

MARCH 2008

SPORT *Aerobatics*

OFFICIAL MAGAZINE OF THE INTERNATIONAL AEROBATIC CLUB

The Intermediate Sequence in a Great Lakes

- Crop Duster to the Rescue
- Calendar of Events
- Aerobatics and Airsickness





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Howard Kirker puts his Great Lakes through the paces of the 2008 Intermediate sequence. (Photo by Tyson Rininger, www.tvrphotography.com)

SPORT Aerobatics

OFFICIAL MAGAZINE OF THE INTERNATIONAL AEROBATIC CLUB

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The International Aerobic Club is a division of the EAA.



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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.



Judson Bartlett

LETTER from the EDITOR

by Scott Westover

Bonding over energy management

Last month I was asked to give a speech to the medical staff of a major hospital in New Hampshire. At first I was slightly bewildered by the invitation. What does flying and aerobatics have to do with medicine? However, after talking with the person who extended the invitation, I soon realized that flying an airplane and caring for patients demand the same basic skill—the ability to think about the world in terms of energy management.

For a pilot, the ability to manage the complex relationships between gravity, lift, drag, and thrust dictates the outcome of each flight. For a physician, those same forces are present every day in private practice or the operating room. And doctors are managing those forces with passengers on board in the form of patients, concerned family members, regulatory agencies, administrators, and insurance companies—and that's just a few of the ticket holders.

The story that I chose to share with the group was about my first solo aerobatic practice flight. It was a humbling adventure that started with a couple of loops and rolls that made me feel like Chuck Yeager. However, my confidence during that flight grew beyond my skill level, and soon I was attempting a more advanced maneuver. Shortly thereafter I was practicing my recovery technique to survive an inadvertent inverted spin. The point of sharing that particular story was this: At some point before the recovery I had to make a conscious decision to move my right hand away

from the emergency door lock and my left hand off my harness release in order to fly the airplane. My head knew how to get out of the mess I was in and that I had time to do so given my altitude. But my instincts were still unfamiliar with the environment of an aerobatic cockpit in an unexpected situation. With both of my hands busy there were no hands left with which to fly the airplane. That's no way to recover from anything.

I could tell from the response of the crowd that they understood the message. While everyone today understands the benefits of teamwork, there are times when self-reliance is critical. During my flight no one could recover for me. I had to do it myself prior to reaching my hard deck for bailing out. The decisions were mine. The consequences were mine. The same is true for that surgeon who is performing a complex procedure or the pediatrician making a critical decision about a treatment plan for a vulnerable patient. They are alone in the cockpit and relying on their training and decision-making to deliver a safe flight for that patient and his or her family.

I have always known that the decision to learn to fly changed my life. I have also maintained for a long time that the skills learned in the cockpit prepare us to live better lives if we can learn to think beyond our airplanes. It was a pleasure to share that insight with a group of fellow students of energy management. Fly safely!

**Sport Aerobatics is your magazine. To submit news, comments, articles, or article ideas, please send them to:
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PRESIDENT'S PAGE

by Vicki Cruse • IAC 22968
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Vicki Cruse

Intermediate 2008

A few thoughts on this year's sequence

Since the fall board meeting and the approval of the Knowns for 2008, I have personally been approached by at least four members with concerns about the Intermediate sequence. I felt it necessary to provide some background on this sequence and how it was chosen. In this issue, Howard Kirker and Malcolm Pond take you through the sequence from two different perspectives. We've never done a "How to Fly" piece quite like this, and we hope you find it helpful.

The sequence was designed by an IAC veteran who has flown competitively for more than 30 years. Prior to submitting the sequence to Brian Howard, the Rules Committee chairman, the submitter called to ask if I would look over a proposed sequence. He also asked if I knew anyone with a grass-roots plane who could "test fly" the sequence and provide feedback on it.

IAC policy states the Intermediate Known sequence should be able to be flown by a 150-hp Decathlon. The problem is that currently there are no Decathlons flying Intermediate due to fuel tank issues. When you take a look at the Intermediate category flown last year at Nationals, 57 percent of the pilots flew a Pitts or an Eagle, indicating the representative aircraft for Intermediate should perhaps be an Eagle or four-cylinder Pitts. (The IAC board will review this policy at the spring board meeting, as suggested by a member.)

I suggested the test plane should be an aircraft that might be

considered even more grass roots than a Decathlon. I thought of Howard Kirker, a Great Lakes pilot, who began flying Intermediate in 2006. I contacted Howard, explained what we needed, and asked him if he would fly the sequence and get back to me. A little more than a week later, Howard did get back to me with his report on the sequence in detail. Despite his initial reservations, he said, "Bottom line, it was completely flyable. I liked it a lot, and it obviously had a great deal of thought put into it regarding energy management. It was Great Lakes friendly, and I can fly it without taking a break, which is very unusual. Many of the figures are new or different from typical Intermediate, but proved not to be a problem.... I expect there may be some concerns regarding the extended-time and high-g pulls in Figures 2, 3, and 4."

Howard did have some recommendations for figures at the end of the sequence that initially were not "Great Lakes friendly." These were incorporated into the final sequence submission. After being contacted by a member with concerns about flying it in a high-performance aircraft, I asked Malcolm Pond to fly the sequence in his Edge. His evaluation, along with some thoughts on dealing with the g's, is also in this issue.

Admittedly, this Intermediate sequence is not a sequence to be taken lightly, and it is not a category sequence where the pilot can decide two days before the contest to start

practicing. This sequence requires some thought—from strategic, g-tolerance, and practice standpoints. Most coaches recommend initially breaking down a sequence into mini-sequences of two to three maneuvers, rather than practicing an entire sequence. This sequence reinforces that concept.

The Rules Committee has decided there is a need for a Sequence Evaluation Committee composed of competition pilots who are well recognized for their skills. CIVA does this with Advanced and Unlimited sequences. Members will still review the sequences and be able to make choices, but they will have the recommendations of people such as Giles Henderson and John Morrissey.

Some year's sequences are easier than others, and none will please everyone. There will always be a learning curve no matter which category one is transitioning to, be it Sportsman to Intermediate, Intermediate to Advanced, or Advanced to Unlimited. One never knows the true "flyability" of a sequence until you fly it and use past experience (and a little black book of notes from previous flights) to help you with it. Many a Freestyle has looked great on paper but was a terrible sequence when flown. The Intermediate sequence is a challenge, yet it's flyable in a true grass-roots airplane. Take it slow and learn the sequence in pieces at altitude. Most of all, be safe no matter what category you fly. ☺

NEWSBRIEFS

2007 Doug Yost Memorial Aerobatic Scholarship



Courtesy IAC 78

Max Kahlhamer is the recipient of the '07 Doug Yost scholarship.

In 2001, Doug Yost was a young aspiring IAC competition pilot flying in his first year of competition when his life was tragically ended in a motorcycle accident. In 2002, his family established a scholarship grant to be awarded annually in his memory. The

purpose of this scholarship is to promote air safety through aerobatic training.

Max Kahlhamer, a senior at the University of North Dakota (UND), has been named as the scholarship recipient for 2007. In his personal statement about why he was eager to receive the scholarship grant, Max said, "I am honored to receive this scholarship because it will give me a better understanding of aerobatic flight and tailwheel training. I believe that all pilots should have training in conventional gear aircraft. This aerobatic course will help me to broaden my horizons and increase my recognition of unusual attitudes. I am excited to take up this course and perhaps join the UND aerobatic team in the collegiate IAC competition."

Max holds a commercial certificate and multiengine and instrument ratings. He is now working to become a certificated flight instructor. The scholarship is administered by IAC 78, and more information is available at www.IAC78.org and www.iac.org/programs/scholarships.

Sun 'n Fun Moves 'Splash-In'

Sun 'n Fun is moving the popular "Splash-In" portion of its annual fly-in from Lake Parker in Lakeland, Florida, to nearby Lake Agnes in Polk City, which is adjacent to the internationally known aviation attraction Fantasy of Flight.

"While the Sun 'n Fun Fly-In itself will proudly remain at Lakeland Linder Regional Airport, the 'Splash-In' portion will be held at Fantasy of Flight," said Sun 'n Fun President and Fly-In Chairman John Burton. "Fly-in volunteers and members of the Sun 'n Fun staff have been working with Kermit Weeks and his team at Fantasy of Flight for the past several months to make this exciting possibility a reality. We think this will have a very positive impact on safety, logistics, and participation at the Splash-In. At the same time, it will offer an opportunity for Splash-In participants and their guests to enjoy the short hop to Fantasy of Flight and to enjoy the attraction's incredible facilities."

The Sun 'n Fun Fly-In will be held April 8-13 at Lakeland Linder Regional Airport in Lakeland, Florida. The Splash-In portion of the Sun 'n Fun Fly-In is a two-day event and is designed especially for amphibians and seaplanes. The Splash-In portion of the fly-in will take place this year on Thursday and Friday, April 10 and 11.

Additional information on the 2008 Sun 'n Fun Fly-In, including the Splash-In, can be found on the official Sun 'n Fun website www.Sun-n-Fun.org.



Clay Smith

MT-Propeller broke all previous production records in 2007.

MT in 2007: Another Record-Breaking Production Year

MT-Propeller would like to say "thank you" to all of its customers who made 2007 another successful business year. The company broke all previous production records: 1,500 constant-speed propellers and 5,222 propeller blades were manufactured and delivered, which add to the total of 10,057 constant-speed MT propellers flying worldwide as of last year. Additionally, 222 fixed-pitch propellers were manufactured and delivered to customers. Looking ahead to 2008, the company pledges to continue to make every effort to produce the highest quality aviation product for satisfying its customers.

IAC Works to Remove Barriers for Aerobatic Pilots

The International Aerobatic Club and EAA are working directly with the FAA to obtain a categorical exclusion from overly burdensome environmental impact requirements that are currently proposed when pilots apply for an aerobatic practice area box. This development came during the annual EAA/FAA Recreational Aviation Summit on January 23, 2008, at the EAA Aviation Center in Oshkosh.

IAC President Vicki Cruse represented the organization during the session. This annual meeting, unmatched anywhere else in the aviation community, included key aviation issues such as general aviation safety, aircraft certification, flight standards, and aircraft operations for aerobatic, vintage, amateur-built, and warbird aircraft.

Nick Sabatini, FAA associate administrator, led the FAA group that numbered more than a dozen agency officials. It was an opportunity to review progress since 2005, when the IAC took proactive measures by quantifying noise levels in response to isolated public noise complaints. The goal was to develop legally defensible standards the FAA could use for the approval of aerobatic

practice areas, as well as to mitigate noise complaints from the public in those areas. "Unfortunately, a draft document emerged from the agency that would require an applicant for an aerobatic practice area to research a plethora of unrelated environmental factors such as light emissions, endangered species, water and air quality, location of historic and cultural landmarks, and other requirements typically required of projects such as runway extensions or airport construction," Cruse said. "While no standards were set with respect to noise, an application was created that, to date, no private citizen has been able to complete."

The FAA has requested additional environmental studies of six aerobatic practice boxes. IAC's government representatives will gather this information in their respective regions. As a result of these studies, additional data will be collected to affirm that ground-based environmental impacts are not applicable to aerobatic boxes, a key finding in leading to a categorical exclusion. To follow this important issue, visit www.IAC.org where updates will be posted.





A black and white photograph of an aerobatic harness system. The harness is made of dark material with multiple straps and buckles. A vertical strap on the left side has the text "STRONG PARACHUTES" printed on it. The harness is shown against a white background with black diagonal stripes on either side.

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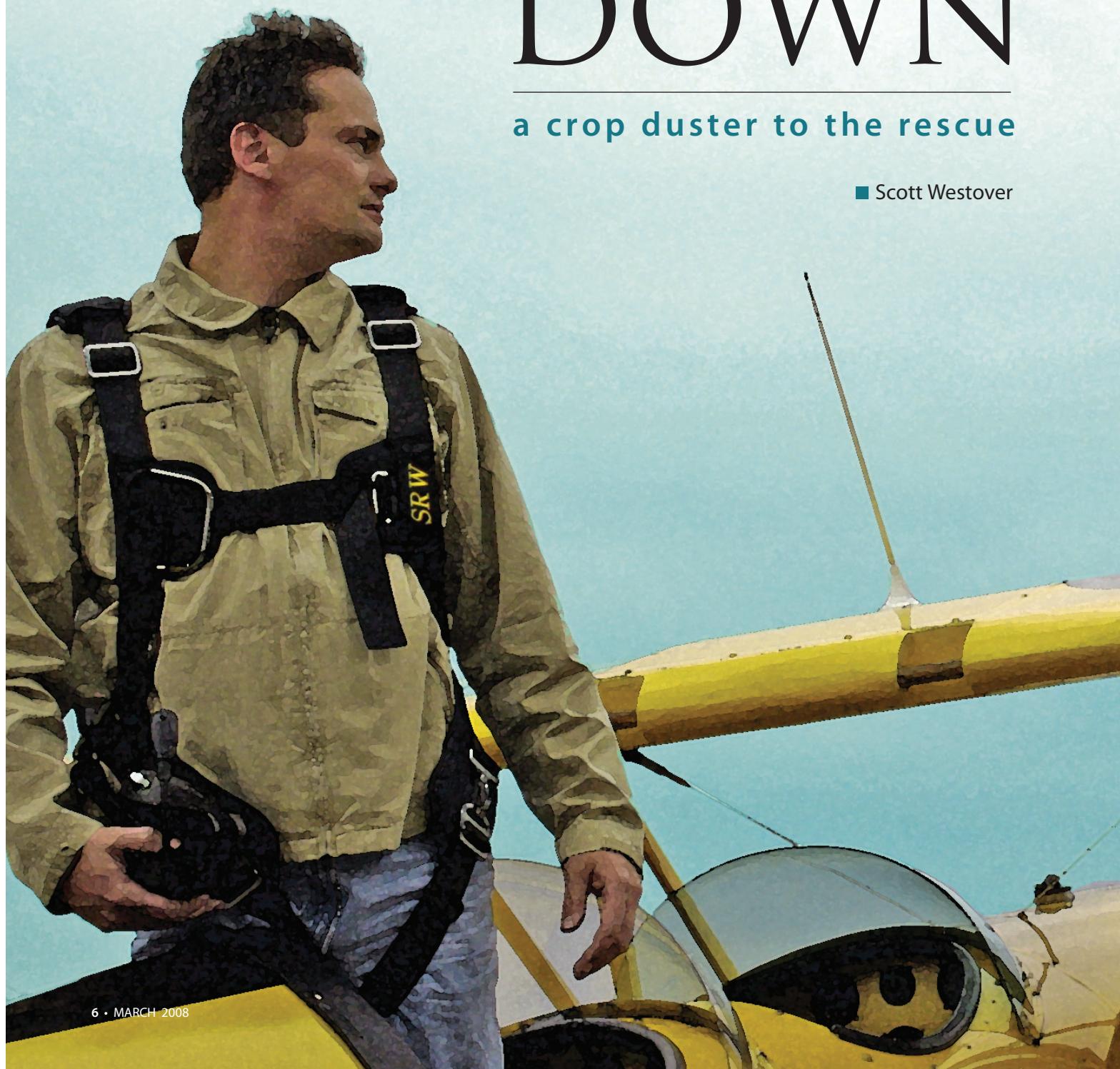
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WHAT GOES UP MUST COME DOWN

a crop duster to the rescue

■ Scott Westover



For many pilots the decision to learn how to fly is more emotional than rational. For me, it was a chance to cheat time and get to know my father as he had been as a younger man. Before his flying career was interrupted by medical issues in his 30s, he had been logging hours as a crop duster, ferry pilot, flight instructor, and corporate pilot. His wings were clipped when I was a young boy, and I grew up with stories about the kind of adventure that can only take place in and around flying machines.

As an adult, I decided to learn to fly in an effort to better understand my father as a person. I figured the best way to appreciate his perspective would be to see the world from the vantage point he loves the most, which is through a windscreens at altitude. In my late 20s I learned to fly in secret, sharing the accomplishment with my father only after I had passed my checkride. I will always remember the first takeoff with him in the right seat. I was nervous until we were in the air—after that we were just two kids sharing an adventure of our own.

After I became a pilot, the stories my father had shared took on new meaning for me. I asked him to retell his favorites, especially about his days dusting crops. My flying goals started to include aerobatics as Dad's stories about crop dusting led to a natural curiosity about the control envelope. As my interest grew I pursued professional instruction and continued to fly with my father as much as possible in our newly acquired aerobatic trainer. Watching the tattered leather collar of his trusty flying jacket flip around in the open air as we rolled the Acro Sport for the first time is something that I think about every time I climb into the rear hole. My dad is with me on every flight despite the fact that he and Mom recently traded their New Hampshire snow tires for year-round Arizona sunscreen.

I had been flying aerobatics for about three years when an odd thing happened. I took the airplane up

for the annual New England ritual of a spring "shakedown" flight to make sure that everything works after a winter of minor repairs and maintenance. The flight itself was great, but the landing was terrible. Despite some recent dual instruction, the airplane bounced and screeched down the runway. I reassured myself with the familiar, "As long

Dean Westover, Sr.

as takeoffs equal landings you're ahead." But then there was a second rough return to earth, followed by a third and fourth. I was starting to think about finding a set of training wheels for the airplane.

Unable to figure out what I was doing wrong, I called my father and explained the problem. From 2,500 miles away he listened and offered advice. I applied his suggestions with no improvement. In fact, things got worse. I was increasingly depressed, and being unable to safely land even as the aerobatic maneuvers improved was a major source of frustration. I found that I was dreading the attempt at landing as soon as I was airborne. Crisp figures don't seem to matter much if you can't land the airplane.

One evening after a flight I flipped open my phone and made the standard call to my father from the hangar. In frustration I blurted, "You should just fly out here and help



"AFTER I BECAME A PILOT,
THE STORIES MY FATHER
HAD SHARED TOOK ON
NEW MEANING FOR ME."

Judson Bartlett



Courtesy Dean Westover, Sr.



Scott Westover

UPPER: As an instructor, Dad helped hundreds of pilots to earn their wings. **LOWER:** The image of my father's collar fighting the wind will be with me forever.

me figure out what I am doing wrong.” My father had logged thousands of hours as an instructor, and if anyone would be able to make a diagnosis and then help me to fix the problem, I was sure that he could. To my surprise my father replied that he would come out of retirement if I could pick him up at the airport in a few days. Right then we set aside four days in June to fly as much as we could.

I picked up my father on a Wednesday night, and by Thursday morning we were strapped into the airplane and thundering down the runway. After talking through landing proce-

dures on the ground, we were in the practice area plowing through a series of drills that I thought I had already mastered. We worked on the basics of establishing and controlling glide speed and the rate of descent. With him acting as my safety pilot we put the airplane in slow flight and simulated the landing approach at a safe 5,000 feet above the ground. When I was flying with enough precision to satisfy my instructor we turned back to the airport. Just the act of heading toward home base had me sweating. I desperately wanted to make a smooth landing, so I began to plan for our

arrival with gusto. If I had looked at my control hand, I am sure that I would have seen my knuckles whiten as I increased my death-grip on the stick—never a sign of a smooth landing to come.

As we set up on the downwind my father was silent. I could tell he was taking it all in so that he could offer suggestions later. When we turned onto the base leg everything began to go wrong. I was too high and waited too long to turn final. I pushed the nose down and my airspeed built up rapidly. When we were about to touch down I was far too fast and fighting a stiff crosswind. Through the intercom I heard my father draw in a breath, and a moment later I understood why.

We hit that runway extremely hard. The airplane was twisting and turning, and screams were coming out of the tires. I had never heard sounds like that before—this landing was worse than anything that had sparked me to call my father in the first place. As I looked out the left side of the airplane, I saw the runway lights disappearing under my wing. I was braced like a little kid and expected the dreaded sound of impact at any time. Despite the chaos of the moment, the conversation inside the cockpit was eerily calm. As the rubber briefly clawed at the pavement, I unconvincingly said, “We’re okay. I’ve got it.” My father matched my tone with, “That’s good. You have it.” I had indeed “had it,” at least with the landing attempt. The power went in, and we went around. The runway lights made one more grab for the airplane as the wing dipped slightly to the left, and then we were clear. “That wasn’t so bad,” I said. “But I am open to suggestions for making it better.” My father wasn’t in a joking mood. His only advice was, “Let’s start by changing runways so the wind is helping us instead of fighting us.”

We switched to a more favorable runway, and my father started to talk a blue streak. As we prepared to enter the traffic pattern on a 45-degree entry to the downwind leg, he quizzed me on all of the elements we had practiced at a safe altitude. He reminded me that the landing starts long before the airplane touches the ground. I calmed down and

things improved. After the series of acceptable landings, Dad and I spent the car ride home from the airport talking about what I had learned. The biggest thing I took away was the understanding that I had been spending far too much time focusing on the landing itself—dreading the touchdown and the accompanying chattering of my teeth—and that I had been rushing through the pattern leading up to the landing to get it over with. When I used the entire pattern to land the airplane and checked my altitude, speed, and power throughout the approach, things went much better. I was more relaxed as the airplane turned final, and I felt very much like the pilot instead of a passenger. While the landings that day still seemed a little rough, they were much improved and, more importantly, they were safe. We would discover an important contributor to the remaining roughness on the second day of crop duster boot camp—a day that the weather kept us in the hangar.

The rain and wind kept us on the ground in the early hours, so we enjoyed a long breakfast. By late morning it looked like the clouds might break, so we made the trip to the airport to be ready if the flying gods decided to smile. Just as the gate closed behind us lightning streaked down, and we both knew there would be no flying that afternoon. Instead of turning around, we went inside the

hangar, and Dad had me “fly” the pattern several times while he watched the control movements from outside of the cockpit. He made some suggestions and then grabbed a broom from the corner.

AS THE RUBBER BRIEFLY CLAWED AT THE PAVEMENT, I UNCONVINCINGLY SAID, “WE’RE OKAY. I’VE GOT IT.”

hangar, and Dad had me “fly” the pattern several times while he watched the control movements from outside of the cockpit. He made some suggestions and then grabbed a broom from the corner.

He instructed me to stay put and then positioned himself well in front

of the left wing. With the broom perpendicular to the floor, he walked toward the cockpit and asked me to yell out when the broom was lined up with the tires. I was wrong three times before I got it right, and that revealed that I did not know where the landing gear was relative to my position in the airplane, making it impossible to know when the wheels

were about to contact the runway on landing. We figured out some cues I could use to improve my timing and visual reference.

After the broom exercise, Dad wandered around to the side of the airplane and asked me to fly the pattern one more time. This time he watched my feet on the rudder pedals by looking down into the front cockpit. Even in my relatively tame trainer, I work the pedals on landing. As I turned final, touched down, and rolled out (yes, he made me do this in real time), Dad noticed that my big feet were activating the toe break when the rudder pedal was depressed. This would certainly cause the airplane to pitch violently and

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reduce stability on the ground. We spent some time working on placing my feet differently, and eventually I found a position that allowed me to use the pedals without hitting the brake. As we all know, it's hard to make progress in life with the brakes on. I could not wait to apply this new technique the following day.

The next morning the rain was gone but the wind remained. I was comfortable braving the wind if that was what had to be done to try out my new technique. We were at the airport early, and after an efficient preflight we were back in the pattern. This time, I was the one shouting out speeds and altitude at different points. As we turned final, my father reached down to his side and put his hands on my toes to remind me to stay off the brakes. That first landing was among the best I had ever made—including those in airplanes where I could see the runway on final. We shot several more smoothies and then landed for lunch.

After lunch we took off again, and this time we left the airport. My father has a lifelong friend named Carl who continues to live on the family farm in Greenfield, New Hampshire, about 20 miles from the field. Eventually

we found the dirt road leading from the highway to the tiny town. As we flew over Greenfield, I asked my father if he would like to take the controls, and his response was to rock the wings immediately.

Soon we were in a precise and descending turn. On the ground, a hay field was clearly in view, and I recognized the layout of the house and barns. I also noticed a tractor slowly pulling a wagon while someone threw on the bales. I knew instantly where we were going, and I could not help but utter, "Just don't hit anything." "No problem," was the response, and the voice belonged to a young and excited pilot instead of a 73-year-old man. Work in the field ceased, and I could see Carl waving up at us. My father waved back with our wings, and I could see the smile on his face even from the rear seat.

Once we were finished playing barnstormer I took the controls and flew to the airport. When we entered the pattern, it was back to serious business. After making about five more acceptable landings, probably the result of keeping my feet off the brakes, we were finished. In four days we had shot about 75 landings, and the performance had gone from barely

survivable to uneventful. As we taxied from the runway back to the hangar, I asked my dad if he wanted to take the airplane around the pattern one more time. He declined, saying that he would like to end a perfect lesson with a perfect landing. As we taxied back he seemed to think out loud. He mentioned that he hopes that every time I fly I will hear his voice: "What's your altitude?" "What's your airspeed?" "Hold it off, hold it off—just don't let her land."

When we climbed out of the airplane for the last time before Dad headed back to Arizona, he took off his well-worn flying jacket and hung it on a rack in the hangar. He explained that he would not need it anymore, and that it might serve as a reminder of all we have covered together. It does, and it reminds me of the landing lesson as well. Every pilot should be lucky enough to have an instructor who is willing to fly across the country for an intense lesson. I am doubly lucky to have my instructor be my father. I can only hope that my kids will turn to me when life is serving up rough landings and that I'll be able to help smooth things out as my father has done so many times for me. 



Courtesy Dean Westover, Sr.



Scott Westover

LEFT: Learning to fly allowed me to meet my father as a man my own age. RIGHT: My son Smith is eager to take the controls. My job will be to have advice worth asking for.



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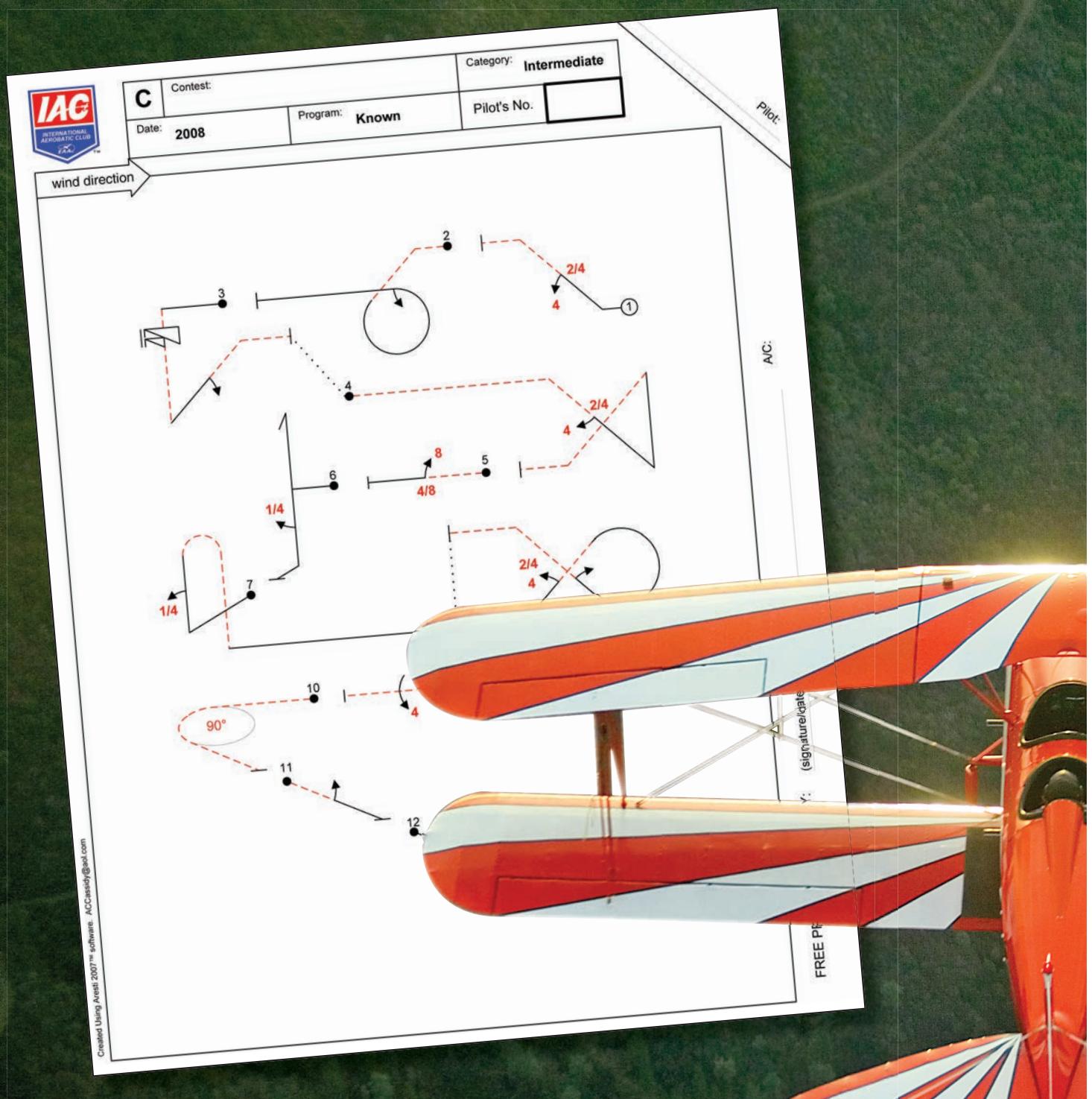


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The 2008 Intermediate Sequence

Flying the “Known” in a Great Lakes

Howard Kirker, IAC 6425 • Photos by Tyson Rininger



Non-traditional. Different. Challenging. Much can be said about the 2008 Intermediate Known Compulsory Program, but with several new figures, numerous dashed/red lines, some extended positive-*g* pulls, multiple point rolls, an inverted turn, and even a modest push, it certainly will not be called boring or dull. Yes, it also includes a sprinkling of figures mastered in Sportsman or familiar from the previous years' Intermediate sequences. Fundamentally, though, it is quite different from all recent Intermediate Knowns – and unique among them in that it can be flown in my 180-hp Great Lakes without having to take a break! This is a fresh, well-crafted, energy- and altitude-friendly sequence that will give you a workout and keep you thinking. Best of all, it's a lot of fun to fly.



THE OVERALL SEQUENCE

In the big picture, it seems to me this sequence gets most of the basics right: the three center-box figures are on upwind legs; the “hangars” (the spin, hammerhead, and humpty) are at the upwind end of the box; there are two opportunities for cross-box correction in a big wind; there are no altitude losers at the end of the sequence; and it flows well. Of course, there are some obvious challenges, including:

- With four half-rolls, three two-of-four rolls, and one four-of-eight roll, in the heat of battle, every occasion for a 180-degree change of orientation is an opportunity for confusion.
- Two of the center-box figures are point rolls (the four-of-eight and a four-point), both starting from inverted, posing additional chances for a spontaneous “helmet fire” (they can use up a lot of box, too, even into the wind).
- Figures 3 and 4, the spin and the angular goldfish (sometimes called

a bow tie), present back-to-back downwind 45-degree lines, making an “out” an easy accomplishment with a strong X-axis wind.

- Four of the figures have $K > 20$ (compared with only two in each of the last five years’ Knowns), so these had better be done well if one is flying for “wood.”

This Known grabs attention from the outset with 10 of the 13 figures showing dashed/red segments in them—meaning inverted! Practically, though, only three of these really have any “push” to them: the humpty, probably a familiar figure by now; the 90-degree inverted turn, not common in a Known, but a staple in many Intermediate Unknowns; and the 45-degree push-out at the end of the bow tie (Figure 4), truly a new maneuver to the category and a fun add that can be flown at modest negative g . With sufficient practice, and that’s why it’s called the Known, the execution of these figures becomes less demanding, and the flow of the sequence gets more comfortable. At a contest, however, one doesn’t just

mechanically fly the figures through the sequence, but must also package the presentation in that microscopic aerobatic box, for the judges, while accommodating the wind of the day. As they say in car racing, here’s where the rubber meets the road, because the more complex burden of orientation, presentation, and box management while hanging from your belt ensures this sequence will be a continuing mental challenge throughout the competition year.

FLYING THE SEQUENCE

So let’s go fly the sequence, figure by figure, and see how it works out. The Great Lakes hardly is the typical Intermediate-category aircraft, and I’m not an instructor, so this definitely isn’t a tutorial on “how to fly the maneuvers or sequence.” I’ll try to stick with a basic description of each figure; comment on what seems new, different, or challenging; and offer some of the tactics and strategy I’m considering while trying to manage my way through the sequence. Hopefully some of this may be useful to others; however, pilots of six-cylinder monoplanes or other more

capable aerobatic mounts likely will have different issues to deal with through the sequence, and they may need to modify my airspeed and altitude references a bit. That's a joke, folks!

The Great Lakes is a wonderful aerobatic trainer. It is solidly built with well-harmonized (if heavy) controls; it has no bad habits, and it can be graceful when flown well. I believe it's an excellent aerobatic mount at the Sportsman level, and a capable one at Intermediate, where its limitations of relatively low power, low V_{NE} , high drag, slow roll rate, and semisymmetrical wing start to restrict performance. A typical Intermediate sequence has lots of vertical lines and, even though those lines are pitifully short, the sequence requires many high-speed entries/exits, throwing away gobs of energy and using up precious altitude. This year, only the hammerhead and the humpty present those issues, and the spin, bow tie, and goldfish afford good energy/altitude recapture, so this sequence is relatively Great Lakes friendly. Of course, it may pose different energy-management situations for those of you with power to spare. From a presentation standpoint, compared with many aircraft flying Intermediate, the Great Lakes' figures are small, lines are short, and, with low airspeed, it's relatively easier to keep in the box; on the other hand, when the wind is strong and/or the Lakes gets out of position, scarce energy must be sacrificed to recover. My attitude is that, all in all, every airplane has its strengths and weaknesses, so it's up to each of us to do the best we can with what we've got. For now, ride along in a Great Lakes as we head for the box.

THE FIGURES

Box-entry technique (altitude, speed, position, style) is unique for each pilot, aircraft, and wind condition, and for this sequence, it is no different. Plan to put Figure 2 roughly in the center of the box, right in front of the judges, so Figure 1 should be completed in the first half of the box. Entry positioning in the Y-dimension demands more flexible planning, as the first cross-box corrector and Figure 6, and on-the-go

wind correction (at least for me) will be a lot more difficult with all the inverted lines in the first five figures. It's also not too early to formulate a tentative plan for the second wind corrector and factor that into the entry strategy.

For the Great Lakes, we'll try to start Figure 1 about 500 feet inside the box (in a strong wind, a little more) at 2,800 feet near V_{NE} (153 mph). Cross-box position will be somewhere in the back half of the box (depending on today's wind). So, entry plan settled, we wait for the chief judge's call, then set up on base leg, last checks (trim, power, oil temperature and pressure), another notch on the ratchet, safety roll, turn toward the box on final, dive, three wags, and pull to horizontal—game's on!

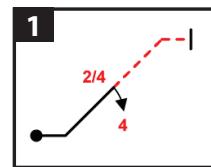


Figure 1: 45 upline, two-of-four roll, lay out inverted. There is nothing new in this figure, and

the energy from the entry dive allows holding a nice point in the roll.

If the entry was right, we're level at about 150 mph just after crossing into the box. Count two beats (no delay for positioning or we'll just bleed off speed), pull to a 45 line, and set it. Two count. Roll left to 90 degrees of bank, and crisply stop. Remember a touch of top rudder to keep the nose up. Two count (the roll is slow, so to balance, the pause has to be held a bit). Roll to inverted. Three count. Pull down gently to horizontal inverted flight, making sure to keep the nose "up," as we're pretty slow here. If the pace/duration of the counts has been correct, the Lakes will be at the top of the box and about 70 mph (just above inverted stall).

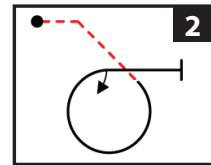


Figure 2: 45 inverted downline, seven-eighths loop, half-roll to upright. Basically a variant of a

down or inverted loop, this was a new figure to me, and it took a little time to work it out. The initial 45 downline, if held too long, can cause

a rapid buildup in speed and result in significant g's at the bottom of the maneuver, so proceed cautiously. One way to practice this is in halves; first, the initial downline and the pull for the "last three-eighths" of a normal loop, stopping at level flight. Then the second half of the figure is just the familiar Immelmann, a half-loop up with a half-roll off the top, and you know the speed and g's needed to make that look good. Done this way, the elements of the first half of the figure can be adjusted until the line and pull result in the speed and g's at the bottom that match what's wanted for the second half. When putting the two halves together, don't forget to initiate an anti-g straining technique (hereafter called "grunt") before starting the pull for the seven-eighths loop. Of course, the complete seven-eighths loop must be round, must be wind corrected, and will be done in front of the judges. A coach or ground critique will be invaluable in trying to get this figure competition ready.

Okay...we'll fly level inverted briefly, then pull to inverted 45 down, and set the line. There's a balance to be struck before the pull—holding the horizontal will only build speed, and we don't want to end up with too much at the bottom of this figure, but we also don't want to be too slow for this one-eighth loop segment, lest we fall into it without a proper radius. On our back while on the 45 downline, speed builds quickly; two count, and start grunting. Begin pulling to start the looping segment, gently at first and increasing until "locked" for a 140-mph, 4g loop at the bottom. Continue around to finish the seven-eighths loop, easing the pull toward the top to avoid the dreaded "pinched" downgrade; then stick forward and full left for the Immelmann-like half-roll to level flight.

The Lakes is at 65-70 mph here at about 3,200 feet and should be just past center box, so we're going to check our position, sneak a glance at the sequence card, and just cruise for a bit. We're still headed into the wind and need to get to the end of the box for Figure 3; one luxury with the Great Lakes is that its abundant drag tends to slow us



down fairly quickly when we do cut power to start the spin.

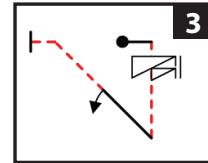


Figure 3: One-and-a-half-turn spin, 45 upline, half-roll, lay out inverted. While not seen previously (at least recently) in a Known, this figure was in an Unknown last year, so I've had some experience with it. There's no need to hold the downline after the spin for long, or the pull at the bottom will just get more demanding. Further, the 45 upline now will be downwind—so it should be kept relatively short, and it's best to be slow after laying out at the top.

We pull the throttle back shortly before the end of the box, slow to the stall, execute our best one-and-a-half-turn spin, stop the rotation, stick forward (but not very much, or we end up tucked on this particular spin), power in, and we're vertical down, gaining speed quickly. Two count and grunt; then pull around a three-eighths loop segment, probably at 4.5 to 5g. Set the 45 upline, and we should be at about 135 mph. Two count, half-roll to inverted, three count, lay out—and now we're flying level inverted at about 2,600 feet and 70 mph. Keep the nose up because we're slow and don't want to gain speed going in the next figure.

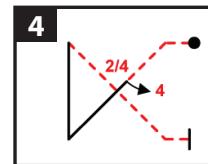


Figure 4: 45 inverted downline, two-of-four roll, pull to vertical up, pull over to 45 inverted downline, push out inverted. This angular goldfish, or bow tie, was new to me, even though it's in the catalogue of allowable Intermediate Unknown figures. Here the half-roll on the second 45 line has been dropped in favor of a 45-degree push-out to end the figure level inverted. That's different, but it's not a big deal. After setting the inverted 45 downline, the push can be executed at the speed and g of one's own choosing (this is a Family 1 figure, so the radius of the push doesn't have to match earlier pulls).

Time's a wasting, we're going downwind, and we've got another 45 line to fly! Pause briefly while inverted,

pull to the 45 downline, and set it. Now, we want to get through this next bit of the figure quickly so we're not at Mach 1 pulling to the vertical, but the Great Lakes rolls slowly and has to pause longer to match the roll time for the two-point; meanwhile we're building speed while headed downhill, and there's hardly time for any line segments before and after. It's never easy, eh? So, it's a very quick three count, roll 90, quick two count, roll upright, quick two count, grunt, and pull. This is a three-eighths looping segment to vertical, and we are likely at 140-150 mph and 4.5 to 5g going around the corner.

Set the vertical, count three, and remember to feed in some forward stick so we don't get on our back. Start the pull over the top, another three-eighths loop, with enough speed to make a smooth radius, and crisply set the inverted 45 downline. Eyes to the ground...this is when we'll find out if we're in the adjacent county or still in the box! Nothing we can do about it now, but it does let us start think-

ing about positioning of the next few figures. Let the speed build to 95-100 mph and start the push out; roughly -2.5g seems to work fine, and remember to add right rudder or we'll end up off heading. We finish level inverted at about 2,100 feet and 125-130 mph.

Yes, this little 45-degree push is new and a little different for the Intermediate category, but I find it fun. As has been said so well by another, "Try it; you'll like it." Even better, fly it in a Great Lakes; pushing out in an open-cockpit biplane is a truly exhilarating experience!

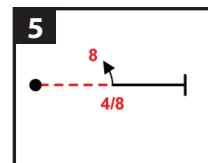


Figure 5: Four-of-eight point roll to upright. These have been plentiful in Unknowns, although typically

from upright level flight to inverted; no real tricks here. By adjusting the push (initiation speed and/or g) or power at the end of Figure 4, the entry speed of this roll can be set to allow a nice ham-

merhead, coming next for Figure 6.

The delay before starting here is a function of our positioning; if we got the spin done at the upwind end of the box and the wind isn't howling, we kept Figure 4 "in" and are approaching center box—it's time to roll. (If the wind did take us into the next county on Figure 4, then we'll need to drive upwind first.) Pause, one-eighth roll, stop, two count, one-eighth roll, stop, two count, one-eighth roll, stop, two count, one-eighth roll, stop upright.

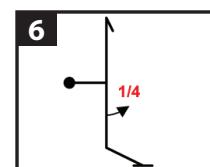


Figure 6: Pull to vertical up, hammerhead, one-fourth roll down, out upright on Y-axis. This is a standard Intermediate figure. The decision here is which way to roll on the downline for cross-box positioning. It's obviously influenced by the day's wind, current position in the box, and position at this point versus plan; it also sets up the next cross-box seg-

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ment, and other things being equal, plan to take that toward the judges, if possible. Think quickly!

Looking ahead, we need to get Figure 8, the goldfish, done at the very downwind end of the box, so there's no reason to delay in starting this hammerhead. Pause briefly in level flight, pull to vertical (using about $4g$, which seems "best cornering" for the Great Lakes), set the upline, and wait. Sneak a look at the card. Kick it around at the top, and the Lakes only needs a little out aileron and forward stick to track around true. Stop at vertical down. Three count, roll 90 (remember which way), two count, pull out upright on the Y-axis. We are at 1,700 feet and 145 mph.

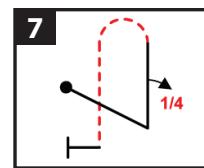


Figure 7: Pull to vertical up, one-fourth roll up, push humpty, out upright on X-axis. This is a standard Intermediate figure. Remember to hold level on the Y-axis for the desired amount of wind correction/positioning before pulling to vertical, and to roll in the same direction as in the hammerhead.

We keep the Great Lakes' nose down a little so we don't bleed off speed (which happens at anything over 120 mph), and when in position, pull to vertical and set the line. This upline has to happen fast, or we won't have the energy to go over the top without running out of right rudder and torquing off. Quick two count, quarter roll, quick three count, and push. It's the typical humpty slow-faster push, but we may hurry it a bit if we are completely out of speed and can't be patient getting over the top. Set the vertical downline, hold it, pull out to get 140-145 mph when level, and set the horizontal with a slight nose-down pitch, again to limit the speed loss between figures. We're now at about 1,400 feet.

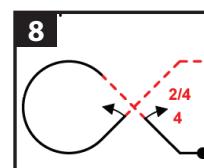


Figure 8: 45 upline, two-of-four roll, three-fourths loop, 45 upline, half-roll, lay out inverted. This is a goldfish with a half-roll on the second 45 line, so it finishes inverted. It needs to be placed as close as possible

to the downwind edge of the box to allow the next two figures (or more) to stay in. Some of us have the additional challenge of trying to finish with enough speed to be successful in the four-point roll that follows.

We'll continue downwind until just past center box, checking the card and bleeding speed (not intentionally!), and at hopefully 135 mph or more, pull to the 45 upline. Set it. Two count. Roll 90 to knife-edge. Two count. Roll on our back. Three count. Start the pull for the three-fourths looping segment, but let it float gently over the top. We're going to make this a larger-than-normal diameter to get maximum speed at the bottom and into the upcoming second 45 line. Grunt. Bring in the g's. Continue the loop to the 45 upline, and set it. Now, very quick two count, half-roll (please, faster!) to inverted, quick three count, and pull to level inverted—but really with the nose “down” a bit. Unfortunately, no matter how quick we were in the second 45 line, we'll come out here at 75 mph or so, too slow for

“As has been said so well by another, “Try it; you’ll like it.” Even better, fly it in a Great Lakes; pushing out in an open-cockpit biplane is a truly exhilarating experience!”

the upcoming four-point roll and subsequent inverted turn. There is no choice but to wait, accelerate, try not to descend so much that those eagle-eyed judges will notice, and accept our fate. By the way, we’re likely above 1,700 feet here, and with all “level flight” figures to go, altitude won’t be a concern for the balance of the sequence.

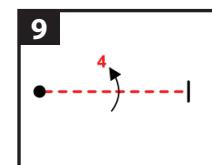


Figure 9: Four-point roll, inverted to inverted. This figure is encountered periodically in Unknowns, but hasn't been seen in a Known since 2002 (upright to upright). Whether you're flying a fast-rolling rocket or a slow-moving but slow-rolling Great

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Lakes, this eats up some box. It's into the wind, but still it's a concern.

We're holding on waiting for 90-plus mph, keeping the nose "down" just a little (as we will throughout this figure), and worrying about the box we're using up. We may wait for 100 if the wind is strong down the X-axis. Roll 90 to knife-edge, quick two count, roll 90 to upright, quick two count, roll 90 to knife-edge (lots of top rudder here to keep the nose "up"; don't sag), quick two count, roll 90 to inverted, and stop. If we were successful in keeping the overall flight path a bit of a descent, we held our speed during the roll—we'll need it for the next turn.

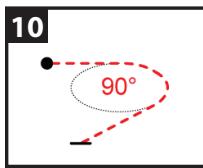


Figure 10: Inverted 90-degree turn, out inverted on Y-axis. A staple of Intermediate Unknowns,

this figure can take up a surprising amount of box, particularly if one tries to keep the bank angle down and/or minimize the amount of push. This is no time to be timid, because if you cruise around gently and end up "out" at the upwind edge of the box, you'll likely stay there for Figures 11 and 12, as well. Ouch! Not much time to decide which way to

turn either, but hanging upside down coming in to this figure, you can get an idea where you are in the box. If prior cross-box planning worked out, then Figures 7, 8, and 9 were done somewhere near the X-axis, so this turn can be taken toward the judges' side of the box for presentation purposes. If close to the front of the box, however, as a result of poor planning, poor flying, or just that darn wind, then the stick needs to go the "opposite" way. Again, think quickly, as you're about to go out.

Aces that we are (this is an imaginary flight, remember), we confirm we're near the X-axis, so we whack the stick away from the judges, set a 60-plus-degree bank, and push. We keep the nose "down" a little to keep our speed up, since we're on the ragged edge of an inverted stall—feel the buffeting? Roll out after 90 degrees, level and inverted on the Y-axis.

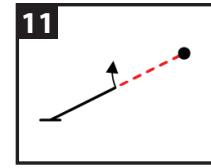


Figure 11: Half-roll to upright. There is nothing new here, and unless we are out of position, there's no need to wait to start this figure.

Brief pause. Half-roll to upright, still on the Y-axis.

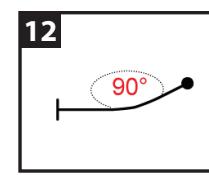


Figure 12: 90-degree turn, out upright on X-axis. The only question here is which way to turn. At last, finally right-side-up and it's confusing! There are lots of ways to think about it, and one is this: move the stick to the same side as for the previous inverted turn.

We roll in 75 degrees of bank or so, yank it around hard in an aerobatic turn (yes, we are trying to scrub off some speed, to set up the upcoming snap), and roll out, probably at about 85 mph, and hopefully we're now positioned near the front of the box.

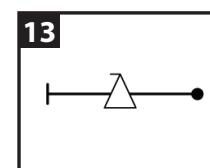


Figure 13: Snap roll. This is a standard Intermediate figure. I know, snaps are never standard...each one's an adventure. The goal here is to put it right in front of the judges. Hit it, and you go out with a "10."

We'll pull the throttle back and hold level flight while we cruise toward center box. The Great Lakes snaps at 80 mph (no, it's not very pretty!), so we'll slow to 75, throttle up, and do our own unique "snap dance." The stop, inevitably, is a

relatively slow deceleration, since the Lakes is plumb out of energy after three-fourths rotation; if we really nailed it, we'll settle for a score in the 8s and be happy. We're level upright at 65-70 mph.

That's it. Three wing wags, and we're out of the box. Whew, that was a workout! Hope you enjoyed the ride.

GETTING READY

If you've been flying Intermediate for a while, I expect you'll like the change, variety, and challenge this sequence brings to the category even if you don't get to fly it in a Great Lakes. If you're just stepping up from Sportsman, it may be a bit more of a stretch than previous Knowns, so proceed deliberately, master the figures individually and in small groups at first, and get help where you need it. As must (and should) always be repeated, if you haven't participated in a good spin/emergency recovery program, please do, and soon! And, if any of

these maneuvers or some aspect of this sequence is of concern, seek out one of our many fine aerobatic instructors before attempting to fly it on your own. Practice high, especially for new figures and the initial run-through of the sequence.

From my perspective, an additional benefit to the increased variety of maneuvers in the Known this year is better preparation for some of the surprises (including hard pulls) often thrown our way later at a contest in an Unknown sequence. Along those lines, all of us, every time we go up for practice or competition, must make sure we're prepared for the g-load demands of that flight. This includes the need to learn and practice an effective anti-g straining technique, to build up and maintain our g-tolerance, to keep hydrated, and to "back off" at the first indication of a problem. A good reference in this regard is *The ABCs of G's* article in the October 2007 issue of *Sport Aerobatics*.

I would also highly recommend prior *Flying the Sequence* and *Stick*

and Rudder articles from old issues of *Sport Aerobatics*. John Morrissey (March 2006) and Rob Dorsey (January 2006 and many years earlier) offered a wealth of insightful strategy, tactics, maneuver specifics, and practical pointers for the Sportsman and Intermediate pilot. I benefited tremendously from their well-written tutorials, and I hope this Great Lakes' fly-along helps you even a fraction as much. Fly safely, enjoy this challenging Known, and I look forward to seeing you in the box! ☺

Howard Kirker is a private pilot living in northern California. An International Aerobatic Club (IAC) member since 1979, he was inactive until 2002, when he got his Great Lakes, which he has flown in Sportsman in 2004 and 2005 and in Intermediate since 2006. Howard is a regional judge and an officer of IAC Chapter 38.

Editor's Note: Our sincere thanks to Wayne Handley for providing the photo ship and Tyson Rininger for photographing Howard's Great Lakes. SW

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The 2008 Intermediate Sequence from the Perspective of Higher-Performance Airplanes

By Malcolm Pond, IAC 429965



Freddy Stenborn

Howard presents his perspective on the 2008 Intermediate Known from the standpoint of the Great Lakes. What about higher-performance airplanes, such as the Pitts series, Extra 300, Staudacher, or others with less drag and more performance?

MORE SPEED, LESS TIME

Higher performance offers the potential for higher entry speeds and longer vertical lines. While higher speed allows for more time on the vertical, it also equates with less time to complete figures across the box or on 45-degree lines, and less time to complete roll or snap elements in horizontal maneuvers.

The initial three figures of the 2008 Intermediate Known sequence (45-degree upline with two quarter rolls, 45 downline followed by a seven-eighths loop, and then slow down into a one-and-a-half spin) are challenging. If you enter the box between 150 and 170 knots, the time across the box in level flight is approximately 11 to 14 seconds, assuming no head wind. If you don't have good box-entry technique, you will either start too soon and be penalized, or you will start too late and waste box space. With high entry speeds, the 45-degree lines by themselves will consume a lot of the box. Time is needed to define the point rolls in Figure 1 and the half-roll on Figure 2. Then you need to slow down for the spin, without making it appear to have a forced entry. If you don't start the sequence right at the edge of the box, you will probably be out after Figure 3.

In order to keep Figure 4 from going out downwind, the vertical line after the spin in Figure 3 needs to be positioned as closely as possible to the upwind edge of the box. Then we have two 45-degree lines going downwind. Once again, time is taken up on the two-of-four roll element in order to make each point crisp.

The next problem is keeping Figures 4, 5, and 6 within the confines of the box. If the vertical line in Figure 4 is not close to the edge of the box downwind, then the inverted 45 and push-out will be too far upwind, and you would have the tendency to rush the points on the four-of-eight roll and then pull up for the hammerhead in order to stay within the box. You run the risk of getting a zero or downgraded score in the eight-point roll if the points appear "soft" to the judges. Even though you "know" that you flew the points, the only thing that matters is what the judges perceive. Don't rush your point rolls!

The remainder of the sequence is not so dependent on speed, but remember to position the inverted 90-degree turn as closely as possible to the upwind edge of the box so that you have time to build up speed and finish the snap at center box. Remember to bring the last three figures (11 through 13) toward the judges so that they can see you better and you can impress them with your mastery of the sequence. No judge will give high scores to a pilot who finishes the sequence low and at the back of the box.

This year's sequence does not have any big altitude-losing figures, but there is certainly a lot more inverted flight, which could lead to the potential for disorientation in box positioning. Also, there are a total of seven 45-degree lines, three of them downwind, and all of them with an inverted component. Downwind 45s eat up a lot of space. Positioning and speed entry for the 45-degree lines will be crucial for good scores and the least number of outs.

MORE G-LOADS

Higher performance airplanes also must contend with higher g's. Remember that for the same radius turn, g forces increase as a square of the velocity. Let's say the Great Lakes flies a 4g turn at 100 knots. If a high-performance plane does the same turn at 150 knots and flies the same radius, the turn generates 9g! Sustained g loads greater than 4g from five to eight seconds increases the risk for g-induced loss of consciousness, referred to as "g-loc."

G-loc is most likely to occur when you are least prepared for it. It will be imperative to know and execute anti-g straining maneuvers in Figure 2 at the pull for the 45 down, in Figure 3 on the way down after the spin and during the pull up to the 45-degree line, and in Figure 4 on the 45-degree downline before the pull to vertical. The 2008 Intermediate Known sequence has three figures in succession for which there is a high risk for g-loc. Each of these figures involves zero or negative g's before the onset of hard positive g pulls at high speeds.

When you practice the figures, remember to be as best prepared as you can, and anticipate the g loads. You could easily find yourself pulling 6 or more g's at the bottom of Figures 2, 3, and 4. If you start to develop tunnel vision, gray out, or black out, immediately back off on the pull so that you don't pass out. Once a pilot has lost consciousness, it takes at least 20 seconds or longer to regain orientation and the ability to fly the plane.

A DIFFERENT FLYING STRATEGY

The 2008 Intermediate Known sequence is definitely fun to fly, but it requires a different strategy for the faster higher-performance aerobatic mount when compared to the Great Lakes. Pay attention to speed, box positioning, g-loads, and anti-g straining maneuvers when you fly, and don't rush your points. The penalty for an out is minimal compared to a low score of zero for rushing figures or messing up point rolls.

Malcolm Pond competes in an Edge 540 in the Advanced category. He is a board member of IAC Chapter 36 and also belongs to Chapters 38 and 49 in California. He is a commercial pilot and has approximately 600 hours' aerobatic time. He works as a cardiologist in Southern California.



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AEROBATICS & AIRSICK

A white propeller airplane is shown in flight, performing a roll maneuver. The aircraft has a light blue and white striped pattern on its fuselage. The background consists of a clear blue sky with some wispy clouds.

**Tips for a
smooth flight**

Jim Zazas

Editor's Note: It's getting to be that time of year when, in the case of open-cockpit fliers in cold parts of the country, covers come off the front holes and first-ride promises are redeemed. Every aerobatic pilot I know has some degree of uneasiness about causing queasiness from g's or nerves in new passengers. Vicki Cruse ran across an article authored by Jim Zazas for the IAC 19 newsletter that addressed the topic well, including the benefits of getting to know the experience of your passenger and making him or her a part of the flight crew. Jim was nice enough to allow us to share his piece in Sport Aerobatics as a public service aimed at making aerobatic ambassador flights as pleasant as possible for everyone involved. Thanks, Jim.—SW

Discussions of aerobatics and airsickness bring back a lot of memories from the days when I taught aerobatics and other formal flight instruction. Almost invariably, a new student who possessed some level of fear about flying and, perhaps, was prone to air sickness would come to me. I found the following teaching techniques invaluable in helping him assuage his fears and, hopefully, alleviate his airsickness.

I used these techniques then and apply many of the same techniques today whether my student is coming to me for a biennial flight review, a tailwheel checkout, or even a T-6/SNJ checkout. Most currently, I use the same techniques for all EAA Young Eagles flights, but in a modified and, unfortunately, shortened format.

First, I want the flight training to be a fun, positive experience for both of us. I want the student to enjoy the learning experience and have fun while we fly together. Moreover, I want to enjoy teaching the student. I want the student to share her fun and positive flying experience with others, as this type of positive feedback reaps its own rewards much later.

Second, I seek to assess the flying background of my students. I am not too keen as to the number of flying hours they possess. Instead, I am more interested in the type of airplanes they had flown previously, the type of instruction they had received, and perhaps most importantly, the training relationship they had with their instructors. Was it professional? Was it thorough, and did it follow a syllabus? Or, was the training formatted around a pattern ride here and a quickie flight there, just enough to barely meet the practical test standards and then a quick signoff for the checkride?

Third, I want to know my students' previous flight devices training, including simulator training or simulator gaming experience. Had they flown a flight simulator, such as the ELITE, FLYIT, Frasca, Advanced Simulation Systems, etc., or used a home-based computer operating one or more of the popular and FAA-approved simulator programs? What type of simulator program or game program was used? Much to my never-ending surprise and joy, I have discovered many EAA Young Eagles possess great home-based flight simulator and similar gaming skills, and they are able to readily apply this knowledge to actual flying activities.

If my student seeks aerobatic instruction, I want to know the student's background in aerobatics, if any. It could be previous formal instruction, an aerobatic flight or flights in a friend's aerobatic airplane, or even an aerobatic "gift flight" paid by a family member or the student himself. I want to know what sparked his desire to learn aerobatics or flying in general. Was it a movie? A television or radio commercial or magazine article? It could be nothing more than flight in a friend's personal airplane or a few simple wingovers in a J-3 Cub or RV-6 that launched

his desire to learn how to fly or reinforced a desire to learn how to fly aerobatics.

If the student has had any aerobatic training, I want to know if this training started with simple, basic, introductory maneuvers designed to build up student confidence and maneuver complexity over time, thus creating a solid aerobatic training foundation. Or, was the training conducted on the other extreme, a fast-paced program that in reality allowed the instructor the opportunity to build more aerobatic time at the student's expense?

Lastly, I want to know if the student had any formal unusual attitude training or experience. I ask her if she had any formal spin training, and what she liked or disliked during this training. Along similar lines, I ask if she had any fair or carnival ride experience, roller-coaster experience, etc., how she reacted to these rides, and what she liked or disliked about these rides.

In summary, I want to know my student's total flying background. With this information in hand and possessing a better understanding and appreciation of my student's experience, I can better meet his instructional needs and expectations, and create a training program and syllabus that fulfills these needs. I endeavor to build a professional relationship with my student. Concurrently, I strive to alleviate any fears or uneasy feelings he may possess. Above all, I want the student to know I am there for him and that he is my No. 1 priority during all ground and flight training.

With respect to airsickness or discomfort, I have found a person's airsickness comes from a lack of understanding the process of the flight to be taken. I endeavor to take time with any student, any EAA Young Eagle, and any aerobatic student to explain the processes involved in the flight we are about to undertake based upon her

"I try to assuage their fears by making them a participant in my preflight duties."

background and experience level. I explain how the controls move, what corresponding control surfaces move, and what control inputs are required to achieve a certain result or results. I describe what we, together, can expect during the flight and what we, together, can do to make the flight more enjoyable and rewarding. I endeavor to relate certain flight conditions based upon any earth-based experiences.

For example, I explain air turbulence as related to the movement of water, e.g., waves or currents and how they affect a boat. With this knowledge in hand, we expand it to the "sea of air" above us and compare how the movement of air affects an airplane. Often, the result is "turbulence." I want my student to feel comfortable. I want him to enjoy the flight and return for another flight or lesson.

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TOP STORY ➤
EAA Launches New Website
EAA launched its new website at www.EAA.org on Thursday, November 1, after several months in development. The new site has a cleaner, less cluttered look, simpler navigation, and a flexible, modular architecture for rapid content changes.

MULTIMEDIA
Meet R.W. and Donna McElroy of Billings, MT, who have camped in the North 40 of the Arapaho National Forest for 30 consecutive years. "We quit jobs to come here because you can always get a job, but this is only once a year," R.W. said.

Visit EAA's [Multimedia](#) section for more videos that illustrate the spirit of EAA - our members, the aircraft they build and fly, chapter activities, and gems from our archives.

MAIL BOX



Clay Smith

Explaining how the restraint system and parachute work helps to relieve nerves.

And, above all, I want him involved and an active participant in making his flight happen. For example, the EAA Young Eagles ground school program taught before any EAA Young Eagle takes a flight is a great start. When my young charge comes to my airplane for the actual flight, I try to go a step further and spend the time reinforcing these brief introductory lessons, all the while building a solid learning foundation. I employ this same format with more advanced ground and flight training students.

Expanding upon this last point a bit further, I get a lot of first-time fliers aboard the big Boeing I fly for an airline. With one or more flight attendants leading the way, passengers come to the flight deck well before departure to share their fears or uneasiness. I try to assuage their fears by making them a participant in my preflight duties. I give them a brief overview of "my office on the 40th floor" and show them what I do, why I move a certain switch or lever, what it does, and when I do it, but I measure and pace what I say. Too much information and the passengers' eyes glaze over, resulting in a less-than-positive experience and doing nothing that alleviates any of their flying uneasiness.

Moreover, I try to get them involved. I hand them a copy of the paper flight plan and show them what information contained on that flight plan is input into the

flight management system, and then I show them how it is done. I let them retrieve the weather for their destination airport through the ACARS (aircraft communications addressing and reporting system) and then explain to them how we "read" (decode) the information presented.

Finally, I demonstrate and explain to them how the other pilot and I, along with our flight attendants, and all the folks on the ground and throughout the airline, are a team that makes this big airplane fly. We all work together to make their flight happen, and any one of us will be most happy and willing to answer any of their questions. In other words, I strive to mollify any fears my passengers may possess and replace these fears with knowledge. I do the same for any new flying student, any new aerobatic student, any EAA Young Eagle or individual making their first flight, and any individual that may hint she is prone to airsickness. I do not profess to know all the answers, teaching techniques, or training standards. There are countless other flight instructors and pilots out there with vastly more teaching experience than this kid, but as a part-time flight instructor, I try to share my flying and teaching experiences with others to build a better, safer flying community. ☾



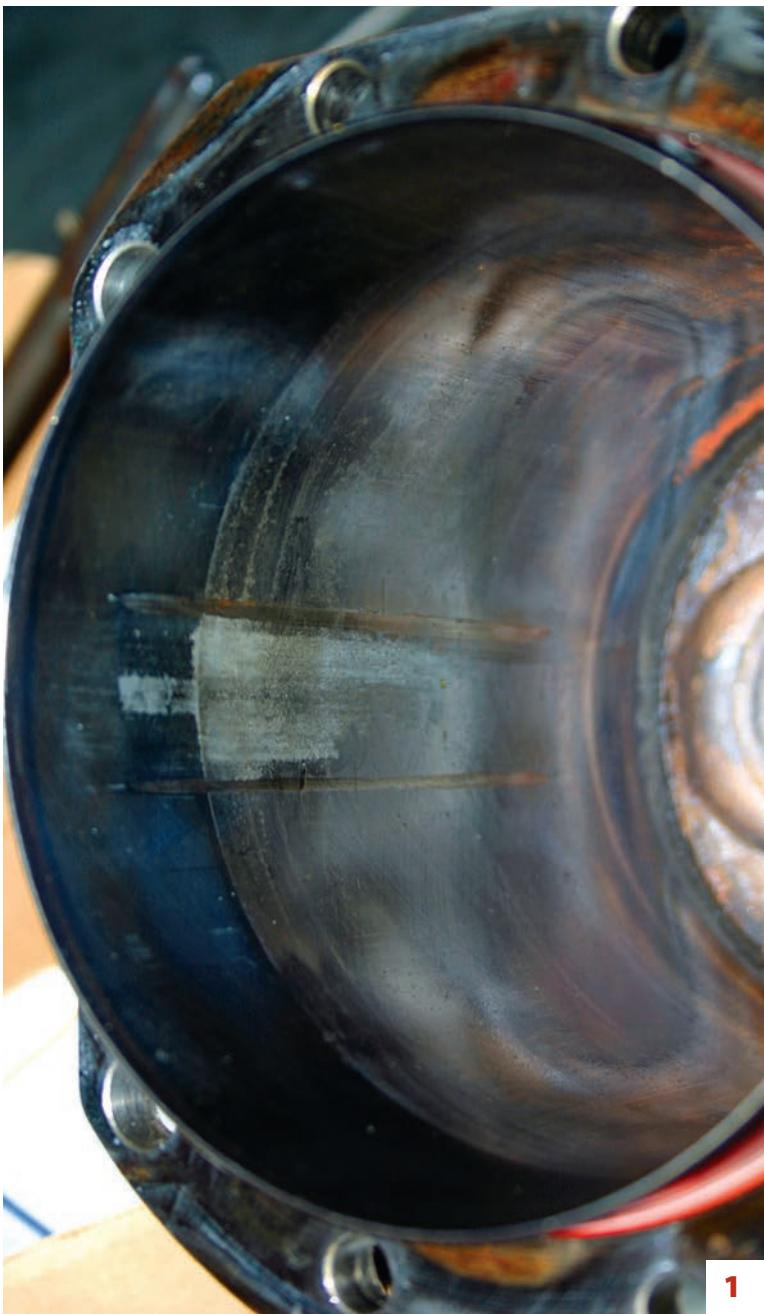
TECHNICAL ADVISOR
Story and photos by Dave Watson

Is there a ticking **TIME BOMB** in your **ENGINE?**

There is a memorable line from *Top Gun* in which Cmdr. Metcalf is giving advice to Maverick. He says, "A good pilot is compelled to always evaluate what happened, so he can apply what he has learned." As a pilot, I have tried to take that advice to heart. After I had my maintenance ordeal with my Super Decathlon back in 2002 (I reported on my wing root and fuel tank failure problems in *Sport Aerobatics* in June 2005), I've taken that advice as a pilot and applied it as a plane owner, too.

Back then, my hearty (but within limits) use of my Super D in Intermediate cost me dearly and required major overhaul of both wings despite my flying it [just] within placard limits. I should have known better, as a few of my friends running flight schools with Super Ds cautioned against doing snaps with them, but I thought if I did them within limits I would be okay. It started with just a couple snaps here and there. Then I became obsessed with winning in Intermediate, and I was doing them routinely. My door occasionally came open, and my spinner was leaving circular scratches on the front

of the cowl, yet on I went snapping and routinely pulling to 6g's in pursuit of the goal. My plane was talking, but I wasn't listening. My wing root fairing finally failed for the third time, which led to a closer inspection that ultimately ended in total overhaul of both wings. Consequently, I have maintained a possibly excessively diligent approach to my aircraft maintenance. I have routinely done more than required when it comes to checking and maintaining my aircraft. However, this year, things went to heck with just a couple of seemingly minor oversights.



1



2

The engine in my Super D has been so good to me over my eight years of ownership that it was still giving me back mostly green oil after 25 hours of use, and would only require about 1 quart during any 25-hour period. That's despite being mostly used for Sportsman level aerobatic training and competition. Never did I get even a morsel of metal from the screens during oil changes. This engine was strong and running clean, and perhaps two years ago, I became complacent. Too complacent to listen to the subtle warnings.

Per the recommendation of a few friends, I started removing and inspecting the upper oil screen during every other oil change, and everything was fine until my January 2007 annual (the engine had only 1,000 hours). At that time, we performed a routine oil analysis, and the results came back with elevated aluminum readings, but nothing was found in the screens. The oil analysis company recommended another analysis at the next oil change to verify the condition. By the time I had received these oil analysis results, I was already ready for my next oil change, and "all was well with my plane." Here is where I should have listened to Cmdr. Metcalf's advice and done a thorough investigation. But the engine was running great, so what could be wrong? Several pilots were dependent on it for a contest in just two days. So the day before the contest, I dropped the cowl, did a quick oil change (at 20 hours) without pulling the upper oil screen (after all, this had just been done a few weeks ago at annual), and I sent in some oil for the recommended analysis assuming all was well. Over the next three weeks, I let five pilot-friends use my plane in competition, and I let the local flight school use it for several hours of unusual attitude training. We racked up another 25 hours in just a couple of weeks, and why not? The engine was running great, despite the 2 quarts of oil it used at the contest.

The day after the flight school finished its use, I got the oil analysis results from the second analysis. They recommended grounding the plane immediately. "What? It is running as good as ever," I said to myself. That weekend, impatient to wait for a certificated mechanic, I pulled my plugs, borrowed a borescope, and then proceeded to soil my flight suit. Upon inspection, I found a major scouring in one of the cylinder walls. My mechanic confirmed it and removed the cylinder a week later. To make a long and hideous story short, one of my piston wrist-pin plugs decided to start scouring the cylinder (photo 1) and had such an affinity to the cylinder wall that it consumed itself completely in less than 50 hours.

Once the head of the wrist-pin plug was gone, the wrist pin itself started wearing on the hardened cylinder, steel to steel. The amount of aluminum found in the screens (photo 2) was mind-boggling, yet this only accounted for a fraction of the aluminum lost by the head of the wrist-pin plug (see photo 3). Once again, I got varying advice ranging from replacing the cylinder assembly and flushing the engine to performing a total overhaul with replacement of all oil hoses. I called Lycoming, and it

UPPER: Scouring marks found from wrist pin contact

LOWER: Metal found in the oil screens

referred me to two service instructions (see www.Lycoming.com for Service Instruction (SI) No. 1267C, Piston Pin Plug Usage, and SI No. 1492C, Piston Pin Plug Wear Inspection. Note these are not airworthiness directives, or ADs). SI 1267C requires replacement of the original wrist pins installed on my aircraft (and many others) with a different design at the next major overhaul. According to the service instruction, "To preclude the possibility of mixing two different plugs in a cylinder and to simplify plug replacement, at the next piston pin plug replacement, plug P/N LW-11775 should be replaced with P/N 72198." SI 1492C, issued in July 2000, specifies, "Field reports indicate an increase in incidents of abnormally worn piston pin plugs in some units shipped after January 1, 1994. Evidence of such wear can be detected by use of an oil filter content inspection or spectrographic oil analysis." Note that the service instruction that suggests the replacement of one design with another does not give any mention of the "increase in incidents of abnormally worn piston pin plugs."

During my discussions with Lycoming, I was told by a technician that complete failure of the pin plug is rare, but not such an uncommon thing—hence the service instruction to swap the designs. There are many Lycoming engines out there flying that have a wrist-pin design that warrants replacement, but Lycoming obviously must think it should make it to the next overhaul and that routine oil analysis will pick it up. Never was I aware of this ticking time bomb in my baby, as service instructions are not distributed to owners. If Lycoming suspects the



3

Piston pin plug head wear

design is deficient (if the pins aren't, why do they need replacement), why does it think they will last until the next overhaul? Mine completely failed in less than 50 hours. After several heated discussions with Lycoming, it told me I was on my own.

Well, more than \$25,000 and an entire flying season later, it flies again. I went conservative with a total engine overhaul including replacement of the propeller governor (which had chewed itself up from passing a few

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chunks of aluminum that had gotten past the screens), oil cooler and all oil lines (to preclude any resident iron or aluminum from contaminating the new engine), four new cylinder assemblies with eight new piston wrist-pin plugs, and other miscellaneous items. All this due to a previously identified deficiently designed \$8.50 wrist-pin plug that vaporized in my engine in less than 50 hours. So what's my point? Stuff happens, right?

Should we have taken just a few minutes to borescope my cylinders at the 1,000-hour annual? Should I have taken another few minutes and pulled the screen at the 25-hour oil change knowing I was running high in aluminum? Should Lycoming have been more diligent and put out an AD rather than the innocuous service instruction? Should I have been more diligent? Of course, but hindsight is 20-20. Yet, if at either of these points I had done those simple things, maybe we would have caught it, and it would have been an easy replacement of the wrist-pin plugs. But, with the excessively high iron concentration in the oil (because the aluminum pin completely disintegrated and allowed steel on steel), I had to overhaul the engine and replace all the oil contact surfaces (hoses, prop governor, and oil cooler). Fortunately, my cost was nothing compared to the possible costs associated with an in-flight failure of this engine resulting from a catastrophic failure of the cylinder. I consider myself lucky that it didn't let loose during a friend's competition flight, ferrying it over

hilly terrain, or during commercial use by a flight school.

My advice after this ordeal: Do not listen to conventional wisdom that permits cutting corners like skipping every other oil screen inspection. When your plane starts talking, listen. During that period, my engine used more than twice the oil as usual, but I had attributed it to hard flying. Bull-pucky! Nobody is flying that plane harder than I did back in 2000 when I flew it in Intermediate, and it didn't consume or throw oil then. It wasn't just talking, either. It was yelling for help.

In retrospect, I had noted (but also did not pay attention to the fact) that the recent exhaust staining on the white fuselage was of a slightly different color and much harder to remove. That was probably from the excess oil and metals getting past the rings. I allowed my desire to keep my friends flying to overshadow my instincts and convictions, and fortunately nobody was hurt. My lessons have been learned, so when it comes to your airplane, listen to conservative advice and then be more conservative. If you fly a Lycoming engine, obviously check all the ADs, but more importantly, check the service instructions. You may just have a ticking time bomb, too. Pulling my jugs and replacing the \$100 worth of deficient wrist-pins plugs prior to failure would have saved me more than \$20,000 and five months of downtime. I hope you can evaluate my mistakes and learn from them as I have.

Happy flying – Dave 

EPILOGUE

Prior to submitting this article to *Sport Aerobatics*, I sent a draft to Lycoming for its comment to ensure I wasn't misrepresenting its service instructions. Within two hours, I received a call back from its manager of product support who requested I send my cylinder to him for evaluation. Without asking for my recent usage history of this engine, he speculated that because of the low-time use on this engine (1,150 hours in 12 years), there must have been surface rust on the cylinder wall that started the cascade of abrasion of the wrist-pin plug. He had no other explanation for the possible premature failure and noted that "manufacturers" do make improvements to their products and told me that the newer design wrist-pin plugs are fabricated from a different alloy than the suspect ones that failed in my engine.

Subsequently, I checked my logs, and this engine was used according to the chart below.

ENGINE USE (per month prior to failure)

Month	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June
Hours	10	14	7.5	2	2	3	5	4	14	20

Note that these hours are generally spread out evenly throughout the months listed, and that in February the annual that detected the elevated aluminum in the oil was done, but there was no metal noted in the screens. So if surface rust is the only explanation for my premature failure, I am even more concerned for the many engines out there that are running with the P/N LW-11775 plugs and covered by the service instruction. Assuming there was no major damage at my annual, the surface rust must have occurred over the two prior months when my usage dropped from about 10 hours (which has been my average for years) to just a few hours per month.

I have subsequently also speculated that any forensics that does or doesn't find rust in the affected area is likely suspect anyway. Considering that the majority of the area affected by the damage is within the area traversed by the rings (which were fine) and that the damage extended approximately 0.005 inch into the wall of the cylinder, what surface rust that may have been there to start the problem could possibly be left?

I commend Lycoming for making incremental improvements in its product, but why hide them behind innocuous service instructions? My intent here is not to damn Lycoming but to get the word out. There was a boogeyman in my engine, and I didn't know about.

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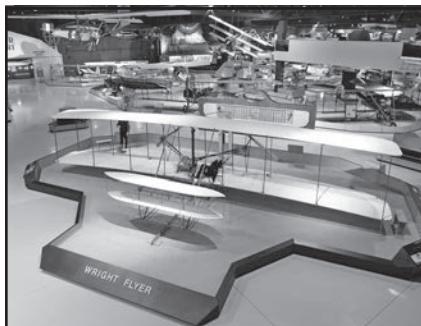
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COPPERSTATE (Southwest)

Thursday, March 27 - Saturday, March 29, 2008

Practice/Registration: Thursday, March 27

Rain/Weather: Sunday, March 30

Glider: Sportsman through Unlimited

Power: Primary through Unlimited

Site: Marana Regional Airport (AVQ): Marana, AZ

Contest Director: John Van Houten

Phone: 480-221-4692; E-mail: acronuts@aol.com

Website: www.IAC69.org

BORREGO MINIFEST (Southwest)

Saturday, April 12

Practice/Registration: Friday, April 11

Power: Primary and Sportsman

Site: Borrego Valley Airport (L08): Borrego Springs, CA

Contest Directors: Gray Brandt and Randy Owens

Phone: 970-948-0816; E-mail: webmaster@iac36.org

Website: www.IAC36.org

1ST CAROLINA BOOGIE (Northeast)

Friday, April 25 - Sunday, April 27, 2008

Practice/Registration: Thursday, April 24 - Friday, April 25

Power: Primary through Unlimited

Site: Lumberton Municipal Airport (LBT): Lumberton, NC

Contest Director: Bryan Taylor

Phone: 910-862-2980; E-mail: RandTAviation@ec.rr.com

Website: www.IAC19.org

57TH SEBRING AEROBATIC CHAMPIONSHIPS (Southeast)

Thursday, May 1 - Saturday, May 3, 2008

Practice/Registration: Saturday, April 26 - Wednesday, April 30

Power: Primary through Unlimited

Site: Sebring Regional Airport (SEF): Sebring, FL

Contest Directors: Hubie Tolson and Alan Bush

E-mail: htolson@nccoymail.com

LOS ANGELES GOLD CUP (Southwest)

Friday, May 2 - Saturday, May 3, 2008

Practice/Registration: Thursday, May 1

Rain/Weather: Sunday, May 4

Power: Primary through Unlimited

Site: Apple Valley Airport (APV): Apple Valley, CA

Contest Director: Patrick Dugan

Phone: 805-612-0976; E-mail: patrick.dugan@yahoo.com

Website: www.Groups.Google.com/group/laac

APPLE CUP (Northwest)

Friday, May 23 - Saturday, May 24, 2008

Practice/Registration: Thursday, May 22

Power: Primary through Unlimited

Site: Ephrata Municipal Airport (EPH): Ephrata, WA

Contest Directors: Ann Marie Ward and Carol Burch

Phone: 206-579-6866; E-mail: amward@relops.com

Website: www.IAC67.org

For the most complete and up-to-date listings, visit www.IAC.org.

If your chapter is hosting a contest, be sure to let the world know by posting it there.

SOUTHEASTERN AEROBATIC OPEN (Southeast)

Friday, May 30 - Saturday, May 31, 2008

Practice/Registration: Thursday, May 29

Rain/Weather: Sunday, June 1

Power: Primary through Unlimited

Site: Clayton County Airport - Tara Field (4A7): Hampton, GA

Contest Director: TBD

Phone: 770-461-3421; E-mail: bobh19@bellsouth.net

Website: www.IAC3.org

HEUER CLASSIC (Mid-America)

Thursday, June 5 - Sunday, June 8, 2008

Practice/Registration: Friday, June 6

Power: Primary through Unlimited

Site: Illinois Valley Reg. Airport - Walter A. Duncan Field (VYS): Peru, IL

Contest Director: Doug Bartlett

Phone: 847-875-3339; E-mail: dbartlett@bartlettmfg.com

Website: <http://IACChapter1.com>

LONESTAR AEROBATIC CONTEST (South Central)

Friday, June 6 - Saturday, June 7, 2008

Practice/Registration: Thursday, June 5

Power: Primary through Unlimited

Site: Grayson County Airport (GYI): Denison, TX

Contest Director: Bud Judy

Phone: 817-559-4522; E-mail: judyranch@alltel.net

Website: www.IAC24.org

BEAVER STATE REGIONAL CHAMPIONSHIP (Northwest)

Friday, June 13 - Saturday, June 14, 2008

Practice/Registration: Thursday, June 12

Rain/Weather: Sunday, June 15

Power: Primary through Unlimited

Site: Eastern Oregon Reg. Airport at Pendleton (PDT): Pendleton, OR

Contest Director: Robert Toppel and Robert Harris

Phone: 503-292-6630; E-mail: rboydt@comcast.net

Website: www.IAC77.org

OHIO AEROBATIC OPEN (Mid-America)

Friday, June 20 - Saturday, June 21, 2008

Practice/Registration: Thursday, June 19

Rain/Weather: Sunday, June 22

Power: Primary through Unlimited

Site: Union County Airport (MRT): Marysville, OH

Contest Director: Lorrie Penner

Phone: 513-284-5076; E-mail: Penn.Lorr@yahoo.com

Website: www.IAC34.com

WILDWOODS ACROBLAST (South Central)

Friday, June 27 - Sunday, June 29, 2008

Practice/Registration: Thursday, June 26 - Friday, June 27

Power: Primary through Unlimited

Site: Cape May County Airport (WWD): Cape May, NJ

Contest Director: Craig Wisman

Phone: 717-877-8933; E-mail: cwisman@comcast.net



Oshkosh. 2008. July 28-August 3.



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