



# Hangar Talk

The “Lightning” Newsletter

July 2009 - Volume 2, Issue 7



## Steve Biele’s – “Lightning of the Month”

Please submit a photo of your Lightning for future “Lightning of the Month” consideration.

The goal of the newsletter remains **to get the word out** on happenings at Arion Aircraft, and **to give a voice** to Lightning builders and flyers. To be successful we will need inputs from you in order to meet that goal. So it is not only a way for the factory to provide Lightning news, but it is your newsletter as well, and, as such, its success will depend on you getting involved to spread the word and to help other builders and flyers with their project airplanes. So think of this newsletter as an “exchange of information publication”. Send your inputs directly to me at: [N1BZRICH@AOL.COM](mailto:N1BZRICH@AOL.COM).

### Contents in this issue:

Page	Page
2 –In Memory of Duane Sorensen -	25 - Upcoming Events -
2 –Meet Lightning’s Mark Stauffer -	25 - Lightning Skunk Works -
5 -News from the Factory -	26 - Technical Tips -
16 – News from the Dealers -	27 – Engine Clinic -
19 - News from Builders and Flyers -	29 – Other Items -
23 - Flight Safety -	30 - Final thoughts -

**And now, the rest of the news.**

## In Memory of Duane Sorensen:

You have probably heard the tragic news that we have lost another member of the Lightning community. **Duane Sorensen** and his instructor pilot perished on 8 June, 2009 when Duane's Lightning, N130DS, impacted trees while attempting to land at the Transylvania County Airport (22W), Brevard, NC, where the aircraft was based. Although the NTSB has released its preliminary report, not much is really known at this time. I am sure I speak for the entire Lightning community when I say that our hearts and prayers go out to the family and friends of Duane and his instructor who have "slipped the surly bonds of earth".

**This month's lead story** hopefully will be the first of several future articles that will let our readers get to know the Lightning staff – up close and personal. They all have a story to tell about how they got interested in aviation and how they ended up in Shelbyville as part of Arion Aircraft's key personnel. **Mark Stauffer** is our first "target" as we aim to find out all about his past, his interest, and what motivates him to help others achieve their dream of building an aircraft. Now, here's Mark.

## Will the real Mark Stauffer please stand up!



**Hi! My name is Mark Stauffer** and I'm the Production Manager, leader of the Builders Education and Assistance Program, and one third of the full time staff at Arion Aircraft. I also have the dubious distinction of being the first, and probably last, Lightning Newsletter centerfold. I have met most of you either in person, over the phone or by e-mail but Buz Rich asked me to tell you a bit about myself and how I ended up with Arion Aircraft.

I have no idea where I got the desire to fly. Maybe it was from my father taking me to air shows at

Andrews Air Force base when I was a young boy or from my first airplane ride at the age of 15 in a Beechcraft Sundowner. No one in my family had even tried to learn how to fly, though my father built a glider of his own design as a young boy in the early 30's and about killed himself trying to fly it off a very high wall. While stationed in Japan I hitched a ride in a C-172 at Yokota Air Base and it was there that I decided to start saving my money to learn how to fly. When I returned stateside I started taking lessons at Langley Air Force Base in Hampton, VA but quit in frustration after 20 hours. There is a lot to be said about working with an instructor that you can get along with.



**2005 Presidential Inaugural Parade**

Two years later, frustrated that I hadn't accomplished my goal, I started back with a small flight school in Newport News, VA. My instructor was a young, enthusiastic Naval ROTC student at Hampton University and with him I finished my training in three months with 56 hours total time. I passed my check ride June 21<sup>st</sup>, 1998.



During this time my AOPA Project Pilot Mentor, Bob Granzow, was about 8 years into an RV-6 kit. Bob was the person that introduced me to experimental aviation. One thing led to another and four months after receiving my pilots' certificate I was a member of the local ultralight club and the owner of a Maxair Drifter XP503. This "ultralight" had an N-number and I was able to log all of my 190 hours of flight time. A group of us even flew from southeastern VA to NY and back! However, all the time I was flying it I was thinking of building my own plane with a little better cruise speed and probably most important – a cockpit!

**My Maxair Drifter XP503 over southeastern VA.**

I started looking at all kinds of kits, from the RV-9 and Zenith 601XL to the Rans S-6 and Kitfox series 5. My main concern was possibly having to store it outside (hangar space can come at a premium in MD) and relative ease in building knowing that this would be my first kit and that I would be building it all by myself. I finally decided on the Zenith 601XL after attending their rudder workshop and getting a demo flight in November, 2002.

I received my kit January 26<sup>th</sup>, 2003 and started right to work on the tail section in my two-car garage in Odenton, MD. With an advertised 500 hour build time I just knew I would be done in a year or two. Two

and one half years later I was at a point that I felt I could order the engine. I had been looking at engines since the day I bought the kit and after talking to Pete Krotje of Jabiru USA at Sun n Fun a couple of times, I decided on the Jabiru 3300. It was much more affordable than the Rotax 912S and Jabiru USA had a complete firewall forward package already designed for it. After Oshkosh 2005 Pete offered the very first Jabiru engine seminar at their new home in Shelbyville, TN. A friend of mine and I flew my Cherokee 140/160 (I was forced to sell the Drifter after the ADIZ was put into place around Baltimore and Washington, DC) to Shelbyville to attend. It was during that trip that I fell in love with the area.

In the months that followed I'd called Jabiru USA with questions about the installation and it was during one of those conversations with Dana Otterback that on a whim I asked if they were hiring. She replied that they were expanding in the future and they were looking for some managers. I told her that I'd managed people for most of my career and she suggested that I talk to Pete. I ended up driving down to Shelbyville the week of Thanksgiving 2005 and talked to Pete about possible positions. I left Shelbyville with a job offer and a lot of thinking to do. At this point I had been in the military for 23 years and was looking for a new challenge in my life but it was also scary to leave something that I'd been doing for over half of my life. After thinking about it for a week and a couple more phone calls with Pete, I decided to put in my paperwork to retire. Pete was gracious enough to wait for me until July of 2006, since the military doesn't accept two weeks' notice! In January 2006 I separated from my wife (unrelated to the career change or airplane) and in June moved myself, the Zenith (in a trailer) and the two cats to a new chapter in my life in Shelbyville. In eight months I had become single, retired from one career, moved to a new city and started a new career. Talk about a change!



**NOTE: Since this was written, Mark's 601XL is now being painted. You can get an idea of the finished product from the bottom photo. We will have more shots in a future newsletter. In the meantime, if you happen to be in Shelbyville, have Mark show you his "tin can" airplane. You will be impressed with the workmanship and attention to detail. Beautiful job, Mark!**

## News from the Factory:

### SLSA “Lightning Sport” Update:

In this and future issues of the Lightning Newsletter, Nick and I are going to share some of the “FAA paperwork” and the processes that were required for the ASTM (American Society for Testing and Materials) certification for the Special Light Sport Lightning. In this issue Nick will start by covering some of the standards that were required for the design and performance of the LS-1. In later issues I will include some of the writeups of the flight test profile results that were required for the ASTM certification. In all, 25 different and specific flight test profiles were required to be performed and successfully completed for certification. I must say that flying all the different ASTM flight test profiles was the fun part. Writing them up was a little more like work. Now, here is Nick’s informative article:

### Lightning LS-1 ASTM Compliance Project;

#### Testing summary for compliance to F2245 standard specifications for design and performance of a Light sport Aircraft

By Nick Otterback

**Overview:** About 50% of the Lightning kits sold are specifically built to meet light sport rules for cruise speed, stall, and weight requirements. Arion Aircraft, LLC, took this new found interest for LSA seriously, and in early 2008, decided to start looking at the standards to which a production aircraft could be built and flown. These standards are set by the industry thru the ASTM, an internationally recognized group responsible for the quality, manufacturer and safety of everything from pens to aircraft.

We knew that the kit built Lightning could easily stall below the required limit of 45 knots IAS with the extended wing tips, and while the gross weight of the kit was above the 1320 lb limit, it was easy to lower the gross weight. But, could we slow down this sleek little aircraft to 120 knots at max continuous power, and could the components hold up the barrage of normal and somewhat peculiar structural test required by F2245? After looking at the standards a little closer for a few months and making some changes to our demo plane to see if the flight requirements were a possibility, it was clear that we had a good shot at an SLSA version of the kit.

I would like to share with all of you, in brief, the testing and work that went into taking the already proven kit from “homebuilt” to “production”. Through the testing we found areas that needed a slight re-design to meet the standard and some areas were found to be overly strong and thus changed to reduce weight or complexity. This testing has improved the overall design and manufacture of the kit, flying qualities of the aircraft, and construction techniques used in the processes.



## Structural Testing:

**Wings** - The wings of the Lightning were originally tested to 11g positive and 9 negative at a gross weight of 1320 pounds. With the original gross of the aircraft at 1425 lbs this testing was more than sufficient to provide a 5g positive and 3g negative limit for the EAB kit. The ASTM standards set no maximum g for testing however did set a minimum of positive 4g and negative 2g.

With the addition of the extended wing tips the wing loading was lowered increasing the overall strength margin of the wing. Shorter takeoffs, shorter landings, and slower stall speeds were all benefits of this needed item for LSA compliance. One added side benefit to a cleaned up go-fast lightning was a higher TAS at high altitudes.

The LS-1 does incorporate one additional change to the wing - a permanent 3 degree trailing edge droop. The flaps, ailerons, and wing tips all are drooped slightly. This gives a more cambered airfoil and induces some drag, helping to slow the aircraft down and slow the stall speed to well below 45 knots.



***5,000lbs of Wisconsin Barn lime provides the load required.***

**Tail** - The horizontal tail and attach points, spars, and tail itself were tested for the balancing loads and gust loads expected on the horizontal tail in flight. Elevator hinge and rudder hinge lines were also tested. Some were conducted on test fuselages while the good ole' prototype Lightning was used for others.



***Horizontal tail plane loaded to 7.07G.***

The tail was loaded to 7.07G for a worst case scenario. The most tail load expected would be at a more forward cg and actually a weight lower than gross. At gross the CG gets closer to the center of lift and the required tail loads lessen. The SLSA Lightning is stressed for +4 and -2 so the requirement for ultimate load is +6 and -3. We ended up with 7g because 1 less bag would have been too light, so we stuck another bag on. This put us to 7.07g. I forgot to take pictures, but we piled on the bags we had left and it

went to just over 9g on the tail and didn't even make a noise. Later test were for gust loads and this took 100% of a load on one side and 70% on the other to put unbalanced loads on the tail. All went well.

**Note of interest:** *The prototype Lightning, N233AL, was used as a test bed for some of the structural testing. If a complete system was needed and building one would have been too costly in time and materials, we opted to use N233AL. This aircraft is a flyable aircraft and is flown on a regular basis. It also was used for all spin testing done on the Lightning design.*



**Hinge line testing on 233AL.**

**Engine Mount** - The ASTM standards require that the engine mount and related areas withstand a positive limit load of 4g while also withstanding the engines maximum torque output.

In this case, over 1200 lbs of load was applied to the engine CG and 427 ft lbs of torque was applied simultaneously thru the same point.

We used some left over engine boxes to hold the weight and a system of levers and straps to hold it all in place. That is Mark looking over the tail from a safe spot; sorry about the bar for building your Zenith, it went to better use!



**Positive limit load with max engine torque applied.**

**Tie Downs** - Yes, tie down points must be tested, and for those who didn't quite trust those outboard flap brackets being used as tie downs, they hold very well.

The standard calls for them to hold the aircraft down in a 38 knot ground gust. The expected lift produced by the wing in a ground gust must be computed. Then that load distributed correctly for each tie down point. Next, pull on it and see if it holds. Using a ratchet strap with a digital scale inline, we applied well over the required load to 130 lbs with no problems; the fork lift was used for a hard point to pull from.



***Out board tie down points, flap brackets, being tested.***

The standard tail tie down was the lower rudder bracket. Many builders have opted to not use that and make their own. We listened and decided to build and test a tail tie down similar to the ones several builders have used. Good job with the design work because the tail tie down ring also withstood over 100 lbs of force without even a noise. I would recommend using this tail tie down as the standard, so if you are currently building a Lightning, put one in. If your Lightning is already flying, it would make a good winter project.

**Control Systems** - All the control systems (for roll, pitch, and yaw) must be tested to the expected loads that a pilot or occupants could apply while flying the aircraft in any expected flight profile. The system, its mounts, hinges, rod-ends, push-rods, bell-cranks, and stops, must all be tested, not to mention the control device itself, i.e., stick, or pedals.

For most of the tests the prototype aircraft was called to action, but for one of the more interesting ones for the rudder pedal system, we build an entire rig.

A sustained load of 200 lbs must be applied to each pedal; that means 400 lbs of pilot force at their feet! A pilot pushing on both pedals for braking is one test. The pilot and co-pilot pushing in opposite directions on the pedals is also another one.

During this test the upright rod deformed slightly as did the flute tube. Note, these did not fail or interfere with normal operations, but they must hold, so the upright design was changed and the tube wall thickness increased. These changes were incorporated and tested again; all held with no problem. This design change has now been incorporated into the kit to improve them as well.



***Rudder pedal force test.***



**Landing Gear** - The Landing gear tests were some of the more interesting and fun tests to accomplish. The test rig we had been using was fitted with a spar box, wings, main landing gear, and a nose to the already fitted mount and engine block. The fuel tanks were filled with water and the fuselage loaded to a max gross of 1320 with a CG at a near aft position. The landing loads were one of the more in depth portions of the ASTM standards. Extensive calculations and different scenarios were all part of the gear testing. For the tests, the gear was changed to a solid straight gear leg with no taper, and the length increased to give more flex and shock absorbing capability to the 7075T6 aluminum material. This simple change was made because of the intended use of the SLSA Lightning - lower time pilots, pilot getting back into flying after a lay off, flight training, etc. Drop tests were conducted from over 13" at max gross weight with no deformation of the landing gear and structures. The height is derived from formulas provided by the ASTM in the standards, and then other drop test heights figured based on the landing load which must be attained at impact.

After this testing was successfully complete, it was brought to our attention that these "controlled crashes" didn't need to be accomplish at gross, but rather at a weight lower than that. Taking into account the lift that wings provide during a full stall landing would have reduce the drop weight to near 900 lbs. Since the aircraft held at 1320, we opted not to test again or re-design, leaving the added safety factor in place.



*Drop test from 13" at 1320 lbs tail low main gear landing only.*



*Same drop as above but forward view.*

**Flight Test** - The flight testing is an equally impressive and in-depth mass of standards. Some are not so interesting while others are very demanding for the pilot. Although extensive flight testing was done on the original kit prototype, the ASTM standards required specific testing in the production configuration. The majority of the flight tests were accomplished in the 2008 demo, N324AL, after being retrofitted for light sport compliance, or in N233AL, the prototype Lightning aircraft.

In all, 25 different flight profiles were tested. One of the more interesting test was a full power accelerated stall. This involved entering a 30 banked turn near stall than applying full power and continuing to increase load until the stall. The end result, because of the clean design and excess energy that the Lightning has, was a nose high attitude that felt almost straight up before the break. In each case the aircraft always returned to level when controls were properly applied and coordinated.

Buz, whom is largely responsible for our great newsletter, did all of the spin testing for us. Previously we had tested the short wing version for spins, but had not spun the long wing tips yet. The requirements included 1 turn or 3 second spins in every possible configuration - power off, power on, flaps up, flaps down, left, right, and all combinations of these configurations were tested.

The spin test, by far, were the most hazardous of all the flight test accomplished. Although the prototype is equipped with a BRS system which is nice for this kind of testing, we still could not design a satisfactory canopy jettison system. We relied much on the Lightings proven flight history and the test pilot extensive past spin experience and ability to bring the plane back safely.

The lack of a canopy jettisoning system is one of the main reasons the Lightning is not approved for aerobatics; no matter how well it might look like it could perform them.

The flight testing also included countless prop changes. Anyone interested in that data is welcome to it. We did get some interesting numbers that might be beneficial to you kit builders. The long story, short, is we stole Mark's prop from his Zenith, figuring a prop for a slow plane would be a good place to start when trying to slow down a fast one. This prop was the wooden Sensenich 64ZK51, although the carbon fiber ground adjustable Sensenich set to a similar pitch would also be a good option.

We also removed the standard wheel pants and gear leg fairings. A set of slightly modified Jabiru J230 wheel pants did very well to hide the tires. This change also helped in reducing the cruise speed.

**Is That All?** - Not quite, once all the testing had been completed, all the information needed to be put together.

An overall Compliance Plan must be written. It is kind of an overall summary of what has transpired. For each section of testing, for example, control systems, you would have a subsystem compliance plan showing how the control systems are going to be tested and shown to meet the standards. Then you have a test plan for each system, like yaw. This would include directions on how to do the test, test cards to record data, and then finally, a test report explaining the data collected and how it shows compliance.

A Quality Assurance program must be in-place to make sure that each plane comes out the same. A good service manual, similar to that for most GA planes, needs to be written to make sure the aircraft are maintained properly in the field. A POH, or flight manual, also must be written that contains specific operational information as outlined by the ASTM.

Finally, with all the required documents in hand, it's time to call the FAA. Every Light Sport aircraft first receives an experimental R&D certificate. This allows the manufacturer to flight test and ensure that the aircraft meets the Light Sport standards. After the production acceptance flight test is complete the FAA will return to review the rest of the documentation. All the documentation is reviewed and if they feel that your design complies with the intent of the ASTM standards than you will receive an AWC for that aircraft in the Light Sport category. The FAA will only come once to look at the design and conformance documents, than after that, the producing company or LAMA will audit the materials to insure that the design still meets the standards. Each aircraft produced will be issued a R&D certificate first to make sure it meets the standards before receiving it final SLSA AWC.

With all the above done and approved, the Lightning can now be built by the factory as an SLSA aircraft. This means not having to build a Lightning if you want to fly as a sport pilot or if you just don't want to build your own aircraft and can live with cruising at 120knts. Hey, the SLSA Lightning still looks like it goes Mach 2. What a beautiful aircraft.

## **Lightning Sales and Factory Assist Build Updates:**

**The following report is from Katie Bosman.**

Here are some photos from Lightning's latest public appearance: Tallahassee AirFest 2009. (The Jabiru picture shows Ben's unique way of squeezeing the rain water off of the Jabiru - just set it on its tail skid and you have access to the entire top surface of the wing!)



I flew Lightning 325AL and Ben flew Jabiru 689J (otherwise known as Blue Angel 2). We weren't sure if we would even get there on Friday--the weather was hot and muggy and the southern sky was blanketed with billowing towering cumulus. I told Ben that I didn't want to go anywhere unless he activated the XM Weather in 689J, so he did. We found a clear corridor west of Huntsville, AL and got out of town about 12:30 pm. Ben had a ton of fun playing with the XM weather radar. We scooted around several building storms and then got sandwiched between some pretty colorful echoes and Huntsville's class C airspace. Hmm... Storms or controllers? The decision was easy, and I called Huntsville Approach

for VFR flight following. Once we passed south of KHSV, the weather cleared up enough to squawk VFR and continue unassisted on a direct course to the Florida border.

We stopped in Auburn, AL for a break. I beat Ben in (not surprisingly--I WAS in the Lightning) and was able to watch him land on Runway 18. Just as he touched down, one of the P-47 Thunderbolts from Tennessee Air Museum roared overhead and began his approach into the airport for their Armed Services Day celebration. Of course, the only camera we had was in Ben's plane, but the sound was unforgettable.

The ride into TLH was interesting and strangely relaxing. Ben led the second leg. I parked the Lightning 2 miles behind him as he called out vectors around building storms. It was beautiful... I've rarely seen rainbows from the sky, but that day each storm we passed showed us a colorful lining against the deep green Florida landscape. Soon the big Tallahassee airport came into view. We called up approach and I guided the Light-Sport Lightning in for a smooth and ridiculously short landing roll on the 6000-foot runway. Normally I wouldn't brag, but there was no denying that this time I definitely had the Lightning Grin. 325AL is one fun, solid bird.

One of our Jabiru dealers is also a Remos dealer, and he had a Remos at the show. His pilot asked me what it would take to get a ride in the Lightning... so Sunday morning I took him up, and we burned around over the gator swamps in the west practice area. He gave me a ride in the Remos in return. He liked the Lightning, and my mom told me that if I didn't have anything good to say about someone (or some plane), I shouldn't say anything at all. :-). Just kidding... it's cute. It handled well and performed pretty well too, but I felt a little cramped up after a short flight. I missed the ability to stretch out and effortlessly look around.

There was a meager public turnout and even fewer people in the market for a new LSA, but we were glad to be there alongside the other LSA manufacturers that were invited to attend. Several toddlers got to sit in the Jabiru and one teenage volunteer sat in the Lightning and had his picture taken with it. Lots of people posed next to the Lightning to get their pictures taken--It's always the one people OOOH and AAAH over. I was thrilled to see a local TV commercial with a slideshow of still photos advertising the airshow--the first photo showed the Warbird Adventures T-6s in formation. The second photo was a beautiful aerial shot that Pete took of 325AL over a scattered cloud layer on the way to Sun N Fun.



We stuck it out until mid-afternoon Sunday; Lightning and Jabiru were the last LSAs on the ramp. Everyone else bugged out early because of thunderstorms and poor turnout, but since we had planned on staying until Monday, we sat by our planes and watched the Warbird Adventures T-6 Texans fly around and the passing thunderstorms rumble by.

Overall it was a fun weekend and a chance for me to see what the LS-1 can do. I was quite impressed with the handling and performance of 324AL's little brother and came to the conclusion (surprise surprise!) that I'd fly it pretty much anywhere.

**Virginia Festival of Flight - Two Lightnings and a Jabiru 230 aircraft were also on display during the recent Virginia Festival of Flight. This was a two day fly-in at Suffolk, Virginia. The weather was fantastic and the event was extremely well attended. Below are some photos from the event showing several Lightnings and a Jabiru.**



**Joe and Linda Mathias welcome Nick in the new SLSA LS-1 Lightning.**

**Ryan and Dean from Green Landings were there in Jim Langley's beautiful Lightning.**



**Pete flew a new J-230 Jabiru to the event and here talks with Doug K'berg about who has the coolest hat.**



**Gary Winkler flew up from NC in his newly completed jet. Beautiful aircraft, Gary, and also a cool hat.**

**Here the gang discusses what they are all going to do with their anticipated stimulus packages.**



**The LS-1 was one of the most beautiful aircraft on display and drew lots of interest from fly-in attendees.**

Pete and Nick in more stimulus discussion.



Judge Joe on the left with his cool hat.

On the right, Linda (with half a hat) and Ryan (no hat) are checking out Jim's jet.



Departure time on Sunday afternoon.



## News from the Dealers:

Green Landings hosted an Open House on 6 June. Although the weather in SE Virginia was delta sierra that morning, I was able to depart KJGG by late morning when the ceilings and visibility went up to minimum VFR. By the time I arrived at WV22 the weather there was great. Green Landings is a beautiful little grass airport – it is truly a nice place to visit, but I would really rather live there.



This photo shows the main work hangar at GL. Jim Langley's jet is in the foreground and my steed is behind near the hangar.

A Sky Ranger taxis out for departure on runway 21. I got to fly a Sky Ranger while there. It is a nice airplane, and much faster than my J3 Cub. Well heck, everything is.



These photos may look like folks eating the burgers that Dean cooked, but actually they are more stimulus package discussions.

Red hat







**Buddy's hangar – impressive.**

**Charlie Kieth's newly flying jet. He recently flew it to Franklin, Virginia, where it will be based. He will have it painted there.**



**This is Greg's jet. I made another stop at GL on my way to Sentimental Journey in my Cub and Greg had made lots of progress in just over a week.**

**This Lightning is going to Spruce Creek Airpark, near Daytona Beach, FL. Runway there is 23 & 05. Check out its N number.**





Ryan'sson, "Jet" (yes, that's his name), checking for traffic at 3 o'clock. He absolutely loves airplanes and flying in Lightnings.

To the right is Ryan'sJet in Jim'sjet.

"Gross flight, target at 8:30 level. Check weapons. Cleared in hot."



## Current Lightning Dealers:



Arion Lightning, LLC, contact Nick Otterback, Shelbyville, TN, 931-680-1781, [www.flylightning.net](http://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](http://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](mailto: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



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## News from Builders and Flyers:

**This first message is from Jack Benson who bought N414GL, the first Green Landings demonstrator. The July ,08 issue of the Lightning Newsletter had Jack's original message about buying Ryan's airplane. Here is a follow up note from Jack.**

Buz,

Thanks for your "words of wisdom" this past year. Below is a summation of happenings during my first year of Lightning ownership. Feel free to pass on any, or all, comments to other owners/builders.

Lightning Serial No. 103 – N414GL – One Year and One Annual Later

I purchased Ryan Gross' (Green Landings, WV) demonstrator last May and flew it to its new home in southwestern New Mexico – an uneventful flight except for the aft C. G. loading (40 pounds of baggage). Forward stick all the way – couldn't trim it out.

My initial impression, a year ago, of flying the Lightning hasn't changed. It's a fun airplane and a joy to fly; responsive to controls and inexpensive to operate. A trade-off from my previous aircraft is the necessity to carefully plan what I'm taking on X-countries – no more "pile it all in". That's a trade-off I'm pleased to accept.

Another plus, N414GL's max gross is 1,320 pounds – and it has the composite ground-adjustable prop. The extended wing tips would satisfy LSA parameters, enabling my shedding the FAA physical, should I wish.

I should note that I've only flown one other experimental – a Glasair. That was a go-fast machine but too similar to certificated aircraft in cost (fuel burn and engine maintenance) to satisfy my wants. It also wouldn't meet the LSA rules. The Lightning was definitely the best choice. It's nice to see that ex-RV owners have also chosen the Lightning as their next aircraft.

As mentioned in a previous note to you, there is always much interest in the Lightning from local pilots and at X-country fuel stops. That should translate into more Lightning owners.

Greg Hobbs, Southwest U.S. Lightning representative in Marana, AZ, solved the aft C. G. loading issue by installing the electric trim. The trim (I believe) resulted in a slight left wing heavy condition which was remedied by raising the right flap a bit. All is well.



A gear shimmy I and, it appears, many others have experienced was corrected by installing Flight Custom III tires (balanced first) inflated to 28 psi.

I, as many others, have experienced engine stoppage when retarding the throttle on final. That was corrected by setting the idle rpm, then installing the additional stop on the cable – against the sheath. For the stop, I went to the local electrical contractor supply and purchased a 90-cent grounding lug – works fine.

A condition that was more difficult to correct was the inability to get more than 30 degrees of flaps within the normal airspeed envelope. I tried to extend past 30 at approach airspeeds down to 60 mph – no luck. I was able to get 45 degrees on landing rollout and when slowing to about 55 mph at altitude. At your suggestion, I changed the flap motor (with the old trim motor). The problem is now corrected. Was it the new motor, or was it the fact that, when installing the motor, I complied with the build manual directions, revision 1, dated 5/3/2008, re: spacer-washers at both ends of the motor? There were none installed originally which may have caused some binding during movement (414GL was built prior to this revision). As a side note: I'll probably continue to use 30 degrees for normal approaches and landings – seems enough. The 45 degrees will be there if I need it.

Not having built the airplane, I was obligated to have the annual done by an A&P. A local IA volunteered. Although this was his first look at an experimental, his past work included everything from Cessna 150's to King Airs. He digested the Jabiru manual, Service Bulletins and Letters; read the many excerpts I printed out from the Lightning Build Procedures; and, I feel confident, gave me a good annual. He found some loose jam nuts, made minor adjustments to valve clearances and engine and prop bolt torques, and found one electrical bundle that was routed a bit close to a control cable. I'm satisfied I have an airworthy plane. (I was also very pleased at the cost – considerably less than on the three certificated planes I've owned.) About ten hours since the annual and everything working well.

The A & P was both amused and impressed with the Lightning. Amused – in that my filters and plugs were NAPA auto variety. Impressed – in the simplicity and apparent strength of the airframe and with the Jabiru engine. Said he enjoyed working on the plane and “call me next year”.

Again, Buz, I deeply appreciate your help this past year. Thanks.

Jack Benson, Silver City, New Mexico, [keysjoyce@hotmail.com](mailto:keysjoyce@hotmail.com)

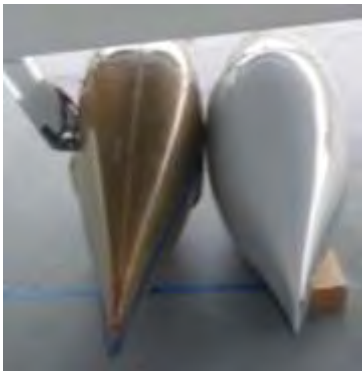


**Above is still my favorite photo of N414GL. Surfs up.**

**This next message is from Jim Goad, a Lightning builder (kit #41) from Florida.**

Hi Buz

A couple of weeks ago I met a guy from Moore Haven Florida that manufactures fiberglass and carbon fiber wheel pants and other components. His wheel pants are a little more streamline than what I had on my lightning, so I bought a set. I am enclosing some pictures of the new wheel pants versus the old wheel pants.



I wasn't sure they would fit, but other than the nose gear, I was able to use the same brackets.

The most important thing I am writing you about is that on the nose gear I noticed the bolt that runs through the nose gear strut that limits the turning radius was bent. I removed it and it looks like where it goes through the nose strut that it is wearing. Enclosed is a photo of the bolt showing the groves that are cut into it.

I think in the future when I do the annual I will replace the bolt each year. It is an AN4.



Jim Goad

**Here is my message back to Jim about the nose gear bolt.**

Jim,

I forgot to mention your AN4 bent bolt from your nose gear in my previous message. I have seen this before, including a broken bolt on an Esqual. But the Esqual uses an AN3, vice the 4. I have upgraded mine to a 4. As I am sure you have figured out, the bolt is what keeps the nose wheel from totally castering 360 degrees. When you turn tighter than the normal 30 degree caster, the nose wheel is dragged sideways and that is what bends the bolt. So just be cautious when you are trying to make a sharp turn while taxiing. Your plan to replace it every annual is probably over kill. Just inspect it every annual and replace only if it is bent or grooved.

Blue Skies,  
Buz

**The next message is from Mr. UK himself – Clive James.**

Hi Buz, all quiet on the list at the moment. Busy myself; haven't even read the new newsletter yet! I've got the Esqual the right way up with modified rudder pedals and new U/C legs. I'm impressed with the new nose leg, a lot more solid than the Esqual one.

I'm about to get the engine on and then will start on the cowlings. Again quality level is good. Any tips for the fit, I'm thinking around the modification that I believe I'll need to do as the Esqual body shape isn't the same?

I like the nose spat fitting method though Arion haven't sent the stock aluminum and that seems to be missing from all the places I normally buy from. Always the way!

Just had a nice weekend away on the South coast of the UK. Spent two hours above the Bank Holiday traffic (5 hour drive) to a small grass strip with a load of homebuilt fliers. Just what it's all about!



The small 'island' is the most expensive place to live in the UK, called Sandbanks.

More than Mayfair in London!

Hope all is well,

Regards, Clive

**And from Johnny Thompson on 15 June.**

Hi Buz

Thought you might like to use pictures of Greg's rebuild for one of your newsletters. He has updated serial number 3 with the new wing tips, canopy and lock, instrument panel, longer engine mount and cowling, along with a lighter fuselage. On doing a new weight & balance the CG moved about 3 inches forward which is a tremendous improvement. He also installed the electric trim and modified the elevator to the new standards. End results are a great flying aircraft with improved handling. Also modification to the oil cooling system has really helped in Arizona. Greg extended the air box on



the oil pan fins, restricted the outflow and dropped the oil temp to 145. Directing the air flow from this air box through a duct to the opening in the lower cowl along with a new air duct on the rear of the oil cooler that also vents air directly outside the lower cowling helped to drop the air pressure in the lower cowling and lowered the temps of the cylinders heads. The new paint job along with the airbrushed wood grain panel and gold lettering makes this one sharp aircraft.



Greg's panel on the left and his newly rebuilt Lightning landing at his Arizona strip on the right.

Johnny Thompson



Above is Greg's Lightning (kit #3) before the recent rebuild and repaint.

## **Flight Safety:**

**These next several messages refer to a previous safety article and the fuel vapor explosion caused by static electricity that Johnny Thompson experienced. Therefore they certainly fit under this flight safety section. The first one is from Steve Sundquist.**

Buz,

As always, a great newsletter with a lot of very useful and informative material, BUT terrible timing! Just yesterday I glued in my fuel filler rings. Now I see Johnny Thompson's article on grounding the fuel caps. I live in a dry climate too, and have generated some good sparks just wiping off sanding dust. Obviously,

static is a real issue. I'd be interested in learning how to ground the air frame, too.  
Steve Sundquist  
Kit #48

**Then Walt Mefford sent in the following suggestion.**

Interesting paper on static charge with respect to fuels. Check out –

<http://www.esdjournal.com/articles/Smallwood/Controlling%20Electrostatic%20Ignition%20Hazards%20final.pdf>

Walt Mefford  
N881WP

**Next is Johnny's response to both Steve and Walt.**

Steve,

Sorry I did not send out the mod info earlier but waited for this month's newsletter to publish it. My Kit was #26 and at time Arion was using a different housing but same cap. Everything is the same as the one I did the mod on except it has a deeper (longer) throat. My kit came with the deeper throat; see the last picture in my article, which is the one that can be modified after being installed. If you have this fuel filler housing then you can use the same parts with a minor change. Not having been fueled yet you should try something.

Use a long 1/8" drill and drill hole in the location as shown in the last picture (picture that shows the housing installed in the wing). You will have to drill at an angle, try to use a center punch before drilling. You can enlarge the hole to 1/4" and then use a SS 1/4" screw and MS21042 nut to hold. To hold the nut inside the tank I bent with torch a long box wrench into a "U" shape and taped one end of the wrench box end to hold the nut. The longer old style housing keeps the cable away from the cap and works well. You do not have to countersink the hole on this type housing. This is how I did the mod without too much work; as with anything, there has to be a better way to do a mod and I hope someone can come up with a better way and will share it.

After reading the article from Walt I would think that this would work. You could clean out a small 1/4" wide groove in the wing against the housing then drill a 3/16" hole into the tank. Pull the cable through and lay about 1/2" length in the groove against the housing and glass in place. Test with ohm meter for good ground between housing and other end of cable. It may work even if the housing does not have a 100% ground. If painted do not cut a groove just drill 1/4" hole against housing and install cable with flux into wing and bolt other end to cap as shown. I think it would work. I'm sure someone can come up with a simple mod that will work and can be done on aircraft flying. Let's hear some ideas. Find a better way to do it, there is always a better way!

Walt, good article -

<http://www.esdjournal.com/articles/Smallwood/Controlling%20Electrostatic%20Ignition%20Hazards%20final.pdf>

Johnny Thompson



## Upcoming Events:

**27 July - 2 August - Oshkosh AIRVENTURE.**

Start getting yourself and your aircraft ready now. See Other Items section below.

**11 - 13 September – Jabiru Engine Seminar at SYI.**

**25 - 27 September (most likely date) - Lightning Fly-In at SYI.**

**13 - 15 November – Jabiru Engine seminar at SYI.**



## Lightning Skunk Works:

This month's Skunk Works section is so highly classified that it is rated **DBR**. For those of you that may never have had an "Above Top Secret" security clearance, the DBR rating is only used in those instances where release of the information to those not cleared would certainly have a catastrophic impact on the subject program and major national security implications. DBR means "destroy before reading", so that is what has been done – the words that explain what is going on in the photo below have been destroyed before you could read them. You can only guess at what is happening here as the Green Landings Gang takes a rest from a hard days work at a secret airfield just outside the DC Air Defense Identification Zone (ADIZ), the Special Flight Rules Area (SFRA), and the DC metropolitan area flight restricted zone (DC FRZ). The one thing I can say about the photo is that this used to be a biplane before the red and green warning lasers burned off the lower wing.



**Note:** Historically you may remember the famous WW 1 US "Hat in the Ring" squadron. This photo actually shows the not so famous Green Landing's "hats under the wing" squadron.

## Technical Tips:

If you have previously maintained an aircraft with a Lycoming or Continental engine you are probably used to doing compression checks as part of the engine annual inspection. Engine cylinder compressions checked on a regular basis and compared to previous readings can help you determine the health of your engine as well as sometimes give an early indication of an engine problem. A differential compression tester as shown below makes it easy to do the compressions checks.



Compressions checks on a regular basis for your Jabiru engine is also a good way to monitor the health of your engine's cylinders and you can use the same compression tester that you used for your Lycoming or Continental. **However**, the adapter that screws into the spark plug hole for those US engines will not fit your Jabiru spark plug hole. You will need an adapter with the same threads as the NGK plugs that the Jabiru engine uses, and that requires one with 14 MM threads. I was able to order an adapter at a local auto parts store. Then all you have to do is add the quick release male coupler plug (1/4 " NPT) that fits your compression tester and you are in business. See the photo below.



**Spark plug hole adapter w/ 14MM threads**

Some mechanics do the compression test on a cold engine and some prefer to do the test on a warm engine. I have done both, but if I test a cold engine, I think you can probably add a pound or two to your compression readings.

# Engine Clinic:

## Cooling the Jabiru Engine

By Pete Krotje

Cooling an air cooled aircraft engine properly is really simple in concept. All one needs to do is to get the proper volume of air flowing past the cylinders and heads at the proper velocity so that the heat generated by combustion is carried away. In the real world however, there are many mechanical and environmental factors that make this simple concept a complicated exercise.

Cooling set up on a Jabiru engine can be a bit simpler than a traditional aircraft cowl baffling system because the fiberglass plenums (called Ramair Ducts by Jabiru) eliminate the need for designing and constructing traditional engine and cowl baffling. I remember an EAA chapter meeting I attended to introduce the Jabiru engine. During the "Builder Report" section of the meeting a proud RV-6 builder described how he had spent seven or eight hours laying out and cutting the 53 pieces of aluminum needed to begin the cowl baffling process for his project. He had not riveted anything together yet or trial fit anything but had spent all that time cutting out pieces of aluminum. Then I spoke about the Jabiru engine and pointed out that it takes about a half hour to fit the cooling ducts – what a simplification of the cooling process.

Just being able to bolt the cooling ducts on the engine, though, does not automatically assure a satisfactory result to the engine cooling process. The ducts channel the air to the right place but the cowl itself has to create a differential in pressure between the top of the engine and the bottom of the engine where the warmed air is drawn out of the cowl.

Cowl design must create an environment inside the cowl where high pressure is above the center line of the cylinder. Air that comes into the cowl must be routed up and above the cylinders. To accomplish that an air dam must be installed in the front of the Ramair Ducts to prevent air from entering the cowl and flowing downward.



Openings in the front of the lower cowl must be kept to a minimum so as to allow very little air into the lower cowl that might raise the pressure inside the lower cowl. Remember that there must be a significant differential in pressure between top and bottom cowl or air will not flow through the heads and cylinders and take the heat away. The photos below are of a cowl from a Zenith 601 and a Zenith 701 whose builders sent their engines to us with warped heads. There's no problem seeing why the heads

overheated as the 64 sq inch hole in the lower cowl effectively pressurized the lower cowl giving the air no reason to flow from top to bottom through the ducts.



Balancing the temps between cylinders is another challenge for builders to overcome. It is relatively easy with the Jabiru Ramair Ducts to change the temps of individual cylinders. Caution – the basic assumption here, though, is that the cowl design funnels enough air through the system to adequately cool the engine.

By installing small deflectors in the tops of the Ramair Ducts we can change the airflow across the heads and cylinders. The photo below shows a set of ducts with vertical air dam deflectors extending down from the tops of the ducts about 3/8 to 1/2 inch. Placing one of these deflectors over a cylinder head (forward of the front spark plug of that cylinder) will lower the head temp of that cylinder. It will also usually raise the head temp of the cylinder behind it. On the six cylinder Jabiru, with no deflectors in the tops of the ducts, the middle heads usually run hotter than the front or rear. Installing a deflector over the hot cylinders will balance out temps.



It may take several tries to get the balance just right. We often start with deflectors about a half inch long and then after a test flight we will file or grind the baffles down to get more even temps from cylinder to cylinder. If middle cylinders are too cold we would reduce the size of the deflector over the middle. This will raise the temp of the middle cylinder and lower the temp of the rear cylinder. It can take several flights to get it just right but that's why our planes are called "Experimental".



Pete Krotje

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**NOTE: If you have not attended one of the Jabiru engine seminars, I highly recommend that you do so. The information presented on engine installation, operation, maintenance and overhaul is well worth the cost of attending the class. Call Jabiru USA to get scheduled.**

## Other Items:

I am writing this on 22 June, so my departure for **EAA AirVenture Oshkosh (27 Jul to 2 Aug)** is less than a month away. Remember I go up a week to ten days early to work in the Vintage area. Anyway, my point here is that it is time to start getting your aircraft and yourself ready for the trip. I do my maintenance when the need arrives, so there is generally no list of needed things to do to get the airplane ready at the last minute. How about you? Just be sure you have a current oil change so that one does not come due while you are on the road. Same goes for head torques, valve adjustments, or the need for new spark plugs, caps or rotors, tire pressures, etc. Add a good wash and wax job and you will have your jet looking super for all the admirers and judges.

I normally try to pack the aircraft a day or two early to make sure everything fits and that it is stored properly so that your W&B is good and that nothing will tend to shift while you are in flight. If you are camping, the weight of this equipment can add up quickly. Don't forget your tie downs and canopy cover, but these items should be packed last, as they will be the first things you need when you get to your parking space.

Another thing I like to do when getting ready for a long cross country flight is to refuel my aircraft when the outside air temperature is cool. That way you can tend to get the maximum number of gallons in your tanks. If your airport has underground tanks, the fuel is probably cool, but if your airport uses a fuel truck that sits out all day, that fuel is probably warm and thus expanded somewhat. So take that into consideration. No, I don't flight plan so that every ounce of fuel is required, but I have always believed in the three things that do a pilot absolutely no good. Those three things are - runway behind you, altitude above you, and fuel you left back at the airport.

To get yourself ready for Oshkosh, start a walking program a month or so before your trip so that you are ready for the many miles you can rack up while walking around the fly in area. Also, try to get lots of rest the night before your cross country flight to OSH. By packing your aircraft early, and having your maps ready for the flight well ahead of time, you will not need to burn the midnight oil getting ready the night before. Are your sectionals current?

You should also have studied the Oshkosh NOTAM and know the Fisk arrival procedures. The NOTAM is already published and available at the EAA web site. And don't forget to keep track of the weather for your departure time.

NOTE: Oshkosh arrival NOTAM is at - <http://www.airventure.org/flying/notam2009.pdf>

Certainly don't forget your wallet, credit cards, extra money and cell phone. Now, everyone, launch the entire Lightning squadron. See you there.



## Final Thoughts:

**GO GREEN!** No, I am not getting ready for football season and cheering for the Green Bay Packers. I am just repeating the sentiment that you seem to hear and read in about every type of advertising in today's ecological earth friendly world and environment. So not to be behind the times, I suggest all of us Lightning enthusiasts go green. I am not suggesting that you paint your jet green, although there are some beautiful Lightnings out there that have a shade of green as part of their paint scheme. So what am I saying? Easy. Find a nice green grass runway and enjoy the pleasure of landing on that green environment. I think you will really enjoy going green and rolling on the grass. Go green.

Blue Skies,

*Buz Rich*

[N1BZRICH@AOL.COM](mailto:N1BZRICH@AOL.COM) (Contact me directly for newsletter inputs – I need your help to keep this newsletter fun, interesting, and informative.)

### What's faster, a Lightning or a black lightning bolt?



In this case, the Lightning is by a factor of 2. It is twice the speed on the same fuel burn.