

Letter from the Editor:

This year, I believe Sun-N-Fun was down in attendance from last year by quite a bit. Although on Friday and Saturday, the attendance was up more than during the week, the overall attendance was much less. Still there was a lot to see and the airshows were great as always. The Breitling Jet team and their L-39s were impressive. A great show and they were quiet. My older ears like quiet.

The Lightning of the Quarter is the UL390is powered Lightning you have been reading about for several months. A picture of the airplane is below and it really is a pretty bird. Arion Aircraft has been testing and testing, trying different propellers and then testing again. You have to realize, this is the first aircraft the engine was ever flown on and there are a lot of unknowns. More about the plane later.

I am trying out this new format for this issue and will keep it, or not, as the readers provide feedback.

Blue Skies, Dennis W. Wilt dwwilt@aol.com



The Breitling Jet Team



Second Quarter 2015 Volume 8, Issue 2

Published May, 2015



Inside this issue:

2
3
5
6
9
10
11
13
19
20

Lightning of the Quarter - Doug and Rhonda Guy's Pretty Jet



Lightning of the Quarter

Article by: Dennis W. Wilt

This airplane has been in the newsletter for a while now. We have watched the development and testing of the UL390is engine and various propeller combinations to get the maximum performance available from the airplane. Arion Aircraft has been working on the plane for a little over a year. How do I know that? They just completed the first condition inspection for the airplane. It has been a long road and not unexpected when you marry an untested engine to an airframe. This is the first airplane that has ever flown the UL390is engine.

So, the engine runs really well and it sounds really good, I have heard it. So far, the performance has not been as good as the O-320 powered plane, but it is a lot closer now than is was. The latest I know is from a picture (see below) on the Arion Aircraft FB page that shows 2930 RPM, 11.6GPH, 130IAS, and 134TAS. I am not sure if these are good numbers or the final indication of the performance with this engine, but they are still very respectable.

Doug and Rhonda Guy, owners of this very nice airplane recently travelled to Shelbyville for some transition training. A smart thing to do for anyone that is getting ready to fly a new model of aircraft. There are pictures of them below that show the big Lightning smile as they are flying the plane. Especially Rhonda.



Doug and Rhonda Guy—Proud Owners of N958DG

I hope to get some personal information from them regarding their aviation background and the reasons for selecting the engine. In any case, they will have many years of flying fun with this aircraft. Doug and Rhonda, welcome to

the Lightning family!!!

I sincerely hope they come to the Homecoming in October.



The GRT Display on a Flight with Nick



Jason Doing the Condition Inspection



Rhonda with a Great Big Smile



Nick Smiling - Doug Concentrating

Sun-N-Fun Article by Dennis W. Wilt

Sun-N-Fun was fun as usual this year, but in my humble opinion, attendance was way, way down. The airshows were great as usual and there were plenty of planes to see and explore.

Nick was not able to get to the show until Tuesday because of weather, but as the pictures show, he indeed did arrive safely. As usual the XS320 was a hit as was the pedal plane "Dusty" that Buz brought down from Williamsburg, VA. There were some kids that truly did not want to get out of Dusty and basically threw a fit as their parents took them away. It was great to get to see the whole gang from around the country. Tom Hoffman from

Neenah, WI was there as was Greg and Crystal Hobbs from Arizona. Mark Stauffer showed up and So were the entire crew from Jabiru USA.

Nick gave a couple of forums on the O-320 powered lightning and although there were not a lot of people attending, those that were there were very interested.

I have posted pictures of

the Lightning booth and some other interesting items below. I hope you enjoy them. The sister of the little girl below was too big for Dusty, but she is a true homebuilder. She explained how Dusty could be modified so she could fit. Linda Mathias, a Lightning owner is there as are some other friends from VA. I could do more, but you get the idea.



Dusty Standing in Before Nick Arrived



The XS-320 with Dusty Getting to Fly



A Rare Picture of Nick Working (just joking here)



This Little Girl was a Pro. She Could Fly Really Dusty.

More Sun-N-Fun Pictures



Lake Parker Arrival



Lightning Forum



Using ADS-B Weather



Past the Weather



Linda Mathias, & Connie and Nick Jones



Buz Making Like a Plane

News from the Factory



The factory is progressing nicely on the latest LS-1 (S/N 173). The plane is a pretty silver metal-flake with a red registration number. The avionics are an upgrade, too. This is a really nice plane and will likely have take it's first flight before I publish this issue.

There is also an Owner Build Assist getting ready to start, although the owner, Ed (I don't have his last name) is already working on the panel. That is enthusiasm!!! Ed is building a Lightning XS.

The Factory is also building Mark 2 tails. I thought I would include a picture of them in the jig. These are all from the Arion Aircraft Face Book page.

And of course, the Lightning XS was on the cover of Kitplanes in March!!!







Recent Service Bulletin





www.flylightning.net email: info@flylightning.net phone: 931-680-1781 2842 Highway 231 North, Shelbyville, TN 37160

SERVICE BULLETIN				
Service Bulletin #	AASB-1-5-2015			
Superseded Bulletin #	N/A			
Issue Date	05-01-2015			
Effective Date	05-01-2015			
Limitations for Completion	Before Next Flight			
Make & Model Affected	All factory produced SLSA & ELSA Aircraft SN78 thru SN173			
Page 1 of 3				

1. Applicability: ALL factory produced SLSA and ELSA Lightning LS1 aircraft SN78 thru SN173.

2. Background: Some owners are failing to Re-register the ELT with NOAA. ELTs are being tested or activated and Arion Aircraft is being notified. The registered owner of the Aircraft and ELT must be on record at NOAA to insure the proper people are notified quickly in the event an ELT is activated.

3. Compliance with- Implementation Schedule. The ELT must be re-registered with NOAA before the next flight.

4. Procedure:





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Page 2 of 3				

1. Located in the Airframe Logbook issued with the aircraft is an ELT registration card. See photo below.



- 2. Note that this entry has all the information needed to re-register your ELT.
- 3. Even if you have re-registered your ELT, the registration must be renewed on a periodic basis set by NOAA.





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Page 3 of 3				

- 4. Go To the web address listed in the entry.
- 5. Follow the directions for registration.
- 6. Once your ELT is re-registered with NOAA, contact Arion Aircraft thru phone or email that this has been accomplished.

5. Level of certification required for SLSA Lightning LS-1.

Any work called for by this letter must be accomplished by the Owner or operator of the aircraft. On completion of the work, the owner or operator must note the completion of the actions required by this letter in the aircraft's maintenance logbook. This note should specify what work was carried out, reference this Notification, indicate the date of the work and the identity of the person carrying out the work.

News From The Dealers

From Lightning Aircraft West:

Yes, Crystal and Greg were at Sun-N-Fun as usual and although they have some pictures of the event on their blog page, I think I have enough Sun-N-Fun pictures for the magazine. It is always nice to see them, great friends and just wonderful people.

Lightning Aircraft West is working on a plane that will be sent to Indonesia. How cool is that?

I haven't written anything about Bob the Builder's (aka Dr. Robert) Lightning build, but it has been going on over the past several months. He had a first flight since the last publication. There are a few of pictures of his nice panel

No news from the other dealers, so this is it for dealer news. and the first flight of his Jet.

As always, there was a presence at the Cactus Fly-In. From the blog, there was a windy start to the fly-in, but based on the pictures on the website, <u>http://</u> <u>www.lightningaircraftwest.blog</u> <u>spot.com/</u> it was a pretty nice event.

The dealership has been busy, new Mark 2 tails and new builds.

It looks like I'll get to visit this July. Donna and I bought a California C-152 and have to fly it home to FL (poor us). We intend to stop by for a short visit.



The Indonesia Jet



Bob's Panel - Above and to the Right



On the Takeoff Roll

First Landing

Current Lightning Dealers or Representatives



Pilot Spotlight - Paul "Bear" Bryant

Unknown to me at the time would be the desire to build my own aircraft, but certainly at the age of 7 when my dad introduced me to flying I knew I was hooked. The New England leaves were in full color that cool October Saturday when my dad surprised me with the gift of flight. On the way to the airport, the red, yellow and orange maple leaves were slowly falling off the trees as the hints of winter were just around the corner. I imagined the flight each one took as it left its branch and glided to the ground. I began to imagine what my first flight would be like. I stretched out my arm of the open car window and placed the palm of my hand against the wind. Slowly dipping and raising it, I imagined I

3000 hours flying (not piloting) in the US Air Force AWACS and JSTARS. I spent 27 years in the Air Force- seven of them as an enlisted and the other twenty as an officer. I was a young Lieutenant and my first officer assignment was to Oklahoma City to be a crewmember aboard the AWACS. It was a great time to be there, as the AWACS was called all over the world to "watch" the skies and seas for our national security and the security of our allies. While there at OKC, I met my wife Kathy. She's a great person and has certainly sacrificed a lot during our journey together. This June we will celebrate our 33rd anniversary.

I also flew with the NATO AWACS out of Geilenkirchen Germany. That was a great experience as I got to fly all

Article by Bear Bryant

was flying my hand over the tree tops - up and down as the wind would catch it. Ah, the beginnings of aerodynamics. Would flying be like that or something altogether different? I was soon to find out.

Although it had the appearance of a huge flying ship from the perspective of a seven year old, the yellow Piper Cub was inviting and the pilot was a friendly 'old' man probably in his 40s. That first flight was perfect. Calm winds, clear blue skies and lots of fall colors as we flew over some of New England's gorgeous hills and valleys. Listening to the pilot through the scratchy headsets, watching all the instruments and rods and dials he was pushing, turning or pulling was certainly alluring. Looking out the side window, the countryside zoomed

along. The highway veered off into the woods. The river I hadn't noticed crossed in front of us and quickly turned into the big lake off to the east. The thrill was exhilarating. Then, more crackling into my ears. "Take the stick, son", the pilot was announcing. "Take the stick". At his urging, I put my hand on the stick. White knuckled, eyes popping out, mind racing as fast as the cub was flying (don't forget I'm a 7 year old), I had the controls. I was flying...no I was piloting!

It was in my blood, but it would be a while before I would be able to experience flight again. Money, time and life sometimes seem to get in the way of dreams. It was in my blood and I would someday fly again. I did.

Sixty years later, I have over



over the NATO skies with multinational crewmembers. Many of our deployed locations were Greece, Italy, Turkey, Norway, Iceland, Denmark, and England.

While in Germany, I earned a Masters Degree in Aeronautical Science, from Embry-Riddle Aeronautical University (European Campus). This was one of the best educational curricula I had ever taken.

My last assignment before I retired was to Warner Robins Air Force Base in Georgia. I ended up with a key role to help bring the unit on-line. This included logistics oversight for all the new facilities, being the first chief of staff of the unit, working with the new wing commander to make sure crews and airplanes were recruited, trained and maintained. While with the JSTARS unit, one of my last deployments was to Europe during the Kosovo war. At that time. I was a mission crew commander and my crew made Air Force history one night during the first days of the conflict. We were credited with the first JSTARS "kill". It was a significant event in my long Air Force career and brought a lot of mixed emotions. I retired a couple of years after that and settled down in Clearwater, Florida with Kathy. After the military career, I worked for GE Aviation and retired with them in 2012.

I also have over 700 piloting hours in general aviation aircraft including an instrument rating and a few years of instructor privileges under my belt.

I began my homebuilt trip about seven years ago from a friend who took me to Sun-N-Fun. Did I ever think I could build one of these experimental flying machines? No not really, but that introduction to EAA several years ago help light the spark that would take me there and continue to build upon my boyhood dream.

On September 15, 2008 the build Journey began....53 years after my first flight I started to build the Lightning at Shelbyville, TN part of their builder assist program... Now, I have a beautiful "jet" that I've enjoyed flying and maintaining for the last several years.

Kathy and I sold our Clearwater home of 22 years and are building a new home in Brooksville, FL which is about 30 miles north of Tampa. My jet is already hangared at the Brooksville airport (BKV) and we are hoping to be in the house by the 4th of July. If you are ever nearby, come and visit us.

It's is truly amazing that after the single ride at seven years old, I would have experienced so much that aviation has to offer. I've gotten to see so much more than the colorful New England autumn



N82PB

News From Builders and Flyers

The Quest for an Accurate IAS

Lightning Kit 127 built 2011 in Shelbyville TN, USA and shipped to Newcastle, NSW Australia.

Air Speed Indicator Set up:

- Dynon Skyview avionics plus separate analogue air speed indicator.
- Both instruments use the standard pitot / static probe that came with the kit and located under the right wing.
- T connectors were used so that both instruments shared the same static port and pitot.
- IAS readings on both instruments are within 4 Knots at air speeds from 40 to 110 Knots IAS (see graph below)
- Accuracy of the Dynon was confirmed by manometry (see graph below).
- There were no air leaks in the pitot (confirmed by manometer)

Kit 127 fist flew on the 22nd December 2011 (Report in Newsletter Jan / Feb 2012). Paul, the test pilot's comment was: "flies well but floats forever". Little did I realize at the time, but this simple comment would lead to endless hours of effort and frustration, trying to achieve an accurate Indicated Air Speed.

There followed some transition training with Paul (I was a low hours pilot). I have since logged about 85 hours solo.

My early landings were dreadful – floating forever, ballooning, often bouncing and lots of go-arounds. Clearly the approach speed was too fast but the IAS was 60 Kts on final and 50 over the numbers as recommended by Arion. For some reason I doggedly stuck to these numbers even



Graphs showing correlation between Dynon and Analogue (upper left). Manometry testing for accuracy of Dynon (upper right) and calculated IAS from a column of water (lower left). This latter graph was generated using an internet calculator and confirms the accuracy of the Dynon. Note: at low air speeds (<30 Knots) delta IAS is relatively large with small changes in the water column. ? a large contributor to my problems (read on).

though I knew the instruments was underestimating my speed. I really should have been at 31 knots (indicated) over the numbers!

Why 31 Knots - because the stall speed (IAS on the Dynon) with full flaps was 24 Knots and 1.3 x 24 = 31.2.

Here are some of the early test data from February 2012:

	Stall:	Clean	34 Knots			
		Full Flap	24 Knots			
GPS Calibration triangle: Feb ruary 2012 – see graph next page						
IAS (Kts)		(ts)	CIAS (Kts)			
	99		103			
	75		80			



When graphed, the error becomes greater as the IAS becomes lower. 60 Knots IAS was actually 68 knots CIAS, 50 knots IAS was actually 60 knots, 40 Knots IAS was actually 52 Knots and 30 Knots was actually 43 Knots.

The "true" stall speed of the aircraft from Arion is 36 Knots. By extrapolation my 24 Knot stall is actually 36 Knots CAS (the factory figure!!).

Even though I had this information, I found great difficulty in reducing my speed to blow 40 knots indicated on final. I even flew around at 35 to 40 Knots indicated on several occasions to try and convince myself that the stall data and GPS data were in fact correct (which they were). Eventually I slowed the approach to 50 knots on final, 40 over the fence and even less over the numbers. My landing improved, the aircraft settled like it should with the stall warning blaring!

By the way, the analogue air speed indicator does not read below 40 Knots whereas the Dynon reads all the way down to 15 Knots.

There then followed the quest for an accurate indicated air speed. My reading and discussion seemed to suggest

that the likely problem was position error. Most opinion felt that the pitot side of thing seems to rarely cause problems.

The instruments themselves were first checked with a manometer. They were both accurate (see graphs above) and there were no leaks.

The pitot was perpendicular to the spar and pointing about 15 degrees down. Correcting this so that it was parallel to the cockpit sill made no difference.

The first experiment was to move the standard static port down and out. The pitot was moved at the same time. My logic was that doing this would eventually find "clean air". It was done in several stages such that the static port was finally about 2.5 inches further down and 3 inches further out from the leading edge. It looked somewhat ridiculous and none of these changes made any significant difference when a GPS triangle was flown. The static port was then moved back to the standard position below the wing but further back from the leading edge. Again this made little difference when the GPS triangle was flown. By this time I had manufactured 5+ different pitot / static combinations and eventually returned to the standard item!

At another time I tried 2 holes in the static mast, one opposite the other. Needless to say it made no difference.

The two instruments were then connected separately to avoid flying countless GPS triangles at various speeds:

- The pitot remained common to both instruments.
- The analogue IAS remained connected to the static port under the right wing for reference (the standard position)
- I was then able to experiment with the Dynon static port in different locations.
- This arrangement allowed

Second Quarter 2015 Volume 8, Issue 2

Several locations were tried for the Dynon static port.

1) Both sides of fuselage, half way between cockpit and elevator (you have to look hard):

This gave a full flap stall speed of 54 Knots IAS on the Dynon.

That is not a typo, the stall speed with the static port in this position was more that twice the stall speed with the static port under the wing! The analogue just read < 40 Knots.

GPS calibration was not done.

For interest – the cruise speed at 2850 RPM with this arrangement was135 Knots IAS on the Dynon (static on fuselage) and about 112 Knots IAS on the analogue (static under the wing).

2) Static port free in cockpit:

Cruise at 2850 was 135 knots on the Dynon and 112 on the analogue. No further testing was done as I felt 135 Knots IAS on the Dynon was clearly above the capability on the aircraft (in level flight @2850 RPM).

3) Static port free in wing:

Again cruise speed was 135 Knot IAS on Dynon so no further testing .

4) Static port just aft of cowl.

There is a Cessna 182 parked in my hangar and this is the location of its static port. I was confident that this would be the perfect position as after all, Cessna should know.

The results:

Stall full flap 54 Knots (exactly the same as aft fuselage)

Comparing the analogue and the Dynon at various speeds with the Dynon static in this position showed that the difference became very much greater at lower air





speeds (higher angle of attack). Just what I didn't want, but consistent with previous testing.

By this stage I was just a tad frustrated and resigned myself to living with inaccurate instruments. I was not about to do any IFR and planed to reattach both the Dynon and analogue ASI's to the standard static port under the wing and leave it at that (with a bold notation in the POH).

However, my friend Bob (Ex RAAF, RV 7 flyer who has done all the stall testing) suggested that I read about this topic on the Vans Air Force Forum.

Vans uses a simple pop rivet

(estimated price < 1.0 cent) as its static port. It has been described as cheap and cheesy but comes with the kit! There are several posts on the forum where people have tried to "improve" on this with static ports sourced from Aircraft Spruce (which are what I have used). The results have often been less than satisfactory and it seems that Vans does actually know best with most posters on the forum returning to the standard set up with the rivet. One poster suggests that a flat Aircraft Spruce static port often gives incorrect readings because of laminar flow right next to the aircraft surface. If the port protrudes by as little as 20 thousands of an inch, the results can be very different and for the most part more accurate.

Sooo..... I drilled out the Aircraft Spruce static ports and inserted pop rivets with a domed head and the mandrel removed (see pic). It made absolutely no difference!!

I then added one and later three thin washers under the rivet as suggested on the Vans forum. Again it made no difference (see graph). The IAS was still wildly under reading especially at the higher angles of attack (slower speed). If you look carefully, the speed using the Dynon static (behind cowl) only changes 3 - 4 Knots when the analogue (static under wing) changes from 50 to 40 Knots.

A reasonable person would have given up at this stage and returned to the standard pitot / static arrangement under the wing, but a Google search (images) found a similar setup to the Lightning except there were a series of holes drilled in the static mast (see pic). And, I came across a statement that the holes in the static mast should be at least 5 diameters of the tube back from the tip (? why, no explanation was given). As a last resort, I thought I would try this.

Yet another pitot / static was constructed with four 1.0mm holes evenly spaced around the static tube and greater than five diameters from the tip (pic). Both instruments (Dynon and analogue) were connected to this pitot / static using the original set up with T pieces. The static ports on the fuselage



Static Port Using a Pulled Rivet and Washer



and behind the cowl were now totally redundant.

Would anyone like to guess the stall speed? Here is the data:

Stall full flap 24 Knots IAS

GPS Calibration triangle: March 2015

IAS (Kts)	CIAS (Kts
100	106
80	89
60	68
40	54





From Google

Actual Installation

So, the static under the wing, with four 1.0mm holes has made absolutely no difference. Graphing the results gives almost identical data to the original lightning "standard" set up from February 2012.

And that's it. I refuse to do any more. A notation will be placed in the POH and I will live with the inaccuracies.

One might well ask if all of this was a total waste of time? The answer is probably yes, but maybe not. It has been a huge learning curve. I still find it hard to believe that so called position error can have such a major effect on IAS. Of concern, in my case, is the magnitude of the error at the lower air speeds – it was greater than 100%. Remember the full flap stall speed on the Dynon with standard static under wing was 24 Knots IAS while the full flap stall with the static on the fuselage and behind cowl was 54 Knots IAS (and this was confirmed on more than one occasion).

Any comments or suggestions would be welcome. I could kick off with a few comments myself. For example:

Is my aircraft unique?

Have other owners experienced these issues?

A quick survey of other owners stall speed would be interesting.

Cheers, and be careful

Geoff Eather Kit 127 Australia)

Notes from Nick and Dennis:

Dennis: First of all, the work that went into this article is very impressive. Geoff likely knows his airplane and it's indicated airspeeds during flight much better than most of us. This is truly test flying the airplane. My airplane's IAS is a little higher than expected based on factory information, Geoff's is obviously lower. The question we should ask: Should these differences worry us? I would say not. At least in the US, the 40 hours of test flight is used to determine, in part, the IAS that are used for flight. Each airplane can be different, even for the same model of an experimental airplane. I use the IAS that I determined are best for my airplane for takeoff, when in the pattern, and for landing. I know what my IAS is for stall and I pay attention to that when I am doing slow flight and in the pattern, especially for short final. These speeds should be in your Pilots Operating Handbook (which you write yourself) and kept in the plane.

From Nick: It is curious why Geoff's IAS is so far off, I have flown many Lightning's with different pitot/static setups. Some that are the same setup usually get a similar airspeed, but they can be off a little, but none are more than 4-5knts different from one another. The amount of equipment in a system can cause errors too. We just had a plane in where the back up Air Speed Indicator never read right. We sent if back to the manufacturer and they found the small tube from the static port to the bellows was never attached! So when we put it in, his entire system read different than before and closer to what I would expect. With that said, if you have a Lighting that says it stalls at 100, than you fly 130knts on final. An Air Speed Indicator should be accurate, but when you get down to it, they are really for reference only and your performance data and numbers for your aircraft is what matters. This is why with every aircraft I fly, even when I flew Dennis' airplane, I did 1 stall in landing configuration before I landed to see where it was going to break or at least give up a little. Then I just fly a 30% margin over that on final.

Wayne Patterson - Australia

Wayne Patterson, a proud Lightning builder and owner in Australia is planning on visiting AirVenture this year. He has sent some nice pictures and says he has about 70 hours on the plane. Looks like he is having a lot of fun.



Upcoming Events

AirVenture - Oshkosh July 20 - 26, 2015



Donna is Somewhere in There

Lightning Homecoming October 3, 2015



Final Thoughts



Every Issue, I write "The adventure continues". And it surely does. So, you read earlier that Donna and I bought a C-152. The pictures are above and it is a sweet little plane. Donna went out to Corning, CA to Rainbow Aviation to take the Light Sport Repairman Maintenance Airplane Certification course. She also completed the Rotax 912 Service Course. While she was there, she saw this nice plane for sale and decided to buy it. It is a really nice airplane (even if it isn't a Lightning) and I suspect we will have a lot of fun with it. We intend to fly commercial out to Sacramento the first week of July and then fly it home. One of the first stops will be at Lightning Aircraft West to visit with Greg and Crystal. Then we will continue the long flight home and go as far as the weather will permit each day. As you all know, flying in the summer poses a lot of weather related challenges.

So, my jet now has the new Mark 2 tail and I think I have finally figured out how to land the thing. It does handle different and is much more stable during stalls, landings, and cruise. The best part is, Donna likes it. Donna and I will be at AirVenture and I will for sure be at the Homecoming (even if I have to drive). I also plan to fly to Virginia to help judge the Regional flight competition for the National Intercollegiate Fly-ing Association (NIFA) that will be held at the Newport News - Williamsburg International Airport (PHF) in late October. I will also help judge the Regional competition for the South Eastern US that will be held at the Melbourne International Airport in early November. NIFA has competitions between collegiate flight teams in different regions all over the country. There are regional competitions and then a National Competition. If you get a chance, you should help judge one of these events. It is great fun.

Blue Skies,

Dennis W. Wilt