JUNE 2007

Sport Aerobatics

OFFICIAL MAGAZINE OF THE INTERNATIONAL AEROBATIC CLUB

The MX2:
"A two-place hot rod"

- Operating Limitations Review
- Mastering the Aileron Roll
- Sun 'n Fun 2007 Recap

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— Perry Bradley, *Aviation International News*

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Gary Ward turns heads in his one-of-a-kind MX2 at Sun 'n Fun 2007.

– Photo by Jim Koepnick

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Judson Bartlett

LETTER from the EDITOR

by Scott Westover

Flying in Living Color

Putting this issue of *Sport Aerobatics* together felt particularly good. It reminded me of bolting the spinner back on after an extended maintenance session—satisfying and full of the promise of future flights. This month marks our growth into a full-color magazine. The IAC board decision to fund this evolution, I believe, is based on three things. First, it is support for the magazine becoming increasingly member-focused. Second, it recognizes the amount of work our member-contributors put into their articles. Third, investing in *Sport Aerobatics* tells me that people have noticed the incredible talent of the people who work behind the scenes on this monthly opus.

Over the last several months you have seen covers that have featured both well-known national icons and lesser-known local stars. You have received instruction from some of the most respected pilots in our sport. Hopefully, you have noticed a deliberate balance between competition content and recreational reading. The focus is on the thing shared by all IAC members: the passion for flight. What you do with that passion is less important than having it and keeping it strong.

The best place to find those passionate, meaningful stories is from the people who live them. I love working with members to get their stories on paper. The amount of work that people put into their contributions is humbling. The result reflects diverse experiences and individual voices. At the same time, all of the articles are related in some way to make the magazine flow. That is only possible because of the work our member authors do each month. And starting this month, those stories will be told in living color.

If you look at the masthead on page 2 of any issue, you will see a list of names. All of these people work together to give birth to these pages every month. I would like to recognize two of them in particular for their incredible contributions that have helped earn the confidence of the board and the thanks of the editor.

Colleen Walsh is our copy editor. Colleen helps everyone who contributes to *Sport Aerobatics* to sound professional by following IAC guidelines, making sure our grammar is worthy of our collective diplomas and ensuring the point of the story is never lost in jargon and hangar tales. Somehow she does this without stripping the individual voices from the articles, and the result is exceptionally strong finished pieces that reflect the different personalities of the people who wrote them.

Then there is Phil Norton. Phil is our art director, and he is nothing short of a guru. Each month Phil takes time to really think about maximizing the value of the magazine for our members. He studies each photograph and creates a design that will help tell the story—not overpower it or distract readers from the message. His work makes us stronger every month, and I am excited to see him have full color in his design tool chest.

I hope you enjoy this issue of *Sport Aerobatics*, and that you will continue to allow us to share your stories and thoughts with others through this magazine. Maybe by this time next year we will have so much content that we'll have to add more pages. Now that is a problem worth looking forward to!

***Sport Aerobatics* is your magazine. To submit news, comments, articles, or article ideas, please send them to: IAC, P.O. Box 3086, Oshkosh, WI 54903-3086; or email them to *tookyflyer@tds.net*.**

SPORT Aerobatics
OFFICIAL MAGAZINE OF THE INTERNATIONAL AEROBATIC CLUB

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Mailing: Change of address, lost or damaged magazines, back issues.
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The International Aerobatic Club is a division of the EAA.

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SPORT AEROBATICS (USPS 953-560) is owned by the International Aerobatic Club, Inc., and is published monthly at EAA Aviation Center, Editorial Department, P.O. Box 3086, Oshkosh, WI 54903-3086. Periodical Postage is paid at Oshkosh Post Office, Oshkosh, Wisconsin 54901 and other post offices. Membership rate for the International Aerobatic Club, Inc., is $45.00 per 12-month period of which $18.00 is for the subscription to *SPORT AEROBATICS*.
Manuscripts submitted for publication become the property of the International Aerobatic Club, Inc. Photographs will be returned upon request of the author. High resolution images are requested to assure the best quality reproduction. **POSTMASTER:** Send address changes to *SPORT AEROBATICS*, P.O. Box 3086, Oshkosh, WI 54903-3086. PM 40032445 Return undeliverable Canadian addresses to World Distribution Services, Station A, P.O. Box 54, Windsor, ON N9A 6J5, e-mail: *cpcreturns@wdsmail.com*.

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PRESIDENT'S PAGE

by Vicki Cruse • IAC 22968
E-mail: vcruse@earthlink.net

State of the Club Address

Memphis is more than BBQ, Elvis, and Beale Street

In May the International Aerobatic Club (IAC) board of directors held two days of meetings in Memphis, from which the minutes should be on the website as you read this. While the minutes tell some of the story, I thought I'd go into detail on a number of issues to let you know what IAC is doing for you.

The week before this meeting, IAC came off a successful Sun 'n Fun Fly-In at Lakeland, Florida, that you can read more about in the pages of this issue. **Membership** remains steady at 4,600, and we anticipate a slight increase in membership through improved relations with aerobatic flight schools and as a result of other outreach programs. ***Sport Aerobatics*** continues to undergo improvements. The variety of content has improved significantly since Scott Westover came on board as editor, and we are happy to announce this is the first issue that is in full color.

The board clarified a misunderstanding in judge selection for the U.S. Nationals and put in place a new section in the *IAC Policy & Procedures Manual* detailing procedures for removal of a team member. Speaking of teams, both the **U.S. Glider Aerobatic Team and U.S. Unlimited Aerobatic Team** will be about to compete as you read this—the Glider team in Austria and the Unlimited team in Spain. In his report, glider chairman Klein Gilhausen briefed us on a successful training camp with Jurek Makula, a six-time World Glider Aerobatic Champion. In addition to coaching, Jurek offered the U.S. team use of the Polish team gliders in Austria, making participation of the U.S. team possible. Norm DeWitt of Unlimited Aerobatics USA reported the fundraising efforts are going well, and additional sponsor and individual donations continue to be received.

The **Hall of Fame** ceremony to be held in Oshkosh on November 9 will be more readily open to member attendance, and EAA is planning additional events and awareness of the inductees this year. Inductees from each division will be announced shortly and introduced in *EAA Sport Aviation* and at EAA AirVenture Oshkosh. We hope to have the IAC inductees present at AirVenture. Nominations for the IAC Hall of Fame are always welcome, and a petition may be downloaded from the IAC website, *www.IAC.org*.

Robert Bismuth of Chapter 77 and Jennifer Haglund of Chapter 67 presented Pendleton, Oregon, as the location for the **2008 Advanced World Aerobatic Championships** (AWAC). Proposed dates are August 1-10. Fundraising efforts are in full swing, with about 25 percent of the needed funding acquired. If you or your company is interested in sponsorship, please contact Robert or Jennifer through the AWAC 2008 website listed at the end of this article. Pendleton will be the site of two competitions prior to the AWAC for those who would like to get a feel for the area. Chapter 77's fall contest dates are August 10 -11, and the spring 2008 contest date in June is yet to be determined.

The **Judges Program** continues to undergo more automation, thanks to the efforts of Randy "the web guru" Owens and Greg Dungan. Judges programs were requested online this year, and the IAC contest scoring program will now allow the tracking of all judges and assistants at contests, assuming correct data entry at the contest level. The judges exams are now fully web-friendly. Contest scheduling was also automated by Randy, as well as contest scores being placed online as soon as they are completed by the contest scoring chairman at each contest. On a side note, if the contest registrar and/or scoring chairman do not enter the data properly, the contest scores and judges data will not be available. Lisa will no longer be responsible for fixing bad data.

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The **Government Relations Committee** continues to have its hands full with work on FAA Chapter 48, the document that covers aerobatic practice and contest boxes, as well as the new environmental requirements that remain undefined as of yet. We are not out of the woods yet, and we anticipate some efforts required on the part of the waiver applicant regarding noise issues. However it is still a work in progress. In the meantime, it should be business as usual with the FAA on issuance of new waivers and renewal of existing waivers. If any problems occur, please contact your IAC government rep for help. Rather than escalate a problem, please get these guys involved.

In addition, we've been working with EAA Warbirds of America on the **experimental exhibition requirements**. Bill Fischer, the Warbirds executive director, reports the meeting in March was very productive as industry representatives met face to face with the FAA staff to review, paragraph by paragraph, FAA Order 8130.2F. Many changes were recommended, including the elimination of the 300 nm/600 nm area flight restriction. This change eliminates the need to reissue operating limitations when an aircraft is moved to a new flight standards district office (FSDO) jurisdiction and removes any redundant references to current FARs. The result should be a smaller, less restrictive order. The FAA staff felt that this would be at least a six-month process.

The **Aerobatic Flight Instructor Standards Program** is well underway and should be announced formally at AirVenture this year. This is a voluntary program to recognize those who teach aerobatics, but who have not attained the NAFI Master Instructor status. The National Association of Flight Instructors (NAFI) will administer the program. Along these lines, the IAC regional directors are in the process of contacting **aerobatic flight schools** to update their information on our website and offer IAC materials for their use. We hope to partner with them later this year for another IAC program integral to the future of IAC.

Preparation for the **U.S. National Aerobatic Championships** continues. The next step is to name a contest director (CD) to a committee that was formed last year, chaired by Allyson Parker-Lauck. The committee was created to spread the Nationals work out, so the responsibility for the entire event doesn't fall on the shoulders of the CD. Dates for the Nationals are September 23-28; stay tuned for the website availability once more information is gathered. This year should be well-attended due to the AWAC being in the United States in 2008.

Mastery of Flight continues to be an issue, and one I'm determined to see through to completion. We seem to incur one roadblock after another with the program, and it is currently on hold due to insurance and EAA risk management issues. The IAC board feels this program is vital to the future of IAC as a way to introduce all pilots to the benefits of stall/spin awareness and unusual attitude training. We anticipate running this program through existing aerobatic flight schools and instructors. The plan is to spend a day with pilots through seminars and flights that will translate into a safer flight environment for all. Stay tuned on this one and keep your fingers crossed.

We are currently in the beginning stages of transition with EAA to attempt to better organize both entities and reach some common goals. As the song by Booker T and the MGs (or the Neville Brothers if you are a little younger!) says, "A Change Is Gonna Come." Again, stay tuned.

Lastly, I'd like to thank Mike and Judy Heuer for organizing this board meeting in their hometown and hosting the Friday night dinner at their house with famous Memphis BBQ. Several board members stayed Saturday afternoon for a tour of some Memphis attractions at the conclusion of the meeting. In case you are wondering, board members pay their own expenses for Board meetings, including lunch both days. The tour included a horse-drawn carriage tour of downtown, currently undergoing significant renovation; a walk down Beale Street – an area credited with the development of the Memphis style of jazz and blues in the 1920s through '40s by musicians including Louis Armstrong and B.B. King; a visit to Handy Park, named for the "Father of the Blues," W.C. Handy; and dinner at Rendezvous, perhaps the most famous BBQ establishment in Memphis.

Another IAC group visited Sun Studios where Johnny Cash, Elvis, and many other music legends first recorded albums. Unfortunately none of the group made it to Graceland, which, other than FedEx, may be the most well-known association with the city of Memphis. The velvet Elvis for my hangar will simply just have to wait.

HELPFUL WEB LOCATIONS

UAUSA and the Unlimited Team
www.UnlimitedAerobaticsUSA.com

IAC Hall of Fame
www.IAC.org/programs/hof_history.html

AWAC 2008
www.AWAC2008.org

IAC Chapter 77 - Oregon
www.IAC77.org

IAC Government Representatives
http://Members.IAC.org/government/aerobatic_waivers.html

Aerobatic Flight Schools
www.IAC.org/begin/schools.html

U.S. Nationals
www.USNationalAerobatics.org

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Airspace, Operating Limitations, and Airmanship

A regulatory review

DISCLAIMER: The opinions contained in this article are general, do not constitute legal advice, and cannot be relied upon regarding any specific legal issue that may be faced by a reader. In such cases, the reader is directed to seek appropriate legal advice.

By Mark Mattioli, Esq.

As I write, spring is finally here. The ice on the hangar door has melted, I have evicted any and all wildlife that took residence in the corner of my hangar over the winter, and perhaps most importantly, I've restocked the refrigerator with appropriate after-flight beverages.

It is time to get the Eagle out of the hangar, and to practice. If you're like me, every spring you say to yourself that you'll really focus on your flying and perhaps move to a new category, get a new rating, or devise a really difficult sequence that will wow the judges. Maybe you decide to just improve your air work and commit to perfecting those vertical lines that give you trouble. Whatever you've decided to do, you have committed to becoming a better pilot.

But while air work is a large part of improving airmanship, we shouldn't overlook knowledge. In his book *Redefining Airmanship*, Tony Kern describes airmanship as a multifaceted endeavor. It includes not only good aircraft-control skills, but also a full understanding of the regulatory environment in which we operate. This definition of airmanship applies not only to air carrier and military operations, but also to general aviation. Although our sport is practiced in visual flight rules conditions, we certainly do not fly in a regulatory vacuum. Rather there are multiple regulations we need to take into account whenever we fly aerobatics. Part of our spring flight ritual should include a review of the regulations governing aerobatics. This article will first address the regulatory environment and then the issues regarding operating limitations applicable to experimental aircraft.

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AIRSPACE AND 91.303

We first turn to one of the most important regulations for aerobatic pilots, FAR 91.303. We will start with the wording of the regulation:

No person may operate an aircraft in aerobatic flight;

(a) Over any congested area of a city, town, or settlement;
(b) Over an open-air assembly of persons;
(c) Within the lateral boundaries of the surface areas of Class B, Class C, Class D, or Class E airspace designated for an airport;
(d) Within 4 nautical miles of the center line of any Federal airway;
(e) Below an altitude of 1,500 feet above the surface; or
(f) When flight visibility is less than 3 statute miles.

For the purposes of this section, aerobatic flight means an intentional maneuver involving an abrupt change in an aircraft's attitude, an abnormal attitude, or abnormal acceleration, not necessary for normal flight.

Mark Mattioli at the stick in his Christen Eagle. Photo by Laurie Zaleski, ARTZ Graphics.

On its face, the regulation seems clear. But upon careful reading, there are potential ambiguities and traps. For example, when does the regulation apply? As written, the regulation states that no person may operate an aircraft in "aerobatic" flight unless the elements of the regulation are satisfied. We learn, at the end of the regulation, that "aerobatic" flight means anything that is not "necessary" for normal flight. So does this mean that anything other than straight and level cruise flight is "aerobatic" flight? Probably not. However, the regulation is sufficiently vague to potentially include maneuvers performed as part of private pilot training. Take for example a simple departure stall that involves a high pitch attitude and is sometimes taught with an abrupt pull to simulate premature rotation. An argument can be made that this is "aerobatic" flight; however, most pilots would not consider it so. Conversely, to a pilot who has not slipped on short final in a Pitts from an altitude of 900 feet, landing a Pitts or other biplane may seem to be an aerobatic maneuver.

Given the lack of definition in the regulation, pilots will often substitute the requirements for when a parachute is necessary for flight as setting the bar for when "aerobatic" flight is being conducted. These regulations are found at FAR 91.307. This regulation provides that a parachute is necessary when pitch exceeds 30 degrees or bank exceeds 60 degrees. Technically, while this is a good guide for when aerobatic activity is being conducted, there is a variety of activity between straight and level flight and 30 degrees of pitch or 60 degrees of bank that may also technically qualify as aerobatic flight.

The reality is that our opinion of what constitutes "aerobatic" activity often differs from the opinions of our straight and level friends. A recent case in point was a flyby by a pilot at her home airport. From the National Transportation Safety Board (NTSB) decision, it appears that this was simply a low pass, with smoke on, as a way to say goodbye to the family. That this pilot did not intend her activity to be "aerobatic" was evident by the fact that the plane (an Edge 540) was fully fueled and loaded—something no aerobatic pilot would do if he or she intended to really fly aerobatics. Nevertheless, the December 4, 2006, decision by the NTSB gives us insight into what the FAA considers to be aerobatic flight. Interestingly, the NTSB reversed the administrative law judge's (ALJ) decision finding that there was insufficient evidence to support license revocation.

According to the facts of the decision, the pilot performed maneuvers in close proximity to an airport runway, flew in an opposite direction to the flow of traffic, and performed an abrupt pull and turn. The pilot contended that the maneuvers were nor-

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mal for the aircraft in question (Edge 540), and that the steep takeoff was required due to the poor glide ratio of the aircraft. There did not appear to be a good non-aerobatic explanation for why the pilot utilized air show smoke. The pilot in question, however, claimed to have done so as a goodbye for her ill grandmother who lived near the end of the runway and could not get out of the house to see her granddaughter off. The NTSB revoked this pilot's commercial certificate and determined that the activity was aerobatic activity in violation of 91.303(e) (below 1,500 feet).[1] Additionally, this same evidence served to support a finding that the pilot violated FAR 91.13(a) prohibiting careless and reckless operation of an aircraft. Of particular note to the NTSB was that this was the second incident involving this pilot.

This case is important for numerous reasons. Many of us would not consider the activity described in the report to be aerobatic. Indeed, the ALJ who initially heard the evidence found it to be insufficient. The fact that the NTSB reversed the decision of the ALJ is indeed rare, as the NTSB typically affirms the ALJ's decision, especially where issues of credibility are involved. The ALJ did not find the FAA's witnesses as credible as those of the respondent.

Second, the use of smoke creates an almost irrebuttable presumption to most that the maneuver is "aerobatic." To some, it is an aerobatic maneuver if the plane simply sits on the ramp with the smoke system on. Smoke draws attention to the aircraft and makes any maneuver look more extreme. If you are going to fly a low pass, don't use smoke, and don't announce it as a low pass. Finally, for this pilot, the fact that this was the second action by the FAA played heavily into the decision. Unlike baseball, it appears that two strikes may result in your being tossed from the aviation game.

Assuming we are satisfied that 91.303 is applicable, the next question is whether we are flying over a "congested" area of a city or town. These terms are again vague. It is commonly accepted that a "congested" area is any area on a sectional or terminal area chart that is depicted in yellow. Nevertheless, this term is not clearly defined.

Aerobatic aircraft draw a lot of attention, especially close to the ground, so it is important to know the rules. Photo by Laurie Zaleski, ARTZ Graphics.

Thus, again we see that FAR 91.303, with which we must comply, does not use terms that are defined by the regulations. Indeed, a review of the controller glossary reveals no definition for the term "congested area." Moreover, for those of us flying aircraft with experimental type certificates, there is an additional trap, which will be discussed later.

We can now move to subpart (b), which prohibits aerobatic flight over an open-air assembly of persons. Taking this provision literally, we have violated FAR 91.303(b) if we fly over two people who are gathering in the open. This is not a defined term, therefore giving considerable latitude to the FAA to interpret it. Here, at least one pilot was charged with a violation of 91.303(b). Remarkably, the incident involved a helicopter. In that case, the FAA alleged that the helicopter pilot performed a military maneuver known as a "return to target" or RTT. According to the FAA's witness, this maneuver involved the helicopter's flying up "nose first," or at "a 90-degree angle," and then appearing to flip over "as if on its side." The activity occurred over a privately owned ranch that stabled horses for the public.[2] The individuals over whom this pilot flew were his family.

Assuming that we are not flying over a congested area, and not flying over an open-air assembly, we must next determine whether we are within the "lateral" boundaries of Class B, C, D, or E airspace designated for an airport. If you want to start a controversy, at your next gathering ask a few pilots what this means. You will, undoubtedly, be presented with alternative meanings. Indeed, this is with good reason, as the FAA itself has interpreted this provision inconsistently.

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The first problem is determining the meaning of the terms "lateral" boundaries of Class B, C, D, or E airspace designated for an airport. When we think of Class B or C airspace, the proverbial "upside down" wedding cake example comes to mind. This airspace will consist typically of a circle around the airport that begins at the surface and continues up to an altitude of about 1,500 feet. The next ring usually consists of a wider circle that begins at approximately 1,500 feet and continues up to 3,000, with a further ring starting at 3,000 and continuing up to 7,000 feet or above. The question is whether aerobatic activity is permitted under this third ring from 1,500 up until 3,000 feet.

For a very long period of time the answer was no. The FAA interpreted this provision to mean that, for Class B airspace, no aerobatic activity was permitted anywhere in the shaded Class B airspace depicted in the chart, regardless of whether such activity was actually within Class B airspace. Hence, lateral boundaries meant, until recently, that the prohibited area began at the top of the outer ring of the Class B airspace and continued to the ground. In other words, no aerobatic activity was permitted by 91.303(c) under the shelf of the Class B airspace. According to an interpretation dated July 14, 1999, in response to a request for clarification by EAA:

"Your letter states that EAA considers the floor to the innermost ring of Class B airspace as surface area. This definition is incorrect.... [T]he surface area includes airspace at

Take for example a simple departure stall, which involves a high pitch attitude ... An argument can be made that this is "aerobatic" flight; however, most pilots would not consider it so.

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each lateral boundary of floor area of Class B airspace, without considering whether the boundary contacts the surface of the earth. The definition does not therefore limit a 'surface area' to airspace that contacts the surface of the earth, nor does it provide an alternative definition for the floor area of the outermost ring." By this definition, aerobatic flight is not permitted within the vertical or lateral confines of Class B airspace.

Fortunately, the FAA has again clarified this provision. On March 7, 2006, Assistant Chief Counsel Rebecca MacPherson reversed a prior FAA opinion on whether aerobatics could be legally performed underneath the shelf-floor of Class B airspace. In the letter, MacPherson notes first that the text of the regulation, Pilot-Controller glossary, FAA Order 7110.65L, and no less than two prior interpretations have led to contradictory understandings "within the agency." In other words, the FAA did not really know what it meant. This new interpretation was the result of a revision to Class B airspace in the Minneapolis-St. Paul area. The revised FAA ruling provides that:

The term "surface areas" refers only to those components of airspace that come in contact with the surface of the earth. In the case of Class B and Class C airspace that are composed of multiple, layered components and are very often shaped like an "upside down wedding cake," the surface areas are only the inner-core components of the "cake" that extended upwards from the airport surface to the ceiling of the airspace. The outer areas of Class B and Class C airspace, in which the floor of the airspace does not touch the surface of the earth, are not "surface areas" as used in section 91.303(c).

With contest season in full swing, it is important to understand the regulations that influence when and where you practice. Photo by Laurie Zaleski, ARTZ Graphics.

An additional ambiguity that may have also been clarified by the March 7, 2006, letter regards the definition of Class E airspace designated for an airport. Nevertheless, use of this term is inconsistent. FAR 71.71 defines Class E airspace as:

(b) The airspace areas designated for an airport in subpart E of FAA Order 7400.9P (incorporated by reference, see §71.1) within which all aircraft operators are subject to the operating rules specified in part 91 of this chapter.

Thus, by reference, the regulation directs us to look at FAA Order 7400.9P to determine whether the airspace is "designated for an airport." FAA Order 7400.9P is a 700-plus-page order that outlines the geographic areas of various airspace. Subpart E of the order defines the various categories of Class E airspace. There is no designation of "airspace designated for an airport" in subpart E. The closest we come is section 6002, which lists Class E airspace Designated as a Surface Area. The text to this section begins "The Class E airspace areas listed below are designated as surface areas designated for an airport."

This is to distinguish "airport" Class E airspace from other Class E airspace, such as transition Class E airspace. Indeed, the March 7, 2006, order makes this clear:

When the floor of Class D and certain Class E airspace (designated for an airport) begins at the surface and extends upwards, aerobatics are prohibited in accordance with section 91.303(c). However, it should be noted that there are other Class E airspace areas that extend upward from some altitude above the surface, such as transition areas that extend upward from 700 or 1,200 feet above the ground level. Such areas are not surface areas and aerobatic flight in these areas is not prohibited by section 91.303(c).

Thus, aerobatic activity in Class E airspace is permitted, provided the airspace is not surface Class E airspace in the vicinity of an airport, and provided that the other requirements of FAR 91.303 are satisfied.

The next three subsections, 91.303(d), (e), and (f), do not suffer from the same vagueness found in the preceding three subparts. Subsection (d) states that aerobatic activity is not permitted within 4 nautical miles of a federal airway. Subsection (f) states that aerobatic activity may not be performed where visibility is less than 3 nautical miles. Both are fairly objective.

Moreover, 91.303(e), which states that aerobatic activity may not be performed at altitudes less than 1,500, is likewise clear. Nevertheless, out of all of the NTSB decisions regarding FAR 91.303, the overwhelming majority involve a violation of subsection (c). As discussed above, often the issue is whether "aerobatic" activity took place. There is usually little doubt that the activity was performed at less than 1,500 feet.

An additional issue may be in play even if you are flying in a waivered box with a floor below 1,500 feet. Here, you are well-advised to check your insurance policy. If you are planning to move, for example, from Sportsman to Intermediate, you should make sure that your insurance policy provides coverage for flight below 1,500 feet. If not, you will be flying without insurance regardless of whether you are flying in a waivered box. Hence, before deviating from any of the FARs, even if authorized by a waiver, make sure that your policy covers this activity.

OPERATING LIMITATIONS

For those of us flying aircraft with experimental airworthiness certificates, there is an additional issue. Unless allowed by your operating limitations, an experimental aircraft may not operate over a congested area. FAR 91.319(c) provides:

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Unless otherwise authorized by the Administrator in special operating limitations, no person may operate an aircraft that has an experimental certificate over a densely populated area or in a congested airway. The Administrator may issue special operating limitations for particular aircraft to permit takeoffs and landings to be conducted over a densely populated area or in a congested airway, in accordance with terms and conditions specified in the authorization in the interest of safety in air commerce.

For those of us flying an aircraft certificated as an amateur-built aircraft, under FAR 21.191(g), thanks to the efforts of the EAA, the operating limitations of the aircraft should allow flight over congested areas. The standard operating limitations are found in FAA Order 8130.2F, specifically in chapter 9.[3] Section 153(b)(6) of this order provides that the operating limitations contain, for Phase II operations, a statement to the effect that operation over densely populated areas and congested airways is permitted provided that sufficient altitude is maintained by the pilot to ensure a safe landing in the case of an emergency. Thanks again to the efforts of EAA, owners with older operating limitations can update their operating limitations to include the new language. A note of caution, however, is that the default operating limitations contain a provision prohibiting aerobatic flight. Where, however, the owner has demonstrated that the aircraft is capable of aerobatic flight, this restriction may be removed. A certification that the aircraft is able to perform aerobatic flight and a listing of the specific maneuvers is required per Section 153(b)(16):

To some, it is an aerobatic maneuver if the plane simply sits on the ramp with the smoke system on.

The aircraft may only conduct those aerobatic flight maneuvers that have been satisfactorily accomplished during flight testing and recorded in the aircraft maintenance records by

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Before flying aerobatics, every pilot should know what kind of airspace they are operating in and how the regulations may change with the scenery. Photo by Kate DeBaun

use of the following, or a similarly worded, statement: "I certify that the following aerobatic maneuvers have been test flown and that the aircraft is controllable throughout the maneuvers' normal range of speeds, and is safe for operation. The flight-tested aerobatic maneuvers are _____, _____, _____, and _____."

While we are on the topic of experimental aircraft, a discussion about when they may be used to carry passengers for hire is warranted. FAR 91.319 provides the general rule that an aircraft certificated in the experimental category may not be used to carry passengers for hire. An exception is provided by FAR 91.319(e):

(e) No person may operate an aircraft that is issued an experimental certificate under §21.191(i) of this chapter for compensation or hire, except a person may operate an aircraft issued an experimental certificate under §21.191(i)(1) for compensation or hire to—

(2) Conduct flight training in an aircraft which that person provides prior to January 31, 2010.

Thus, flight training is allowed provided that the aircraft is certificated under 21.191(i)(1) pertaining to experimental light-sport aircraft. Otherwise, the pilot must seek an exemption from 91.319(a) (preventing operation for compensation) pursuant to subsection (h). This provision applies only to flight training:

(h) The FAA may issue deviation authority providing relief from the provisions of paragraph (a) of this section for the purpose of conducting flight training. The FAA will issue this deviation authority as a letter of deviation authority.

(1) The FAA may cancel or amend a letter of deviation authority at any time.

(2) An applicant must submit a request for deviation authority to the FAA at least 60 days before the date of intended operations. A request for deviation authority must contain a complete description of the proposed operation and justification that establishes a level of safety equivalent to that provided under the regulations for the deviation requested.

(i) The Administrator may prescribe additional limitations that the Administrator considers necessary, including limitations on the persons that may be carried in the aircraft.

The idea here is that the aircraft is used for actual training. Owners of these aircraft with the appropriate deviation authority are cautioned that this provision should not be used as a means to defray expenses by offering rides to the general public.

On a final topic, EAA, the IAC, and other organizations are currently working with the FAA in an effort to further revise the certification requirements for experimental/exhibition aircraft. Currently, various flight standards district offices (FSDOs) have differing interpretations of the regulations when these aircraft change hands. Importantly, for experimental/exhibition aircraft, the proposed changes would allow the new owner to keep the same operating limitations and a new program letter would not be required. Failure by the FSDO to issue new operating limitations to new owners has caused many unexpected headaches for new owners. Interpretations of the requirements for these aircraft have differed not only among FSDOs in different regions, but also among officials in the same FSDO. If you own an experimental/exhibition certificated aircraft, keep your eyes open for further developments in this area.

Now get out there and practice.

Mark Mattioli is a business and commercial litigation attorney with Post & Schell, P.C., in Philadelphia, Pennsylvania, and has represented professionals in disciplinary matters. When not practicing law, he flies a Christen Eagle II based in Lumberton, New Jersey, and is an active member of IAC Chapter 52. He can be reached at 215-587-1087 or at mmattioli@postschell.com.

FOOTNOTES:

1 Blakey v. Andrzejewski, Order EA-5263, 2006 NTSB LEXIS 73 (December 4, 2006)

2 Garvey v. Lever, Order EA-4639, 1998 NTSB LEXIS 23 (February, 12, 1998).

3 Note that this order was revised on April 18, 2007. The primary thrust of the revisions is to make clear that the restoration of a certificated aircraft does not make the aircraft eligible to be certificated as an amateur-built aircraft.

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Success at

Record numbers equal record sales

Story and photos by Vicki Cruse

Vicki Cruse and Ann Salcedo welcome visitors to the new IAC location at 2007 Sun 'n Fun.

Thank you to the IAC members and aerobatic enthusiasts that stopped by the International Aerobatic Club exhibit to say "hello" at the 2007 Sun 'n Fun Fly-In at Lakeland, Florida. The IAC tent was moved slightly east of its previous location, across the taxiway. This was the first year that Sun 'n Fun general admission attendees were allowed on the flightline without paying extra. In years past, the IAC was staked out just beyond a fence that required an additional fee to pass. This year we saw a noticeable increase in traffic.

Ann Salcedo, IAC's resident Type-A volunteer, set up the IAC area this year. With some direction from our executive director, Lisa Popp, the result was spectacular! She made the most of our space, and the layout was perfect. Ann's crew of volunteers working in the tent was outstanding. The open flightline, the variety of aircraft out front, and Ann's outstanding job resulted in the best Sun 'n Fun IAC has ever had, with nearly $7,000 in merchandise sales and 20 new members for IAC. Alan Cassidy's *Better Aerobatics* book sold out the second morning.

Jim and Jean Taylor, of Sun 'n Fun, parked airplanes out front, and the variety of planes that showed

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Sun 'n Fun

up was the best we've had in years. This area couldn't be missed by those near the east edge of the Sun 'n Fun grounds and particularly by those on their way to the Warbirds area. The aerobatic airplanes drew a lot of onlookers. At one time there were three Extras, two MX2s, four Model 12s, a Zlin, three Pitts, and a Skybolt out front. The addition of Al DiGulio's Model 12 that graced the cover of the April issue was perfect. More than one person commented on the fact the cover airplane was right outside the tent.

Our new location also afforded front row seats for incoming aircraft including military jets, which terminated many a cell phone call. Other aircraft paraded by throughout the day and created a bit of a dust issue that drove Ann and the other volunteers crazy. The location was good for air show viewing, however, and we want to offer special thanks to Roscoe Morton for promoting the U.S. Unlimited Aerobatic Team during team members' David Martin and Goody Thomas' air show performances.

Besides the plethora of airplanes and great merchandise, IAC found its tent about 100 yards from what may be the greatest non-aviation thing ever at Sun 'n Fun…homemade ice cream. Ann and I came to the conclusion that it's perfectly normal to have such an indulgence more than once a day, after all it's Sun 'n Fun and all the walking burns it off, or at least that is what we told each other.

Thank you to all those who took part in making IAC's presence at Sun 'n Fun so spectacular. From the EAA staff, to Ann's group of volunteers, to Gordon Penner who presented two forums this year, to Lisa who worked from afar, to Falcon Insurance who sponsored the member party, and especially to Ann Salcedo (without whom none of this would have been possible). Fortunately, we needed volunteer Doug Lovell's foreign language skills only once to help a couple of international visitors translate Ann's Boston accent into English. If you did not get a chance to fly into Sun 'n Fun, we hope to catch up in Oshkosh later this summer.

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2006 REGIONAL

PILOT	CATEGORY	REGION	PP%	TROPHY
Joe Haycraft	Sportsman	Mid-America	87.56	1
Craig Henry	Sportsman	Mid-America	79.06	2
Jeffery Granger	Intermediate	Mid-America	85.69	1
Brett Hunter	Unlimited	Mid-America	69.55	1
Byron Brumbaugh	Sportsman	Northeast	76.28	1
Weston Liu	Sportsman	Northeast	73.30	2
William Gordon	Intermediate	Northeast	76.48	1
Ray Franke	Advanced	Northeast	67.67	1
Kendall Simpson	Advanced	Northeast	66.18	2
Dennis Thompson	Unlimited	Northeast	71.23	1
Victoria Benzing	Intermediate	Northwest	83.30	1
Michael Mulcahy	Intermediate	Northwest	80.08	2
John Smutney	Intermediate	Northwest	63.99	3
Todd Whitmer	Advanced	Northwest	83.96	1
Doug Sowder	Advanced	Northwest	80.29	2
Greg Howard	Unlimited	Northwest	82.88	1
Vicki Cruse	Unlimited	Northwest	80.74	2
Norm DeWitt	Unlimited	Northwest	78.85	3
Tom Rhodes	Sportsman	South Central	86.01	1
Sarah Tobin	Sportsman	South Central	80.00	2
Andrew Macha	Intermediate	South Central	81.75	1
Scott Poehlmann	Intermediate	South Central	78.93	2
Melissa Andrzejewski	Unlimited	South Central	75.06	1
Robert Freeman	Unlimited	South Central	72.77	2
Joe Haycraft	Sportsman	Southeast	86.46	1
Timothy Walter	Sportsman	Southeast	84.15	2
Dale Evans	Intermediate	Southeast	75.53	1
Hector Ramirez	Advanced	Southeast	84.67	1
Jenner Knight	Sportsman	Southwest	88.68	1
Mike Eggen	Sportsman	Southwest	84.32	2
Michael Hartenstine	Sportsman	Southwest	82.08	3
Vicky Benzing	Intermediate	Southwest	81.29	1
Jason Wondolleck	Intermediate	Southwest	79.96	2
Ron Rapp	Intermediate	Southwest	79.25	3
Todd Whitmer	Advanced	Southwest	85.11	1
Malcolm Pond	Advanced	Southwest	81.25	2
Reinaldo Beyer	Advanced	Southwest	77.89	3
Vicki Cruse	Unlimited	Southwest	80.23	1
Norm DeWitt	Unlimited	Southwest	78.88	2

Dennis Thompson

William Gordon

Hector Ramirez

Joe Haycraft

Congratulations to the winners and everyone who flew in the 2006 Regional Series. Forty competitors out of 58 total series participants received awards. Forty-two of the 58 entrants successfully competed at the three or more contests needed to qualify for the series in their respective region.

The Regional Series began in 2002 with 60 pilots competing for the series titles, and it hit a high of 107 participating in 2004. To be eligible, a pilot must fly at least three contests during the year (two for the Northwest Region due to unavailability of contest sites) and one may include the U.S. Nationals. If more than three contests are flown, the highest scores are used to arrive at each participant's total percentage. First, second, and third place trophies are awarded to qualified participants in each category (Primary through Unlimited) in each of the six regions. Trophies are sent to the chapter presidents of the winners in each region for awarding at an event held in the local area such as a chapter meeting or first contest of the next season.

Congratulations again to all of the series winners. For additional detailed information on the 2006 Regional Series, go to *http://Members.IAC.org* under Contest Results, Regional Series. Information and registration for 2007 is available on the Internet.

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SERIES WINNERS

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Norm DeWitt

Ray Franke

Melissa Andrzejewski

Byron Brumbaugh

Timothy Walter

Weston Liu

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"Right there we stopped the project and decided to design an entirely new fuselage."

Gary Ward and the MX2

Between the "Sun" and the "Fun" the story is told . . .

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By Budd Davisson, photos by Bonnie Kratz

So, there you are, transported back to 1942, and you're talking to a group of engineers and test pilots.

"No, really, the structure is nothing but cloth glued to cloth. It'll roll 400 degrees a second, climb 3,500 feet per minute, and is stressed for plus and minus 14g's. Oh, yeah, and it's home-built."

Need we say what kind of reaction could be expected? They would think you were nuts. Ignoring the spectacular (read that as 1942-unbelievable) operating specs, the "glue and cloth" thing would have them rolling in the aisles.

Have the same conversation with a similar group of engineers and test pilots today, and they'd yawn and go on their way. Been there, done that. In an age of glue-together airliners and fighters that can tumble and accelerate while going straight up from a standstill, it's pretty hard to impress anyone. Still, from time to time, an airplane comes along that shows us what can be done if attention is paid to detail and state-of-the-art everything is brought to bear on the subject. Such an airplane is Chris Meyer's MX2 as was represented by Gary Ward's interpretation at the 2007 Sun 'n Fun Fly-In at Lakeland, Florida.

Gary Ward's MX2 is the result of a collaboration between Gary, Chris Meyer (the young entrepreneur behind MXR Technologies), Composites Universal Group in Scappoose, Oregon (who worked with Gary in completing his MX), Mirco Pecorari (the Italian designer/studio who designed the paint scheme), Don Pennington (who blew the unbelievable paint job on it), and a bank of computers that helped in everything from refining the design right down to full-size blueprints to lay out the paint job. Isn't technology a wonderful thing?

The concept behind the MX2, as stated by company president Chris Meyer, is simple: It's a two-place hot rod. The designers' goal was to run every performance parameter right out of sight. This meant lots of motor, as little weight as they could get away with, and the strength and aerodynamics that would work with the other factors to give it Unlimited capabilities as well as an SMA (Sunday morning amazement) Factor that would peg the grin meter.

Chris says, "We also wanted to set a standard for quality and state-of-the-art construction that no one could challenge."

Very few flying machines, with the possible exception of those coming out of Rutan's Mojave dream factory, are truly new designs. To a certain extent, they are all evolutionary, rather than revolutionary, in nature. They borrow from one another but combine the different design features in ways that produce something unique. That is the case with the MX product line. As Chris will freely tell anyone who cares to listen, the MX had its roots in his purchase of a Giles 202 kit many years ago. As that particular product line ran into trouble, Chris found himself moving from his home state of Michigan for the sun of Florida where he set up a business finishing 202s for customers. In the course of conducting that business, he began thinking about providing a kit of his own. In fact, when the 202 project failed, he and his investors bought the remains of the company. After the IRS got through slapping liens on different assets, he found he owned the tooling but not the rights to build an airplane from it, plus there were no lay-up schedules available for the composites, so the tooling was, at least temporarily, useless.

Initially the goal was to build the Giles 202, as is/was, but almost as soon as Chris landed in Florida, he began to come in contact with lots of serious aerobatic types from Mike Mays to Robert Armstrong, Alan Bush, and Gary Ward. They all said that, in their opinion, the Giles would not snap and spin as cleanly as they would like, and they assumed it was a wing issue. Later, after surveying customers, one of the consistent comments was that they wanted more motor (it had an IO-360, nominally 200 hp). What? More motor on an aerobatic airplane? What a surprising concept!

Since it was universally agreed not only that the design needed some changes, but also that those changes would alter the design enough that the rights issues would disappear, Chris and his company, MXR Technologies, decided to redo the wing. They went to AirBoss Aerospace in Reno who restructured the wing with an eye toward reducing weight while a new aerodynamicist held their hand to aid in improving performance. The result was an entirely new wing—in appearance, function, and structure. A one-piece unit, it wound up with a double taper, rather than one edge being straight, and an entirely new airfoil.

Chris says, "We got lucky the first time out in that the wing performed really well, but it still didn't snap as well as we wanted it to."

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At the same time they hung an AEIO-540 Lycoming on it and realized almost immediately that they were using up any safety margin the fuselage originally had. Designed for a four-cylinder, the fuselage just wasn't up to the extra weight, speed, and performance of the six-cylinder upgrade.

"Right there we stopped the project and decided to design an entirely new fuselage. By that time, other than the basic configuration, nothing of the Giles remained."

When they began flying the new airplane, designated MX2, they realized they had performance to burn, but as Chris puts it, "It still snapped a little funky."

Having done all they could with the wing, they began to look elsewhere, beginning with the tail, which was of standard cruciform configuration with the leading edge of the vertical stabilizer in line with the horizontal stabilizer. Many airplanes have this arrangement, but most of those airplanes aren't being asked to instantaneously deliver massive amounts of yaw and pitch, as is required for a clean snap entry. After a lot of research and test flying, they realized that when the rudder and elevator were yanked into position for a snap, as the airplane yawed the airflow around the leading edge of the vertical stab disrupted the flow over the stabilizer/elevator, greatly reducing its efficiency. They moved the vertical surface back several inches so the horizontal stab was slightly ahead of the vertical and instantly found they had an airplane that would yank your head off in a snap. Life was good! Enter Gary Ward of Lincolnton, Georgia.

Ward started flying as a teenager in J-3 Cubs, earned a degree in aerospace engineering, and worked for Cessna in Citation engineering before returning to the family lumber business in Georgia. During that time he continued flying but got into aerobatics late in his flying career.

"I'd always wanted to do aerobatics. The hook was really set when I was on a scuba diving trip to Key West," he says. "I booked a flight with Freddy Cabanas in his Pitts S-2A, and I knew I had to get an aerobatic airplane.

"Through an arrangement with a doctor friend of mine, I wound up with an S-2B and went to Ray Williams in 1995 to learn to fly it."

Almost immediately he started flying air shows in the Pitts and had no idea that he was on a course that would eventually have him flying a hot rod MX2.

"I didn't set out to do this, but while I was flying the Pitts I saw a Giles 202 and had to have one, so I bought a kit. I worked with Composites Universal Group in Scappoose, Oregon, to get it finished, and we got it flying in late 1998. While it was still in primer, I was out flying air shows with it.

"I flew the Giles for eight years, but for the entire time I knew I wanted a six-cylinder engine and the increase in performance it would give me. For some reason, however, I didn't want an Edge or an Extra. Then MXR got its prototype MX2 flying, and I went down and talked to Chris about getting one of the first kits."

The final kit configuration MXR arrived at was what it calls its super quick build kit. It meets the FAA's 51

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percent requirements and is approved, but it doesn't require any composite fabrication by the builder.

Chris Meyer says, "We decided right from the beginning that, although this was technically a homebuilt airplane, we were going to approach it as though it were a certified airframe and stick to aerospace standards and materials. Everything in the airplane, from the prepreg carbon fiber cloth to the glues, to the lay-up schedules and tooling are strictly aerospace quality. In fact, aerospace quality is one of the things we try to stress when selling the airplane."

Gary Ward had the kit delivered to Composites Universal Group in Scappoose again. He'd had such a good building experience with the company on the Giles that he saw no reason to go any other way.

"I lost track of all the time I spent up there working with them on the airplane. But, it was going to be what I considered to be the ultimate aerobatic airplane, and I wanted to be part of the building process. We spent a lot of time getting the ergonomics exactly right for me. The airplane has a 45-

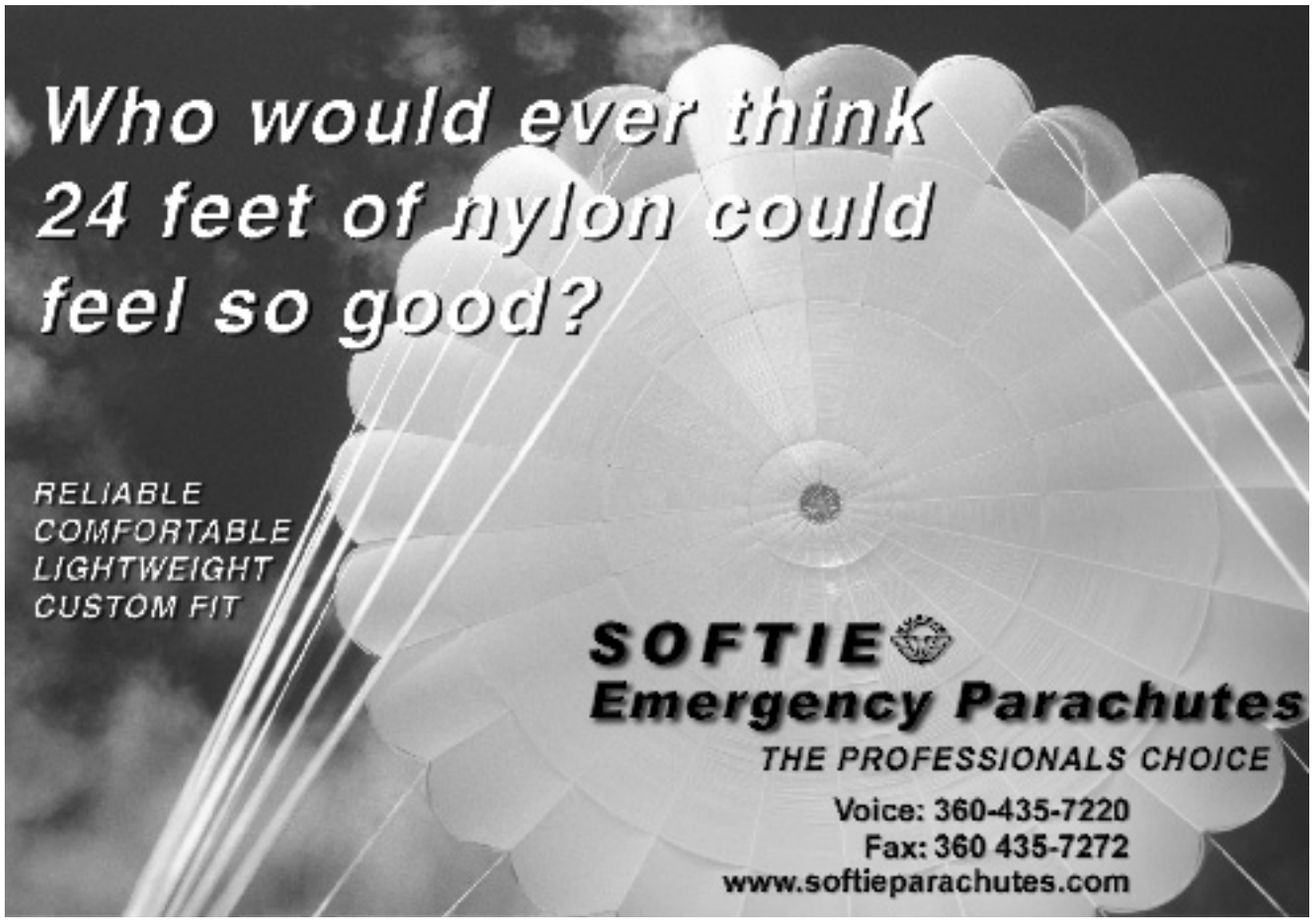
Is One Better Than Two?

Every two-place aerobatic monoplane eventually sires a single-place version, which is aimed at more performance, more speed, and less weight, and the MX2 is no exception.

Chris Meyer says, "We had a lot of requests for a single-place version, but rather than just covering up the front hole, we decided to make it a really different airplane.

"Among other things, we moved the pilot and wing forward and moved the engine and firewall back, resulting in an airplane that's 2-1/2 inches shorter. More important, all of the masses are closer together, and that lets it tumble and corner more effectively. When we were doing the CAD work, we eliminated most of the static margin from its stability profile, which makes an airplane much more maneuverable. Among other things, it snaps better. Plus it retains its energy better. We were also able to knock 120 pounds out of the empty weight and beef it up to handle 350 hp. It weighs just a hair over 1,200 pounds empty.

"We're not taking any customer orders on the MXS until the airplane has been further evaluated and everyone involved is satisfied. This is all being done with our own money, not customer dollars. This way there is no pressure to freeze the design prematurely to satisfy waiting customers. A number of pilots, including Greg Poe and Red Bull racer Nigel Lamb, say they are interested in buying one, but we're not taking deposits until everyone involved is happy with it. Flight testing to date has been better than expected, and we will continue to evaluate the plane over the next several months to ensure everything is right prior to production."



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degree reclined seat, so you have to be careful about where you place controls and the way you set everything up. When we were all done, it fit me so well that nothing wears me out. I can pull *g*'s all day long and it doesn't get to me, and it's a pure joy on cross-country." No doubt the cross-country trips are enjoyable in part because of the 190 knot cruise speed.

"I also designed my own smoke system that includes a flop tube in the tank so there's no skipping in the smoke trail. I wanted it to be a solid line regardless of what I was doing. Everything about the airplane is exactly the way I want it, which is one of the beauties of building your own airplane rather than buying one off the shelf."

True to form, Gary began flying air shows in the airplane while it was still in primer in early 2006. He would have painted it but didn't because no matter how hard he tried, he couldn't decide on a scheme.

"The entire paint scheme process was really frustrating. I just couldn't come up with anything I liked and that was unique. Flying air shows, I wanted it to stand out, but nothing outstanding came to mind.

"I was talking about this with Kevin Kimball at an ICAS convention, and he suggested I get a hold of Mirco Pecorari in Italy. Mirco is a graphic arts designer who loves airplanes and is rapidly gaining a reputation for coming up with schemes that include those things I was looking for, mainly something unique and that really stands out.

"Mirco sent me a bunch of different designs, and every single one of them was good enough to use. The problem became choosing between them. We went back and forth and eventually used elements from several designs before settling on one.

"One of the nice things about working with Mirco, who did the Python scheme for Kevin Kimball, is that he's not only fast, but does everything on a computer so he can fire the layout off to you quickly and with accurate coordinates for the painter to work from. In fact, he sets it up so full-size templates can be generated, and the painter can use them to do the masking and match the illustrations exactly.

"It was really tempting to do a lot of the scheme with decals, but I decided from the onset that I wanted it to be all paint. At the same time, however, I wanted to keep the paint as light as possible, so we did a little weight control analysis and weighed everything at different stages. I found out, for instance, that we could sand 15 pounds of primer off the airplane before applying the topcoats. We used a BASF base coat with clear over it and netted out a total increase of only 10 pounds.

"The paint was shot by Dan Pennington, who runs a local body shop, and no, he doesn't want any more airplane jobs. I think my Giles and the MX used up his patience for airplanes.

"I now have 175 hours on the airplane and have run it all over the country including a trip to Acapulco and San Francisco. It has done everything I could possibly ask of an airplane, and I love the way it stands out in an air show. So, you could say I'm a happy camper."

Editor's Note: If you have the urge for your airplane's paint scheme to stun the folks on the ramp, check out Mirco Pecorari's website at ***www.AircraftStudioDesign.com.*** You can also catch up with Gary Ward and his MX2 by visiting ***www.GaryWardAerobatics.com.***

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Ask Allen

A master rigger answers your questions about parachutes.

By Allen Silver

Q I would like to practice pulling the ripcord on my parachute before shipping, but what do I do with the sprung pilot chute?

A Pulling the ripcord before shipping your parachute is a great idea! Your rigger doesn't need the practice…and every aerobatic pilot should practice finding the handle before it's actually needed. Many of my customers are reluctant to pull the ripcord because they have a box that fits their parachute perfectly, and they're not sure what to do with the pilot chute.

If there is enough room in the box, lay it alongside the parachute. Or, if space is at a premium, place the pilot chute in a couple of plastic bags from the supermarket. Compress the pilot chute into the bags and tie it shut with the bridle of the pilot chute. The bridle is the approximately 4-foot long, 1-inch wide piece of webbing that ties the pilot chute to the top of the canopy.

Instead of tying the bags shut, many people prefer to carefully tape them closed. This works great, but be careful that *none* of the tape touches any parachute material. The glue from the tape is harmful to nylon over time.

Q To help prevent theft, can I mark my parachute container with a marking pen?

A Absolutely not! Your parachute is a very strong piece of equipment. However, it is chemically fragile. Just like tape adhesive, some marking pens can damage the nylon container over time. A parachute is a life-saving device that deserves extra care. Don't weaken the material by writing your name all over it. (Besides the safety issue, this also reduces the resale value, unless you sell it to someone with the same name as you!)

The safe way to personalize your parachute container is with sewn lettering. **Never** use a marking pen.

If you want to deter parachute thieves, there are two ways to go about it. One way is to order a unique color combination, such as pink with purple and orange stripes and green trim. No one will want to steal it, but no one will want to fly with you either. A better approach is to have a qualified rigger sew a name tag on the carrying bag or directly to the parachute harness. Many companies like Para-Phernalia, maker of the Softie parachute, can add a monogram of your name or N number. This is a great way to personalize your parachute. It looks much better than a marking pen, is better for the nylon, and can be removed by a qualified rigger if you decide to sell your parachute.

For flying clubs and fixed base operators that have many parachutes to keep track of, I have sewn club patches and ID numbers on parachute harnesses and carrying bags. This is an easy way to keep track of parachutes for scheduling maintenance and rental use. If your club has a dozen parachutes that all look similar, it is much easier to say, "Take parachute No. 2," instead of hunting for a serial number or trying to find "the blue one that's kind of lumpy at the bottom and smells funny." Happy flying…and keep the questions coming!

Allen Silver is the owner of Silver Parachute Sales and is always available to answer your questions about parachutes. Send your questions to ***Allen@SilverParachutes.com.***

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Unlike one-turn spins, where we must begin the recovery before reaching the intended exit heading, aileron rolls stop instantly when we neutralize the roll inputs. Be patient.

Recreational Aerobatics

Story and photos by Rich Stowell, MCFI-A

MASTERING THE AILERON ROLL

Aileron roll, slow roll, snap roll, barrel roll—maneuvers that incorporate the word "roll" into their very names. But the aileron roll and the slow roll are true rolls in the sense that aileron is indeed the primary input. The snap roll, on the other hand, isn't a roll at all. The Aresti figure incorporates a spin-like triangle; more precisely, the symbol represents an accelerated stall/spin. And back when the barrel roll was part of the Sportsman category lexicon, its symbol depicted a roll with a tiny loop dangling like an earring from the arrowhead. Yet the barrel roll isn't really a roll either; elevator is the primary input. The essence of this maneuver is a crooked loop, and one could argue that "barrel loop" is a more apt description of the intended maneuver.

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Although the words "aileron roll" together are redundant, the phrase is used to differentiate the method of entry from the slow roll. A distinct pitch up characterizes the start of the aileron roll. By comparison, cross-controlled aileron and rudder inputs characterize the start of the slow roll. We also tend to speak casually about rolling with the nose of the airplane "on" a point. The fact is that the nose will always roll "around" a central reference point. In his book *Flight Unlimited*, Eric Müller writes mystically about sacred points that lie on the sacred circles tracked by the nose during perfect slow rolls. Aileron rolls have key points, too. And the shape carved by the nose is akin to the block letter "D" during a right aileron roll, and a backward "D" during a left aileron roll.

Slow rolls are used in aerobatic competition and in the Achievement Awards program. For the remainder of this article, though, we'll detail the aileron roll. It's the easier of the two rolls to learn. It's essentially a 1*g* maneuver throughout, and when flown well it feels better than the slow roll. It's also an ideal choice for the recreational aerobatic pilot. Our featured airplane is a 1978 Standard Decathlon (150 hp, fixed-pitch propeller).

As the name implies, our attention must be on the ailerons during the aileron roll. All other control movements are subordinate not only in terms of our focus, but also in terms of the magnitude of their displacement. It's even possible to perform the roll with aileron deflection alone, but the maneuver would end in a steeply nose-down attitude, off the original heading, and with considerably more altitude lost than necessary. The intent of any rudder and elevator inputs during the aileron roll, therefore, is simply to improve the quality of the maneuver. Properly timed adjustments in rudder and elevator can be used to minimize deviations in our starting heading and altitude. From this standpoint, rudder and elevator movements serve a purely cosmetic function during the roll.

ROLL MECHANICS

We'll break down our aileron roll into four parts: the setup, entry, roll, and exit.

PART 1: SETUP

Excursions from the starting altitude and airspeed are innate in the aileron roll. Rpm will change as well in our fixed-pitch Decathlon. Consequently, let's trim for level flight at 2300 rpm. This power setting is a few hundred rpm below the marked red line on the Decathlon's tachometer, so unless we fall out of the maneuver or end up significantly nose-low when we're done, we shouldn't need to adjust the throttle during the roll. Perform the obligatory clearing turns and point the nose toward a prominent reference. Push for 120 mph. Use small rudder inputs to maintain your heading during the shallow dive. Once you attain the roll entry speed, pitch to level flight. Pause for a beat.

PART 2: ENTRY

Pitch the nose up 20 to 30 degrees above the horizon. Don't be shy here. Pull as though you're performing a steep turn and load the airplane with 2 to 2.5*g*. Fewer *g*'s than this will result in too much speed being dissipated in the transition to the roll attitude; more *g*'s than this are unnecessary. Pull to the recommended nose-up attitude. Stop! Glue the nose to an imaginary point in the sky for a beat.

PART 3A: LEFT ROLL

Smoothly but smartly drive in full left aileron. Don't let anything stop you from reaching the control limit. This may require pressing your leg against the side of the cockpit to allow additional deflection. No matter what else happens from this point on, strive to apply more and more aileron as the roll proceeds, even if you believe you already have full deflection.

Simultaneously squeeze in a bit of left rudder as you drive in the left aileron. The purpose is to cancel the adverse yaw associated with our large and rapid aileron input. Insufficient left rudder here will cause the nose to yaw right, retarding the roll rate; excessive rudder, on the other hand, will slice the nose downward prematurely, resulting in a faster rate of altitude loss. Once applied, keep the relatively small rudder input where it is for now.

The airplane starts rolling the instant we move the stick laterally. By the time the ailerons are pinned against the control stops, we are well on our way to inverted in the Decathlon. Applying a small amount of forward elevator as the airplane nears inverted will reduce the rate at which the nose collapses toward the horizon. We're not trying to prevent the nose from falling here; we just want to slow it down a little. So as soon as the ailerons are fully deflected, ease in a touch of forward elevator. Think of the aileron-elevator control movements as though you

Pitching up 20 - 30 degrees prior to entering the aileron roll is critical to a successful maneuver.

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Above Maintaining full aileron deflection during the roll takes some practice.
Right The view as the airplane nears the first 90 degrees of rotation during a left aileron roll.

are shifting into gear in a car with manual transmission. Move the shift lever all the way over, then forward into gear.

The push during the roll, however, should be soft. Use mostly your wrist to displace the elevator rather than involving your whole arm. And although the stick only travels forward an inch or two, aim that push toward your kneecap. The ailerons must remain in contact against the control stops throughout. Release the soft push as soon as you see the airplane pass through the inverted position. "Release" is the operative word; do not pull back on the stick in the literal sense. Simply stop pushing forward.

The roll should now be within 90 degrees of wings-level flight. You'll certainly see the nose falling below the horizon here—this is perfectly normal! Accept the nose-low attitude. Resist the urge to try to pull the nose "up," as this invariably leads to two problems: First, you'll instinctively release the aileron input as you pull, thereby slowing the roll or even stopping it in a bank. Second, you'll pull the nose off the original heading. Keep that stick firmly against your left leg no matter what.

Instead, let's feed in additional left rudder as we advance toward upright flight. More left rudder applied during the last quarter of a left roll—especially the last 45 degrees of roll—offers several advantages:

Left rudder is now in the "top rudder" position and can be used to prevent the nose from dropping any farther below the horizon;

The supplementary left rudder cancels adverse yaw, which has increased somewhat since we first started the maneuver;

Our heading will be preserved.

Smoothly but continuously depress the left rudder pedal until reaching wings-level flight. The more rudder you can feed in by the time you return to upright flight, the better. Provided the ailerons remain fully deflected as you stretch your leg out on the rudder pedal, you should sense a slight increase in the roll rate. The roll rate petering out, or stopping altogether, is a sure sign that you're releasing the aileron (and probably pulling aft on the stick) as the rudder is being applied. If you sense this, nudge the stick forward a tad and reapply the aileron. Maintain the aileron and rudder inputs until the wings are exactly level before neutralizing the controls.

PART 3B: RIGHT ROLL

The right aileron roll calls for the mirror image of the inputs applied during the left roll—right aileron and right rudder throughout. But with other things being equal, the right roll will tend to proceed at a slower roll rate for two reasons: First, the airplane is rolling against the engine effects in the Decathlon. Second, the biomechanics involved with the application of full right aileron (right hand on the stick) result in a rather awkward arm movement compared to a left aileron input. Be more patient and more persistent with all of your inputs when rolling right. If necessary, use two hands on the stick when applying right aileron.

PART 4: EXIT

Unlike one-turn spins where we must begin the recovery before reaching the intended exit heading, aileron rolls stop instantly when we neutralize the roll inputs. Be patient. Hold the aileron and rudder until the last possible second, even though the nose might be well below the horizon. We must complete the roll in its entirety before worrying about the pitch attitude. Simultaneously neutralize the aileron and the rudder upon reaching wings-level flight.

Pause for a beat, then return the nose to a level flight attitude if need be. Pitch to level with the same pull used in the entry to the roll. Now verify that your heading is still the same as when you started. If the roll went well, including appropriate rudder and elevator corrections, your exit altitude should be close to your starting altitude, too. The *g*-meter should register +0.5 as the minimum and +2.5 as the maximum *g*'s encountered. The heavier *g* comes during the entry and exit pulls; the lighter *g* during the soft push applied once the ailerons are fully deflected.

The nose of the airplane follows a curve during the roll itself; the stick, however, moves in straight lines separated by right angles in our Decathlon. Changes in elevator and aileron are distinctly separate from one another, with inputs occurring along only one control axis at a time. Control movements have a definite rhythm to them as well. All the while, we're actively looking straight ahead at a reference point around which the nose is rolling.

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SOME COMMON TENDENCIES

Problems pilots might have when performing the aileron roll include:

1. Pitching the nose up too slowly and not high enough prior to starting the roll. Pull as if performing a steep turn, and raise that nose a healthy 20-30 degrees above the horizon.

2. Beginning the roll before completely releasing the aft elevator used during the entry pitch up. Pull the nose up, freeze it there for a second, then apply full aileron.

3. Slow, hesitant, or incomplete application of full aileron. When it's time to roll, accelerate that stick from the neutral spot to full aileron deflection in one smooth-but-rapid movement.

4. Applying the forward elevator too late and too vigorously. The push on the elevator should be soft and applied almost immediately upon achieving full aileron deflection. It's better not to nudge the elevator forward at all than to overdo it. Think of the elevator and rudder actions during the roll merely as "adjustments;" hence, apply them subtly and smoothly. If you feel yourself shift in your seat as a result of a corrective action, chances are the input was too aggressive.

5. Pulling aft on the stick in lieu of, or while feeding in, additional rudder in the last part of the roll. Resist the urge to pull near the end of the roll. Focus on aileron and rudder only until wings-level flight. Finishing off heading to the right following a left roll, or off heading to the left following a right roll, are symptoms of pulling near the end of the maneuver.

6. Stopping the roll 10-20 degrees too early. If you find yourself consistently under-rolling, mentally tell yourself to perform a 370-degree roll.

7. If anything should go wrong during the roll, apply more aileron! Keep rolling until you are upright once again. Address the pitch attitude after the wings are level. Moreover, if the nose falls 30 degrees or more below the horizon, or if the ambient engine noise rises noticeably, reduce the power.

WORDS OF CAUTION

Please don't even think of rolling an airplane unless all of the following are satisfied: You've received dual instruction in the maneuver first, you are proficient with the maneuver, it's approved in the particular airplane, you are operating within the aerobatic category envelope, and you have plenty of altitude in the appropriate airspace. Furthermore, FAR 91.307 stipulates that no pilot carrying a passenger may execute an intentional maneuver that exceeds 60 degrees of bank relative to the horizon unless all occupants are wearing approved parachutes.

Rolling maneuvers tend to be the most common trigger for motion sickness in the majority of pilots (especially on days with a poorly defined horizon).

Rolling maneuvers tend to be the most common trigger for motion sickness in the majority of pilots (especially on days with a poorly defined horizon). Be sure to focus your vision outside of the cockpit during your rolls. Take it easy on passengers as well by limiting the number of rolls you'll do to them. Either that or carry lots of airsick bags — but rest assured, making your passengers uncomfortable is no way to endear them to the magic of aerobatics (or to keep your cockpit clean and smelling fresh).

No matter how good a stick you think you are, performing an unapproved maneuver outside of the aerobatic category places you at higher risk should you botch the attempt. For instance, the structural limits are -1.52 to +3.8*g* with the flaps up in the normal category, compared to -5.0 to +6.0*g* in our featured Decathlon's aerobatic envelope. Attempting to roll the wrong airplane at low altitude similarly has a slim margin for error and can be a recipe for disaster. Let's fly smart out there.

The basic loop in an RV-7 is up next.

Rich Stowell is a NAFI Master Instructor-Aerobatics and author of the new book *The Light Airplane Pilot's Guide to Stall/Spin Awareness.* E-mail your thoughts and ideas to **rich@richstowell.com.**

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CALENDAR OF EVENTS

Check www.IAC.org for current listings.

Ohio Aerobatic Open (Mid-America)
Friday, June 22 - Saturday, June 23, 2007
Practice/Registration: Thursday, June 21
Power: Primary through Unlimited
Location: Union County Airport (MRT): Marysville, Ohio
Director: Gordon Penner **Website:** *www.IAC34.com*
Tel: 513-520-6065 **E-Mail:** *gpenner@cinci.rr.com*
Enterprise Rent-A-Car available at this location.

Apple Cup (Northwest)
Friday, June 22 - Saturday, June 23, 2007
Practice/Registration: Thursday, June 21
Power: Primary through Unlimited
Location: Ephrata Municipal Airport (EPH): Ephrata, Washington
Director: Ann Marie Ward **Website:** *www.IAC67.org*
Tel: 206-579-6866 **E-Mail:** *amward@relparts.com*

Henry Haigh Challenge Michigan Aerobatic Open (Mid-America)
Friday, July 6 - Sunday, July 8, 2007
Practice/Registration: Friday, July 6
Power: Primary through Unlimited
Location: Jackson County Airport-Reynolds Field (JXN): Jackson, Michigan
Director: Dick McDonald **Website:** *http://MyWebPages.Comcast.net/iac88/*
Tel: 810-632-7395 **E-Mail:** *rmac@cac.net*

9th Annual Okie Dust Devil (South Central)
Friday, July 13 - Saturday, July 14, 2007
Practice/Registration: Thursday, July 12 - Friday, July 13
Power: Primary through Unlimited
Location: Thomas P. Stafford Airport (OJA): Weatherford, Oklahoma
Director: John Creswell
Tel: 580-774-1971 **E-Mail:** *creswell@classicnet.net*

Salem Regional (Mid-America)
Saturday, July 14 - Sunday, July 15, 2007
Practice/Registration: Thursday, July 12 - Friday, July 13
Power: Primary through Unlimited
Location: Salem Leckrone Airport (SLO): Salem, Illinois
Director: William Perman
Tel: 636-236-8691 **E-Mail:** *perman@slu.edu*

Canadian Open Aerobatic Contest (Northwest)
Friday, July 20 - Saturday, July 21, 2007
Practice/Registration: Thursday, July 19
Power: Primary through Unlimited
Location: Abbotsford International Airport (YXX): Abbotsford, British Columbia
Director: Royden Heays
Tel: 604-646-4860 **E-Mail:** *heaysr@telus.net*

Hill Country Hammerfest (South Central)
Friday, August 3 - Saturday, August 4, 2007
Practice/Registration: Thursday, August 2
Power: Primary through Unlimited
Location: Llano Municipal Airport (AQO): Llano, Texas
Director: Jeffery Poehlmann
Tel: 512-423-5333 **E-Mail:** *jeffery@texas.net*

Doug Yost Challenge (Mid-America)
Saturday, August 4 - Sunday, August 5, 2007
Practice/Registration: Friday, August 3
Power: Primary through Unlimited
Location: Cumberland Municipal Airport (UBE): Cumberland, Wisconsin
Director: Mike Niccum
Tel: 952-652-2245 **E-Mail:** *PGNic@AOL.com*

Beaver State Championship (Northwest)
Friday, August 10 - Saturday, August 11, 2007
Practice/Registration: Thursday, August 9
Power: Primary through Unlimited
Location: Eastern Oregon Regional Airport at Pendleton (PDT): Pendleton, Oregon
Director: Robert Toppel & Bob Harris
Website: *www.IAC77.org*
Tel: 503-292-6630 **E-Mail:** *rboydt@comcast.net*

Kathy Jaffe Challenge (Northeast)
Friday, August 24 - Sunday, August 26, 2007
Practice/Registration: Thursday, August 23
Power: Primary through Unlimited
Location: Flying W Airport (N14): Lumberton, New Jersey
Director: Ron Chadwick
Website: *www.IAC52.org*
Tel: 732-671-6089 **E-Mail:** *bubbaron@comcast.net*

Gulf Coast Regional (South Central)
Saturday, September 1 - Sunday, September 2, 2007
Practice/Registration: Thursday, August 30 - Friday, August 31
Rain/Weather: Monday, September 3 - Monday, September 3
Power: Primary through Unlimited
Location: Houston Executive Airport (78T): Katy, Texas USA
Director: Dan Clark CD **Website:** *http://www.iac25.com*
Tel: 713-932-8400 **E-Mail:** *d.clark@asepusa.com*

Happiness is Delano (Southwest)
Saturday, September 1 - Sunday, September 2, 2007
Practice/Registration: Friday, August 31
Power: Primary through Unlimited
Location: Delano (DLO): Delano, California
Director: Bob Meyer
Tel: 661-822-0894 **E-Mail:** *rmeyer0844@aol.com*
Enterprise Rent-A-Car available at this location

Harold Neumann Barnstormer (South Central)
Friday, September 7 - Saturday, September 8, 2007
Practice/Registration: Thursday, September 6
Rain/Weather: Sunday, September 9 - Sunday, September 9
Power Categories: Primary Sportsman Intermediate
Location: New Century Airport (KIXD): Olathe, KS USA
Director: Paul Thomson
Tel: (913) 638-6221 **E-Mail:** *info@iac15.org*
Enterprise Rent-A-Car available at this location

Illinois State Open (Mid-America)
Friday, September 7 - Sunday, September 9, 2007
Practice/Registration: Friday, September 7
Power Categories: Primary, Intermediate and Unlimited
Location: Illinois Valley Regional Airport (VYS): Peru, Illinois
Director: Bob Hart **Website:** *www.IACChapter1.com*
Tel: 815-363-8967 **E-Mail:** *hrtlndfrm@aol.com*
Enterprise Rent-A-Car available at this location.

East Coast Aerobatic Contest (Northeast)
Saturday, September 15 - Sunday, September 16, 2007
Practice/Registration: Friday, September 14
Power: Primary through Unlimited
Location: Warrenton-Fauquier Airport (W66): Warrenton, Virginia
Director: Scott Francis
Tel: 703-618-4132 **E-Mail:** *s.francis@ieee.org*

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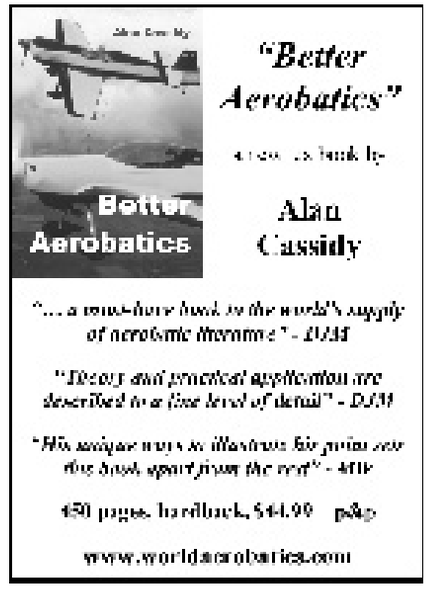

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NEWSBRIEFS

FAA Approves Training with Columbia 400

The Columbia 400 will loop and roll at air shows this summer.

The Tutima Academy of Aviation Safety has been granted approval by the FAA to conduct Executive Pilot Awareness Training (E-PAT) with the Columbia 400. This approval marks the first time that a standard category aircraft will be used for unusual attitude training.

Tutima Academy founder, aerobatic pilot Sean D. Tucker, one of the world's most-recognized and most-decorated air show performers, will demonstrate loops, various rolls, spins, and Immelmanns using the Columbia. The Columbia 400 unusual attitude training demonstrations, which launched at the Sun 'n Fun Fly-In at Lakeland, Florida, will take place at additional shows in 2007, including Andrews Air Force Base Air Show on May 19-20, the Northwest Regional EAA Fly-In in Arlington, Washington, on July 14-15, and EAA AirVenture Oshkosh, in Oshkosh, Wisconsin, from July 23-29.

To find out more about the E-PAT program offered at Tutima Academy of Aviation Safety, please visit the website at *www.TutimaAcademy.com*. To learn more about the Columbia 400 and where the demonstrations will occur, visit *www.FlyColumbia.com*.

New Sonex Sport Acro

Sonex Aircraft LLC has unveiled the new Sonex Sport Acro. Much like the Sonex Sport Trainer, the Sport Acro is a hybrid of feature and option selections from the existing Sonex design, making it suitable for enhanced aerobatic performance. This new model offers an affordable entry-level aircraft for Primary and Sportsman class aerobatic competition.

The primary feature of the Sonex Sport Acro is the increased-span ailerons. These larger ailerons are expected to increase the crisp Sonex roll rate to a competition-worthy level. Sonex Aircraft LLC expects the Sport Acro to achieve aerobatic competition-class performance on just 80 hp. The prototype Sport Acro has an AeroConversions AeroVee 2.0 80-hp engine under the cowl. Using an AeroVee engine and requiring a minimum of optional equipment, a pilot can build an aircraft for entry-level aerobatic competition for just $25,000 complete. Learn more at *www.SonexAircraft.com*.

Sonex Aircraft, LLC

The Sonex Sport Acro promises affordable competition-worthy performance.

12-Figure Advanced for the U.S. Nationals

With a vote of 8 to 5, the IAC board ruled this weekend that the U.S. Advanced Aerobatic Team aspirants will be required to fly a 12-figure Free at the U.S. Nationals. Those not wishing to declare for the team may fly a 15-figure sequence. The board felt it unlikely any pilots would choose this option. CIVA rules will be followed for the Advanced and Unlimited categories at the U.S. Nationals, to be held September 23-28 at Grayson County Airport in Texas. More details regarding the Nationals will be posted to the U.S. Nationals website at *www.USNationalAerobatics.org*.

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World Record-Setting Pilot and Lycoming Take on Tough Terrain

Hans Georg Schmid is taking flight to another dimension with the support of a Lycoming IO-580-B1A, 315-hp engine. Schmid already has more than 162 aviation world records under his belt. He will now attempt another world record by flying around the world, twice, over both of the earth's poles and the four corners of the globe with his custom-built Express experimental aircraft.

The pole-to-pole adventure will take Schmid across some of the most desolate landscape on earth, making reliability and safety the number one priority. "A Lycoming engine was the only choice for me," Schmid said. "I want the confidence of knowing I have a Lycoming up front."

Schmid's record attempt is targeted to be completed in a three-month time frame that takes him over the North Pole twice during winter and total darkness, as well as over the Pacific Rim during typhoon season.

"Lycoming is proud to support the circumnavigation efforts of Hans Georg Schmid," said Dennis Racine, Lycoming director of marketing and customer leadership. "The airplane and the world record seemed like a very good fit for the Lycoming 580 series engines," he added. The project is dependent on sponsors to be successful; if you would like more information about sponsoring or supporting The Polar Frontier: North, South and Beyond 2007, contact *hgschmid@bluewin.ch*.

FAA Denies Petition

IAC efforts to request an exemption to allow IAC contest participants to fly aerobatics without carrying the pilot's operating handbook aboard the aircraft and to carry over the contest fuel exemption (10 minutes) into practice flights for contests and practice areas was denied. The denial indicates the FAA does not have the resources to fully investigate all petitions and therefore terminated it due to the importance of other petitions. The denial may be found at *http://dmses.dot.gov/docimages/pdf101/467860_web.pdf*. The original rule-making petition may be found at *http://dmses.dot.gov/docimages/pdf100/443852_web.pdf*. IAC would like to thank those who took the time to comment on this exemption and we plan to submit the request again on October 1, 2007, the beginning of the fiscal year for the FAA.

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meet a member

Photos courtesy Loren Smith

Name: Loren Smith
Age: Older than the hills
Occupation: President and CEO of a manufacturing company in Minneapolis
Location: St. Paul, Minnesota
Certificates held: Commercial, Flight Instructor with Instrument, Single- and Multi-Engine Land Ratings

What types of aircraft do you fly?

I am proud to own the very first Panzl, the Staudacher derivative built by Greg Panzl of Onsted, Michigan.

What other types of aircraft have you flown?

I've flown just about every typical competition aircraft, instructed in a Champ for several hundred hours, and flew an S-2B in competition for many years.

How long have you been flying aerobatics?

I got tired of the $100 hamburger flights in a "Spam can" and decided to learn to fly a tailwheel aircraft back in the '80s. The instructor at the FBO I located just happened to be a former WWII Corsair pilot who taught a great introduction to aerobatics course. That instructor, Marv Dahlgren, opened up a whole new world for me that never gets "old."

How long have you been flying at contests?

I took the plunge and purchased a brand new S-2B from Aviat in the fall of 1993, and the first contest I flew was Chapter 61's Salem contest in July of 1994. It was my first time ever at a contest, and I had never flown in a box before. Somehow, I had the good fortune of taking both Best First Time Sportsman and First Place Sportsman against a field of about 12 competitors.

What's your favorite part of a contest?

I love the 4-Minute Freestyle. It's the feature of a contest that draws spectators and is the most fun to watch. As a judge, it's the only chance one gets to put a score on what has become an air show performance.

Loren Smith is the proud owner of the very first Panzl.

What do you do for fun besides flying?

My wife, Cynthia, and I really enjoy nature and hiking. We travel far and wide to hike in state parks.

What is the best tip for people who want to start competing?

Joining IAC and participating in a contest as a volunteer will open up the opportunity to meet people with similar interests, a chance to ask a lot of questions, and see what kind of airplane is best suited for you and your plans for aerobatic flying. Take a volunteer job on the judges line as a recorder to begin with; this is the best spot to meet and talk with experienced aerobatic people.

What is your most challenging maneuver?

I had some difficulty getting up the nerve to first attempt the Iomcevak. It's just counter-intuitive to take the stick and slam it all the way forward and kick the rudder all at the same time while at a low airspeed.

Who do you admire in the aviation world?

Clyde Cable is someone I think represents the ultimate IACer. One of the finest judges ever in the sport, clearly the best chief judge of any I have worked under, a fierce competitor, winner of the L. Paul Soucy Award, builder of his own aerobatic mount, and career airline pilot. . . What more can one say about a truly remarkable guy?

What is your favorite flying movie of all time?

Flight Commander, a relatively obscure 1930 movie directed by the legendary Howard Hawks about WWI. This movie has far better in-flight photography than *Hell's Angels* and doesn't have the usual sappy love story. Great aerobatic in-flight photography and lots of WWI planes make this movie a must-see.

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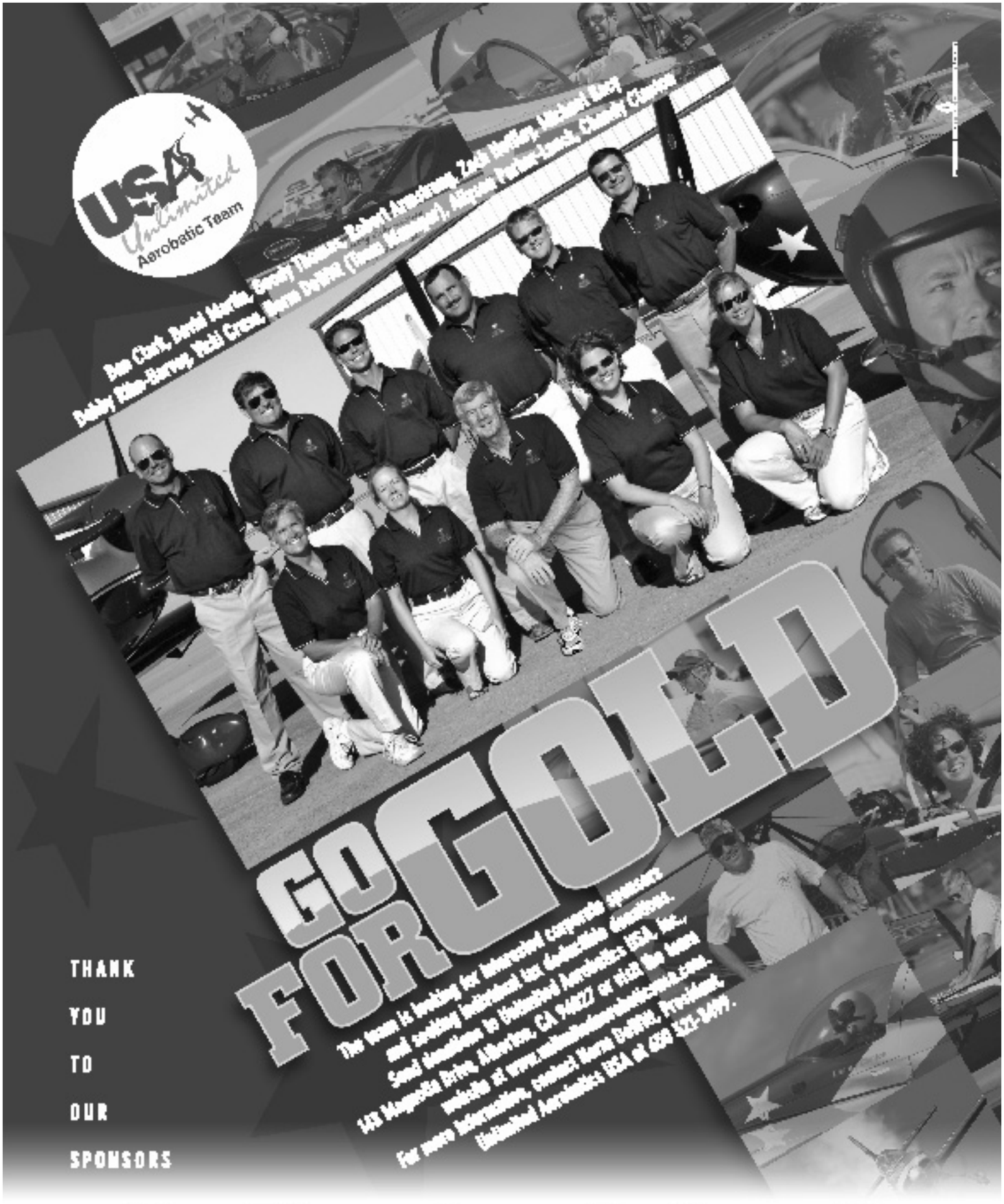

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