Hangar Talk

The "Lightning" Newsletter

January 2011* - Volume 4, Issue 1

*The 36th and last issue I will be writing.

2010 SL-1 Demo, Lightning of the Month

As I have mentioned before, this will be the last issue of the Lightning newsletter that I will be writing. After publishing the newsletter for three years, I feel it is time for someone new to "take the stick" and to provide new direction, a fresh approach and renewed interest. I have enjoyed writing the newsletter over the years, and it has been a pleasure to meet so many of the Lightning owners and builders. My close association with the Lightning community will continue as I will occasionally write articles for the newsletters. But I also will eventually be involved in a brand new aviation development program of potentially tremendous importance to all general aviation that will also involve the Lightning. More information on that new endeavor is included in this issue. You can continue to contact me at N1BZRICH@AOL.COM. Let me hear from you!

For future newsletter information or inputs, contact the factory guys in Tennessee.

Contents in this issue

And now, the rest of the news.

HAPPY NEW YEAR!

Here's hoping that 2011 will be another great year for all of the Lightning community. As I did last year, I would like to recommend some New Year's resolutions for all of us who love to fly. First, try to fly more often this year so that you get the max enjoyment from your airplane and the tremendous freedom that flying represents. Second, make an effort to take someone flying at every opportunity. It can be a Young Eagle or an old buzzard, just share the freedom of flight with someone so that they can see the joys of flight that we all enjoy so very much. You may end up inspiring a future pilot, or convincing a neighbor of yours that flying is a great pastime, or even sowing the seed in another pilot for building or buying a Lightning sometime in the future. All of these are good things. Another suggested resolution is to join an EAA chapter if you are not already a member. If you are a member, get involved by flying Young Eagles and by presenting a program on the Lightning. Make some copies of our newsletter and take them to your chapter meetings to share or just leave copies around the lobby of your home airport. I might even suggest that you get your local EAA chapter newsletter editor to include a link to the Lightning web site in the chapter publication or on their web site. All of these are good ways to spread the word about this great airplane that we all love to fly. My last suggestion for you is that you start planning now to attend as many fly-ins as you can this year. I hope to see each of you at Sun-N-Fun, Oshkosh, and, of course, the Annual Lightning Homecoming and Fly-In in Shelbyville. And if you are still debating whether or not the Lightning is the airplane for you, 2011 is the year to take that demonstration flight and order your Lightning. You will be glad that you did! An article later in this issue about the Lightning being involved in an exciting new project might just help to convince you that it is the best sport aircraft out there for your mission.

Newsletter's Fourth Year and Future

As I have mentioned before, this first issue of the Lightning newsletter for 2011 will be the last that I will be producing. Hopefully, someone else will take the stick and continue publishing the newsletter on a monthly basis. I plan to occasionally have an article or some photos for the new publisher to use, so I will still be associated with the newsletter. Over the years I think the newsletter has been a big help for the entire Lightning community. It has been a source of information for builders, flyers, and potential customers, as well as a way for the factory and the dealers to keep the Lightning community up-to-date on news and potential safety issues. Nick assures me that the newsletter will continue even if someone there at the factory has to do it. I'm glad he agrees that it has been a good resource and worth the effort to continue it. But we all know how busy the Lightning team in Tennessee is; so, here is one more plea for someone out there to grab the stick and take command of the newsletter for a while. I think you will enjoy the experience and the newsletter readers will appreciate your efforts. Blue Skies.

Lightning of the Year for 2010

Before I announce the overall winner, I would like to thank everyone who took the time to vote for the Lightning of the Year. Overall, we had a very good voter turnout (democracy at its best), and

many of the monthly winners got great support. However, there were three aircraft that actually stood out in this very prestigious group and these three together counted for 80 percent of the total votes. As they say, the cream rises to the top, so these three were obviously the cream of the crop.

The <u>top three candidates</u> in the <u>order that they were monthly winners:</u>

March 2010 – Carl & Pat Beatrice

July 2010 – Greg Couchley

December 2010 – Bill Beasley

And the overall winner of "Lightning of the Year for 2010" is:

Bill Beasley's N226WB.

Congratulations to Bill and to N226WB!

Bill's jet is certainly a beautiful example of the Lightning that we all love to fly. Bill lives on an airpark in Texas and started building his Lightning during late June 2010. He used the builder's assistance program in Tennessee and was able to fly his completed jet back to Texas on the 19th of September. I might add that not only did Bill's Lightning win the Lightning of the Year for 2010, but he also got several votes for Hangar of the Year as well. Super job, Bill.

Great News for the Lightning

For all you Lightning owners, I have a question for you. Did you agonize over your decision as to which sport aircraft to buy or build when you chose the Lightning? And, for any of you potential customers, are you still wondering if the Lightning is the right airplane for you? Well, maybe with the following piece of information and fantastic news, I can help you realize that you certainly made the right decision when you chose the Arion Lightning.

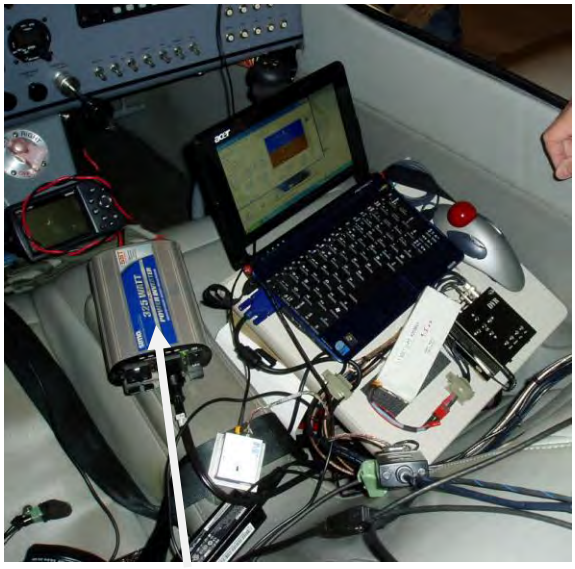
There is a NASA contractor, ViGYAN, Inc., located in the NASA Langley Research Center in Hampton, Virginia, that provides aerospace research and development services to a wide range of government (including NASA) and corporate clients. Business areas include: wind tunnel testing, scientific and engineering software development, and computer technology support. To give you an idea of the type of company that ViGYAN is, two of their recent general aviation projects were, first, developing a way to make composite aircraft able to take lightning strikes, and second, having real time weather available to the pilot in the cockpit. Both of these developments have had a tremendous impact on making general aviation safer.

ViGYAN is currently working on an amazing project with the goal of developing a system that will be able to dampen much of the turbulence that general aviation and commercial aircraft encounter. Now, that would certainly be a major breakthrough for all of aviation in terms of comfort and safety. General aviation aircraft have fewer options than airliners to avoid turbulence due to the lower altitudes that they operate at, and consequently, face greater levels of uncomfortable flight and safety concerns as a result of the turbulence. The system that ViGYAN has developed and tested in a wind tunnel is called the Active Ride Improvement System (ARIS) and their analysis from the ongoing wind tunnel tests indicates that approximately 92% of the turbulence / gust lift that aircraft encounter can be dampened or alleviated with the system. Can you imagine what a tremendous advancement to all of aviation that could mean? The application of an effective ARIS to both commercial airliners and small airplanes would greatly increase comfort, improve safety, reduce costs because of not needing to cancel flights or reduce speed, and lead to an overall better utilization of general aviation throughout the country. While the system will eventually be applicable to all classes of aircraft, imagine the impact on market share to the first "small airplane" to have an effective Active Ride Improvement System.

And that "small airplane" is where the Lightning comes in. Obviously a company like ViGYAN could chose any airplane they wanted to test ARIS, and probably every aircraft producer out there would like to be chosen to be used in the testing and development of such a system. ViGYAN figured that the most difficult type of aircraft to reduce the effects of turbulence on would be a very lightly wing loaded aircraft, or light sport aircraft. After looking at the current light sport aircraft on the market, ViGYAN chose to partner with Arion to take the project to the actual manned aircraft flying phase. Wow, that should make all you current and future customers feel really good about your decision to buy a Lightning. An actual NASA contractor, those rocket science guys, made the same decision that you did! They chose the Lightning!

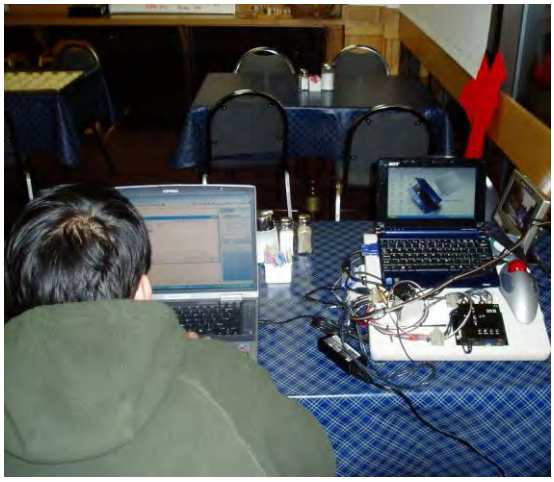
As I mentioned above, they have been working with wind tunnel tests up to this point. In fact, I have been involved with their efforts and have actually flown test flights in my Esqual LS (Lightning Stuff) gathering real and accurate turbulence data for them to use in the wind tunnel. The heart of the data gathering equipment is a very accurate accelerometer that measures forces in the pitch, roll, and yaw axis. This very small piece of equipment is also a self-contained Inertial Navigation System, a GPS, a magnetometer, and has several other capabilities that I don't seem to remember at the moment. To say the setup has amazing capabilities is certainly an understatement. Everything is fed into a laptop computer that records all the data. There is also a very small camera that records my stick movements to coordinate those inputs with the accelerometer.

These guys are true rocket scientists and rocket engineers at work. Some of the photos below will give you an idea of the type of instrumentation and data gathering equipment they have been using when I fly their engineers in my aircraft.



The power inverter was used during ground test only. Note camera to record stick movements.

The engineer that flew with me on the first turbulence data gathering test flight also wore special goggles that would allow him to see what the camera saw as well as what was on the laptop display in case the sunlight washed out the laptop screen.



Note the small accelerometer, it provides a display on the laptop that is very similar to my Grand Rapids EFIS. Left photo shows ground test of equipment before the flight. Right photo shows their computer expert downloading the data from the flight pack to a larger laptop. The engineers were about as excited with the resultant graphs as we are after a successful Phase One flight test.

ViGYAN's next step will be to modify an Unmanned Aerial Vehicle, that NASA will likely supply, with the ARIS and then test fly it to further confirm their wind tunnel results. After that is completed, their plan is to build and install the system on a Lightning for the manned testing phase. That is when I will get really busy, helping to build the EAB Lightning to light sport standards, installing the ARIS system, and then doing all the actual test flying of the ARIS-equipped Lightning. We plan to do the build and modifications with the help of Nick, Mark and Moostang Mike at the Lightning factory in Shelbyville.

That flying phase of the ARIS testing might be a year off, but the planning for it has already started. We are laying out a step-by-step flow chart for the build, modification, and actual manned flight tests. Also, the turbulence data we are currently gathering in my Esqual will be used to update the modifications and flight computer programming for the UAV and, of course, the manned Lightning ARIS flights.

By now you are probably asking how the ARIS concept and design really works? Well, for now, it is all proprietary information, so I can't give any more information than I already have provided above and the short explanation I provide below. However, gust alleviation systems have been tried before, but the results have been unacceptable on small airplanes due to their complexity, weight, and inability to move conventional controls fast enough to offset the gust lift *as it happens*. ViGYAN's Active Ride Improvement System is an open loop system with "leading" sensing and small chord flaps that are more efficient aerodynamically than the large chord flaps, and can be moved fast enough (due to 1000 times less inertia) to practically kill the gust lift *as it happens*. Simple, right? Stay tuned for more information on this exciting program.

Update on Gerd Nowack's Lightning in Germany

A shape can be seen just behind the shores of the Nowack Family Koi and Recreation Facility, an object that points its blunt snout out of the room that is known to friends and neighbors as "Gerd Nowack Aerospace". Yet it is covered by sheets to protect it from the midsummer`s sunrays and curios looks, but somehow it seems familiar to the Knowing.... could it really be? Now the big moment comes, the veils are removed and:

YES!!! It's Rollout Day in Linden, Germany! The first European Lightning is presented to the public, standing on its own wheels - well, the main wheels at least - and, after a few frantic moments that seem to stretch to hours, it has its own wings bolted on!

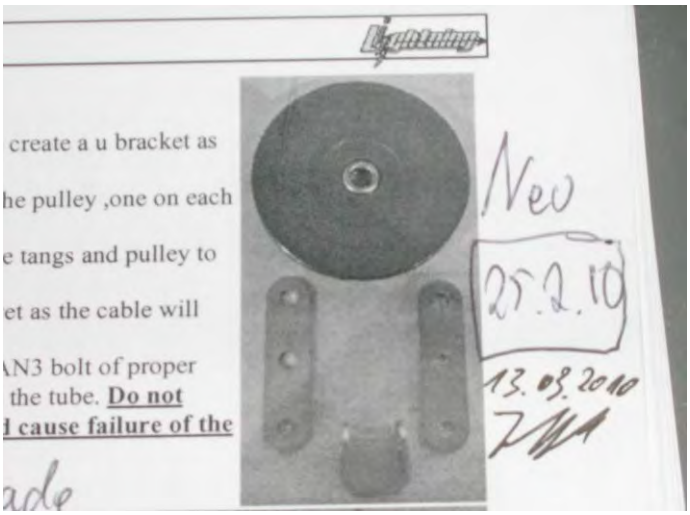
Well, friends of the Lightning, you might remember me from an older Newsletter. Since November 2009 I`m busy building my own Lightning; kit no 89. During the past 13 months I have logged 650 building hours, without builder`s support except the occasional helping hand from wife Ulrike and the daughters Laura and Nikola. I could keep quite close to my guesstimate of 50 hours per month on average. Progress has been good overall. It never got boring and I learned a lot of new things. But of course it also had some rough moments, full of epoxy dust and machine noise. And there were those moments of truth, when I saw that the part that I had worked on for hours was not good and had to go into the trash bin, and I had to do it over.

Since in the past I have done a lot of metal work (car and bike repair, a little gun smithing and steel and copper tube plumbing at home), I was at first attracted to the steel and aluminum tasks, like the rudder pedals and the Canopy hinges. That worked fine, and my examiner was quite satisfied.

As I mentioned the last time, certification in Germany is a lengthy process. When I started the building I had to look for a certified Aircraft Examiner with experience in the experimental aircraft field, and to get him approved by the LBA, our FAA.

In Germany the examiner has to check just about everything that the builder makes out of raw material for correct size and workmanship. To avoid later trouble it's a good practice to present the parts that are hard to reach for a check before installing them and to get the signed approval in your building log.

So I visited my examiner, Mr. Kerkhoff, at his home, only 20mls away from Linden. I had a basket full of stuff along for checking, like pedal assemblies, elevator hinges, trim flaps, and the little steel brackets for the rudder cables and their nylon rollers. The first time he didn't like them. He said they weren`t square but round, so the washers would touch the brackets only at their edges. Well, I didn`t want to start a discussion. I went and ordered another set of steel tangs from Mark and made new, better brackets. Next time he approved them.

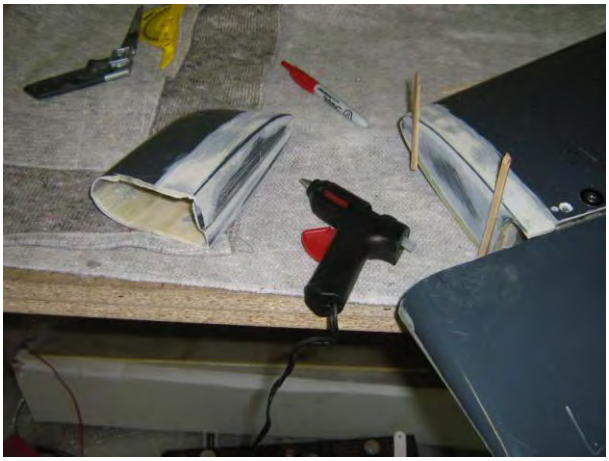


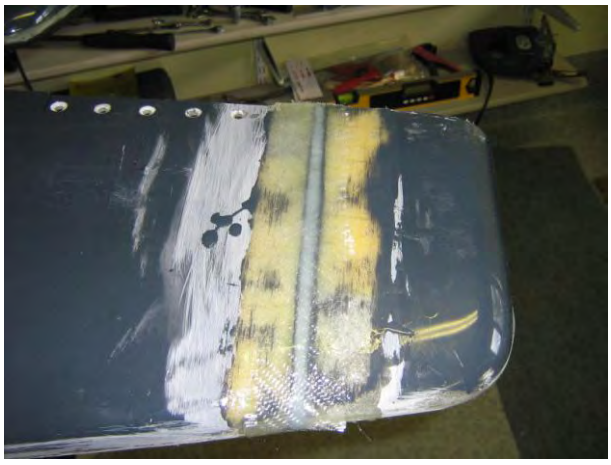
Then I did the horizontal stabs and the elevators, and at this time I had to go and cut into the flesh of my Lightning in order to make the elevator trim flap. A frightful moment! No machine work this, I felt. I used a short handsaw with a blade for metal cutting. That took a while, but the cuts came out straight and even.

Due to a little ambiguity in the Builders Instructions, my first cut was at 17 3/4", but should have been at 24". Well, Nick told me it's no big thing; just do one more cut at 24" and glue those two parts together with flox. Then epoxy it over with two layers of glass. He said they had to make it several times on their search for the right elevator trim flap size. So that gave me a nice opportunity to learn how to connect two pieces in such a way that they hold together tight, and no seam can be seen - at least after painting.

Next came the stabilizer modification. Since I had observed on my short Lightning flight in SYI that the elevator was quite touchy - at least compared with an Airbus`s - I decided to do the full modification with no elevator horn left. This time the sawing (handsaw again!) went with much less anxiety!

To get the former horns to the stabilizer turned out to be much simpler than feared. Nick advised me to use a heat glue gun for initial fixing and icicle sticks for the gap- well, Starbucks sticks worked fine also! Then to fill the gaps with flox and epoxy it all over - simple!





So the building went on and on, one chapter of the instructions after the other, interrupted by my usual work and the chores at home, of course.

Six long weeks were needed for the building and fitting of the canopy - those who also have gone through this will understand how happy I was when at long, long last I finally got a good fit of the canopy to the fuselage, and I could go and look for a nicer task!

And then, in the last day of June, during a stretch of really nice summer`s weather in Upper Hessen, the great moment came: Everything was ready to get my Lightning out in the open and put the wings on the fuselage. During the next days I adjusted the AOI, drilled the AOI holes and closed the gap between wings and fuse with epoxy and fiberglass cloth, all on my lawn. Before the next rain I had it all taken apart again and stowed away in its place in "Gerd Nowack Aerospace".

What comes next is something that you American Lightning builders are spared of: the wing g-load test. You all have seen the pictures of the wing and all those lime bags on it on the Arion home page, haven`t you? Since my Lightning is the first in Germany I have to prove the stability of my Lightning`s wings. They tell me, every self built aircraft here has to go through this, only very common kit planes like the Vans RV`s are exempted because they had so many tested before.

With some organization I managed to find a date and a place for the event: a friend works at a shop for construction materials, they had the time - after closing for the weekend -, and the space in their big storage hall, they have also lots of the heavy stuff - 30kg paper bags of concrete mix- , and two forklifts. On August 19th my family, many friends and Mr. Kerkhoff the Examiner met for the big event.

Another friend had made four strong steel angles with holes at the right places for the wing bolts and I had bolted them to some thick wooden planks. We ferried both wings over to the site with my small trailer, and after the shop had closed, we bolted both wing spars to the steel angles, and the planks to a small stack of pallets.

My supervisor had calculated the correct weight and approved the bag distribution plan that I had prepared, and so we started to put 37 concrete mix bags on each wing - 1110 kgs or 2445 lbs! That equals the 4,1 g`s which would be the max gust load according to the V-N-diagram that I had presented for the application to the First Certificate... - have I already mentioned that we have to face a lot of bureaucratic stuff here in Germany?

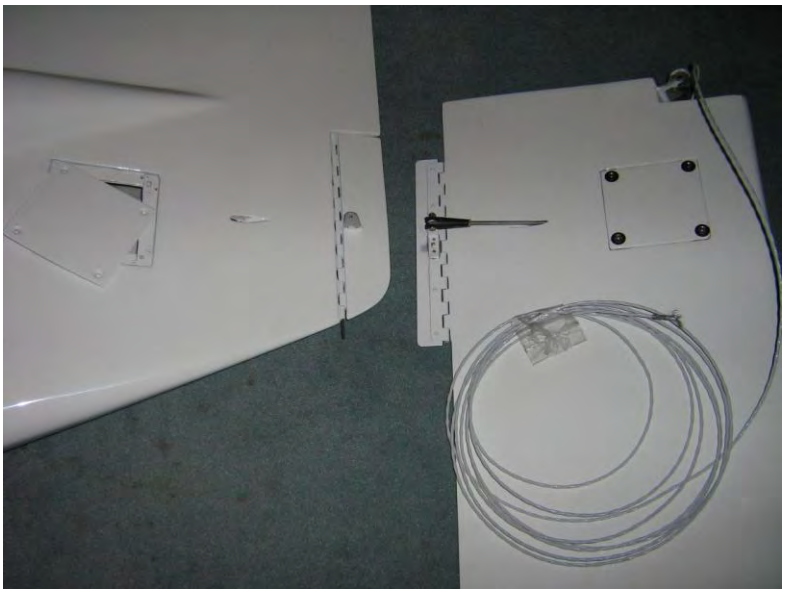
During the loading process the wings were supported by the two forklifts. After all bags were where they were supposed to be, and counted, and after everybody had taken a deep breath, the forks were lowered slowly. After the wings were free, they had to stay that way for at least 3 seconds, which passed without event! Then the forklifts took some of the load off the wings, and we could start to remove all the bags. Of course, the height of the wingtips was measured before and after the test to exclude any permanent deformation of the wings.

So an important hurdle on my way to my own Lightning was crossed and I could continue the building.

Now, after a bit more than a year, there are no parts left that I haven`t worked on, even the wheel fairings are ready for painting, The wings, flaps, ailerons and all the tail parts are already spray-painted. The panel is almost complete, powder coated in Airbus-blue/gray, arranged around a single MGL Voyager EFIS and German Funkwerk radios. I learned that I will have to put standard ASI and altimeter in, too. Those are on order.

Part of the switches are switch type CB´s, so there are button CB´s only for the radios, prop, flap and the trim system, which in my case means a 3-axis electric trim - what they call the poor man`s autopilot! The

aileron trim is a copy of Lynn Nelsen`s design as published in 2/09 newsletter. Thank you, Lynn! The rudder trim is my own design with a small trim-flap at the bottom of the rudder and the same Ray Allen trim actuator as in the pitch trim system.



Transponder and the ELT are already coded for the tail sign my Lightning will bear: D-ELIY.

I had little choice in the matter of the first two letters. D and the dash are mandatory, the D meaning Deutschland, of course. E as 2nd letter is assigned here to all single engine planes below 2 metric tons GW. The last three were my choice. I tried to get some Lightning letters in, so the L and I. The Yankee was the best one still free and sounded good, too. Delta Echo Lima India Yankee runs off the tongue nicely, I think.

Presently I am waiting for the length adapter of my Czech 3-blade electric Constant Speed prop - nice, huh? Go to www.woodcomp.cz, if you´re interested. Then I can make the final adjustments to the cowling and finally get the fuselage to the paint shop.

At the beginning of next year- well, if you read this it's already this year- I can start to put everything together for good.

Then at some time in spring I hope to be ready for the Second Certificate that my Supervisor will provide - after rigorous testing by Mr. Kerkhoff, of course, which will be the basis for my application to the LBA for a Temporary Permit To Fly!

And that's it for the moment! I guess, in a few months I will have something more to tell for a later newsletter, if you are still interested in those strange German ways!

A Happy New Year to you all and a good and accident-free 2011 for the whole Lightning Community!

Gerd

News from the Factory

Lightning Sales Update

As we start a new year, I asked Mark to give us an updated total list of Lightnings sold since Sun-N-Fun in 2006 when the Lightning's first sales contracts were accepted. Below is his sales update as we start 2011.

Hi Buz,

I finally had a chance to compile some yearend information for you. By the end of the year we will have delivered a total of 113 airframes since we began in the Spring of 2006. We have Lightnings in: Australia - 23, New Zealand - 1, Brazil - 1, Russia - 1, Canada - 1, Germany - 1, with the remainder in the US. There are now a total of 76 Lightnings flying.

For the year 2010, we sold 36 airframes (both EAB kit and LS-1), delivered 31 airframes. We actually sold more than we could produce this year - the remaining 5 will be delivered in 2011. LS-1 sales: Sold 12 and have delivered 8. The remaining four are scheduled for delivery in the 1st Qtr of 2011.

On a side note, for all SLSA producers, we are 6th this year in total SLSA and ELSA registrations behind Piper, Cub Crafters, Cessna, Flight Design and Tecnam. (Source: www.bydanjohnson.com.) One thing I can say is that we have actually delivered all of our registered airplanes. The 9th registration was Dave Jalanti's E-LSA.

We have finished production on Lightning Australia's LS-1 and are waiting for the new GRT autopilot servos before we crate the plane up and ship it over to Dennis Borchardt. Dan Johnson believes this will be the first American made S-LSA to be EXPORTED to another country.

There were a total of 20 first flights of Lightnings (EAB, SLSA, and ELSA) this year.

So as you can see 2010 was our best year yet! For 2011 we're working on ramping up airframe production to 50 and are looking to produce at least 24 LS-1's. We're excited about what 2011 will bring.

Mark
Mark Stauffer, Production Manager Arion Aircraft

The prototype Lightning that started it all.

The current factory demo, N326AL.

There will also be a new Arion Lightning dealer for 2011. Many of you met Jack Gonzenbach at the Lightning fly-in and homecoming this past October 2010. Below is Jack's recent email to me and his official "press release".

Buz,

Here is the news release for inclusion in the January newsletter. With all that is going on and the holidays coming up fast, I didn't have much time to get too creative but hopefully this will at least get the essential information out to the group. BTW, I had a ball during the first build week in Shelbyville and am looking forward to the next two.

Thanks,

Jack

Jack Gonzenbach
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Overland Park, KS 66213
(913) 890-3052
jgonzenbach@flyhoaa.com

FOR IMMEDIATE RELEASE

Effective January 1, 2011, **Heart of America Aviation LLC** (HOAA) has been selected as a dealer for the Arion Lightning series of experimental amateur built (EAB), experimental light sport (E-LSA) and factory built light sport (S-LSA) aircraft. Heart of America Aviation LLC is located in the greater Kansas City area, operating out of East Kansas City airport (3GV), and will cover the states of Nebraska, Kansas, Missouri, Oklahoma and Arkansas.

Jack Gonzenbach, principal, has been involved in aviation off and on for over 30 years and has a manufacturing and design background in metal, plastic, composite and electronic products. HOAA's demonstration aircraft, N874JG, has just completed phase one of the builder assist process in Shelbyville and is scheduled to complete phases two and three sometime in late February of 2011 with the goal of being complete and ready for demonstration rides immediately after Sun 'n Fun 2011.

Contact information for HOAA:

Heart of America Aviation LLC
(913) 890-3052
jgonzenbach@flyhoaa.com

The company's website, ***www.flyhoaa.com*** is still under construction but should be operating in early 2011.

Current Lightning Dealers

Arion Lightning, LLC, contact Nick Otterback, Shelbyville, TN, 931-680-1781, www.flylightning.net

Lightning Southwest, Greg Hobbs, Marana, AZ, 520-405-6868

Green Landings Flight Center, Ryan Gross, WV, 304-754-6010, www.greenlandings.com

Lightning North Central, Tom Hoffman, Neenah, WI, 920-836-2318

Lightning Northeast - Jabiru Power Solutions, LLC, Dave Jalanti, NY, dave@jabirups.com

Lightning Australia, Dennis Borchardt, Kingston SE, South Australia, 08-8767-2145

Lightning Brazil – Cimaer Ltd, Claudio Nunes, Brazil 24 900-000, 21-2637-3605, 21-9451-9700

Russia and CIS – AVIA-NIANIA, Moscow, Russia, + 7495518-62-75, avianiania@mail.ru

Lightning Florida, Max Voronin, DeLand Airport, FL, 386-873-9995, www.moonshineaviation.com

Heart of America Aviation, Jack Gonzenbach, KS, (913) 890-3052, jgonzenbach@flyhoaa.com

News from the Dealers

Max and Olena, the Florida Lightning dealers, sent in the following note and photos of a recent formation photo mission that he and Olena were involved in. Nick, take a look at that turbine jet engine for a future Lightning. Of course, you will have to figure out a way to get enough fuel in the Lightning for anything more than a trip around the pattern. Or maybe an electric Lightning is the way to go next. Electric Lightning - that has a nice ring to it. Of course the Brits have already done that many years ago. See the photo to the right.

Hi Buz,

How are you doing? How's the next and last big Newsletter issue coming along? We did a little flight today; riding around with a photographer for a friend. Few cool pictures (unfortunately I won't get the pictures from the Lightning until after Christmas) - Olena took these riding in the back of the Legend.

- How fast is the Lightning with the landing gear intersection fairings? I don't know, ask my formation buddy.
- Turbine Legend isn't something you'll want to beat around the pattern in. If you burn that fuel, you might want to make it count.
- Couple of aerial photography hints - you want to have your pictures taken when the sun is behind the camera plane (two pictures attached, lighted and in the shade)
- Why is N787FL in a bank half the time? To allow the faster plane go on the outside of the turn and keep the speed higher than mine.
- You do want the clouds for the pictures to look good. Planes look boring against the blue backdrop.
- Olena had lots of fun flying that rocket. Whole flight was about half an hour, Lightning burned 2.8 gal of 100LL, Legend - 28 gals of Jet A.

In case someone is interested, here are the performance numbers for the Legend - http://turbinelegend.com/statistical_data.htm

Have fun and Merry Christmas!
Max and Olena

News from Builders and Flyers

The first note this month in the Builders and Flyers Section comes in from Wayne Lenox who lives on an airpark in sunny and warm Arizona, west of Phoenix and near Buckeye. It is snowing here in Williamsburg, VA, as I write this, so I am very envious of Nel and Wayne.

Hi Buz,

Our Lightning is flying great. So we will be leaving to see our kids and their families that live in Texas. That should be a fun time for Christmas. The only thing we need to do is ship some clothes and gifts. Just can't haul the load that we need.

Thanks again for the great job on our newsletters.

Wayne Lenox

Next input for this month is another message from an Arizona transplant. I think John used to live in Wisconsin, but decided to go south and west until no one recognized a snow shovel that he carried with him. He now lives in the South Mountain area of Phoenix in an airpark called Hangar Haciendas.

Buz,

I promised some pictures from my build at Greg Hobbs place. We would have finished but had a lot of distractions and a couple parts shortages. Greg had a lot of activity that week. Still hope to finish and fly in January.

Merry Christmas

John Drane
N621WV, Kit #85

Next is an update from Benardo on his build progress.

Hi Buz,

I made a couple of wing tie downs today from 1" x 1" x 1/8" 6061 T6 aluminum angle that will attach to the wing **spars** at the tip. I'll send you some pictures, a CAD drawing and some details in the next two or three days. I think that you'll like them. I weighed one of these neat little tie downs and it came out to 1 1/2 oz!
I also added (3), 3" wide and (1) 2" wide 8 oz. fiberglass strips to the inside of the rear spars at the tip to strengthen them for the tip aileron brackets. I did this because I will be adding 9" to the length of the ailerons and so that the rear spar can carry the extra loads. It's probably a little overkill, but what the heck.

I hope that you and your family had a great Thanksgiving.

Regards,
Bernardo Melendez

And finally, Selwyn checks in with an update on his test flying.

I've finished my test flying with very little in the way of changes required, two turns on one flap linkage to correct a slight right wing low tendency was about it. I built mine without the optional sump cooling duct and had some oil temperature problems as the weather warmed up so last week I fabricated and installed the sump duct and cut the air entry in the cowl under the spinner. Oil temperature has dropped by around 15 C and the introduction of additional air into the lower cowl does not seem to have affected the airflow over the cylinders, CHT's have not changed, so I'm happy with the result. My thought is that the sump cooling is an essential mod in this environment.

The picture is us taxiing out for first flight.

Merry Christmas and a Happy New Year to all!

If you are building, keep at it because the result is fantastic. If you are flying, go fly some more and wipe that silly grin off your face. :D
Cheers,

Selwyn
Kit 66

Reader Feedback

Bob Belshe from California is interested in a light sport Lightning. He currently is flying a Lancair 320, but would be interested in trading for an ELSA Lightning.

Hello Buz,

I have a Lancair 235 which I converted to an IO320 back in 1998. I have put nearly 1000 hours on the plane and like it very much. I have been flying with a special issuance medical since 2002, (I'm 76 now) and am thinking that it will soon be time to get serious about switching to light sport.

Though I have never flown a Lightning, I like its looks (wonder why) and I especially like the extensive and well done on-line documentation and your newsletters. Unfortunately for me, Lightning does not have any presence in California that I have found.

What I would like to do is trade my Lancair for a Lightning ELSA which is flying, or nearly flying. Any advice you can offer would be appreciated. You can see all about the Lancair at the web page below.

Thanks

Bob Belshe
Moraga, CA
Lancair 235/320
http://home.comcast.net/~rbelshe/

Photos of Bob's Lancair 320 are below.

Hi Bob,

I appreciate your kind words about the newsletter. Although the January 2011 issue that I am working on now will be the last that I will be responsible for, Nick has assured me that someone else will take over the responsibility of putting it out on a monthly basis. I have enjoyed doing it for the last three years, but I have recently taken on several other aviation responsibilities that will be very demanding on my time, so I would not be able to devote the time required to do it "the right way". However, with your OK, I'll put your message about selling your Lancair 235 in the next issue and maybe some individual or Lightning dealer reading the Jan issue will know of someone looking to buy a Lancair. Also, I am going to info Nick and Mark at the factory on my message back to you, so they will know about your desire as well.

As far as I can remember there is at least one Lightning that is in California. John Krizman, who is from the Sacramento area, I think, built a Lightning with factory build support some time ago.

Maybe you can look him up and go see his Lightning, and perhaps even get a ride. I hope so. Other than that, the Lightning dealer in Arizona would probably be your next closest place to see a Lightning and get a demo flight.

Anyway, good luck on your quest. I know you will enjoy how the Lightning flies. It is a great airplane. Let me know if it is OK to publish your message to me in the Jan Lightning newsletter.
Blue Skies,
Buz

Upcoming Events

US Sport Aviation Expo, Sebring, Florida, 20 - 23 January, 2011

Sun-N-Fun, Lakeland, Florida, March 29 - 3 April, 2011

Nick's Lightning briefing at SNF is scheduled twice - Wednesday, 30 March @ 9 AM in tent # 11, and Friday, 1 April @ 9 AM in tent # 11

AirVenture, Oshkosh, Wisconsin, 25 – 31 July, 2011

4th Annual Lightning Homecoming and Fly-In, Shelbyville, TBD September 2011.

Safety

A recent "happening" (for lack of a better descriptive word) that Nick told me about is the motivator for this month's safety article. The short version of the story is that a Lightning owner, wanting to sell his airplane, had an instructor he knew take a potential customer for a local flight to demonstrate the aircraft. I don't know if this was the instructor's first flight in a Lightning, but from the "rest of the story as I know it", which I will relate below, it sure sounds to me like the instructor was not very experienced in flying sporty aircraft, basic flight aerodynamics, or even in-flight decision making.

During the demo flight the flight instructor, who was actually flying the airplane, made several very questionable decisions. For example, they were flying in a heavily congested area, were not really looking outside the cockpit for traffic, did not have the transponder on, and were not talking to the local air traffic control. All of the above led to a very close potential mid-air with a Hawker Jet. Both pilots said they were as close to an aircraft in flight as they ever had been. Apparently the CFI reacted by stuffing the stick to the stop, with the resultant immediate nose full down attitude that an aircraft with sporty flight characteristics will have. What's an inexperienced pilot now going to do? They promptly pulled the stick full aft; which, of course, resulted in the aircraft buffeting and shuttering hard as the nose started up and then pitched over again. This apparently happened 2 or 3 times until the other pilot (not an instructor) neutralized the stick and recovered the airplane.

Guess what they reported after the flight? They said that the Lightning has elevator flutter caused by the trim spring on the pushrod that also caused the un-commanded pitching. Nick informed them that they had just experienced a high-speed stall, and that the uncontrolled pitching was caused by the aircraft stalling then pitching down again, as it should have reacted. However, with the stick full aft, the cycle continued until someone neutralized the stick and unloaded the aircraft, allowing the wing to fly again.

Now, guess what the instructor said to Nick after he told them it was an accelerated stall, not elevator flutter? The instructor said, "B.S., the plane was at 80 knots, there is no way it stalled." Unbelievable! I wrote a rather scathing email for Nick to send to the instructor that commented on the instructor's lack of basic flying knowledge. However, thinking about the "happening" and trying to use it in a proactive way, I thought perhaps a safety article in the newsletter about accelerated stalls might be a good thing. So, below is a review that hopefully will somehow get back to that instructor and to any other pilot that might like a recap on angle of attack, stalls, and accelerated stalls. Below is that review.

To understand stalls, you should first understand the concept of angle of attack (AOA). **In aeronautical terms the angle of attack is the angle between the relative wind and the mean chord line of the wing. Using more common words, it is the angle at which the wing meets the oncoming air. In most general aviation aircraft, lift increases as the AOA increases until the AOA peaks at about 17 to 18 degrees, or what is called the critical angle of attack.**

It is incorrectly, but often commonly, assumed that a stall occurs at a given stalling speed. **Stall speed is drilled into us as we learn to fly and when we check out in new types of airplanes. Frequently we're instructed to memorize the published stalling speed of the airplane, as if we flew the airplane precisely at its maximum certificated weight for long periods of time, since published Vso and V_{S1} are valid only at the airplane's maximum gross weight.**

In reality, several different stall speeds are valid, depending on the airplane's configuration, its current loaded weight, and, perhaps the least understood of all, the G-load on the airplane at the time. G-load times the loaded weight of the airplane equals the effective weight of the airplane at any given time. This in turn determines the indicated airspeed at which the wing will stall, with adjustments for extension or retraction of flaps, slats or any other lift-enhancing devices.

Point #1: **Angle of attack,** **not airspeed,** **is what determines whether the wing is stalled.**

Point #2: **Indicated airspeed may indicate proximity to a stall in many cases, but there are routine (and abnormal) flight regimes where stalling speed will differ significantly from the published values.**

A lot of time is spent talking about stalls during training, but not much time insuring new pilots really understand what causes the airplane to lose lift and begin to fall. **One of the least understood concepts of aeronautics is the "accelerated" stall.**

An "accelerated" stall is any stall that occurs at a higher than "book" stall speed. Since airplane flight manual stalling speeds are usually defined at maximum gross weight, and since stall speeds decrease with reductions in airplane weight, when could the airplane stall at a speed that is higher than the "book" V-speed? Answer - when the airplane weighs more than maximum weight.

For an airplane to weigh more that its maximum, either the pilot has overloaded it, inadvertently or on purpose, or the airplane wing is loaded to more than one G.

The airplane will stall at speeds higher than "book" if the airplane wing is loaded at greater than one G. Enter a banked turn while holding altitude and you will cause the wing to "load up" with more than the normal force of gravity. This is called a load factor. The steeper the bank, the higher the level flight G-load will be, e.g., in a 60 degree bank, the load factor is 2. Also, a rapid pull-up from a dive also loads the wing, increasing stall speed. Abrupt, severe maneuvering adds G-load.

Additional G-load is by definition an increase in weight (for example, a 1500-pound airplane under a 2G load "weighs" 3000 pounds). Thus, an airplane under G-load "weighs more" and will stall at a higher stall speed. In any configuration a loaded wing will stall at a higher indicated airspeed than the same wing at one G. If the "effective weight" of the airplane under G-loading exceeds the maximum gross weight of the airplane, then the stalling speed under that load will be higher than the published V-speed for the flap (and other lift-generating devices) position.

The above was a lot of words to talk about accelerated stalls, but given the "happening," I felt a review was in order. It is often a story like this that becomes the start of another hangar tale. Pilot screws up, doesn't want to admit his mistake so blames the airplane, tells the story around a group of other pilots, then they go around saying I heard the Lightning has a problem with elevator flutter. The word spreads by people that have never flown a Lightning, but they want others to think they are "in the know." It happens all the time in aviation. This kind of thing is probably what happened with the recent question on the Lightning list when someone mentioned the Lightning might not have enough rudder travel when using full up elevator. In that particular case, I would bet that someone got behind the airplane in directional control on takeoff for whatever reason, just barely got airborne as they left the side of the runway, and blamed it on the Lightning not having enough rudder at full elevator. Don't believe all the hangar stories you hear around a group of pilots. Know the experience of those you are talking to and ask lots of questions. OK, I'm off my soap box and going cold mic, at least for now.

Lightning Skunk Works

Everyone has heard the term dog fighting used when referring to aerial warfare between two or more opposing fighter aircraft. I have been involved in many dog fighting engagements, mostly for training purposes, during my years flying the F-4 Phantom in the Air Force. So it was with a bit of surprise during this past Christmas season to actually witness a dog fight in my own home. Photos below will help you understand the circumstances, but one participant was flying the latest operational fighter, the F-22, and the other participant was, well, a dog.

To set up the scenario for you, Harrison Rich Estelle, my 4-month-old grandson, was the pilot of the F-22 pedal plane (the latest homebuilt aircraft I have built), and the other participant was Lola, a female Airedale and German Shepherd mix, that is Harrison's dog. Lola is very protective of young Harrison and she is quick to check out anything that she thinks might be a threat to his safety and well-being. When I first brought the pedal plane to the house on Christmas Eve, Lola checked it out, but then pretty much ignored it. That was until we let Harrison climb on board the F-22, and then Lola got interested again and was nervously walking around the jet to make sure Harrison was OK. When Harrison's mom started giving him a ride with the jet pointed at Lola, the

dog realized "game on" and she started prancing and jumping around like the good dog she is. The "fur ball" (another name for a dog fight) had several turns and pitch backs, but it was soon over with the F-22's superior maneuverability and young Harrison's outstanding fighter pilot intellect and aviation skills that he inherited from his granddad. Damn, I'm proud of that kid!

Technical Tips

Tex Mantell explains his modification to the Lightning pitot / static tube to improve the accuracy of the indicated airspeed and autopilot altitude hold function.

Selwyn, I had errors in my system till I modified the pitot tube which is also the static port. I added another set of holes for the static line. On the supplied assembly there is one hole. I added another hole of the same size to the other side of the pitot tube. I then placed a set of holes (1/8") about 1 inch back of these holes. I found that corrected my airspeed indications very accurate and have checked them at all speeds. I use a steam gauge for airspeed and also found it improved the autopilot response on altitude.

TEX (wb2ssj@frontiernet.net)

Nick covers suggested Lightning rudder cable tension.

Not sure if we have discussed rudder cable tension or not. We have always tightened the cables then looked for about 1" of deflection of the cable when pulling up on it. This method has worked fine, but thanks to Mark and the cable tension checker he bought for his Zenith 601XL, we started playing with different tensions. We have decided that about 25lbs works well for the Lightning. The cables are loose enough to be free but also not stretch under air-load.

The cable tension meter might not be something you want to buy for a onetime thing, but the cables should be checked at every year at annual, so it is a good investment. Maybe someone in your EAA chapter has one that you can borrow.

Nick

A tension meter like shown below is what most EAA members use. Cost is around $185.00. Normal cable tension for 1/8" cable should be 25 to 30 foot pounds.

Other Items

Winter flying has several possible hazards that we don't face when the weather is nice and warm. In previous newsletters we have discussed many of these cold weather concerns, but since winter is once again on us, perhaps a review of cold weather starting procedures for the Jabiru aircraft engine would be in order. Several things such as cold / thick oil, fuel vaporization in the carb, and a weak battery can make winter engine starting more difficult. Below are several things to think about to get your Lightning fired up when the outside temps are on the cold side.

First, make sure everything about your engine is set to optimum conditions. What I mean by this is that the spark plugs are clean and have the correct gap, the coil gap is properly set (.010), and the battery has a good charge. I keep my battery on a trickle charger during the winter months so that it is always fully charged.

Next, pre-heat your engine so that the oil is warm and not too thick to allow the engine to turn over easily or too thick to provide good lubrication when it first starts. There are many ways to pre-heat your engine (if you don't have a heated hangar) but one thing I do that helps my cold weather starts is to keep the engine warm by keeping a 75 or 100 watt light bulb under the engine oil sump all winter long. Of course, I take it out for flying. Just make sure the light bulb is not touching any part of your lower fiberglass cowling. The other things I do to help hold the heat in the engine compartment is to place a heavy blanket over the top of the cowling and to plug up the cowl intake holes. This technique keeps the oil warm and thus the engine will turn over much easier than it would with cold / thick oil. My engine seems to stay warm and happy using this method and I have been able to easily start it when the outside air temperature is well below freezing.

This light bulb heating technique actually keeps the entire engine, not just the oil, "up to temperature" and thus helps the carb choke and fuel vaporization to work properly. Of course, don't forget the Jabiru cold starting instructions about pulling the choke out, making sure the throttle is full back, and pulling the propeller through several blades (I use four to six) before doing the preflight. After you have completed the preflight, the fuel drawn into the carb when you pulled the engine through, will have had time to vaporize and thus make your engine easier to start. (If you haven't flown for a few days, run the electric fuel pump before doing the above.)

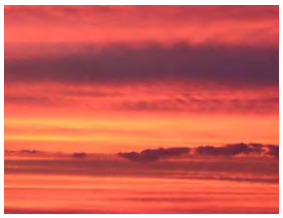
For you guys that live in Florida, invite the "cold weather guys" down for a visit during the weather months. We'll be glad you did.

Above photo was taken early on 26 December 2010 of my home in Williamsburg, VA. You can imagine the snow piled up in front of my hangar at KJGG.

Final Thoughts

Why I fly?

Think of a warm summer evening and you are flying near puffy clouds with their shapes glowing orange/red by the setting sun. There is no sight like it. What non-pilots can see from the ground is nowhere close to comparing what we see from our in-flight position. That is why I fly.



How about a flight above a large city on a clear night? Pilots have a fantastic view of the city that looks something like sparkling diamonds and jewels. Non-pilots cannot begin to imagine that sight. In the nighttime cockpit of a small general aviation airplane you get a view that is so much better than an airline passenger's view through the tiny side window of a commercial flight. That is why I fly.

Think of an absolutely rotten weather day; low ceilings, rain, low visibility. You are cleared for takeoff on an instrument flight. You release brakes and move the throttle forward. Shortly after you lift off you are climbing into the crud and visibility outside becomes zero. You are now doing some serious flying, using only your instruments and the skills you have developed with hours and hours of practice. Suddenly, you break out on top and it is a totally different world. Seeing the bright sunshine and bright blue sky above, so different from the gloom and doom you just left, is almost a religious experience. Things are suddenly right with the world. That is why I fly.

Now, think of the above in reverse. A long flight in the clouds on instruments and now it is time for the descent back to earth. Once again through skill and training, you fly the approach and break out with the runway threshold in sight. You make a "squeaker" landing; cancel your flight plan and taxi back to your hangar. You just made the somewhat difficult look easy. Non-pilots would never understand the accomplishment, nor appreciate the skills required to do it. And it feels good. That is why I fly.

Taking someone for their first airplane ride is a wonderful experience and one of my favorite "flying" things to do. This old buzzard has taken close to 200 Young Eagles flying and I am convinced it is one of the most important things that we (EAA) do. One of my earliest Young Eagles is now an F-15 Strike Eagle pilot at Seymour Johnson AFB. All Young Eagles are potential future pilots and thus the future of flying. Over the past 44 years, I have been fortunate enough to give a first airplane ride to many other people besides Young Eagles.

Some of these were in The F-4 Phantom II, some were in a 2-place Pitts Special, and some were in your basic Cessna, Piper, Beechcraft, Ercoupe, Citabria, or other homebuilt types I have flown for first flights. However, the type of airplane really doesn't matter. What is important is giving the "newbie" a fantastic experience. One that they will fondly remember and one that just might result in them becoming "converts" or future pilots. The most important thing is to make it a pleasant experience. Too many pilots try to make flying look and sound too hard. I guess it pumps up their ego, but it often ends up scaring the "newbie" and thus we have lost the opportunity to convert a "ground pounder" into an aviator, or at least a supporter of general aviation. At first they might be afraid to even get into the plane, but with a little urging, they can sometimes be talked into it. You might have to keep their mind off what is about to happen by talking to them the entire time you are taxiing to the runway. But the second you lift off, you can often see a wonderful expression come over their face. Then you know you have given the wonderful gift of flight to another future "aviator." Soon they are feeling at home in the sky and if they have the "right stuff," they might start to point out things on the ground that they recognize. Tentatively they try their hands at the controls and soon they are confidently turning and banking over the countryside, now not wanting to go back to the airport. But of course you eventually must. The real reward comes after landing when the new aviator slips out of the seat with a new confidence and love of aviation. The "thank you" you see in the sparkle of their eyes is somehow more rewarding than their verbal "thank you." They have lost their fear of flying and the next thing you know, they have signed up for flying lessons. You are so proud to have been a small part of their conversion. The above is a true story. It actually happened exactly this way, and it is another reason why I fly.

I'm sure there are dozens of other reasons why we fly, including the infamous $100 hamburger flight – any excuse to get into the air, right? Or how about the "Angel Flights" that provide free air transportation for medical patients that can't afford to pay for an airline ticket and their health does not allow them to drive. I love a quick aerobatic flight in a Pitts just to get the "cobwebs" out of my mind. The Cub, low and slow on a late afternoon, is about as relaxing as it can get. Or, how about an afternoon family flight of 200 miles or so to visit a special location. That is too far to drive. Flying makes the trip not only possible, but also a relaxing getaway for the entire family. Think about flying from Virginia to mid-Florida in four (or six) hours – depending on your airplane type. You can't do that driving down I-95. But it is a reality in an airplane. Just do it.

All of these are reasons why I fly.

Think of the Initial Point to target run at about 50 feet above the ground in an F-4 at 540 knots (that's 9 miles a minute). With your hair on fire, you have your eyes on the target, the "pipper," the terrain and the instruments at the same time. All the while you are checking for threats and

your wingman's position. Or a 4 v 4 dissimilar air combat tactics flight on a ACMI range with the engines in min afterburner to kill the smoke; once again, with your hair on fire. Or formation takeoffs and formation landings: lots of fun. Or deployments requiring multiple in-flight re-fuelings; challenging, yet lots of fun. Yep, I miss it all. That used to be why I flew.

The above photo shows an F-4E. I have flown most models of the F-4. I've had one up to 2.34 Mach number and another to above 63,000 feet; but that's another story.

Well, if you are reading all this, I am sure you understand and feel the same way. There are so many other reasons to fly that I have not even touched on. You tell us why you fly or about a special flight you have taken and send it in to the new Lightning editor. They will put your story in the newsletter and we can all benefit from your experiences and share your enjoyment. That's your mission – make it happen. But for now, I've got to get to the airport! I feel the need for speed, and that's another reason why I fly.

Blue Skies,

Buz Rich

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(Contact the factory in Tennessee for future newsletter inputs – they will need your help to keep the newsletter both interesting and informative.)