SEPTEMBER 2008

Sport Aerobatics

OFFICIAL MAGAZINE OF THE INTERNATIONAL AEROBATIC CLUB

Red Bull Air Race: Detroit

- The Day the Wing Fell Off
- Teaching the Basics
- Blast from the Past

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A Red Bull Air Race plane in Detroit.
Photo by H.G. Frautschy.

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2008 EAA AirVenture Oshkosh Preview

A small taste of what's to come in October

After a successful AirVenture, the International Aerobatic Club is riding high and will be putting together the highlights for the October issue of *Sport Aerobatics*. Until then, here is a preview. (Photos by Reggie Paulk)

Sean Tucker shows off his low-flying skills during one of multiple inverted passes during a performance at this year's AirVenture.

Camping under the wing of your airplane is but one of the perks of flying in to Oshkosh. One lucky camper used a Decathlon as an RV.

Gene Soucy kept the tail of his Showcat in the air long after taxiing clear of the runway.

PRESIDENT'S PAGE

by Vicki Cruse • IAC 22968
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Doing It Right

The rookie shows us how it's done and includes the family

Earlier this year, I was asked by IAC Chapter 52 (New York) President Mark Mattioli to speak at the contest banquet in Wildwood, New Jersey. Not wanting to pass up yet another opportunity to not be home, collect frequent flier miles, and meet new people, I said, "YES!"

The Wildwood Acroblast was held the last weekend in June in Cape May, New Jersey (just about as far south as you can get), and co-sponsored by IAC Chapters 52 and 58 (Pennsylvania). This area is a major tourist spot during the summer, and this weekend was the kickoff for the "season." Craig Wisman was the contest director, and Will Morey, of Morey's Piers and other ventures, was the major sponsor of the contest. Will owns three piers in Wildwood, complete with water parks and every carnival ride you can imagine. He also owns a few hotels in town that housed almost all the IAC folk and as many of the 20,000 young adults in town for a soccer event as he could handle.

Will was a "normal" pilot until meeting Bill Finagin, who introduced him to unusual attitudes and basic aerobatics. The rest is history. Next came the Pitts S-2B, formation flying, and hosting a competition where he finished first in Sportsman. On Thursday, Bill, Will, and Wes Jones, in matching polos and nearly matching S-2Bs, flew formation down the beach off the Jersey shore. The result must have been spectacular, as the airport received two calls about airplanes on fire just offshore. Only in New Jersey.

Having flown contests across the United States, I believe this one had to be the best effort I've seen to gear a contest toward the family. Normally we hold contests out in the middle of nowhere, and generally the family might come to one contest and never again. This wasn't the objective here. This was the first contest held at the former Cape May Naval Air Station, which implies large runway and lots of ramp space and there was. Clarence, who ran the fixed-base operator (FBO) Big Sky Aviation, watched in amazement as 20-plus aerobatic airplanes were crammed into a space normally occupied by three corporate planes. He and the line guys were also amazed at the number of 5-gallon avgas purchases.

Having flown contests across the United States, I believe this one had to be the best effort I've seen to gear a contest toward the family.

Greg Dungan brought his wife, Carol, and their three boys. While Greg spent time chief judging at the contest, Carol took the kids to the beach and the boardwalk. Those kids slept great at night. Friday evening's private IAC party was held at the end of one of Morey's piers, called the Oasis, and everyone was invited. Oasis it was, with umbrella-laden drinks (for purchase—Will isn't stupid), and this may be the first and only time shrimp and gourmet crab cakes have been served at the Friday evening after flying party. (Note to our Cajun, Louisiana-based IAC members: No offense but the term "gourmet crawfish" isn't widely recognized outside the state of Louisiana.) Bill obviously never introduced Will to Friday night pizza.

If it is possible to have a mix between contests and family events, this had to be the winner. There is already talk of having the competition here next year and making it an even bigger event. This wasn't your ordinary contest at an out-of-the way locale, but an extravagant event for a first effort complete with lunches for the competitors and volunteers, a pilot tent stocked with water and Gatorade, and events like nothing we've ever seen, not to mention the piers and boardwalk. Craig ran the ship, and Will provided all the extras. Even Bill, who has been attending contests for nearly 100 years, was amazed by the amount of effort put into this venue and the availability of things to do in the local community. Watch for this one on the calendar next year and make plans to attend. No excuses for you single-seat aircraft owners not to bring the family. Philly and a rental car are definitely within reach.

NEWSBRIEFS

Bill Finagin

Bill Finagin to Be Inducted Into 2008 IAC Hall of Fame

William (Bill) Finagin, the owner of Dent Air Ltd., an Aviat Pitts dealership and aerobatic flight school in Annapolis, Maryland, will be inducted into the IAC Hall of Fame at a ceremony in Oshkosh, Wisconsin, on October 24, 2008.

Bill became involved in aerobatics in the mid 1970s and has been teaching aerobatics since the early 1980s. He has acquired more than 18,000 flying hours, of which more than 10,000 hours have been in the aerobatic Pitts Special series of aircraft, training more than 600 individuals on flying aerobatics safely.

With safety as his focus, Bill guides his students through the entire repertoire of spins including upright, inverted, flat, accelerated, and crossover. This allows his students to confidently recover from any situation that might occur during their flying.

Bill was the original aerobatic competency evaluator/committee member appointed by the Federal Aviation Administration (FAA). He continues as an active aerobatics instructor, a NAFI Master Certificated Flight Instructor-Aerobatic, and a competitor. Bill has been instrumental in working with the FAA in Washington, D.C., on behalf of aerobatics and is the chairman of the IAC Government Relations Committee.

Michael Church Renews Aerobatic Instructor Designation

The National Association of Flight Instructors (NAFI) and the International Aerobatic Club (IAC) are proud to announce a significant accomplishment on the part of Michael Church of Santa Ana, California. Church recently renewed his NAFI Master Certificated Flight Instructor and Master Certificated Flight Instructor-Aerobatic accreditations. He is the only instructor in the program to have both. Church is the chief flight instructor and president of Sunrise Aviation at Orange County Airport (SNA) and is also president of the Western Pacific Aviation Safety Foundation and was National Aviation Safety Counselor of the Year in 2005.

NAFI and IAC—both parts of EAA—are dedicated to providing support and recognition for America's professional aerobatic instructors while simultaneously encouraging all such instructors to rise up to and maintain a high level of professionalism. NAFI and the IAC are also committed to providing a safe and effective learning environment for those seeking spin, emergency maneuver/upset, or traditional aerobatic training services. For more information on the Aerobatic Instructor Designation Program, visit *www.IAC.org/programs/designation.html*.

Michael Church

IAC Board of Directors Elections

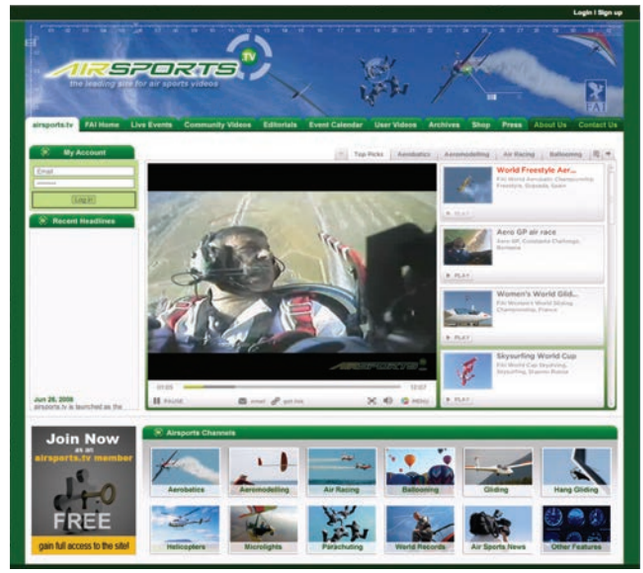
The newest directors were announced at the annual member meeting held at EAA AirVenture in Oshkosh, Wisconsin, on August 1, 2008. Returning as treasurer is Doug Bartlett of Cary, Illinois. Secretary-elect is Allyson Parker-Lauck of Collinsville, Oklahoma. Returning directors are Robert Armstrong of Athens, Georgia, Mike Heuer of Collierville, Tennessee, and Debby Rihn-Harvey of La Porte, Texas. Randy Reinhardt of Lexington, Kentucky, is the newest director to join the IAC board.

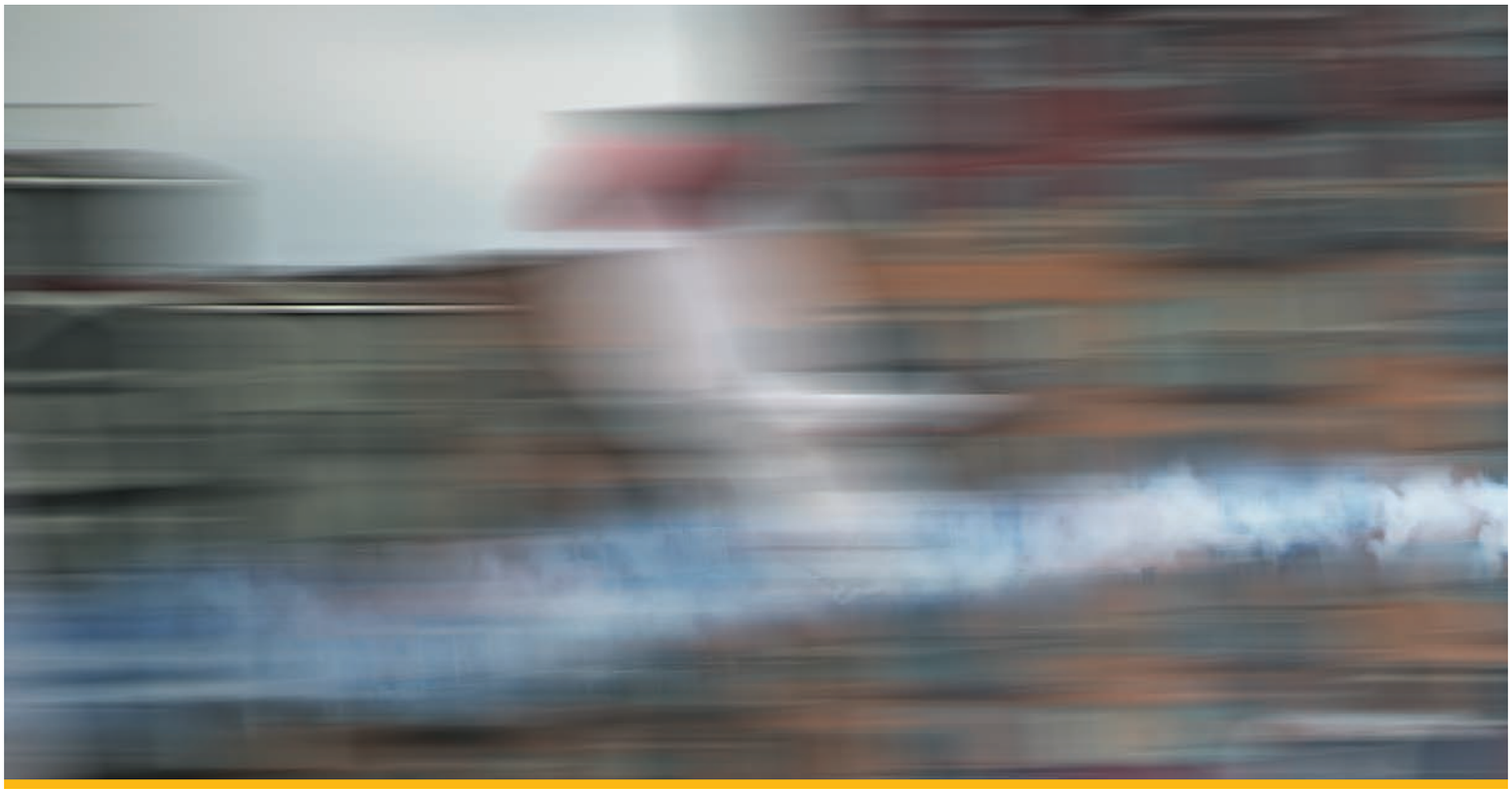
Airsports.tv goes live

Last December, Federation Aeronautique Internationale (FAI) announced that international broadcasting of the first "Airsports World" TV series had started, and that the series was available in DVD format. This 13-episode TV series, featuring most of the major FAI World Championships of 2007, reached more than 250 million homes and attracted many new viewers to air sports.

Building on this success, the FAI and Flying Aces Ltd. decided to continue common efforts to promote air sports and reach new audiences in 2008. Parallel to this year's "Airsports World" TV series, Flying Aces Ltd. has now officially launched its free Internet TV channel at *www.Airsports.tv.*

New features will be added during the year, such as live Internet broadcasting of World Championships and opportunities for event organizers, officials, and competitors to upload their own videos and write editorials covering latest events, team strategies, new products, and advice on getting involved in air sports. For details, visit *www.Airsports.tv* or *www.FlyingAces.co.uk*.





From the IAC to "The Show"

Lisa Popp, IAC Executive Director

"Wow!" "Cool!" "Awesome!" "Amazing!" are heard prevalently among the 750,000 spectators lining the Canadian and U.S. shores of the Detroit River. My 18-month old daughter simply says "wheeee!" and "whoa!" as she points to the sky with excitement as 12 pilots maneuver their aircraft in and out of a 3.8-mile course of 65-foot high inflatable pylons at speeds of 230 mph and pull up to 10Gs. Level flying, vertical passes (knife flying), slalom flying, and even a half-Cuban-Eight are flown throughout the course. It's the third leg of the nine-stop 2008 Red Bull Air Race (RBAR) World Series flown in Detroit May 31 and June 1, 2008.

The pilots are in a competition for points, and the one who accumulates the most points in the 9-race series is crowned the Red Bull Air Race World Champion. Three American pilots and former International Aerobatic Club (IAC) competitors are on the race circuit: Kirby Chambliss, Mike Mangold, and Mike Goulian. Chambliss has been involved in the RBAR since the second race in 2003 and was instrumental in the RBAR's formative years (2003-2004), helping to bring the race to the United States. Mangold's first RBAR was at Reno, Nevada, in September 2004. Goulian is one of the "newbies," having started in 2006. The official RBAR World Series began in 2005. To date, Mangold won the 2005 and 2007 series, while Chambliss won the 2006 series and is in contention to win the 2008 series. He currently is in second place behind Paul Bonhomme of Great Britain. [Editor's Note: At press time another two races were complete with Chambliss winning in London and standing two points behind Bonhomme in the overall standings to date.]

Red Bull Air Race Detroit features three IAC winners

Chambliss was the winner of the Detroit race, finishing just 0.15 seconds faster than Bonhomme. Mike Mangold was bumped from a third place podium finish with nearly three full seconds separating him from Austrian pilot Hannes Arch. “I flew an incorrect knife edge pass in one gate and received a three-second penalty,” said Mangold. However, there is a small cloud of controversy hanging over Arch’s third place Detroit win. “The judges missed a low disqualification call on the No. 3 finishing pilot,” commented Mangold.

With the RBAR World Series now in its fourth official season, I chatted with the American pilots to find out their views on the race progression, the piloting skills involved, the aircraft technology, and the differences between the RBAR, IAC competition, and air show flying.

THE SKILL SET

In the beginning, entry into the RBAR was by pilot recommendation and invitation only. Now, since RBAR’s primary concern is safety, there is a formal rookie training camp in place. There are strict standards for being selected for the training camp from which the next RBAR pilots are chosen. First, a person must have been a National Champion in his or her respective country or must have finished in the top 50 percent at the Unlimited World Aerobatic Championships or European Aerobatic Championships. After that, extensive air show experience and a low-altitude aerobatic waiver is required due to the low-level nature of the races. The pilot’s marketability and home country are also taken into consideration. If a person meets these criteria and then wants to participate in the RBAR qualification camp, he or she may put in an application for consideration by the RBAR. An RBAR super certificate is issued to a qualified race pilot who has signed a contract with the organization to show the various civil aviation authorities the pilots receive special training, are regularly evaluated, and are qualified to perform the duties of an RBAR pilot.

Surprisingly, there is no practice course the RBAR pilots can train on in between races. The pilots keep up their aerobatic flying skills and G tolerance by flying aerobatic sequences off the course and by flying in air shows. "For each race, the course is different and requires specific maneuvers and timing," said Mangold. Some of this can be practiced away from the actual location, but most effectively it is done in the four days prior to an actual race [when the air gates have been erected by Red Bull technicians]." Chambliss has an aerobatic box at his ranch in Arizona but without air gates, so he can only guess where the gates will be for a particular race.

"I was nervous at my first race," said Chambliss. "I saw Victor Chmal smashing into the gates, trying to make the turns, trying not to stall the aircraft. I had only gotten one practice flight in that day. But I came in third place at the race. I think the difference is that world competition pilots are not used to flying down in the dirt, but I'd been flying air shows while flying competition. I think it made the difference, because it takes a while to get used to flying close to something and a few feet above the ground at high G."

"We have held more than 30 races, and no one has been injured, and the only reason has been because of the high level of experience of the pilots," said Chambliss.

THE AIRCRAFT

Three aircraft are prevalent in the RBAR: the Edge 540 manufactured by Zivko Aeronautics of Guthrie, Oklahoma, the Extra 300SR manufactured by Extra Aircraft of Dinslaken, Germany, and the MXS produced by MX Aircraft Technologies of North Wilkesboro, North Carolina.

According to Chambliss, most RBAR pilots have now added wingtips to their aircraft, streamlined the gear, installed longer and more aerodynamically shaped air intakes, mounted smaller wheels, put in floor windows in the fuselage for better three-dimensional situational awareness, and pulled all the antennas inside the aircraft in an effort to make the aircraft faster.

Daniel Grund

US pilot Kirby Chambliss rips a pylon during training for the Red Bull Air Race World Series in London, England.

"If we were to put a normal Edge 540 built for aerobatics in the RBAR versus the one I fly in the races, there would be a two-second difference [in finishing time]," said Chambliss, "but a fraction of a second is deciding the races."

Chambliss' engine also has been increased from a -540 to a -580, and that gives Chambliss a 20 mph speed increase but also adds 60 to 70 pounds of weight. His team is still evaluating if this formula is the right way to go to increase performance.

Other aircraft differences are not so visible. "The sad thing is, in competition you were always happy to give your fellow pilots your 'secrets,' like how to make your flying look better to the judges, but that doesn't happen in racing, because fractions of a second are deciding who wins the race, and any little modifications to the aircraft can make the difference," Chambliss said.

Mangold flies a "Mangold Edge 540." It is a kit that has undergone extensive refinement from the original design. Mangold's team made numerous modifications to the airframe and engine, allowing him to win the RBAR World Series twice in the last three years. "Some modifications are obvious; some are not visible," said Mangold. "There is much secrecy about modifications and how they actually work. The machine is the major ingredient of a winning formula."

Mike Goulian also flies an Edge 540 in the RBAR with a Lycoming Thunderbolt IO-580 engine. "My goal in the next year is to try and get my plane modified to where it is one of the top two or three fastest airplanes," said Goulian. "That is harder than it sounds because everyone is working very hard to get 'fast.' It's a lot like NASCAR. Races are won and lost by just fractions of a second, so every little bit helps."

THE RACE FORMAT

The RBAR race format has been changed from its original design to optimize marketing of the air race and improve pilot safety by limiting the maximum number of flights to three per day. The race is a knockout format consisting of a training flight, qualifying flight, point one, super eights, semifinals, a third place fly-off, and the final.

"The head to head competition is nice for the crowd and TV," said Chambliss, "and takes some of the luck out of it." Mangold commented that the race refinement has required a change in strategy and perhaps equipment from all the race teams.

HITTING A PYLON

Some spectacular video and photographs have been taken of pilots smashing into the air gates. Fortunately, the effect on the pilot's safety and potential damage to the aircraft is not as dramatic as it appears. The pylons are made of spinnaker nylon, an extremely lightweight and flexible material normally used to make sails for boats. The material rips immediately when hit, and yet it can withstand wind speeds of up to 37 mph with-

ANATOMY of a RED BULL AIR RACER

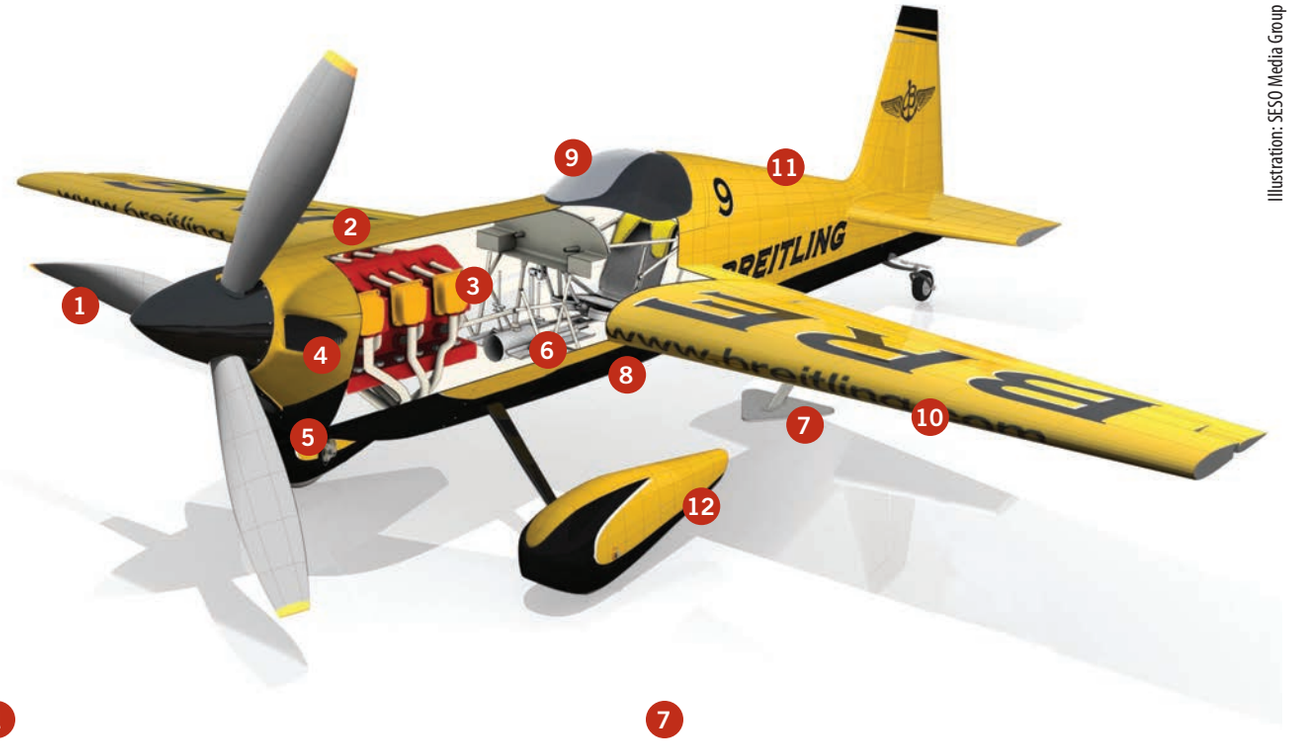


Illustration: SESO Media Group

1

PROPELLOR 3 blade constant speed propellor in various versions are used on all race planes. The manufacturers strive for light weight, with sturdiness and efficiency. These qualities are key when accelerating out of the "slow and tight corners" around Air Gates.

2

ENGINE COWLING Design can vary depending on plane and event. A good combination of low drag with sufficient air flow for cooling is the key to improving race plane performance.

3

ENGINE All race planes use fuel-injected, 6-cylinder Lycoming engines with 6-in-1 exhaust systems. Some are 540 cubic inches with 310 hp and others are 580 with 340 hp, and 30 kg more weight. Engine compression is limited to a ratio of 10:1 by regulation, and other modifications are limited for safety and reliability.

4

AIR INTAKE (Cooling) The cooling intakes are forward-facing vents which force air to cool the engine. Engines are not 100 percent efficient, so not all the energy produced is mechanical power, but also some waste heat that needs to be removed. Cooling is also needed because high temperatures can damage engine parts and lubricants.

5

AIR INTAKE Located below the engine, and modified to increase manifold pressure and thus engine power by 3-5 hp. All intakes have a screen for protection from objects (such as birds) during flight.

6

SMOKE SYSTEM Natural, harmless paraffin wax is injected into the hot engine exhaust gases. The result is a highly visible display of the plane's flight path.

7

CONTROL SURFACES & SPADES Ailerons, elevators, and rudders are larger for greater response, and are therefore extremely sensitive to control. 'Spades' are used to act as a 'servo' to reduce the stick forces around the longitudinal axis for the large ailerons. Some ailerons have small triangles instead of trim tabs – like the elevator – for improved control. The elevator and aileron are controlled via push rods and the rudder via steel cable.

8

FLOOR WINDOW Most race planes have a clear plastic panel on the floor of the cockpit, allowing the pilot to see underneath his plane for better kinesthetic awareness when flying.

9

CANOPY Small and light weight bubble designs vary from plane to plane, but all are aerodynamically designed to reduce drag.

10

WING EDGE and MXS generally use symmetric airfoil, while EXTRA a slight asymmetric airfoil. Symmetric can fly inverted just as well as upright, but produces less lift at slower speeds. Asymmetric wings have a more abrupt stall characteristic. Wings taper toward the end to reduce drag. The position (high or low wing) on the fuselage, and overall wing design is a science unto itself.

11

FUSELAGE There are 2 types: steel tube frames with Carbon Composite Empennage Structure (EXTRA and EDGE), or pure carbon fiber Structure (MXS). The fairings are all light weight.

12

LANDING GEAR All race planes have a fixed undercarriage with hyrdraulically actuated disc brakes, and are tail draggers with a steerable tail wheel.

out being blown over. (Unfortunately, wind speeds in Detroit were a match for the pylons, with wind gusts peaking at 59 mph on race qualifying day.)

"The effect depends on how you hit it," said Chambliss. "If you just touch it with your wingtip, you don't notice it at all. You will just hear an explosion from inside the cockpit." Mangold likened the feeling to a tug on your shirt sleeve.

"In my first RBAR, I hit a pylon in a skid so when the pylon broke, it wrapped around my wing and aileron. The plane flipped upside down in the blink of an eye. At about 25 feet, that gets your attention. However, with all of my aerobatic experience it was not as big a deal as it looked in the video," said Goulian.

IAC COMPETITION, AIR SHOWS, AND THE RBAR

All three of the RBAR American pilots have come from an IAC competition and air show background, and they offered insights on how instrumental their backgrounds were to their success in the RBAR.

"Actually it is not so different from IAC competitions," commented Mangold. "Judging, presentations, boundaries, rules, and flying the program as depicted are similar to both. The air race adds the time factor. Generating and controlling fast roll rates, exactly positioning the aircraft in space relative to a pylon, accelerated stall recognition, and overall situational awareness are all skills from precision aerobatics that directly contribute to success in the RBAR."

Being able to control one's nerves prior to flight is also a learned skill from IAC competition that Goulian has taken with him to the RBAR. "I am comfortable being nervous for races," said Goulian. "Essentially, every RBAR feels like a World Aerobatic Championship. It is a big deal, and each race has a lot riding on it in terms of points for the season."

Goulian also expressed his gratitude for the aerobatic skills he learned from the IAC. "If it was not for the IAC, I would not be doing this," said Goulian. "Flying aerobatics and sport planes is my lifelong passion, and I owe it all to the IAC. I still feel incredibly lucky that I am able to do this for a living."

Chambliss places the major difference in the capability of the aircraft rather than in the skills of the pilot. "In competition, if a guy is good, he can be good in a CAP, Extra, or an Edge," he said. "You can afford to have your aircraft be 5 percent less in performance, but in the RBAR, you are racing against the clock. That 5 percent would put you in 8th place."

And the major difference Chambliss sees from air shows: "In air shows you don't pull Gs at the ground. But in the air races, if you give up any extra seconds on the clock by not pulling that extra high G, you wouldn't win the race," said Chambliss.

Currently Chambliss is a five-time winner of the U.S. National Aerobatic Championships. I asked him if he was considering returning to competition to beat the record of most wins currently held by Leo Loudenslager (Loudenslager won the title seven times in 1975, 1976, 1977, 1978, 1980, 1981, and 1982). Chambliss won in 1998, 2002, 2003, 2004, and 2005. He didn't give much hope to that scenario. "Guys in competition are good," he said. "I am not better than anyone else. If you want to be number one, you have to practice all the time. I don't have the time to practice with all the air shows and Red Bull air races I'm in." Chambliss still flies five to six air shows a year in addition to the RBAR, so he is on the road about 230 days a year. Since he is sponsored by Red Bull, he does a lot of promotional work and cross-promotions for the air races with the other sports that

The Red Bull Air Races attract a wide variety of spectators, with Generation X well represented.

H.G. Frautschy

H.G. Frautschy

Red Bull Air Race winner and EAA/IAC member Kirby Chambliss is flanked by second place finisher Paul Bonhomme (right) and the third place winner, Hannes Arch.

H.G. Frautschy

Kirby Chambliss begins a sharp left roll as he passes the first gate of the course in his Edge 540.

H.G. Frautschy

Mike Mangold rolls his Edge 540 near the finish gate.

H.G. Frautschy

Mike Goulian has an unexpected afternoon off when high winds in Detroit prevented qualification flights.

H.G. Frautschy

Sergey Rakhmanin slams into a hard right turn after making a pass through the Quad gate in his Edge 540.

are sponsored by Red Bull (motocross racing, auto racing, hang gliding, sky diving, etc.). "I do miss it, though. I really do. I love the discipline of the flying. My favorite part was hanging out with my buddies and training. I never really enjoyed the competition itself. I loved the camaraderie of it all. My goal right now is to win the RBAR series again," said Chambliss.

OVERALL IMPRESSION

I've followed Mangold's, Chambliss', and Goulian's progression in precision competition flying, air show flying, and the RBAR for nine years since my start as IAC executive director in the fall of 1999. I talked with them early on while they were flying competition about ways to possibly market the U.S. National Aerobatic Championships as a spectator sport. For numerous reasons that aspiration has never become a reality. The feeling among organizers and pilots was that the subjective judging of the sequences and the constant repetition of the flight programs by more than 100 pilots at the Nationals would never be lively enough for spectator or TV viewing. And there was also a desire by some to leave competition aerobatics an amateur sport or hobby that is achievable by many.

So I wanted to attend the Detroit RBAR firstly because I was thrilled that the race was to be flown so close to my home and that I could witness the excitement in person; secondly, I also wanted to see if the RBAR was accomplishing something the IAC couldn't—marketing aerobatics to the general populace.

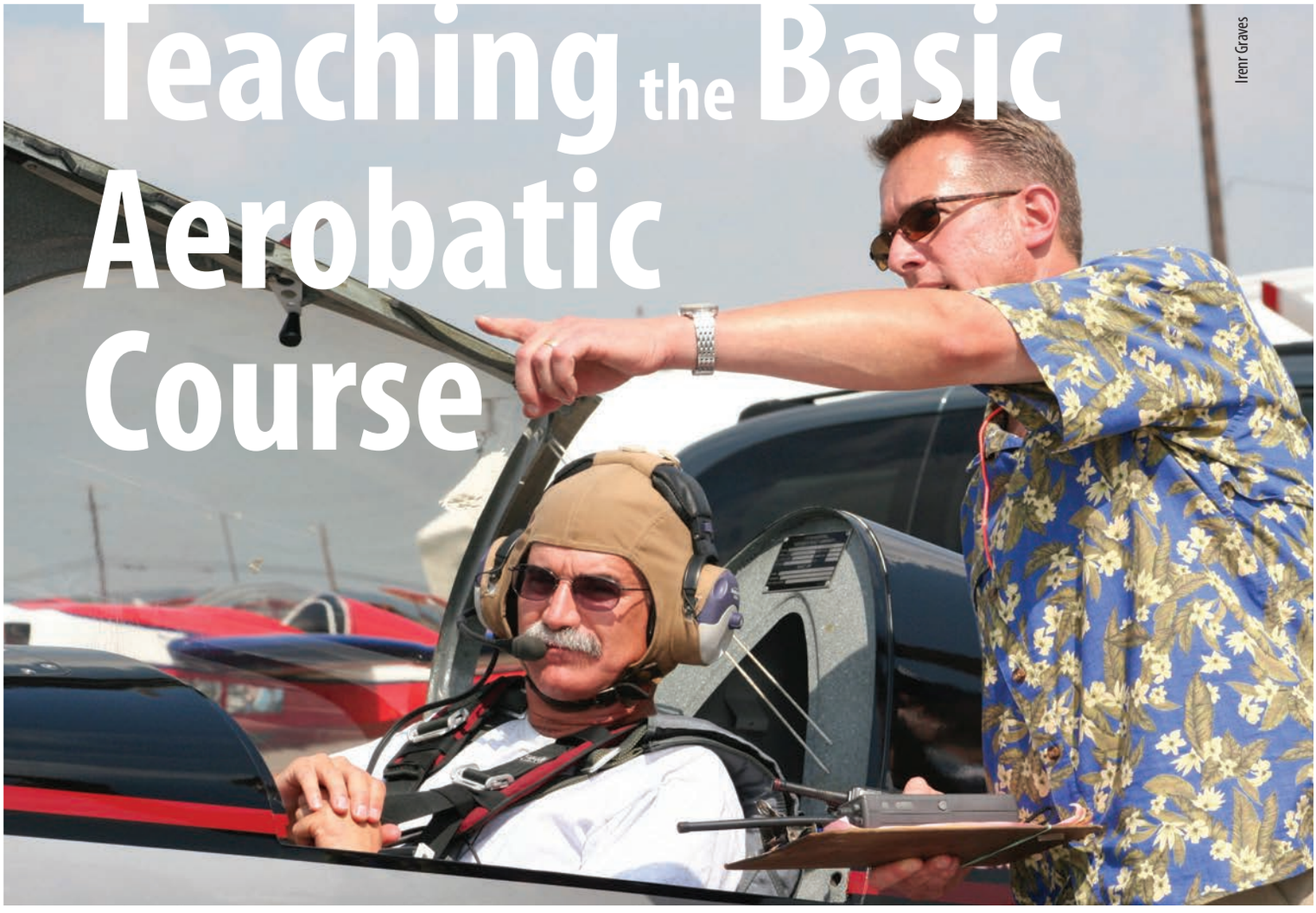
Without question I was envious of the crowds the RBAR attracted. There were 750,000 people in Detroit compared to the 25 spectators at the U.S. National Aerobatic Championships, although when we combined competition with an air show as we did in 2002, we had almost 3,000. I also was envious of the technology—the Television Steward System (TVSS), which in essence is an instant replay of the race; the state-of-the-art race control tower (the "brains" of the operation housing race officials, the TVSS, and electronics equipment to operate and monitor the race); International TV broadcasts; a web presence on YouTube and Facebook and an interactive website; in-cockpit camera footage broadcast on big screen TVs for public viewing; race announcers; and more. And, I was impressed by the logistics of it all—the setup and the dismantling and trans-Atlantic crossings on Boeing 747 planes of the RBAR's precious cargo, which includes among other things the high fliers' VIP lounge, the race control tower, the portable barges, the air gate pylons, kitchens, electronics equipment, the aircraft hangars, and of course, the planes.

And I was awestruck, as I always am, at the pilots' flying abilities. The RBAR promotes itself as "a motor sports competition based on speed, precision and skill" involving aerobatic flying and racing. While the race did an impressive job at showcasing the skills of the pilots to the general public, having been around aerobatics for some time now, I have to admit I was a little disappointed that there was more racing involved in the flying than true aerobatics.

But I do agree wholeheartedly with Chambliss' sentiments regarding the RBAR. "I think it is great for aviation. The more exposure we can give aviation to the general public, maybe people will not be as likely to call the FAA and complain about airplane noise. Hopefully the visibility aviation gets from RBAR will help."

And if the RBAR makes one more child point to the sky with excitement and think about becoming a pilot, it definitely is a good thing.

Teaching the Basic Aerobatic Course



Irenr Graves

Part Two: The first lesson

This is the second article in a continuing series on teaching a basic aerobatic course. With this article I share with those interested my personal techniques that I have developed over years of instructing. Teaching is an art and therefore very personal. These methods work well for me; however, they may not be the same ones other experienced instructors use. Nothing in this article is meant to judge the quality of other instructing styles.

GREG KOONTZ, MCFI-A

Part one of this series was devoted to the task of laying a good foundation with your student through ground instruction. I cannot emphasize enough how important that is. Never assume a student knows anything, so start every lesson with this opening: "I'll start with the basics. I mean the very beginning. I will ask questions to see what you know, then I'll use that answer to bring your thinking around to how I would like you to see it from now on. It's not that you're wrong; it's simply that aerobatic flying is a three-dimensional world, and we are going to transform your thoughts of straight-and-level flight to thinking about flight in all three dimensions."

Before we start the flying lesson, a brief note about safety. Your student is watching you even if you haven't noticed. So, do a great preflight on the aircraft, brief your student on all related emergencies and equipment, and fly high and in the proper airspace. You're a prime cut of an aviator, so don't be remembered as a hot dog!

In the first lesson, the goals of the aerobatic instructor are not what you might expect. This isn't the opportunity to show your student all the exciting maneuvers she is going to be learning, and it definitely is not the chance to prove your superior skills as an aerobatic pilot. It truly is your first shot at scaring the student away forever, so hold your guns! I tell people that if their instructor has a habit of wanting to show them his aerobatic routines, they might actually be paying for the instructor's practice! Be a professional and leave the play for airplane rides.

LESSON ONE: RELAX AND BREAK THE ICE

The first goal of lesson one is to familiarize the student with an aircraft that is likely to be a great deal different from her usual mount. Relax and give the student time to fly around and get oriented with the new aircraft. Have her operate the controls to set up straight-and-level flight. Give her some turns, but don't give her headings; instead start a good habit of looking outside by giving her places in the distance to turn to. Do some steep turns, slow flight, and very simple stalls. You want her comfortable and familiar with the plane. This should take the first 30 minutes!

The second goal of lesson one is to break the ice. The person with you likely has some anxiety about aerobatics! The first 30 minutes of familiar maneuvers generally helps, but now it's time to start gently moving to the new. In my first issue of this series we discussed the crazy-eight maneuver I use to teach orientation. This is the next part of the lesson. Choose a road and set up this S-turning series of wingovers above a nice and long reference like a road or railroad tracks. Start the maneuver by slowly describing how it will look like a skateboarder in a giant half-round pipe. Let the student take over the controls, and as you both go climbing and diving along the road, encourage her to make them bigger and bigger. Watch the student carefully to ensure she is moving her head and eyes to the reference. And, for sure, watch her carefully so that she doesn't get airsick. If she is going to be prone for motion sickness, this is going to weed it out. Be ready to cut this part short, if needed. Don't get too tied up in the accuracy of this practice maneuver. It is just an exercise to get the student doing her first "big maneuvering" with an airplane and learn good orientation. Don't spend too much time with it.

Now we're ready to talk about the first aerobatic maneuver, the aileron roll. There are many types of rolls including slow rolls, barrel rolls, snap rolls, and aileron rolls. They are distinctively different by what is happening to lift through the roll. So, for instance, when we say slow roll, we really are meaning a roll that is performed in level flight. This means that the whole time the aircraft is rolling, we are finding ways to develop enough lift to maintain a level altitude. Now that we have aircraft capable of a 400-plus degrees per second roll rate, the term "slow" might seem ludicrous, but this roll isn't required to be done quickly; it's one that requires maintaining altitude through the roll. This is in contrast to the aileron roll, a roll that disregards level flight. *[Editor's Note: The various types of rolls were comprehensively covered in the August issue in the article "A Roll Is a Roll Is a Roll" by Gordon Penner.]*

ZERO-LIFT ANGLE OF ATTACK RETURNS

Last time we spent a while discussing the zero-lift angle of attack. Now we are going to apply this angle of attack (AOA) to an actual maneuver. To keep it simple we are going to do aileron rolls on a parabolic arc. This eliminates not only the complex control movements required in the slow roll, but also the real nemesis of a roll, which is lift. Lift is the strong force produced by the wing to hold you up. Any attempt to roll an airplane will lead to

big trouble if we don't do something with lift. Tilt the wing over with some bank and lift will turn you. Bank a bit further and you really start noticing that lift isn't working against gravity any more. Roll over on your back and lift will pull you quickly and dramatically toward the ground!

So this is where we'll first experiment with zero-lift angle of attack. By pushing the stick forward until reaching this neutral AOA, we do two distinctive things: first, we neutralize all our lift, which transforms our airplane, with its sharp pointed end and light feathery end, into a giant lawn dart! Second, we find that at this AOA we also have balanced aileron drag and therefore don't need rudder to roll, hence the name aileron roll.

Now let's do this basic of all rolls in the Super Decathlon. First, like all aerobatic maneuvers, establish the correct airspeed. I like to see students in the Super Decathlon have 130 mph for this roll. After setting the correct airspeed, pull the nose briskly up a good 30 degrees to set a nice flight path for a parabolic arc. Then push the stick forward until you are weightless. Why? Because at the zero-lift AOA you are creating no lift, and when you are not creating resistance to gravity, you will not feel gravity! Don't watch the G-meter; look straight ahead and use you butt-meter. Push the stick forward until you are floating, and then, while keeping the elevator portion of your stick right there, move the stick ALL the way to the left.

Then freeze. If you have set the controls right, you now have full ailerons to roll the airplane at the zero-lift AOA, so there is no turning or diving. You are simply floating through an arc while the ailerons create the roll. And what did you do with the rudder? Nothing. There was no aileron drag, so you never moved the rudder. When the horizon comes back to level, return the stick to neutral and then pull the nose back up a bit (because by the end of the roll the arc has got you pointing a bit down).

THE "KOONTZ" AILERON ROLL AS A TEACHING TOOL

The aileron roll is not used in competition, so it is often described inconsistently. If it's not used in competition, then why are we learning it? We want the student to explore the zero-lift AOA and practice finding it. We want him to see the nose yaw from aileron drag and learn to use his butt-meter to find 0G.

Moving the stick to the side of the airplane to roll presents a challenge to maintain the zero-lift AOA. The student should make almost an L-shape with the stick. It will take a bit of coordination to move the stick to the left or right without changing the elevator position. This is where you will emphasis the butt-meter. One way to tell if the roll is being performed correctly is to "float" in the seat throughout the process. Another way to check if the ailerons were applied while maintaining zero lift is watching the nose. The nose should appear to lift up during the maneuver, and then as the stick moves forward and over to one side, the nose should appear to drop straight down as the airplane flies the arc. Some orbiting of the nose might be apparent, depending on the height of your student. That's because if he is sitting higher that the nose, the airplane is actually rolling around the center of the wing, causing a small orbit of the nose and the pilot's head during the roll. The nose should point straight ahead throughout the roll and should end on a point. Any yawing off heading is being caused by aileron drag and lift, which indicates an incorrect AOA! Don't correct any yaw with rudder. Correct it by returning to the right AOA. When you are there, the lawn dart will straighten itself out!

The aileron roll is a constant study of the relationship between aileron drag and angle of attack. As we have seen, ailerons create adverse yaw if applied while creating lift and a balanced drag only at the zero-lift AOA. Take time to clarify this, and let your student see it in action.

He will then have a chance to nail this concept down and be able to use the information with less confusion later.

By teaching the aileron roll in this first lesson you have given your student an easy way to break into aerobatic flight. Do as many with him as you can. If he is doing well, do them to the right. If the "which way does aileron drag pull the nose?" question is still confusing him, then wait to do rolls to the right until the student understands the answer. You have also given him a simple tool to use to get out of many kinds of situations. In most out-of-control or aircraft-upset situations this is the best move. Remembering to do the simple L-shape with the stick may prevent the disastrous split-S by rolling the aircraft right-side-up instead. I call it the lawn dart recovery. Move it all to neutral and then roll to level. I have never been able to throw a lawn dart and make it tumble!

Basic air work, crazy-eights, and aileron rolls; this is the complete first lesson. If done at a comfortable pace, it should take nearly an hour of flying. On the ground, get the model plane and briefly go over what you did in the air with some emphasis on areas where you noticed some confusion.

In the next article, we examine lesson two of this four-flight basic aerobatic course. We'll do some refinements to the aileron roll and introduce loops. Until then, if you have any questions about aerobatic instruction or have some good ideas to share please, write to *greg@gkairshows.com*. We're always learning.

Greg Koontz is a NAFI Master Certificated Flight Instructor-Aerobatic and has been teaching basic aerobatic courses since 1974. He is a full-time aerobatic professional sponsored by American Champion Aircraft flying shows in his Super Decathlon, is an aerobatic competency evaluator (ACE), and is a member if the International Council of Air Shows' ACE Committee. Greg is a member of the National Association of Flight Instructors (NAFI) and actively supports its efforts to raise the standards for aerobatic instructors.

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I07764 Navy **L** (10 remaining)
I07765 Navy **XL** (11 remaining)
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Men's White

I07757 White **S** (5 remaining)
I07758 White **M** (1 remaining)
I07759 White **L** (3 remaining)
I07760 White **XL** (2 remaining)
I07761 White **XXL** (4 remaining)

Ladies Frost Blue

I07767 Frost Blue **S** (4 remaining)
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I05967 Red **S** (11 remaining)
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I05952 Navy **S** (1 remaining)
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I05955 Navy **XL** (3 remaining)
I05956 Navy **2X** (6 remaining)

Red
I05958 Red **M** (2 remaining)
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Ladies' Moisture Management Advantage Dry Golf Shirt

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I09422 Isle **L** (2 remaining)
I09423 Isle **XL** (2 remaining)
I09424 Isle **XXL** (2 remaining)

Canyon/White
I09426 Canyon **M** (1 remaining)
I09427 Canyon **L** (4 remaining)
I09428 Canyon **XL** (6 remaining)
I09429 Canyon **XXL** (3 remaining)

The Day the Wing FELL OFF

[A triumph of cockpit resource management]

By Mike Reilly

Sport Aerobatics Revisited: This truly amazing story first appeared in the September 1972 issue and has been edited for length.

Neil Williams was a right-stuff pilot—100 percent black in the get-the-job-done sector of the personality dartboard. To accompany his hobby as a military experimental test pilot he really dug deep into contest aerobatics, and it was his no-limits determination that dragged our national involvement from Sportsman to respectable world aerobatic competition within a very few years. Of course, several things got broken on the way. The wing of a second Zlin was not the first by any means, but it was the most famous.

It fell off in 1970 while practicing for the World Aerobatic Championships. The newsworthy story is well enough known, a masterpiece of incomprehension. You know the sort of things: "While flying his Zlin Akrobat plane, top pilot Neil Williams noticed that his wing was folding and decided to fly upside down until he was ready to land. Williams was unhurt."

The reality was much hairier than the reading. And I have his own report here: "…height of 1,000 feet and pulling 5G, there was a loud bang accompanied by a severe jolt and the aircraft started to roll to the left. A visual check was made on the airframe and it was seen that the left wing was folding steadily upwards. The roll to the left persisted, in spite of full right aileron, and the aircraft started turning left with the nose dropping. Full right rudder was applied, but although a high degree of sideslip was achieved, the roll to the left continued and the wing continued to fold upwards. Power was varied from idle to full power with no effect. At about 300 feet the aircraft was banked vertically to the left and control was about to be lost."

That is exactly as it looked from the outside. At this point I observed to myself that he would be dead in five seconds, behind the houses across the airfield. It looked hopeless.

He continued, "Aileron was therefore reversed and negative G applied as the nose dropped. As the aircraft became inverted, the wing snapped back into its correct position with a loud bang. It was found that the aircraft could be flown quite normally in inverted flight…."

The snapping into position with a loud bang was a scary moment (for us). The bottom wing bolt (or something adjacent) had obviously failed, and conscious of the nature of the Zlin's top spar attachment (a vertical not horizontal taper pin), we were also aware that the wing, in folding, was progressively bending the structure—when would it break? When it snapped back into its original position and stopped with brick wall abruptness, with a few negative Gs behind it (at about 150 feet), my mind's eye saw it come off, before words could form. It didn't, and he climbed away leaving us stunned. "If he bends it again, it will come off," I thought. "What can he do?" It was a cruelly ironic prospect that, having just avoided death by a few seconds, he would meet it again in a few minutes. I knew he would think of something, but I could not think what it was.

"He's got eight minutes of inverted fuel," said captain Carl Schofield, creditably taking charge and pressing all the emergency buttons in the control tower. Up in the air things were desperate; Williams talked about it afterward.

At this point I observed to myself that he would be dead in five seconds....

"As soon as I rolled inverted the engine stopped. I had turned the fuel off when I thought I was going to crash. I switched it on again and climbed away, forcing my knees against the side of the cockpit to stop my legs from shaking. 'Idiot! Think, damn you! Think!' I told myself. My first decision was to climb as high as possible until the collector [header] tank ran out, so as to give myself the full eight minutes of life I had left." Chilling, isn't it?

The return to life started with a roll to the left, inverted to inverted—the first quarter slow, then a fast, negative barrel. As I saw him start I thought, "If he tries that, the wing will come off." It looked like an attempt to prove that the last few minutes had been an awful dream—"This can't be real; if I roll back upright, everything will be normal."

The actual report is more test-pilot-like: "... to 1,000 feet where experiments were carried out to determine whether the aircraft could be rolled out to normal flight and, if so, to establish the optimum direction. A rollout to the left was attempted, but the wing started to fold, so inverted flight was quickly re-established."

Afterward he told me, "It was very difficult to make a decision as to which way I should roll when I got to the crash landing." As it happened he rolled right, the Zlin pilot's contest direction. You know the story anyway; inverted circuit and approach to half wingspan plus 6 inches (we checked the marks in the long grass), then a half-roll and thump into the ground as the wing folded again, sliding along with divots and bits of aeroplane flying into the air, including a last vertical waving of the left wing. It was the right way up—amazing. Nothing happened for a few, fate-laden seconds, then Williams exploded out of the jammed cockpit canopy, ran 20 yards, and collapsed on the June grass, powerless with relief,

obviously unharmed—unbelievable. I stood in a state of shock, transfixed by the high melodrama of it all. I had never thought of the answer.

The test pilot report mentioned that when it was obvious that there was no fire, he returned to the aircraft to make the switches safe, and added that the emergency services (on the scene very quickly indeed) were fortunately not required. "I was not injured," he concluded. I don't think he remembers what actually happened next, but it was quality Keystone Cops.

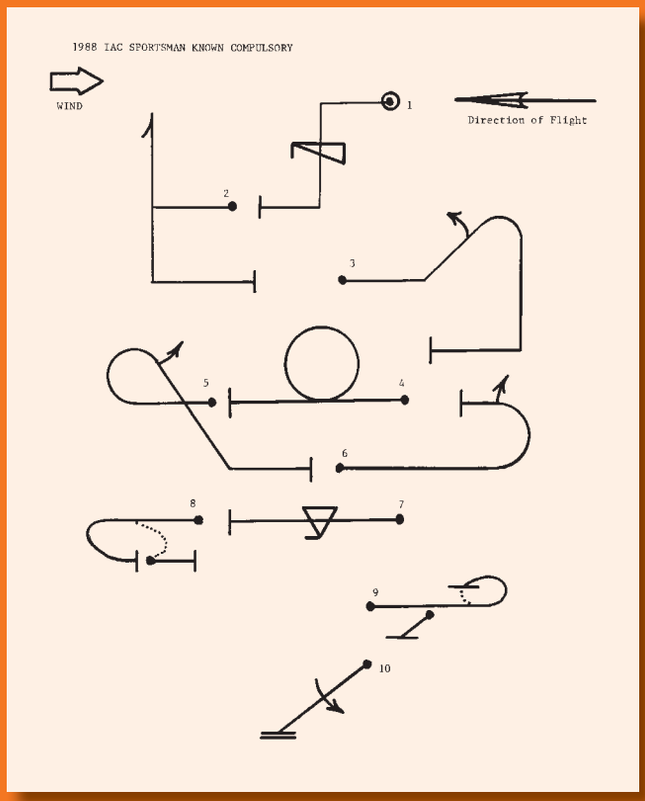
The ambulance men, galvanized by having witnesses a rare but real crash, grabbed Williams off the grass, threw him into the back of the wagon, slammed the doors, and roared away toward their antiseptic lair, vanishing from sight and sound between the hangars. For a few moments, time stood still; nobody moved or spoke; and except for the skylarks there was silence. Within a minute the projector started to run backward, the ambulance reappeared from the camp, and roared back to the wreckage, skidding to a halt as Williams jumped back out. A victory of the individual over the system. Twenty-two years later you could almost persuade me that I imagined it, but I was there.

Did he roll the best way? Left would enable the left wing to carry more down load for longer during the roll, perhaps? Does it matter? Who would dispute that these were difficult conditions? He proved that it was possible, and got away with it. "Oh, and what about the parachute?" you ask. We didn't believe in them then. Waste of weight—too low to jump anyway, see. His report included this thought: "... Had a parachute been carried, the aircraft would most definitely have been abandoned at this point."

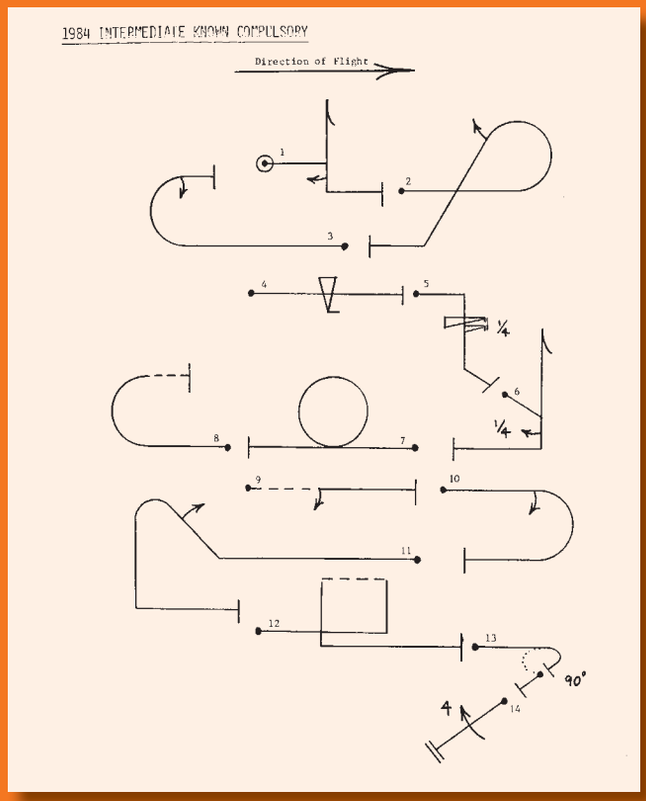
Editor's Note: Though not immediately clear from this article, the main spar in the Zlin had failed at a connection point. Eight years later, in 1978, Neil Williams was killed when ferrying an old military bomber to Spain. Williams was a 12-time British aerobatic champion. His book, *Aerobatics,* written in 1975, remains a popular instructional book today.

a blast from the past

Un-archived sequences from previous years in each category for your enjoyment.



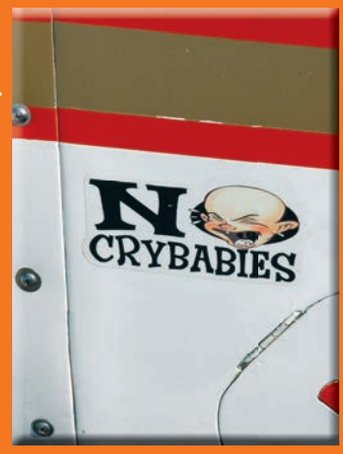
1988 Sportsman Known



1984 Intermediate Known

Since this issue will arrive just before the U.S. Nationals, I've also added a few photos from previous Nationals that should provide a bit of humor to those who know the joys and stresses of competition. -Vicki Cruse

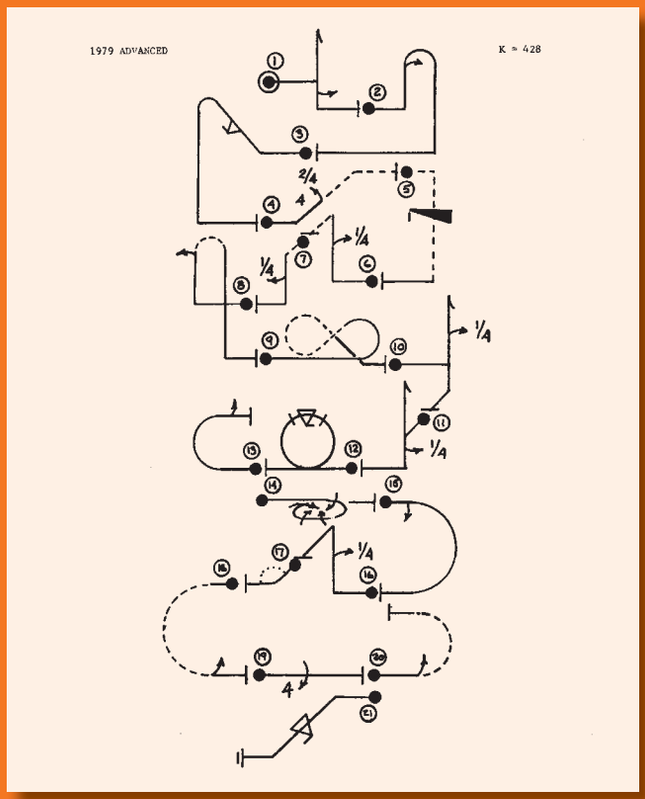
Irene Graves



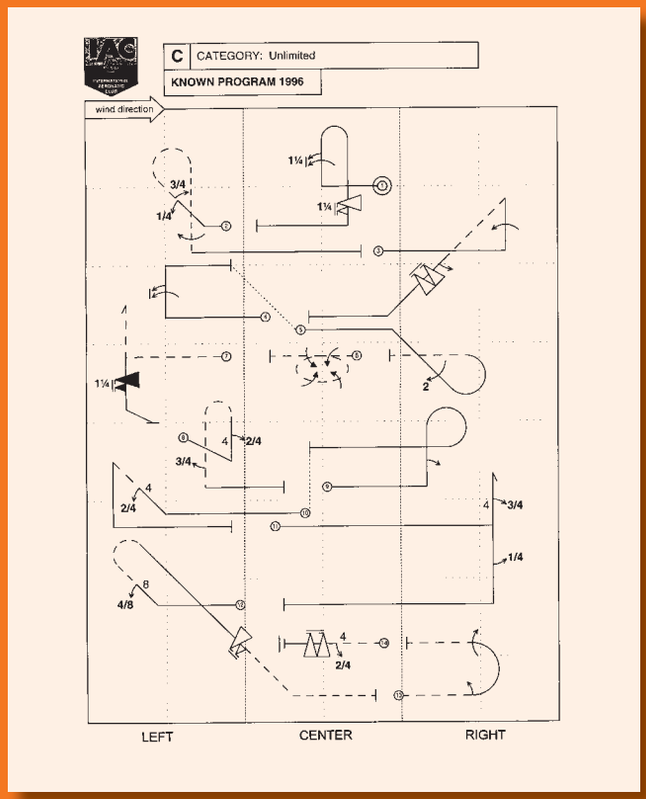
Clay Smith

Clay Smith

Sequences as they used to be, and a little Nationals humor



1979 Advanced Known



1996 Unlimited Known

Before . . .

Clay Smith

. . . and After.

Photo doctored by Pedro

TECHNICAL ADVISOR

by Vicki Cruse

This month's column features two pieces that are both interesting and informative. Dave Watson describes an airplane that wasn't quite as expected, and Jeff Granger discusses propeller balancing.

You Can't Judge a Book by Its Cover

By Dave Watson

In the past I've written of my aircraft mechanical failures in an attempt to bring better attention to the pitfalls that unfortunately have befallen me. In 2003, I created numerous failures in the wings of my Decathlon from doing snaps while competing with it in Intermediate. In February 2008, I reported on the wrist pin failure that I had in my AEIO-360 (also in the Decathlon). So those familiar with my name and seeing it on the technical adviser again, you may be asking yourself, What has Dave done to his plane now? Well, to make a long story short, I pulled the wings off another plane, and once again the problem that got me could get you, too. The failure is from ignorance, not from abuse. The lessons learned are more from the story of the events leading up to the failure rather than in the failure itself. Here are the details:

I purchased a beautiful 1989 S-2B in December 2006. The previous owner was a good friend, and I knew the plane well (so I assumed). I agreed to buy the plane over the phone, having not seen it for more than two years (I had moved to the West Coast, and the plane was back in New England). The previous annual had been conducted by another friend of mine, and if it looked good to him, it was good for me. The one proviso my mechanic friend gave me was that he did not have a punch tester to check the fabric, but it had been tested just a few years prior and was within limits. Having seen this plane numerous times, I blew off the fabric test, as it was visually in perfect condition. Big mistake numero uno!

The plane then spent the majority of the next year hangared in Massachusetts (to avoid California sales tax), and I flew one contest with it in New England that year. After its obligatory 365 days outside of California airspace, it arrived in perfect condition; the fabric and paint still looked like the "hangar queen" that she had been for the past 18 years. Within the first three months, I flew her in Advanced at two contests. It was at the second contest where my series of mistakes added up to an eye-opening event.

Eric Ostrom

What a beautiful airplane!

This plane looks pretty good to me!

"It was at the second contest where my series of mistakes added up to an eye-opening event."

I had just finished the Advanced Unknown that started with an inverted 90-degree turn into a push to hammer with a three-quarter roll up. As it was a hot summer day, I knew I would need all the smash I could muster from my biplane to get cleanly through that vertical roll. I stormed into the box at V_{NE}- never exceed speed, quickly rolled inverted, performed three quick wing-wags, rolled to 75 degrees and smashed the stick forward, rolled out, counted to two, and once again smashed the stick forward for the push hammer. I was halfway through the vertical roll when my lights went dim. Although I didn't exceed the plane's negative G rating, I did bring on those Gs violently, not smoothly. Although the inverted turn scored fantastically, this was big mistake number two. I finished the sequence, landed, and quickly readied myself and the plane for a friend's impending Intermediate Unknown (I was the safety pilot for his flight in my plane).

After a *cursory* (big mistake number three) preflight check, we jumped in and it was his turn in the box. During his second maneuver, an Immelmann, I thought I caught a glimpse of blue and yellow out of the corner of my eye just as he rolled from inverted to upright at the top of the half-loop. I quickly started scanning the plane for evidence of anything wrong. As my friend continued through his sequence, I continued to scan the plane and the volume of the air within the box for anything to confirm what I thought I saw. I never did see anything wrong with the plane and never saw the flash of color again. Since my buddy was zipping through the sequence as if nothing was wrong, I assumed we had shed one of the little round inspection plates during his pull into the Immelmann. Stupid mistake number four.

After he finished flying the sequence, I broke radio silence and told him, "We need to look the plane

over after we land; I think we lost an inspection cover." The inspection didn't take long. As soon as the canopy opened and I stood to get out, my heart stopped. Two rib bays worth of fabric from the leading edge to the aileron was missing from the top of the top wing. How could this plane still fly, nevertheless complete at least seven Intermediate figures (with no noticeable change in flight characteristics) in this condition? You can only imagine the attention we got on the ramp.

After a not-so-close inspection by a highly experienced fabric repairman, I was told my plane was covered in cotton. "COTTON! What the hell—how could that be?" Here's where the story really starts. Turns out, previously unbeknownst to me, Christen Industries covered many planes in the late 1980s with cotton, presumably because they were having difficulties getting good adhesions and laminations with the polyester. So for many planes they reverted to good old 1920s technology—cotton. After acquisition of Christen Industries, Aviat determined this and contacted all the owners of those planes and offered a low-cost re-covering in polyester at the factory (unfortunately, this offer expired in the early 1990s). Few owners took them up on the offer, and many continued to fly with the cotton, probably assuming they wouldn't own the plane in 20 years anyway, so why fix what ain't broken?

"I thought I caught a glimpse of blue and yellow out of the corner of my eye."

After the incident, I carefully went through the logs and service records, and I couldn't find the word "cotton" anywhere. Once again, it's the little things that add up. The first entry in my aircraft log is that these are "replacement logs—the originals were stolen." Perhaps the original logs mentioned cotton, but even if they had, I still would have purchased the plane. The amazing thing is that this cotton bird did not have a single crack, scratch, or otherwise imperfection in the fabric. The aluminum side panels had oxidized more heavily and looked worse than the fabric, so how could there be anything wrong? A bad assumption of mine was that I could judge this book by her cover. Not so, as I have now found out. The dope actually adheres and ages better on cotton than it does on polyester. But, as it turns out, the cotton under the paint is free to degrade like that old Grateful Dead T-shirt in your closet.

After considering all my options, the plane was taken to the factory and the remaining fabric tested out at 25 pounds' punch force. Well below *half* the minimum allowable.

Eric Ostrom

The finished product, definitely better than new.

Something appears to be missing here. Good thing this was just the "training wing."

The plane is now fully restored and once again looks factory new. My learning points from this experience:

Don't take your good-looking fabric for granted. Even polyester can fail when subjected to the forces we apply to it when we do extreme maneuvers. Do your fabric tests as required/recommended (more frequently as your plane ages).

Although the time considerations of contests might rush you during preflight preparations, don't rush it. I am certain that I must have initiated some failure of the fabric in my Advanced routine, but because I didn't have time to grab a ladder and check the top of the wing closely, I'll never really know. I do know that the Immelmann was not what caused that fabric to fail.

If you think something is wrong, it probably is. I know I saw something falling to the ground, so why did I assume the best when lives were at stake?

If you are on a judging line and you see a piece of a plane come off, please mention it to the chief judge (one of the boundary judges later mentioned that they saw something falling to the ground). My buddy had taken a break in his routine; if the chief judge had mentioned seeing something, it would have tipped me to land the plane immediately.

Most importantly, if you have an originally covered late 1980s Christen Industries aircraft, check your logs and/or look at the back of your fabric. If it's yellow and smells funny (like that Grateful Dead T-shirt you're afraid to wash for fear it will fall apart), it's cotton. Aviat is fairly certain that mine was *not* the last of the flying Christen cotton birds of the 1980s. If you have cotton coverings, have them tested immediately and be prepared for substantial re-covering bills. The cotton under that beautiful paint/dope is probably long past its life expectancy.

In closing, I can't thank Danny Adams at Aviat enough for the sensational service and spectacular re-covering job performed on the plane. Fly safely.

Dynamic Propeller Balancing

By Jeff Granger

As I have moved from the Skybolt to the Extra 200 and now to the Extra 300L, the engine propeller combinations have become smoother and lighter with respect to gyroscopic forces. The two-blade metal Hartzell propeller on the Skybolt resulted in a lot of yaw from gyroscopic precession, especially on low-speed, high-pitch-change maneuvers like the push humpty bump. It was loud and there was a lot of vibration.

The transition into the Extra 200 was delightful. It was quieter and smoother, and the gyroscopic forces were less with the three-blade composite MT propeller. I never did consider having the propeller balanced on this airplane.

When I purchased the Extra 300L last spring, I was most impressed not only with the power and interior room, but also with the "turbine smoothness" of the six-cylinder Lycoming IO-540 and the four-blade MT propeller combination. Gyroscopic forces were even less than in the Extra 200. Almost no forward stick is required during a hammerhead, for instance. When I bought the plane, I was aware that there was an airworthiness directive for crankshaft replacement and budgeted to have that done over the first winter.

My mechanic, Rich Packer, sent the propeller to Tiffin Air for overhaul and the engine to Barrett Precision Engines. All went smoothly except for some minor internal engine corrosion that was repairable. The plane had been in Florida all its life and had only 250 hours put on it over eight years. This proves the old adage that "You can take the plane out of Florida, but you can't take Florida out of the plane" and that engines remain healthy when flown frequently.

The plane was out of my hands for almost six months, so when I started flying again it was hard to compare the vibration levels before and after. However, Rich recommends that a dynamic propeller balancing be done after any engine overhaul. This requires taking it over to Muncie Aviation (a good flight away). I already had my hands full trying to get back to basic aerobatic proficiency, and as a result, I think I gradually got used to the increased vibration level.

So, why get the prop balanced? The average airplane that has not had the propeller dynamically balanced will generally have a vibration level of about 0.450 inches per second, due to propeller/crankshaft mass imbalance. This level is more than four times higher than what is considered to be an acceptable vibration level for propellers and causes a significantly higher level of wear and fatigue on engine components. During the balancing process, an electronic balancer is used to measure the vibration produced by the engine. Small trim balance weights are added to the propeller/crankshaft assembly to correct for errors in mass distribution and to reduce engine vibration due to mass imbalance to the lowest

The four-blade MT propeller on Jeff's Extra 300L.

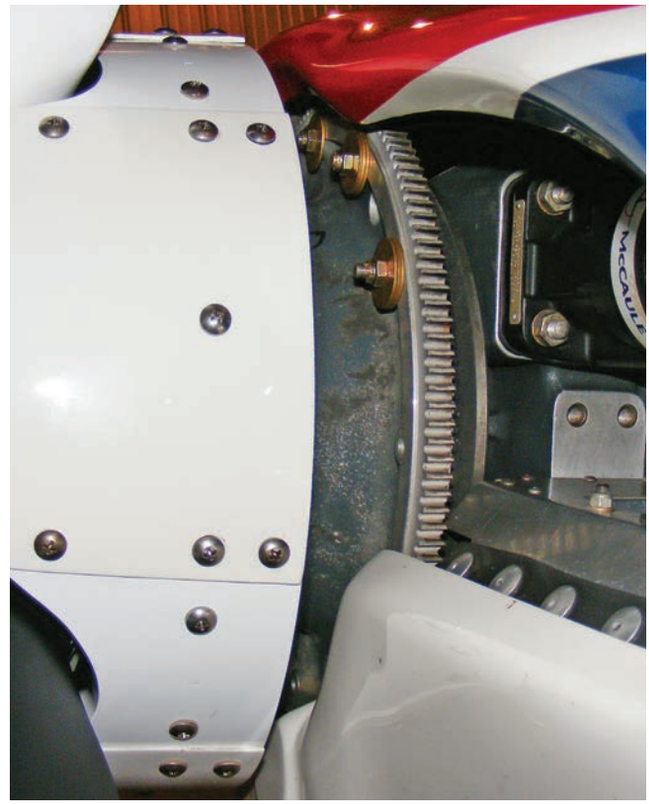
level practical. Besides preserving the engine and engine mounts, it makes for a much more pleasant ride for the pilot and passengers.

The top cowl was removed and the digital accelerometer was bolted to the top of the engine case. A reflective tape was put on the back of one blade and an electric eye on the cowl just to the rear of the prop. A series of engine run-ups was completed to nearly full rpm with the mechanic in the front seat with the handheld computer to measure the force and angle. After each run, a bolt-and-washer set was added to the starter ring gear, which has holes every 30 degrees just for that purpose.

I noticed a big improvement even after the first set of weights was added and thought we were nearly done, but the mechanic just laughed and said, "This engine is still off balance more than most are when they first come in with the owner complaining of unacceptable vibration." At each subsequent run the weights got smaller and the powerplant smoother till it was back to the soft buzz I remembered from last year. Along with active noise reduction headsets, it now makes for very pleasant cross-country flying and a little peace of mind.

The whole process took an hour and a half and was $350, though it may vary in your area. I thought this was very reasonable, considering it won't have to be done again until the engine is overhauled.

Dynamic propeller balancing information referenced from *http://www.DSSMicro.com/faqs/fqprpbl.htm*.



Detail of the starter ring gear with the added bolts.

Courtesy MSW Aviation

CALENDAR

APPLE TURNOVER (Northwest)
Friday, September 5 - Saturday, September 6, 2008
Practice/Registration: Wednesday, September 3 - Thursday, September 4
Rain/Weather: Sunday, September 7
Power: Primary through Unlimited
Location: Ephrata Municipal Airport (EPH): Ephrata, Washington
Contest Director: John Smutny
Phone: 206-248-2650; E-Mail: ***johnsmutny@yahoo.***com
Website: ***www.Appletover.org***

HAROLD NEUMANN BARNSTORMER (South Central)
Friday, September 5 - Saturday, September 6, 2008
Practice/Registration: Thursday, September 4
Rain/Weather: Sunday, September 7
Power: Primary through Unlimited
Location: New Century AirCenter (IXD): Olathe, Kansas
Contest Director: Paul Thomson
Phone: 913-638-6221; E-Mail: ***info@iac15.org***
Website: ***www.iac15.org***

EAST COAST AEROBATIC CONTEST (Northeast)
Friday, September 5 - Sunday, September 7, 2008
Practice/Registration: Friday, September 5
Power: Primary through Unlimited
Location: Warrenton-Fauquier Airport (KHWY): Warrenton, Virginia
Contest Director: Scott Francis
Phone: 703-618-4132; E-Mail: ***s.francis@ieee.org***

ILLINOIS STATE AEROBATIC CHAMPIONSHIP (Mid-America)
Saturday, September 6 - Sunday, September 7, 2008
Practice/Registration: Friday, September 5
Power: Primary through Unlimited
Location: Greater Kankakee Airport (IKK): Kankakee, Illinois
Contest Director: Jim Klick
Phone: 815-609-7165; E-Mail: ***jimklick@sbcglobal.net***
Website: ***www.iacchapter1.com***

U.S. NATIONAL AEROBATIC CHAMPIONSHIPS (US Nationals)
Sunday, September 21 - Friday, September 26, 2008
Practice/Registration: Saturday, September 20 - Sunday, September 21
Rain/Weather: Saturday, September 27
Glider Categories: Sportsman through Unlimited
Power: Primary through Unlimited
Location: Grayson County Airport (GYI): Sherman, Texas
Contest Directors: Director Doug Bartlett and Assistant Director Erica Hoagland
E-Mail: ***iac@eaa.org***
Website: ***www.USNationalAerobatics.org/USN2008/home.html***

ROCKY MOUNTAIN INVITATIONAL (South Central)
Saturday, October 4 - Sunday, October 5, 2008
Practice/Registration: Friday, October 3
Gliders Categories: Sportsman Intermediate
Power: Primary through Unlimited
Location: Lamar Municipal Airport (KLAA): Lamar, Colorado
Contest Director: Jamie S. Treat
Phone: 303-648-0130; E-Mail: ***JamieTreat@q.com***
Website: ***www.iac5.org***

REBEL REGIONAL AEROBATIC CONTEST (Southeast)
Saturday, October 11 - Sunday, October 12, 2008
Practice/Registration: Friday, October 10
Rain/Weather: Monday, October 13
Power: Primary through Unlimited
Location: Everett-Stewart Regional (KUCY): Union City, Tennessee
Contest Director: Mike Rinker
Phone: 731-885-3701 or 731-796-0849

2008 MASON-DIXON CLASH (Northeast)
Friday, October 17 - Sunday, October 19, 2008
Practice/Registration: Thursday, October 16 - Friday, October 17
Power: Primary through Unlimited
Location: Farmville Regional Airport (KFVX): Farmville, VA USA
Contest Director: Chris Rudd
Phone: 850-766-3756; E-Mail: ***akrudd@gmail.com***
Website: ***www.iac19.org***

BORREGO AKROFEST (Southwest)
Friday, October 17 - Saturday, October 18, 2008
Practice/Registration: Thursday, October 16
Rain/Weather: Sunday, October 19
Power: Primary through Unlimited
Location: Borrego Springs (L08): Borrego Springs, CA USA
Contest Director: Joshua Muncie
Phone: 562-688-1466; E-Mail: ***jlmuncie@yahoo.com***
Website: ***www.iac36.org***

For the most complete and up-to-date contest listings, visit *www.IAC.org.* If your chapter is hosting an event, be sure to let the world know by posting it there.

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Christen Eagle I – ***http://www.trade-a-plane.com/specs?clsfdnum=745551; http://.iac.org/featured/Featured%20article%20-%20Vol.33,%20No.02%20February%202004.pdf;*** **662-429-9009.**

MISCELLANEOUS

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meet a member

Robert Bismuth

Name: Barb Higbee

City, State: Freeland, Washington

Occupation: Flight Attendant

Family: Three boys: Jimmy, 14; Jake, 10; Jonathon, 7

Pilot Certificates: Commercial

Aircraft flown: In contests years ago I flew a Pitts S-1C and a G-200. I have flown the Wolf Pitts in contests this year. I have also flown a Pitts S-2A, -B, and -C, Christen Eagle, all kinds of Cessnas, J-3 and Super Cubs, Husky, Howard DGA, C-185 on floats. I have a little time in an Extra 300 and Sukhoi 29 as well.

What experience drew you to flying? My dad always had a love for flying when I was growing up. When I was in high school my sister, brother, and dad all became very involved at our local airport in Issaquah, Washington, flying gliders. My mom also volunteered there every weekend. Dad also had a share in a Great Lakes. Every night at the dinner table they talked about flying, and I knew nothing about it. I was extremely afraid to fly and wanted nothing to do with it. I had been on an airliner in the past that had a problem on takeoff, and I hadn't gotten over the fear. I finally became tired of being the "odd man out" in my family and went for a glider ride. I fell in love with flying from that moment on.

What was your first experience with aerobatics? My dad had a Great Lakes when I started flying gliders, and he took me up. I remember loving the feeling of being upside down! We also had several family friends that had aerobatic airplanes who gave me rides.

What originally got you into competition? It was a natural progression. I volunteered for years at contests my dad flew in, and when we bought our Pitts together it wasn't even a question.

You left competition for 14 years to raise your kids. What motivated you to come back? I had always told myself that when my youngest was in school full time I would start flying again. My final motivation to start again was when a girlfriend asked me, "If you could do anything again that you've done before or take up something new, what would it be?" My answer was, without question, to fly aerobatics! I didn't even have to think twice about it.

Tell me about your airplane. It's called the Wolf Pitts. It is a very special, one-of-a-kind airplane built by Steve Wolf, who has built airplanes for some of the best-known air show pilots. He has been doing innovative things with the Pitts design for years.

When he built the Wolf Pitts, he put all the innovations and experience into a single airplane. The cowl, landing gear, wings, fuselage, cockpit dimensions, and tail surfaces all have Steve's design in them. He also used a lot of carbon fiber and titanium, which is unusual in a Pitts. Most people that see the airplane fly are amazed by the speed, roll rate, and vertical penetration. I love flying it. It is very responsive, light on the controls, and a complete barrel of fun!

What is your favorite part of a contest? When we're all standing around challenging and joking with each other to "move up," as well as giving each other advice and talking about each other's airplanes. The flying really is my highlight, but it wouldn't be the same without the great group of people that comes with it!

Tell me a person or people you admire in the sport. There are so many amazing pilots in all kinds of airplanes and categories. I wouldn't know where to start. Who's not to admire? My dad has been a big part of the sport in the northwest for a long time, and without him I would not have had this great opportunity.

Where would you like to see yourself going in the sport? I would like to fly Unlimited someday!

What food would you most wish to see served at a contest banquet? Lots of dessert, especially chocolate!

mazda LINCOLN Ford MERCURY VOLVO

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