SPORT Aerobatics

MAY 2010

OFFICIAL MAGAZINE of the INTERNATIONAL AEROBATIC CLUB

Walter Extra's First:

The 230

Declaring Emergencies

A Nasty Spin


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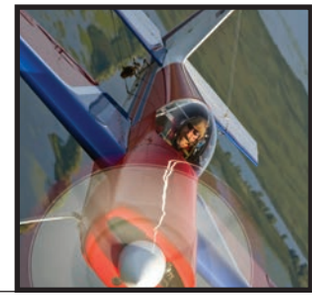
THE COVER

Bob Hart's beloved Extra 230 buzzes over EAA AirVenture Oshkosh in 2009.

Photo by Bonnie Kratz.



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REGGIE PAULK
COMMENTARY / **EDITOR'S LOG**

Focus on Safety

IT'S HARD TO BELIEVE, but May is already upon us. That means the competition season has begun in earnest, and many people are out tossing their airplanes happily about the sky. In order to help ensure they do so safely, May is dedicated to discussing safety.

Predictably, as soon as the weather begins to warm up, people start discussing pertinent topics on The Exploder. I tracked a few of the threads for a while and decided to ask a couple of people for articles related to the topics being discussed.

Many pilots are hesitant to declare an emergency out of fear of having to deal with the FAA, either through enforcement action or as a consequence of the declaration itself. Who wants to hear the dreaded words, "Please contact the tower after landing"? Ashley Messenger responded to a thread related to declaring emergencies, and his response was such that I requested an article for our membership.

Many pilots are hesitant to declare an emergency out of fear of having to deal with the FAA.

This issue brings something new to our membership. Rich Stowell writes about a particularly nasty spin condition achievable in a Pitts, but now, with *In the Loop*, our e-newsletter, we're able to bring you the accompanying video. Rich mounts video cameras to his Pitts in order to show us what he describes in these pages. Let us know what you think.

Keeping aerobatics safe is what keeps aerobatics fun. The more we can do to promote and practice safe flying, the more appeal this wonderful sport will have to those sitting on the fence. Flying with the ground and sky pivoting around the cockpit is what many believe to be the true essence of aviation. If you've never had to look up to see the ground from the cockpit, I can only say you don't know what you're missing. The weather's warm and the skies are beautiful, so get out there and find an instructor to introduce you to aerobatics. You'll find a comprehensive list of flight schools here: *www.IACUSN.org/schools*. IAC

Please submit news, comments, articles, or suggestions to: *reggie.paulk@gmail.com*

DOUG BARTLETT

Working Hard for You

AT THE TIME OF this writing, the board of directors of the IAC has just finished its spring meeting in Dallas, Texas. Although it is not the most exciting type of event, it is important to pass on to all IAC members some of the actions that took place. The first figure in the sequence was zeroed when all of your officers and directors decided to get on one elevator. You guessed it; stuck between floors with the likes of Tom Adams and Debby Rihn-Harvey is a special event. It is a good thing your board members are all fearless pilots and get along very well. It was more than a few minutes before the building maintenance crew was able to pry the doors open and help us climb out of the cramped car. No injuries to report and we all still get along just fine!

Moving on to business, last fall Tom Poberezny, president of EAA, asked me to prepare an operational plan that identified the action the IAC wanted to take for the near and long term. I agreed that such a plan was important not only for EAA and IAC coordination, but also to provide transparency to all of our IAC members. During our meeting in Dallas, the board approved this plan for our current year. The operational plan will be placed on the members-only page of the IAC website, *www.IAC.org*, and should be reviewed by all IAC members. In this plan the actions that are being taken to strengthen the ties between EAA and the IAC are identified, and further, the actions the IAC board is taking in response to member inquiries or requests are also identified. In summary, it is our action plan for the next 12 months. Please take a minute to review this plan. There is a clear shift in strategy as to how the IAC will be managed over the next two years. In the past the officers, directors, and a few key people decided the actions taken by the IAC. The use of committees to review these actions prior to implementation was minimal. The result of these actions led to only a few key individuals having a wide knowledge of the annual plan for the IAC. With the loss of our president and executive director in the same year, we learned some of the weaknesses of this model. The model we will use this year and next will require more coordination and committee work. It will tend to be slower but much more transparent. It will require more participation from the membership, and I am asking every member who desires to take an active role in the leadership of the IAC to volunteer to work on a committee of your choosing. Please contact Trish Deimer at headquarters to start this process.

Prior to the board meeting, all directors were strongly encouraged to contact every one of the chapter presidents in their region to review the chapter strengths, weaknesses, and areas for improvement. As a priority in the meeting agenda the directors are called upon to present their reports. When areas of concern are identified, the directors discuss the issue and decide the action to be taken. The actions or request for a review are identified in the minutes of the meeting. They are then added to the operational plan by assigning the action to a committee or an individual who is given a completion time. In this manner the board asks for the advice and recommendation of the committee prior to making a final decision. Let me give you two examples from our most recent meeting. During a director's report, a member's concern was identified that the IAC does not have any checkpoints for a pilot to advance in category. The directors discussed the issue, felt it may be a safety concern, and decided to refer it to the Safety Committee. The Safety Committee was asked to review the actions of other aerobatic clubs, review the impact of such an action on the IAC, and to report back to the board during the fall meeting if any changes should be made. In a different report, a director brought forward a member's comment suggesting a Sportsman Known sequence be valid for two years, not just one, and the proposed Sportsman Known sequence be available for pilots to review a complete year ahead of its approval. This action was also considered worth investigating and was referred to the Sequence Committee for review and comment.

> "There is a clear shift in strategy as to how the IAC will be managed . . ."

Please take the time to go to our website and review the operational plan and the minutes of the last meeting. Read the directors' reports. Take a minute to talk to your chapter president and ask if local issues were discussed with the regional director before the meeting. Is your director representing you at the national level?

It is important for the members of the IAC to understand how they are represented in the organization. Further, it is important for all members to know how they can review their representation and the efforts of their director. Please remember the board of directors is in place to meet the needs of the membership and not the other way around. The members vote these officers and directors into their positions. We are working hard to ensure the members can review, in detail, the actions the board and each director are taking in response to member requests. In the upcoming election, I ask that you review these efforts and vote for those candidates that you feel will best represent the interests of the IAC membership. *IAC*

Hartzell Introduces Aerobatic Propeller

PRESS RELEASE: HARTZELL PROPELLER Inc. has developed an advanced structural composite propeller for aerobatic aircraft using its proprietary ASC-II technology. The new Claw 2.0 propeller has recently achieved FAA type certification, meeting all of the propeller certification requirements. The original Claw and the new Claw 2.0 are the only certified advanced-composite propellers available for aerobatic use. The propeller has not yet been issued a supplemental type certificate for this aircraft; however, Hartzell is making the Claw 2.0 propeller available now for Extra 300/330 series aircraft flying in the experimental category.

Former U.S. Unlimited Aerobatic Champion Michael Goulian used an experimental development version of this propeller on his Extra 330SC during the 2009 air show campaign, for which he was recognized with EAA's Bill Barber Award for Showmanship. He was so pleased with the new propeller's performance that he will continue using it during the 2010 air show season.

"I couldn't be happier with my new Hartzell ASC-II Claw 2.0 prop," he says. "It has displayed all the characteristics that made the original Hartzell Claw a market leader, but from a performance standpoint, it has more pulling power at the low end. It also has a more modern look. It is a natural and worthy stablemate to the Claw."

This latest model from Hartzell comprises a unique lamination of carbon fiber and Kevlar, with an electroformed nickel leading edge erosion shield. The composite structure is co-molded on an integral stainless steel shank that accommodates bolt-on counterweights needed for aerobatics.

Hartzell's kit for the Extra 300/330s includes the three-blade propeller and a carbon composite spinner at a special introductory price of $21,900, with a three-year/1,000-hour warranty and six-year/1,000-hour time between overhauls. Visit *www.HartzellProp.com* or call Mike Disbrow at 937-778-4310 for details.

Gone West: Jack Steinfeldt

FORMER GOODYEAR AEROSPACE EMPLOYEE Jack Steinfeldt passed away suddenly of a heart attack while walking his dog, Jinx, Wednesday, February 24. Jack was an extraordinary engineer, mathematician, craftsman, and friend to many at Lockheed Martin. He built and raced midget race cars in Colorado prior to earning a bachelor's degree in electrical engineering and a master's degree in electrical engineering at MIT. Jack moved to Arizona in 1959 with his wife, Woody, and uniquely contributed to radar-image formation and navigation technologies at Goodyear Aerospace for 29 years, before his retirement in 1988. He authored several Arizona engineering memos still available and relevant today. Jack was a pioneer in dry humor and asymmetric fashion, developing one-eared hanging eyeglasses and the one pant leg above the boot statement. Jack learned the physically demanding skills of competition aerobatics through hours of daily practice in the Pitts he built by hand. He competed in contests throughout Arizona and California and always with the intention to win. In 1982, Jack took first place in the Advanced category at the U.S. National Aerobatic Championships in Fond du Lac, Wisconsin. The following year and thereafter, he competed in the Unlimited category. In his Pitts Jack set the world record (C1-A, 500kg) for time to climb to 3,000 meters altitude at 3 minutes 29 seconds. His airplane will be remembered by many for its steep glide past the water tower on return home from daily practice. Jack is survived by Woody, his brother, Ted, and his beloved Jinx. He was 82 years old. A memorial service for Jack was held March 26.

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PHOTO BY **BONNIE KRATZ**

. . . one of the objects of his affection, a superlative Extra 230 . . . has since left his stable and gone to another's.

GONE

But not forgotten

BY BUDD DAVISSON

This may come as a shock to some folks, but the entire world does *not* revolve around aerobatic airplanes. No, really! I'm not kidding. Some people actually have families, and careers, and all that other mundane stuff. Bob Hart, who recently came on to the IAC board of directors, is one of those. And, if you don't think so, you should meet his family: Yes, he's an aerobatic pilot, but he has his priorities straight. We say that right up front so that no one is surprised when one of the objects of his affection, a superlative Extra 230, which he had on display at Oshkosh, has since left his stable and gone to another's. As Bob puts it, "I want to spend more time with the family, and I needed a 'family' airplane, meaning a two-place bird, probably a Pitts S-2B."

These days the name "Extra" on an airplane is another way of saying (in thoroughly American terms) "kick-butt monoplane."

Now, don't get all teary-eyed over the concept of selling a favorite airplane (as both his wife and daughter did, when the airplane left for the last time). We'll bet dimes to doughnuts that by the time he and his lovely wife, Kori, find themselves empty nesters, another Extra 230 will find its way onto their grass runway, into their hangar, and back into their hearts. The Extra 230 is just one of those kinds of airplanes.

These days the name "Extra" on an airplane is another way of saying (in thoroughly American terms) "kick-butt monoplane." Almost as soon as Walter Extra turned his wildly creative brain from its focus on becoming a European aerobatic champion and directed it at developing a better way of punching holes in the sky, there very definitely was a new kid in town in the form of a new monoplane. And it was here to stay.

In 1980, Extra was competing at the world level in a highly modified Pitts Special. At that time, most competitors considered Leo Loudenslager's Laser 200 to be the most highly developed form of aerobatic airplane. Extra counted himself among those. He is often quoted that he liked the way the Laser looked and the way it flew. It was Leo and his Laser that drove the stake into the Pitts Special's heart in Unlimited competition, a fact that wasn't lost on Walter Extra, and he didn't want to be left behind. So, he sat down and started designing his own monoplane, using his own ideas and theories.

By 1983, the Extra 230 began showing up at aerobatic contests and kicking aerial posteriors. A 230-hp (courtesy of a mildly hopped up AEIO-360 Lyc), mid-wing monoplane, it was impossible not to notice its similarity to Leo Loudenslager's by-then-well-known Laser 200 aerobatic champion. The truth is, however, that every aerobatic monoplane is going to vaguely resemble the Laser in many ways because the laws of physics funnel engineers down an increasingly narrower path in search of increased performance. Even with the advent of all-composite airframes and the tremendous latitude that gives the designer in terms of exterior shapes, only the shift from a mid-wing to a low-wing configuration basically differentiates the most modern monoplane from Leo's Laser and the Stephens Akro it was based on, And that was nearly 40 years ago.

The Extra 230 uses traditional wood wing and steel tube fuselage construction, which, if you want to go by strict definitions, is technically "composite construction," because it uses a mix of materials. Okay, we won't go there. As opposed to later Extra wings, the original 230's is all wood rather than being a combination of

PHOTOGRAPHY BY **BONNIE KRATZ**

wood and carbon fiber, and reportedly it was the difficulty in finding enough high-quality wood that caused Walter to stop producing the airplane. Being a stickler for quality control, he destruct-tested every piece of structural wood before putting it in the airplane, and wood that met his quality standards just wasn't available. So, in 1990, the last 230 airframe came off the line.

Truth is, the way aerobatic competition was progressing, the four-cylinder 230 wasn't going to last much longer anyway. Aerobatic pilots are nothing if not power-hungry hot rodders at heart. There is simply no such thing as enough power, much less too much power, so the six-cylinder horsepower race was on, not only in the new Extra plant, but also in virtually every shop capable of wielding a welding torch or epoxy brush. The 230 was left in the wings, as brute force took center stage.

It was Leo and his Laser that drove the stake into the Pitts Special's heart in Unlimited competition…

Just because there are airplanes that are faster, are stronger, and can leap entire sequences in a single bound doesn't mean that when an airplane is no longer the air rage it isn't still a very capable airplane. For example, if you took all the Pitts out of all the competitions, the gatherings would be mighty sparse. The 230 is still a terrific aero bird, plus it has become something of a cult object and is constantly mentioned whenever aircraft handling is being discussed. Walter got it right the first time, and those who own, or owned, an Extra 230 place great value on that. Bob Hart is one of those pilots.

TOP: Bob Hart's plane will always remain in his heart.

RIGHT: The original Extra had a wire braced tail. No composites here!

PHOTOGRAPHY BY **CHRIS MILLER**

Left to Right, Bob, Kaylin, Megan, Madison (the dog), and Kori.

"I've always wanted to fly," Hart says. "Even when I was a young kid in Illinois, *all* I wanted *was* to fly. That might be because my dad flew PBYs in WWII and would spend hours telling me great old stories about his experiences. We just lost him, and I'm realizing more and more how much impact he had on me both as a kid and as an adult. Even though he quit flying after the war, he was always enthused about it, and that enthusiasm worked its way into me."

Bob learned to fly at a "cornfield airport," which is to say he started at the grassroots level and worked his way up into flying for the airlines.

"I instructed full time for three years," he says, "and was later flying freight at night. Being a freight dog teaches you a lot. It also wears you out. Thankfully, I finally got a job flying a corporate King Air and then went into the airlines."

Considering the short flying season in Illinois, it's surprising how much aerobatic activity has always been occurring in the state, which had its effect on Bob including spending four years as the Chicago IAC Chapter 1 president.

"I've always dreamed of owning something aerobatic. At first I didn't even care what it was. I just wanted to be able to go upside down. Then, in 1990 I ran across a Pitts project, an S-1C, and I started working on that. I should say right now that I'm no speed demon when it comes to building things, which is why it took nearly 10 years to finish it. It was your classic 180-hp Pitts, and I competed in it for several years before selling it to Dan Johnson. Dan took it to Oshkosh and entered it in the judging, and it won a Lindy Award. I couldn't have been happier. I didn't build it for that reason, so it felt good knowing others thought it was a good job. I just knew I liked to fly it. I also knew I wanted more roll rate than the flat-wing Pitts (S-1C) gave me, which is part of the reason I sold it."

At the time Bob was thinking about going another direction with his aerobatics, he wasn't sure which way he was going to go, but the concept of a monoplane seemed logical. However, the majority of the Sukhois, CAPs, Extras, etc. were just too expensive. Then his luck and his life changed.

". . . it was a little heart-rending to take the airplane away from her. I didn't think too much about it at the time, but now that I've sold it, I can totally understand . . ."

"I was put in contact with Mike Goulian who knew of an Extra 230 that was involved in an estate sale. He wanted to know if I was interested and, obviously, I was, but what I didn't know was that the airplane was being sold by the widow of a pilot who truly loved the airplane. She was looking for someone to

adopt it, not buy it. It isn't a decision to be taken lightly."

"Of the 19 Extra 230s built, the one for sale was number five," Bob says. "When it was new, Walter Extra competed in it for about 100 hours in Germany, then it went to Boston and has stayed there ever since. That's why Mike knew about it. He also warned me that this wasn't going to be the normal 'Give me the money and I'll give you my airplane' type of deal. In fact, I wasn't going to Boston to buy the airplane: I was going to Boston to be interviewed by the owner's widow to see if I would be allowed to buy it. She wasn't going to sell it to just anybody, and it became obvious that I was being honored simply to be considered as the new owner. I went to her house to visit for a while, then she decided that yes, she'd sell the airplane to me. It wasn't a matter of money: she just wanted to make very sure that her husband's baby didn't end up in the wrong hands. I'm certain that if she thought I was a high-*g*, hair-on-fire type of pilot, she wouldn't have let me buy it. As it was, it was a little heart-rending to take the airplane away from her. I didn't think too much about it at the time, but now that I've sold it, I can totally understand why she felt the way she did."

As a Pitts pilot, Bob was coming into an entirely new aerobatic world. Everything about his new mount was different from his old Pitts.

"There were lots of small nuances to the transition. For one thing all of the wires and struts in front of me were gone, which, although I hadn't realized it, had helped me find references easier and faster. At the same time, with that maze of struts and wires gone, I really felt the freedom associated with aerobatic flight.

"In terms of performance the Extra outperformed the Pitts in a couple of areas, the most noticeable being the roll rate, which made me very happy. Also, it's much cleaner so it doesn't lose speed going uphill very quickly, and the MT prop really flattens out on downlines so I don't miss the drag of the Pitts in that area.

"Spins were also a new experience, especially when outside. Without that extra wing and cabane struts, the increased visibility really makes you feel as if your head is sticking out into the spin, and the first couple of times you flatten it out inverted it's a very strange sensation. But, you learn to love it in a hurry.

"And then there's the landings," Bob says (usually grinning) "after the Pitts, they couldn't be easier. Totally no sweat."

So, you have to ask, why would someone sell what is his dream airplane? If you met his wife, Kori, and daughters Megan (13) and Kaylin (8), you'd understand his next comment.

"Throughout this entire journey, I've had nothing but the utmost support from my entire family, but I don't want to be gone while my girls are growing up," he says. "I'm gone enough as it is, and now they are an integral part of my joy and my fun including flying. Megan is into it, and Kaylin is coming along, too. They are involved in a number of other activities as well. I very much enjoy coaching both of their basketball teams, and Kaylin is teaching me how to play golf! I'll still be part of the aerobatic community, but I won't be competing as much or as hard until the girls are much older. They are part of my life, and I want to be part of theirs. And yes, I'm looking for a Pitts S-2B."

It could probably be said that the family that aerobats together stays together. And the family that stays together, aerobats longer. Priorities, priorities. *IAC*

PHOTOGRAPHY BY **BONNIE KRATZ**

WARNING: The following article and its associated video (http://www.youtube.com/user/richstowell) are for informational purposes only. The spins described herein are psychophysiologically demanding and potentially dangerous.

Do not attempt any of these spins unless doing so as part of an appropriately structured, hands-on advanced spin training program with a qualified aerobatic instructor who is also experienced and current with the spins described herein.

ILLUSTRATION BY **PHIL NORTON**

advanced spin training

SEEING the WORST the PITTS HAS TO OFFER

BY RICH STOWELL

Several years ago yet coincidentally within the same time frame, two pilots approached me with similar inadvertent spin stories. One pilot owned a Pitts S-1T; the other, an S-2C. Both were flying at the Sportsman level. Both were practicing hammerheads. Both were unsure exactly what happened after the pivot and were equally unsure how or even why their airplanes recovered. More importantly, both had been sufficiently impressed by their encounters to seek additional training.

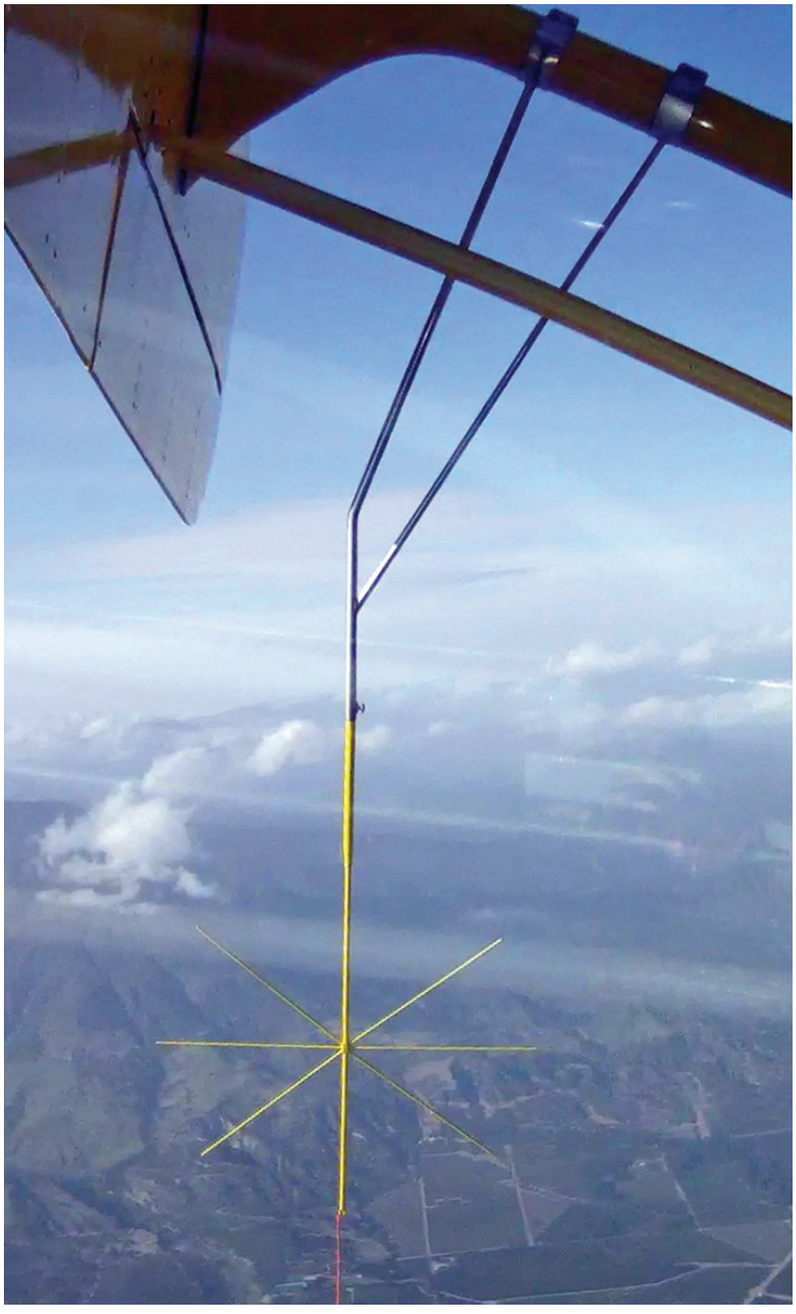
Before continuing with this story, let's review some key stats about spins in aerobatic aircraft. During the period 1984–1998, for instance, 22 percent of the accidents involving aerobatic aircraft that were engaged in aerobatic flight ended with a stall/spin. That's more than twice the total stall/spin accident rate for general aviation as a whole. During the years 1984–1994, upright spin accidents outnumbered inverted spin accidents 2.4 to one. Interestingly, upwards of two-thirds of those spin accidents started as intentional spins. This was true for upright and inverted spin accidents.

Of the accidents involving aerobatics in the Pitts in particular, the stall/spin accident rate was 53 percent during the years 1961–1984. Yet even though the Pitts is equally and easily capable of spinning upright or inverted, inverted spins were outnumbered nearly four to one. Thus it appears the overwhelming majority of accidental spins in the aerobatic environment are upright, even in airplanes that will readily spin inverted.

Re-creating the Spin Scenario

It is in the improper execution of the hammerhead, however, where a significant inverted spin potential exists. My approach with the two Pitts pilots was to duplicate as closely as possible the errant spin each had encountered. We began by discussing general spin and recovery dynamics, as well as how we would proceed toward the spin I suspected they had stumbled upon.

The flying portion—conducted in a rented S-2B with the owner of the S-1T, and with the other owner in his S-2C—began with normal, upright, one-turn spin. Not only did I want to gauge each pilot's skill and discipline with intentional spins, but I also wanted to see if the spins triggered any unusual psychological reactions.



The brief period of wing waggling is the pilot's prespin warning . . .

We incrementally and methodically worked our way to two different spin departures from hammerheads: an upright spin and an inverted spin scenario. Although the upright spin from the hammerhead seems to be the less common of the two, it nevertheless provided a stark contrast to the inverted spin and rounded out the training exercise. Witnessing the behavior of the Pitts as it transitions from a hammerhead into an upright spin is interesting in its own right as well.

The Upright Departure

This scenario began with a typical hammerhead entry (25-squared, 160 mph, +4.0*g* pull to the vertical upline in the Pitts). The pivot would be initiated at the appropriate time; however, the sequence of inputs during the pivot was modified as follows:

1. Apply full left rudder

2. Apply full right aileron

3. Apply full aft elevator

With the throttle position unchanged, full left rudder kicked in and held, and the stick

PHOTOGRAPHY BY **RICH STOWELL**

held in the aft right corner, the airplane was allowed to depart controlled flight. Upright spins generally tend to be more stable along the yaw and pitch axes than along the roll axis. This particular entry offered an excellent demonstration of reduced stability in the roll axis: The Pitts would transition into a series of distinctive wing waggles, rolling from a steep left bank to wings level (in some cases, actually rolling through wings level over to the right side), and back again. The period of these oscillations was estimated to be less than two seconds.

Though unusual, the roll oscillations were not unduly violent. No unusual *g*-loads were sensed. The Pitts typically would go through three such wing waggles and then would transition into a smooth, flat, upright spin to the left. The flat spins were recovered using NASA Standard actions coupled with "PARE" (see "PARE" sidebar) callouts, as well as the Beggs Method with the callouts "power—off; hands—off; opposite rudder." The Pitts recovered consistently and predictably regardless of the recovery protocol used.

SOME USEFUL DEFINITIONS

Post-stall gyration (PSG) describes the uncontrolled motion about any or all of the flight axes immediately following a departure from controlled flight, but prior to the incipient spin phase.

Upright spin refers to a spin encountered while under a positive *g* loading, wherein the wing is stalled at its positive critical angle of attack regardless of the airplane's attitude.

Inverted spin refers to a spin encountered while under a negative *g* loading, wherein the wing is stalled at its negative critical angle of attack regardless of the airplane's attitude.

Spin direction is the direction the airplane is yawing relative to the pilot during a spin. Also referred to as "direction of rotation."

In-spin refers to rudder and aileron controls applied in the direction of rotation, for example: left rudder during a left spin; right rudder during a right spin; left aileron during an upright spin to the left; right aileron during an inverted spin to the left.

Out-spin refers to rudder and aileron inputs opposite to the direction of rotation, for example: right rudder during a left spin; left rudder during a right spin; right aileron during an upright spin to the left; right aileron during an inverted spin to the right.

Rogue spin is an unfortunate term sometimes heard within the aerobatic community. It is used to describe spin behavior that apparently defies explanation, or behavior that occurs seemingly uncommanded by the pilot. Reports of so-called rogue spins are more likely the result of rogue inputs made by unaware pilots.

"Post-stall gyration" (PSG) is a term often applied in the context of jet aircraft behavior. PSG is unusual in light airplanes, which tend to go from stall to spin with nothing in between. But the roll oscillations observed en route to the flat spin could qualify as PSG. The brief period of wing waggling is the pilot's prespin warning, indicating that the attempted hammerhead should be aborted and spin recovery actions initiated *immediately,* prior to flat spinning.

To reinforce what the pilots were experiencing, I would make the following calls during the process: "First warning," "Second warning," "Third warning," "Flat spin," "Recover. We also performed several spin recoveries during the oscillatory phase; recoveries here were rapid and positive.

This, however, was *not* the particular spin the two pilots had unintentionally entered.

The Inverted Departure

As in the upright scenario, this one began with a typical hammerhead entry. But instead of establishing a vertical upline, we would intentionally pull 5 to 10 degrees beyond the vertical (i.e., negative up) and would hold that line until pivoting. The sequence of inputs for the pivot were as follows:

1. Apply full left rudder

2. Apply full right aileron

3. Apply full forward elevator

The full forward elevator input simulated a pilot's futile attempt to re-establish the vertical line during the pivot. With throttle position unchanged, full left rudder held, and the stick pinned in the forward right corner, the airplane was allowed to depart controlled flight.

Once again the Pitts went through a PSG phase prior to spinning. The oscillations were less dramatic than in the upright scenario; nonetheless, prespin warning was obvious. But when it finally came time to spin, the

Note the positions of the string in this sequence . . .

OVERWHELMED

Although "overwhelmed" (or "frozen on the controls") simply and effectively conveys the pilot's outward reaction to the nasty inverted spin, the internal dynamic is far more complex. The dramatic visual commotion coupled with the peculiar physical sensations triggered a flood of involuntary physiological changes that propelled the pilot into the red zone—he had become incapacitated. Not unlike reactions seen during combat and law enforcement encounters where humans are suddenly thrust into imminent-threat-of-death situations, the pilot was unable to take further meaningful actions to save his life. In his own words: "I would be dead right now if I had been alone in the cockpit. The look of that spin remains crystal clear in my mind half a year after the experience."

The pilot's reactions were perfectly normal in the context of human physiology. Similar to the other two Pitts pilots mentioned at the beginning of the article, this pilot was also flying at the Sportsman level. He possessed good flying skills. He was committed to recurrent training and safety, having successfully completed unusual attitude and Pitts checkout training at two of the country's top aerobatic schools: "I certainly was diligent and methodical in my approach to training for the Pitts. I thought I had the airplane dialed in, that there was nothing I hadn't seen or couldn't handle. This experience proved me wrong. It scared me straight." All of us involved in sport aerobatics must be committed to recurrent spin and unusual attitude training in the same way instrument pilots must be committed to instrument recurrency. The demands and real dangers of the aerobatic flight environment simply cannot be ignored.

Pitts would transition with a vengeance, suddenly whipping into a steep, fast, and rather uncomfortable inverted spin. No smooth rotation here; this one was *nasty!* In fact, it's the nastiest spin I believe you can perform in a Pitts. And it's not an inverted flat spin, either; it's a nose-low inverted spin with an in-spin aileron input.

Inverted spins tend to be more stable in roll, less so in pitch and yaw. This spin exhibited those characteristics. And compared to the usual -1.5*g*'s or so encountered during normal inverted spins, the *g*-load would spike between -2.5 and -3*g*'s as the Pitts whipped into the spins. Not only would we experience a rapid onset of high negative *g's*, but we would occasionally sense lateral *g*'s (Gy) pushing us sideways in our seat as well. The jerk of the sudden negative *g*'s has been known to push pilots from their seats and rip headsets off.

The jerk of the sudden negative *g*'s has been known to push pilots from their seats and rip headsets off.

The opposing directions of yaw and roll, the less stable motion about two flight axes, the awkward sitting position of the pilot, and the difficulty in applying precise and

PHOTOGRAPHY BY **RICH STOWELL**

full control deflections under the higher negative *g*'s certainly add to the shock reported by pilots who have encountered this vicious inverted spin. *This* is the spin the two pilots accidentally fell into while practicing their hammerheads. The Beggs Method in the Pitts is tailor-made for this exact scenario. The reasons:

1. It's too easy for pilots to pull the stick aft involuntarily when subjected to the sudden, high negative *g's* of this spin alone, much less when the negative *g* is coupled with Gy. Pulling the stick aft would only aggravate the already wicked spin.

2. It's easier to implement with the necessary precision to ensure recovery.

3. This is a case where having an alternative yet effective means of accomplishing recovery in a particularly difficult situation is a good thing. The downside, however, is that the Beggs Method is not reliable in many other airplanes. (Such a limitation cannot be overemphasized. This discussion is about a specific spin scenario in a specific airplane; it is imperative not to extrapolate beyond the Pitts, please!)

We chose the Beggs Method as the default for this particular scenario. I verbalized again as the process unfolded, calling, "Warning, warning, warning" during the PSG phase, followed by "Spin; power—off; hands—off; opposite rudder." We also applied these same recovery actions several times during the prespin phase, with the Pitts responding rapidly and positively each time.

NASA Standard "PARE"

1. Power—off

2. Ailerons—neutral

3. Rudder—full opposite

4. Elevator—neutral (Note: "Neutral" is the direction of control movement, not necessarily the final location)

The Beggs Method

1. Power—off

2. Hands—off the stick

3. Rudder—full opposite

The Nasty Spin Gets Nastier

As a result of the work with the two Pitts pilots, I developed a one-day, two-sortie Advanced Spin Training Module specifically for the Pitts. While working on the inverted spin scenario with another Pitts owner recently, things got even nastier. The S-2B had just whipped into the inverted spin. As usual, I called, "Power—off; hands—off; opposite rudder," but the rudder did not reverse. The spin had overwhelmed the pilot (see "Overwhelmed" sidebar); he requested assistance. I obliged, but not before the Pitts convulsed into a second turn. The *g*-meter popped to -4.5 *g*'s this time around! Even so, kicking the opposite rudder with the power already off and hands off the stick resulted in prompt recovery. This series of events occurred twice during the flight.

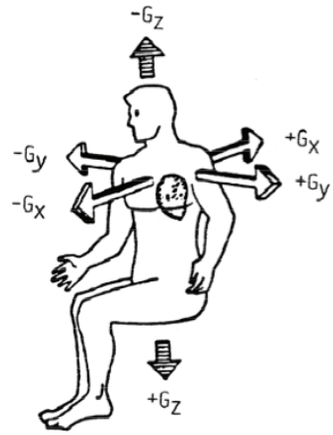


Figure 3. Notational system for g's acting on pilot.

From FAA Advisory Circular 61-91, "A Hazard in Aerobatics: Effects of G-Forces on Pilots," dated 2/28/84.

Mentally replaying the events afterward, I came to believe that if this spin were allowed to continue, it very well could overstress the airplane as it oscillates violently in pitch, or as a result of a spontaneous transition into a high-speed, high-*g*, inverted spiral. This is a serious spin and must not be taken lightly. Yet if a Pitts pilot has never seen the oddly interesting prespin behavior before, the surprise of it could result in freezing on the controls or inappropriate control inputs until the airplane finally does spin. The situation would become dire at that point.

The essential purpose of unusual attitude spin training is to experience the chain of events leading to a spin departure in a controlled environment, thereby turning the surprise and novelty of the departure into controlled and correct responses by the pilot long before things get worse. In the case of the Pitts, the airplane is somewhat reluctant to spin

ADVANCED SPIN TRAINING Module Offered by the Author & CP Aviation Inc.

LESSON 1

1. Review normal upright spins
2. Upright Flat Spin Build-Up
3. NASA Standard and Beggs Spin Recoveries
4. Unusual Attitude Spin Recovery—Botched Hammerhead

LESSON 2

1. Review normal inverted spins
2. Inverted Flat Spin Build-Up
3. NASA Standard and Beggs Spin Recoveries
4. Unusual Attitude Spin Recovery—Botched Hammerhead
5. Inverted—Upright and Upright—Inverted Transitions

from the hammerhead, but it certainly will if the pilot persists with inappropriate inputs. The hammerhead must be aborted—even at the expense of a poorer score—and spin recovery actions initiated *immediately* upon botching the pivot. Freezing on the controls or fighting to save this (or any other) aerobatic maneuver will rarely lead to the desired outcome.

As noted in the disclaimer at the beginning of this article, please do not attempt these spins yourself unless it's in the context of a dual training environment with an experienced instructor. Be careful and be safe out there. IAC

Rich Stowell is a Master Instructor–Aerobatics and author of the book *The Light Airplane Pilot's Guide to STALL/SPIN AWARENESS*. He has performed more than 31,000 spin recoveries in 200 airplanes.

Special thanks to retired NASA test pilot Jim Patton and fellow Master Instructor–Aerobatics Paul Ransbury and Clarke McNeace for reviewing the draft of this article, to CP Aviation for the use of N80AS, and to Scott Malherbe for editing the companion video.

PHOTO BY **CASEY ROZELL**

Getting There

Is it half the fun?

In 1974 I decided to chase a dream. It wasn't easy. I was 20 years old and supporting myself and my flying addiction by flight instructing. Most of my funds were exhausted trying to eat enough calories to survive and keep my '69 Volkswagen running. This made a dream to fly my J-3 Cub all the way to the annual EAA Oshkosh fly-in seem more like a far-fetched scheme.

BY GREG KOONTZ

Late one night I got a brilliant idea. I decided to raid the Gorilla. The Gorilla was a big plastic "piggy bank" my mom had given me many years before. I had started a habit of stuffing all my loose change into its narrow little head slot every day. It had become very heavy, the kind of heavy that made me have visions of my healthy toes getting smashed as I carefully carried it to the carpeted floor of the den to do surgery on the poor beast. My soon-to-be-wife girlfriend, Cora, and I sat on the floor and counted out the bounty spread across the floor.

Out of the Gorilla had poured $78. Can you believe it? Back then it was enough to do a round-trip flight from Alabama to Oshkosh feeding a Continental C-65 engine and a pilot. I followed my friend Jerry's Luscombe the whole way for the biggest flying adventure I had seen by then. The air show itself became a mere part of the experience.

Even my corporate flying employer was smart enough to never apply *gotta-get-there* pressure.

Now a middle-aged flier, I can look back at a lifetime of flying little airplanes all over. My corporate flying notwithstanding, I'm reminiscing on the real cross-country adventures going to destinations of *my* choosing, a foggy clump of memories flying to a logbook full of air shows and contests. These were done with minimal navigation devices and *never* with gyro gauges. Squeezed in on weekends and vacation time, these flights were always laced with the burning desire to get there. As circumstances will tend to dictate, getting there was not always all that easy or fun.

I'll admit before continuing further that no one ever pointed a gun at me and told me I had to get anywhere. Even my corporate flying employer was smart enough to never apply gotta-get-there pressure. But the truth is, when it involves your personal desires to go somewhere, the disease we call get-there-itis will fester.

THE BEST TEACHER

My first dose of the cure for this infection came to me like my father's idea of a good swimming lesson. The experience shrank my confidence to push weather about as effectively as the cold lake was in shrinking everything else.

I was at the annual Pitts fly-in in Ozark, Alabama. This is one of the great flying events of our sport and is hosted with blind generosity by Marshal Collins. Marshal has a passion for the Pitts like no one else and holds this event every year to honor the planes and the man who designed them. It was the last time I saw Curtis Pitts alive and the first time I had a Pitts to bring down and fly in the air show. I was in the big orange Pitts Model 12 that the proud owner was having me fly in a few shows that year. Being a born and bred buff of old and low horsepower planes, I had my hands full with this over-motored beast that was Mr. Pitts' last work of art. But I did have a great time at the grassroots event, and after the big Saturday night party in Marshal's barn came the Sunday morning flight back home in north Alabama. But all was not well.

I had a lunch date to meet the whole family of the boy my daughter had just decided to marry. Of course, I gave my word that the Pitts fly-in would in no way impair my ability to be there on time. What I didn't check before staying over for the party was the weather. I woke up to widespread low clouds as a warm front crawled its way through the state.

But this is my state, and I felt I knew every square foot of it. I reasoned quickly that the visibility under the clouds didn't look all that bad (from where I was standing), and the Model 12 wasn't too big that it couldn't fit between the trees and a 500-foot ceiling. I had a Garmin 195 mounted to the panel, and as long as I stayed out of the clouds, the lack of any gyros shouldn't be a problem. It seemed much easier to face this weather than my daughter's scorn.

Leveling off at about 400 feet above ground level (a comfortable 100 feet below the clouds!) I set up cruise. The 360-hp Model 12 can cruise about any speed you want; it's just a matter of how much fuel you want to guzzle. For 39 gallons per hour (gph) you'll go 180 knots, or 17 gph will get you 130; you can let your pocketbook decide. But economics didn't matter…this time I had a different problem. At low speed, I had a big round cowling making forward visibility a bit poor under these conditions. At higher speed, I could be approaching obstacles at a frightening rate. I had to choose between not seeing the towers in time or not

seeing them at all. I chose to slow down and zigzag. If get-there-itis causes a high fever, by now my hair should have been on fire!

As fate would have it, the clouds en route remained at a steady altitude. The problem was the terrain didn't. I was encountering a hilly part of the state. This disease has an element of denial, so I pressed on being sure it would get better. Slowly and surely the ground and clouds were putting me in a squeeze. Eventually my wheels were near the trees and my rudder was going IFR. I had to make a turn back to Ozark right away.

This was not a time to reprogram a GPS; in fact, this was no time to look inside at all. Even a slight change in altitude would put me in trees or clouds. So I figured I could backtrack the course already set in the Garmin if I could just do a level 180-degree turnaround. I turned left and made a careful effort to complete the reversal. I rolled out at my best guess at a 180 and glanced quickly at the nav screen. Rats! I had 20 more degrees to go to line up on Ozark. Looking back outside, and a little to the left around the big cowling, I banked left again.

Woosh! Just as I banked, a tower flashed by my right window! The image of a big round cover over some kind of antenna filling up my right Plexiglas is forever burned into my brain. I immediately turned my head and pressed against the canopy to get a clear look, but it was so close as it passed that it was then too much behind me to see. Believe me when I tell you that if I had not raised that right wing at that exact second, I would have been forever a dark place in Model 12 history.

Greg flying the Model 12 on a decidedly better day.

insult to injury, the weather cleared to beautiful blue in just a couple of hours.

I share my dumbest adventures as a part of my own therapy. I think it's part of a 12-step program somewhere. You know, "My name is Greg, and I'm a get-there-holic." It's a constant reminder that we all can fall into the trap, and it's always out there. It's a part of our beloved activity. In fact, even with the scrappy safety record that comes with air show performing, it pales in comparison to the risk we encounter just getting there. The statistics prove it.

The discipline of contest style flying has produced a safety record long envied by the air show crowd. Self-regulation and internal cross-checks create a safe atmosphere at contests that is second to none. *The real danger, then, still lies in getting there.* We are all the pilot in command of our little craft and in charge of our own domain. I doubt seriously on that bleak Sunday morning in Ozark I would have made any better decision as long as it was left to my own clouded judgment. That is the way of get-there-itis.

So, if you ever have the opportunity to be sizing up the weather with a friend making that big go/no-go decision, please remember: friends don't let friends fly dumb! Our confidence as can-do pilots can be bigger than our common sense. It sometimes takes a friend we respect to wake us up. IAC

It seemed much easier to face this weather than my daughter's scorn.

LOOKING BACK

I might have put an orange scuff on the antenna; I'll never know for sure. The only real damage was to the upholstery directly beneath me. I managed a safe return to Ozark and landed uneventfully, even with the harsh vibrations caused by my frazzled nerves. I tied down the Pitts and prepared to face all the other fly-in pilots who were patiently waiting out the weather at the airport. To add

PHOTO BY **CASEY ROZELL**

Declaring Emergencies . . .

PHOTO ILLUSTRATION BY **PHIL NORTON**

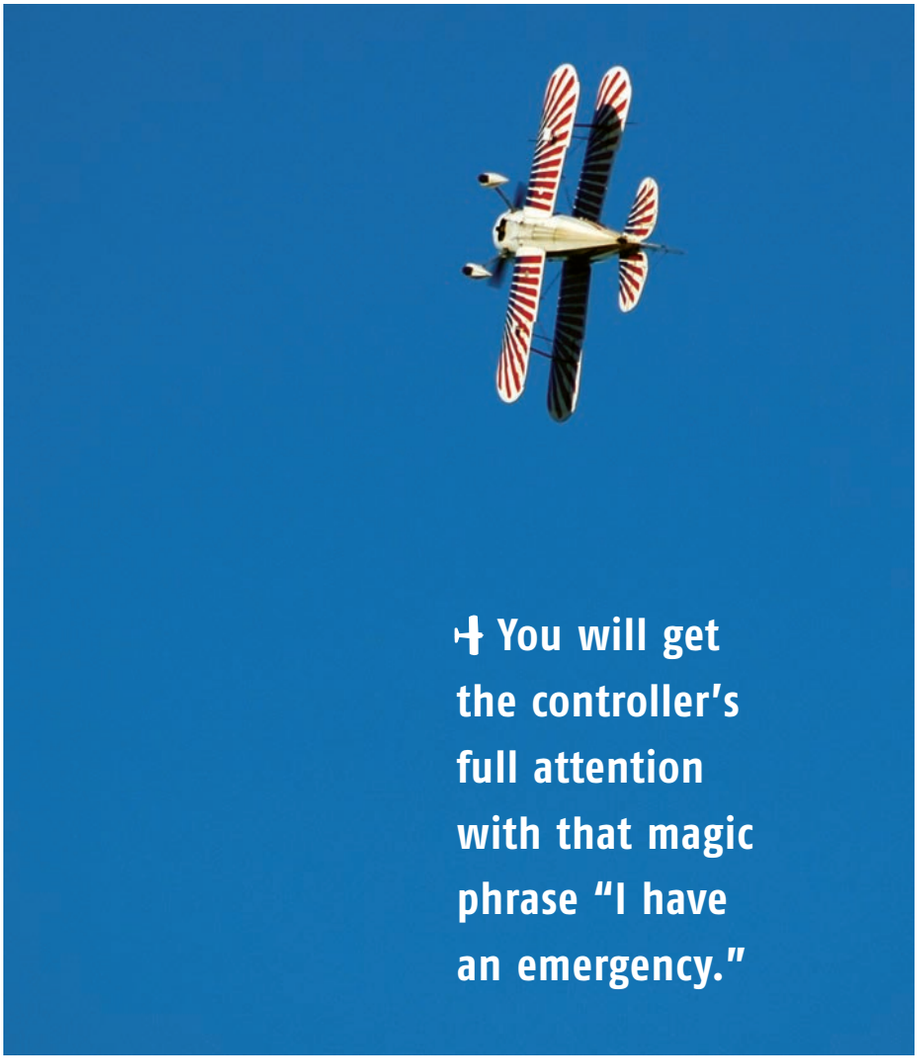
. . . JUST DO IT!

BY ASHLEY MESSENGER

"Well, I do declare!"

This is a phrase that we, south of the Mason-Dixon line, use to express astonishment. (Proper pronunciation: de-CLAY-yuh.) A perfectly applicable phrase when a refreshing aeronautical romp deteriorates, suddenly or otherwise, into something a bit less enjoyable.

Even though we all take great care to maintain our mounts to the highest possible standard, to keep our personal proficiency at peak levels, and to fly within the confines of all applicable regulation, well, stuff happens. Sooner or later, you are going to face some manner of in-flight emergency. We push our airplanes hard, and if something is prone to failure, we're going to find it, sometimes while airborne.



You will get the controller's full attention with that magic phrase "I have an emergency."

Equipment malfunction notwithstanding, the very nature of flight will sometimes find us in a situation requiring quick action to avert dire consequences. It could be weather related, maybe physiological, or any one of a host of antagonists. So, do you declare an emergency? Should you declare an emergency? What happens if you have to bend a rule or two to meet the emergency? There is no clear answer. Each situation is unique; every declaration of emergency has an upside and a downside. Overall, I feel the benefits stack the deck in favor of declaring and seeking all assistance available.

ATC

Normally, the formal emergency declaration is something you use when in contact with air traffic control (ATC) of some ilk (often when flying cross-country) in order to either seek relief from clearances and instructions or to place resources at your disposal. It all depends upon the facility, but you may have access to radar position fixing, sophisticated crash, fire, and rescue services, and/or emergency medical care. You might just need a quick, accurate vector to the closest suitable airport or the direction of emergency vehicles to some two-lane road that your bird is about to alight upon. Now, we don't always use ATC services on every flight, and I'm not saying you should or shouldn't. But, it would seem most prudent to have the frequency of a nearby facility at the ready should the need arise. They can be of immense help.

It is imperative that you state to the controller very clearly the exact nature of your problem, and the exact extent of the assistance you require. *Timeliness is paramount!* Hint and hope is not really an effective communication technique, and there is not much anybody can do for you when you have only 2 gallons of fuel left. You will get the controller's full attention with that magic phrase "I have an emergency." Quite often, controllers will offload their traffic to another controller to concentrate solely on your situation, should it be serious enough. In addition, that statement is really the only way to properly stress the urgency of your plight. A famous anecdote along those lines concerns Avianca Flight 52, a Boeing 707 that ran out of fuel in New York in 1990. While there were many associated factors, the flight did not receive the priority handling it desperately needed because the pilot never said the magic words; the busy controller never fully realized the gravity of the aircraft's fuel state.

PHOTOGRAPHY BY **PEGGY MESSENGER**

It is quite possible that you will have no choice in the matter of declaring an emergency. Yes, a controller can declare one for you! More accurately, a controller can assign you emergency status if he or she determines that your flight situation warrants that action.

It is imperative that you state to the controller very clearly the exact nature of your problem . . .

Completely Out of Control

So, is there value to the declaration of emergency in a non-ATC environment? There is, indeed, for it can be invoked retroactively. We regularly fly in environments where there is no one to hear your declaration, nor any real resources to be readily had. You might think that no one is around to see that little "tweak" of FAR Part 91, but you never know when you may need this retro relief. Perhaps a hypothetical parable will illustrate.

Your indulgence, please, for a brief devotional reading from the book of 14 CFR, Part 91.3.

(b) In an in-flight emergency requiring immediate action, the pilot in command may deviate from any rule of this part to the extent required to meet that emergency.

(c) Each pilot in command who deviates from a rule under paragraph (b) of this section shall, upon the request of the Administrator, send a written report of that deviation to the Administrator.

Essentially, it is quite possible that a regulation violation will not result in enforcement action, if it was reasonably required to ensure a safe outcome to the event. Welcome relief!

Picture if you will a serene summer day at a nontowered airport in, oh, let's say, Kentucky! The proper notice to airmen has been issued, the waivered practice box is open, and it's in use by certain colorful homemade aerobatic airplanes. The traffic pattern is populated with a few standard training airplanes from outlying airports, taking advantage of the moderately challenging terrain to hone student skills.

One of the aforementioned colorful airplanes departs the box abruptly, and instead of entering the standard traffic pattern, it dives into the final approach at a steep pitch attitude, cutting in front of one of the trainers to land. The trainer's crew is less than amused and leaves the area, mad enough to report this event to the local flight standards district office (FSDO). The offender won't be hard to track, for the airplane is festooned with red, blue, purple, and yellow *feathers*, for Pete's sake.

How many violations can you count?

- Well, there's good old 91.113, right of way rules.
- And 91.111, your basic operating near other aircraft.
- Don't forget 91.126, the traffic pattern direction rule.
- I'll bet the dive into final bent old 91.303 pretty hard.
- And we can always rely on Old Faithful, 91.13, careless and reckless operation!

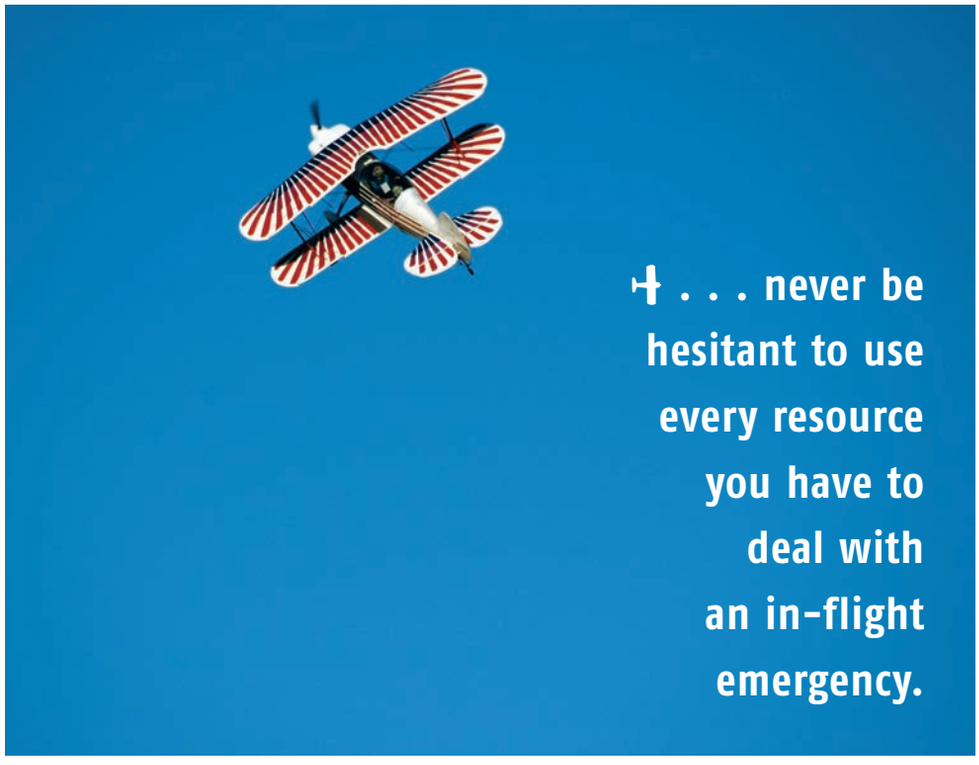
Looking grim for the home team here. However, consider the same scenario in this context. The aero bird has ruptured the fuel sight gauge, and fuel for the planned flight plus visual flight rules reserves is relocating to the front seat cushion. The competition pilot finds it prudent to remove electrical power from

the aircraft and land immediately. He feels that the separation between his aircraft and the trainer on final is adequate, but he can't transmit his intentions for fear of fire. He does what he feels he must.

This malfunction is not one required to be reported by NTSB 830, and had nobody been in the pattern that day, it could have been discreetly dealt with and all would be quiet on the FSDO front. After all, there was no need for sophisticated outside assistance; no accident occurred, and no aircraft or property was damaged either. But it required a few rules to be bent to get the wounded bird on the ground expeditiously. The presence of the other aircraft set the stage for more violations than would have otherwise occurred. I personally feel that, as the pilot of the emergency aircraft, it makes a far better impression to call the FAA and confess, either before the other guy or within a short time thereof. That way, you can start the ball rolling on receiving the benefits of 91.3(b) and the provision of 91.113(c), which gives an aircraft in distress right of way over all other traffic.

Federal Entanglement

Whether the FAA finds out about your little "deal" from you, ATC, another pilot involved, or even a ground observer, its interest is pretty standard. It wants to ensure that any violation of the FARs was reasonable to the mitigation of the emergency, and that the pilot involved was and remains competent to exercise the privileges of his or her certificate. The regulations will not, however, protect you from willful disregard or careless operation.



PHOTOGRAPHY BY **KIM WOLFE, PEGGY MESSENGER**

. . . great weight is placed upon the airman's attitude . . .

The FAA will investigate to ensure that violations were not the cause of the emergency in the first place, for example, an inadequate preflight. Things that you should have taken care of before the flight (like the transponder check, your parachute pack, a thorough weather briefing, that oil pump airworthiness directive) you are going to have to own, pure and simple. But, it doesn't require an emergency to get violated for these things if you are the type that regularly plays a little fast and loose with them; a ramp check will suffice quite nicely for that.

You might even face the dreaded "709 ride" (which comes from Title 49 of the United States Code, paragraph 44709), to reaffirm your aerial competence. But, with the protections of emergency authority in place, a ride with Paul Polyester, aviation safety inspector, is really a minor inconvenience (aside from the debilitating Brut fumes). Allowing a situation to deteriorate into an accident or incident will surely result in your being investigated in any case, and probably more extensively. You are going to face violations (perhaps more of them and more serious ones) without regulatory relief. In these situations, great weight is placed upon the airman's attitude, and acting in a forthright and professional manner really does smooth the way. It demonstrates your mindset to do things correctly. This is especially true if you averted a more serious situation with a timely call for assistance!

The bottom line is, never be hesitant to use every resource you have to deal with an in-flight emergency. The declaration of an emergency, either during the event or after the fact, can justify your actions in the heat of the moment. If you conduct your flying in a conscientious manner, make an honest effort to remain in compliance, and show overall good judgment, you have little to fear. And you all do that, anyway, because it's just the right way to fly! IAC

CONTEST CALENDAR

DEPARTMENTS

MARK YOUR CALENDARS for these upcoming contests. A complete list, and the latest calendar, is at ***www.IAC.org***. And, if you're hosting a contest, let the world know by posting it there!

// **61st Sebring Aerobatic Contest** (Southeast)
Thursday, May 6 – Saturday, May 8, 2010
Location: Sebring Regional Airport (KSEF): Sebring, FL
Tel: 954-551-0625 • **Web:** www.iac23.com
E-Mail: dlprince@nationsafedrivers.com

// **Armed Forces Memorial** (Southeast)
Friday, May 14 – Saturday, May 15, 2010
Location: Grenada Municipal (KGNF): Grenada, MS
Tel: 662-417-5698 • **E-Mail:** wroberts@waco-eng.com
Website: www.iac27.org (under construction)

// **Jersey Skylands Aerobatic Championships** (Northeast)
Friday, May 14 – Sunday, May 16, 2010
Location: Greenwood Lake Airport (4N1): West Milford, NJ
Tel: 1-908-635-2815 • **Website:** www.iac52.org
E-Mail: stephenseidel@embarqmail.com

// **Southeast Aerobatic Open** (Southeast)
Friday, June 4 – Saturday, June 5, 2010
Location: Tara (4A7): Hampton (Atlanta), GA
Tel: 706-326-4877 • **E-Mail:** marty.flournoy@fcrealtors.com

// **U.S. -Canada Aerobatic Challenge** (Northeast)
Saturday, June 5 – Sunday, June 6, 2010
Location: Olean Airport (OLE): Olean, NY
E-Mail: penn.lorr@yahoo.com

// **Northern California Supreme Box Ballet** (Southwest)
Friday, June 11 – Saturday, June 12, 2010
Location: Paso Robles (PRB): Paso Robles, CA
Tel: 510.579.3407 • **E-Mail:** martin@pull.gs
Website: www.iac38.org/paso2010.htm

// **Lone Star Aerobatic Contest** (South Central)
Friday, June 11 – Saturday, June 12, 2010
Location: Grayson County (GYI): Sherman/Denison, TX
Tel: 469-713-4505 • **E-Mail:** Loop4fun@aol.com
Website: www.IAC24.org

// **Ohio Aerobatic Open** (Mid-America)
Friday, June 18 – Saturday, June 19, 2010
Location: Union County (MRT): Marysville, OH
Tel: 614-505-6555 • **Website:** www.iac34.com
E-Mail: jgranger@columbus.rr.com

// **Apple Cup 25th Anniversary** (Northwest)
Friday, June 18 – Saturday, June 19, 2010
Location: Ephrata Municipal Airport (KEPH): Ephrata, WA
Tel: 603-860-4456 **Website:** www.iac67.org
E-Mail: AppleCupCD@gmail.com

// **Wildwoods AcroBlast** (Northeast)
Friday, June 25 – Sunday, June 27, 2010
Location: Cape May County (KWWD): Lower Township, NJ
Tel: 717-756-6781 • **E-Mail:** cwisman@comcast.net
Website: www.iac52.org

// **Midwest Aerobatic Club Challenge** (South Central)
Saturday, June 26 – Sunday, June 27, 2010
Location: Seward Municipal Airport (SWT): Seward, NB
Tel: 402-785-1060 • **E-Mail:** lynn.bowes@hotmail.com
Website: www.2connect.us/mac80

// **Green Mountain Aerobatic Contest** (Northeast)
Friday, July 9 – Sunday, July 11, 2010
Location: Hartness State Airport (KVSF): North Springfield, VT
E-Mail: wsgordon@earthlink.net
Website: www.iac35.aerobaticsweb.org

// **Michigan Aerobatic Open** (Mid-America)
Saturday, July 10 – Sunday, July 11, 2010
Location: Jackson County – Reynolds Field (KJXN): Jackson, MI
Tel: 734-255-2263 • **E-Mail:** rtbutts@live.com

// **Salem Regional Aerobatic Contest** (Mid-America)
Saturday, July 17 – Sunday, July 18, 2010
Location: Salem/Leckrone Airport (KSLO): Salem, IL
Phone: 314.369.3723 • **E-Mail:** bruceballew@earthlink.net

// **Hill Country Hammerfest** (South Central)
Friday, August 6 – Saturday, August 7, 2010
Location: Llano Municipal (AQO): Llano, TX
Tel: 512-497-9656 **E-Mail:** acroguy@aol.com

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