

SPORT

May 2017

Aerobatics

OFFICIAL MAGAZINE of the INTERNATIONAL AEROBATIC CLUB



Tried-and-True
SAFETY
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2017 F-150 Raptor



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The all-new 2017 Ford F-150 Raptor is leaner, meaner and more powerful than ever. Re-defining what it means to be the only purpose-built, high-performance, off-road truck in the market. It's approximately 500 pounds lighter than the previous generation, thanks to high-strength, military-grade, aluminum alloy plus a high-strength, boxed steel frame.

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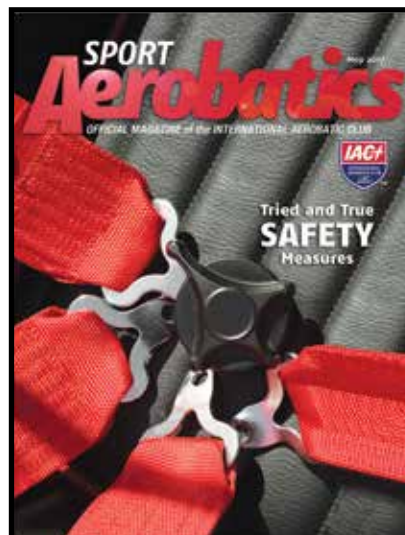
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COVER

Seatbelts are not new.
Neither is flying safely.
Photo by Steve Mann.

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Letters

EVAN PEERS, EDITOR

There was an airframe failure at the 2015 World Aerobatic Championships in France. Nigel Hopkins of South Africa was flying his MX-2. Hopkins successfully left the aircraft and deployed his parachute. The following is just one of his insights into why he was prepared and survived.

After the structural failure of my aircraft, I have been asked many questions about my thought process and actions. What went through your mind? You must have gotten one serious fright? Do you believe your previous skydiving experience helped? So if I may, I will share some of the answers and thought processes with you.

There was no warning of any failure. There was a loud bang followed by a loss of control — STARTLE FACTOR! In this instance muscle memory was key! There was no time or need for checklist procedures. Unlatch the canopy, release the seat belts, evacuate the plane, locate and pull the ripcord. Within 5 seconds I found myself hanging under a parachute. Now what?

It took a few seconds to realize the extent of what had just hap-

pened. Then, although there was a huge feeling of relief there were also some questions: Do I have control of this round parachute, which way is the wind blowing, where am I going to land?

One thing is for sure, if you are not ready, or stay with the aircraft, the outcome is not going to be favorable. So what can we do to prepare ourselves? You cannot avoid the startle factor, especially when you are in another state of mind such as focusing on the maneuver you're about to do. But how you react in the time constraints is paramount to survival, and there is no substitute for actual experience so a skydiving course is obviously first prize!

Remember, confidence comes from discipline and training!

— Nigel Hopkins

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

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President's Page

Safety – at the core of our culture

MIKE HEUER, IAC PRESIDENT, IAC 4



This month's issue of *Sport Aerobatics* is devoted to safety. This continues a tradition stretching back many years, to focus attention annually on the constant need we all have to refocus our efforts and dedicate ourselves to safe operations in our sport and in our competitions. This has been at the very core of the IAC's culture since its foundation in 1970. It is also in line with the philosophy that all of the organizations within the EAA family share.

Promoting safety is an effort that has many aspects. First of all, our emphasis on safety at our sanctioned competitions is embedded throughout the IAC's official contest rules. Safety is the responsibility of all contest officials as well as participants who can often exert effective peer pressure on their friends and colleagues to keep it safe, both at organized contests as well as practice and critiquing sessions. Looking out for your fellow aviator can be far more powerful than all of the federal regulations and IAC rules combined.

The IAC also has had an organized safety program since our inception. During our early decades, there was a strong emphasis on what we call "technical safety." Aerobatic airplanes were not as sophisticated as they are today and with less of a service history. Competition created new challenges to aircraft structures, engines, and propellers, and our technical safety program gathered incredible amounts of information on technical problems and published them in this magazine. These were ultimately assembled in a series of four *Technical Tips* manuals that are available at our website for download.

To keep that effort going, there is now a webpage called "TechWatch" that is linked to the IAC website and can be found at www.IAC.org/techwatch. I urge you to visit this website, view the considerable amount of information that can be found there, and contribute to it with text and photos when you encounter a technical problem of your own. Your fellow members will be grateful, and you will be adding to the already considerable database we have on operating and maintaining our beautiful fleet of aerobatic aircraft.

Stepping back a bit, however, I would add that the very nature of our activity, which involves flying an airplane to all the edges of its performance envelope and being comfortable and proficient in any attitude of flight, is at the very heart of being a proficient and skilled pilot. Therefore we are constantly urging our fellow pilots

to take aerobatic instruction and to feel the confidence that it brings as well as overcome the fears of being in a situation over which you may not be fully in control. In the IAC, we do spend a lot of our time and organizational resources in promoting aerobatic competition and staging contests all over the country. We are proud of our superb safety record, which is a result of our culture and our rules as well as reliance on each other to keep it safe.

While competition is a part of the IAC's tradition, this does not mean that we will ever ignore the importance of stressing the need for all pilots to have exposure to aerobatics, though they may never pursue a career in competition. For many of us, the challenge of competition becomes a way of life. But we fully recognize this is not something for everyone. This is why we will continue to improve our programs and our publications so as to reach all of our 4,000-plus members throughout the world who look to us for information and education.

My first aerobatic competition was in 1968 in Monroe, Louisiana, in what we then called the Primary category — the equivalent of Sportsman today. Up until then, I had learned spins and recoveries from normal, upright flight, all controlled and easy. I went on to fly in Advanced in a Pitts S-1S and then later in an Extra 230 and Pitts S-2B. However, it was not until the late 1980s that I saw the full gamut of inverted and accelerated spins. I had the honor to fly with a good friend, Gene Beggs, who had developed an emergency spin recovery that worked in the airplane I was flying. I also saw accelerated upright spins and inverted flat spins for the first time. It was an eye-opener. I took that instruction because I felt the need, since I was active in competition. That said, I wish I had the knowledge and exposure to these maneuvers that Gene showed me in those sessions in the Pitts much earlier in my career. I urge all of our members to do the same — only sooner rather than later.

Take advantage of the benefits of being part of a chapter, where so much expertise resides, and get on the flying schedule at one of those aerobatic schools if you haven't already. It is an experience that will remain with you for the rest of your life.

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

Oshkosh Convention & Visitors Bureau Sponsors 2017 U.S. National Aerobatic Championships



US Nationals contest director Gary DeBaun, Cathy Cluff, and Mike Heuer.

Cathy Cluff, sales director at the Oshkosh Convention & Visitors Bureau, attended the IAC board of directors meeting on April 1, 2017, to present a check from OCVB to sponsor the welcome dinner at the upcoming 2017 U.S. National Aerobatic Championships in September. Cathy has been very welcoming and instrumental in assisting with local connections for the competition organizers. We look forward to seeing Cathy, Oshkosh Mayor Steve Cummings, and City Manager Mark Rohloff in attendance at the opening ceremonies and welcome dinner.

OCVB is a private not-for-profit organization funded solely through room tax dollars from Oshkosh hotels. Its mission is to promote Oshkosh as Wisconsin's Event City and Winnebago County as a premier destination for corporate, sports, and leisure groups as well as for individual visitors. www.VisitOshkosh.com

Siemens and Extra Aircraft to Bring World Record Electric Airplane to AirVenture

Walter Extra announced that he and Siemens are planning to bring the Extra 330LE electric-powered aircraft to AirVenture. It will be parked in front of the IAC Aerobatics Pavilion during its stay. Details are being worked on, including the possibility of a flying demo.

This aircraft, being used by Siemens AG as an electric motor test platform, has established numerous world records and firsts in its class.

IAC Team Council and Unlimited Team Manager Set

At the spring board of directors meeting, the IAC board approved Tim Just as the new chairman of the IAC Team Council, to replace Michael Steveson who is stepping down from the position. The Unlimited Team pilots met by teleconference on March 9, 2017, and proposed Alice Johnson as the 2017 Unlimited Team manager. Alice agreed to accept the position, and the board of directors approved her appointment at the spring meeting.

IAC Lifetime Members

An IAC Lifetime member becomes part of an exclusive group of people who have chosen to act as stewards of the sport of aerobatics. Lifetime members lead by example through their demonstrated commitment to promoting and enhancing the safety, education, competition, and enjoyment of aerobatics.



Welcome to the IAC's new Lifetime members:

Raymond Harris, Camp Hill, Pennsylvania, IAC 26766

Sabu Sivaraman, Chennai, India, IAC 430936

Oliver Spatscheck, Randolph, New Jersey, IAC 437931

Craig Thighe, Denver, Colorado, IAC 437284

James Wheaton, Rutherfordton, North Carolina, IAC 1437

New IAC Chapters for 2017

Welcome back, IAC Chapter 777, Las Vegas, Nevada

Congratulations to Tommy Suell for reviving the Las Vegas chapter after a 15-year hiatus. "I feel that there is a better way to promote our sport by using social media and sharing my passion with the younger generation, because without them, there is no future in aerobatics."

Tommy currently flies a 1998 Christen Eagle II. Although new to aerobatics, he was the third-place finisher in the 2016 Southwest Regional Series.

Chapter meetings will take place at 6:30 p.m. on the fourth Wednesday of the month, in the Grand Canyon meeting room of the North Las Vegas Airport. The chapter is currently busy working on establishing its box waiver.

www.Facebook.com/IAC777

www.IAC777.org

New Chapter, IAC 131, in Redlands, California

Under the direction of Casey Erickson, a new chapter of the International Aerobatic Club has been established in Redlands, California. Redlands Municipal Airport has an approved area for aerobatic flying. The club, known as the Inland Empire Aerobatic Club IAC Chapter 131 Aerobats, held its first official meeting in April to discuss its formation and plans to host its first contest. In addition to hosting annual aerobatic contests, the club will be responsible for the aerobatic practice area, which is a 1-mile area northeast of the airport above the Seven Oaks Dam drainage basin.

"There are about eight or nine people who regularly use the practice area," Casey said, "including pilots based in Redlands, Riverside, and air show pilots."

Erickson reports that the chapter is in the process of working with the city of Redlands for permits to host the 2017 Air Wars, which is tentatively scheduled for July 20-22. They will be making a decision in the next few weeks if they are a go for this year.

www.Facebook.com/redlandsaerobats

Aerobatics at SUN 'n FUN

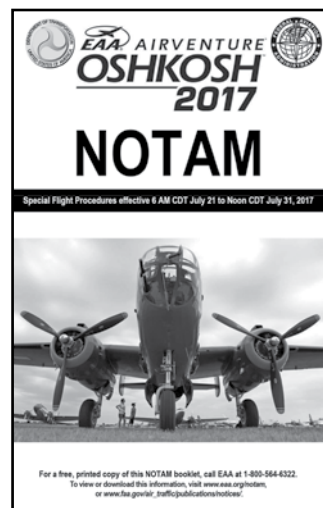
There was much to see on display at SUN 'n FUN in the Aerobatic Center, hosted by Jim and Jean Taylor. Included were the Eagle Sport Aviation Club's Pitts S-2B, which has flown more than 500 competition flights over the past 19 years, an Unlimited-class Allstar SZD-59 aerobatic glider, and the first display of Eddie Saurenman's new SAW REVO hyper-light carbon fiber hybrid aerobatic monoplane.

Beth Stanton presented a well-attended forum titled *YOU Can Fly Aerobatics. Yes, You.* The talk introduced attendees to the full spectrum of aerobatics, from unusual attitude and spin recovery training to recreational and competition aerobatics. Beth also inked a collaboration with the National Association of Flight Instructors to promote the safety benefits of aerobatic training to a broader audience via their *Mentor* magazine and webinars.

2017 AirVenture NOTAM Released

The FAA has released the EAA AirVenture Oshkosh 2017 Notice to Airmen (NOTAM), specifying arrival and departure procedures for EAA's 65th annual fly-in convention July 24-30. The NOTAM, which is in effect from 6 a.m. CDT on Friday, July 21, until 12 p.m. CDT on Monday, July 31, applies to Oshkosh as well as nearby airports. While the overall procedure is similar to past years, there are updates in nearly every area to enhance safety, efficiency, and convenience for the thousands of airplanes expected.

www.EAA.org/notam



IAC

Safety Committee

Incident response planning & fostering safety knowledge

TIM BRILL, SAFETY COMMITTEE CHAIRMAN, IAC #27802



My name is Tim Brill. I am your Safety Committee chairman. There are six IAC regions. I am from the Southwest Region. Your other two Safety Committee members are Doug Sowder from the Northwest Region and Steve Johnson from the Southeast Region. I am actively seeking representatives from our Mid-America Region, South Central Region, and Northeast Region to join our committee. Don't be shy; send me an e-mail!

What does the Safety Committee do? My job is pursuant to the *IAC Policy and Procedures (P&P) Manual*, Sections 202 and 223. I am responsible for the Aerobatic Mishap Review Program, Human Factors Review, Technical Safety Program, and the Aerobatic Instructor Designation Program. Per the P&P, I also sit on the U.S. National Aerobatic Championships jury.

From P&P, Section 223A:

The Aerobatic Mishap Review Program was established to lend assistance to the National Transportation and Safety Board (NTSB) in investigations of aerobatic accidents. Since the IAC has intimate knowledge of aerobatics and aerobatic aircraft, its assistance may be relevant in such matters. The program also exists to compile statistics on aerobatic mishaps and give advice to the IAC Board of Directors and general membership from information learned during the review of aerobatic accident investigations.

From P&P, Section 223C:

The purpose of the Human Factors Program is to inform the membership of human factors applicable to the sport of aerobatics, to identify human factors problems in the sport including the physiological aspects of aerobatic flying, and to determine an appropriate solution through applied technology for the problems.

From P&P, Section 223D:

The IAC Technical Safety Program is concerned with items of a technical and/or safety-related nature that

apply to aerobatics and aerobatic aircraft. The Technical Safety Program has been presented to IAC members as a clearinghouse where members are encouraged to submit ideas, problems, and solutions and where members can also make personal inquiries for information about specific problem areas.

I would like to see every one of us, not just members of the Safety Committee, become flight safety mentors to any IAC member and interested GA pilot.

The Safety Committee's primary job is to generate an incident-response plan for the U.S. National Aerobatic Championships. This incident-response plan comes under the purview of the Aerobatic Mishap Review Program, although it is not the only part of that review. Last year my incident-response plan was six pages long. I guess some thought this was a bit too streamlined (although Gary DeBaun liked it!), so then I considered something like PUB 249 — you know, the kazillion-page sight-reduction tables for celestial air navigation. Although this approach was warmly em-

braced by several government workers, I thought it way too tedious.

So like Goldilocks, I am aiming toward something a bit more in the middle. Luckily, the U.S. Nationals will be held at Oshkosh, so I am essentially adapting the incident-response plan used by EAA AirVenture. The International Council of Air Shows (ICAS) also stepped in and offered its support. A perk of being a member of the Safety Committee is being able to collect information from and build relationships with many non-IAC programs. Everyone is here to maintain and enhance your safety!

My Goals as Safety Chairman

I think the IAC is uniquely positioned to provide mentorship for flight safety, not only to the majority of our members who do not actively compete, but to non-member GA pilots as well. Think about it. Who better to talk about such things as stall-spin awareness than pilots who do it on a regular basis? I am active in the Reno area as a FAASTeam member, and I have asked Doug and Steve to become active with their local FSDOs. Our judges chair, Weston Liu, presented a safety seminar last summer and said it was very well-attended. I would like to see every one of us, not just members of the Safety Committee, become flight safety mentors to any IAC member and interested GA pilot. The Safety Committee can be both your resource and liaison, and the FAA has extended its help in promoting all things safety.

I would like to encourage all our members to pursue the IAC Achievement Awards (either the Smooth or Stars awards). Doing so is fun and promotes safe flight. I would love to resuscitate some type of regional acro fest. Heck, even if we can encourage a GA pilot to fly his C-152 into the box and safely perform a 60-degree steep turn, we have fulfilled our mentor mission and may have a new member. The insurance liability issue may have some bearing on this, but I'll bet we can find a solution. I remember the "freezer fest"

we had in Reno many years ago. I just wish I had a picture of then-judge Jim Nahom wrapped in a sleeping bag and sitting next to a burn barrel in the snow. Priceless! (You thought I forgot, eh, Jim?)

I would like to revitalize the old IAC *Technical Tips* publication. Perhaps this is best done in conjunction with the IAC Technical Committee. As stated in P&P Section 223D above, this is an information exchange. So any member who has an idea or concern, let's hear it. That's how we all learn. Maybe we can create an "Ask a Mechanic" sidebar in *Sport Aerobatics*.

The same goes with human factors. Your story may just save lives, so let's hear it. I know that many professional pilots are reluctant to speak on the record regarding g issues (especially negative-g issues) and disorientation, but let's find a way to anonymously get the information to the next generation of aerobatic masters.

This next statement is a more personal request. I notice that when many of our Advanced and higher-level competitors finish their flights, off they go into air-conditioned cars and hotel rooms. I certainly understand the rigors of your competition, but keep in mind that you are the reason that so many lower-level competitors and volunteers come to our contests. You have a treasure-trove of experience and are the inspiration for future competitors. Your advice and mentoring directly contribute to their safety. So if there is any way you can make yourselves available at contests, please do so. Thanks.

So, my fellow IAC members, this is my vision for the Safety Committee. I look forward to your input and to meeting many of you at regional contests and the U.S. Nationals. In the meantime, fly safely and have way too much fun!

IAC

Tim Brill operates Brill Aerosports in Reno, Nevada. He is an ATP, MCFI-A, IAC national judge and "All Five" patch holder, FAA safety rep, SAFE member, and EAA flight advisor with about 8,200 hours of flight time, of which more than 3,500 hours is acro time.

Aerobatic Safety Refresher

A red aerobatic airplane is shown in the upper right corner of the page, flying diagonally upwards. The plane has a distinctive design with a long, thin fuselage and a tail section that is angled upwards. It has two propellers, one on each side of the fuselage, and a small vertical stabilizer. The background is a clear blue sky with some light, wispy clouds.

BY CHELSEA STEIN ENGBERG

EVAN PEERS



In aviation we use numerous avenues to learn how we can best manage what we love to do in the safest way possible. As aerobatic pilots, we need to take other things into consideration as well. We operate high-performance aircraft, at high speeds, in contained spaces (or at least we try to stay in the box!), using all edges of the flight envelope. Things happen quickly, and we spend a limited amount of time in straight-and-level flight, making the safety topics to be considered much more complex.

When discussing safety within the context of aerobatic events, we need to consider two main categories: the individuals involved and the particulars of the event itself. Within each of these main categories are several subcategories that, when properly evaluated and managed, will interact to maintain safety and, in the event of an unwanted incident, lead to the best outcome possible. These subcategories include the following:

The Individual

- Personal wellness
- Equipment
- Experience/ability
- Training/practice
- Aircraft readiness

The Event

- Participants
- Location
- Environmental factors
- Safety plan
- Incident-response plan

A lot of these topics come up in aviation conversations regularly, to the point that they are often seen as buzzwords. That's a mistake. Let's drill down a bit and make sure that we all agree on what they mean and under-

stand the roles they play in safety and incident-response planning.

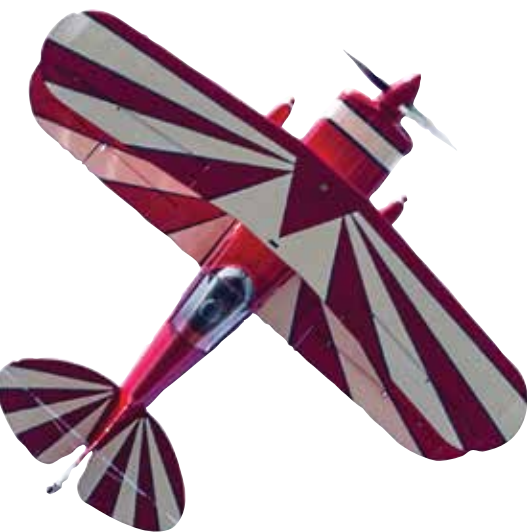
The Individual

It should be noted that this category does not just pertain to pilots (although that's the group that we will use for examples as we work through the subcategories). It actually applies to everyone who is a key player in the event (including contest directors, safety directors, emergency response personnel, etc.).

Personal Wellness

We have all learned the FAA's IMSAFE (illness, medication, stress, alcohol, fatigue, emotion) checklist. Personal wellness is an expansion of IMSAFE. Physical health issues caused by aerobatic flight, including things that can affect your *g*-tolerance and ability to stay focused in the aircraft, must be game-stoppers. In addition to admitting when we're not fit to fly, we also need to maintain physical fitness for flight by focusing on proper nutrition, hydration, and exercise.

Personal wellness requires looking beyond the immediate physical factors to related issues that can affect our ability to perform safely as pilots. Anything that affects our ability to focus and make quick and appropriate decisions must be a game-stopper. This includes emotional factors, especially those that induce extraordinary levels of stress. Saying, "You know, today isn't my day to fly" is not a sign of weakness; it's a sign of great decision-making. Forcing yourself into a flight when you're not at your best risks your safety and the safety of those on the ground.



Flight Equipment

Most general aviation pilots can throw a water bottle and their headset in their plane and be ready for a fun weekend flight. As aerobatic pilots, our equipment plays a much more significant role in our ability to perform safely. Are you wearing a helmet or a headset? Why are you wearing what you're wearing? Is it because that's what you've always worn, or is it because you sat down and weighed the pros and cons of both options and made the right choice for you? What clothing are you wearing? What is it made of? Is it flammable? Does it breathe? Does it provide you with the best comfort for your environment?

Again, there are pluses and minuses to every option. The question is, have you considered them all? Have you thought through all the other safety options (flame-retardant gloves, shoes, flight suits, etc.)? I'm not trying to tell you what you should or shouldn't wear; I'm suggesting that if you haven't thought these things through, you should take some time to do so. It is definitely a worthwhile exercise.

Experience/Ability

Experience and ability are not the same thing, although they are often correlated. The more experience you have in a particular area, the greater your abilities. Those abilities also depend on the breadth and depth of your experience and your willingness to learn from it. Let's say we fly the

same flight in the same location under basically the same weather conditions 1,000 times. Then we go to a contest far away where the weather is totally different, the box and its surroundings are completely foreign, and we have judges staring at us for the first time. Chances are our flights there will not be the same as our most recent practice flights. On the other hand, if we had flown those 1,000 practice flights in different locations under a variety of conditions, we'd likely perform at a higher level.

Fortunately, we have control over this. We can expand our abilities by expanding our experience. Flying in different locations and taking advantage of honest critiques and good coaching can help us expand our envelope. Even when we can't vary location, we can still broaden our experience. For example, when flying at sea level, we can practice with the power back to simulate hotter days and/or higher-elevation airports.

Training/Practice

There is a difference. These terms are often used interchangeably, but in the world of aerobatics they can mean very different things.

Training can be of two types: It can be actual flight training (e.g., a flight review, getting a new rating, or spending some time with an aerobatic instructor in flight) or it can involve a coach on the ground who instructs you over the radio to help you "fix" things you're struggling with in a particular figure or sequence.

Practice, on the other hand, involves repeating actions for a purpose. For aerobatic pilots, practice means going out and repeatedly flying figures and sequences. We often do this on our own or possibly at a critique day. Note here that critiquing is not the same as coaching. Critiquing involves an observer on the ground giving you feedback without including clearly defined instructions on how to fix issues that might affect your score. Coaching, on the other hand, is

when a qualified aerobatic coach not only provides you with feedback but also helps you perfect your flying through instruction (often via radio and/or recorded discussion while he or she watches your flight).

Being safe and prepared for flights involves both practice and training. It's important to evaluate how current your training is. For example, when was the last time you flew with an instructor, and is your training in emergency spin recoveries up to date? I often talk to folks who say they practice only competition spins. Their competition spins likely score well, but what happens when they find themselves in an inadvertent spin and their habit is to draw a downline after the rotation stops? To be at our safest as well as our best, practice and training are essential.

Aircraft Readiness

This section will be short and sweet. The airplanes we fly are important to our overall well-being, and so it's crucial to really know your bird. To help you learn more about the ins and outs of your aircraft, you might consider assisting with (or completing on your own if you're a mechanic) a full annual inspection. This also helps you build trust and understanding with your mechanic.

Knowing and understanding your aircraft's limitations is an absolute must. If you do not respect these limits, you are putting your life, the lives of anyone who flies with you, and your plane at risk.

One last note: If you're flying a lot of aerobatics in your plane, you should consider doing an in-depth inspection a few times a year and not just during the annual. We put our planes through serious paces, and so we need to be sure that, like us, they are staying healthy and happy throughout the season.

The Event

The second main safety category is the event itself. Of course, in this

article we are focusing on competition flying, but this information applies to other events as well. Although it is important that pilots be aware of and consider this information, it is especially vital that those putting on the contests think it through.

Participants

There are two important questions to ask when preparing to hold a contest.

The first is, “Who’s coming?”

This isn’t simply a matter of looking at pilots’ names! Who is coming, what planes are they bringing, who are your volunteers, who are your safety/emergency-response folks? These are all important questions to ask for a number of reasons, including that you, as the contest director, chief judge, pilot, etc., should know what you will have to work with.

The second question is, “What is the participants’ experience/skill level?”

Again, this applies not only to pilots, but also to those holding the contests. Do you have a bunch of Advanced and Unlimited pilots who have been doing this for years, or are you lucky enough to be hosting a majority of Primary and Sportsman pilots who are participating in their first contest? Keep in mind that category does not always correlate with experience, so get to know your competitors.

Knowing your volunteers and understanding what they know and don’t know will also help you make your contest as safe and efficient as possible. Considering their safety backgrounds (if any), their volunteer/contest experience, etc., will allow you to prepare for the proper amount of training for your volunteers.

In general it is very important to keep your finger on the pulse of what’s happening at your contest, especially if you’re the contest director, safety director, or chief judge. Folks in these positions are

responsible for determining what is safe and right, which doesn’t always make them the most popular kids at the contest. That’s okay. The important thing is that what is being done is right and safe, and that it’s done for a reason. If it is, the decision-makers will gain the respect of everyone in the long run.

Location

Knowing as much as possible about the event location is key to effective safety management. Raise your hand if you’ve gone to a particular contest so many times it feels like home when you check into the hotel each year. I bet there are a lot of hands up! But how well do you really know your event site?

We all know that it’s important to take airport configurations into consideration, along with box placement, hold locations, traffic patterns, and NOTAMs. We also know that we need to be familiar enough with the location to allow us to be as considerate as possible to those who live nearby. But here are some more in-depth points to consider:

- What’s the quickest access route to the box if there is an incident?
- Has the box placement been chosen with that consideration in mind?
- Are you familiar with the air traffic, taxiways, and runway flows in case of an accident?

These questions must be considered with different emergency scenarios in mind. Sometimes what we think makes the most sense initially may not once the worst-case scenarios are thought out and taken into consideration.

Make sure you know the neighbors; they may be affected by different emergency situations and need to be contacted. With regard to emergency-response personnel, go beyond just knowing how to dial 911. Get their direct numbers; invite them out to the event site to show them important locations, flows, and procedures; and give them information about the differ-

ent planes at the contest and how to help pilots out of them in case of an emergency. Taking these small steps can make a critical difference in certain situations.

Environmental Factors

Of course, environmental factors are part of the location discussion, but I think they warrant their own subcategory because they play a huge part, in multiple ways, in aerobatic competitions. Winds and/or storms can shut down a contest. Extreme heat can become a significant safety issue and on occasion has been known to halt flying at events thanks to its terrible effect on both pilots’ (lowered g-tolerance, fatigue, dehydration, etc.) and planes’ performance!

If you’re at a location where extreme weather may be a factor, get to know local companies that can help out (by supplying water, shade, and fans in the event of excessive heat or providing entertainment in the event of long rain-outs — we know pilots can quickly get bored!).

Safety Plan

If you’ve skipped ahead you might be asking yourself, “What the heck is the difference between a safety plan and an incident-response plan? A safety plan includes everything that pilot and event coordinators can do to avoid having to implement an incident-response plan. It’s the pre-emptive strike we can make to keep everyone as safe as possible. The incident-response plan, which we will look at in the last section, is implemented if an incident occurs.

Much of what we’ve discussed to this point falls under the safety plan. Here are some key points to consider when developing this plan:

- Know ahead of time what will and won’t be accepted during a tech inspection.
- Plan ahead for weather limitations, restrictions, etc.
- Think through all types of sce-

narios that may negatively affect flights or the event as a whole. Think through all incident/accident scenarios.

- On practice days, there must be eyes (with a radio) on the box at all times. Remember that the person flying in the box is expecting to have an additional set of eyes looking out for him or her. Furthermore, the person running the flights in the box needs to be prepared and capable of implementing the incident-response plan should the need arise. This is commonly overlooked.

- Contest days are just beefed-up practice days. Everyone that needs to be able to implement the incident-response plan must be well schooled on where it is located and what is in it, and must have reviewed it and be ready to live by it.

Incident-Response Plan (IRP)

Not everyone knows that an IRP exists, but everyone participating in an event should. Additionally, everyone needs to know what to do in the case of an incident/accident. This is important because not everyone will know what is in the IRP, nor do they need to. You have three categories of people at a contest (we'll stick to contests because everyone there, for the most part, has some sort of role in the event, and we don't have large numbers of bystanders to consider):

Responders: Those who are in charge of activating and running the IRP. These are the key players. They include the contest director, chief judge, safety director, and others, including emergency responders and any other volunteers who have been asked ahead of time to play a role running the IRP.

Victims: Those involved in the incident/accident — no explanation needed.

Bystanders: This is everyone who isn't included in the first two categories, and they often need to be reminded at each morning briefing that their role in the event of an accident is to stay out of the way

of the responders. Human nature often pushes us to run toward a terrible situation to help; unfortunately, this can often lead to more injuries, confusion, and a lack of clear response action. Make sure that if you have skills that may be useful in an emergency, you notify the contest director and safety director in advance. You will likely find yourself on the IRP team!

Some other things for contest and safety directors to consider:

- Make sure you have the right people in the right roles. Different players bring different skills and abilities to emergency situations. Keeping the right people in the right roles is critical.

- Train your IRP team to know the steps for first response. (Who's calling 911? Who are the first responders to the accident site, and how are they getting there? What channel should radios be on for accident communications? Are there communication issues to be aware of?)

- Make it very clear who is managing the event site and who is managing the accident site. These should be two different people who can communicate with one another quickly and clearly.

- Have a public communication plan. Clarify who is responding to public inquiries and what information should and should not be released. Have a plan and inform the event participants, including volunteers, of what to do/not do in the event of an emergency (think about pictures, videos, social media, reporters, etc.).

- Do a mock run-through involving the key players. It's wise to do this at least once a year so that if you ever do have to activate the process it won't be the first time it's been done.

- IRPs must be reviewed annually as well as prior to every event. Make sure all the emergency contact information, maps, site layout, etc., are updated. Event sites can change from year to year, and we may not realize it until we arrive.


Conclusion

By regularly reviewing a few key items; making sure we monitor ourselves, our airplanes, and our events; and working together as a team with safety as the sole goal, we are sure to continue holding great events that are fun, safe, and professional. A coach I very much respect and look up to (yes you, Bill Stein!) once told me, "Fly every practice flight like a contest and every contest flight like a practice." These are wise words that have become a mantra for many. By giving every flight or event the same level of importance, safety practices will be applied uniformly across the board.

The IAC provides a number of safety resources on its site, including safety checklists, safety alerts, TechWatch, and a template for an incident-response plan. These resources, along with safety talks and learning from others in the sport, are great ways to stay up to date on the latest safety information and practices. **IAC**



Chelsea Stein Engberg is an aviation consultant, flight instructor, and Advanced-level aerobatic pilot. Since starting to fly in 2003, Chelsea has logged time in more than 50 types of aircraft and has become an expert in upset recovery training and aviation safety. She has acted as safety director for many competitions, including the 2013 World Aerobatic Championships, and has provided safety-consulting services to numerous organizations within the aviation industry.



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The Beggs/Müller Emergency Spin Recovery Procedure

Not just “hands-off”!

BY GORDON PENNER
MASTER CFI-AEROBATIC, FAA GOLD SEAL CFI

EVAN PEERS

Over time pilots have gotten in the habit of calling the Beggs/Müller Emergency Spin Recovery the “hands-off” spin recovery. Many pilots don’t know the full procedure or the story behind it. Many pilots mistakenly believe that letting go of all controls is the only positive action they must perform. According to Rich Stowell this incorrect belief is No. 4 of the 12 myths about stalls and spins. (Stowell, Rich, *The Light Airplane Pilot’s Guide to Stall/Spin Awareness*, 2007).

Here is the actual Beggs/Müller Emergency Spin Recovery procedure straight out of Gene Beggs’ book, *Spins in the Pitts Special*, (2001), page 2:

1. Power – OFF.
2. Remove your hand from the stick.
3. Apply full opposite rudder until rotation stops.
4. Neutralize rudder and recover to level flight.

Gene Beggs is a well-known aerobatic competitor and instructor, is a member of the Aerobatic Hall of Fame, and qualified for the U.S. Aerobatic Team in 1984 and 1986.

Gene wrote several articles in *Sport Aerobatics* about spins in the Pitts Special starting in 1984, where he first advanced the Beggs/Müller spin recovery procedure. Swiss National Champion Eric Müller and Annette Carson first wrote about this recovery procedure in 1981.

He adopted the “power off — hands-off — opposite rudder” method in Eric Müller’s article after

testing it thoroughly. He then began teaching it in his school in Texas. It was very controversial at first. It was also tested and championed by other aerobatic greats such as Bob Herendeen and Clint McHenry. The number of spin accidents in the Pitts and Eagle went down.

Gene went to Southwest Airlines and dropped out of the aerobatic scene. Later, contact with Pitts dealer K.D. Johnson of Santa Paula, California, brought about a conversation concerning Pitts Specials and their rising number of spin accidents.

According to Gene, K.D. asked, “Gene, are you aware of what is happening recently in the world of aerobatics?” I responded, ‘No, I have been completely out of touch.’ He continued, ‘Well, we have a new group of people in aerobatics today who seem to be repeating history with all the spin accidents that are occurring. These newcomers have not had the benefit of reading your spin articles.’” (Beggs, 2001, p18). That conversation caused Gene to use the previous spin articles plus knowledge gained from his aerobatic school experiences and test pilot experiences to write the book *Spins in the Pitts Special*.

Gene notes that spin problems in the Pitts are not just the issues of correct control inputs made in the correct order. There is also the problem of subtle pilot confusion. Looking in the wrong place can cause a pilot to misidentify the spin direction and misidentify whether the spin is upright or inverted. There are even diagrams in the book on this subject. The Pitts-type aircraft seems quite suscepti-

ble to this effect. The pilot in the spin must look directly over the top of the cowlings and nowhere else to determine spin direction. In the Pitts this means looking through the cabane struts, *not* over the top of the wing.

Letting go of the stick also keeps pilots from transitioning to inverted by mistake. Anti-spin rudder when upright becomes pro-spin rudder if the pilot accidentally pushes to an inverted spin attitude.

For a while it was thought that the Emergency Spin Recovery Procedure, which is what Gene calls it, would work on any airplane. This was later proven to not be the case by senior NASA test pilot Jim Patton, who headed the 10-year NASA stall/spin study. Gene and Jim worked cooperatively on this determination. This subject is covered well in Gene’s book, and also in Chapter 11 of Rich Stowell’s book, *The Light Airplane Pilot’s Guide to Stall/Spin Awareness*, which was written by Patton. It does work for Pitts and Eagle aircraft, though, and others on a case-by-case basis.

The book *Spins in the Pitts Special* should be a requirement for any Pitts or Eagle driver. It is also one of the best books on spins in general. Another excellent, comprehensive aerobatic book is *Flight Unlimited 95* by Eric Müller and Annette Carson, where the Emergency Spin Recovery procedure is also covered.

Gene says he is not suggesting that we eliminate the hands-on spin recovery. Pilot confusion in the Pitts and Eagle, however, has proven to be a subtle killer.

We must not forget.

IAAC



Nighttime at the 2016 U.S. Nationals

Every night, all of the aircraft gather for a game of *Where's Waldo?* IAC style. Above: Lake Texoma Jet Center. Below: Plyer's Hangar. Photos by Evan Peers.





Normalization of Deviance

Devil in the details

BY ALLEN SILVER



As I'm winging my way home from the good life in Costa Rica on my favorite airline that serves peanuts and where bags fly free, I've decided to write my column about how a three-word concept has come into my understanding during the past three months. It keeps showing up, and I think it also has great value to aerobatic pilots. It is called the "normalization of deviance."

I heard this term first at the International Council of Air Shows last December; the second time was at the National Warbird Operators Conference in February; and the last was in an article from the latest *Parachutist* magazine. These speakers, authors, and I are all talking about our fields of expertise, but we all are preaching the same sermon. I'll tell you


about them, but first will give you a little background on what "normalization of deviance" means.

Now we all take risks of one kind or another, and life itself is a risk. But that is not what I am talking about here. I am talking about how some practices have become so out of the norm that the consequences have led to disastrous effect. Sociologist Diane Vaughan, Ph.D., described the term in her studies of deviance in organizations. Professor Vaughan teaches and conducts research at Columbia University's Department of Sociology. Her list of awards and accomplishments are numerous. Her most recent endeavors include researching how large groups or organizations affect the decision-making of the individual.

Professor Vaughan explains normalization of deviance as

when people within an organization become so accustomed to changing the rules and guidelines that they don't consider their new change as deviant despite the fact that they have far exceeded their own rules for elementary safety. As people grow more accustomed to the new deviant behavior, the more it occurs. To people outside the organization, the activities seem deviant; however, people within the organization do not recognize the deviance because it is seen as a normal occurrence. She further explains that education is the best solution for mitigating deviant behavior. Being clear about standards and rewarding those who come forward (whistle-blowers) is part of the education that needs to take place.

So what does this have to do with us? Whether we are part of a large organization, a community organization such as the International Aerobatic Club, or even a member of a local IAC chapter, we need to think less individualistic and more as team players to stop the negative effects due to our deviance from accepted standards and practices. Our thinking and practices need to become more team-based, where each person can see that he is letting his fellow flyers down when he subverts or overlooks rules and accepted procedures. Leaders need to set an example with their full cooperation. A top-down approach is very important.



Education — and also continuing education when updates are known — is vital. For instance, after years of flying, major airlines understand the need for cockpit resource management (CRM). After numerous accidents where the right seat never questioned the left seat, the airlines developed CRM training, and the accident rate dropped dramatically. We still have airplanes landing short of the runway, such as at San Francisco, because of the failure to speak up. How do you explain that to someone after an accident “if only I had spoken up I may have prevented this accident”? Preventing deviance from rules is easier than correcting damages (if that’s possible) that result from changing time-proven procedures even slightly.

The whole point of my column is the importance of working as a team to help deviated practices from becoming “the new norm.”

International Council of Air Shows

At the 2016 ICAS Convention in Las Vegas, astronaut Charles Pre-

**Preventing deviance
from rules is easier
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court gave a talk that was quite an eye-opener. Not only has he been in space aboard the shuttle and spent time on the International Space Station, Precourt was also one of the investigators of the 1986 Challenger and 2003 Columbia disasters. What he spoke about was the normalization of deviance, as in “We’ve always done it this way — why change?” In the case of the Challenger, the faulty O-rings in the rocket boosters were of concern to some of the engineers, but they were considered not a problem because they had worked before. The group that had assessed the joints had conducted tests to find the limits and capabilities of the joint performance. Each time evidence, initially interpreted as a deviation from expected performance, was reinterpreted as within the bounds of acceptable risk. The acceptance of this risk led to the Challenger exploding on the morning of January 28, 1986.

Precourt went on to explain that pieces of foam had been coming off the shuttles on lift-

off and had never caused a problem. So why worry? It was considered within acceptable risk. Well, tell that to the families of the Columbia astronauts when it disintegrated on re-entry.

The normalization of deviance has and will continue to cost the lives of people until we take another look at how we conduct our pre-flight inspections, maintenance, and parachute procedures, or how we’ve always done a particular maneuver before with no problem.

National Warbird Operators Conference

The second example of normalization of deviance came during the recent NWOC held this past February in Virginia Beach, Virginia, where I was one of

the guest speakers. I was invited to give my bailout seminar. I have been a guest speaker at NWOC on at least four occasions over the past 10 years. This group of dedicated pilots recognizes the need for continuous education to help mitigate the normalization of deviance. It was during my presentation there that I spoke on this three-word concept I’d first heard about in Las Vegas two months prior. The goal of my presentations is not only to present my “Bailout and Survival Equipment Seminar” to pilots but also to help them understand that the normalization of deviance is not normal. I don’t want you to ever have to see if your expensive cushion (parachute) works.

What was unusual was that when I was through with my presentation, the very next speaker, John Lohmar, unbeknownst to me, spoke about “Your Risk Perception Profile.” John is a graduate of the NTSB’s Aviation Accident Investigation School and is a certified aviation accident in-

investigator. He does expert witness testimony, safety consultation, and accident investigation. What do you think he talked about in depth? You guessed it — the normalization of deviance.

Later, it was refreshing to see this group break into smaller group discussions on safety-related issues. At the ICAS convention, it also has one particular session for pilots. Here they discuss openly and candidly the previous year's accidents and incidents in the hopes of preventing future accidents.

Parachutist Magazine

When I arrived home from the conference, I was pleased to find my copy of *Parachutist* magazine waiting for me. For those of you who don't know, I've been skydiving for more than 54 years. Although I will admit that I stay in the aircraft more now, I have accumulated almost 2,000 hours of flight time. But let's get back to the magazine.

I opened the March issue and found an article that spoke about the normalization of deviance. The article was written by Chet Boyce and was titled "Military Aviation's Lessons for Skydivers." He talked about naval aviation and how it operated on the envelope's edge, which means there is no margin for error. He discussed the need for a robust safety program in naval aviation and how other industries have adopted similar programs. Such programs are equally relevant to the world of skydiving. I had just finished reading the first few paragraphs when I came upon the next section titled "Normalization of Deviance." This was the third time in less than three months that the words "normalization of deviance" came up. Chet went on to

How can we have an effect on stopping the "it's always worked before" attitude?

describe how one simple act out of the norm with repetition soon becomes "the new norm."

I would like to talk about my profession. That's where I'm the expert. I spent 18 of my 25 years in the Air Force working with parachutes and other survival equipment. I was constantly teaching continuous education classes to reinforce known practices that would help our pilots survive in case of an emergency. I've been involved with skydiving and parachutes in the civilian and military world for more than 54 years. I'm an FAA master parachute rigger and was a designated parachute rigger examiner for many years. Besides giving the practical and oral exams to upcoming parachute riggers and issuing them temporary certificates, I also helped with accident investigations. I have seen the normalization of deviance at work. Trust me, pilots or sky-

divers have not found new ways to kill themselves. They simply keep repeating the same mistakes over and over again. We're all creatures of habit, and those good habits need reinforcement continuously to make them become second nature or, as I would say, "committed to muscle memory."

As I'm going home as a passenger in an aircraft at 38,000 feet, it's comforting to know that the two pilots up front go through continuing education all the time to reinforce best and proven procedures so we all arrive safely at our destination. There are countless occupations that require their employees to go through continuing education courses with some regularity to prevent the normalization of deviance.

My question to you is: How can we have an effect on stopping the "it's always worked before" attitude? Just because you've sometimes or always bypassed or changed the rules and it's worked, it doesn't mean you're not in for a rude awakening someday. It's not as simple as just saying I'll stop being complacent. There is work on your part. You must come forward and be honest with yourself.

One of the big killers and causes of accidents is when a dangerous task becomes rote. This is one of the most dangerous times when deviation from best practices can sneak up on us. Things such as fatigue and stress also can contribute to poor decision-making. When you accept lower standards of performance, you're letting your guard down and you're setting yourself up for costly mistakes. In the article written for *Parachutist* magazine, Chet mentioned something very important. He said, "People can

generally easily spot complacency in others, but find it hard to spot in themselves.”

Now let's get back to the question of how you can help prevent the “it's always worked before” attitude. I suggest that you sit down with your group and seriously discuss having a safety day.

For several years, the United States Parachute Association has been having a safety day program in which drop zones can participate, one weekend a year. It works and likely has saved many lives over the years. The military calls it a stand-down. However, just thinking about safety is not enough. Bring in guest speakers with fresh ideas. Continuing education is available to help refresh and reinforce your safety procedures and maybe teach you a new procedure or technique of which you were unaware. Let me or another qualified person talk about parachute and aircraft procedures. Call it “Save My Butt Day” or whatever, but be proactive and do something before I or someone else gets a call to help with an accident investigation.

There is no such thing as an unsafe question, but there are unsafe answers! Let's make the normalization of deviance a thing of the past.

Take care, fly safely, and blue skies.

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A lesson never forgotten

BY TIM JUST

I was living in Selma, California, going to school in Fresno, and working at the local hobby shop. Lonnie English walked into the shop one day. He had just won the 1983 Nationals in Advanced and wanted to build a balsa wood replica of his airplane. He was based in Selma and told me about his Pitts and two others on the field. He also told me there was a Super Decathlon at the flight school there. The very next day I jumped into my 1969 Volkswagen Bug and headed south.

I was still a student pilot. My aerobatic experience at that point was two rides but never a lesson. I parked in front of the first building I came to where the words Remle Aviation and an airplane flying upside down were painted on the door. This must be the place. On this unscheduled first visit I met Alan Geringer, the owner of the airport, flight school, and N5030C, the Super Decathlon. Remle was named after Alan's father Elmer. I came to realize that being backward or upside down was kind of the norm there. I told Alan that I wanted to take an aerobatic lesson. He asked, "Why?" This question surprised me and was the beginning of an interview that lasted well over two hours. He asked questions about my knowledge of the sport, my goals, aspirations, and motivation. I

learned later that Alan had lost an aerobatic student on one of his first solo aerobatic flights while performing low-level aerobatics in front of his friends, with predictable results.

As we talked, the interview became a ground school lesson. Loop, roll, spin, and hammerhead are the cornerstones of all aerobatic maneuvers, Alan explained. After our ground school, we walked over to the airplane. Next on the agenda was how to preflight. Starting in the cockpit he showed me some of the safety features like dual lap belts and the door that could be jettisoned quickly from the inside. We worked our way around the airplane looking at every control and control surface. This was my first experience with a constant-speed propeller, fabric covering, and a tail wheel. As we continued around, he was very deliberate. He explained the reason for everything and what the potential failure modes were, poking and prodding, looking for any evidence of unexpected wear. This was a huge departure from the FBOs and flying schools I had previously encountered. Up to this point in my pilot training the briefings had consisted mostly of my instructor telling me what airline he wanted to work for.

Alan showed me how to put on a parachute and explained the D-ring and how important it is to find it with your eyes. Things were

starting to get interesting. No matter how hard you pull on the harness you will never get it open, he said. A few have tried. You really have nothing more pressing to do.

As the morning evolved there was nothing left to do but go fly. Alan asked if I had brought long pants. "No, I always fly in shorts; it's fine," I answered. I'm not sure what the Guinness world record is for driving from Selma to Fresno, putting on a pair of long pants, and driving back, but it's mine. It would've been difficult to explain, had I been stopped, why driving recklessly was required so that I could fly safely.

Canopy, seat belt, seat belt, out the door, and find the D-ring with your eyes. He was adamant that I knew and understood this procedure. I was impressed with how insistent he was that I recite it over the intercom prior to every departure. On my first flight in the back seat, I immediately understood the reason. If he didn't get me out of the front, he wasn't going anywhere because he had to get past me!

It's been many years since my introduction to aerobatics and Alan Geringer, but I still repeat the words he taught me every time I get into my airplane. "Canopy, seat belt, seat belt, out the door, and find the D-ring with your eyes." The 1969 Volkswagen is gone, but the lessons I learned that day will never be forgotten.

IAC

Loss of Control

Staying within the envelope

BY TIM BRILL

A few years ago, the FAA emphasized the problem of runway incursions. There was rarely a flight magazine that did not have something to say about runway incursions. Luckily that seems to have been properly addressed. Now comes the new emphasis: loss of control. Over the next few years, you will be hearing lots about this subject.

We all know that when airplanes are designed, they need a certain amount of energy (airspeed) to generate the lift required to fly. Of course, if the airplane has too much energy, it tends to break. Between the minimum airspeed required to fly and the maximum airspeed it can structurally withstand is the airplane's flight envelope.

Your primary job as the pilot in command of an airplane is to keep it within its flight envelope. Know also that if you do stay within the airplane's flight envelope, everything that airplane will do is by design, meaning the airplane will not do anything "unusual" as far as the airplane is concerned. The airplane will only do what you tell it to do, nothing more, nothing less.

I say this because as an instructor, I often hear pilots complain

that their airplane is not doing what they want it to do. They blame the airplane. In reality, they need to ask exactly what did they tell the airplane to do.

In addition to staying within the flight envelope, your duty as PIC is to ensure the safety of the flight. Here you are concerned with the always-changing relationship between the airplane, pilot, and flight environment. Is the airplane airworthy, the PIC skilled and mentally alert, and the flight environment (weather and wind) appropriate? You were taught from day one of your flight training to continuously evaluate these three critical flight safety factors. Most importantly, you were taught that if there was ever a hint, perceived or actual, that one or more of these flight safety factors may be questionable, either don't fly or divert and get back on the ground.

As long as the PIC stays within the flight envelope and maintains an awareness of these three flight safety factors, loss of control is generally not an issue. In fact, we aerobatic pilots typically do a very good job of maintaining airplane control. The biggest contributing factor used to be maintenance-related. Even that

area is improving. But our goal is no loss of control accidents. Also, as mentors (directly or indirectly) to non-aerobatic pilots, we need to stress the importance of no loss of control accidents.

When have you lost control? The FAA has no specific definition, but rather emphasizes situations in which you are likely to lose control of your airplane (VFR into IMC, stalls, inadvertent spins, preflight prep, maneuvering flight, etc.).

I would offer that anytime you as PIC either do not know how your airplane got into its current situation or worse you are not sure what is going to happen next, you have lost control. Remember, the airplane will only ever do what you tell it to do. As an aerobatic pilot, we can adopt this definition, too: If the maneuver you are flying is not what you intended to fly, or does not resemble what you intended to fly, you too have momentarily lost control. If you intend to fly a hammerhead and end up with a tail slide, you guessed it: loss of control.

Why is this important? Well besides the obvious loss of control, the more quickly you can recognize something as wrong, the more

quickly you can intervene in the error chain and prevent or fix the problem. Very rarely do airplanes spontaneously destruct (unless you are flying outside its flight envelope). It is usually a sequence of events, typically with the PIC making the errors, that cause the problems. In most cases, the potentially disastrous outcome could have been prevented if the PIC intervened sooner and broke this error chain. So, by recognizing a problem sooner and having enough time (altitude) to react, you can break this error chain. Have some idea of what you are doing before you do it. If your steep turn is 60 degrees, don't wait until you roll 180 degrees before you take some action.

So, how do I communicate with my airplane? Again, the airplane will only do what you tell it to do. For old guys like me, sometimes there is a disconnect between what the brain wants and what the body delivers. But the airplane still will only do what you tell it. Fundamental to this communication is how to control the airplane. Your airplane has three primary control surfaces: elevator, aileron, and rudder. They control pitch, roll, and yaw. The three control axes intersect at a point known as the center of gravity of the airplane. So right away, a good weight and balance calculation is required for you as PIC to ensure flight safety.

We know that our airplane is a three-dimensional machine. It responds to the relative wind, not to the ground. As such, as PIC we are taught to internalize the movement of the airplane relative to us sitting in the airplane, and not relative to the ground. Pitch becomes a *head to foot* movement of the nose of the airplane. Roll becomes a *head to hip* movement of the nose of the airplane. Yaw becomes an *ear to ear* movement of the nose of the airplane. (At least this is what my friend, Rich Stowell, attempted to get into my thick head!) In this way, the airplane does not move

“backward” when we fly inverted. The control inputs are always the same regardless of your attitude.

This is usually easy for new pilots to understand until that initial confusion doing their first inverted or rolling turn. But then you quickly realize the control inputs are still the same regardless of your attitude. Your airplane is doing exactly what you are telling it to do!

How do I attach myself to my airplane?

A more subtle issue in your communicating with your airplane is what I will call “ergonomics.” How do I attach myself to my airplane? A perfect example may be a slow roll to the left in a Decathlon. In theory you begin with neutral aileron and elevator. You first move the aileron left, then some forward elevator as you approach inverted. Now, if you are tense, and your right elbow (assuming you are holding the stick in your right hand) is locked on your hip, that forward elevator you want turns into taking out some of the left aileron, and your roll rate changes. Take another example, a chandelle to the right in your Cessna. While pulling on the control yoke, you may also be pulling down with your left hand, adding some left aileron. You are expecting the airplane to continue to roll right, but you are actually telling it to roll left.

There are lots of examples of incorrect ergonomics. Heck, just do Dutch rolls and see if you can remain seated in the middle of your seat. I find that many new aerobatic students are completely unaware of these ergonomic issues. Most of these problems can be eliminated

by being aware that ergonomic issues can, and do, happen, and by moving the controls relatively slowly and deliberately. Most new pilots move the controls way too fast, not giving the airplane time to respond. Of course, when you have to move, move. When it is time to use the rudder on a spin exit or hammerhead pivot, move it!

One final consideration for airplane communication and control is energy. Your airplane needs a certain minimum airspeed (amount of energy) to complete each specific maneuver. Don't try to force the airplane to do something it simply will not be able to complete. If you think this will be an issue, take an interruption, lose a few points, and try it again. Remember, you as PIC can control the airplane's airspeed; it's energy. You have interchangeable sources of energy. You have the potential energy of altitude (and fuel in your fuel tank), and you have the kinetic energy of airspeed. You can exchange one for the other. In fact, in aerobatics that is exactly what you do: You give up altitude for airspeed, and in turn give up airspeed for altitude.

There are a few implications. First, don't chase the airspeed indicator; it always lags behind. Instead, set a line, then check the airspeed. Set it and check it. Take your time and don't rush the airplane. As a line judge, I often talk with my assistant judges about the sequence being rushed. The outcome is not pretty.

Next, as you are learning, have lots of altitude. You can always give up altitude for airspeed. You can always take more time to solve problems if you have more altitude. Pilots still do a very bad job of maneuvering their airplane while low, slow, and turning. There is a reason you lose points for a judge's low call, yet almost never get called for being too high. No judge I know will ever fault you for taking an interruption to gain altitude.

Stay within the flight envelope.

I think I mentioned that a few times! Don't allow the speed to become too excessive. I have several thoughts here. First, the "fly faster and pull harder to show that longer line" attitude. In aerobatics, the length of the line is not scored. The judge either sees a line or does not. So, trying to impress the judges by redlining your Super Decathlon to demonstrate some long vertical line is a waste of energy. Of course, when I was learning vertical snap rolls in my Pitts S-2B at the Stead Airport (elevation of 5,046 feet), we used to joke the redline was a target. Not smart. Also, be careful of maneuvers where the exit may load up lots of excessive speed, like a split-S. Start high and slow, end low and fast. If you rush and keep staying in the aerobatic box as your main consideration, instead of a slow entry speed, you come out at warp speed! Again, not smart. Have patience and take your time so the airplane will do only what you want it to do.

But what happens if, despite all my best intentions, I still lose control of my airplane? Again, here is where lots of altitude is your best friend. Your error chain will normally begin with some distraction, some faulty perception of what just happened, and perhaps some inappropriate control input based on that perception.

As you are learning new maneuvers, you can reduce the faulty perceptions by combining inputs into segments, segments into maneuvers, maneuvers into sequences. As an example, an Immelmann is half of a loop and half of a roll. Practice the loop. Practice the roll. Then put the segments together into an Immelmann. As another example, practice the spin, practice the Immelmann, and then combine those maneuvers into a sequence. Don't be in a rush!


In my Decathlon, if I really muck things up, I find by reducing the power (of course I have lots of al-

titude), neutralizing the stick, and wiggling my feet, I regain control of the airplane pretty quickly. It's kind of like how I fix my computer problems: I turn it off and reboot. Do the same in your airplane: Put everything back to neutral. Sure, if you are in a spin, you need to use the rudder in the PARE acronym: Power idle, Aileron neutral, Rudder full opposite, Elevator neutral.

But even using PARE, two of your three primary controls go to neutral first. Spirals are much the same: power, push (don't pull!), roll. As a last resort, let go. Eliminate yourself as a possible aggravator.

In summary, know your personal minimums. Take your time. Don't rush. Have lots of altitude. Stay within your flight envelope. Ensure your airplane is airworthy. Ensure you are airworthy. Watch out for dehydration and fatigue. Watch the weather. Let's have no loss of control accidents. And most importantly, have fun! **IAC**





Spin CG Sensitivity, Certification, and Dual Category Airplanes

BY GORDON PENNER

MASTER CFI-AEROBATIC, FAA GOLD SEAL CFI

Aircraft spinning characteristics are greatly affected by CG. There is no quicker way to get into an unrecoverable spin than by having a CG too far aft. Also, some aircraft are certified in two categories. We have to be certain we are in the aircraft's weight and balance "recovery zone."

The information in this article and the quotes are from Rich Stowell's book, *The Light Airplane Pilot's Guide to Stall/Spin Awareness*, which brings in information from many sources, including the NASA stall/spin studies.

Under standard class airworthiness (as opposed to special class airworthiness that includes experimental category and the like) you have normal, utility, and aerobatic categories. They each have different spin requirements and g, or load limit, requirements.

A normal category aircraft is prohibited from spinning, but must still show that it can recover from a one-turn spin with no more than one and a half additional turns. An aerobatic category aircraft is approved for spins but must show that it can recover from a six-turn spin with no more than one and a half additional turns.

Normal category g-limits are +3.8g's to -1.5g's. Utility category g-limits are +4.4g's to -1.75g's. Aerobatic category g-limits are +6.0g's to -3.0g's.

Utility category is the funny

one. Spins can be approved or prohibited. If the spin testing by the manufacturer meets the aerobatic category requirements, then the aircraft can be approved for spins as long as it is loaded within the CG and gross weight limits. However, if the manufacturer only does the normal category spin testing, or the aircraft cannot meet the six-spin requirement, then the aircraft will be prohibited from spins even though it is certified in the utility category.

Add to this mix the fact that some aircraft are dual category. The C-172 and the old Piper 140 can be flown in both the normal and utility category, and they can both be spun in the utility category. Depending on model year the Decathlons can be flown in both the normal and aerobatic categories. Each of these spin-capable aircraft *cannot* be spun with normal category CG loading.

The Piper 140 actually had a rash of spin accidents attributed to being dual category, as well as to possibly improper spin recovery actions.

Part of the problem in most airplanes is that a lot of spin recovery information in the pilot's operating handbooks and placards is contradictory, sometimes leaves steps out, and changes over time. *The Light Airplane Pilot's Guide to Stall/Spin Awareness*, pages 293-295, covers the

case study on the PA-28-140. This is a normally solid airplane that if operated improperly can set the stage for disaster. Prior to 1976 the spin information given to the pilot for the 140 on a placard was “for Spin Recovery, use full rudder against spin, followed immediately by forward wheel.” There was no mention of power or ailerons, both of which are usually spin aggravators. From 1976 on, it shows procedures similar to the 1936 NACA procedure and Stowell’s PARE procedure, “Throttle: Idle, Ailerons: Neutral, Rudder: Full Opposite, Control Wheel: Full Forward.”

The rash of spin accidents in the 140 prompted the issuance of Service Bulletin No. 753 in December 1982. The four-page bulletin, affecting all PA-28-140s built, included expanded spin information and was to be kept in the airplanes at all times. It seems pilots generally were unaware just how critical it was that this airplane be in the spins-approved utility envelope when performing spins. Cross the line into the spins-prohibited normal envelope — even a little bit — and the airplane could become unrecoverable from the spin. Which seat rail holes the front seats were adjusted into literally could be the difference between recovering and spinning into the ground. Accurately assessing weight and center of gravity in the Piper PA-28-140 is absolutely imperative. Yet little in the flight manuals or the flight training environment drove home the seriousness of this point.”


However, pilots were still not getting the information, or still not understanding how critical CG was. This prompted the issuance of Special Airworthiness Information Bulletin ACE-97-02 to advise the pilots to comply with Service Bulletin No. 753 of December 1982.

Please don’t forget that aerobatic mounts have more powerful tails for stopping spins and higher airspeed redlines and allowable g-loads for the recovery once out of the spin. Most utility category spinnable aircraft have reduced amounts of all of the above. The PA-28-140 case study is representative of all airplanes in one way or another when operated outside of the CG envelope.

When an aircraft’s CG is moved aft the lever arm to the rudder, the anti-spin control, becomes shorter, making the rudder less effective. In any aircraft the CG can be moved far enough aft to make recovery impossible. Aft CG also makes the aircraft spin flatter, which can inhibit spin recovery.

Some of these accidents happened in training with a CFI on board. Please, please, please make sure of being in the aircraft spin recovery zone and know all the correct procedures for spins before the starter is activated.

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Keep Your Head in an Emergency

Helmet review

by Weston Liu

If you fly aerobatics for a long time, you will eventually know someone who has had, or see a report of, an airplane broken in-flight and the pilot landing by parachute. Sean D. Tucker has bailed out a couple of times. Here in the Northeast United States I know a competitor who had his Yak tail taken off by another aircraft. One item that is often overlooked in the reporting is the head protection worn by the pilots. When Tucker spoke about his last bailout, he mentioned ducking down to release the canopy and still having it bump his helmet as it left. Our Yak pilot friend reported finding a ding in his helmet that likely occurred when the other airplane hit his. My takeaway has been that you aren't likely to bail out successfully if you are dazed or lights-out. Today's topic is head protection for aerobatic pilots.

What do we want for head protection in our airplanes? First, if we are pulling lots of g's, we want light. Unlike those old bulky jet helmets that you see in the movies, there are lots of options today, and they won't give you a strained neck or have big knobs on top waiting to scratch your canopy.

Next we obviously want impact protection. How much? Aviation helmets aren't built to Department of Transportation specs. Motorcycle helmets are built to protect against dragging your head against the ground or bouncing off a guard-rail at 60 or so mph. This and the customer price sensitivity have them built out of lower cost and heavier material. Military helmets are built to Department of Defense and NATO specs that cover impact from hostile fire debris as well as concerns about weight when the wearer is pulling g's. Aerobatic pilots hope to not need to worry about the neighbors shooting. Sky-diving helmets are built to protect individuals who bump into each other in free fall and hit their head on the ground during landings.



Bonehead Composites PilotX

As pilots, we want our comms to fit or at least be compatible with what we wear on our head. Many of us also want active noise reduction (ANR) to protect our hearing. And in the northern regions we might want some warmth in the winter but not a lot of heat in the summer.

And since there is a big difference in the room under a Pitts S-1T canopy versus the Extra's and Sukhoi's canopy, our choice of ride affects our choice of helmet. Friends have learned through experience that a lot of helmets just don't fit under the canopy in a single-seat Pitts.

From lowest cost to highest, here are some of the options.

Entry-level head protection can be found in the form of a U.S. Navy surplus flight deck cranial. About \$35 on eBay. These are cloth, built around a David Clark style passive hearing protector, with ABS plastic shells over impact-absorbing foam, snapped on. If you own a traditional David Clark headset, you can remove the hearing protector that comes with the helmet and slip your David Clark's right in. I added a Headsets Inc. ANR kit and a quick-release plug on the cord to mine. The ANR works great in my Pitts. Note: If you have to go skydiving, the quick release plug lets you dive out of your broken ship without taking time to unplug anything. And you do not have cords trailing and trying to wrap around your parachute, preventing it from opening. This rig fits in all of the aerobatic airplanes.



Guner with Clarity headset.

Next up in cost are a couple of newer entries in the pilot helmet market. Bonehead Composites started out making skydiver helmets. The Guner model is very light, low profile, and works in the Pitts S-1 where surplus military helmets literally get stuck during negative g's. The Clarity Aloft and QT Halo headsets fit right under a Guner and should slip right off without help if you have to dive out of the airplane. A number of Pitts pilots and I are flying with this helmet. The carbon fiber shell makes it very light. No strained neck at +6g. And the Clarity and QT Halo headsets weigh next to nothing. The earbuds block out noise as well as providing ANR. List price on the Guner is \$230. For comms the Clarity Aloft is \$525. If it is still available, the QT Halo is \$359.

With pilots purchasing the skydiver Guner model, Bonehead developed a pilot-specific carbon fiber helmet with built-in comms. The PilotX moves upscale with built-in speakers in the ear cups, a boom mic, quick-release comm cord, more comfort padding, weight of 2.3 pounds, and a list price before adding ANR, earbuds/communication earplug protection (CEP), custom paint, etc. just north of \$1,000.

If you fly an Eagle, Extra, or other ship with room under the canopy

(not an S-1 Pitts), the last couple of generations of military jet helmets are options. The HGU-55 and HGU-68 are the latest U.S. light-weight helmets available. The 55 is available used on eBay or through surplus outlets for about \$300 and up if you know what parts to mix and match. Looking at new or refurbished options, internet sources like Gibson & Barnes, AviationHelmets.com, and FlightHelmet.com have offerings starting around \$800 without comms. Adding civilian comms, ANR, earbuds/CEP, etc. are extra cost options.

Less common, but available new, are the MSA Gallet helmets. These are used by foreign militaries and a few aerobatic pilots. My hangar neighbor flies with one. Starting price is about \$1,700 including comms. Reported to be light and comfortable.

Visors — Most of the pilot helmets can accommodate a visor. Since sunglasses do the same job at less weight, adding a visor is mostly adding cool factor. But from a practical point of view, beware the visor options that use a center knob to move the visor up and down. In the up position that knob is just waiting for the wearer to push negative g so that knob can put an ugly scratch in your expensive canopy. Bungee visors are preferred.

Since most pilots are somewhat extroverts, I will mention that you can add custom paint to all of these helmets. The vendor or your local airbrush artist can apply any graphic from Maverick to Hells Angel.

And if you are trying to protect your hearing, ANR plus earbuds/CEP really keep the noise out. Most over-the-ear headsets, as well as helmets, can have earbuds/CEPs added.

With the wide range of cost, anyone who habitually flies their ship to the \pm g-limits can wear head protection. We hope we never need it, but a helmet is one more safety item that might make a difference if the airplane decides to give up on us during a flight.

Fly safely.

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Contest Calendar 2017

www.iac.org/contests

2017

WESTERN REGIONAL CONTEST CALENDAR

5/04-5/06 | DUEL IN THE DESERT
Apple Valley Airport | APV | CA
6/01-6/03 | COALINGA WESTERN SHOWDOWN
New Coalinga | CBO | CA
6/16-6/18 | KILLAM-FLAGSTAFF
Killam-Sedgwick/Flagstaff Regional | CEKG | CANADA
6/22-6/24 | APPLE CUP WESTERN OPEN CHAMPIONSHIP
Ephrata Municipal Airport | EPH | WA
7/13-7/15 | THE CORVALLIS CORKSCREW
Corvallis Municipal Airport | CVO | OR
7/20-7/22 | CANAM AEROBATIC CHALLENGE
Cut Bank International | CTB | MT
8/10-8/12 | BEAVER STATE REGIONAL CONTEST
Pendleton Regional Airport | PDT | OR
9/01-9/03 | HAPPINESS IS DELAND
Deland Municipal Airport | DLO | CA
9/01-9/03 | ROCKY MOUNTAIN HOUSE
Rocky Mountain House | CYRM | CANADA
9/07-9/09 | APPLE TURNOVER
Ephrata Municipal Airport | EPH | WA
9/23-9/30 | U.S. NATIONAL AEROBATIC CHAMPIONSHIPS
Wittman Regional Airport | OSH | WI
11/08-11/11 | TEQUILA CUP
Marana Regional Airport | AVQ | AZ

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CLINT MCHENRY IN EXTRA 230. DON'T MISS THE EXTRA AIRCRAFT EXHIBITION IN THE IAC PAVILION AT AIRVENTURE, JULY 24-25, KOSKONZUS, WI
PHOTO © CLINT MCHENRY, IAC. PHOTO COURTESY OF CLINT MCHENRY

2017

SOUTH CENTRAL REGIONAL CONTEST CALENDAR

4/21-4/23 | BEN LOWELL AERIAL CONFRONTATION
USAF Academy Airfield | AFF | CO
6/01-6/03 | LONE STAR AEROBATIC CHAMPIONSHIPS
North Texas Regional Airport | GYI | TX
6/22-6/25 | GULF COAST REGIONAL 25
Jackson County | 26R | TX
6/23-6/25 | MIDWEST AEROBATIC CHAMPIONSHIPS
Seward Municipal | SWT | NE
7/08 | SUPER D TANGO
Akroville | XA68 | TX
7/14-7/16 | HIGHPLANES HOTPOXIA FEST
Fort Morgan | FMM | CO
9/08-9/10 | ACE'S HIGH AEROBATIC CONTEST
Newton City | EWK | KS
9/23-9/30 | U.S. NATIONAL AEROBATIC CHAMPIONSHIPS
Wittman Regional Airport | OSH | WI
10/06-10/08 | THE CLYDE CABLE ROCKY MOUNTAIN
AEROBATIC CONTEST | Lamar | LAA | CO

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About the Posters

The 2017 International Aerobatic Club contest calendar posters are now available. Downloadable copies are available to IAC members at: www.iac.org/2017-contest-calendar-posters. Contact execdir@iac.org for printable files.

Designed by IAC marketing chair Margo Chase, this set of four regional posters evoke the early days of the Extra, featuring a photo of Clint McHenry in the first Extra 230. The model was first introduced to the international aerobatic community at the World Aerobatic Championships in Bekescaba, Hungary, in 1984. Subsequent models of the Extra aerobatic aircraft series have proven to be some of the most successful competition aircraft of all time.

2017

MID-AMERICA REGIONAL CONTEST CALENDAR

5/19-5/21 | HOOSIER HOEDOWN
Kokomo Municipal Airport | OKK | IN
6/02-6/04 | SALEM REGIONAL AEROBATIC CONTEST
Salem-Leckrone | SLO | IL
6/15-6/17 | OHIO AEROBATIC OPEN
Bellefontaine Regional Airport | EDJ | OH
6/25-6-26 | MIDWEST AEROBATIC CHAMPIONSHIPS
Seward Municipal | SWT | NE
7/07-7/09 | MICHIGAN AEROBATIC OPEN
Bay City James Clements Municipal Airport | 3CM | MI
8/11-8/13 | DOUG YOST CHALLENGE
Spencer Municipal | SPW | IA
8/18-8/20 | UPPER CANADA OPEN
Saugeen Municipal | CYHS | CANADA
9/08-9/10 | ACE'S HIGH AEROBATIC CONTEST
Newton City | EWK | KS
9/23-9/30 | U.S. NATIONAL AEROBATIC CHAMPIONSHIPS
Wittman Regional Airport | OSH | WI

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2017

EASTERN REGIONAL CONTEST CALENDAR

4/13-4/15 | CAROLINA BOOGIE
Wilson Industrial Airport | W03 | NC
5/03-5/05 | SEBRING 75!
Sebring Regional Airport | SEF | FL
5/19-5/21 | WILDWOOD ACROBLAST
Cape May County Airport | WWD | NJ
5/25-2/27 | ARMED FORCES MEMORIAL
Grenada Municipal | GNF | MS
6/08-6/10 | SOUTHEAST AEROBATIC OPEN
Bear Creek Bash | Russell Towers Field | RMG | GA
7/13-7/15 | GREEN MOUNTAIN
Hartness State Airport | VSF | VT
8/25-8/27 | KATHY JAFFE CHALLENGE
South Jersey Regional Airport | VAY | NJ
9/08-9/10 | EAST COAST AEROBATIC CONTEST
Warrenton Fauquier Airport | HWY | VA
9/23-9/30 | U.S. NATIONAL AEROBATIC CHAMPIONSHIPS
Wittman Regional Airport | OSH | WI

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Is your chapter hosting a contest that is not listed? Want to find out how to host a new contest?
Contact Lorrie Penner at execdir@iac.org.

ADDITIONAL DETAILS, including registration details, contact information, complete contest and practice dates, and more can be found on the IAC website at www.iac.org/contests.

NOTE: The IAC online pre-registration system is currently unavailable while undergoing overhaul.
Please contact the contest director or a representative of the listed chapter to pre-register or to volunteer. Pre-registration assists the limited volunteer staff to accomodate all participants and make each contest a success.

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