



SPORT

AEROBATICS

OFFICIAL MAGAZINE OF THE INTERNATIONAL AEROBATIC CLUB

MARCH/APRIL 2022



- THE WOBBLIES, PG. 36
- EMERGENCY LANDING, PG. 40
- DUSTING OFF COBWEBS, PG. 44

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COVER

ON THE COVER:

Luc Martineau, IAC 436772, flies his Aviat Pitts S-2C, serial 6089. The plane was purchased from the Afton, Wyoming, plant in 2012. "I have no intention to replace this great plane – I just enjoy it too much," said Luc.

Photo by Francois Bougie

ABOVE:

Luc's first experience flying the Pitts Special was with Bill Finagin. "Bill had the patience to teach me to land it, fly Sportsman and complete advanced spin training." Photo by Francois Bougie

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IAC Governance

BY JIM BOURKE, IAC 434151

I NORMALLY USE THIS space to encourage our competitors and volunteers, but for this installment I'd like to try to introduce the membership to some of the IAC's inner workings.

The IAC's governance documents are all online and found at [IAC.org](https://iac.org) by going to the About menu, then selecting Governance Docs. Available here are the articles of incorporation, the bylaws, and the *IAC Policy and Procedure Manual*.

The articles of incorporation establish the legal entity's reason to exist and its most basic functions. These functions are fleshed out by the bylaws, which explain the details on board composition, elections, IAC membership, chapters, and how the bylaws themselves can be amended. The *IAC Policy and Procedure Manual*, or *P&P* as we tend to call it, contains the rules the board makes to guide itself, IAC staff, and IAC volunteers. While the *P&P* is not binding on the board as a whole, because it is created by the board and can be changed by the board at its discretion, it lays the groundwork for most of our operations.

Our *P&P* defines how we run our committees, such as the rules committee or the sequence committee. The *P&P* also includes letters of agreement with the National Aeronautic Association (NAA) and EAA. In *P&P* Section 301A, we see how the IAC has been delegated the task of selecting and managing the U.S. Aerobatic Teams, choosing the national champion, and administering aerobatic competitions by the NAA. In *P&P* Section 301B, we see that the IAC has a working relationship with EAA.

Sometimes I am asked, "Why are we involved in international competition?" or "Why are we involved with EAA?" These documents explain how these relationships function and why no president of IAC can unilaterally decide to take the IAC in a different direction.

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

membership and serve two-year terms. There are occasionally questions about whether it is wise to have unelected board members. It is not uncommon for boards to reserve some seats for board appointment, but I do see the argument that it could be better to have all positions accountable to the membership.

The bylaws state the IAC board shall meet at least twice a year. We do one meeting in the spring and one in the fall. These are called regular board meetings. We also can hold special board meetings, either by request of a majority of board members or at the discretion of the president. Our regular board meetings are very busy affairs that can sometimes go two full days, but our special meetings are called for important issues that can't wait for a regular meeting and are sometimes over in a matter of minutes for trivial issues.

The board conducts business during meetings by making motions, debating, and voting, with the majority having their way. It can sometimes be hard to be on the losing side of an issue (I've certainly been there a few times), but at the end of the day, the majority gets to decide the path we will take. The rules by which board meetings are conducted are

called parliamentary rules. While our bylaws do not require it, the IAC generally follows Robert's Rules of Order.

Sometimes people want to get involved, and I love to see that! Members sometimes want to attend our board meetings in person. This is entirely at the board's discretion, but thus far in my experience the board is unlikely to say no. The board knows that it serves at the pleasure of the membership and tries hard to accommodate reasonable requests. Unfortunately, we cannot allow guests to record meetings, and in particular we cannot allow any kind of livestreaming. While I understand the reasons for this rule, I do sometimes think it is a shame because the membership would be very pleased if they could see the board in action.

This was all possibly more detail than many IAC members care to read about, but I think it's important that we all understand a bit of our structure. A final important detail to mention is that every procedure, policy, rule, and bylaw of the IAC is ultimately up to the membership. Some policies, like those found in the bylaws, are very difficult to change. But nothing is impossible. If you have comments or questions, please feel free to reach out to me at president@iac.org. **IAC!**



Don't Take It for Granted

BY LORRIE PENNER, IAC 431036

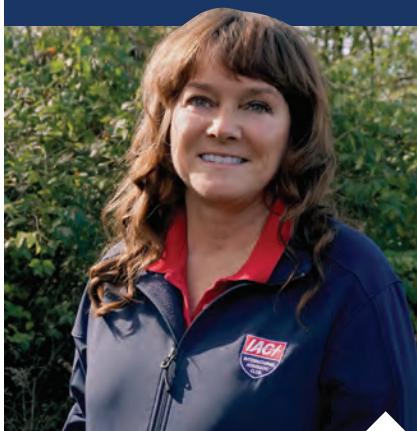
OHIO RECENTLY HAD A few days of light snowfall, not unusual in the winter months. What made this one different for me was experiencing ice on a bridge. It didn't turn out pretty for the borrowed truck I was driving on one of those icy evenings.

It's funny the things you think about when you are in the middle of an emergency situation. I wished I had taken some sort of emergency maneuver training for autos like I have done for airplanes.

The other thing I thought about was the vehicle I was driving and what made it different from my car. In my flying life, I am not the most experienced pilot, but I have flown Cessnas, Champs, Cubs, a Decathlon, gliders, a Piper Pawnee, and our new RV-7. I've studied the pilot's operating handbook of each aircraft and know stall, cruising, and landing speeds. However, what did I know about the truck I was driving that night?

My regular car is a Prius that has front-wheel drive. I didn't think about the truck not having front-wheel drive. If I knew or remembered that detail, I might have handled the skid on the icy bridge a bit different. The back end of your average truck is lightweight, and power is going to the back wheels, which upon impact with ice was successfully going its own direction before I knew it. My attempt at "steering in the direction of the skid" was worthless, and any light breaking or tapping on the brakes had no effect.

Unfortunately, the direction of the skid had me headed at the guard railing, and I wasn't really crazy about having the airbag blow up in my face. So, knowing that impact anywhere away from the driver was going to hurt a lot less, I deepened the turn in the direction of the skid, effectively turning the truck 180 degrees and slamming the tailgate into the railing. I



was able to walk away without a scratch. The truck was drivable, but damages were worse than I hoped.

By sharing my tail of woe, I hope that I can encourage you to approach every aircraft like you know nothing about it. Don't assume just because it looks like something you've flown before that it has all the same flying characteristics. Even a little extra power or center of gravity shift may have you falling out of a maneuver or unable to stop a spin.

Find a flight school near you that offers emergency maneuver training and/or basic aerobatics. Learn all about the aircraft you are flying, and you will be amazed by the feeling of confidence it will instill in you. And it may save your life. Fly safe!

Check out the flight school listing on the IAC website: IAC.org/Aerobic-Flight-Schools. **IAC**

I HOPE THAT I CAN ENCOURAGE YOU TO APPROACH EVERY AIRCRAFT LIKE YOU KNOW NOTHING ABOUT IT. DON'T ASSUME JUST BECAUSE IT LOOKS LIKE SOMETHING YOU'VE FLOWN BEFORE THAT IT HAS ALL THE SAME FLYING CHARACTERISTICS. EVEN A LITTLE EXTRA POWER OR CENTER OF GRAVITY SHIFT MAY HAVE YOU FALLING OUT OF A MANEUVER OR UNABLE TO STOP A SPIN.



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U.S. National Aerobatic Championships Update

Planning proceeds

MIKE HEUER, IAC 4

PLANNING FOR THE 2022 U.S. National Aerobatic Championships is proceeding and hardly stops after completion each fall. Lessons are learned, new rules are implemented, policy is revised, and officials are chosen. I was approved by the board of directors to serve as contest director in 2022.

The dates of the 2022 event are different from our traditional time frame. The Nationals will be held on **Sunday, October 2, through Friday, October 7**, with our awards banquet and ceremonies that last night. Please mark your calendars.

In my five-decades-long career in aerobatics, this will be the first time I will direct the Nationals, but not the first time I have headed up a large event. I was a contest director for the IAC Championships in Fond du Lac, Wisconsin, for three years in a row — a contest of equivalent size to the Nationals. That said, the Nationals has its own complexities, and this year, we will be choosing a U.S. Advanced Aerobic Team to compete in Las Vegas in 2023, and we will be flying both power and glider categories, as we have for many years.

My first task was to begin assembling a team of officials, which we call the key volunteer group (KVG). Fortunately for me, as well as for many past contest directors, we have experienced volunteers who have served in their roles at Nationals and can step in and continue to do a great job.

The chief judges are some of the first to be recruited, and I am pleased to announce that all four chief judges have served at Nationals in the past. Unlimited chief judge will be Hector Ramirez; Advanced chief judge is DJ Molny; Intermediate chief judge is Peggy Riedinger; and joining us from Great Britain once again is Nick Buckenham, who will chief the

Primary and Sportsman categories. Incidentally, Nick has been a member of IAC since May 1989 and even competed at the Fond du Lac championships in the early 1990s. He currently serves as president of the FAI International Aerobatics Commission (CIVA).

If you come to Nationals as a competitor, and after parking your airplane, the first person you should see will be our registrar, Liza Weaver. Liza has served in this job for several years and will process your paperwork in the offices in the hangar. Our chief technical monitor, John Ostmeyer, will be the next person you should see, who will complete the technical review of your aircraft.

Sunday will be a busy day, though flying will not start until noon. The general briefing and pilot briefing for the categories to be flown on Sunday is planned for 11 a.m. that day, as well as our opening ceremonies. Since it is team selection for Advanced, their Known flight program will be first up.

The rest of the schedule of events will be announced as we fine-tune it for 2022. We also will publish Nationals bulletins from time to time, with the first coming no later than March. **IAC**

2022 Officer/Director Nominations Sought

DOUG SOWDER, IAC 14590, LIFETIME MEMBER, ELECTIONS CHAIR

IAC MEMBERS, IT IS time to nominate our 2022 slate of officers and directors. **Nominating petitions are due by April 15.** Voting will be done electronically on the IAC website, beginning June 29 and ending July 26. New officers and directors will be installed at the close of the IAC annual membership meeting at EAA AirVenture Oshkosh on July 29, 2022.

Positions to be filled are president, secretary, and three directors. Directors are elected “at large,” not by region, and are then assigned a region after they’re elected. If you wish to see which directors’ positions are up for election or reelection, go to IAC.org and navigate to About/Leadership/Yellow Pages. Terms of those officers and directors with “July 2022” after their names are expiring this year.

Prospective board members should review the bylaws of the International Aerobatic Club Inc. and Section 218 in the *IAC Policy and Procedure Manual*.

Very briefly, a candidate for office must submit a nominating petition signed by 10 current IAC members in good standing, a photograph, and a résumé/bio. For more information, details are listed below. All signatures must be on a petition form, and I can accept multiple petition forms. So, if you choose to run for office, you can fill out a blank petition form, email it to another IAC member and have them sign it, scan, and e-mail, fax, or snail mail to me. My fax number is 509-489-4783.

Feel free to contact me with any questions you may have. I prefer to have IAC-related email sent to me at dougsowder@gmail.com. **IAC**





New IAC Chapter 137

The Alberta Chapter 7 of Aerobatics Canada, originally founded in the 1980s, has added another designation to its name — IAC Chapter 137.

Neill Cook is the current chapter president and explained that, “becoming an IAC chapter and part of a larger organization dramatically increases publicity, value, and opportunities for our tight-knit club to enhance our membership. This is something all aerobatic enthusiasts want to see, the flourishing and growth of the sport we love.”

Historically, they were not a recognized chapter of the IAC, yet they still received support at aerobatic competitions regarding Unknown sequences and scoring/computing. The Canadian chapter felt that in recognition of the ongoing support it had received from the IAC, the best show of appreciation would be to fully commit to the organization as a registered official chapter.

The increasing difficulty encountered when applying to obtain insurance for competitions and practice events also played a part in the decision. The chapter members’ collective experience has shown that insurance is getting harder each year to obtain, and joining with an expansive group of aerobatic enthusiasts provides value to their membership base by becoming part of a larger base.

“I think another part that was a determining factor to becoming an IAC chapter was the work done by Jeff Seaborn as the chair of the EAA Canadian Council and Lenora Crane as the president of Aerobatics Canada,” said Neill. “Our members had numerous questions regarding becoming a chapter, and Jeff and Lenora put in a considerable volume of time working with members of the IAC to answer and address the concerns our members had.”

Some of the major questions or concerns with becoming an IAC chapter were regarding the Aerobatics Canada affiliation. It was a belief, now proven myth, that the chapter would not be able to operate its aerobatic club under Aerobatics Canada and run them in parallel. It was a concern for the members as they did not want to lose their “Canadian” identity (not that our culture is completely “inverted” when compared to that of the United States).

Secondly, there was a mistaken assumption that the insurance coverage offered through the IAC for contests and practice days was not available to chapters, pilots, and planes outside of the United States.

Our chapter members conduct practice for aerobatic competitions most weekends when the unpredictable weather on the west side of our mountain range is favorable. In the past, having official organized practice days was challenging due to the logistics that were required. The chapter’s first endeavor using this approach was at Killam-Sedgwick. The logistics basically turned the practice day into a competition, which is how the Alberta Aerobatic Club grew from two competitions per year to three, with one at Rocky Mountain House and co-hosting Cut Bank, Montana, being the other two.

The original founders of Aerobatics Canada Chapter 7 were Bob Herbison, Grant McKay, and Bob Petryk. They were also the original builders/owners of the Christen Eagle, so the idea of starting a club may presumably have manifested from the minds while tools were in hand and an aircraft was taking shape before their eyes. Bob Herbison was the first chapter president, followed by Grant McKay, and then Bob Petryk. These founders were an enthusiastic trio, so much so that with a small but mighty group, they hosted the 1988 World Aerobic Championships in Red Deer, Alberta.

The first contest came early in the formation of Chapter 7. Neill said, “The first contest was at Springbank, the year after the chapter was formed. It was quite successful because Grant McKay had come up with some ‘prizes.’ Since that time, we have had a contest every year at various locations around southern Alberta, and a judging school at least every two years, with perhaps slightly less incredible awards. The 1986 contest had an Ultimate wings kit donated by Gordon Price for first place. That was impressive, since a wing kit these days for a Pitts is \$15,000-20,000!”

To help increase the awareness of aerobatics, the chapter has recently conducted additional practice days during the summer months. The two new locations where the chapter hosted practice days were Ponoka and Drumheller. As previously stated, hosting practice days at a new location requires a high volume of logistics, and the chapter would not have had successful practice days without the help of the Ponoka Flying Club and the new Drumheller Airport managers, Patrick and Cathy Bonneville.

“We are starting to see more young people involved in aerobatics,” said Neill. “Some of the latest members of our club are amazing pilots who have come up through the levels extremely quickly and are giving some of the more senior experienced and proficient members a run for their money (and most recently winning). It has been great to see how much enthusiasm these pilots have and how far these new young members have come in their aerobatic proficiency.”

Members of IAC 137 fly a variety of aircraft, including a Laser 230, One Design, Christen Eagle, Pitts S-1, Sukhoi 26, Sukhoi 29, Super Decathlon, Giles 200, Extra 300, GameBird, Harvard (not competition), and an RV-6.

Join us in congratulating IAC Chapter 137! Visit the members on their Facebook page at: <https://www.facebook.com/AlbertaAerobaticsClub>. **IAC**



Philip Dewsnap and his Super Decathlon at the 2021 Western Canadian Championship.



Jesse Mack first place finisher at the 2021 Western Canadian Championship with Charlie Teeuwsen and Lenora Crane.

Having a Fit – Fitting in a Pitts

BY BUDD DAVISSON, IAC 435420

WHEN IT COMES TO building or purchasing a Pitts Special, as opposed to something like a Cessna 172, a question is often asked that is seldom part of a 172 purchase. (Yes, I did just put Pitts Special and 172 in the same sentence, which is probably illegal!) The prospective Pitts pilot asks, “Will I fit in it?” This is a valid question, because pilots come in different shapes and sizes, as do Pitts Specials. So various combinations and permutations must be considered.

First, let’s skim through a very brief compilation of the different Pitts models and how height/weight/leg length factor in. Also, we’re leaving the Model 12 out of the discussion because its weight and CG limits are much wider so, although critical, are easier to stay within.

Single-Place Pitts (Excluding S-2S)

The S-1 series (S-1C, S-1D, S-1E, S-1S, S-1T) features two basic fuselage lengths, firewall to tail post: 121-3/4 inches and 124-3/4 inches. The 3 extra inches lie between the instrument panel and the headrest, so if built to plans, there are two distinct lengths of cockpits. The S-1Cs are all homebuilts and started out with short fuselages, but many were built with the longer ones. The S-1E (factory-built kit), S-1S, and the S-1T all have long fuselages. However, if you’re buying a completed airplane, it’s not unusual to find an S-1C that received symmetrical wings somewhere along the line and is being sold as an S-1S. If the airplane was built in the 1960s or early ’70s, it could be long or short, so one of the first questions you need to ask is which fuselage it was built on.

The S-1-1B Super Stinker has an entirely different fuselage. It’s much longer with more cockpit room, but only a few have been built, which is a shame. It’s a real kick-but air plane!

Most, but not all, S-1s are homebuilts, so unless it’s a factory-built S-1S or S-1T, there is no way to know whether the rudder pedals were mounted in the normal position. Homebuilt airplanes are just that — homebuilt. And not all homebuilders are the same height or have the same leg length, so it’s not unusual to find rudder pedals mounted in a position that may have accommodated the original builder but might not fit a buyer. If you’re at the edges of the height envelope (under 5 feet, 6 inches or over 6 feet, 1 inch), the only way to know for sure is



to try the aircraft on for size. If you need more leg, cushions behind your back can move you ahead; however, if legroom is a serious problem, not much can be done to make you shorter, unless you move the rudder pedals. This is not an easy process on a completed airplane.

Two-Place Pitts (Including S-2S)

The reason the S-2S, a single-place airplane, is being included with the two-place birds is that the fuselage is the same as that of a late-model S-2A (more on that later), but the front hole holds a gas tank, the wing is moved forward, and an IO-540 rather than an IO-360 hangs ahead of the firewall.

The back seats of all two-place Pitts are essentially the same length, but the later S-2As (1979, serial No. 2206 and later) and all S-2B/Cs use a fuselage that is 2 inches wider at the firewall but tapers to the same width at the back of the rear cockpit. The back cockpits have basically the same dimensions as the long S-1 fuselage cockpits. So although there are minor differences in the rear cockpits, if you fit in one, you’ll fit in all of them. The same is not true of the front seats.

The front seat of the original S-2A is very uncomfortable because the seatback is too vertical. Some of us who routinely use the front hole have had a back cushion custom-built that is 3 inches thick at the bottom and 1 inch thick at the top. That gives just enough angle to make it, if not comfortable, at least not annoyingly uncomfortable

— however, some legroom is lost. I have something around 4,000 hours giving dual instruction from that position, as opposed to 3,000 in the back. I am (or was) 5 feet, 10 inches tall with a 30-inch inseam, and I’m fairly comfortable. We’ll get into inseam and height considerations a bit later.

When the factory went to the wider fuselage in the S-2A, the front seat bottom was moved ahead an inch, which gave a little more angle to the seatback. The rudders were moved ahead a similar distance. The relocating of the seat and the rudders required a piece of hardware that can be used to iron out a minor ergonomic problem with the original S-2A front seat.

If you're in the front seat of the original narrow-fuselage airplanes, it's hard to keep your feet off the brakes when landing and taking off because the rudimentary brake pedals can't be adjusted far enough forward to keep you from getting brake when you want rudder. That can be cured by using late-model S-2A brake slave rods — the quarter-inch rods that hook the front brake pedals to the back brake pedals, where the master cylinders are mounted. These later rods are an inch longer, allowing more brake adjustment on earlier S-2As; however, the parts number isn't in the parts manual. When ordering, you have to get the Aviat parts person to look it up for a later S-2A.

S-2Bs and S-2Cs move the rudders and seat bottom forward yet another 4 inches, which makes for a very comfortable front seat. Partway into S-2B production (the exact serial number is unknown), the sheet metal above the



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longerons was cut down to the bottom of the canopy, which gave more shoulder room and made visibility from the back a little better. In S-2Cs, the sheet metal where the windshield is mounted was reshaped, giving more visibility from both the front and back seats. In fact, I think the front seat of the S-2C is the most comfortable and has the best visibility in Pittsdom.

What About Too Tall and Too Short?

The question of how height figures into how well a pilot fits into a Pitts is the wrong question. Or at least it's not the complete question. Height alone doesn't tell us how well a person is going to fit in a Pitts. A big variable is a pilot's inseam (i.e., the second number on our jeans size). That tells you how long your legs are. That number also gives you a rough idea of the seating height. For a given height, longer legs are combined with shorter sitting height. It's common to judge how serious a Pitts instructor is by the number of cushions they own. It takes a lot of cushions to properly fit different-sized pilots in the cockpit. One of my female students was of average height but had a 34-inch inseam. That's what you might expect on a 6-foot, 3-inch man. I had tons of cushions under her but nothing behind her.

It's also not unusual for one's legs to be too short to reach the pedals comfortably but still be long enough to reach the brakes. Putting more cushions behind a pilot can move them ahead only so far before full aft stick travel is no longer available. To avoid this, rudder pedal extensions are available from Aviat (they'll work on both front and back pedals but require a mechanic to install) and Dent-Air.

Dent-Air's are primarily for the back pedals and don't require a mechanic to remove or install them. The shortest student I've ever had was a young lady who was 4 feet, 11 inches tall. I exhausted my supply of cushions and had to borrow some, but she did fine — although she was holding the stick, which is shorter on S-2As, by the very top.

Then there are the differences from human to human that aren't reflected in basic measurements. At one point, by pure coincidence, I had two 6-foot, 6-inch pilots at the same time. They couldn't fit in the front seat for obvious reasons, so they went in the back. They both had 36-inch inseams, but I could fly one and not the other. This was because their knees were located in decidedly different positions on those long legs. There was 2-inch difference in where their legs bent, so one student couldn't get his knees under the instrument panel no matter how hard he tried. The same thing would occur if they were being stuffed into S-1s.

Basically, a 6-foot, 2-inch pilot of more-or-less-normal proportions will fit in either seat of an S-2 or S-1, but the short-fuselage airplanes will be a tight fit. Pilots who are taller than 6 feet, 2 inches or who have inseams 34 inches or longer can expect to be folded up. In my experience, a trial fitting is required if the inseam is 35 inches or longer. If a pilot is that tall, however, weight might become a factor.

So What About Weight?

How heavy is too heavy for a pilot? Here again there are variables. In the S-1, it's impossible to make a black-and-white statement about weight because the S-1s can vary from 730 pounds empty to nearly 850 pounds. Pilots who weigh 200 to 225 pounds, or even more, will usually be okay in an S-1, but the exact CG has to be determined. This is critical because, among other things, doing aerobatics puts us in speed ranges and maneuvers where spins, whether intentional or unintentional, have to be considered. For that reason, we absolutely have to stay ahead of the rearmost CG limit.

In the two-place machines, you also need to consider whether you're talking about the front or back seat and whether you're flying solo or going with two pilots. Because I have an electronic CG app for it, let's use the S-2A as an example. If a 240-pound pilot has full fuel and no one with them in the front seat, they'll be in the aerobatic envelope on both takeoff and landing. At 260 pounds, they'll take off in the acro envelope but will land slightly outside of the normal

envelope after an hour. Remember, the CG moves back with fuel burn. With a 170-pound passenger, the most the pilot can weigh and still be in the acro envelope is 195 pounds. At 210 pounds, they'll take off in the normal envelope but land slightly outside of it. The S-2B and S-2C can tolerate greater weights.

The Takeaway on Height and Weight

Any pilot who is too tall or too heavy already knows that. They've dealt with it their entire lives. They know that one of those factors may keep them out of a Pitts cockpit. If that's the case, we feel for them. However, all is not lost. There's always the Model 12. Or the Skybolt, which is essentially a big guy's Pitts! But it ain't a Pitts, so ...

Budd has more than 43 years and 5,500-plus hours of dual given. Most of those hours were done in the traffic pattern teaching people to master the Pitts on the ground and in the air. He's flown more than 300 types of aircraft as pilot in command. **IACF**

It is common to judge how serious a Pitts instructor is by the number of cushions he owns.



PHOTOGRAPH COURTESY OF BUDD DAVISSON

FACTS, FIXES & TIPS

FROM THE PROS

COST OF FUEL HAVE YOU RETHINKING THE NEXT FLIGHT?



With fuel as one of the highest operational costs, distance, cargo, and environmental conditions are major considerations for flight. As costs continue to rise, each refuel has a little price-shock, so knowing you're getting the best mileage is worth investigating.

Full Service	\$5.20
Average Jet A	
\$5.72	
Average 100LL	
\$6.93	
Average 54F	

Source: AAA.org (2021)

A good place to start is with your aircraft's exterior. Paint, age, and condition weigh heavily on aerodynamic efficiencies. In flight, air surrounding an aircraft resists its motion, creating a force known as drag. Over a smooth, polished surface the air will glide, streamlining in uniform, uninterrupted parallel. This laminar flow does not require additional energy to maintain flight, so speed can increase.

Conversely, any disturbance along the surface including erosion, oxidation, abrasion, parasitic deposits, no matter how microscopic, causes skin-friction that disrupts air flow. Here molecules "stick", collide, and slow down so that the surface is a thickening layer of swirling turbulent air. Think peaks and valleys. As irregular terrain obstructs, air flow becomes random and unsteady, impeding velocity and requiring greater fuel consumption to maintain flight. Products specifically engineered to level irregular surfaces, like NuPower II, NuPol, and Citricut Extra for painted surfaces, and NuShine II, a graded system of metal polish, actively lift dirt, remove debris, deoxidize, and fill and coat with protective sealants to restore to a smooth polished surface. Polishing formulations like these will maintain the right surface conditions for improved fuel efficiency.



WHAT'S WITH THESE BLACK EDGES ON MY JUST POLISHED ALUMINUM?

It's polish residue, an excess buildup of polish and debris collecting along the edges of each polished section.

It can be easily eliminated with a metal cleaner like Nulmage and a gentle wipe on/rub off with a flannel cloth.



ABOUT THAT ANGLE...

PRO TIP! For painted metal, laying the buffer flat against the surface is better. Not so on bare metal. It's critical to hold the buffer at a 10°-15° angle, so only one side of the pad is working polish into the surface. This avoids unwanted swirl marks, cuts, and overheating. Always focus on no more than a 24" square, moving up/down, left to right, fully polishing the target area.

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FUSION 540

A HYBRID COMBINATION OF
MONOPLANE DESIGN IDEAS

GREG MCCONNELL, IAC 431320



PHOTOGRAPH COURTESY OF GREG MCCONNELL

FUSION 540

Many hours of design work and drawing resulted in a design incorporating a steel tube fuselage, wooden wing, and built-up tail.



WHILE COMPETING WITH MY Pitts S-2B in Intermediate and watching the Unlimited guys in their machines go up for 3,000 feet with multiple rolls, I knew the Pitts Special had a finite life with me if I wanted to compete at or near that level. The Unlimited pilots' performances were something to behold for a newcomer.

With all the Unlimited class Extra, Edge, CAP, and XtremeAir aircraft to choose from, I saw the price tag and knew they were well out of my reach. What to do? Build my own Unlimited category aerobatic aircraft, of course. I thought I had the required skill set for the build; as it progressed, though, I saw there was a lot more to learn.

I was very impressed with one of our club members' CAP 232. I liked the way it performed and presented in spins. After the competition, I was allowed to make a few drawings of its layout.

Many hours of drawing and design work later, I had come up with a design incorporating a steel tube fuselage, wooden wing, and built-up tail. It looked a bit like the CAP. As the design evolved, other aircraft features were added, and my initial ideas evolved.

Rather than spend years building everything, I heard that Bill Scheunemann, a well-known wing designer from Precision Aero, was building wings in the United States. I contacted him, and he was able to build a 21-foot wing, based on the One Design for me. While that was being built, a partially built One Design project came up for sale in the States that looked like it could be completed with relative ease.

Fast-forward about 12 months, and a 40-foot container was booked. And in the container headed my way was the 21-foot wing from Bill and the One Design project. The One Design project was 95 percent complete, so I decided to finish it first. Then I would tackle my Unlimited project afterward.

Two years later, the One Design (1D) was finished. I sold half to my good mate Alan Kilpatrick, and together we trained and flew the 1D against Unlimited class aircraft to win multiple titles. Between us, we won three Australian National first-place titles and a 4-Minute Free first place.

The 1D is an outstanding aircraft, but occasionally we needed a break for height in some sequences. With the 1D completed, it was time for the next job: finish the new project. I theorized that adding 100 more horsepower on my Unlimited project would overcome the vertical challenge.



ABOVE: The engine was built up from a Lycoming 540.

BELOW: There were multiple design changes, including the rear rudder angle, which was halfway between an Edge and Extra design.

So, I went back to building, and a lot of the successful 1D philosophy went into the new project. Brian Turner, who runs Latrobe Valley Airframes and Welding with his family, has made multiple One Design fuselages, so I gave him my fuselage plans. Pretty soon I went down to pick up the new fuselage.

To help speed up the build, I enlisted the help of another good friend, Rodney Ashdowne, EAA 209597 and IAC 12537, who has been an EAA member for over 38 years! We fabricated an engine mount for the 540 engine and added various mounting tabs and controls to the fuselage. Wing to fuselage mating completed and with tail attach brackets installed, the fuselage was 90 percent done. Building this aircraft took a huge amount of work and thanks must go to all my helpers, but especially Rodney for the countless hours he put in. And he even put his own Pitts S-1 project on hold to help me finish.

We made moulds for cowls, fuselage panels, and the turtledeck, and practiced our vac bagging (a composite construction technique to give a lightweight part strength). After learning the techniques needed for the build, we finalized the design with carbon Divinycell (a high-performance core structural foam product for sandwich construction from Divinycell).

The empennage required multiple design changes to refine structure, hinge design, tailplane placement, stabilizer, elevator, fin, and rudder shape and size. The rear rudder angle was halfway between an Edge and an Extra. Tail placement was with the intention of the spin characteristics similar to the CAP 232. Therefore, the elevator was slightly forward of the rudder.

The tail surfaces were overengineered to take into account my inaccurate stress calculations, hinges were manufactured on my dad's milling machine, and spars were routed. I went with all-wood vertical and horizontal stabilizer surfaces, plywood, and light glass cloth covering. The elevator and rudder are wood frame with carbon fiber and Divinycell sandwich skins, as the straight-line surfaces were light and easy to manufacture. The tail surfaces are aerodynamic and mass balanced.

Brian Turner had an oven for blowing canopies, and that made quick work of blowing a canopy. Fast-forward a couple of thousand hours of construction later, finishing sanding, painting it out, and working on the electrical and instrument panel — all building on the experience of the 1D and Pitts. (I had done a full rebuild of my Pitts S-2B before starting the One Design.)



FUSION 540

The engine was built up from a standard Lycoming 540. The plane got new cylinder kits, 10-to-1 pistons from Ly-Con, Sky Dynamics cold-air intake and exhaust, Performance Airflow fuel system, B&C Specialty Products 8-amp alternator, Jihostroj Aero Technology & Hydraulics governor, and Whirl Wind Aviation 400AC prop. Engine assembly was carried out by local engine builder Craig Davis at Platinum 300 Aircraft Engine Maintenance; he woke up the airport on a few occasions with an intensity of sound during the ground testing. Other components were Grove Aircraft landing gear, wheels, and brakes.

The design concept for the instrument panel was uncluttered and functional. Importantly, I wanted no protruding switches or knobs in line with my skull; I have friends with scars from these. Therefore, I chose to centrally place a Guardian Avionics iPad mini mount. The iPad usually runs with a split screen, Talos Avionics AHARS on one side with an EFB app on the other. Piper aircraft switches are neat and preengraved. The plane has a Becker radio, Flight Data combined g-meter, clock, and voltmeter.

Most electrical parts came from B&C Specialty Products, as did the wiring diagram for aerobatic aircraft. Of course, Aircraft Spruce was invaluable as a source for most other parts.

A lot of the design ideas were a combination or fusion of current monoplane ideas, hence Fusion 540.

Thanks must go to the Sport Aircraft Association of Australia (SAAA), our EAA equivalent, allowing the project to be signed off for Phase I test flying. Standard taxi tests showed sensitive rudder control during taxi. After getting used to the feel of the rudder pedals, precise control is achievable as it has a fully castering tail wheel with no locking or steering cables.

Tail placement was designed for similar spin characteristics to the CAP 232. The uncluttered and functional instrument panel and a couple thousand hours before the beautiful paint job.



Time came for first flight, and the Fusion 540 effortlessly lifted off the ground and climbed away as expected. The main problem was keeping the speed under control, with 300 hp and 1,185 pounds of acceleration it's quick; the never exceed speed has not yet been established. Other than slight nose-down trim, everything went well.

The flight lasted about 20 minutes with a stall speed check for approach-speed calculation. It stalled with no adverse indications at approximately 47 knots, multiplied by a factor of 1.3 gave a speed over the fence at 61 knots. As it turned out, that speed gave too high a nose attitude for three-point landing; subsequent landings over the fence at 75-80 knots proved more suitable and easier to fly with lower nose attitude on final for increased visibility.

Thanks to the downloadable JPI engine monitor, I could concentrate on flying the aircraft during tests and comprehensively check all the engine parameters after landing. The oil pressure needed a slight increase in adjustment — I assume due to pressure drop over the large oil cooler — when compared to Craig's ground testing.

The flight testing program has revealed no adverse flight characteristics while slowly expanding the flight envelope. SAAA flight-test cards guided the program. High- and low-speed flight testing is complete, and initial aerobatic performance is as expected.

The spin testing revealed the spin attitude and rate that I was after and easily controlled exits.

Testing was progressing well but had to be put on hold for a time due to coronavirus restrictions in Australia. When things opened back up, flight testing was completed. Other than a cracked exhaust that needed rewelding, everything has performed well.



First flight with Rodney Ashdowne.

Overall, I'm very happy with how the aircraft performs. The main flight characteristics to get used to are a light pitch feel; after a few maneuvers, it is easily controllable throughout an aerobatic routine. Also, I may change the aileron spade shape and size to lighten the aileron feel slightly. The year 2022 is looking like we will have fewer COVID restrictions, and we have several competitions scheduled on this year's calendar. I hope to make it to them.

Greg McConnell became an IAC member in 2003. In 2000, Greg started flying competitively. That year, he entered the Australian National Championships, which was his first contest, and won the Sportsman category. He progressed through the Unlimited category.

Besides flying the Fusion 540, Greg also has time in his Pitts S-2B, the DR-107 mentioned in this article, and a Cessna 152 Aerobat in which he used to give aerobatic instruction. He has a total of 17,500 hours flown with 250 hours of that time in aerobatic flight.

Currently, Greg is making a living as a check airman and simulator instructor on an Airbus A320 aircraft for Jetstar Airways based in Australia. **IAC**

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THE ZLIN Z-50

EAST MEETS WEST - AN AMAZING MACHINE

JORGE MACIAS ALONSO, IAC 432353



A MOTHER LETS HER pup learn in a safe environment, encouraging small steps that allow him to reach his full potential while making mistakes that won't cause irrevocable harm. But make no mistake — the Zlín Z-50, or "Zeta" (as it is called in Spain), was born in the middle of the Cold War in the '70s to win everything and show the world the capabilities and craftsmanship of the Czech Republic.



Low cost and easy flying. Competitive in Advanced and able to fly Unlimited. 2005 European Advanced Championships.

The old Zlín (Acrobat, Trener, and Trenermaster) that dominated in the '60s and '70s had reached their limit, and it was time to create a new design. The Moravian engineers were not limited to national products, as those in the Soviet Union were. In order to build the best aircraft, they decided to put together the best components from different countries to create an amazing machine. This is an Eastern bloc aircraft with both Western and Eastern components.

The engine was an American Lycoming AEIO-540 with 260 hp (later 300 hp). The Christen inverted system was another American component. Germany contributed a revolutionary Hoffmann composite propeller (wood and fiberglass). Finally, the fuselage, from the Czech Republic, had the most beautiful curved lines ever made in aluminum.

The Czechs didn't scrimp on man-hours, materials, or costs. The landing-gear legs are solid titanium. The compound fuselage curves come from an incredible array of different aluminum panels riveted together in a way that would make a Boeing or Airbus engineer cry with delight. Finally, the oversized tail is covered with fabric in order to save weight. An aircraft like the Zeta would be impossible to build today in a cost-effective way.

The Zlín Z-50 is among the very few aerobatic aircraft that have never had a catastrophic failure. At the time, its +9/-6 g-limit was thought to be the limit of the human body, long before the Sukhoi Design Bureau started having second thoughts. A never exceed speed (V_{NE}) of 327 kph (203 mph) was considered enough for an aircraft with such a low wing loading to stay in the 1 km aerobatic box.

Everything with the Zlín Z-50 radiates competition. Its fuel capacity was only 66 liters — enough for it to work in

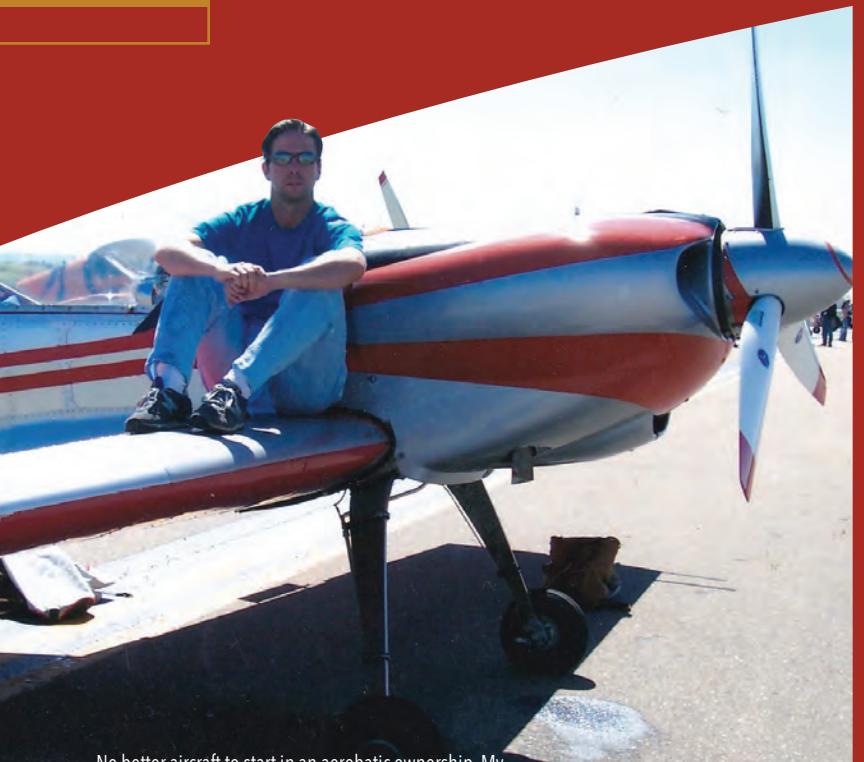
the aerobatic box and not much more. For ferry flights, it required two 60-liter tip tanks. When it was being developed, the political commissar supervised the installation of wing tanks to help prevent defections to the West.

Right from the start, at the 1976 World Aerobatic Championships (WAC), the Zlín Z-50 was a very competitive mount — and the envy of all the teams that didn't have one.

Just two years later, it was winning the World Aerobatic Championships. In 1982, in order to keep up with the new machines, the "L" and "LA" models' power was increased by 40 hp to create the LS model.

To expand their market to capitalist countries, the manufacturers started to add integral ferry tanks. This resulted in a 30-kilogram weight increase, and while the addition enhanced the aircraft's raw performance, its sweet handling characteristics suffered.

And here comes the eternal Zlín pilots' debate — which one flies better? Having flown both (the lighter L and the more powerful LX), I accept a slight performance penalty so I can have an aircraft with some of the best flying characteristics ever made. Accept it! If it doesn't have the best raw aerobatic performance out there (and certainly it does not), at least it has among the best flying characteristics. However, the LS version won four European Aerobatic Championships and two World Aerobatic Championships.



No better aircraft to start in an aerobatic ownership. My first win at the 2004 Spanish National Championships.



Aircraft curves show an aluminum plane can be pretty.

TEST FLIGHT

In the summer of 1990, I was 14 years old and working my first summer job when I crossed paths with the Zlin Z-50. I was there to help future world champion Ramon Alonso and his team. He had just purchased one of the first Su-26Ms the Russians sold to a noncommunist.

I was there as everyone's helper and to provide legends such as his trainer Vytas Lapenas and mechanic Raul Magan with everything they needed. The job was amazing. The Sukhoi was new and radical, but two

A lot of time has passed in order to see fully certified machines beat the Zlin Z-50L 560 kg and 260 hp or the Zlin Z-50LS and LX 600 kg and 300 hp power-to-weight ratio. Not only was the power-to-weight ratio amazing, its big wing also resulted in a very low wing loading. Combined with an oversized tail (it's bigger than those of the Sukhoi, Extra, CAP, etc.), it indicates where this aircraft is unbeatable: at low to medium speeds.

But not everything was perfect. The Zlin Z-50's wing is mounted with 2.5 degrees of wing incidence. This helps with takeoffs and landings, but it would prove to be the aircraft's downfall when it came to some maneuvers. When the aircraft is rotating vertically with the wing at zero degrees, the tail is wagging like an excited puppy making a circular offset rotation, giving the impression that the fuselage is not truly on the vertical. Let's be honest: The asymmetric and curved fuselage, though beautiful, doesn't help in this matter.

Same thing with the negative flicks. That positive wing incidence didn't help because it was more difficult to flick negative compared to positive flicks, and this leads to a lower score.

At the Unlimited world level, without the best high-speed performance and with the worst negative flicks and vertical presentation, the Zlin started fading away from the top of the rankings, giving way to Sukhois, CAPs, and Extras.

abandoned aircraft at the far end of the hangar got my attention. They were beautiful and sleek. When I had time off, I would play inside their cockpits.

I was told they were four Spanish Aerobatic Team Zlin Z-50s that were now considered obsolete, and so no one took care of them anymore.

In 2002, after two summer training camps with Vytas in Lithuania and with the "aerobatic poison" in my blood (as he called it), I was ready to find an aircraft for the 2003 season. I asked around and was given a choice between a fifth share of a Sukhoi Su-29 or a fifth share of a Zlin Z-50 that a group of enthusiasts had restored to flying condition.

Because the Zlin was cheaper and its operating cost was just a third of the Sukhoi's — and because so many pilots praised the sweet handling characteristics of the Zlin compared to those of the Sukhoi — the choice was easy. Not long after purchasing the Zlin Z-50, I realized it was the plane I had played in during my childhood.

From the cockpit of the Zeta, you can appreciate its superior design and craftsmanship. Everything is within reach and designed with an eye toward ergonomics — a consideration that had not really been stressed until that era. The seat is overengineered in order to provide a perfect reclined position for pilots of all heights. At 6 feet, 3 inches, I don't have problems inside the bubble canopy. The bubble canopy provides almost 360 degrees of visibility and was seen in very few aerobatic aircraft at that time.

The cockpit is full of Soviet- and Czech-style instruments. Everything is in meters, kilometers per hour, atm, Celsius, etc. If you've flown the Blanik glider, you will notice that most of the instruments are the same. And this leads us to one of the Zeta's biggest drawbacks: Its brakes, which are exactly the same as those in the Blanik, are of a not-very-effective drum style. Not only do they lack the required bite, especially at heavy weights, but also they have a tendency to overheat and totally lose effectiveness. If you taxi out using them to zig-zag, they will be lost in a medium-to-long taxi. To avoid overheating and losing the brakes, you need to taxi straight and stick your head out of the cockpit with the canopy open.

If you use the brakes in the landing roll with heavy weights (tip tanks, baggage, a heavy pilot, etc.), you will lose them after landing.

Once you know the brakes' capabilities, you need to learn how to use them — or not use them except when you really need them. The Zlin Z-50's low approach speed helps a lot, and typically the brakes are only required in runways that are shorter than 800 to 900 meters.

On one occasion I landed during a ferry flight into a field at a busy towered airport where a championship was taking place. I lost left brake effectiveness, and every 90-degree turn to the left had to be done with a 270-degree turn to the right, which really freaked the controller out.

During takeoff, the Zlin Z-50 handles like a classic taildragger. You have forward visibility at all times, and after you lift the tail and experience a minuscule brisk acceleration, you are in the air. During the takeoff roll, the long landing-gear legs provide excellent propeller clearance, but the titanium big modulus of elasticity gives you the impression of wobbling, like they were made of chewing gum.

The best rate of climb speed is 145 kph (90 mph), and you can maintain full power at all times or reduce it to a more conservative setting. A throttle/propeller pitch interconnect prevents oversquaring of the engine. That may be ideal for aerobatics, but it also leads to full rpm with full throttle. This feels strange when you're cruising at high altitudes that hold 2700 rpm continuously when operating at wide open throttle.

In the air, you feel the flight controls' effectiveness, and only at very high speeds will the ailerons seem heavy at full deflections. Spins start with a buffet at 100 to 110 kph (68 mph) with a nice and docile entry, thanks to its tail. Its execution is perfect, and the exit is probably among the most crisp and precise you'll ever see, thanks to its oversized and low-weight tail (which is strut-built and fabric-covered to keep its weight down).

THE JOB WAS AMAZING. THE SUKHOI WAS NEW AND RADICAL, BUT TWO ABANDONED AIRCRAFT AT THE FAR END OF THE HANGAR GOT MY ATTENTION. THEY WERE BEAUTIFUL AND SLEEK. WHEN I HAD TIME OFF, I WOULD PLAY INSIDE THEIR COCKPITS.



Even during the nastiest flat and power-on spins, control is maintained at all times, and just a little input will let you exit the spin condition — something that not all aerobatic mounts are capable of.

The tabs in the ailerons are masterpieces. During the first part of a stick deflection, they work as antitabs, helping to center the stick; past that deflection, they work as servo tabs, helping to obtain full deflection. This is something to look out for, as they tend to wear the bearings, resulting in lower effectiveness.

In order to get the official 360 degrees per second during aileron rolls, you need a strong arm (or two arms) at high speed. At low to medium speed, it is more manageable. Working in point aileron rolls again, the wing incidence works against a nice presentation, as it creates an effect close to that of an asymmetric airfoil, when in reality it is fully symmetric.

When pulling vertical maneuvers, a speed of 250 kph (155 mph) works for loops, half-Cubans, Vertical 8s, etc. When going fully vertical, flying at more than 300 kph (186 mph) helps one draw a long line. Vertical penetration is not the Zlin Z-50's forte at 1,800 feet travel, but it's comparable to other contemporary designs.

Going to the vertical and pulling g's, its thick NACA airfoil scrubs lots of energy if you're going for max at 9g. The aircraft feels at home working at 7-8g at high speed or as little as 4-5g at low speed if you're looking to conserve energy in a full Unlimited or Advanced program.

For the wingover, textbook procedure involves hitting the oversized rudder at 60 kph (37 mph). The Zeta is the only airplane I have flown in which the airspeed indicator actually shows 60 kph (37 mph) as it is in the pilot's operating handbook (when I kick the rudder). From zero to V_{NE} , the needle requires to turns twice (once on the outer scale and a second time on the inner scale), making it easy to differentiate 59 or 61 from 60. For the humpty bump, a little more speed is required, and you need to actively work with the rudder, correcting for P-factor.

With such large flight controls, you are not going to allow a slide backward during tail slides, but the pivot will be crisp and manageable. Going downward, its clean lines (for the time) make crisp and fast rotations that keep the aircraft from exceeding 327 kph (203 mph). Pulling the power back would be a crime that you will pay for at the end of the program with a lack of energy.

I have never done it, but according to legend, when Zlins started getting outclassed by newer designs, pilots flew them past their limits. According to those stories, when pushed well past V_{NE} , the aircraft's cowling inflates like a squirrel's cheeks full of nuts, and then it's time to pull. This was during the 1980s and 1990s, when the Pitts, Yaks, and Zlins were trying to keep up with the latest Sukhois, Extras, or CAPs.

Snap-rolls are easy to learn and execute. When going full out, the Zlin Z-50's low wing loading and NACA airfoil (compared to "ice cone"-shaped airfoils) make it a little

sluggish. Attitude appears negative again and looks weird with the wing incidence.

The Zlin Z-50 is an excellent machine if you're competing up to Advanced at a national or regional level. If you're competing internationally, the Unlimited and Advanced categories will be out of reach.

Its ergonomics are amazing. Its seat offers infinite combinations in order to give everyone a relaxed position with all controls within reach. The one-piece canopy offers uninterrupted visibility, making the aircraft one of the few Unlimited machines out there in which you can see the runway in short final.

A 140 kph (87 mph) approach lets you decide between a three- or two-point landing after a long float caused by its low, big wing. This aircraft glides instead of falling out of the sky every time you close the throttle. Its characteristics are similar to those of a Piper Cub and are unmatched in a machine so capable and powerful.

It is inexpensive to buy and own, in part because it has a Lycoming engine with easily accessible parts. Prop overhauls are reasonable, and even though it's more beautiful than other "spam cans," its structure won't give a competent mechanic much trouble.

The aircraft's original life limit of 600 hours was imposed by the Soviets, who thought they could throw it away and build a new one as needed. In certified countries, the Zlin Z-50 can get one life extension at the Moravan factory, or at your maintenance station if your country's aviation authority approves it. In some countries with an experimental category, it can be operated with no problems under certain conditions.

This is definitely a machine that marked a new era. It was unclear how big an engine would be needed for the Unlimited category. Monoplanes flying behind six-cylinder engines with composite three-bladed propellers are a normal sight 45 years later. From the top of the WAC standings and national air shows to recreational aerobatics, this aircraft has more than made a name for itself. **IAC**



Two 50-liter tanks can be fitted in the wingtips to increase range.



260 hp, low weight, good visibility and tame manners make takeoff a breeze.



IAC Chapter 137, Alberta, Canada,
competitors and chapter members at the 2021
Rocky Mountain House Aerobatic Contest.

MEET THE U.S. UNLIMITED TEAM



COMPILED BY LORRIE PENNER, IAC 431036

THIS YEAR'S U.S. UNLIMITED Aerobic Team is made up of experienced, world-class competitors. All the team members have been to a World Advanced Aerobic Championships (WAAC), a World Aerobatic Championships (WAC), or both. The team is actively preparing to bring its A-game to Leszno, Poland, for the 31st Fédération Aéronautique Internationale WAC August 3-13.

Most of the team will be leaving the United States well before EAA AirVenture Oshkosh 2022, which takes place in July. Traveling to Poland to support the team are team manager Alice Johnson and coach Coco Bessiere, in addition IAC historian and President Emeritus Mike Heuer, who has been selected to serve on the WAC jury.

We wish the team well. Go, Team USA! Being part of the team is not an inexpensive endeavor, so if you would like to provide financial support, the IAC website is set up for your donations: IAC.org.

ROB HOLLAND, TEAM CAPTAIN

ROB HAS NEVER KNOWN a time when he was not completely obsessed with aviation and aerobatics. When Rob was a kid, his dad brought him to an air show where he saw an airplane flying upside down, and he knew that was what he *had* to do.

He has been flying since the age of 18 and has accumulated more than 11,000 hours of flight time in more than 172 different aircraft types ranging from Piper Cubs to regional transport aircraft and gliders to high-performance aerobatic machines.

Rob's complete dedication to the sport of aerobatics has earned him an impressive list of personal achievements:

- 10-time U.S. National Aerobic Champion, 2011-2021
- Five-time World 4-Minute Freestyle Champion, 2011-2019
- 2012 recipient of the Art Scholl Award for Showmanship (the highest honor an air show performer can receive)
- 2008 World Advanced Aerobatic Champion
- 2008 ASB Person of the Year
- 2006 World Advanced Aerobatic silver medalist
- Member of U.S. Aerobatic Team, 2004, 2006, 2008, 2011, 2013, 2015, 2017, 2019, 2021
- 2008 Daniel Webster College Distinguished Alumnus of the Year

Rob graduated from Daniel Webster College in 1997 with a Bachelor of Science in aviation management and aviation flight operations.

Rob is as an airline transport pilot with flight and ground instructor (CFI, CFII, IGI, AGI) certificates. He also holds a glider and seaplane rating.



Rob has had a diverse aviation career so far. He's worked as a flight instructor, banner tow pilot, aircraft ferry pilot, Pilatus PC-12 corporate pilot, and commuter airline pilot. He currently works full time both domestically and abroad as a professional air show performer.

Rob's infectious, upbeat, and approachable demeanor makes him a favorite crowd-pleaser at air shows. His love of aviation is immediately apparent to everyone who meets him. Rob hopes to instill in others his insatiable desire to excel and encourages them to actively pursue their goals and dreams.



JEFF BOERBOON

AS A STUDENT AT the University of North Dakota, Jeff acquired all his flying ratings and was given his first opportunity to fly aerobatics. While at UND, Jeff was an aerobatic flight instructor and a member of the 1989 and 1990 NIFA National Championship teams.

Since 1999, Jeff has flown for Delta Air Lines as an Airbus A320 captain. Before joining Delta, he flew for Grand Canyon Air Tours and American Eagle Airlines from 1992 to 1999.

Jeff won the U.S. National Aerobatic Championship in 2003 and 2007 in the Advanced category and won again in 2010 in the Unlimited category. He has been a member of both the U.S. Advanced and Unlimited Aerobatic teams, having flown in multiple World Aerobatic Championships while receiving numerous awards and accolades.

In recent years, Jeff has flown air show performances in Jack Link's Jet Waco, the *Screamin' Sasquatch*. Jeff currently flies air shows in the Yak-110, a one-off design that combines two Yak-55 fuselages with a jet engine mounted in between. He was inspired to fly aerobatics when he was only 7 years old after attending EAA AirVenture Oshkosh.

In 2021, Jeff secured a place on the U.S. Unlimited Team at the U.S. Aerobatic Championships by placing second in the Unlimited category.



JIM BOURKE

JIM'S LOVE OF AEROBATICS is lifelong, having begun as a young child when he delivered airplanes with his father, an aircraft broker. After a four-year stint in the Air Force, he turned his aviation passion toward RC model planes. He founded the world's most popular website for RC modeling, RCGroups.com, in 1996 and acquired Knife Edge Software, which created the RealFlight RC flight simulator and other flight simulation products. He has since sold his RC-related interests in order to focus on aerobatics. Jim is a member of the Academy of Model Aeronautics Hall of Fame.

Jim has served the IAC in many areas, including as a board member, safety chair, national judge, juror, contest director, and coach. He is currently the IAC president. Jim spearheaded the recent ground-up rewrite of the IAC Official Contest Rules.

He is also an air show pilot with a surface-level waiver. He shares his life with fellow aerobatic pilot Marianne Fox and has three children.

Jim first earned a slot on Team USA in 2016 and will be competing in his third World Aerobatic Championships this year. "I believe that flying aerobatics is perfectly approachable for almost everyone with good equipment and the right training, and I've made it my mission to share what I learn as I progress in the sport," Jim said.



PHOTOGRAPH COURTESY OF LORRIE PENNER



CRAIG GIFFORD

CRAIG HAS BEEN FLYING general aviation aircraft his entire life and has more than 4,500 hours in dozens of types of aircraft.

He is a returning member of the 2017 U.S. Unlimited Aerobatic Team that won bronze in South Africa and of the 2019 U.S. Unlimited Team that won silver at Châteauroux, France. He is also a three-time member of the U.S. Advanced Team, having won numerous team and flight medals while placing in the top 10 worldwide twice.

Craig flies an Extra 330SC that he has flown for three years. Originally from Texas, he now lives and works in Minneapolis. He currently serves on the IAC board of directors as the Mid-America regional director.







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AJ WILDER

A.J. IS AN AVID aerobatic competitor with more than 25 years of flying experience. He can be found flying his Extra 330SC in aerobatic competitions throughout the U.S. and Europe.

With multiple ratings in nearly every type of aircraft, his passion for flying is unmatched. A.J. is a two-time U.S. team member. As a U.S. Advanced Aerobic Team member, he finished 12th overall and ranked as one of the top three scoring pilots for the U.S. team that received a silver medal in 2018, and he was also a member of the U.S. Unlimited aerobatic team in 2019.

A.J. co-founded the Figure 1 Foundation in 2015, a nonprofit organization dedicated to granting aviation scholarships to young adults. He is a registered architect and the president of Wolcott Architecture, a successful Los Angeles design firm.

"I'm honored to be on the U.S. Unlimited Aerobatic Team again, and I look forward to competing in Poland this summer," AJ said.



PHOTOGRAPH COURTESY OF LORRIE PENNER



AARON MCCARTAN

AARON HAS BEEN AN active competitor with the IAC since 2007 and is based in northern Iowa. He has consistently proven himself to be a strong competitor, having won U.S. National Championship titles in 2013 in Intermediate and back-to-back Advanced National Championship titles in 2016 and 2017. His career highlight to date was a gold-medal performance on the U.S. Advanced Team during WAAC 2018 in Romania, where he was part of the trio that won silver in the overall standings.

Aaron has served the IAC in nearly every volunteer role during his career, including as contest director for the U.S. National Championships in 2012.

Aaron recently transitioned from the Panzl S-330 to the Extra 330SC for his competitive pursuits. He has nearly 3,000 hours of total time and more than 1,500 hours in tailwheel and aerobatic variants.

"My father and I began attending contests in 1991 as non-flying volunteers, and in 1992 we helped at a regional contest where the U.S. Unlimited Team was competing in preparation for WAC in France," Aaron said. "Seeing the team dynamic and meeting my heroes as I actively followed the sport was really inspirational. It's a true honor to finally reach this level!" **IAC**



JOHN WACKER

JOHNNY WAS A MEMBER of the U.S. Advanced Team in 2015, 2017, and 2019. Originally an alternate, he competed with the team in the 2016 World Advanced Aerobatic Championships in Radom, Poland. He also flew as a team member at the 2018 WAAC in Strejnic, Romania.

An IAC member since 2007, Johnny has been flying competitively since 2009. He has been to the U.S. National Aerobatic Championships six times, where he consistently finishes in the top 10.

Being from Alabama, Johnny competes primarily in the Southeast region and was the Southeast Regional Series 2010 Sportsman champion. He placed fourth in Intermediate in 2014, fourth in Advanced in 2017, and third in Advanced in 2018. He currently flies an Extra 330SC.



2022 IAC CONTEST SEASON CALENDAR



IAC.org/Contests



DATES	HOST CHAPTER	NAME	REGION	LOCATION	AIRPORT
April 22, 2022	36	Hammerhead Roundup	Southwest	Borrego, CA	I08
April 29, 2022	23	83rd Sebring Aerobatic Contest	Southwest	Sebring, FL	KSEF
May 13, 2022	3	Mark Fullerton East Coast Championship	Southwest	Rome, GA	KRMG
June 3, 2022	38	No. Calif. Aerobatic Showdown	Southwest	Tracy, CA	KTCY
June 4, 2022	61	Giles Henderson Memorial	Mid-America	Salem, IL	KSLO
June 10, 2022	80	MAC 50th Anniversary	South Central	Seward, NE	KSWT
June 18, 2022	11	James K Polk Open	Northeast	Warrenton, VA	KHWH



G-Induced Vestibular Dysfunction – The Wobblies

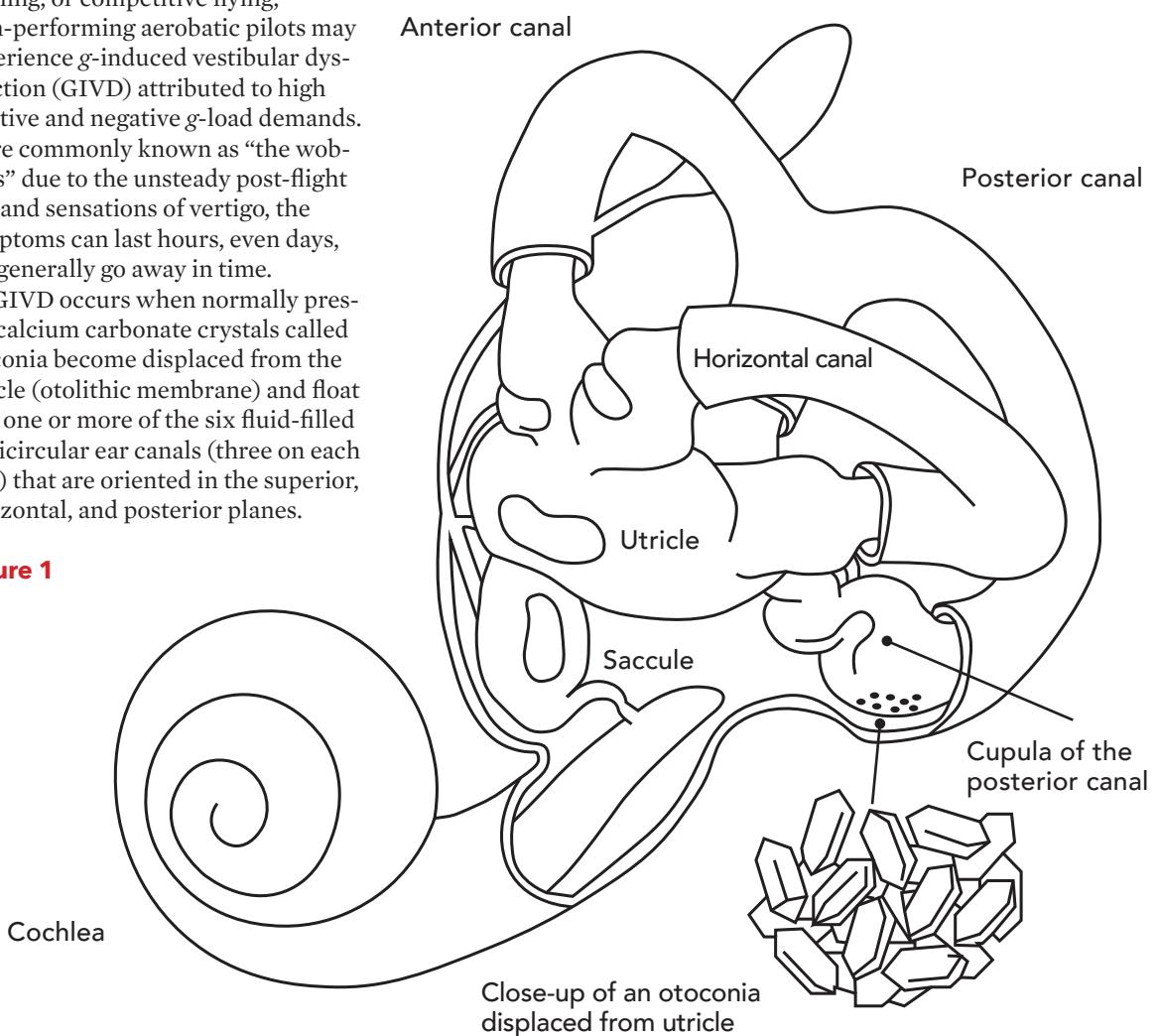
Safety – Human Factors

ZINNIA KILKENNY, IAC437244

DURING OR AFTER AN air show, training, or competitive flying, high-performing aerobatic pilots may experience g-induced vestibular dysfunction (GIVD) attributed to high positive and negative g-load demands. More commonly known as “the wobblies” due to the unsteady post-flight gait and sensations of vertigo, the symptoms can last hours, even days, but generally go away in time.

GIVD occurs when normally present calcium carbonate crystals called otoconia become displaced from the utricle (otolithic membrane) and float into one or more of the six fluid-filled semicircular ear canals (three on each side) that are oriented in the superior, horizontal, and posterior planes.

Figure 1



Among the many reasons otoconia may become loosened include mild to severe head trauma, infection, age, or additional comorbidities.

When otoconia navigates into the semicircular canal, mismatched abnormal signals are sent to the brain, communicating the head is moving when it's not. The recipient may experience a range of symptoms, from nystagmus, also known as “dancing eyes,” and dizziness, to unsettling, incapacitating, whirling vertigo and nausea. In the air, with the horizon going around and around, it can be perilous.

Two Notable Analyses

How prevalent is it? In an off-the-record survey conducted by Thomas Upson Muller at the World Aerobatic Championships in 1998, the United States team physician and FAA examiner relayed that more than 75 percent of competitors representing several countries had experienced at least one episode of GIVD. (Thomas Upson Muller, M.D., FACS 2002. G-induced vestibular dysfunction ('the wobblies') among aerobatic pilots: A case report and review, *ENT Ear Nose & Throat Journal*, volume 81 number 4, page 271.)

In 2001, Scott Poehlmann, M.D., International Aerobatic Club vice president emeritus and competitor, sent an epidemiologic questionnaire to the then 5,500 members of the IAC. He would publish the data in a January 2004 *Sport Aerobatics* article titled “Results of the ‘Wobblies’ Study.”

Of those polled, 2.6 percent responded. Of those who competed in 2001, 605 claimed they were actively competing, and nearly one-quarter of them said they'd experienced symptoms consistent with the wobblies. Two-thirds of Unlimited pilots felt instances of the wobblies, while 2.9 percent of Sportsman reported symptoms.

Understandably, finding pilots amenable to an interview about their episodes was challenging, since some competitors are reluctant to disclose an occurrence of GIVD. Of the three Unlimited competitors and one former USAF F-15 fighter pilot I initially contacted with known GIVD occurrences, one Unlimited competitor agreed and requested anonymity.

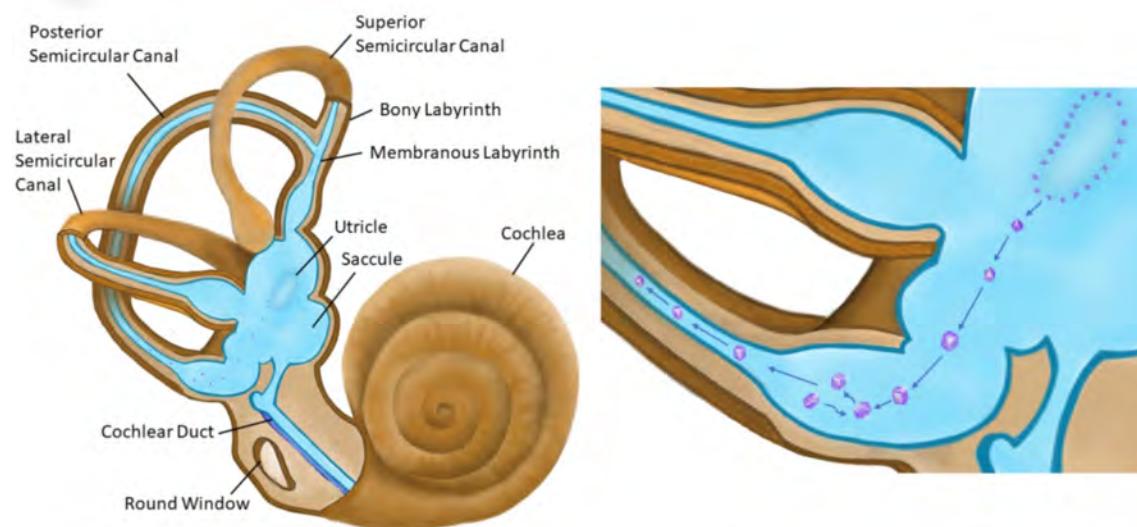
IN 2001, 605 CLAIMED THEY WERE ACTIVELY COMPETING, AND NEARLY ONE-QUARTER OF THEM SAID THEY'D EXPERIENCED SYMPTOMS CONSISTENT WITH THE WOBBLES. TWO-THIRDS OF UNLIMITED PILOTS FELT INSTANCES OF THE WOBBLES, WHILE 2.9 PERCENT OF SPORTSMAN REPORTED SYMPTOMS.

In 2007, he attended an aerobatics training camp in central California conducted by Sergei Boriak. While practicing numerous push maneuvers at the time, he suddenly developed vertigo and nausea while looking to the side over the top of a pull-push humpty. Admittedly, he might have been a little dehydrated and worn out at the time of the sortie. Nevertheless, Sergei instructed him to land immediately. A fellow physician pilot noticed he exhibited lateral nystagmus that resolved in time. He aborted the camp and flew home the next day.

While conferring with another pilot, he was referred to Teresa England, a physical therapist in Garden Grove, California, specializing in vestibular disorders. England used infrared goggles with built-in cameras, which aids in diagnosing the problem, and confirmed lateral nystagmus, also referred to as “dancing eyes,” due to repetitive and involuntary eye movement in one or both eyes.



SAFETY



The recommended in-office treatment included the Epley maneuver, named after its inventor, John Epley, M.D., in the competitor's case. It's effective if the posterior ear canal is affected. He was then guided through a series of sequential movements to dislodge the crystals from the semicircular canal and return them to the utricle.

Without using steroids, Valium, Antivert (meclizine), or any other medications, this method, along with a checkup, seemed to cure the problem. Since then, he's competed in the Advanced and subsequently Unlimited category without a recurrence.

He attributed his wobbles episode to mild dehydration and positioning his head in an unusual manner that was not straight ahead during pushing maneuvers. Now when performing similar figures, he conscientiously tries not to look anywhere but over the nose, especially for outside figures.

The promising news in the two cases is that the episodes resolved themselves by following their prescribed medical recommendation and respite from flying. However, the grounded part, losing the privilege of flying, is why some competitors are reluctant to disclose a GIVD occurrence and the reason for the scantiness of information. (FAR 67.105(c) 205(c) 305(c))

RESIST THE TEMPTATION OF SELF-DIAGNOSING AND SELF-TREATMENT USING YOUTUBE OR THE EPLEY METHOD, ALONG WITH VARIANT EXERCISES TO RESOLVE GIVD.

How Is GIVD Diagnosed and Treated?

If you suspect GIVD, contact your health care provider. They will diagnose the affected canal(s) and systematically rule out other misdiagnosed health issues. In addition, patients are often referred to professionals trained explicitly for vestibular disorders or a vestibular rehabilitation therapist.

Simple, clinic-based diagnostic tests to determine GIVD include the Dix-Hallpike maneuver or supine roll, which includes first intentionally provoking symptoms triggering vertigo, and then observing specific nystagmus patterns, an assessment made more sensitive by having the patient wear infrared video goggles. Specific therapies will be used once the health care professional identifies what canal(s) are affected.

Worthwhile noting, nystagmus may be present due to underlying health issues, which underlines the importance of seeking professional medical assistance and having a well-established diagnosis.

Additionally, resist the temptation of self-diagnosing and self-treatment using YouTube or the Epley method, along with variant exercises to resolve GIVD. Instead, a qualified practitioner should perform these maneuvers, since self-administering may lead to more problems.

The encouraging news is that most GIVD cases are resolved with respite from aerobatics and guidance from medical professionals and can be corrected mechanically. Before too long, the world will stop whirling, and you'll return to spinning with intention.

Disclaimer: This article is not intended as a substitute for professional health care.

Resources:

- Aviation Medicine Advisory Service (AMAS)
- Vestibular Disorders Association (VEDA)



Zinnia Kilkenny is a classical ballet and body alignment teacher in Monterey, California. She is a national judge and author of the Meet a Member column, which appears monthly in *In the Loop*. Zinnia has been flying aerobatics since 2013 and flies Intermediate in a Pitts S-2A through Olmsted Aviation. She is a member of and served as vice president of Chapter 49, and is a member of chapters 36 and 26. **IAC**

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SAFETY



Emergency Landing in a Pitts

SHELDON APSELL, IAC 16866

A LONG TIME AGO in a galaxy far, far away (Florida to be exact), Mikey Goulian (as I said it was a long time ago and Mikey was just a kid then, so we called him Mikey; now we call him by his proper name, Sir Mikey) was conducting an aerobatic training camp at a place with the unlikely name of Yeehaw Junction.

My wife had recently bought me a Pitts S-2B for my 50th, and I thought this would be the perfect opportunity to learn how to fly the Sportsman sequence in it. The idea was to take an airline flight to Florida, and then four of us would share the use of a single S-2B that was owned by one of the other participants and had recently been re-covered by the factory in Afton, Wyoming. Since all S-2Bs have identical flight characteristics, the logistics became very simple. With each of us having three flights per day over a period of four days, with expert critiquing from the ground, this was the perfect learning environment.

Anyhow, I had the last flight of the second day. That evening the weather was ideal for flying, with mild temperatures, little wind, and low humidity. I was working on perfecting the hammerhead reversal maneuver. I pulled to the vertical, and as my vertical speed decreased, I applied full left rudder followed by a little bit of opposite aileron and forward stick. To my surprise and confusion, the airplane started turning rapidly to the right. This was not supposed to happen! That's when I noticed that the fabric on the top right wing had separated at the leading edge, producing a large air brake.

I APPLIED FULL LEFT RUDDER FOLLOWED BY A LITTLE BIT OF OPPOSITE AILERON AND FORWARD STICK. TO MY SURPRISE AND CONFUSION, THE AIRPLANE STARTED TURNING RAPIDLY TO THE RIGHT. THAT'S WHEN I NOTICED THE FABRIC ON THE TOP RIGHT WING HAD SEPARATED AT THE LEADING EDGE, PRODUCING A LARGE AIR BRAKE.

Since I had plenty of altitude, my first thought was that I should consider bailing out. However, I had never done a practice jump and never had any real instruction in the use of the parachute. But many, many, many years ago (before the Big Bang and in a parallel universe), I did participate in a course on ejecting from a jet. Over the years, I had tried to push that from my memory, because as I recalled, a lot of things happen real fast when ejecting — all of them bad. Nevertheless, I did recall that there were three really important things to remember.

The first was that you had to get low, because above 60,000 feet, your blood will boil without a pressure suit. This was not going to be a problem. Nobody was going to get a Pitts up that high — with the exception of Spencer Suderman, of course. Spencer H. Suderman (USA) achieved the Guinness World Record for 98 inverted flat spins at Yuman International Airport on 20 March 2016.



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SAFETY



The second thing I remembered was that you want to get slow. There has never been a successful supersonic ejection — successful being defined as being able to walk away from it with only minor injuries. This also was not going to be a problem. Although I have seen a biplane with a jet engine at Oshkosh, as far as I know it never reached anything near supersonic speed.

Third, and most important, you want to get over friendly territory before ejecting. The closer you can get to friendly territory, the more likely help will be available. The instructor made a big point of how an airplane can still fly even with a lot of damage to the airframe, so keep flying as long as you can maintain some degree of control. At the time, I thought this was pretty useless advice, because the reason for me being there was that we were planning to fly over some places that were definitely not friendly.

As this thought entered my mind, I looked down and noticed to my horror that I was right over a pond where earlier in the day we had been throwing food to the alligators. This was definitely unfriendly territory!

Plan B. Fly the airplane. I found that if I only turned to the right, I could maintain control. Fly the airplane. I also found that although I could not climb, I could almost maintain altitude. Fly the airplane. There was also a nice grass strip adjacent to the home in which we were staying. Fly the airplane. I knew that I would only have one chance at the landing since I could not climb.

I am told that this would have been no great deal for anyone who had trained with Budd Davisson, because he teaches beginners to land a Pitts on a 15-foot-wide runway with a 60-knot crosswind at midnight with one hand tied behind your back. But I had not trained with Budd, and every landing in the Pitts was a new experience for me, so the pucker factor was quite high. Anyhow, I managed to make one of the best landings I had ever made (or made since).

WHEN FACED WITH AN EMERGENCY... IF AT ALL POSSIBLE, FLY THE AIRPLANE WHILE ANALYZING THE SITUATION AND CONSIDERING YOUR OPTIONS. WHEN YOU RUN OUT OF OPTIONS, BAIL OUT.

Examination of the aircraft proved it to be not airworthy, and it had to be disassembled and trucked away for repairs. However, the lesson learned is worth repeating. When faced with an emergency, do not submit to your first instinct (which is usually, "I pay my taxes and eat my vegetables, so this can't be happening to me."). If at all possible, fly the airplane while analyzing the situation and considering your options. When you run out of options, bail out.

Sheldon Apsell has been an IAC member since 1990 and is the treasurer for New England IAC Chapter 35. He flies an Extra 300L regularly in competition in the Northeast Region, most recently at the 2021 Wildwood AcroBlast in the Sportsman category. **IAC**

PHOTOGRAPH COURTESY OF SHELDON APSELL

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Dusting Off the Cobwebs

Safety – Ask Allen

ALLEN SILVER, IAC 431160



FOR THOSE OF YOU who are coming out of winter hibernation, it's time to start thinking about putting away the skis or returning from your winter home in some warm exotic place. Flying season is now upon us. **Will you be prepared?** The time to start dusting the cobwebs off your parachute, aircraft and, most importantly, yourself is here.

Now is the time to start thinking about your emergency procedures. This step applies not just to your bailout procedures but also all your emergency procedures. In my experience, most emergencies that come up could have been avoided with proper preventive measures. The first line of defense is you practicing your emergency procedures before and after each flight until they become muscle memory. This action easily can cut your response time by 50 percent or more.

I specialize in emergency bailout training and the use of survival equipment, such as your Nomex flying clothing and your helmet. How about organizing or attending a bailout/survival equipment seminar in your area? I'm finalizing how-to Zoom seminars. Please consider hosting a seminar from me or someone else in your area. If it is not possible, I have a webinar on the EAA website that is free and goes down quite well with a nice glass of wine or a cold beer. Go to SilverParachutes.com and click on the link (about halfway down my home page). I will be booking Zoom presentations soon. This option

will be an excellent choice for those groups that do not have the budget to fly me all over the country. Being up close and personal is what I would like to do, but with our current COVID-19 situation, your safety is my first concern.

Now is a good time for me to discuss some of the ongoing problems continually popping up that could affect your safety. I may not pack parachutes anymore, but pilots still call or email me with their questions and concerns. You do not have to be a customer to contact me.

I just discovered that videoconferencing is a fantastic way to communicate. Let's face it — Zoom is here to stay. I've had pilots Zoom with me and show me a problem they may have with their parachute. A picture or a Zoom meeting is truly worth a thousand words. Recently, a pilot wondered why his parachute was constantly falling off his shoulders. I explained it was so far out of adjustment that during a bailout, he and his parachute may become separated, kind of like an ugly divorce. I showed him how to adjust his parachute, and he was good to go. All you need to do is contact me. Don't forget that your parachute rigger is usually the first person you should contact. After a long winter, your parachute probably needs a current repack, anyway.

What I am most concerned about are pilots new to aerobatics who have had little or no firsthand training on the ins and outs of their parachute and other survival equipment. In a perfect world, I would like to see everyone return their parachute(s) to the factory or to a

factory representative at least once every few years to make sure their expensive cushion has been receiving the tender loving care it deserves from you or your rigger.

Unfortunately, there are riggers who are not as familiar with pilot emergency parachutes as they should be. Having another set of eyes occasionally inspect your expensive cushion may not be a bad idea.

Does your rigger spend time with you and answer all the questions about your parachute that you may have? I feel it's a disservice if I sold you a parachute or packed your parachute, and you did not fully understand how to properly adjust, wear, and use it when I returned it to you.

A while back (now quite a while), I had two new customers fly to my airport and pick up their new parachutes. I spent over an hour with them until I felt confident that they had an excellent chance of survival in case of an emergency bailout. I also went over how to egress their aircraft. In addition, they left with my bailout seminar handout material, which is available to anyone on the home page of my

website. They left with the understanding that they could call or email me anytime with questions. That also goes for those of you who are not my customers. I am very specialized and have serviced only pilot emergency parachutes in my shop for over 40 years and spent 18 of my 25 years in the Air Force servicing all types of survival equipment. After packing close to 45,000 parachutes, I retired from packing parachutes, about five years ago, to the delight of my hands.

I have had numerous articles published over the years addressing many of the issues you might like to know more about, such as how to properly take care of your parachute, putting it on and off, and of course, how to pull that shiny silver ripcord handle. I may sound like a broken record, or is it now a broken CD? But I constantly received parachutes in my shop that needed a generous helping of TLC. Just having your parachute packed occasionally, at the closest place, may be cost effective and may save you time, but will it save your life in an emergency? There are areas where you can save, but not getting proper servicing for your parachute is not one of them. You need to make sure your rigger is tending to you and your expensive cushion properly.



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First, start off with proper adjustment and fit. Put your parachute on. Bend at the waist and tighten the straps as you normally would and then straighten up. Your parachute should be nice and snug. You should *not* be able to lift up the portion of the harness that goes over your shoulders by more than about half an inch. You need to make sure your parachute stays with you when it is deploying. Does your parachute (**see photo above**) look like this? If yes, you need to adjust or have your rigger adjust it *before you go flying again*. If you ship your parachute to your rigger, call to give them your height and weight. Maybe send or email a photo with it on so the rigger can better understand what's going on. Many riggers hand tack the webbing in place after making the necessary adjustments so it doesn't slip between repacks. In an emergency bailout, if your parachute is out of adjustment, it could cause you severe injury during deployment. An example is the chest strap if you have one. This problem could cause severe injury to your neck and/or face if your harness is not adjusted properly. For more information about this problem, read Kirill Barsukov's account, titled "Mid Air Collision," in the February 2012 issue of *Sport Aerobatics*.

Now, if you are still with me, I'd like to discuss two other items that kept appearing in my shop — checking the length of the pack closing loop(s) and the condition of the rubber bands. I have harped on these two issues before. First, let's go over the rubber bands. Does your rigger have replacement rubber bands? They do not last forever and need replacing from time to time. These rubber bands hold your

lines in place and help to properly sequence the opening of your parachute. If your rubber bands are rotted and/or weak, your suspension lines could fall out of them easily. This problem can cause an out-of-sequence opening. You and/or your deploying parachute could become entangled. If you ship your parachute to your rigger, you can check the rubber bands yourself by donning your parachute and practice pulling the ripcord and inspecting them. Make sure you keep your parachute and especially the suspension lines away from the scratchy part of any Velcro tape. Now locate the rubber bands. If you pull up on them and they are pitted, sticky to the touch, or very weak when you pull on them, they need to be replaced. I went through 5-10 pounds of rubber bands a year. They will easily last for many repacks if you properly store your parachute. Keep in mind they will deteriorate a lot faster if you live in a hot and humid climate or store your parachute in a hot place like the trunk of your car.

Since you now have your container open, check the length and condition of the closing loop(s) that the ripcord pins go through. They are what hold the container closed. The specs are in your owner's manual. The closing loops will always stretch between repacks and *must* be either shortened back to factory specs or replaced if worn. If they have not been checked and replaced in a long time, they usually will be at least one or more inches out of tolerance. The closing loops keep your spring-loaded pilot chute properly centered and compressed so it can launch far away from you when you pull the ripcord. They keep your ripcord pins from slipping and coming out prematurely. The closing loop(s) must be within factory specs. You do not want your parachute accidentally deploying on the ramp to the amusement of your fellow pilots.

Remember, practice, practice, practice.

Allen Silver owns and operates Silver Parachute Sales & Service located in Sonora, California. He has been an FAA Master Rigger since 1974 and in 1991 was designated as a Parachute Rigger Examiner for the FAA. He has also served three terms as the chairman of the Parachute Industry Association (PIA) Rigging Committee, a worldwide organization that represents the parachute industry. He has over 3200 parachute jumps as a sport and professional skydiver for 55 years. Allen has over 1900 plus hours of flight time, of which more than 1200 are in a Marchetti SF-260. **IACI**

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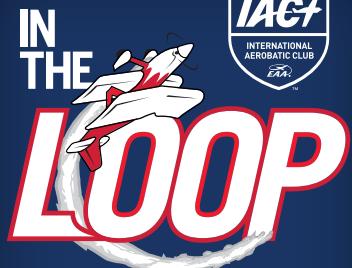
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