



SPORT

# AEROBATICS

SEPTEMBER/OCTOBER 2022

OFFICIAL MAGAZINE OF THE INTERNATIONAL AEROBATIC CLUB



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- ▶ INTERNATIONAL AEROBATICS DAY, PAGE 20
- ▶ ANATOMY OF A SNAP-ROLL, PAGE 30

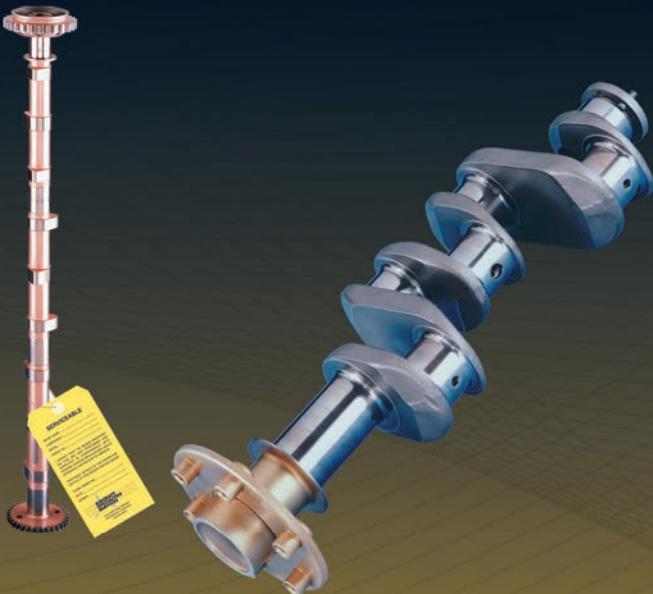
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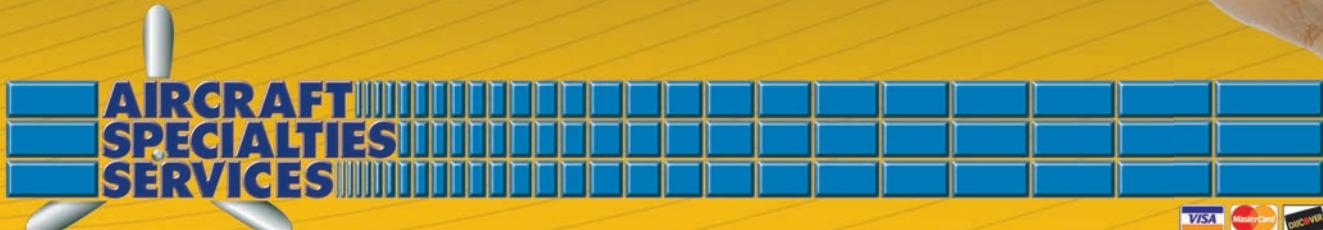
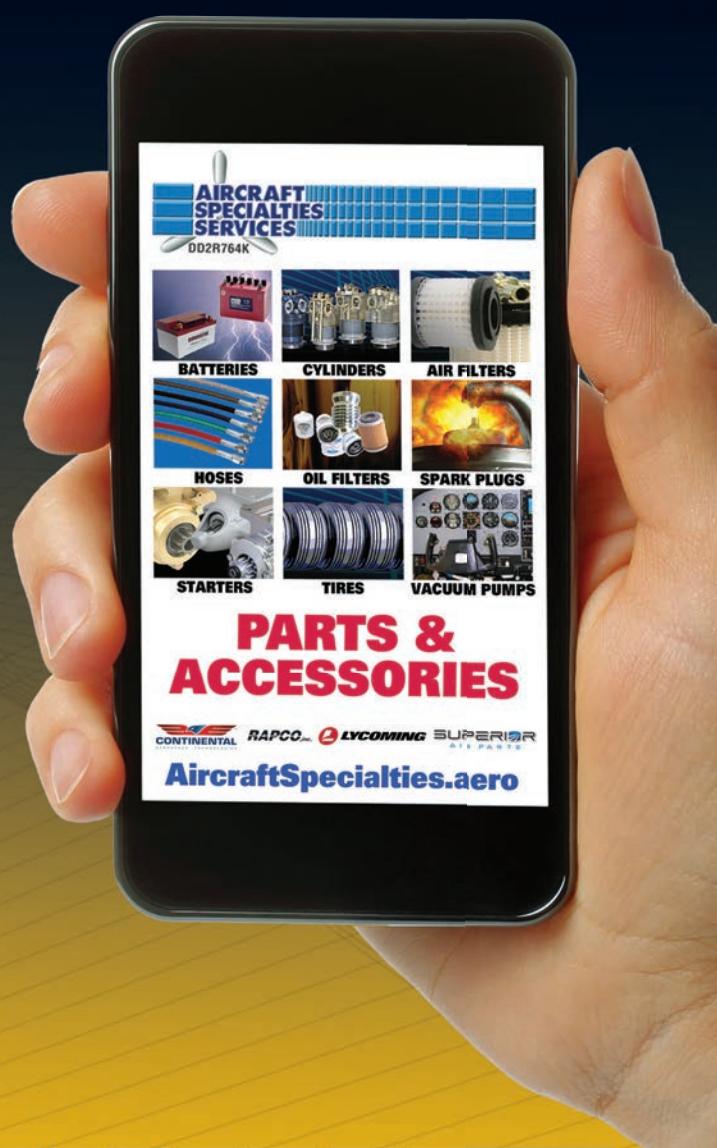
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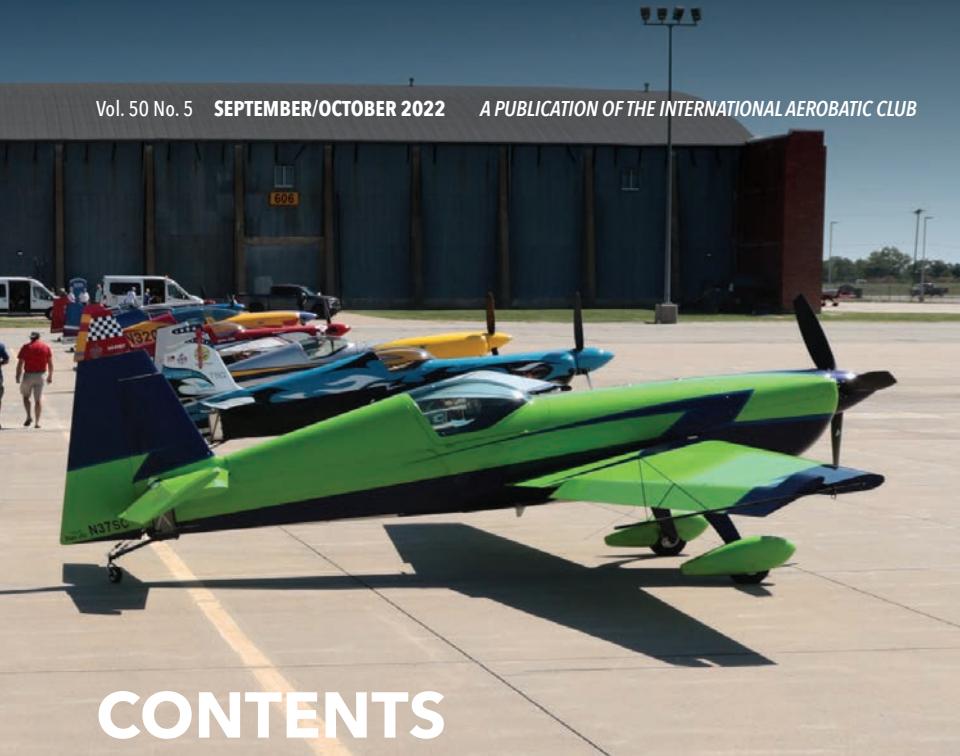
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## COVER

**ON THE COVER:**  
Josh Pruzek's beautiful Pitts S-1-11B built in collaboration with Mark and John Sorrell of Hiperbiplane fame, and Tony Horvath of Specialty Aero.

**ABOVE:**  
Salina, Kansas, will once again act as home base for the U.S. National Aerobatic Championships, October 2-7, 2022.

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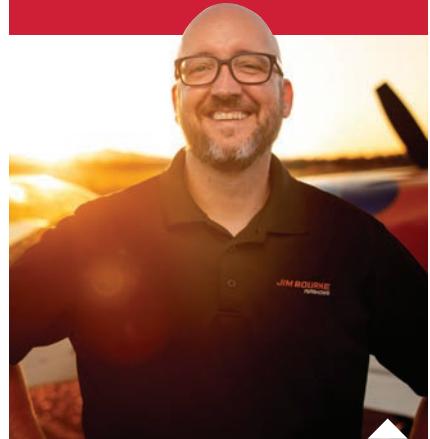
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# Membership Dues, Aerospors Conference and the Pitts Flying Museum

BY JIM BOURKE, IAC 434151

## Dues Increase

**THE BIG NEWS TO SHARE** is that the IAC board recently approved a much-needed dues increase. The International Aerobatic Club has been charging \$45 per year for memberships since 2001. In constant inflation-adjusted dollars, that would be \$75 in today's money. After some debate about the various approaches, the IAC's finance committee recommended an increase that splits the difference. Starting in October, dues will be \$60 annually.

This change is obviously a big jump, and I'm sure there will be questions from some concerned members. But our costs are rising along with everything else in an inflationary economy, and this move is important for the IAC's future financial health.

Rather than increase the dues to a level that would simply allow us to survive, I'm pleased the board agreed to an increase that also will allow us to finally update our website. Our website is an amazing resource created and maintained by our volunteer IT team. The team does a great job, but volunteers simply cannot find the time between money-making endeavors to upgrade the site as often as our members would like. Consequently, our site is not the best to look at on mobile devices, and it lags behind the other EAA divisions in aesthetic appeal. Superstar IAC volunteer DJ Molny stepped up to the plate, sourced a list of potential vendors, interviewed them, and made a recommendation to the board. The new site is currently being developed and will hopefully be rolled out around the end of the year.

I know that dues increases are not fun for everyone, and we might lose some members over the extra \$15. But I hope we can all agree that in the real world, where we buy things with money that is constantly inflating, adjustments such as this one must happen from time to time. If there are any questions, please send them my way.



Left to right: Greg Principato, Jim Bourke, Denise Layton (SSA – gliders), Martin Palmaz (USHPA – hang gliding/paragliding), Steve Hubbard (USPA – parachutes), Chad Budreau (AMA – model aircraft), Noah Rasheta (USPPA – powered parachutes). Not present but on the phone was Pat Cannon from BFA (ballooning).

## Aerosports Conference

It's a shame that more IACers do not know Greg Principato. Greg is the president of the National Aeronautic Association, more commonly abbreviated as NAA. As president of the NAA, which governs all U.S. aerosports awards and records, Greg has a seat on the IAC board. He is a calm, professional person who stays silent most of the time but gives great advice when the board needs it most.

Recently, Greg invited me and the leaders of several other aerosports groups to Dallas, Texas, for some information sharing. At first, you might think that the world of aerobatic competition doesn't have much in common with the world of model airplanes or ballooning or powered parachutes. But it turns out we have plenty in common. In fact, the various aerosports groups Greg interfaces with are more alike than different.

For example, I was fascinated to learn that, in every aerosport, there is a similar percentage of competitors to members. In the IAC, we have about 400 competitors and about 4,000 total members, so about 10 percent of our members compete. Sometimes I hear arguments about how that percentage is too high or too low. It turns out that it matches well with several other groups. The United States Parachute Association has 42,000 members; about 3,000 of them compete. The Soaring Society of America (which focuses on sailplanes) has 10,000 members; about 1,000 of them compete. It seems after much discussion that the IAC is in a normal range. Whether 10 percent is the "right" number is still a matter of debate, but at least we know we aren't an outlier.

I learned a lot of other things that I won't have space to explain here, but obviously we are all facing inflation and contemplating or are in the middle of enacting dues increases. We all seem to have the same troubles dealing with our government, and everyone is trying to decide what to do with their magazine versus social media.

After some great roundtable discussion, I came up with a list of the products we all have in common. Every aerosport organization has a website, social media, and a magazine. They all maintain standings. They all advocate for safety and help people find training. They are responsible for sanctioning contests. They provide insurance. They work with the government on behalf of their members. They provide community and help people share knowledge.

I have to say it was the most informative discussion I've enjoyed in a while, and I look forward to more opportunities to connect with this group.

## Trip to the Pitts Flying Museum

It seems about once a week that someone tells me I should trade my monoplane for a Pitts, so I like to remind people every so often that I love all airplanes. In fact, I had an adorable Pitts S-1 until recently when a local pilot convinced me to part ways with it. They are such great-handling airplanes that I think every aerobatic pilot could use some time in one.

Recently I visited the Pitts Flying Museum at Queen Creek, Arizona. I took some pictures, and I understand we are working on a full write-up. This place is definitely worth going to if you are in the Phoenix area!

Also in biplane news, I see that Tony Horvath and Josh Pruzek's Pitts S-1-11B project is being covered in this month's issue. I am not often jealous of someone else's airplane, but the beauty of this plane can't be captured in a photograph. Tony always does great work, so I'm delighted to see him and Josh get some limelight.

That's all for me this month; please contact me at [president@iac.org](mailto:president@iac.org). **IAC**



# Reflecting on AirVenture and Looking Forward to Nationals

BY LORRIE PENNER, IAC 431036

**I'VE JUST RETURNED FROM** EAA AirVenture Oshkosh and find myself reliving every detail of the people I met, the forums I listened to, and the beautiful airplanes that caused such enjoyment for many. Over 645,000 people were on the grounds during the week, many filled with the wonder and enormity of it all.

The IAC Aerobatic Center was the busiest I've seen it since the 70th anniversary of the Pitts Special. IAC AirVenture Chairman Jordan Ashley ran a well-tuned operation and introduced some new traditions: popcorn and jelly beans, a welcome bag for the pilots who parked in the IAC area, a meet-and-greet with Kirby Chambliss and Mike Goulian, IAC chapter camping in Camp Scholler, plus new volunteer awards at the IAC member gathering and dinner on Friday night.

One of my favorite new traditions was the IAC Collegiate Program participants from Metropolitan State University of Denver acting as IAC ambassadors — interviewing, taking photos, and visiting with all who were interested in aerobatics. They represented the IAC well and give us hope that our traditions and aerobatic knowledge base are making their way through to a younger generation.

In this issue of *Sport Aerobatics*, we see more of our IAC members sharing their aerobatic experiences and knowledge. David Taylor shares what he learned about judging gliders from the U.S. Air Force Academy cadets in his article titled "Glider Judging — Reviewing the 'Setting the Line' Rule." Tom Myers confesses in this month's column "Looking and Seeing" that he forgot to remove the rudder gust lock from the tail of his airplane, and his error will help us all change behavior on the pre-flight inspection. Thank you for the wake-up call!

International Aerobatics Day was once again a great success with many of our chapter members sharing their time to speak with general aviation pilots. Adults and children from the

public marveled while watching IAC chapter members put their machines through intricate routines. IAC 35 and 58 share their experiences of the day, making new friends and getting reacquainted with old ones and pulling together as a chapter to be ambassadors for aerobatics.

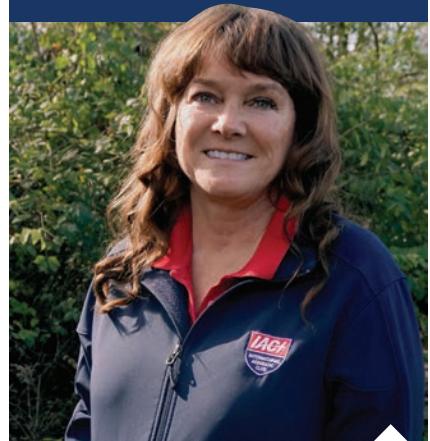
Coming in October is our premier event — the U.S. National Aerobatic Championships. Registration has been open since May 27, resulting in over 55 pilots preregistering (as of August 23). We are expecting this to be a big year for the Advanced power pilots because it is a team selection year. The World Advanced Aerobatic Championships will be held in Jean, Nevada, next year, and everyone is excited to be the center of the world again.

Although by the time this issue arrives in your home it will only be a couple of weeks before Nationals, go to the website and preregister. Liza Weaver is keeping registration open until September 27. So, it's not too late! Visit [IAC.org/Nationals](http://IAC.org/Nationals) now!

See you in Salina, Kansas. **IAC**

## ► CORRECTIONS:

Genevation recently made a change to its website. The new URL is [Genevation.eu](http://Genevation.eu) and its email is [ferenc.zsigo@genevation.eu](mailto:ferenc.zsigo@genevation.eu).





2022  
U.S. NATIONAL  
AEROBATIC  
CHAMPIONSHIPS  
OCT 2-7 SALINA, KANSAS

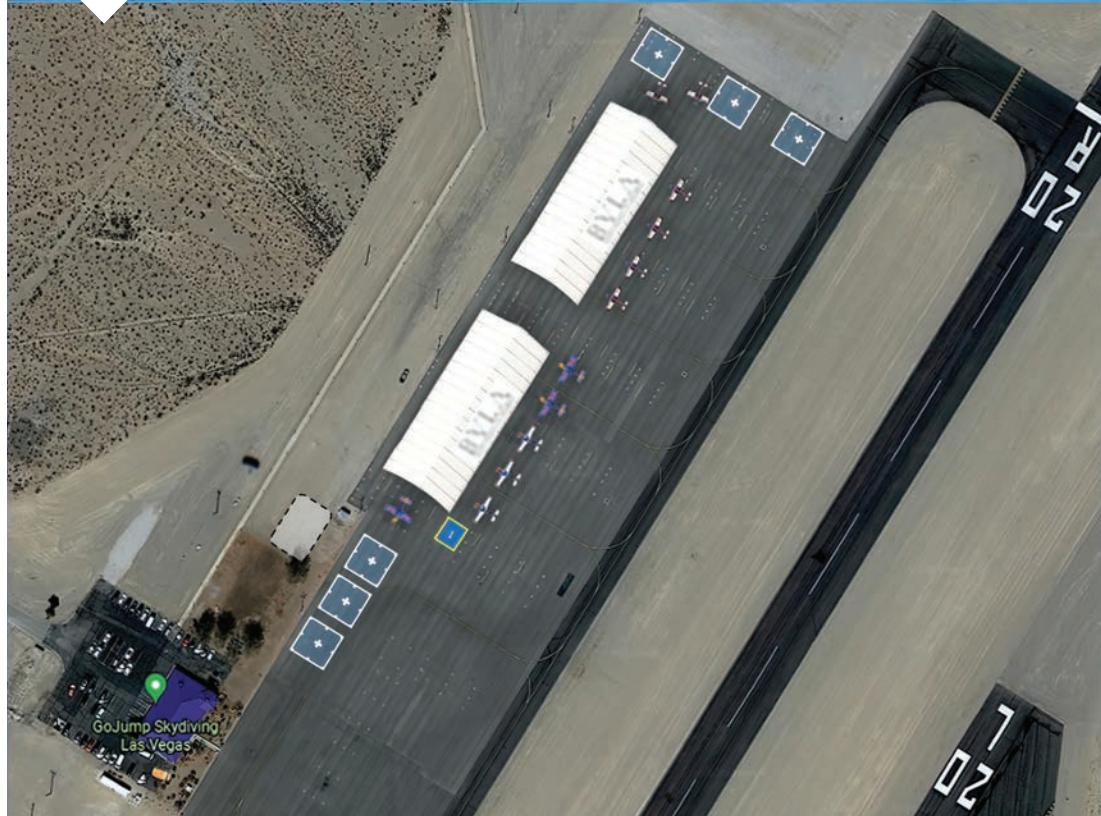
# What Flies in Vegas, Stays in Vegas

**Except for the trophies ... those leave with the champions**

**DUNCAN KOERBEL**, WAAC 2023 MANAGING DIRECTOR, IAC 437649

**IN OCTOBER 2023**, 70 of the world's best Advanced aerobatic pilots will bring their A game to Las Vegas, Nevada, for the 15th FAI World Advanced Aerobatic Championships (WAAC). This occasion will be the first WAAC in the United States in 15 years.

What's it all about? Every two years, the FAI holds the WAAC. Bids are submitted at its annual meeting, and just like the Olympic Games, the host venue is named. With support from the International Aerobatic Club, I traveled to Warsaw, Poland, in 2018 to bid, and the United States was awarded the contest. We are a go for flight October 24, 2023, to November 4, 2023.



Overhead view of the setup at Jean Airport located at the southern edge of Las Vegas Class B airspace. Plans include large 35- by 80-foot open-air structures for airplanes and teams.

The championships are in Las Vegas to promote the international appeal for the event. The airport is Jean (OL7), perfectly situated outside of Las Vegas' Class B airspace. In 2019, the IAC West Open Championships was held at Jean as a proving contest. The contest was a great success, with pilots flying in all five categories and a 4-Minute Free wrapping it up. The contest was a great learning opportunity for me to work with the airport management, Las Vegas FSDO, and the ATC. It is also good to get the box laid out at a new airport and find your way to the judges line in the desert. Even better when you don't get a flat tire!

The rules for WAAC 2023 are similar to an IAC contest; however, the FAI Sporting Code, Section 6, lays out the rules for this world event. In the IAC contests, the competitors fly a Known, Free, and then an Unknown flight. For the WAAC, the first flight is a Free Known composed of five figures from a Known "master set" selected at the CIVA plenary each year for each category, plus five Free figures each competitor must add in order to design a sequence of 10 figures that satisfies CIVA regulations.

The rest of the flights are the Free Unknown sequences made up of team-submitted figures. Three Unknown flights ensure only the best come out on top.

The WAAC 2023 organizers are working hard to raise funds for the event and developing the suite of volunteers required to run the 10-day contest. If you would like to volunteer, please go to the website and send us a note via the contact page. The WAAC volunteer team is in need of everything from the air boss, ground boss, and logistics help to daily volunteers to staff the contest.

The U.S. Advanced Aerobatic Team for 2023 will be selected this October at the U.S. National Aerobatic Championships in Salina, Kansas. All Advanced category pilots are encouraged to bring their best and compete. Even if you do not make the team, it is possible you can come to Las Vegas and compete as an individual in what is known as hors concours, or HC. Practically speaking, HC means that you will be scored like every other pilot, but your results will not count in the official standings. This category is open to all countries with the proper endorsement from their nation's aerobatic/aero-sports committee.

The WAAC 2023's organizers are partnering with the Figure 1 Foundation to donate their profits for the aviation scholarships they grant annually. The foundation was co-founded by AJ Wilder, U.S. Unlimited Aerobatic Team member, and Chris Olmsted, IAC 49 chapter president. The scholarships awarded by the foundation go to passionate, career-oriented individuals in the aviation industry who show intent on giving back to the aviation community and furthering aviation safety. Scholarships awarded are for glider training, earning a private pilot certificate, tailwheel endorsement, upset recovery and spin training, aerobatics, and earning aerobatic judge certification.

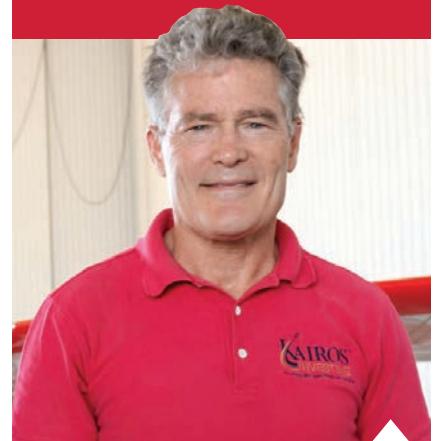


The WAAC 2023's organizers also have partnered with Aircraft Spruce & Specialty to ensure maximum aircraft on ground coverage from its warehouse in Corona, California. In addition to the trophies provided by FAI/CIVA, the organizers are planning impressive individual trophies that involve the generous support from our sponsor MT-Propeller.

Extra Aircraft and MX Aircraft Co. will be on-site for demos to thank the generous support of WAAC's many sponsors.

The WAAC is also fortunate to have generous support from Body Vision Los Angeles (BVLA) and the Jimmy Graham Foundation. Our thanks to BVLA leaders Nick and Kerry Martin and Jimmy Graham, co-chairman of the EAA Young Eagles program.

Visit the website at [WAAC2023.com](http://WAAC2023.com) for more information about the championship. **IAC**

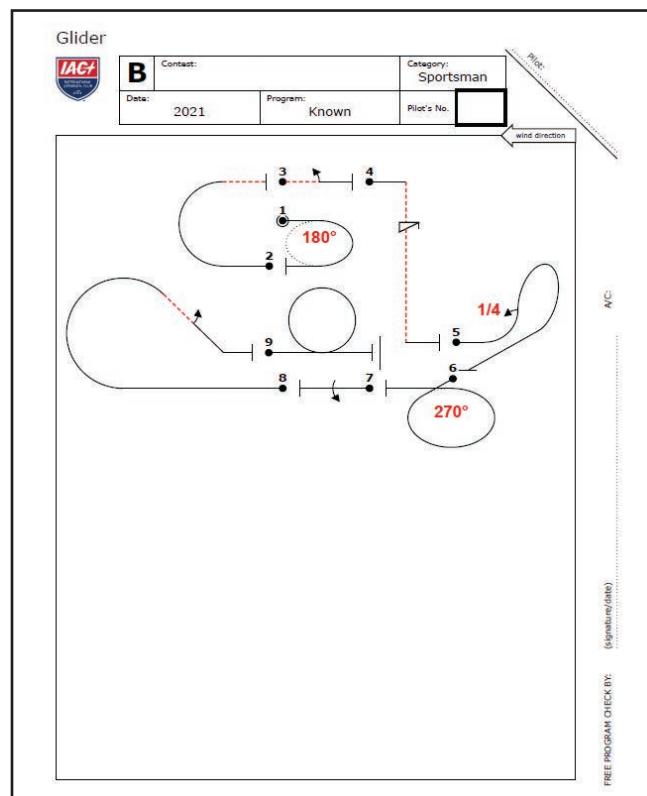


# Glider Judging – Reviewing the ‘Setting a Line’ Rule

BY DAVID TAYLOR, IAC 435489

**IF YOU LIVE EAST** of the Mississippi, you won't get much experience judging gliders. For some reason, it doesn't seem to be much of a thing out east. In fact, the last time I saw a glider was at the 2019 U.S. Nationals, and it had been four years since I'd judged one. Since there are so few opportunities, it's not unusual for judges to get fuzzy on the judging criteria between viewings.

That was the case during the 2021 U.S. Nationals when, due to a weather slip, a set of Sportsman gliders were added to the Unlimited Power Free Unknown-1. Below was the sequence the gliders were flying.



I can also look in the Rule Book and see if there are any illustrations that demonstrate some of these transitions and how the judge scores the figures.

During the bus ride out to the judging area, I recalled that the setting-a-line rule said something like “the competitor can exit a figure at any reasonable angle.” Here is the actual verbiage from the 2021 IAC Rule Book:

34.20.2.1 In Glider flights, the lines marking the entry into and exit from a maneuver can be at any reasonable angle and need not be the same, provided the angles do not violate the basic form of the figure.

Example: If a pilot is about to fly a loop, which requires only a moderate velocity, followed by a hammerhead with a quarter-roll on the upline, which requires a high velocity, a judge can expect a much steeper attitude on the line marking the loop's exit than on the line marking the entry to the loop.

My problem was, I couldn't quite figure out what that meant I might see in the Figures 2-3-4 string. The glider would need to be nose up to get it to stall and spin (correct?), so that means I would see the glider come out of Figure 2 early (i.e., a little nose up) and maintain the nose-up attitude through the half-roll, and then maintain it into the spin entry? Could the pilot even do a nose-up half-roll from the top of a half-loop up? (I'm thinking no, but if that's true, how are they going to get to the spin-entry parameters?)

At the judging area, while we waited for the first aircraft to launch, there was an impromptu judges' discussion about the “exit at any reasonable angle” rule, and we heard questions such as, “If you need a different nose attitude, you can change nose attitude between figures, right?” and “Isn't there a penalty for changing nose attitudes?” I came away from the discussion still unclear about what I was going to see and what I might do with respect to deductions. Maybe all the other judges were clear in their minds, but I'd be willing to bet more than a Coke that wasn't the case. Lucky for me, the glider competitors did a great job flying and nothing questionable happened between figures.



Whew! Got away with being glider-rusty!

At the evening social that night, I engaged a group of U.S. Air Force Academy cadets, explained my lack of clarity, and dug out the Form B from my pocket. The cadets explained it so well, I thought it was worth passing along.

It turns out that “exit at any reasonable angle” only applies to figures that have some verticality to them – loops (or portions), Cubans, quarter-clovers, 45- or 90-degree uplines or downlines, etc. As pilots exit those types of figures, they can set “any reasonable angle.” But once the competitor comes out and sets the angle (which doesn’t necessarily equate to attitude), they are not allowed to change that angle before commencing the next figure (not without incurring a penalty at least). The key parameter to keep track of is the trajectory (i.e., angle) of the center of gravity (CG), not the nose attitude.

More importantly, though, if a figure is meant to be flown level, the competitor is not allowed to reposition the angle as they exit that figure.

Given the above two thoughts, let’s look at the Figure 1-2 transition and planning. Dive into the box, wing-wag, set the angle, and then hold that angle throughout the 180 competition turn. But the competitor is not free to change the angle after rolling out of the turn. They’ve had to preplan what they were going to need to complete the half-loop up and make sure they set the appropriate angle going into Figure 1 so they would have the knots to make it uphill smartly in Figure 2.





## PROGRAMS & COMMITTEES



Now let's see how that plays out in Figure 2-3-4 planning and transitions. We've already established that the pilot can come out of Figure 2 at any reasonable (CG trajectory) angle, but Figure 3 and (the start of) 4 are supposed to be flown "level," so whatever angle the pilot chooses, they would have to maintain for all of Figure 3 and into Figure 4 until the spin initiation. That angle needs to be preplanned and can't be changed without the standard 1-point-per-5-degrees penalty.

The big hypothetical question mark sitting over my head remained: Assuming the nominal glider can't come out of a half-loop up and then do a half-roll, all with the nose appreciably above the horizon, how on earth could it then slow down and stall without repositioning the nose?

Spoilers! That was the piece of the puzzle I wasn't considering. I forgot that gliders have spoilers. With that "new" piece of information, and the bit about watching the CG trajectory and not necessarily the nose attitude, the Figure 2-3-4 visual presentation all made sense.

For example, the glider might come out of Figure 2 with a 5-degree downward trajectory. (And the nose attitude would likely closely match the CG angle — you don't need much angle of attack when you have a 39-to-1 glide ratio.) Then the CG continues the 5-degree-descent angle throughout the Figure 3 half roll, with the CG still moving at a 5-degree angle and the nose moving as necessary during the roll to maintain the CG trajectory — same as in the power category. And then, exiting Figure 3, out come the boards! The CG stays at the same 5-degree descent, but now the nose starts pitching up to maintain "level" flight as the airspeed slows toward stall. And finally, controls and spoilers are input as necessary to enter the spin.





And with all that new knowledge and perspective, it's easy to picture what must happen on the Figure 5-6-7-8 sequence. The pilot sets the desired (CG trajectory) angle coming out of the quarter-clover and must keep that angle throughout Figures 6 and 7 and into 8.

Voilà!

For review, here are the salient points I will take forward:

The "setting a reasonable angle" issue only involves the angle of travel of the CG; pay no attention to the nose attitude. When you think about it, it is the same for the power category, only there is no leeway in what the CG angle can be. For level figures in power categories, the CG must travel on a true level line, even though the nose may be at significantly different attitudes, depending on what the plane airspeed is.

Setting a reasonable angle only applies to the exit of figures that had a vertical component to them.

If a figure is supposed to be "level," the glider pilot is not allowed to change the CG trajectory angle during the figure or when coming out of it.

My thanks to our United States Air Force Academy competitor brethren for splainin' it and helping me continue down the path toward better glider judging and spectating. **IAC**

---

**David Taylor** has been an IAC member since 2010. He currently flies a Giles G-200 in the Advanced power category. In 2021 he placed first in the Regional Series in the Northeast.

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# THE 11-YEAR *Pitts* 11 MODEL

BY JOSH PRUZEK, LIFETIME IAC 24408, and  
TONY HORVATH, IAC 440961, with  
LORRIE PENNER, IAC 431036

**IN THE SPRING OF 1998,** Josh Pruzek received the May issue of *EAA Sport Aviation*. On the cover was the brand new Aviat Pitts S-1-11B, a reincarnation of the Pitts Super Stinker. "Flies like a monoplane with two wings," Kirby Chambliss said! "I want one badly," Budd Davisson said. "Me too!" Josh thought.

**TOP:** Mark and John Sorrell welded up the basic fuselage truss.

**MIDDLE:** Chris Murley/Wolfpitts airfoiled carbon horizontal stab.

**BOTTOM:** Ribs from the Precision Aero Marine "stock" wing kit.



At the time, Josh was building a Christen Eagle (now flying in the United Kingdom as G-OZIP). However, after selling that project a few years later to finance a flying Pitts S-1S, his thoughts drifted back to the S-1-11B. After his building experience with the Christen Eagle, he felt there were some changes he would like to make, and the Model 11 looked to be the best bang for the buck at the time.

According to “The Pitts Returns,” a May 1998 article by Budd Davisson, “... the airplane is the only airplane with this kind of aerobatic performance we know of that can be scratch-built from a set of plans. What this means to the homebuilder is that costs can be kept to an absolute minimum while the final result is of world class quality.” Budd did a little quick math for everyone and figured he could build up an IO-540 for around \$15,000, and all the tubing wouldn’t cost \$1,000. Then the wing wood would be close to \$2,000. “If only those figures were true today!” Josh remarked.

The original prototype was designed in the late 1980s by Curtis Pitts. In the May 1994 issue of EAA Sport Aviation, Budd Davisson had taken his first swing at writing about the Pitts Super Stinker in the article “The Old Master Does It Again.” Budd observed that Curtis dusted off his drafting board to design an Unlimited category airplane that the average homebuilder could screw together for much less than the top aerobatic mounts of the day, which were running \$150,000-\$250,000.

In this 1994 article, Budd said Curtis hadn’t made up his mind what he was going to do with the Super Stinker. Although he wanted to get back into the airplane building business and offer plans, he was leery about liability problems. In the end, the airplane design went through several ownerships before landing at Aviat.

Josh ordered his Super Stinker plans, serial No. 4028, in August 2006. He ordered a VR3 tubing kit and a Precision Aero Marine wing kit a year later. He began construction in 2009 by asking the Sorrell brothers, Mark and John of Hiperbipli fame, to weld up the basic fuselage truss for him. “You could count the completed Model 11s in the world on one hand at that time,” Josh said. “I decided to enlist the help of the Sorrells because of their vast experience building and rebuilding aerobatic biplanes.” The Sorrells would go on to complete most of the basic airframe, working closely with Josh on modifications and changes he wanted to incorporate. The Sorrells would also complete the fabric work, and their meticulous craftsmanship and attention to detail are evident in the finished product.

Although Aviat has sold more than 100 sets of plans, only 20 Model 11s had been completed and flown by the

# FLY GREEN - FLY MT

time Josh completed his. Several of those Model 11s had been chronicled in *Sport Aerobatics*, and Josh still has the dog-eared copies from many hours of studying those articles and photographs.

One of those planes belonged to Dan Salcedo, who built an S-1-11 because he wanted to stay competitive in the Advanced category and because his wife, Ann, knew he needed more power. Ann contacted Eddie Saurenman, who was one of the many owners of the plans before Aviat, and he made some modifications of his own. Ann bought the plans as a surprise birthday present for Dan. "I put some of my own touches into the project that are similar to Aviat's, including a carbon fiber, semi-reclined seat and a squared-off rudder," Dan said in an article written by Budd Davisson that appeared in the February 2008 issue of *Sport Aerobatics*.

Although he originally intended to build his airplane as an S-1-11B clone, exactly as Aviat had done, Josh decided to make some changes to the basic Model 11 airframe. Not long after Josh's material kits arrived, Steve Wolf and Tony Horvath introduced the Wolfpitts Pro they had built for Wyche Coleman. Several discussions with Tony — by this time running his own company called Specialty Aero — convinced Josh that many of the trick ideas Tony and Steve came up with for the Wolfpitts Pro could be adapted to the S-1-11. "The original Wolfpitts and the Wolfpitts Pro were the biggest influencers on this project," Josh said. "Steve Wolf was one of my childhood heroes, and his interpretations of the classic Pitts design represent the pinnacle of biplane technology."



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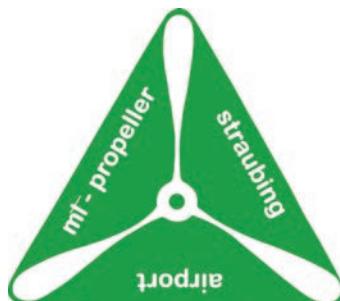
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**TOP:** Modified wings with outer one-third swept leading edges and tapered spars with carbon wingtips.

**MIDDLE:** A good time to mate the wing to the fuselage before going further with the wing.

**BOTTOM:** The extended rudder was modeled after the Pitts Model 12.

The original factory-built S-1-11 wings incorporated what would become known as “Super Stinker Wing Technology.” Curtis had incorporated his patented method of using a different airfoil section on the bottom wing so the top wing would always stall first. “However, when doing this for the Super Stinker, he came up with a unique aileron design that gives light, quick pressures and phenomenal roll rates without resorting to shovels which would hang below the ailerons,” Budd Davisson said in the 1998 article “The Pitts Returns.”

Douglas fir spars were originally supplied with the Precision Aero Marine kit. Josh intended to replace them with spruce but ultimately kept them due to their slightly greater strength. Josh chose to further modify the wings by incorporating design refinements pioneered on the Wolfpitts Pro, including a swept and tapered outer wing planform with a carbon fiber wingtip and nearly full-span, three-hinge aluminum ailerons with an overbalance “ear” to reduce control pressures further. Working with Tony and the Sorrells, the Precision Aero Marine wing was modified to include the new wingtip and aileron design.

Additional Wolf modifications incorporated into the design include the carbon fiber cowl, the titanium-rod landing gear, the horizontal stabilizer and elevator, and the single-piece, swing-over canopy. Tony also designed a few additional modifications specifically for this aircraft, including a removable carbon fiber turtledeck and many carbon and aluminum fairings.

Tony produces popular parts for Pitts builders, including performance parts for the Pitts S-1-11 and Pitts S-1. Josh’s airplane served as a prototype for many of these for the Model 11. Tony is also an important member of the Pitts community and “grassroots” aerobatics movement, as well as a prolific aircraft builder. His list of aircraft builds and modifications is impressive and includes Sean Tucker’s Oracle Challenger III, Peter Kohmann’s Pitts S-1T, and Pete Diaz’s Pitts S-2S.

Making his living supporting custom aerobatic aircraft, Tony has established himself as the go-to source for aerobatic aircraft rebuilds, custom fabrication, and modifications. He is carrying on where Steve Wolf left off when Steve moved away from building, maintaining, and modifying Pitts aircraft.

Known for producing popular parts for Pitts builders, including performance parts for the Pitts S-1-11 and Pitts S-1 and his involvement in developing the Wolf wing kit for the Pitts S-1, Tony enjoyed working with Josh. “He is the kind of customer you can talk into anything,” Tony said. By “anything,” Tony meant that Josh was open to adapting the “trick ideas” he and Steve came up with for the Wolfpitts Pro for his Pitts S-1-11B.

# Parts List

## FUSELAGE

- VR3 fuselage kit, mostly stock, some changes to formers and stringers to streamline the shape
- Laser-cut fittings by Kevin Kimball

## WINGS

- Precision Aero Marine “stock” wing kit
  - » Douglas fir spars
  - » Modified with outer one-third swept leading edges and tapered spars with carbon wingtips
  - » Plywood leading edges and aileron covers
  - » Wolfpitts extended, three-hinge, aluminum, balanced “ear” ailerons (Tony sells a complete kit, carbon tips extended ailerons)

## EMPENNAGE

- Initial empennage was the stock plans design from VR3
- Second empennage was a VR3 empennage kit of Steve Wolf's design
- Third empennage was a Chris Murley/Wolfpitts air-foiled, carbon horizontal stab, and balanced elevator skins
- Extended rudder – modeled after the Pitts Model 12
- Dual trim tabs

## LANDING GEAR

- Initial landing gear was stock spring aluminum design
- Initial engine mount was a stock design
- Second landing gear/engine mount design incorporated steel Wittman rod-gear made by Langair Machining
- Third mount design was built for Ti rod-gear
- Aviation Products 4-inch dual-fork tail wheel and stainless steel tapered tail spring
- Tail Lynx custom tail wheel steering springs and cables
- Team Rocket fiberglass wheelpants (these will be replaced with carbon fiber when available)
- Grove dual-puck wheels and brakes

## AVIONICS & ELECTRICAL

- United Instruments airspeed and altimeter, Century Instruments g-meter, Airpath compass, Electronics International MVP-50P, Garmin GTX 345/GTR 200B/aera 660
- Hidden GPS, comm, and transponder antennas (Garmin and Advanced Aircraft Electronics)
- EarthX Battery, SD-8 alternator, B&C light-weight starter

## FUEL SYSTEM

- Main tank is plansbuilt, 29 gallons, fabricated by Shawn Jarrell Fabrication
- No wing tank
- No header tank
- 8-gallon smoke tank that was later wired to double as a fuel tank that can pump fuel into the main tank
- Airflow Performance fuel pump and filters
- Reverso smoke oil pump

## FIREWALL FORWARD

- AEIO-540 by Unlimited Aero Engines
  - » New cryo-treated crank, rods, and counterweights
  - » New Lycon pistons
  - » New Lycoming cylinders with tapered barrels
  - » Airflow Performance fuel injection
  - » Sky Dynamics cold air intake and six-into-one exhaust
  - » RV-10 baffle kit
  - » Clear carbon front baffle by Specialty Aero
  - » Counter-weighted Hartzell Claw propeller
  - » Carbon fiber spinner
  - » PCU5000 governor

## OTHER COOL STUFF

- Wolf carbon cowl
- Single-piece, side-opening canopy with carbon skirt
- Removable single-piece carbon turtledeck
- Carbon upper gear leg fairings
- Aluminum and carbon wing root fairings
- Formed aluminum seat pan and back with recesses for seat-pack Softie parachute



After the Sorrells had completed the basic airframe, Josh brought it to Tony's shop for the firewall forward installation, painting, assembly, and rigging. The aircraft is covered in medium Ceconite and double covered on the inboard third rib bays both upper and lower. Nitrate and butyrate dope through silver is topped with PPG Delfleet base/clear topcoat. "Ceconite was chosen for the additional tautness it adds to the fabric. We find that it holds the airfoil better during aerobatic loads," Tony said.

"From the beginning of this project, I had a feeling it would end up being blue," Josh said. "It's my favorite color, and no one had done a bright blue Model 11 or Wolfpits yet." Tony found a blue paint sample on another project, and Josh had it matched in PPG Delfleet. While the paint scheme was being designed, Tony had everything first painted blue since this color would anchor the scheme. Ultimately, the paint scheme design was completed by Kevin Burns at Scheme Designers, and the final paint scheme application was done by Cascade Custom & Design.

While it took 11 years for Josh to complete his project, he always had another airplane to fly, his Pitts S-2B, so he didn't mind the time the project took. But there were frustrations with getting supplies and parts when needed. He waited three years for an engine and a similar time frame for the exhaust at one point. Build time was added occasionally because he is an aesthetically driven person, and everything had to be done just right. The engine mount was redone three times, as was the empennage. Sheet metal was reworked until the fuselage lines flowed perfectly, without unnecessary angles or bumps. Other cool stuff (aka custom items not in the plans) that took many

additional hours were the custom modifications that Tony and the Sorrells came up with based on their years of extensive experience building aerobatic aircraft. "I enjoyed the building process as much as I now enjoy the finished aircraft," Josh said.

N806PS received its airworthiness certificate on January 22, 2021, and the first flight was completed in February 2021 with test pilot Sean Van Hatten. On a bright sunny day in Creswell, Oregon, Sean's findings on the test flight included a bit of right-wing heaviness, an alternator that wasn't charging, minor oil and fuel pressure fluctuations, several uneven cylinder head temperatures, and a slight pitch sensitivity as a result of the incorporation of both overbalance ears and servo tabs on the elevators. All issues uncovered on the test flight have since been resolved.

"I was hoping for 1,090 pounds empty – the Aviat -11B's empty weight – but I suspected it would be 30-50 pounds heavier all along," Josh said. And it was. N806PS weighs 1,137 pounds with 10 quarts of oil, ready to fly. "I'm pleased with where it ended up, but I have a few things I can do to bring that down in the future," he said. "The plane is an absolute rocket and will blow right through the 230 mph redline in straight and level, wide open throttle flight."

That speed was not surprising with its high-compression AEIO-540 by Unlimited Aero Engines, which was counter-weighted by a Hartzell Claw propeller. "Tim Hess built an incredible engine," Josh said. "He's not the most well-known engine builder, but his work on several Red Bull Air Race teams convinced me he knew how to get the most performance out of a motor. I waited a long time for it, but it was worth it."

Josh Pruzek stands with his completed project.





Budd noted similar performance in his 1998 article about the S-1-11B (with a similar AEIO-540 Lycoming and Hartzell HC-C3YR-1A/7690P prop). “Rolling out onto centerline with the throttle coming up, I was treated to the most amazing acceleration I’ve ever felt in an airplane. Actually, it may have been the most acceleration I’ve felt in anything, which includes some fairly serious drag cars. Later I did the math: At that weight (competition weight 1,350 pounds) and power, the power loading was under 4.5 pounds/horsepower. No wonder it was a rocket ship! Aviat claims 4,000 fpm, and later timed climbs showed the rate of climb may actually be higher than that.”

“I can confirm Budd’s experience with the factory prototype,” Josh said. “It is an incredible airplane to fly, and I am only beginning to understand its full aerobatic potential.” Josh intends to compete in the aircraft and hopes to debut it at the popular Corvallis Corkscrew annual competition.

Lastly, Josh pointed out that this project produced not only an incredible aircraft but also some fantastic relationships along the way. “I’ve met more people throughout this project than I ever imagined,” he said. “For me, that was an unexpected reward.

This project would not be possible without many of those individuals, including the incredible talent and guidance lent by Mark and John Sorrell and Tony Horvath. These three have forgotten more about biplane construction than I’ll ever know, and I am grateful for their creativity, ingenuity, and their friendship. I’d do another project with them in a heartbeat!” **IAC**

#### **Josh Pruzek**

Josh grew up in an aviation family in western Wisconsin and learned to fly while attending college. He worked as a flight instructor and Part 135 charter pilot until the events of September 11, 2001, saw him pursue a 20-year career in marine, aerospace, and defense contract manufacturing. Josh maintains his instructor ratings and is a four-time Pitts owner. He is also a lifetime EAA, IAC, and AOPA member.

#### **Tony Horvath**

Tony was the recipient of the IAC’s 2019 Curtis Pitts Memorial Trophy, which recognizes an outstanding contribution to aerobatics through product design. He is an aerobatic airplane builder, supplier, and pilot in Creswell, Oregon. Tony worked for Steve Wolf from 2004 to 2009. In 2009 he started Specialty Aero. He supplied Wolf Aircraft parts until 2014 and still builds the wing kits for the Wolf Pitts.

Appearance  
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To be certified, solvents and degreasers, like NUVITE’s NuPower® and CitriCut® Xtra, both effective on soils, grease, carbon and tar, are assessed for flammability, flashpoint, residual product staining, and against softening or decreasing hardness of any protective barrier.

Chances are bargain detergents will leave a filmy-soapy residue that becomes a magnet for soils, dust, and debris on your next take-off. Aviation certified soaps and detergents, like CitriCut® Gel, do an excellent job removing dirt and oils from your plane’s underbelly, as well as rinse and neutralize easily and effectively.

Aircraft windows should be cleaned only with certified agents like C-49® Multi-Purpose Surface Cleaner. Testing shows aggressive solvent-like cleaners cause crazing, which may refract light and create visibility issues or worse, failure.

There are many top-quality aircraft cleaning agents. Uses vary under different conditions; the type of material, aircraft finish, and whether the cleaning is internal or external.

It’s most important to remember:

If it’s not AVIATION CERTIFIED DON’T USE IT!

The owners’ manual should list all manufacturer’s approved brands for cleaning your aircraft. Keep in mind, chemical cleaning agents change as alternatives are developed, and along with new agents come new precautions and procedures. Always consult with a trusted FBO or professional detailer for updates.



**PRO TIP!**

Take a close look at the fine print in the owner’s manual as it relates to usage of cleaning products.

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Use of non-approved aviation products may negate terms of certain warranties. For example, unlike NUVITE’s Regard furniture polish and its Leather Guard conditioner, the main ingredient in most commercial products is silicone. Silicone builds waxy layers that trap dirt and oils, effectively altering the surface. Removal is difficult and will more than likely jeopardize any existing warranty.

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# International *Aerobatics* Day

## Reflections from IAC 35 and 58

**Eric Anderson**, IAC 436341, **Ray Fuller**, IAC 437750,  
**Mark McKibben**, IAC 18919, and **Chris Murley**, IAC 435695

### IAC Chapter 35

**Ray Fuller**, IAC 437750

**I**t was a beautiful New England day with little to no wind — perfect for aerobatics. Following the resounding success of the inaugural National Aerobatics Day in June 2021, the International Aerobic Club (IAC) took the event global. The first International Aerobatics Day was held on June 25, 2022.

The IAC's New England Chapter, IAC 35, celebrated the day in Concord, New Hampshire, at the Concord Municipal Airport (KCON). Pilots arrived early in an array of airplanes. Displayed on the ramp were colorful examples from Pitts, Christen Eagle, Sukhoi, Lazer, Zlin, Staudacher and, of course, one or two Extras. Planes designed in the United States, Russia, the Czech Republic, and Germany served as ambassadors to the international spirit of the day.

Chapter member Rob Dumovic arrived in a head-turning Extra 300 emblazoned with the stars and stripes of the American flag. Rob is embarking on a journey to join the U.S. Advanced Aerobatic Team and is chronicling his journey at Spread Aviation on YouTube.





A bold black-and-yellow Extra 330SC entered the pattern. The distinctive Extra taxied to the ramp with IAC 35 lifetime member Michael Goulian at the controls. Mike was gracious enough to watch the pilots as they performed their routines in a chapter practice session. Mike also spent time speaking with pilots, and visitors, including one young pilot who has his sights set on a flying career in the U.S. Air Force.

The day unfolded with a perfect blend of stunning weather, phenomenal flying, a meet-and-greet with the pilots and, of course, food. IAC 35 even had its own branded cookies and cupcakes! Visitors marveled as the pilots put their airplanes, and themselves, through their aerobatic routines. Pilots were seen in hangars performing “the dance” as they walked around in an imaginary box, their hands diving and climbing, and visualized their routines.

When not in the air, the airplanes formed a stunning static display. Visitors walked around the airplanes, spoke with the pilots, and learned about the airplanes and aerobatics. Several people asked about flying lessons and getting started in aerobatics.

Aerobatics represents the ultimate expression of the freedom of flight. Likening aerobatics to “pure” flying, British aerobatic pilot Alan Cassidy wrote, “Pure flying involves no application. It has no purpose other than personal fulfilment. It is selfish and pointless. It is also utterly inspiring and addictive. [No other machine] comes close to providing the three-dimensional freedom of expression and timeless joy of limitless pure flight.”

The essence of the day was a celebration of aerobatics, of limitless pure flight, and of a community coming together. Adults and children alike were able to speak with the pilots and get close to their magnificent machines. Adults and children alike watched in awe and were mesmerized as the pilots put their machines through their intricate routines. Some met and chatted with Mike Goulian, a true ambassador of the sport and the community. Some even left with a cherished “selfie” with Mike. It was clear to see that many of the visitors were inspired. Some may even become addicted.

IAC 35 sends a heartfelt thank-you to all those who worked behind the scenes to make International Aerobatics Day a success across the aerobatic community. It also extends a very special thank-you to all those who attended the celebrations.



# International Aerobatics Day



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## IAC Chapter 58

**Eric Anderson**, IAC Chapter 58 president,  
**Mark McKibben**, IAC 18919, and **Chris Murley**, IAC 435695

Chris Murley did it again! Fifteen airplanes turned out for the second annual Skyhaven International Aerobatics Day. Fifteen!

I missed Friday — the camping and the evening party. But I did stop in on Saturday for a few hours — enough time to enjoy the aerobatic box, make new friends, and get reacquainted with old ones.

With two successful IAC Chapter 58 events under our belts, Chris is considering making it a biannual event with a fall date still to be determined.

Mark McKibben showed real mettle, baking in the sun, coaching, and keeping all the participants safe. He'd spent two full days on the judges' line at Warrenton, Virginia, the weekend prior. That's some fortitude! Since he and Chris saw most of the action, I'll let them tell the story of this fine hot, sunny day.

"First of all, I want to thank Chris Murley and Matt Griggs for hosting a wonderful event in such a glorious location,"

said Mark. "Their generosity is amazing. Upon arrival, I was graced with the scale version of my bird, a Super Starduster project I have been working on since purchasing it in 2020. Tom Lowrie is not only a master craftsman when it comes to scale construction; he's also an amazing pilot.

"I appreciated an introduction to Kelvin Rempel and his son, Brett. We had a great time talking about building and flying acro. Dan Williams had driven down for Friday because of weather/fog in the morning but went home and then flew back in his beautiful Acro Sport on Saturday. Travis Pauly and Tom Kitchen flew in from the Pittsburgh area, and Bill Hall drove in.

"Someone mentioned my last name and a young man said, 'What? That's my last name!' Cole McKibbin is a sales rep for Piper, and it was the first time outside of family we had met someone with basically the same last name.



# International Aerobatics Day

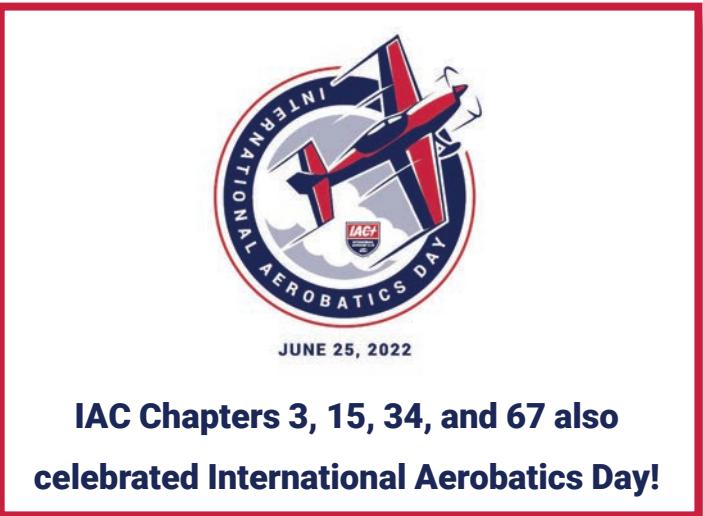


"Eric Anderson flew his Pitts in for the event. It is always great spending time with him. Kendall Horst and Sheldon Horst flew up in the AcroDuster Too. It is a beautiful bird with an impressive performance." [It won a Reserve Grand Champion Silver Lindy.]

"Igor Shmunko flew his Christen Eagle up and claimed he hadn't flown since November. Ray Franke came up in his new-to-him Pitts S-2B. He claims he can't fly it; I don't agree. Time in the seat will solve that. There were so many people I didn't get to meet or talk with. I spent both days working with those who wanted some coaching, and a noticeable improvement was made by all but Smizo (aka Chris Murley). His flying was great out of the box — pun intended.

"The local turnout wasn't as big as last year but was easier to keep a handle on. A coal mine buddy of Smizo's cooked a roast for sandwiches for anybody who wanted one, and it was some good eating. He also brought a 95-year-old WWII vet, Phil Voystock, who was sharp and just awesome to have on-site. Friday's pizza and libations were enjoyed well into the wee hours and the fun and frivolity were abundant. The aviation family is an awesome group, and I consider myself lucky to be included even though I still am struggling with getting my plane to fly. I know I've missed someone in this and sincerely am sorry."









"What a great event!" said Chris Murley, host and organizer. "Each year our chapter events are just getting better! It was pretty hot this year, but that didn't slow us down too much. Everyone who wanted to fly did as much as they could possibly have wanted to."

"The highlight for me, flying-wise, was watching Tom Kitchen masterfully fly his Citabria in all its capabilities!"

"It was just so nice hanging out with friends and meeting new ones! Tom Lowrie put on some great model demonstration flights. We had the opportunity to show our model and full-scale modified Acro Sport II [ASIIS] routines to everyone. Tom and I did a formation flight with my plane (the ASSIS) and the RC model of the same plane. The routines were super-fun; the other flight was with Travis in his Skybolt and me in my ASIIS.

"My absolute favorite part of the weekend, though, was my mining buddy Billy Best bringing our great friend Phil Voystock along. He's a 95-year-old coal miner who worked the last of the big mines here around Scranton and Wilkes-Barre. On Saturdays our group, a non-profit 501(c)(3) called 'Underground Miners,' is restoring a small mine in a park in Scranton for an exhibition/tour mine, and Phil comes down almost every weekend and sits outside watching us cut timber and such. It was great to be able to have him come watch 'the show' — something he'll never forget!"

"Can't wait to do it again!" **IAC†**



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# Anatomy of a Snap-Roll

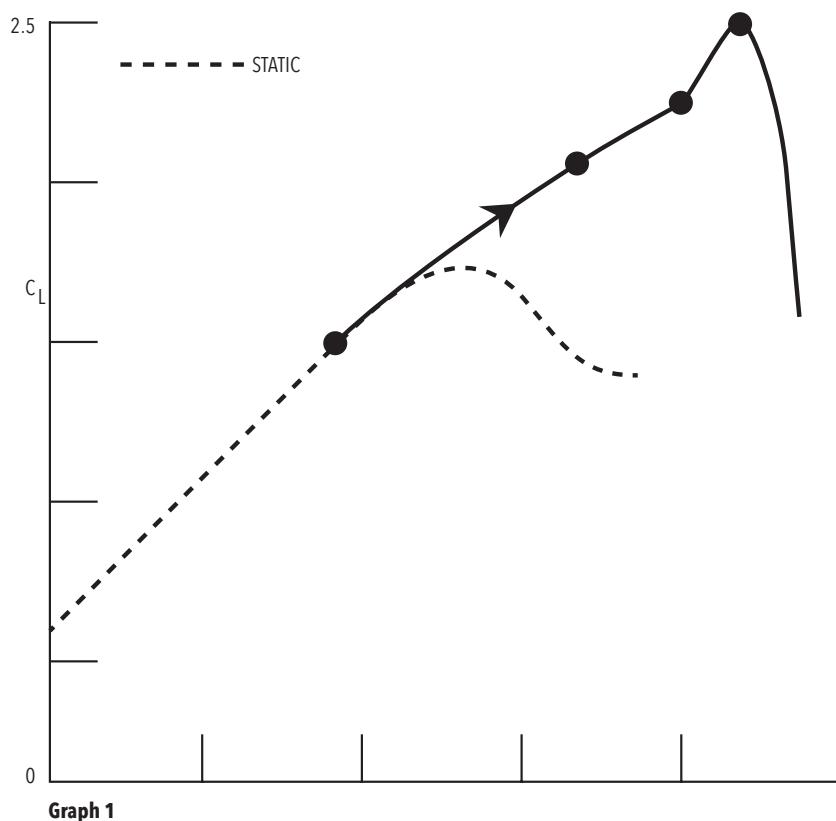
ALBERTO BECCARO, IAC 25833

**SNAP-ROLLS ARE BEAUTIFUL MANEUVERS** but can be dangerous for our aircraft. Why? They can impose high loads to the aircraft, and I am not referring only to the gyroscopic loads on the engine crank-shaft and engine mounts; I am talking about the wing.

Let's start talking about how the aircraft structure is sized. When we speak of an aerobatic airplane, one of the first features coming to our minds is how many g's it can bear: from -3g to +6g is the minimum required by the regulations (FAR 23 in the United States or EASA CS-23 in Europe) for an aircraft to be certified in the aerobatic category, but we know modern aerobatic aircraft can carry more than that amount, e.g. +/-10g.

What does it mean?

To make sure you know about the maneuver diagram, an example is shown below (Graph 1).



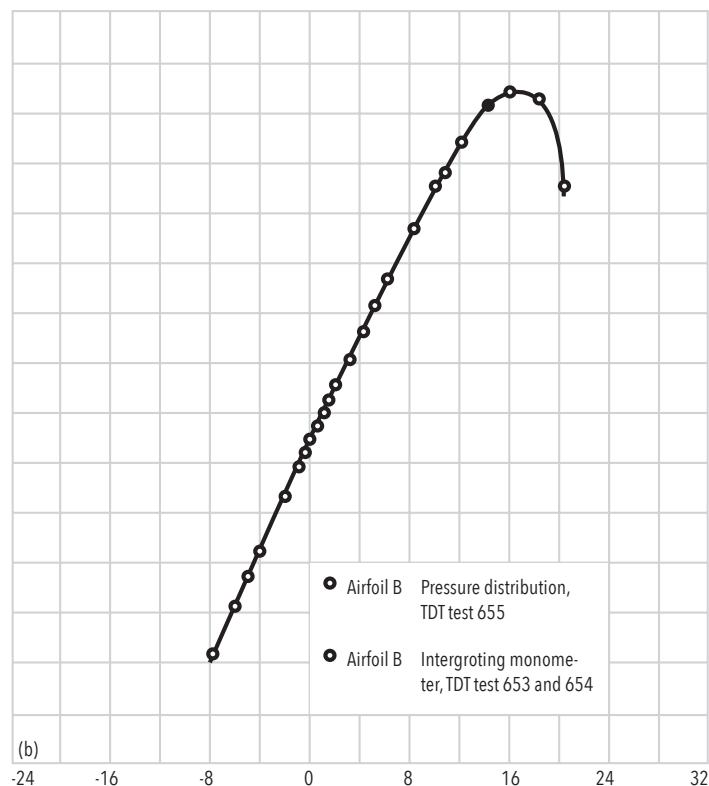
It means you can pull or push limit load factors from  $-3g$  up to  $+6g$ , up to the maximum aerobatic weight, in symmetrical maneuvers. Even if the maximum maneuvering speed (VA) is intended, you can move the stick full backward without overstressing the aircraft for the elevator movement only. By the way, you see that it can be not valid for stick full forward, i.e., negative g, and is not automatically valid for ailerons, unless specified in the pilot's operating handbook (POH). In some specific airplanes, the POH also states limitations for the ailerons, but what is requested by the rules is the symmetrical load factor envelope.

A 6g symmetrical pull for a 1,500-pound aircraft means that the wing is loaded with 6g multiplied by 1,500 pounds, which equals 9,000 pounds. (In reality, something more is needed to balance the elevator download, i.e., 4,500 pounds on the right semi-wing and 4,500 pounds on the left semi-wing.) If you move the stick to the left during this maneuver, the right semi-wing will be subject to 4,500 pounds plus the increase in lift due to the aileron deflection; therefore, that semi-wing carries more than 6g.

Snap-rolls are asymmetrical maneuvers. But there is an even more important factor to consider.

Most of the maneuvers we perform follow the rules of "steady aerodynamics," meaning that the rate of change of our angle of attack is not fast enough to affect the aerodynamics. We pass through a series of conditions that can be considered "steady," i.e., stopping for a short time in each position. The following example is the usual CL versus angle of attack (alpha, a) curve measured in a wind tunnel (Graph 2).

It is built by moving the model for example from  $\alpha = -8$  degrees to  $\alpha = +20$  degrees with a step of 1 degree, that is, changing the  $\alpha$  by 1 degree at the time, stopping in that position, acquiring the data (e.g., lift, drag, pitch), and then moving to the next position until the full range is covered.



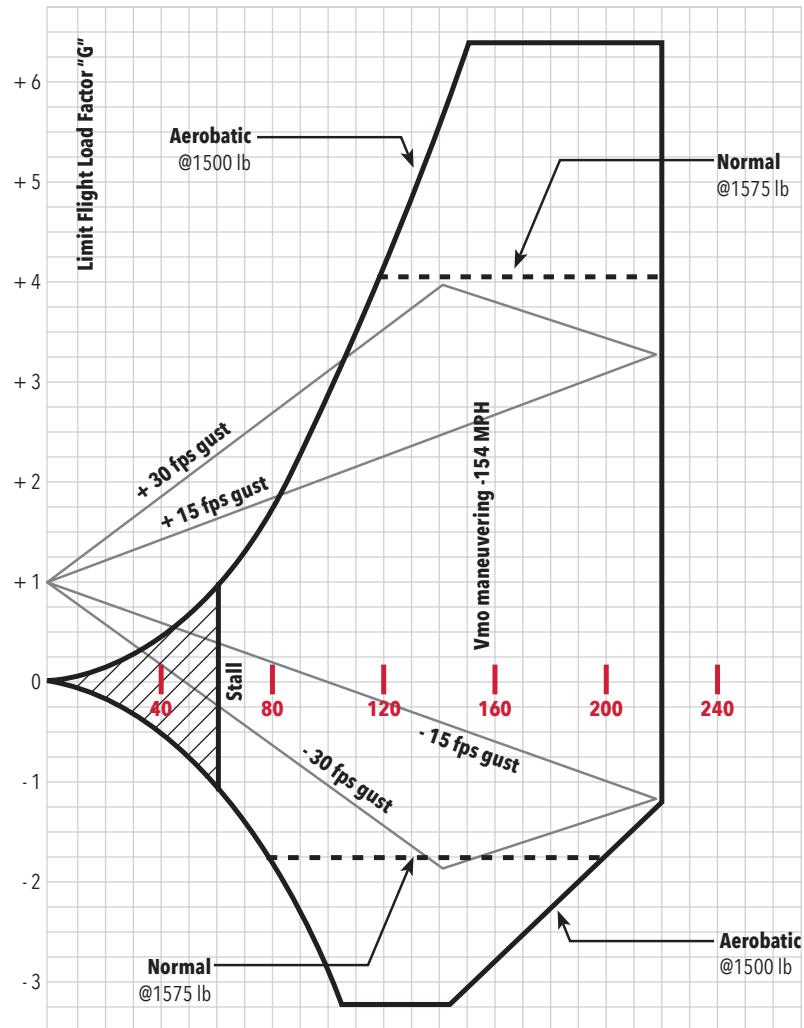
Graph 2  
CL versus angle of attack, wind tunnel measurements

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**Graph 3**

Dynamic CL versus angle of attack of an oscillating airfoil in wind tunnel

For the snap-roll, we go in another domain, the one of unsteady aerodynamics, i.e., the rate of change of angle of attack is so fast that the air has not a steady behavior and has no time to “adapt” to the new condition. It has an unsteady, or dynamic, behavior.

Unsteady aerodynamics is the one used by the insects that move their wings very fast; they also take advantage of the wing interactions. A wing in unsteady conditions has very different characteristics with regard to a steady one; particularly, the CLmax can be much higher than the steady one — to simplify things a lot — if the air is not immediately “realizing” that the angle of attack is changed and stays attached to the wing for a short time.

In Graph 3 (the one of the lower wing of the Pitts), there is an example of the NACA 0012 airfoil CL versus  $\alpha$  in steady or static condition and in a dynamic condition; the dynamic characteristics vary with the rate of change, so there is not one unsteady aerodynamic characteristic. But you can see in this example that the CLmax is more than twice the static one (Graph 3).

So, coming back to the snap-roll, it starts with an asymmetric stall. In addition, the CLmax can be much higher than the steady one, i.e., the one used for determining the maneuvering speed, being:

$$L = N_z * \text{weight} = 1/2 * \text{air density} * \text{wing surface} * CL * V^2$$

When you use the CLmax in the formula at speeds above maneuvering speed, you overstress the aircraft, but you have the same result if at maneuvering speed your aircraft develops a higher CLmax, such as in a dynamic maneuver like the snap roll. If your airplane develops a CLmax dynamic that is twice the CLmax static, the maximum speed for the snap roll is roughly 0.4 times smaller than the maximum maneuvering speed.

Usually, the CLmax dynamic is not twice the static one during a snap-roll but can be 20 percent higher. Therefore, the maximum speed for the snap-roll is about 10 percent lower than the maneuvering speed; in fact, for the Pitts, VA is 154 mph, and the maximum speed for the snap-roll is 140 mph. However, it is not a golden rule, so do not apply it to all aircraft. It depends on the airfoil and on the rate of change of the angle of attack.

It is important to carefully read the POH and airplane limitations and stay with what is indicated there. Do not rely on the fact that you or somebody else did something once and did not break the aircraft, because aircraft do not break just a bit above limit load, i.e., maximum g-limit; there is a margin established by the rules. When we pull within the limit loads, the aircraft maintains its full structural capability. When we pull above the limit load, the aircraft structural capability can be impaired by small cracks or permanent deformations that can develop a full structural failure after one or some further applications of limit load.

Bottom line, the margin is built in order to let you come back home, but it does not ensure that after a few other maneuvers, even within limit loads, that the aircraft could not break apart.

Again, use your airplane always within the limits indicated by the manufacturers in the POH.

Fly safe and inverted. **IAC**

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**Alberto Beccaro** has been an IAC member since the 1990s. He flies a Pitts Special S-2A that he has owned for the last 10 years. Alberto has around 600 total hours, of which 200 are aerobatic. He is an aerospace engineer and has been employed more than 30 years for an Italian aerospace company.

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The graphs in the article are taken from the Pitts POH (maneuver diagram) and the NASA Technical Memorandum 81246 titled "The Phenomenon of Dynamic Stall."





# Looking and Seeing

BY TOM MYERS, IAC 16830



**ALLOW ME TO SET** the scene. The place is the tiedowns near the starter's E-Z Up tent at the 2021 Coalinga, California, contest. The time is just before the Unknown flight. I have just finished preflighting my airplane. I am now pushing the airplane out onto the taxiway next to the starter's E-Z Up tent. The starter, AJ Wilder, says to me, "Are you sure you want to leave that on your rudder?" Thank you, AJ. You have demonstrated the real value of us all getting together and looking out for each other.

As soon as I heard AJ's question, I knew what I had done, or more specifically, what I had not done. What I had not done was remove the gust lock from my rudder during my preflight inspection. A bit of thought and more conversation with AJ helped me identify a list of whys and a list of behavioral and equipment changes that I was going to make to help ensure that I would not repeat the mistake.

I keep my airplane in a hangar. I am able to hangar my airplane at many of the contests that I attend. Coalinga rarely has hangar space available, so the airplane spends the contest in a tie-down spot. The wind is always blowing at Coalinga. Thus, during the Coalinga contest, there is the unusual use of a rudder gust lock. Additionally, the control stick is strapped back with the harness belt to prevent the ailerons and elevator from banging around. I skipped the step of checking the full ranges of motion of the ailerons and elevator during the preflight inspection because they were strapped down and protected. What I did subconsciously at the same time was skip the step of checking the rudder for full range of motion.

Behavioral change number one: I now always preflight my airplane as if it was at a tie-down spot, even when it is in a hangar.

Behavioral change number two: If it is breezy where I am doing my preflight inspection, I

check all flight controls for full range of motion, then strap back the control stick again until I get into the airplane. No shortcuts.

AJ mentioned a very interesting phrase for what I had done as we discussed what happened. He called it "looking but not seeing." My pre-flight inspection was focused largely upon looking at all the usual stuff. I was relying upon muscle memory and not paying enough attention to what I was actually doing. What I was not doing well was taking a step back and keeping my mind open and senses aware for the unexpected out-of-the-blue stuff. I was looking, but I was not seeing.

Behavioral change number three: Making a conscious effort to be more cognizant and aware of the big picture as well as the little picture. Not just going through the motions. Taking it all in. Looking, thinking, seeing.

My rudder gust lock was painted orange and had a short length of thick orange yarn attached. I purchased it when I still had my Stephens Akro. The Akro is painted mostly bright white. The orange really stood out against the white. Contrast city.

The rudder of my Edge is painted mostly red, with some yellow and black highlights. The orange gust lock does not stand out nearly as well. Contrast? Not so much. Please see the before photo.

Equipment change number one: I purchased some bright, neon-green spray paint and some thick, fluffy, bright neon-green yarn. I repainted the gust lock gaudy green; I added the gaudy green yarn to it. Lots of yarn. Contrast? Oh, yeah. Please see the after photo.

The reality of the situation is that if no one had noticed the rudder gust lock still being in place by the time I got in the airplane, I would have known immediately what I had forgotten to do as soon as I put my feet on the rudder pedals.

The flight controls all get moved around quite a bit as I get myself situated and harnessed in. The result would have been a walk of shame in front of everyone at the starter's area as I got out of the airplane, walked back to the tail, removed the gust lock, and stowed it back at the tie-down spot.

I recently wrote an article for *Sport Aerobatics* in which I described my stupid check. My stupid check is my short list of a few last checks I make before climbing into the airplane. My stupid check is the result of a walk of shame I had to make once to remove the pitot tube cover. I forced myself to do it instead of asking someone to do it for me in order to reinforce the learning experience.

Behavioral change number four: Include a full lap around the airplane during the stupid check, deflecting the flight controls as I do.

This situation was a wake-up call. Wake-up calls are good. They get your attention without anything bad happening as a result. Paying attention to wake-up calls gives you an opportunity to make yourself aware of the chain of events that led to the wake-up call and not repeat those events in the future, events such as cutting corners. Events such as thinking about your upcoming sequence while doing your preflight inspection instead of thinking about your preflight inspection while doing your preflight inspection.

Fly safe. **IAC**



Before: "My rudder gust lock was painted orange and had a short length of thick orange yarn attached."



After: "I repainted the gust lock gaudy green; I added the lots of gaudy green yarn to it."

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**2022 IAC CONTEST SEASON CALENDAR**► [IAC.org/Contests](http://IAC.org/Contests)

DATES	HOST CHAPTER	NAME	REGION	LOCATION	AIRPORT
September 16, 2022	107	Hammers Over Hondo	South Central	Hondo, TX	KHDO
September 17, 2022	137	Canadian National East	Mid-America	Midland, ON	CYEE
October 2, 2022	119	U.S. National Aerobatic Championships	South Central	Salina, KS	KSLN
October 15, 2022	5	Clyde Cable Rocky Mountain	South Central	Lamar, CO	KLAA
October 21, 2022	34	Ohio Fall Frolic	Mid-America	Bellefontaine, OH	KEDJ
October 28, 2022	36	Akrofest	Southwest	Borrego Springs, CA	L08
November 3, 2022	23	84th Sebring Championship	Southeast	Sebring, FL	KSEF
November 18, 2022	62	Tequila Cup	Southwest	Marana, AZ	KAVQ

# Aerobatic Seat Belts

BY KEITH DOYNE, IAC 10545, IAC SAFETY CHAIRMAN



**THERE'S A PIECE** of safety equipment that aerobatic performers tend not to pay much attention to until they need it. No, it's not the parachute — it's the humble seat belt. I don't know how

many pilots include a seat belt check as part of their preflight or post-flight check. Yes, I am one of the pilots who typically doesn't check the entire seat belt system. However, that will change.



"Here is the setup in my Pitts S-1, which is also how I wore the belts in my S-2B," said Spencer Suderman.



The Hooker Harness in the Sunbird S-1X designed by Dan Rihn.

At many aerobatic competitions, I have seen pilots get in their aircraft, buckle up, tighten the belts, and move on to the engine-start procedure. If all is good on that score, they then get into competition mode and fly a great sequence. There are times when pilots do consistently check their seat belts. However, this usually occurs in the air. During practice, it's not uncommon for a pilot to fly one or two maneuvers in order to check their belts, look for loose items, and check the inverted systems. At aerobatic competitions, pilots can perform a two-point roll on the base leg to the box to check these items. At the 2021 Nationals, the Unlimited and Advanced pilots were allowed to fly optional safety and practice maneuvers in the box, which did let them check their seat belt security. Officials approved a contest rule change that, as of this year, gives Unlimited and Advanced pilots this option at regional contests.

Your aircraft's seat belts take a beating, especially when you fly gyroscopic, outside, or inverted maneuvers. The Unlimited and Advanced categories feature many outside snap and inverted maneuvers. I can remember reading about one instance where a pilot's seat belts failed. It occurred during practice for the 1996 World Aerobatic Championships in Oklahoma City. Phil Knight's head went through the canopy of his Extra 300S after a steel loop broke in the crotch strap of his seat belt during an inverted snap roll. He was able to successfully land his airplane. I believe there was another incident involving a Panzl in which a seat belt anchor pulled out of the airframe. These are rare occurrences that demonstrate the strength and durability of well-designed aerobatic seat belts. However, nothing lasts forever, and aerobatic seat belts are no exception. Aerobatic seat belts are typically not made by the aircraft manufacturers but rather bought from outside vendors. The original equipment manufacturer will have the vital information regarding its seat belt system.

Today, the most common aerobatic seat belt system is the Hooker Harness. It's found in many different aerobatic airplanes and gliders, and some pilot operating handbooks specifically list it in the weight and balance section. Below are the Hooker Harness instructions for continued airworthiness:

We recommend replacement/repair of harness systems based upon condition, not physical age. Some governing agencies will require replacement based upon age regardless of condition (10 years is common). There are four main areas of inspection.

#### **1. Webbing:**

- A.** Frayed, torn, cut, or fuzzy. Minor fraying is permissible.
- B.** Severe fading or discoloration. This is a sign of ultraviolet (UV) damage. If the exposed area of the webbing is more than two shades different than unexposed area, then replacement is needed.
- C.** Creased, chafed, or otherwise damaged
- D.** Bunching of webbing due to not pulling straight through hardware
- E.** Chemical exposure or other spotting

#### **2. Hardware:**

- A.** Corrosion or rust
- B.** Plating missing or flaking off
- C.** Bent
- D.** Inoperable buckles, difficulty latching or unlatching
- E.** Broken lid on lift-latch buckles
- F.** Inoperable springs
- G.** Missing or otherwise damaged components (elastic keepers and pull tabs are not considered as required components)

#### **3. Stitching:**

- A.** Broken or missing stitches
- B.** Severe fading or discoloration. See 1B above.
- C.** Inconsistent pattern or thread size. Structural thread size should be the same throughout the entire harness. Irregular patterns or varied sizes may be indicative of field modification.

#### **4. Labels:**

- A.** Missing or damaged
- B.** Illegible

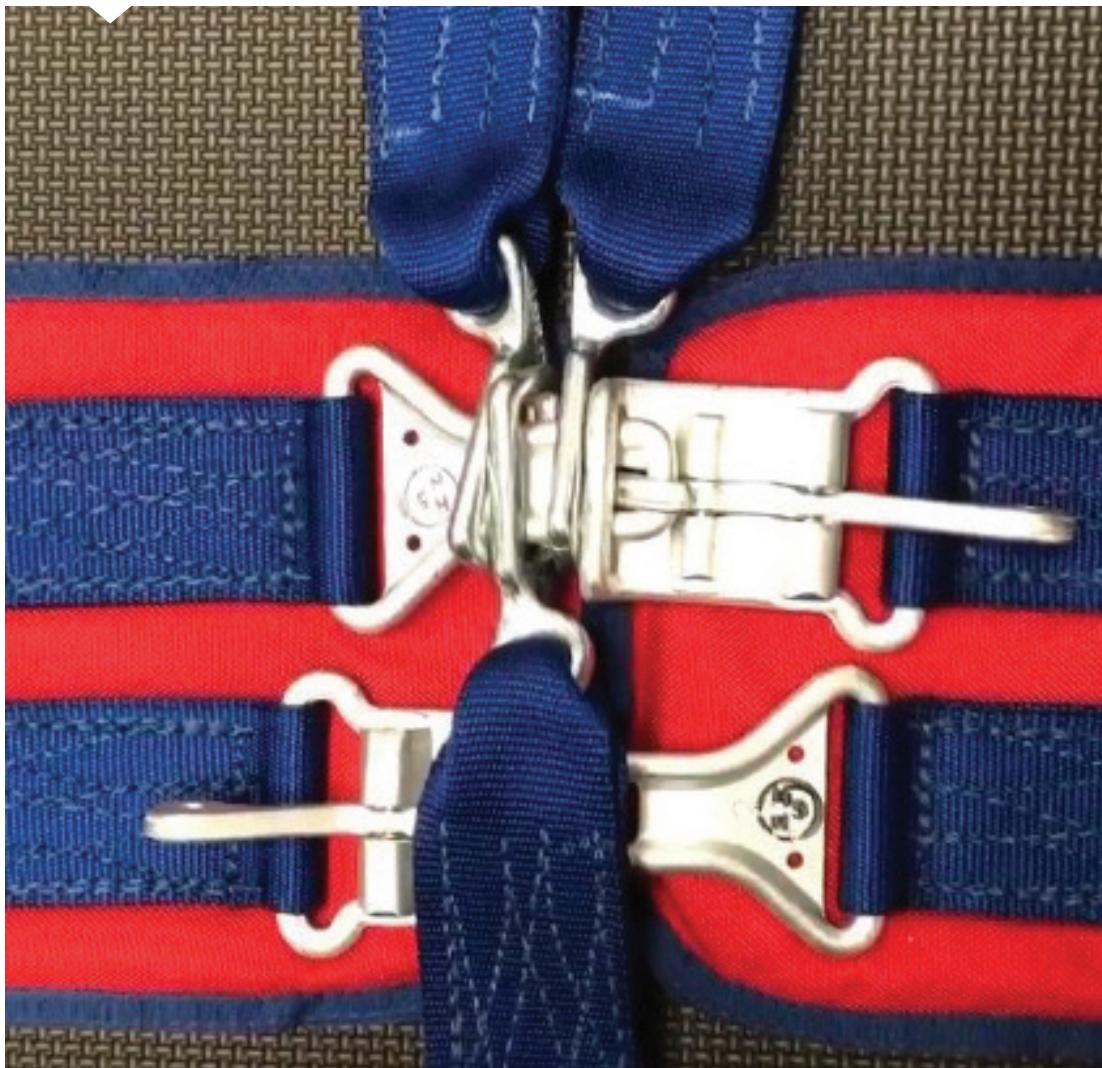
If any of the above damage exists, the belts should be replaced or repaired. Repairs must be performed by an authorized facility that must be capable of returning the belts to the original design configuration. Any questions about serviceability of the harnesses should be directed to the original manufacturer for determination.

There are some simple and easy things pilots can do to help maintain their seat belts. The next time you move the aerobatic harness out of the way before your aerobatic flight, take a few seconds to look at the webbing, locking mechanism, and ratchet (you need to check if you have one or two). If you find anything that stands out (see the list above), it's time to check with the experts. I would recommend permanently adding this quick check to your preflight checklist. Another option is to use a towel or

foldable sunshade to protect your aircraft seat, seat belts, and parachute from the sun. Not only will it keep the seat and metal locking mechanism cool, it will also help block the heat and the damaging UV rays. Your seat belts and parachute will be grateful.

In aerobatics, it is the accumulation of wear and fatigue that causes most items to fail. Your aerobatic seat belts and harness fall into this category. As with the rest of the airplane, you should take the time to look over this important safety device. If you have any questions, issues, or doubts or are unsure if what you are looking at is unsafe, call and ask. The only dumb question is the one you do not ask. Get answers and peace of mind. This will allow you to focus on the fun part – flying aerobatics!

Fly safe. **IACF**



Hooker Harness set up for an Acro belt from its video, "How to Fasten an Acro Hooker Harness".

# WHAT'S YOUR STYLE?



Be sure to look into the complete selection of IAC merchandise on sale!

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# Welcome, New Members

**WE ARE EXCITED** to welcome 27 new international members and 278 new U.S. citizens who joined the IAC from September 2021 through June 2022. Some became aerobatic competitors, some began flying aerobatics recreationally, and some started volunteering at their local chapter, but all are aerobatic enthusiasts. We are happy to recognize members joining or rejoining. By doing so, you demonstrate a commitment to enhance the safety, education, competition, and enjoyment of aerobatics! **IAC**

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# From the IAC Archives

BY MIKE HEUER, IAC 4, IAC HISTORIAN



**A WONDERFUL PORTRAIT** of Frank Price was recently donated to IAC by the Charlie Harris estate. Charlie was IAC 3647, a real promoter of aviation and aerobatics, and a friend and admirer of Frank. That portrait will adorn the walls of the IAC Pavilion in Oshkosh along with the iconic picture of Frank standing next to the Soviet team at the first World Aerobatic Championships in Bratislava, Czechoslovakia, in 1960. He was the only American there.

All of this reminded me of my own experiences with Frank, who was a larger-than-life personality and a key pioneer in the early days of aerobatics in the United States. He was the founder and president of the American Tiger Club, which was named after the Tiger Club in Great Britain and was one of the first aerobatic organizations in the United States. Frank cranked out a monthly newsletter that was full of news and information but was always informal and a bit unorganized. Around the same time, the Aerobatic Club of America was formed and gained recognition from the National

Aeronautic Association, which gave it the franchise for the management and promotion of aerobatics in the U.S.

Frank was different and went his own way. The American Tiger Club was really a small, informal organization of his friends. Each year, a "Tiger Days" event was held near Waco, Texas, where aerobatic pilots would fly in, meet with friends, fly each other's airplanes, and go out in one of the four quadrants around the airport to fly aerobatics. There were no real rules or structure — just good fun. Our family went to Tiger Days in 1968 with our Ryan ST-A and had a great time. We came to regard Frank as a friend and mentor. I was 18 years old at the time.

IAC was formed and came together in the winter of 1969-70. Over the Christmas holidays in December 1969 and January 1970, we held a bunch of meetings at my family home — I was on holiday break from college at the time — and finalized the first draft of the IAC Official Contest Rules. I typed it out myself on a portable, manual typewriter and also hand-drew the Aresti dia-

grams that appeared in it. We were getting ready to launch IAC and a full schedule of regional contests in 1970, and we were anxious to finish it. Of course, this was all in the pre-internet days and our business was conducted personally, over the phone, and through the mail.

My father, Bob Heuer, the first president of IAC, believed that for our contest rules to work and gain acceptance, we really had to consult with the luminaries and leading personalities in aerobatics at the time. That, coupled with the fact that we really were a "break-away" organization, as the Aerobatic Club of America was still running things, it



Frank Price holding the American flag at the 1960 World Aerobatic Championships.

was important to gain allies and seek out support for our ambitions. Key to this was the early support from EAA and its president and founder, Paul Poberezny, along with his entire family. For some time, Paul had wanted an aerobatic division of EAA to help preserve the flying rights of homebuilders, and IAC became the structure for his ambitions and goals.

The plan we formed, before going to press with our rulebook, was to do an air tour in our Beech C-35 Bonanza and meet with those key people personally. We took off on the morning of January 2, 1970, for Louisville, Kentucky, to meet with Paul Soucy (father of Gene), and it so happened the Poberezneys were also in town, so we had quite a meeting that evening in Paul's house in Louisville. To make a long story short, we then flew to Atlanta (to meet with Frank Morgan, the first president of a newly formed IAC Chapter 3) before traveling on to Okeechobee, Florida (Bill Dodd and Cotton Hodges); Homestead, Florida (Curtis Pitts); New Orleans, Louisiana (Roscoe Morton); Monroe, Louisiana (Marion Cole); and finally, Waco, Texas, on January 11, 1970, to meet with Frank Price.

It was quite an experience. Frank was gregarious and friendly, as always. His hangar — quite large, and like a museum — was located at the Waco airport. At that time, Frank was really known as a Bücker Jungmeister fan and pilot, and his was there. We had previously seen him perform in the airplane at Tiger Days in 1968. By 1970, he was offering plans for the airplane, but



This wonderful portrait of Frank Price was donated by the Charlie Harris estate.

we had built a Pitts S-1S (N442X, now in the EAA museum in Oshkosh), and though the Jungmeister was an airplane we deeply admired, we never took up a building project.

At the time, Frank was selling the Aresti catalog (fourth edition, 1967), as he had an exclusive deal with Jose L. Aresti and was the only source for the catalog in the United States. We bought one, and that rather thick paperback manual still sits in my personal archives. The price was an astounding \$50 at the time, translating to nearly \$400 in today's dollars. That compares with today's price of about \$20 for the catalog from Aresti System S.L. in Madrid, Spain. IAC rules are free to members.

After going over the draft of the rulebook with Frank, we were on our way to Kansas City, Missouri (Dr. Dale Drummond, one of the leading judges at the time) and arrived home on January 13, 1970. All those visits we made with those friends in aerobatics still stand out in my memory, all these 52 years later. All supported IAC and what it was founded for and organized to promote. "Grassroots" aerobatics was the theme back then and still is to this day. When I saw that portrait of Frank a few days ago, the memories flooded back of our brief time in Waco.

The last time I saw Frank was at the 1996 World Aerobatic Championships in Oklahoma City. He was suffering health problems at the time, but that personality of his was alive and well. His pioneering set the stage for America to participate in the World Aerobic Championships, and his love of "grassroots" aerobatics was an inspiration to all of us who were working hard to get IAC off the ground.

IAC recognized Frank for his work and dedication by inducting him at our first Hall of Fame awards ceremony in 1987 along with Duane Cole, Curtis Pitts, and Jose L. Aresti. **IAC**



1987 IAC Hall of Fame recipients: (Left to Right) Curtis Pitts, Frank Price, and Duane Cole.


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