experienced builder can start and quickly complete an aircraft that is strong, safe and reliable for years.

Thirdly, the performance of the airplane: I feel unqualified to compare it to other aerobatic airplanes as I have very little experience except 100 hours in a Deception. I know from the 25 hours I have expected. I have talked to many people, who have seen the prototype compete, and feelings are that it is superior to any stock Pitts. My experience confirms this to me. I will be competing with it next year (1985) and have great expectations.

Feel free to call me regarding the airplane at 403-269-4150.

SPORT AEROBATICS '84

ABOVE: The Super Acro Zenith.



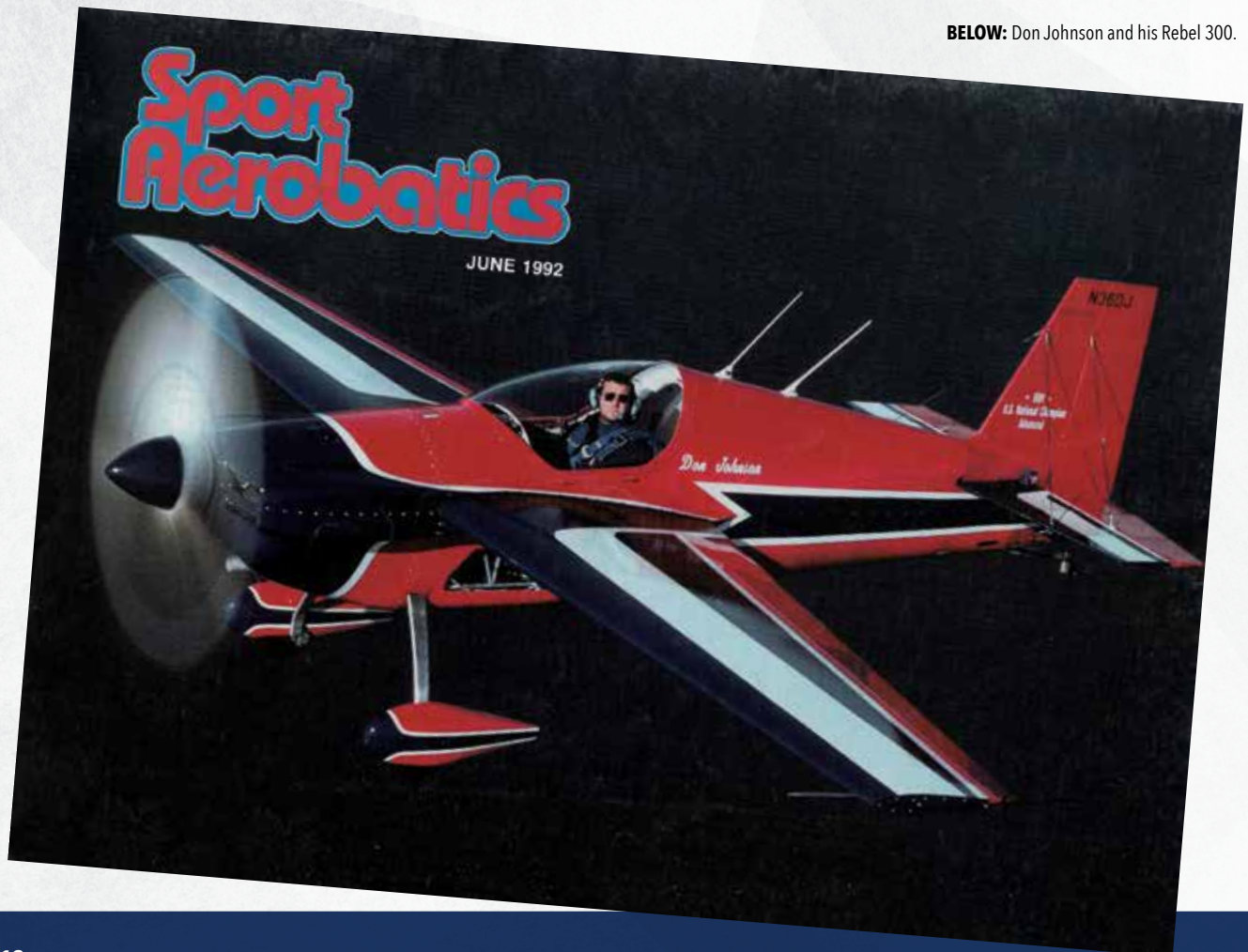
**ABOVE:** *Atlantis II*, built by Bill Shain.

Super Acro-Z was a kit produced by Zenair in Canada, also known as Zenith in the United States. Kim Maier, IAC 8547, of Calgary, Canada, was the first builder to complete the Super Acro-Z kit plane in August of 1984. In an article, Kim stated, “The kit was very satisfactory. I received all materials required either initially or by prepaid freight if missing.” Construction time was 900 hours, which included detail work not in the manual at that time.

The plane was advertised in the magazine monthly as a “Limited Custom Production Built Aircraft complete from the Zenair factory for \$60,000 USD.” Kim said the kit itself cost \$18,000. When engine, instruments, radio, prop, painting, and miscellaneous hardware were added, the total cost was \$32,300.

The performance numbers listed in the ad were a roll rate of 270 degrees/second, climb rate of 3,000 fpm, and a rating to +/-12g. The aircraft was powered by a 200-hp engine and a constant-rate propeller.

**BELOW:** Don Johnson and his Rebel 300.





The paint job on Bill Shain's *Atlantis II* was inspired by Patty Wagstaff's scheme on her Extra 300S.

The Atlantis is a two-seat, side-by-side, low-wing aircraft with a conventional landing gear. In the March 2004 issue of *Sport Aerobatics*, Bill Shain described his experience with the Atlantis kit he purchased in 1998. He spent an excess of 2,500 hours over the course of five years and seven months building his Atlantis II. Bill was honored with a Bronze Lindy in 2003 at EAA AirVenture Oshkosh for his high-quality craftsmanship in the construction of the aircraft.

Bill's Atlantis II is powered by a 200-hp Lycoming AEIO-360 with a 74-inch Hoffman constant-speed propeller, and he reports that it has a cruise speed of 187 mph. Empty weight is 1,160 pounds, and max gross weight is 2,050 pounds. The plane is rated for +/-10g.

Specs for Atlantis include an empty weight of 1,100 pounds, gross weight of 1,900 pounds, 200-hp Lycoming IO-360 powerplant with a two-bladed MT constant-speed propeller, cruise speed of 178 mph, stall speed of 50 mph, and roll rate of 200 degrees/second. **IAC**

In this cover shot from the *Sport Aerobatics* June 1992 issue, Don Johnson of St. Charles, Missouri, in his Rebel 300, took home first place in the Advanced category at the 1991 U.S. National Aerobatic Championships in Denison, Texas.

In a U.S. Nationals article, Mike Heuer wrote, "The biggest surprise was the Advanced category, which had 29 entries and turned out to be the largest category at Nationals. Don Johnson, a 27-year-old professional pilot, was the winner in a beautiful Rebel monoplane, N36DJ. Also powered by a 300-hp Lycoming, Don built the aircraft himself. His first and only previous Nationals was in 1988 in Sportsman."

Unable to locate specs for N36DJ, Don found that the specs for Paul Bennet's Rebel 300 were readily available. Paul's plane was modified with a 400-hp Lycoming IO-540, so some of these specs will be greater than what Don's 300-hp-driven Rebel 300 experienced. It has an empty weight of 1,146 pounds, rate of climb of 3,000 fpm, roll rate of 360 degrees/second, and a rating for +/-10g.



Gordon Price flew his own Ultimate in the 1983 Oshkosh Air Show.



# Aerobatic Trim

BY GORDON PENNER, IAC 429704, THREE-TIME MASTER CFI-AEROBATIC, FAA GOLD SEAL CFI



**THERE IS A LOT OF DISCUSSION** out there about the different ways of setting the elevator trim for aerobatics. This seemingly simple topic brought about an explosion of different opinions and book references as we talked to different people. Also, this seemingly simple topic is not just about setting the trim for aerobatics. It is also a signpost that reveals the ebb and flow of knowledge in our whole aerobatic system in the United States, and in some cases, the world.

There was also a fragmentation of opinions over time, meaning that many were not aware of the other techniques for setting trim that existed. We must also introduce the terms “zero-g trim” and “neutral point.”

I thought I would present a representative sample of what some of the aerobatic books say about this subject and what experienced pilots say. As an aerobatic instructor, I have just about all of them on my shelves. I only do this step to begin the discussion and to show what is already out there for your consideration. The final choice is up to you.

When I was new, learning aerobatics for recreational flying and to compete in Sportsman in a 150-hp Decathlon CS, I was taught to set the trim for 10 mph over book looping speed before beginning the sequence. Looping speed in that model Decathlon is 140 mph. It only does about 125 mph indicated in level flight at full throttle, so I had to dive to get to 150 mph to find that setting. Once set, I was to leave the trim there throughout the sequence. I was also taught to put the trim in that same place even when practicing individual maneuvers. That way, the feel on the elevator would always be the same each time the maneuver was performed.

I was also given two other reasons that such a nose-down/high-speed trim setting was valuable. One was that, on the downlines, the airplane would seek straight down and not try to pitch up on you (nose toward your forehead) until you reached the trim speed.

The other was that the amount of forward stick pressure needed when in the negative-g regime, as in the inverted portion of a slow roll or point roll, would not be near as high.

The above system felt good and got me successfully through many Sportsman category competitions. I had no idea there were so many other ideas on how to do it.

Let's break it all down.

- **Question 1** is the basic overall question about how we should trim for aerobatics: Should we trim for each maneuver to reduce control pressure, as we do for normal flight, or should we set the trim in one place before beginning the sequence and leave it in that position throughout the whole sequence?
- **Question 2** is that if we are only going to set one trim position before the sequence begins and then leave it there throughout, what should that position be? Also, what logical reasoning do we use to determine this setting?
- **Question 3** is an outgrowth of Question 2: If we set the trim in one place for the whole sequence, is that setting different depending on what category of difficulty you are flying, or what maneuvers are inside your sequence?
- **Question 4** is how do we set the trim for training or practice on individual maneuvers, especially if you are new or if you are a recreational-only flyer?

When addressing the fragmentation issue as well as the knowledge issues, one thing all of us in our sport must remember is the continual “forgetting” of common knowledge that seems to happen. The institutional memory or tribal knowledge in our sport always seems to be decaying, and we have to pump it up at regular intervals.



Gordon Penner's 1974 150-hp Decathlon CS.

Rolling inverted to find the best trim position is Ron Schreck, IAC 433751, in his Van's RV-8.



Former IAC Safety Chairman Bruce Johnson said it best, most people remain in a hobby for about five to seven years. People are always cycling in and out. When people cycle out of our sport due to a change of interest or due to life getting in the way, they take their knowledge with them. The passing down of knowledge to new people is not all that systematic.

The IAC-affiliated system is a good central place where tribal knowledge is kept alive, but not everyone comes through the IAC path to become an aerobatic practitioner. Even within the International Aerobatic Club, our knowledge retention is not perfect, which is a good reason to have these discussions. We of the IAC must continually pump that knowledge up, recognizing that the decay is always there.

Questions 1 and 4 go together. Train as you fly, fly as you train, right? A decision must be made on how the trim will be set, and that system must be used throughout all aerobatic flying.

The consensus from all the instructional books for answering questions 1 and 4 seems to be to set the trim in one place and have it there throughout. Setting it in the same place every time any aerobatic maneuvers are flown, whether individually or in a sequence, also builds muscle memory in training and in later experience.

So let's see what some of the aerobatic instruction books say about the value of trim forces that result from the large airspeed changes throughout an aerobatic sequence. This discussion also will answer questions 2 and 3. In addition, we will nail down the zero-g trim and neutral point definitions.

In Eric Müller's book *Flight Unlimited 95* (written with aviation author Annette Carson), the Swiss and European aerobatic champion said the following on the trim subject:

"There are different reasons for trimming in different ways, depending on the machine and the purpose of the flight. With an aeroplane approved for aerobatics but without an inverted fuel and oil system, for instance, I trim it to +1g at the maximum horizontal speed before the start of my performance or training, and I do not change this trim until my routine is finished.

"With real aerobatic machines (*appropriate +/-g ratings and inverted fuel and oil systems – Ed.*), normally there is only an elevator trim, which we set for an entire sequence to the zero-g trim.

"To find the best trim position, we must first half-roll inverted, trim the aeroplane so that it flies hands-off horizontally, and note the setting. Then we must trim halfway between hands-off in normal flight and hands-off inverted: we call this the zero-g trim."

In Chapter 5, "The Basic Maneuvers – The Loop," of Neil Williams' 1975 book *Aerobatics*, the British aerobatic champion wrote: "First one sets up the aircraft in a fast cruise condition. Then, the machine is trimmed slightly nose heavy, so that it can be held in level flight with only the pressure of one finger ... the trim is now set for all aerobatic flying, and although many pilots use the trimmer during maneuvers to take the load off the stick, I prefer to accept these loads, because it gives me a feedback of information from the aeroplane, and a datum to work from. If the stick force changes unaccountably, it may mean that something on the aircraft has moved, and I must then land and investigate."

In Chapter 4, "Technique and Feel," of David Robson's book *Skydancing*, the author said on Page 78, subtitled *The Use of Trim*, "The development of this (aerobatic) sensitivity is adversely affected if the aircraft is constantly retrimmed to remove out-of-trim stick forces. As a general rule, most properly designed aerobatic aircraft have only a small trim change with changing airspeed so that the out-of-trim forces are not excessive over the operating envelope of the aircraft. In this case, it is preferable to trim the aircraft at an airspeed corresponding to cruise at maximum continuous power and leave it set.

"Any reduced airspeed (increased angle of attack) will be reflected in the necessary pull-force. Similarly, speeds above this will be indicated by the push-force required. Trim (out-of-trim force) is a very valuable reference for flying by feel and, therefore, for developing a sensitivity for aerobatic maneuvering."

In Alan Cassidy's book *Better Aerobatics*, which I consider to be the top of all the great aerobatic how-to books, the British aerobatic champion and instructor has the most robust and comprehensive treatment on the subject of "The Elevator and Elevator Trimming."

Steve Johnson, IAC 20081, Advanced category competitor, in his MX2.



### THE ELEVATOR

Cassidy wrote, “In aerobatics, however, we are striving to fly accurately through constantly changing attitudes. A lot of this maneuvering involves prolific use of the elevator in order to make continuous changes in wing lift. Under these circumstances, accuracy requires a full understanding of the lift-generating system, of which both the elevator and its trim control are essential parts.

“A simple wing moving through the air would always try to take the path of least drag, which would mean zero angle of attack (alpha) and no lift. The wing in flight generates lift only because the elevator produces down force that holds the wing at a non-zero angle of attack. The elevator and the wing together form a lift-generating system that we can vary and control.

“When the pilot moves the elevator control, he/she is actually demanding a change in the angle of attack of the wing. The position of the control column, in the fore/aft sense, is effectively a measure of the angle of attack of the wing.

“There is a very important stick/yoke position in every aircraft where the elevator in fact does nothing, and the wing then has zero alpha and generates no lift. I shall call this position the ‘neutral point’ in reference to the elevator control.

“It also follows that the same stick position will give different load factors at different speeds.

“The amount of lift being generated is proportional to the airspeed squared ... Also, each pilot is feeling something different through the stick, because the stick forces are different (if the trim is the same each time).”



### TRIMMING

“In most aircraft, it is possible to set the trim control position sufficiently far nose-down so that when the elevator is released, the aircraft flies a parabolic flight path and the *g*-meter reads zero,” Cassidy wrote. “This is how weightlessness is simulated in astronaut training. With this trim condition set, a fair amount of back pressure is required on the stick to maintain level flight at cruise speed. If the stick is released, it moves forward to the position where the elevator is doing no work.

“This is the ‘neutral point’ referred to above.”

### APPLICATION

“There are many occasions in aerobatic flight where it is necessary to have the wings generating no lift, in other words to fly at zero alpha,” Cassidy wrote. “These occasions include all vertical lines and both of the occasions in a straight line roll (*slow roll* – Ed.) when the wings are vertical with respect to the horizon (*what we Americans call knife-edge flight* – Ed.).”



Tony Wood, IAC 20897, entering knife-edge flight in his Sukhoi.

An advertisement for the Extra NG aerobatic aircraft. The main image shows a red and white Extra NG aircraft in a steep climb, banking vertically. The aircraft has the registration number D-EYND on its fuselage. The background is a scenic landscape with a river and hills. In the top right corner, there is a logo for EXTRA AEROBATIC PLANS. In the bottom right corner, there is a logo for SOUTHEAST AERO. The text "EXTRA NG" is prominently displayed in the center-right. Below it, the text "The Next Generation of Aerobatic Aircraft" is written. At the bottom left, there is a paragraph of text: "The Extra NG is flying in the USA and available for immediate delivery from Southeast Aero. Experience a leap forward in performance and design. Demo flights available for qualified pilots." At the bottom center, there is contact information: "Contact: Doug Vayda dvayda@southeastaero.com 904-568-9410".

**TRIMMING FOR AEROBATIC SEQUENCE FLYING**

“It is not practical, nor is it wise, to try to change the elevator trim setting after the start of a sequence of linked aerobatic figures,” Cassidy wrote. “So it is necessary to consider what you want and set the trim control before starting the sequence.

“Where you set the trimmer is a matter for your own preference, and may vary depending on the complexity of the sequence you are going to fly. Whatever position you decide, you should make this decision based on a sound logical basis, so here are some thoughts worthy of consideration ... the purpose of an adjustable trimmer is to reduce workload for the pilot. Remember that at any time when you are flying level, however briefly, at other than the trimmed speed, some stick force will be required on the elevator control to maintain the flight path. The question to ask yourself is: ‘When is it most critical that the elevator looks after itself, so that I can concentrate my mind on other things?’”



Alan Cassidy's book *Better Aerobatics* has a robust and comprehensive treatment on the subject of elevator trimming. The book is available at [EAA.org/shop](http://EAA.org/shop).



**2020 IAC CONTEST SEASON CALENDAR**



DATES	HOST CHAPTER	NAME	REGION	LOCATION	AIRPORT
Oct. 9, 2020	36	Akrofest	Southwest	California	Lo8
Oct. 9, 2020	52/58	Kathy Jaffe Challenge/Wildwood Acroblast	Northeast	New Jersey	KWWD
Oct. 10, 2020	5	Clyde Cable Rocky Mountain Aerobatic Contest	South-Central	Colorado	KLAA
Oct. 16, 2020	34	Ohio Aerobatic Open	Mid-America	Ohio	KEDJ
Oct. 16, 2020	107	Texas Hill Country Hammerfest	South-Central	Texas	KAQO
Oct. 16, 2020	3	Mark Fullerton Memorial Bear Creek Bash	Southeast	Georgia	KRMG
Oct. 24, 2020	61	Giles Henderson Memorial Challenge	Mid-America	Illinois	KSLO
Nov. 21, 2020	23	Sebring 81	Southeast	Florida	KSEF

### SIMPLE SEQUENCES

Cassidy wrote, “If the sequence to be flown is all positive, with no vertical rolling, as you find in the Basic (Primary) or Sportsman categories, then the answer is probably ‘When I am flying very fast through the box between figures and need to think about positioning and what comes next.’”

“The ability to fly without having to make an elevator input will only occur when you are level at trimmed speed, so it is best to arrange this happy state for when your brain has to be quickly making other decisions ... So consider the highest speed at which you are going to be flying level during the sequence and trim for hands off at this speed.”

### ADVANCED SEQUENCES

“If the sequence to be flown includes a lot of vertical rolling, then this is the time when you need the finest elevator control,” Cassidy wrote. “Such sequences also probably include a balance of positive and negative loops and lines. In these cases, it is my strong recommendation that the trim is set to give zero g; elevator neutral point. Then vertical lines will stand a much better chance of remaining vertical when you quickly apply

aileron to roll ... This is my recommendation for the Advanced and Unlimited categories.

“My preferred method of trimming for neutral point is simply to start a climb, about 45 degrees nose up, from a relatively high speed, fast cruise say, then let go of the stick and look at the accelerometer. ...

“Now move the trim control nose down until the g-meter reads zero and you are effectively weightless.

“Now if you fly in Intermediate, you are on the cusp between these two recommended solutions. So you can decide for yourself which is most important to you.”

There you have it. Here are some techniques for your consideration and for the “energetic” conversations that are to follow. At least now we know a lot of the opinions — and the reasons behind them — that are out there from those who have been there before us. A later article will present opinions of current competitors and instructors.

Enjoy! *IAC*



# Who Packs Your Parachute?

BY ROBERT MARSHALL, FAA-CERTIFICATED PARACHUTE RIGGER



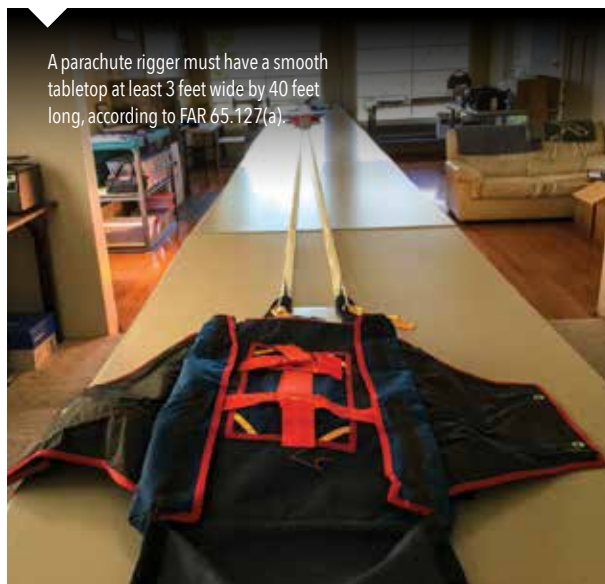
**THESE WORDS WERE A POPULAR** motivational speaker's tagline in the 1990s. That speaker was U.S. Navy Capt. Charles Plumb, an F-4 Phantom pilot in Vietnam who, after 75 missions, was shot down by a surface-to-air missile but survived due to deploying his parachute. Charles later learned who packed his chute that fateful day, who helped save his life. When we think about the lifesaving aspects of a parachute, it seems wise to ask, "Who does pack my parachute?" Do you know him, do you ever see him, and does he share his knowledge and expertise with you on a regular basis? There are a lot of questions floating around that expensive seat cushion.

When repack time rolls around, do you give it to Joe who gives it Sally who gives it to a rigger to repack? If anything like this scenario exists, you are missing a learning opportunity. If you are going to put your trust into someone so critical, preparation, knowledge, and training are required to be successful. Your qualified, professional parachute rigger is there to partner with you.

I once had a customer come to me and ask for a repack because he didn't much like using that guy over at XYZ Aviation. When I asked why, he said, "Well, you take your parachute over there, and you hang it on a hook with \$50. And when you come back in a week, your parachute is still hanging on that hook, and your 50 bucks is gone! It's like doing business with the tooth fairy." In that instance, the customer was trying his best to do the right thing, but the rigger failed him. Pilot and rigger are in this situation together, a team of two.

Since we are a team, it is helpful to know what is required of an FAA-certificated parachute rigger who packs emergency parachutes. Aside from having met the experience and knowledge requirements and having passed the necessary oral, written, and practical tests, the rigger must have a smooth tabletop at least 3 feet wide by 40 feet long, according to FAR 65.127(a). Does your rigger have a 40-foot packing table? Have you seen it? Because without one, he cannot meet the regulatory requirements, nor can he establish the all-important "wind channel" when packing a round parachute. Stretching your chute out in his hallway with a 50-pound bag of dog food holding tension doesn't cut it. Is there a sewing machine nearby to shrink the closing loop on a Softie — which takes all of 15 seconds — but is necessary to meet the length specification on almost every repack? How about replacement closing loops for Strong parachutes so that the "pop top" pilot chute tucks down neatly instead of tilting up on one end, being unsightly and becoming a potential snag hazard? How about repairing broken stiffeners? These aspects of repack and others are all important maintenance items with which your rigger should be familiar and experienced. But as I said, we are a team.

So, what is required of the other team member, you? Aside from choosing a qualified, professional rigger and selecting the right parachute for you and your application, do you know the proper component terminology? Terminology expertise gives you a much better understanding of your gear and is helpful when discussing parachute equipment over the phone. How about where to find the packing data card, also called the *logbook* for the parachute? Every manufacturer "hides" it in a different place. Speaking of which, there are currently five major manufacturers of pilot emergency parachutes (PEPs), and they are Softie, Strong, National, Butler, and now Summit Parachute Systems. If you have an older brand, there is a good chance it is obsolete and not worth trusting with your life. Security, Pioneer, Irvin, and Switlick — these brands now all belong in museums. Do you practice emergency egress procedures? Anthony Oshinuga, a rising star in the air show, competition aerobatics, and racing world, can open the canopy of his Pitts, remove the safety belts, egress past the tail of the airplane, and pull the rip cord in about seven seconds: "glass, clasp, and your ass" as they taught us in Pylon Racing School. You don't need to necessarily match Anthony's speed, and granted, some airplanes are much harder to egress from than others. Saving your butt with a parachute is all about preparation and muscle memory. And that is developed through repetition.



A parachute rigger must have a smooth tabletop at least 3 feet wide by 40 feet long, according to FAR 65.127(a).

Ejections from F-4 fighter jets are rare as civilian bailouts. Still, the next time your 180-day repack cycle comes due, think about a call to your parachute rigger and ask to schedule a time when you can come in and pull the rip cord and observe an inspection and repack of your lifesaving device. Team up. Ask a lot of questions when you are there. After having done that a time or two, after drilling your emergency procedures, and after making a jump or two at your local sky diving operation, you will have done your part in preparing for the event that will almost certainly never come, but if it does, its outcome won't have been left to chance. The time to *seriously* consider bailing out of your stricken aircraft is right here on the ground, not when the ground is rushing up to meet you in flight. Extricating yourself from a broken airplane is doable. Charles Plumb proved it in Vietnam. There were six bailouts in 2018 alone. As we often say in the sky diving world, "There's a planet coming at you at 120 mph — *do something!*" Staring at that planet is not the time to ask, "Who packs my parachute?" Just hope it isn't the tooth fairy.

**"THERE'S A PLANET COMING AT YOU AT 120 MPH — DO SOMETHING!" STARING AT THAT PLANET IS NOT THE TIME TO ASK, "WHO PACKS MY PARACHUTE?"**

In the next article, we will discuss the components of a parachute system, the nomenclature.

Until then, stay safe out there. **IAC+**

**ROBERT BEGAN** his aviation career jumping out of perfectly good airplanes in 1978 and has since accumulated more than 3,600 sky dives. He became a sky diving jumpmaster in 1998 and AFF free-fall instructor in 1999. At that time, he created Roberts Air to offer AFF sky diving instruction to the Southern California community. Roberts Air has since grown into Roberts Air Services offering a range of aviation services. He graduated Parachute Riggers school in Boulder City, Nevada, and became an FAA senior parachute rigger in 2006 and has been a private pilot since 1998 accumulating more than 1,000 hours PIC. Robert attended Miramar College in 2005 to become a Licensed A&P Mechanic and added his inspection authorization in 2013. He is now in the process of building an aerobatic biplane from plans in his barn in North San Diego County.

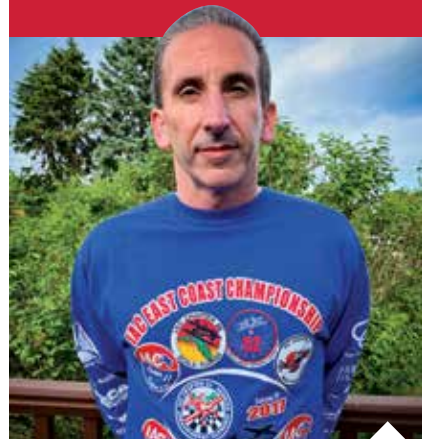
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# Lycoming Service Bulletins/Instructions

BY KEITH DOYNE, IAC 10545, SAFETY COMMITTEE CHAIR



**LYCOMING PUBLISHES SERVICE BULLETINS**, instructions, and letters to address various issues with its engines. Some of the publications are strictly informative but still important. Lycoming technical publications can be found at [www.Lycoming.com/contact/knowledge-base/publications](http://www.Lycoming.com/contact/knowledge-base/publications).

On April 24, 2020, Lycoming released Service Instruction No. 1009BE, *Time Between Overhaul (TBO) Schedules*. This instruction lists all Lycoming engine models with the corresponding TBO and associated notes and has the following caution:

“OPERATING HOUR TBOS ARE BASED ON ACCELERATED TESTING AND OVERALL FLEET SERVICE DATA. BECAUSE OF VARIATIONS IN THE MANNER IN WHICH ENGINES ARE OPERATED AND MAINTAINED, LYCOMING CANNOT GIVE ASSURANCE THAT ANY INDIVIDUAL OPERATOR WILL ACHIEVE THE OPERATING HOUR TBOS IDENTIFIED HEREIN.”

AEIO-320 and AEIO-360 (180-hp) engines have a TBO of 1,600 hours. All other aerobatic or AEIO-XXX engines have a TBO of 1,400 hours. All aerobatic engines listed in this instruction have one associated note, which reads:

“The reliability and service life of engines can be detrimentally affected if they are repeatedly operated at alternating high and low power applications which cause extreme changes in cylinder temperatures. Flight maneuvers which cause engine overspeed also contribute to abnormal wear characteristics that tend to shorten engine life. These factors must be considered to establish TBO of aerobatic engines; therefore, it is the responsibility of the operator to determine the percentage of time the engine is used for aerobatics and establish his own TBO. The maximum is the time specified in this instruction.”

This note leaves pilots/owners in a bit of a quandary as to when to have their engine overhauled before the engine tells you how. Unfortunately, there is no clear answer. Professional air show pilots already know their TBO. Their custom aircraft engines are rebuilt every year. For everyone else, it may end up as an educated guess. Some of the questions you need to consider are how much of your time is aerobatic, which category do you fly, how many contests do you fly, how modified is your engine, and do you fly some air shows. For those who fly Advanced or Unlimited category and/or fly some air shows, expect the TBO to be reduced, possibly by half. If your airplane has a fixed-pitch prop and you routinely fly over 3000 rpm, expect the TBO to be reduced, possibly by several hundred hours. Engine modifications (i.e., higher compression pistons, different camshafts, custom exhaust, ported/polished cylinder heads, etc.) that can lead to higher CHTs, EGTs, and oil temperatures will reduce the TBO. Not properly preheating your engine for wintertime flights or taking time to cool the engine in the air before landing with a long taxi back to the hangar during the hot summer flights will reduce the engine TBO. To help better estimate a TBO, I do recommend checking with other pilots who are in a similar situation as you (type of flying and aircraft/engine/propeller combination) to see what they are experiencing. As always, scheduled oil changes, analysis, and good annual engine inspections are another excellent way to track engine health and provide valuable insight as to how close you are to the TBO. It is best to reach your engine's TBO while the airplane is on the ground and in the hangar. Lycoming provides you a maximum limit, but your flying will dictate your engine's specific TBO.

On May 25, 2017, Lycoming released Service Bulletin (SB) No. 480F, *Oil Servicing, Metallic Solids Identification After Oil Servicing, and Associated Corrective Action*. The SB provides the oil servicing schedule and procedures for both oil screens and oil filters. There is a section that addresses potential sources of excessive oil consumption. The SB does provide valuable information in determining what kind of metal flakes you can encounter and possible sources of that material. The table below is “Table 2 Guidelines for Identification of Metal Particulates and Chips & Corrective Action” from the SB.



The Lycoming O-320 is a naturally aspirated, air-cooled, four-cylinder, direct-drive engine.

Table 3 in the SB is the “Guidelines for Particle Quantity and Size on Oil Filter, Oil Pressure Screen, or Oil Suction Screen,” which provides information on the “how bad is it” based on the size and quantity of the particles found in the oil screen or filter. Table 4 in the SB is the “Recommended Corrective Action Options” corresponding to the type, size, and quantity of particles found. The tables have valuable information to deal with potential small or big problems.

Lycoming publications provide important information to pilots, owners, and mechanics. TBO and oil analysis are not topics discussed every day. However, I did see a post on Facebook by an aerobatic pilot earlier this year regarding metal shavings found during an oil change. I am hoping the final verdict is not an engine rebuild. It is pilots, builders, and mechanics asking questions that inspire me to research and share information that will help make the people and this sport safe.

Have fun and fly safe. **IAC+**

METALS/ALLOYS	TESTS AND CHARACTERISTICS	POSSIBLE SOURCE OF ORIGIN ON LYCOMING ENGINE	NEXT STEP
Steel or Cast Iron	Picked up by magnet, or will move when a magnet is placed on the opposite surface of the filter element or strainer cloth – which will prevent chips from sticking to the magnet.	Camshaft lobes Gears Tappets Push rods Rocker Shafts Impellers Piston rings Cylinder barrels	Refer to Table 3 for the quantity and size of the particles.
Bronze	When placed in nitric acid, turns bright green.	Connecting rod bushings Rocker bushings Crankshaft bearings Intake valve guide Piston pin plug Idler gear bushing	Refer to Table 3 for the quantity and size of the particles.
Nickel	Not picked up by magnet.	Exhaust flange V-band coupling Gasket	Refer to Table 3 for the quantity and size of the particles.
Stainless Steel		Valves Exhaust components Valve seats Oil bypass valve spring Safety wire	Refer to Table 3 for the quantity and size of the particles.
Chrome		Piston rings Exhaust valve stems	Refer to Table 3 for the quantity and size of the particles.
Copper	When placed in nitric acid, turns bright green.	Platings	Refer to Table 3 for the quantity and size of the particles.
Brass	When placed in nitric acid, turns bright green.	Oil suction screen Pressure relief valve spacer	Refer to Table 3 for the quantity and size of the particles.
Lead		Bearings	If lead chips, chunks, or balls are found, complete Corrective Action 4 in Table 4.
Aluminum Flakes	When placed in 50 percent solution of nitric acid and muriatic acid (approximately 30 percent hydrochloric acid and water), or a sodium hydroxide solution, the aluminum particles bubble and fizz and form a black residue.	Crankcase Accessory housing Oil pump body Cylinder head Pistons Piston pin plugs Oil sump baffle Turbocharger inlet housing Sleeve bearings	Refer to Table 3 for the quantity and size of the particles.
Magnesium		Oil sump	Refer to Table 3 for the quantity and size of the particles.
Tin	Soft, malleable Not picked up by magnet When dropped onto a hot (500 degrees Fahrenheit) soldering iron, tin particle will melt and fuse with 50/50 solder.	Tin-plated parts	Refer to Table 3 for the quantity and size of the particles.
Cadmium		Plating	Refer to Table 3 for the quantity and size of the particles.
Zinc		Plating	Refer to Table 3 for the quantity and size of the particles.

# Yuichi Takagi

BY ZINNIA KILKENNY, IAC 437244



**ZK: OMEDETOU [JAPANESE WORD FOR CONGRATULATIONS] ON YOUR FIRST UNLIMITED WIN AT THE COALINGA WESTERN SHOWDOWN SINCE ENTERING COMPETITION 15 YEARS AGO.**

YT: Thank you. I placed first at the contest in Coalinga, California, in June 2019. In past contests, in all categories I participated, I had placed third or lower. Of course, I have been having good times at all contests, but this was definitely the best memory ever.

**ZK: HOW DID YOU BECOME INVOLVED IN AVIATION, AND WHY DID YOU LEAVE JAPAN TO FLY IN THE UNITED STATES?**

YT: About 30 years ago, after my high school graduation in Kanagawa, Japan, I was preparing to enroll in college, not aviation-related, for a degree. However, I was not motivated to study because I didn't have a clear vision of my life.

One day, I recalled a memory during my kindergarten graduation ceremony. Everyone, one by one, had a little time to speak about our dreams in front of the crowd. With a model airplane in my hand, I remember saying, "I want to be a jumbo jet pilot."

Nobody in my family was in aviation, but this was what I thought. That's right; I used to be thinking to be a pilot. How about to become an aircraft mechanic? I felt — because I was wrenching on bicycles and motorcycles most of time — that this was a perfect idea. It was the starting point of my life as an aviator.

I left home in 1992 and enrolled in a technical school for aviation maintenance. I was surprised because I had not known that studying is so enjoyable. When I graduated, I almost got a helicopter mechanic job, but the life was not easy. In 1994, nearly all general aviation companies in Japan stopped hiring because of the long-lasting business depression.

No problem. While I was attending the school, I visited a flight school in Riverside, California, to get my private pilot certificate in a C-150. I was aware of the country's aviation culture, and I loved it. I changed my plan from Japan to the U.S. in minutes. I worked hard commuting between Japan and the U.S. for the next couple of years to get a pilot certificate and mechanic certificate.

In 1999, I received a permanent resident card in the U.S. This was my starting point as a professional aviator.

**ZK: WHY AEROBATICS?**

YT: Aerobatics is my last thing in my life. At least for now. I enjoyed riding a bicycle since I was 4 years old, and a motorcycle at the age of 16. One time, I thought I might become a bicycle racer, but I was not talented. I gave up many activities in past.

I liked them, but I was not skilled. I was riding them recklessly, and I was hospitalized by a motorcycle accident, too. I am not a natural-born pilot, but it seems to be I am safe enough to fly and enjoy aerobatics.

When I started aerobatics, it is in my mind all the time. It is my life. I haven't seen anything to make me more passionate than with aerobatics.

In 1995, I went for aerobatic training flight in a 1946 clipped wing J-3 Cub in Watsonville, California. I was excited to be in the "real" airplane with a parachute. When I rolled the airplane with my instructor, I felt that it broke an invisible barrier, which was surrounding me. I soloed the airplane later, and I saw a new world.

I became a certificated flight instructor in 2000 and began working as a mechanic and instructor. The pay was just enough to survive. I could not afford aerobatics, but slowly, my income became stable. In 2002, I was able to fly a 7KCAB to brush up my rusty aerobatic skills. Then I took aerobatic lessons in a Pitts S-2B in Livermore, California, to become a better pilot. I could not believe that the airplane was able to maneuver like that. I was taught not only aerobatics but also very high-level airmanship.

## YUICHI TAKAGI

IAC: 431712

**Occupation:** Aerobatic flight instructor, air show performer, aircraft mechanic

**FAA certificates and ratings:** Commercial airplane SEL, MEL, instrument, commercial glider, airframe and powerplant mechanic





After a couple of dual flights, it was recommended I do a solo checkout on the airplane. I refused the offer, firstly because I was very happy to fly dual. And I thought it was impossible to fly the airplane myself, but I did. Once I was checked out in the S-2B, I flew it nearly every weekend. And I started instructing aerobatics in the airplane later. We never know what is coming next in our life.

I flew my first aerobatic contest in Sportsman in the Pitts S-2B in 2004 in Paso Robles, California. It was fun to be with aerobatic people on the field to support the sport. Most people I met before were flying just to have certificates or for their careers, but those people at the contest were different. They were flying for the sport. Nothing else. It was amazing.

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I moved up to Intermediate next year, Advanced in 2010, then Unlimited in 2013. I purchased a Pitts S-2S with my friend, Andrew Connolly, in 2006. We shared and flew contests together. It is my personal airplane now. I modified the airplane to fit my body well and became capable to compete in Unlimited.

**ZK: WHAT ARE YOUR GOALS?**

YT: To retire from my flying job at the age of 70. Until that age, I will continue flying aerobatic competitions, including U.S. Nationals and air shows, and will instruct high-performance aerobatics, which I learned during my flights.

To me, nothing is better than to see the spectators' faces after the aerobatic flights. After that age, I will become a full-time mechanic to help people fly. **IAC+**

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