SEPTEMBER 2009

Sport Aerobatics

OFFICIAL MAGAZINE OF THE INTERNATIONAL AER[illegible] CLUB

Aerobatic Flight Schools

Aircraft Partnerships:
Part II, the legalities

Endo Tumbles:
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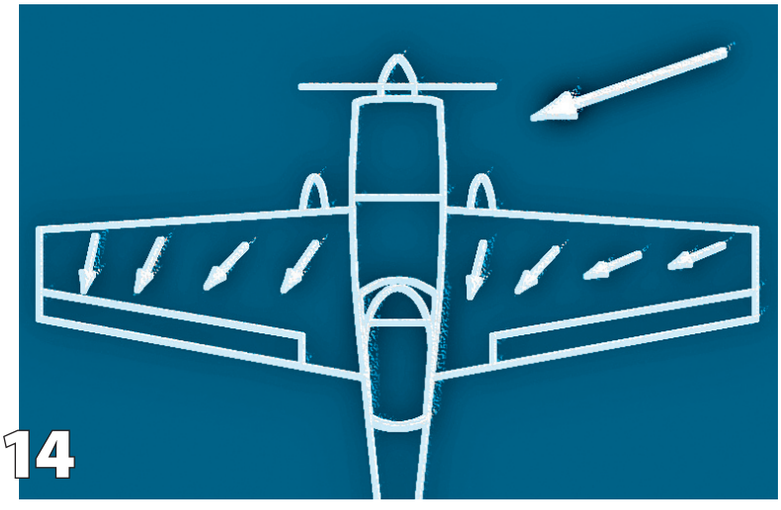
CONTENTS

6


14

29

FEATURES

COLUMNS

DEPARTMENTS

THE COVER

A Warbird Adventures T-6 Texan during a training flight.

– Photo: Michael Jorgensen

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LETTER from the **EDITOR**

by Reggie Paulk

Farewell, Vicki

This magazine is about to go to press as I write this, and yet it is incomplete. The day before Vicki crashed, she was sending me edits and we were discussing the progress of this issue. The next day, I was parsing through my e-mails when I saw that she had been killed while practicing her routine at the World Aerobatic Championships. After the tears stopped flowing, I wondered how in the heck I was going to move forward.

From the moment she brought me aboard, Vicki has been my partner in this magazine. We've collaborated every month in order to bring you all of the wonderful material you've been reading for the last year. This month, we missed our monthly phone call because Vicki needed to travel to the World Aerobatic Championships in England, so we stayed in contact via e-mail.

One thing that stood out about Vicki is she seemed to know everybody in the industry and how they related to one another. I would receive random e-mails detailing story ideas from sources I could only dream of.

She never stopped moving; her pint-size betrayed her energy. Vicki could fill a room with her presence. She was at once in command, but had a soft side she would only reveal after getting to know you well enough. It did cross my mind once or twice that she could fold me in half if she was so inclined.

I only knew Vicki for a year, but I know for certain that she would be mortified to see so much space taken out of the magazine to dedicate to her memory. Whenever we lost a member of our community, Vicki would always mention how much she disliked the 'Gone West' pieces. I'd be fired over this, but she earned the recognition.

"The best way to honor Vicki is to move forward."

The best way to honor Vicki is to move forward. She would expect me to continue improving upon this magazine and to come up with ideas that help the membership get the most out of their benefit. I can already feel her kicking me in the pants, telling me to get moving.

Vicki, we'll miss you, but we'll keep moving onward and upward. Godspeed and know that our memories of you will be cherished.

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

Vicki Cruse . . . her legacy lives on

EAA and IAC staff and members have spent more than a few minutes in recent days thinking about the empty spot in our hearts since the tragic passing of IAC president and EAA director Vicki Cruse on August 22, while competing in the World Aerobatic Championships in England.

One thing that became immediately apparent is that Vicki would not want us to mourn her passing, but to share how she lived her life and her remarkable and lasting contributions to aerobatics and general aviation.

Initial news reports highlighted her many accomplishments in a relatively short aviation career, including her 2007 U.S. National Unlimited Championship, her four berths on the U.S. National Unlimited Team, her sportsman and intermediate category titles, and much more. However, those accomplishments only spotlighted what Vicki did, not who she was.

Aviation changed Vicki's life. She was not a child prodigy – she dreamed of being a marine biologist while growing up in Missouri – but her entry into the aviation and aerobatic communities in her late 20s allowed her natural gifts to blossom.

Vicki Cruse earned her pilot's certificate in 1993, but did not immediately continue flying. She admitted she lacked the confidence in her own abilities to fly solo and didn't have anyone to fly with. Only after taking Rich Stowell's Emergency Maneuver Training (EMT) course, did she discover the joy and possibilities of the sky.

"The course introduced me to aerobatics, gave me confidence that I could fly myself, and it changed everything for me," Vicki said in an interview nearly two years ago. "When I give talks about aerobatics, I usually show a picture of Rich Stowell and tell people this man cost me a lot of money. I would not have accomplished what I have without Rich's EMT course."

Within aviation, Vicki reached remarkable goals, even with some personal limitations. Her small stature meant that every airplane she flew had to be modified. Her Edge 540 had rudder-pedal extensions, a booster seat, and shorter-than-normal control stick movement.

Vicki relied on the basics learned from Rich Stowell and the mentorship of Norm DeWitt when she began to fly competitive aerobatics in 1997. From that point, Vicki found her place, winning contests and moving up the competition ladder. The shy girl from Missouri didn't place limits on herself, as she expanded her competition horizon when she obtained a Glasair and qualified to race in the National Championship Air Races at Reno, Nev.

In less than 10 years, that confidence elevated her to a place on the U.S. Unlimited Team. A decade after her first aerobatic contest, Vicki earned the national unlimited title.

At the same time, she became more involved in the leadership of the aerobatic community. In 2005, she was elected as IAC president, an office to which she was re-elected in July. That role also gave her a seat on EAA's board of directors and a policymaking voice for the entire organization.

Each role was time-consuming, but Vicki accepted the responsibilities with a dedication that was unparalleled. The focus and drive she developed through aerobatic competition transferred to her tenacious effort on behalf of EAA and IAC members.

Sometimes Vicki admitted that her work and aerobatic flying didn't leave much of a personal life. She tried to give herself a little more balance, but felt the desire to give back to aviation as it had given so much to her. Vicki, above all, was focused, honest, and stood firm on her principles.

She was a person who discovered that the journey is just as rewarding as the destination.

"I don't plan 99 percent of the things I end up doing; they just find me," she said recently.

Fate has a way of doing that – finding the people who are needed and giving them the talents to succeed.

"Most people have no idea of what they are capable of until they believe they can do it," she said in that 2007 interview in which, prophetically, she said a few seconds later, "Live life like today was your last. It's a great concept, but sometimes hard to execute."

Vicki Cruse has left a true legacy. She made IAC a better organization through her leadership. For that she will always be remembered. Godspeed, Vicki.

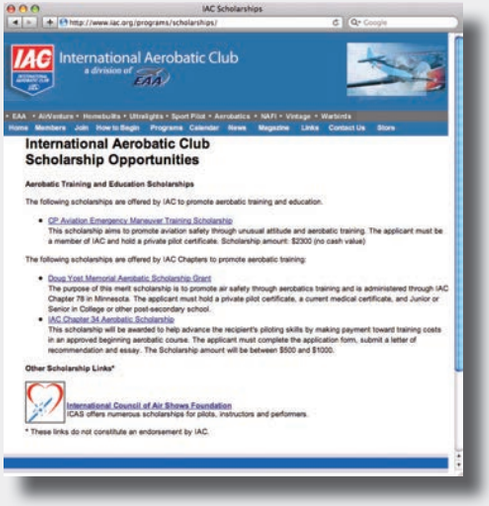
NEWSBRIEFS

Oshkosh365 Is Live and Online

Wouldn't it be nice to stay connected with your fellow chapter members, competition volunteers and friendly people with common aviation interests on a daily basis? Enter Oshkosh365.

The Experimental Aircraft Association and The International Aerobatic Club's newest membership benefit is a great way to share your passion for aerobatics. Check out Unusual Attitudes in the forum area dedicated specifically to all things aerobatic. Here, you can search for people, post pictures, share and gain knowledge and information; even find that part you couldn't find at the Fly Market at AirVenture. You can join a special interest group or start your own and even access detailed local weather reports before you head to the airport.

Sign up for free at *www.Oshkosh365.org*.



Emergency Maneuver Training Scholarship Winner

At the annual member meeting in Oshkosh on July 31, 2009, Blake Poe of Oak Park, California was announced as the recipient of the CP Aviation Emergency Maneuver Training Scholarship. Blake is an Aeromechanical Engineer and a fairly new light sport pilot with 80 hours. Blake plans to upgrade to a private pilot when he can afford it. The CP Aviation scholarship is awarded annually to one recipient who receives unusual attitude and aerobatic training in Santa Paula, California. For more information on this, and other, scholarships available through IAC, please visit *www.iac.org/programs/scholarships/*.

FAA To Issue Airworthiness Directives's and Special Airworthiness Information Bulletins Electronically

Beginning in October, and phasing in completely by March 1, 2010, the FAA will distribute all AD's and SAIB's electronically. Those who wish to receive AD's via paper may still do so through a paid subscription. According to the FAA, electronic distribution will provide a timelier and more cost effective method to provide safety information. For more information, visit *http://rgl.faa.gov* and *http://www.gpoaccess.gov/fr/*

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Aircraft Co-Ownership

PART II: Resolving Issues Up Front is the Key to Success

Mark Mattioli, Esquire

Have you ever thought of buying an airplane with another person? If so, before launching into the abyss, there are issues to consider. If not structured carefully, aircraft co-ownership can have devastating financial consequences. Unfortunately, it is only when something goes wrong that the real problems will surface. Human nature being what it is, no one enters into an aircraft co-ownership arrangement thinking it will result in disaster. Aircraft co-ownerships, however, always come to an end; common reasons are wanting to upgrade to a better aircraft, someone getting out of flying, a job change for one of the members and the aircraft is lost in an accident. Don't get me wrong, co-ownerships for aerobatic aircraft are a great idea, and there are many success stories. However, we always need to think how we will end the arrangement.

There are really four essential, but primary, issues you need to discuss with your co-owners: who will own the aircraft; what is the form of the arrangement; how will it be terminated; and how to handle insurance. (See the companion article by Ryan Birr of Northwest Insurance discussing insurance issues.)

Who Owns the Airplane?

The first consideration is how the aircraft will be owned. Here, there are a variety of different forms: joint ownership; corporate ownership; and individual ownership. Joint or co-ownership is the simplest form from a transactional standpoint. In this form of ownership, two or more individuals simply purchase the aircraft jointly and are listed as the owners on the FAA registration form.

In most co-ownership arrangements, the aircraft will be registered by a corporation or some other organization. It is necessary to review the forms the transaction can take. In general, the two basic types of organizations are partnerships and corporations. In between the two are limited liability companies, which are very good organizational models for joint aircraft ownership. A third category is called the unincorporated association, which is really a group of individuals who are acting jointly.

Corporations

We start with a corporation. In the eyes of the law, a corporation is a separate "person" distinct from its individual members. This means that a corporation can bring suit and be sued in its own name. More importantly, in most situations, the independent owners cannot be sued for the acts of the corporation. A corporate form, then, offers the greatest level of protection from liability to third parties. Because the corporation is the owner, it retains the liability. This is especially important if the corporation is sued. For example, if a corporate entity, say "Fly for Fun, Inc." decides to purchase a brand new Pitts S2C, and convinces a bank to lend it the money, the bank's only option in the case of default would be to go after the corporation.

"The corporation immunizes your partners, not the individual operating the aircraft."

Second, the corporate form cannot be used to commit what amounts to a fraud on others. Thus, if two pilots get together to buy an aircraft through a corporation that they know they cannot afford, there is a very strong likelihood that the bank will "pierce the corporate veil" and seek to hold the individuals responsible if they default. In addition, the corporation needs to act like a corporation, and keep minutes, have meetings, etc. to maintain its corporate status.

There are many misunderstandings regarding corporate form. Some think incorporation will shelter them from all negligent acts. What these people do not realize is that incorporation does not immunize an owner or member from his or her individual acts. Thus, if you are the operator of an aircraft that is involved in an accident, you are personally liable for your own actions. The corporation immunizes your partners, not the individual operating the aircraft. This raises the question as to why individual aircraft owners incorporate. Unless there is a tax benefit (the aircraft is used for business), there is probably no benefit to this structure.

On the positive side, the corporate form allows ownership to be maintained by the corporation if one owner needs to sell his or her share. One anonymous IAC'er reported a partnership he was in was assessed a sales tax after one of the owners sold his share back to the group. The group formed a new corporation, and was hit with a tax bill for 8% of the aircraft's value. Having the corporation issue shares to owners may help eliminate this tax consequence.

The drawbacks to incorporation are that you need to maintain corporate formalities, and there may be tax consequences if the aircraft is eventually sold for a profit (i.e., double taxation). This topic is beyond the scope of this article, and consultation with tax counsel or a good CPA is always a good idea.

Partnerships and Limited Liability Companies

We next move to partnerships. Unlike a corporation, a partnership is not a separate legal entity. Rather, it is an association among the general and limited partners. It is governed by a partnership agreement which spells out the duties and obligations. Unlike a corporation, members of the partnership owe a fiduciary duty to each other, and more importantly, general partners are responsible for the acts of fellow partners done on behalf of the partnership. In other words, if one partner crashes, the others are jointly responsible. General partners, unlike shareholders in a corporation, are typically responsible for running and managing the organization. Barring unusual circumstances, a general partnership is not a recommended organizational form for joint ownership of an aircraft.

Another relatively recent (as far as the law is concerned) organizational form that may be utilized by aircraft co-owners is the limited liability company. This entity is part corporation and part partnership. For organizational structure, it works like a partnership. However, it also provides many of the protections of incorporation. It is governed by the certificate of organization or similar document which should spell out the duties of the owners. Where applicable, the limited liability company provides a viable alternative to incorporation. Members

SHOULD YOU INCORPORATE in DELAWARE?

If you live in Delaware or your aircraft will be based there, by all means, yes. If not, for most aircraft co-owners there are few, if any, benefits.

The benefits are primarily geared towards state taxation. If your aircraft is not based in Delaware, you will likely be taxed in the state where it is based. State taxing authorities have been known to conduct surveillance at local airports for this reason.

Moreover, Delaware incorporation makes you subject to being sued in Delaware. Additionally, if you incorporate in Delaware and are not based there, you may need to register as a "foreign" corporation in your home state, which may require payment of additional fees to your home state.

Reggie Paulk

may be divided into different classes. This may permit probationary new members, (for example members who do not yet meet the insurance requirements for solo flight) to be classified in a different category. Thus, the limited liability company allows for a great deal of flexibility. In addition to the flexibility, there may be tax advantages to this form of organization. As a result, this form of organization is a very good choice for joint aircraft ownership.

The FAA permits limited liability corporations to register aircraft, although this was not always clear. If you chose to form a limited liability company to purchase the aircraft, note the specific FAA requirements to register the aircraft, and be sure to submit a copy of the organizational documents.

" . . . the more you resolve prior to drafting an agreement, the less you will spend on attorney's fees."

Unincorporated Associations

Assuming that you fail to elect any organizational form for the joint ownership of your aircraft, your joint venture would be deemed to be an unincorporated association. What this means is that you can be sued as an unincorporated association. Inasmuch as I know of no benefits to being sued, this default category is not recommended. The bottom line is that you don't want your organization to fall into the category of an unincorporated organization. Be warned that if you do not form a corporation, limited liability company, or a partnership, this is the status of your joint ownership. If you have registered your aircraft as "co-owners" on the FAA registration forms, you are likely an unincorporated association.

It's All In the Agreement

Assuming you have decided to incorporate or, better, form a limited liability company, you must next create your operating agreement. As a limited liability company operates more like a partnership, the operating agreement is the contractual glue that binds the owners. For a pure corporation, you should require each owner to enter into a separate operating agreement which sets forth their duties and obligations. Indeed, an operating agreement is critical to the success of the partnership.

While the details of what should be in an operating agreement are beyond the scope of this article, the following are issues you need to discuss and resolve with your co-owners. Although there are many operating agreements available on-line, you are getting exactly what you pay for. These may be a good start, and AOPA has information and sample forms on its website, but each agreement should be tailored to your particular circumstance. This does not mean that your first call should be to an attorney to draft an agreement. Rather, the more you resolve prior to drafting an agreement, the less you will spend on attorney's fees.

Maintenance

Who will maintain the aircraft and how will you decide whether to upgrade equipment or have work done on the airplane? More importantly, how will you handle major issues like engine rebuilds? For example, a Lycoming AEIO 360 (depending on year) has a TBO of 1200 hours. What happens if the engine begins to show signs of problems before then? We all have different levels of comfort with maintenance issues, ranging from fix every squawk to wait until it fails. Two partners at opposite ends of this spectrum may run into conflict. Having this issue spelled out in the operating agreement is helpful. For example, the agreement can state that the engine will be rebuilt, replaced, overhauled at, for example, 1,000 hours. The point is that this will have been agreed to in advance. If you decide mutually that the engine does not need to be overhauled at 1,000 hours, then so be it. The point is that you have mutually decided to delay the overhaul.

Aircraft Use

Next, you need to agree how the aircraft will be used. For example, if one partner will utilize the aircraft for commercial purposes this can have insurance implications and may subject the aircraft to additional wear and tear. While many pilots provide some level of instruction in their aircraft, this may cause more wear than normal operations, especially if the aircraft is used to teach landings. In addition, it may present additional liability risks for the other owners.

Also, work out how the aircraft will be used at contests, if at all, and categories if applicable. A Decathlon being used in intermediate-category competition undergoes far more stress than a Decathlon being used for sportsman-category competition. In most cases, all the partners will likely have similar interests in contest flying. Indeed, partnerships work very well for competition aircraft. However, you need to think about what happens if one person loses his or her interest in competition flying. That is, will the other pilots be permitted to attend competitions? This should be addressed in the agreement.

Finances and Responsibilities

Another area to explore is the relative duties of the owners. For example, is there a schedule for cleaning the aircraft? Many of the complaints pertain to leaving a "dirty" airplane for the next person. The agreement can be as specific as to spell out that the aircraft should be fueled and the bugs cleaned off at the end of each flight. If a person fails to keep his or her end of the bargain, you can build in financial or other consequences.

How the owners will handle finances and uninsured losses are other areas that absolutely must be discussed and put in the agreement. Many co-owners pay into a maintenance fund based upon the hours flown. The partnership can also specify a monthly hangar fee and insurance fee. In addition, it can specify a fixed and

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.

variable fee. Consider that even if one partner never utilizes the aircraft, there are still maintenance fees (like an annual inspection) that will be incurred. Thus, just because one owner never uses the aircraft, it does not mean that his or her maintenance charge should be zero.

Termination

Most of the real hostility pertaining to aircraft co-ownership has to do with how individual shares of the aircraft can be transferred. The ideal situation is to have the organization partners re-purchase the shares from the exiting owner. While this may cause some initial economic issues for the remaining partners, in the long run it is better for the remaining owners to find a new co-owner than to put the onus on the exiting partner to find someone willing to buy in. Depending on the reasons for selling his or her share, the exiting owner may simply be looking to find a warm body. This new individual may not be suitable for the arrangement, and even if the agreement states that the remaining owners must approve the new owner, you don't want to be in a situation where you are fighting over the suitability of the proposed owner. Hence, while more expensive, it is better for the remaining owners to find a new co-owner. Indeed, some co-owners suggest that you should never enter into a partnership for an aircraft unless you can personally afford the aircraft on your own.

So how do you value the aircraft it you need to sell it or buy back a share? Again, this can become a tricky issue. The exiting owner will want to argue for a higher price, while the remaining owners will contend the plane is worth less. There are a few options. One is to set forth the methodology in the agreement. It might be the purchase price times an inflationary factor, with a deduction for additional time on the engine and airframe, and an increase for the value of any new equipment. Alternatively, you can agree to have an appraisal performed by a mutually-agreed-to valuation specialist. Whatever you decide, the point is to agree to the methodology before you purchase the aircraft.

Provided you have worked out the difficult issues up front, co-ownership of aerobatic aircraft can provide a viable alternative to sole ownership. Most of the partnerships are overwhelming successes and the co-owners are very happy. Working out what will happen if life forces a change in the relationship can determine your ultimate satisfaction, and save you from many headaches. It may even save your friendship with your ex-partner.

The opinions contained in this article are those of the author, who does not purport to speak on behalf of EAA, IAC or any entity referenced in this article.

Mark Mattioli is a business and commercial litigation attorney with Post & Schell, P.C. in Philadelphia, Pennsylvania. When not practicing law, he flies a Christen Eagle II based in Lumberton, NJ. By secret vote while he was otherwise indisposed and unable to object, he was appointed President of IAC Chapter 52 and is also a member of Chapter 58. He can be reached at 215-587-1087 or at ***mmattioli@postschell.com.***

Insuring Various Aircraft Ownership Programs

Ryan Birr, President, Northwest Insurance Group

At Northwest Insurance Group, we see a fair number of IAC aircraft being owned and operated by more than one individual. We also see this in the corporate aviation world as well; I believe it is as much about an economical level of utilization of these types of aircraft as well as the cost sharing aspects. It doesn't make much financial sense to own any kind of special use aircraft if it only flies 100 hours a year or less; hence by having more owners or users, the cost per hour can be dramatically reduced by increasing utilization. In Mark Mattioli's article, he describes the various legal arrangements for ownership, and makes a great case that "it's all in the agreement." I couldn't agree more. For us, there are some logistics as well as decisions to be made about insurance structure, and all parties to the contract should agree uniformly.

Although simple, we regularly see issues regarding logistics. Who is our contact person and which person is giving the authority to tell us to make changes to the insurance policy? We don't want all 5 owners calling us with different instructions. Is the billing address the same as the policy address, and is this the same as the contact person? If the LLC or INC is incorporated in Delaware, for example, we need to issue the policy in the state where the aircraft is based. If we send an invoice and it doesn't get paid, is our contact person the responsible officer? Our goal is to have a good mailing address where the policy and invoices can be sent where the contact person is the only person authorized to start, amend, or cancel the insurance policy. This protects both the group and us from detrimental changes being made to the policy without consent of all the owners… It's all in the agreement, as Mark would say.

"Unlike auto or homeowner's policies, aviation policies are generally very unique . . ."

One widespread misconception about aviation insurance is that all policies are created equal. Unlike auto or homeowner's policies, aviation policies are generally very unique and rarely follow any standardized format. This fact couldn't be more evident when dealing with multiple insureds on a single aircraft, especially when a corporation or limited liability is employed as a holding company for their aircraft or multiple aircraft. Every company treats coverage differently with respect to the corporation and its respective members or shareholders. For example, some companies have exclusions against liability claims made by insureds on the policy, even if one of the other partners caused the loss (i.e. mid-air collision between two aircraft on the same policy). Whichever insurance policy is chosen, it must be carefully engineered to extend to coverage to the group with respect to the understanding that the owners have made about how the coverage should protect them. If non-owners are also allowed to use the aircraft, this could increase the complexity of the insurance contract substantially.

Some policies have many coverage enhancements in addition to the basic insuring agreement; many extra coverages won't be available to the individuals if a corporation is the sole insured on the policy. We can often solve this by naming the corporation and the individuals on the policy, thereby extending ancillary coverages to the individuals. Then in the event of any physical damage loss, each individual member will be named on the claim check and have to sign off, which isn't problematic if everyone agrees. Aviation policies also have many warranties for the owners to adhere to; how the aircraft is used; where it's flown; who is flying it: those pilots are current and legal as well as the airframe. There is always a possibility that one owner could invalidate the policy and the remaining owners might become parties to the loss out of their own pockets. All owners need to be acutely aware of their responsibilities and agree how to deal with uncovered losses should they arise as well as implement procedures to mitigate this possibility.

Generally though, we need to know who all the owners are and if they are flying the aircraft. We need to know if any instruction is taking place in the aircraft, especially if given to non-owners. The owners need to agree whether the corporation is the sole insured or that all owners are included as individual insureds and if so, do they want the policy to extend liability coverage to one owner making a claim against another owner or not. Are there any other unanticipated uses or situations that we have not contemplated but the owners have discussed amongst themselves? Finally, we need one representative with authority to make changes to the policy.

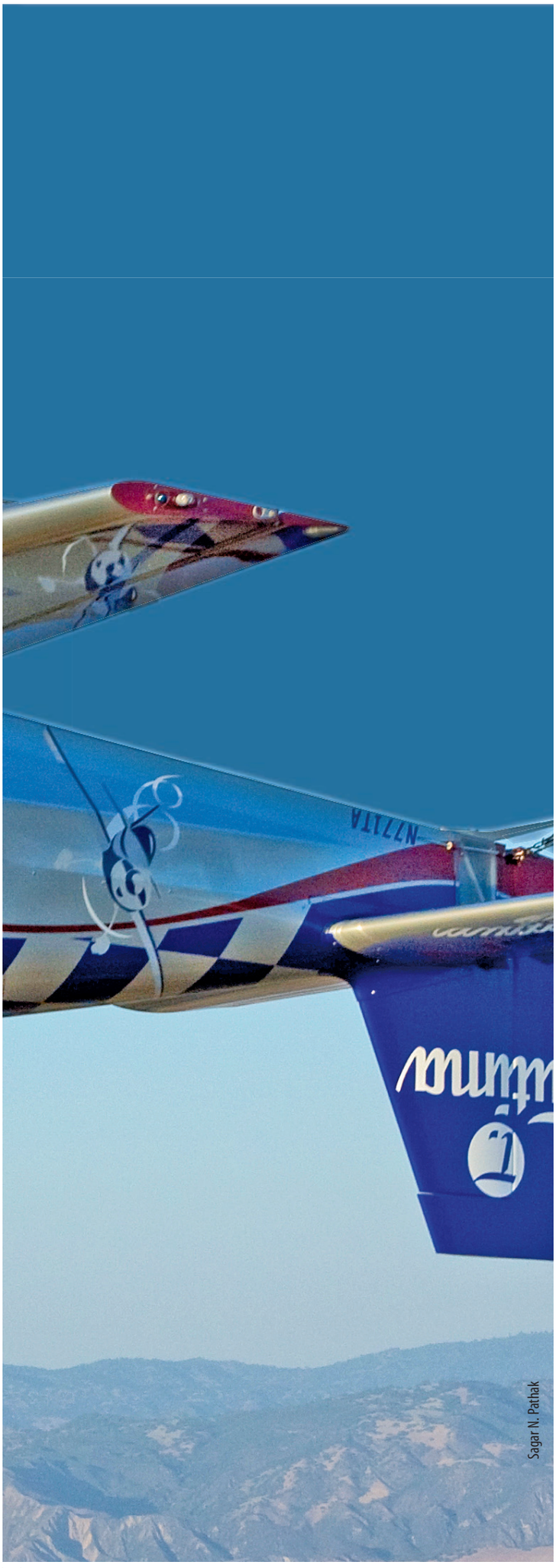
Once armed with the desired blueprint of the policy, the finality to the process lies in deciding how much insurance should be purchased for both the hull and liability. When there are multiple insureds named on a policy, there is a chance, although unlikely, that all the available limit of insurance is used on behalf of one of the owners prior to the remaining owners' lawsuits being settled after a loss. The only remedy for this is to purchase adequately high liability limits. If these needs are higher than ordinary, there may need to be some concessions by the owners regarding policy structure in order to access higher insurance values or limits. I strongly recommend coordination between your attorney and aviation insurance broker in an effort to get the partnership agreement and insurance policy to work together seamlessly.

The Endo Tumble

Ben Freelove

There are few maneuvers that are as visually surreal as an aerobatic aircraft effortlessly tumbling end over end. Many styles and techniques can be used to accomplish this feat, but I will focus on the most fundamental of these approaches.

We'll call it the Endo Tumble . . .



Sagar N. Pathak

In order to begin experimenting with these maneuvers you must have training in and proficiency with recovering from all types of spins in your aircraft. I have seen tumbling maneuvers turn into developed spins that can often be counterintuitive to the control inputs being applied.

Example: Aircraft spinning upright flat, yawing left, with full right rudder and full forward elevator applied!

Aircraft type

You'll also need a tumble friendly aircraft. These will include most modern monoplanes. Biplanes usually have difficulties with "blocking" (the tumble suddenly stopping), and typically do not like to do true Endo-style tumbles, although I have seen it done and it is pretty fun to experiment with.

A lightweight composite or wood prop is preferable to metal one, as is a three blades vs. two blades. This will spare the crankshaft from possible failure. If performing tumbles on a regular basis, expect to replace rubber engine mount shocks more often than usual.

Technique

Note: The following explanation is assuming a Lycoming-powered aircraft. The rudder/aileron inputs will be opposite for you Sukhoi drivers.

Setup

Start high! Falling or spinning out of a tumble can cost thousands of feet of altitude.

The maneuver works best if performed along an ascending arc similar to a ballistic aileron roll. From level flight simply pitch the nose up to around thirty degrees and wait for the airspeed to bleed off, typically 90-100 knots, then begin the tumble control inputs (discussed in the following paragraphs). Once you've mastered this entry, the climbing line is a great place to insert aileron rolls, which can be seamlessly blended into the tumble for great effect.

Rudder

The key element to getting a solid, sustainable tumble is to provide the airplane with as much left sideslip as possible. In the case of our tumble, the best way to accomplish this is to apply full left rudder. The rudder application should be deliberate but not slammed to the stop. It should take about one full second to move the pedal all the way down. One trick to getting maximum sideslip is to first deflect right rudder, and then perform the full left rudder application. This pre-loads the vertical tail by providing it with some positive angle of attack, increasing the left rudder's initial authority.

Elevator

The elevator input will follow the rudder input. The stick should begin to move forward just prior to reaching the maximum yaw angle. Like the rudder input, the stick movement should be forceful but not too fast. Be sure to get the elevator all the way to the stop!

Aileron

The use of aileron in the tumble will depend on a few factors: aircraft type, airspeed, the initiation attitude

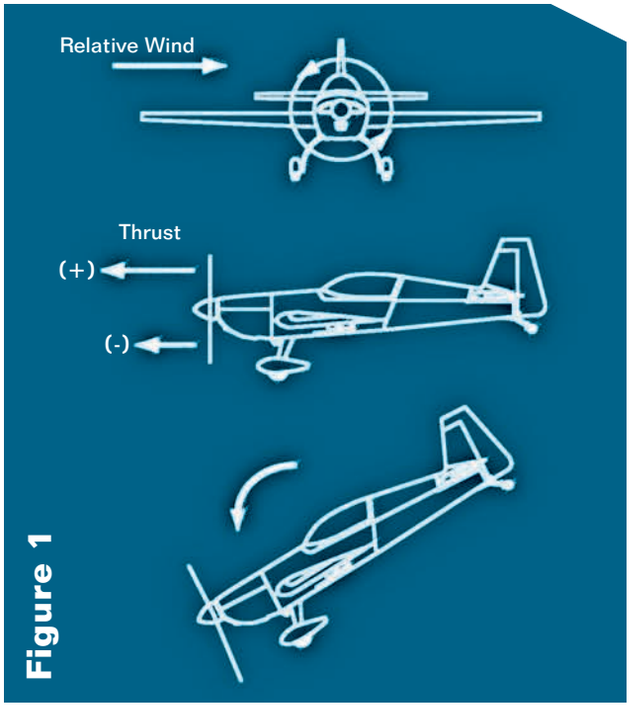


Figure 1

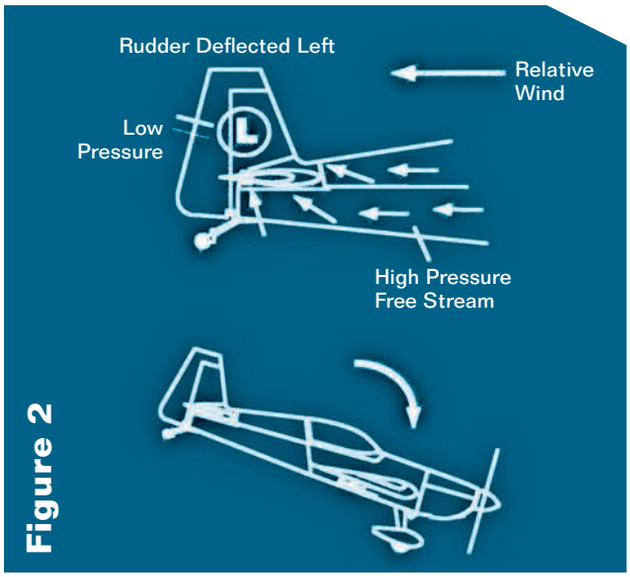


Figure 2

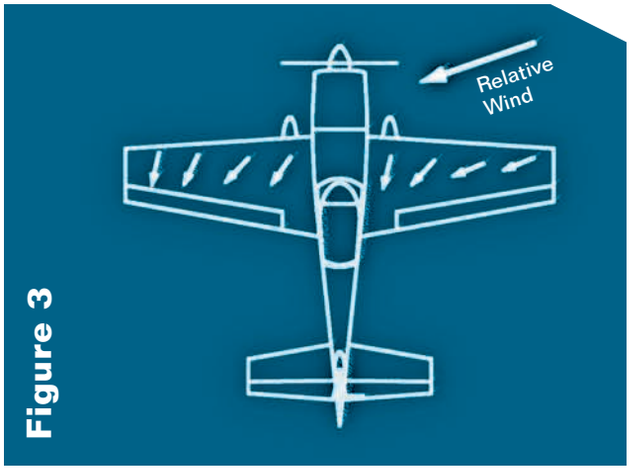


Figure 3

etc. Left aileron is usually required, so plan to use somewhere between one quarter and three quarter deflection. The simplest method is to just use the aileron to level the wings to the horizon as you pass through the first inverted position. Some experimentation may be required to determine the most effective aileron use, especially in trying to obtain multiple rotations. I generally try to find a good spot and not move the stick and usually use about 1/2 left aileron for the Extra 300L.

Recovery

As the airplane continues to tumble it will rapidly lose energy and begin to arc downward. With practice, you can finesse the airplane all the way around this arc into a nice knife-edge spin. In fact, a right wing down knife-edge spin is an Endo Tumble performed on a vertical down line. Keep in mind that once the tumbling begins to move downhill, altitude loss will be shockingly high!

The easiest way to stop the Endo Tumble is to simply neutralize all the controls. Some trial and error may be required to figure out the timing required to stop upright, wings-level. Pulling the elevator back past neutral may also provide a cleaner stop, and certain aircraft may need right rudder application as well.

Another, more explosive recovery is to apply full left aileron which will transition the tumble into a snap roll styled finish. The snap roll is then completed with opposite rudder before the controls are all neutralized.

Review

From level cruise flight: 1.) Pitch up 30 degrees 2.) Wait for approximately 90 knots 3.) Full left rudder 4.) Full forward stick w/ some left aileron 5.) Neutralize the controls to recover.

How it works

The aerodynamic questions behind the tumble have intrigued me for many years. After a fair amount of research I believe I have a reasonable explanation behind the forces involved. Tumbling an aircraft is usually described as a "gyroscopic" maneuver but we'll see here that gyroscopic force plays only one small role in the aerodynamics of a perfect tumble.

There are two key pitching forces in an Endo Tumble:

Prop

The first key force is asymmetric thrust. If we apply an air stream parallel to the disc of the propeller (in this case from the right), the blade that is swinging over the top of the nose will see an increase in its airspeed and therefore produce more thrust. The lower blade will see a decrease in its speed and produce less thrust. This differential in thrust produces a large nose down moment, which causes the airplane to tumble. You can play around with this by simply applying full left rudder at a relatively low airspeed. It's a pretty dramatic ride! (See Fig. 1.)

Tail

The other force involved answers the question, "Why doesn't the airplane tumble very well with the stick back?" You actually can perform stick back tumbles, but they don't really resemble an Endo Tumble and generally require a lot of rolling component.

Ben Freelove in formation with the Collaborators.

As the rudder is deflected, a low pressure is created above the horizontal stabilizer. This low pressure induces a higher angle of attack on the horizontal stabilizer, creating a nose down moment. Simply put, with the rudder deflected you have more forward stick authority, and reduced back stick authority. This also explains why you have to pull the stick back during a forward slip. I like to call this force *yaw-pitch coupling* and have found it very prevalent in many aerobatic figures. (See Fig. 2.)

Other forces; Gyroscopic Precession

Gyroscopic force from the propeller disc translates the nose down pitching of the tumble into a greater left yawing moment, which increases the amount of asymmetric thrust produced by the prop and "squares up" the tumble.

Wings

The airflow over the right wing in a tumble is at a large offset angle, almost parallel to the wing. This produces very little lift and essentially takes the right wing out of the equation. The flow over the left wing begins to turn back toward normal, and is almost completely head on by the wingtip. This explains why we need a certain amount of left aileron to stabilize our Endo Tumbles. (See Fig. 3.)

With a little practice, Endo Tumbling can become natural and effortless. With some experimentation, you can modify the maneuver to an almost infinite degree, placing it on different lines, with different speeds and varied control inputs. Remember to fly high and have fun!

Since moving to California in 2001 to pursue his lifelong passion for aviation, Ben has logged over 5,000 hours in more than forty different types of aircraft. One of the San Francisco Bay area's most popular flight instructors, Ben has joined the Tutima Academy Team in order to continue his dream of flying aerobatics. He is a serious aerobatic competitor flying in the Advanced category. Ben flies the Tutima Extra 300L as right wingman for the Collaborators.

Flying Aerobatics

Where to begin

Thom Richard

Reggie Paulk

Many people who read this magazine have only dreamed of flying an airplane upside down. To some, an accelerated stall is an exciting maneuver that takes us to the edge of our personal envelope. Expanding that envelope is the desire of many pilots, but knowing where to begin can be the hardest part.

In order to expose more pilots to the world of sport aerobatics, the International Aerobatic Club created a web site which lists over 93 schools in 34 states, including a few internationally. The site lists schools by state, and provides contact information and website addresses of participating schools. In addition to types of aircraft available, you will also find a list of available instructors at each school.

Scrolling through the list of aerobatic flight schools, you quickly realize that the Decathlon, Pitts and Extra 300 are the mainstays of most programs. Of course, this makes sense given that just about any maneuver imaginable can be accomplished by this combination of aircraft. Digging a little deeper reveals a lot about the world of aerobatics as well as the many opportunities available to get upside down.

APS Emergency Maneuver Training

For a little insight into some of the programs offered, I contacted Paul "BJ" Ransbury of APS Emergency Maneuver Training, located in Mesa, Arizona. BJ is a former Canadian fighter jock. Having flown F/A-18 Hornets for the Canadian Air Force, he entered civilian life flying an Airbus 320 and air shows as part of the Team Extreme aerobatics team in his Extra 300 in the 1990's.

As its name implies, APS focuses on providing pilots with emergency maneuver training (EMT).

"The EMT program is designed more for pilots who want to learn how to recover the airplane from a wide variety of situations," BJ says. "There can be certain situations you end up in you don't have the proper skills to get out of."

In fact, the majority of pilots who come to APS do so just to obtain the skills necessary to avoid a dangerous upset situation. As one of only a handful of MCFI-A—Master Certified Flight Instructor-Aerobatic, BJ is more than qualified to teach competition level aerobatics, but he does very little.

"If somebody's interested in going into competition," he says. "We'll often refer them to another company simply because our focus is more on the EMT and upset recovery training."

Because APS uses the Extra 300, BJ suggests students start out on a less capable airplane in order to get the fundamentals.

A large part of aerobatic flying is geared toward emergency maneuver training.

"But if they're insistent," he continues, "we'll take 'em through our program."

In fact, there is a common theme among many of the aerobatic flight schools I contacted for this story. Many pilots go to these schools in order to obtain a tail wheel endorsement with a little aerobatics thrown in for fun. Because many common tail wheel trainers are aerobatic, it sure would be a waste to spend your entire time upright.

Budd Davisson

Budd Davisson has been an aviation writer for more years than I care to print. If you don't know, Budd's claim to fame is that he'll teach anyone to land a Pitts. Operating out of his bed and breakfast in Phoenix, Arizona, Budd puts between 350 and 400 hours a year on his Pitts S-2A teaching between 50-60 students how to get a Pitts on the ground safely. So what does the typical student look like?

"My average student has 225 hours and less than 10 hours of tail wheel time and that's it," he says. "What I like to see, if possible, is a tail wheel endorsement and a couple of hours in the back seat of a Citabria shooting landings so they get the sight picture down. That will save them at least an hour and a half of much more expensive time."

Budd says the big thing is to get as much tail wheel time as possible, with a little back seat time in a tandem airplane, regardless of what it is. So how tough is it to pick up the skills necessary to fly a Pitts?

"I've been doing this (teaching the Pitts) for 38 years," says Budd. "I've had exactly one person who couldn't fly the airplane. This is not brain surgery, for crying out loud. It's just a matter of how much training you get, and working at it until you get it."

With almost 5000 hours spent flying the pattern with students in his little red and white biplane, Budd knows a thing or two about working until you get it. Even with all that experience, though, he still can't judge how a pilot will do when they fly with him.

"I cannot predict how somebody is going to do. Period," says Budd. "I've had guys with 60 hours, no tail wheel time, no right to be able to fly the plane at all and I'm ready to solo them in six hours. I've had high time crop duster pilots with all kinds of tail wheel time and all sorts of background who couldn't find their [butt] with both hands."

Thom Richard

While not the ideal aerobatic mount, the T-6 Texan (top) sure is a heck of a lot of fun.

And what about aerobatics?

"Aerobatics is part and parcel of what I do," Budd says. "But the vast majority of people come to me just because they want to learn how to land the airplane. In doing aerobatics, I spend a fair amount of time making sure they understand speed/*g* relationships, and what a V/N diagram looks like. I think we'd be doing a disservice to take them out there and do maneuvers without teaching them the concepts and the dynamics of what's going on. If you don't know the concepts, you can't extrapolate what you do know into a situation you don't know if you've been doing it by rote."

Budd admonishes his students to "Feel your butt."

"That's the most common phrase you'll hear out of me," he says. "I'm old fashioned. Fly the windshield, fly your butt and you'll never get in trouble."

Warbird Adventures

When you think of recreational aerobatics, I'll bet the T-6 Texan rarely comes to mind. But what a perfect airplane for the pure joy of a loop or a roll! Thom Richard is Chief Pilot for Warbird Adventures, located in Kissimmee, Florida. Using three World War II-era T-6's, Warbird Adventures gets pilots up to speed on the T-6.

"We primarily check people out to lean to fly T-6's," says Thom. "But anybody that's going to go fly any single-engine tail wheel warbird can come to us for training."

They do focus on aerobatics, but the training is comprehensive. They cover all normal and emergency procedures as well as all types of landings. Aerobatics in a T-6 are interesting.

"We teach aerobatics all the way up to formation aerobatics," Thom says. "The T-6 is quite limited in its aerobatic capabilities. We only do positive *g* maneuvers. We don't do snap rolls or tail slides. And we avoid exceeding four g's."

Doing aerobatics well in a T-6 is much more difficult than other aircraft such as the Pitts or Extra because of the much greater mass and heavier control forces. As for the T-6 and competition, Thom says the airplane is definitely *not* a good stepping-stone.

Aerobatics isn't just about competition. It's about exploring and expanding your own personal envelope. Competition is just another way to improve upon your skills once they are gained. Ours is a sport that begins at 30 degrees of pitch and 60 degrees of roll, but ends wherever you want it to. That kind of freedom has to be experienced to be believed.

If you're reading this right now, it's already too late for you. It's time to visit the IAC's list of aerobatic flight schools and begin your journey of self-discovery. What other sport offers you the opportunity to learn from a Hall of Famer? For a pittance, you can fly with Bill Finagin, the 2008 IAC Hall of Fame recipient. With over 18,000 hours in the Pitts, he knows a thing or three about aerobatics. Want to fly with a national champion? How about 2008 National Unlimited Glider Champion Jason Stephens? For a change of pace, you can get upside down in a glider at Arizona Soaring, Inc. Turf Soaring, Inc., another Arizona soaring school, is also capable of providing you with your silent *g* fix.

If you haven't already, please visit the IAC's list of aerobatic flight schools (*http://www.iacusn.org/schools/index.php*.) Follow the links, make some calls, but be sure to go out there and get upside down! Happy flying!

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Stan Burks

IAC Safety

By Stan Burks, IAC 431160

Below you will find a recently released preliminary National Transportation Safety Board (NTSB) report.

This report is of a pilot attempting low level aerobatics in an RV-6A aircraft. In my research of accidents that occur during aerobatics, this scenario presents itself over and over. Please read this report and take note of the different factors involved in this accident: Low level, nimble aircraft, and a crowd of spectators.

If you are tempted to try such a maneuver, think about the consequences you may have to endure.

As always, please continue to train, plan, and practice.

NTSB Identification: ERA09LA229
14 CFR Part 91: General Aviation
Date: Saturday, April 04, 2009 in Englewood, FL
Aircraft: Gaynor Donald J RV6A, registration: N88WG
Injuries: 1 Fatal, 1 Serious.

This is preliminary information, subject to change, and may contain errors. Any errors in this report will be corrected when the final report has been completed.

On April 4, 2009, about 1435 eastern daylight time, a Donald J. Gaynor experimental amateur built RV-6A, N88WG, registered to and operated by a private individual, crashed into trees in Englewood, Florida. The certificated private pilot was killed, the passenger received serious injuries, and the airplane sustained substantial damage. The flight was operated as a personal flight under the provisions of 14 Code of Federal Regulations Part 91, and no flight plan was filed. Visual meteorological conditions prevailed at the time of the accident. The flight departed from the Venice Municipal Airport (VNC), Venice, Florida, at an undetermined time.

Witnesses at a local gathering referred to as the "Redneck Roundup," stated that a white single engine airplane flew over their heads at what they estimated to be 300 feet and then the airplane did what some witnesses referred to as a "barrel roll" and others referred to as a "loop." The airplane disappeared from sight. Organizers of the roundup stated that there was no air show scheduled to be performed at the gathering.

Examination of the airplane by a Federal Aviation Administration inspector found that the airplane had collided with trees in a heavily wooded area. The wings and cockpit canopy had separated from the airplane. There was an isolated area of fire damage near the instrument panel and under the accessory section of the engine consistent with a postimpact fire.

The airplane has been recovered from the accident site for further examination.

Fresh Out of the Stable:

First Flight of the Votec 252 T

On the 26th of June 2009, designer, builder and test pilot Max Vogelsang took his newest design into the air. According to Max, everything went perfectly well and the aircraft is a joy to fly.

"The handling qualities and the performance are so good that I even tried a couple of rolls and loops on this first flight," he said.

In case you are not familiar with the name Max Vogelsang, he is an accomplished aerobatic pilot, has flown a mighty Mustang P-51 for many years at airshows all over Europe and designed the very capable, high-performance aerobatic Votec 322 and 351 (see Sport Aerobatics 8/2007 and 1/2005).

Votec is the abbreviation for Vogelsang Technik (Max is designing and building other composite structures as well). 252 is the abbreviation for 250 horsepower and two seats. T stands for Trainer. Just as all Votec aircraft, the 252 is fully aerobatic.

What the 252, the 322 and the 351 have in common is a wood wing, part of the landing gear and most of the controls. Should you prefer a wing made of composite, this will be possible in the near future. The wood-wing by the way was tested successfully to 25 g's.

The fuselage is a carbon fiber composite sandwich structure and is covered with even more composite material. Of course, Max made sure it's easy to remove the cover for inspection.

The customer is king when it comes to engine choice. At the moment, the 252 is available with a 250 horsepower engine but, as you can never have enough power, a 350 horsepower engine is possible as well (and should 350 HP not be enough, a Rolls Royce C-250 turbine will certainly make you very happy).

With the first flight completed successfully, flight-testing has started in earnest and Max has already established the stall speeds at maximum takeoff weight (MTOW). The stall itself is vice free and the airplane gives a clear indication of the impending stall.

Stall speed level flight power off: 60 MPH
Power on: 50 MPH, (with 30° bank): 55 MPH.

Max hopes to complete the flight tests over the next few months. The aircraft will be available in kit form from the beginning of next year and he is also exploring ways of certifying it under the new Light Sport regulations. We will keep you updated.

For more information, contact:

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Calendar of Events

If hosting a contest, let the world know by posting it. For complete and up-to-date information, visit *www.IAC.org*.

Happiness is Delano: The Hottest Contest of the Year (Southwest)
Saturday, Sept. 5 - Sunday, Sept. 6, 2009
Practice/Registration: Friday, September 4
Power: Primary through Unlimited
Location: Delano Municipal Airport (KDLO): Delano, CA
Contest Director:
John Howell, Kathleen Howell, Steve De La Cruz
Tel.: 661 917 4573 • **Website:** IACChapter26.org
E-Mail: 1jkhowell_1954@sbcglobal.net

Harold Neumann Barnstormer (South Central)
Saturday, Sept. 5 - Sunday, Sept. 6, 2009
Practice/Registration: Friday, September 4
Power: Primary through Unlimited
Location: New Century AirCenter (IXD): Olathe, KS
Contest Director: Brenda Lea
Tel.: 913.908.3362 • **E-Mail:** info@iac15.org
Website: www.iac15.org

Gulf Coast Regional Aerobatic Contest (South Central)
Saturday, Sept. 5 - Sunday, Sept. 6, 2009
Practice/Registration: Friday, September 4
Power: Primary through Unlimited
Location: Brenham Municipal (11R): Brenham, TX
Region: South Central
Contest Director: Bryan Butler
Tel.: 979 251-2274 **E-Mail:** bryanbutler@nctv.com
Website: www.iac25.org

North American Aerobatic Team Championship (Northwest)
Friday, Sept. 11 - Saturday, Sept. 12, 2009
Practice/Registration: Thursday, September 10
Power: Primary through Unlimited
Location: Ephrata (EPH): Ephrata, WA
Contest Director: Les Mitchell
E-Mail: ljmitchell@shaw.ca

Rebel Regional Aerobatic Contest (Southeast)
Friday, Sept. 11 - Saturday, Sept. 12, 2009
Practice/Registration: Thursday, September 10
Power: Primary through Unlimited
Location: Everett-Stewart Regional Airport (UCY): Union City, TN
Contest Director: Mike Rinker
Tel.: 731.796.0849 • **E-Mail:** mdr@vaughnelectric.com

East Coast Aerobatic Contest (Northeast)
Saturday, Sept. 19 - Sunday, Sept. 20, 2009
Practice/Registration: Friday, September 18
Power: Primary through Unlimited
Location: Warrenton-Fauquier (KHWY): Midland, VA
Contest Director: Scott Francis
Tel.: 703.618.4132 • **E-Mail:** s.francis@ieee.org
Website: www.iac11.org

U. S. National Aerobatic Championships (US Nationals)
Sunday, Sept. 20 - Friday, Sept. 25, 2009
Practice/Registration: Saturday, Sept. 19 - Sunday, Sept. 20
Rain/Weather: Saturday, September 26
Glider Categories: Sportsman through Unlimited
Power: Primary through Unlimited
Location: North Texas Regional Airport (KGYI): Sherman/Denison, TX
Contest Director: Chris Rudd
Tel.: 850.766.3756 • **E-Mail:** akrudd@gmail.com
Website: www.usnationalaerobatics.org

2009 Mason-Dixon Clash (Northeast)
Friday, October 9 - Sunday, October 11, 2009
Practice/Registration: Thurs., October 8 - Fri., October 9
Rain/Weather: Friday, October 9
Power: Primary through Unlimited
Location: Farmville Regional Airport (KFVX): Farmville, VA
Contest Director: Michael Davis
Tel.: 434.251.9467 • **E-Mail:** Michael.Davis@areva.com
Website: www.iac19.org

Rocky Mountain Invitational (South Central)
Saturday, October 10 - Sunday, October 11, 2009
Practice/Registration: Friday, October 9
Gliders Categories: Sportsman Intermediate
Power: Primary through Unlimited
Location: Lamar Municipal Airport (KLAA): Lamar, CO
Contest Director: Jamie S. Treat
Tel.: 303.648.0130 • **E-Mail:** JamieTreat@Q.com
Website: www.iac5.org

Borrego Akrofest (Southwest)
Friday, October 16 - Saturday, October 17, 2009
Practice/Registration: Thursday, October 15
Rain/Weather: Sunday, October 18
Power: Primary through Unlimited
Location: Borrego Valley Airport (L08): Borrego Springs, CA
Contest Director: Gray Brandt
Tel.: 970.948.0816
E-Mail: graybrandt@yahoo.com
Website: www.iac36.org

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www.AeroList.org - Like Craigslist for the aviation community.

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Just for Starters

Greg Koontz

The Federal Aviation Regulations give us the opportunity for some very unusual reading. Sometimes they tell us what we can do; sometimes they specify what we can't do; at times they say exactly who can or cannot do these things; and other times they don't. It can be what they don't say that means the most.

Take flight instructing. The fed tells us that instruction counted towards pilot certificates and ratings must be conducted by an *authorized flight instructor.* For example, the Private Pilot Certificate requires 20 hours of instruction from an authorized instructor. Although this mostly refers to a certified flight instructor, it also includes certain other people approved by the government. So does this mean a private pilot cannot give instruction to a student? Not really. It means that such instruction cannot be counted towards the minimum 20 hours of instruction required from an authorized flight instructor. Technically, additional instruction could be given by anyone legal to be on the plane.

If this sounds like a recommendation from me or the FAA to take instruction from a private pilot, it's not meant that way. I think the feds were real careful not to say it. I surely don't suggest it. Nor would I suggest taking your aerobatic instruction from any less than the most qualified person you can find. But here are the hard facts; there is no requirement in the FARs for aerobatic instruction.

That's right. There is no certificate, no rating and there are no requirements. They do tell you where you can fly aerobatics, how high to fly, and even when to wear your parachute. But they do not tell you how to do aerobatics. The closest the feds will approach the subject is to tell you that beyond 60 degrees of bank and 30 degrees of pitch, you're doing aerobatics. Nowhere in the expanse of the Regs do you find the definition of a loop. Nowhere do you find any aeronautical experience requirements. There is no checkride.

" Nowhere in the expanse of the Regs do you find the definition of a loop. "

This means that anybody legal to fly an airplane can do aerobatics if they are in an aerobatic certified airplane in the right place at the right altitude and so forth. It also means that anybody can teach aerobatics. I mean ANYBODY. My mother-in-law once saw me do aerobatics. This is more than the required experience and certification for her to get into the right seat beside a fully certified pilot and teach all she knows about loops and rolls! As long as the person she's with has the certificates to get them legally up in the air, there is nothing illegal here.

This is an area of aviation simply left uncluttered by regulation. I like simplicity. But I don't think the feds did this out of the goodness of their hearts. When or if they ever get into defining loops and rolls within the guidelines of a Practical Test Standard, it is going to be a big mess. Those feds aren't the bunch of dummies you might think. Nobody wants to open that can of worms! The IAC has that arena covered just fine, thank you.

But this no-certification thing leaves us a bit short on having some sort of "authorized flight instructors". Who you going to call when you want to be assured good quality instruction? The Master Certified Flight Instructor-Aerobatics program was created to provide recognition to individuals who have made the extra effort to be qualified to teach aerobatics. This can be helpful to the pilot who needs some guidelines for choosing an instructor. But, unfortunately, this program has not yet become widely known so most people just don't know to look for this accreditation. There are not a lot of them, so they can be hard to find.

So the point is any school with the bucks for a Citabria can hang out a shingle saying "Get your aerobatic lessons here". When the boss gets offered a lease-back from his buddy who just sprung for a new Decathlon, who is going to do the instruction?!

"Hey, Jimmie, didn't you just get your tailwheel endorsement in that old Champ? We're so proud of you we're promoting you to chief aerobatic instructor! Uh, go practice that stuff some".

Nothing beats a little research before you strap yourself in an aerobatic airplane with an instructor. An MCFI-A should be a good bet. A referral from a well satisfied customer is even better. And remember, just because somebody is a good at it doesn't mean they can teach it. If you taught your kids how to drive a straight shift you probably understand this without further persuasion.

Teaching a motor skill takes some serious planning. Just going up and doing some "monkey see, monkey do" flying just isn't going to work. Your instructor should be working from a carefully developed lesson plan that builds from a sound foundation of fundamentals and develops your skills one step at a time. This takes teaching skills and it takes real experience on the subject. It can be hard to find an individual with both. It is even tougher to find one close by. You might need to be prepared to travel.

Recently, the International Aerobatic Club published a list of aerobatic schools on its website. It's a great start for finding an instructor, but still requires you to ask a few questions before you sign up. Be sure the instructors suit you, the training environment seems right and the equipment matches your level of training. If you have an IAC chapter near by, find out what they recommend. And, as always, feel free to drop me an e-mail with any questions you might have.

Greg Koontz has flown sport aerobatics since 1971. He flies air shows sponsored by American Champion Aircraft, is an aerobatic competency evaluator for the International Council of Air Shows, operates Sky Country Lodge aerobatic school, and is a Master Instructor-Aerobatics. Visit ***www.GKAirShows.com****. Please send your stories and ideas to* ***Greg@GKairshows.com.***

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