# Arion Hangar Talk

**The Arion Aircraft "Lightning" Newsletter.**

## November 2008- Volume 1, Issue 10

**Wayne and Nel Lenox's – "Lightning of the Month"**

Issue # 10 will start a new tradition, a Lightning of the month photo, as shown above. Please submit a photo of your Lightning for future consideration for Lightning of the Month.

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 the inputs from all of 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 / or 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.**

## Contents in this issue:


**Page**

**2 -Lead Stories – "Two Special Reports" -** Bear builds a Lightning and Charles goes to "engine school".

**9 -News from the Factory –**

**11 -News from the Dealers –**

**11 -Current Lightning Dealers -**

**11 -News from Builders and Flyers-**

**Page**

**14 – Upcoming Events -**

**15 - Lightning Skunk Works –**

**15 – Technical Tips –**

**17 - Other items –**

**18 -Final thoughts –**


## And now, the rest of the news:

# Two Special Reports

## by Newsletter Readers

In this issue of the Lightning Newsletter I am happy to present **"Two Special Reports"** by a couple of our newsletter readers. First, **Paul "Bear" Bryant** gives up a firsthand report on his factory build assist experience. In this issue he covers week one with a day-to-day agenda. In the December issue you can look forward to reading about his experience in weeks two and three.

The second special report is by **Charles Gallagher** and he gives us his perspective on the Jabiru Engine Seminar that he attended in September. For some time now, I have been suggesting that all Lightning builders should attend this seminar and the report that Charles wrote backs up my thoughts. So, enjoy reading what **Bear** and **Charles** have generously shared with you and then let them know how much you appreciate their efforts on behalf of the newsletter readers.

# "The Build"

## By Paul "Bear" Bryant

### I started this project almost 53 years ago!

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 my arm out of the open car window and placed the palm of my hand against the wind. Slowly dipping and raising it, I imagined I 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 all together 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.

Fifty –three years later, I have over 3000 hours flying (not piloting) in the US Air Force AWACS and JSTARS. I also have over 600 piloting hours in general aviation aircraft including an instrument rating and a few years of instructor privileges under my belt.

Did I ever think I could build one of these flying machines? No, but an introduction to EAA several years ago helped light the spark that would take me there.

On September 15, 2008 the Journey began….53 years after my first flight I started to build the Lightning at Shelbyville, TN as part of their builder assist program…

**Day one. It's a wrench, stupid!**

We started the project bright and early on Monday morning and ran late into the evening. Day one was more than learning about a wrench….here's a list of my accomplishments taken from my log:

Installed finger screens installation. Attached the 90 degree elbow to the 1/4 " barb fitting on both wings and installed 1 ½ feet of fuel line to the barb fittings and plugged the ends. (1 hour)

Measured and cut holes for the fuel sending units on both wings. Note to self: Measure twice, cut once. One of the cuts was not centered and had to re-do. (1/2 hour).

Installed the fuel wing tip vents. Bent the fuel line slightly inward and then cut and installed the tubing and the in-line check valve-making sure the check valve was oriented correctly. Hand sanded around the vent tubing and inside of wing area where the tubing would go through the wing. Installed the venting tubes using "5-minute" epoxy with cotton. These turned out pretty good. (1 hour)

Marked and cut out notches on the wing for the inboard flap brackets using a power cutting tool. Cut notches in the fuselage for the flaps and a "D" cut for the aileron push and pull rods. All the cuts were sanded using a small powered sanding tool. (1 1/2 hours)

Taped over the fuel sending unit holes and fuel drain holes. (10 minutes)

In preparation for the inboard wing skin layups, I removed the gel coat from the inboard wing skins on both wings using a power sanding tool. (1/2 hour)

Installed spar box; temporarily installed wings. Checked parallel to chord line and center line of fuselage. (1 hour)

Leveled plane; marked centerline on firewall flange; cut out firewall. Marked center line on firewall. (1 ½ Hours)

Installed swivel bearings in rudder brackets. Had to drill out hole to have the swivel bearings fit correctly. (40 minutes)

Prepped quarter windows for installation. Had to make sure the windows fit correctly into the recessed gel coat. Measured where to trim the windows and used the power sanding wheel to trim the quarter windows. Had to go slow here as not to crack the quarter window. Took several attempts to get the correct fit. (1 hour)

Marked Horizontal Stabilizer (HS) center line. Installed HS brackets. Set right bracket 3/32 high. Measured 8 1/8 O/B to O/b of HS spar bolt holes. Drilled angle of incidence holes to 1/8". Temporarily installed HS. Checked that HS is square to vertical stabilizer. Drilled angle of incidence holes into HS to 1/8" (2 hours)

Taped two AN-5 large area washers each fore and aft on top of vertical stab. (15 min)

Installed the rudder cable guides. (20 min)

Began the inboard wing layup preparation. Taped Karman with packaging tape so that the fiberglass layups would not make contact to the fuselage. Cut 6 ea 2"x35" lengths of fiberglass for the fiberglass layups. Used a combination of 3.2 and .8 solution. Applied the resin to the fiberglass strips and laid down the wetted fiberglass. Completed both top sides of wings. (1 hour)

Cut out quarter windows. Sanded Gel coat for quarter windows. Prepped and glued quarter windows using 3.2 and .8 resin mixture. (45 minutes) Learned a lot today…time for bed.

Yes, Day one turned out to be a very successful day. The learning curve was straight up and I was ahead of schedule. Having professional personnel available to provide immediate feedback to you on your tasks is extremely beneficial as you will know immediately if you performed a task correctly or not.

Learning Note of the Day: Remember to measure twice, then measure again….

## Day Two. Sleep? I don't need no stinkin' sleep.

After the first day of building it was pretty difficult to get any sleep. There certainly was a lot going on in my head as I tried to drift off to sleep. The excitement that I actually started to build my "jet" was almost overwhelming and knowing that day two would be just as exciting also kept me wide awake.

Day two started just like day one. There was a lot to get done and the activity began bright and early. As you can see by my log notes I got quite a bit accomplished today. I also fine tuned my panel layout and selection of instruments. In addition, decided the color for the panel face and lettering. I also finalized the paint scheme for the fuselage. Since I added the wing tips and didn't have a specific "game plan" for them, I gave **Nick** "some" artistic freedom on my design concept to apply to the winglets. The Arion Lightning Skunk works go at it again… Here's some of the other tasks I completed.

Cut out holes for fuel caps and bonded in fuel caps (50 minutes)

Placed rudder on washers and marked upper and lower rudder brackets. Installed upper and lower rudder brackets. Temporarily installed rudder. Trimmed right side of vertical stab approximately 1/8". (1 hour)

Marked and drilled mounting holes on firewall. (30 minutes)

Trimmed and sanded trailing edge of HS (10 minutes)

Installed hinges. (1 hour)

Trimmed extra skin from elevator (30 minutes)

Flipped plane over (10 minutes)

Cut out inspection holes. Installed nut plates (45 minutes)

Started rudder pedals assembly (2 hours)

Installed flap and level with bottom of Karman. Trimmed wing skin to provide a good gap for flaps. (45 minutes)

Installed O/B aileron hinge bearing. (30 minutes)

Fabricated and installed I/B aileron hinge bracket. Installed I/B aileron hinge bearing. (1 hour)

Learning note of the day: Wear safety gear all the time…also flip plane over to work on underside of plane.

Now it"s time for sleep……

## Day 3. Is it a plane yet?

This was the day to add the new wing tips. I decided to make this a permanent modification and, therefore, fiberglassed the wingtips to the wing. There is an option to have these mounted with screws, but I liked the single-wing look the fiberglass leaves. By the way, since you can"t get into the end of the original wing after you fiberglass in the new tips, you have to make sure the fuel vents have been installed correctly. In addition to the wing tips installation, additional work centered on the flaps, aileron, and rudder pedals installations.

Installed flap and leveled with bottom of Karman. (1 ½ hours)

Installed O/B aileron hinge bearing. (30 minutes)

Fabricated and installed I/B aileron hinge bracket. Installed I/B aileron hinge bearing. (1 hour)

Trimmed wing skin to provide 3.75” to 4.00” of travel. (20 minutes)

Installed wing tips and glassed wing root fairings on both wings. (3 hours)

Finished assembling rudder pedals assembly. (30 minutes)

Built rudder pedal support tube and brackets. Installed rudder pedals and flute tube; (2 hours)

Assembled wheels; drilled axles to weldments; inserted tubes into tires. (2 hours)

Sanded and layered up fiberglass on lower sides of HS to root of empennage. (1/2 hour)

Sanded and layered up fiberglass on elevator end tips (1/2 hour)

Cut out HS inspection point and installed nut plates with pull rivets. (1hour)

Drilled out and installed hinges with pull rivets on HS at hinge points; (1/2 Hour)

Perform elevator balance modification (1 hour)

Installed HS to empennage (45 minutes)

Learning note of the day: Epoxy can be “cured”.

## Day 4.

So far, during the build, I"ve been listening to 2 types of music: country and western. **Mike** and **Mark** tried to educate me on the finer points of C&W music. They say the planes are built better with this kind of music in the air…mmm, if that"s the case, this is gonna be one fine built aircraft. Today, however I"m going to introduce **Mike** and **Mark** to my kind of music…

Here"s what got accomplished today:

Finished right wing flap and aileron (2 hours)

Temporarily glue IB flap brackets to fuselage (20 minutes)

Installed firewall (45 minutes)

Installed motor mount (30 minutes)

Measured and drilled cabin entry steps (both sides) (1 hour)

Installing Landing Lights

Removed wings (20 minutes)

Mounted tires onto wheels (20 minutes)

Prepped axles (2 hours)

Prepped and installed landing gear struts into brake housing (2 hours)

Prepped and installed nose strut in to motor mount (1 hour)

Learning note of the day: If you"re going to break off a drill bit into a piece of metal, make sure it"s a practice piece of metal…the objective is not to ADD weight to the airplane!

## Day 5.

The “main event” today is to get the engine hung. It was a thrill to open the box and see this beautiful new engine from Jabiru. I"m hoping it will provide lots of hours of safe, economical flying. With a lot of help from **Mike** and **Buz**, the engine got mounted without any problem and day 5 was certainly a success. As you can see a lot

got done on day 5, but I still had time for nice flight with **Buz** in the 2008 demo with the new winglets…N324AL flies great!

Cut out the NACA vents on fuselage (30 minutes)

Installed nose wheel spacers (45 minutes)

Drilled out nose wheel strut turning rod (30 minutes)

Cut spacers and installed on nose wheel assembly for turning "stops" (45 minutes)

Glassed the elevator balance modification (1/2 hour)

Flipped plane upright (10 minutes)

Installed engine (1 ½ hours)

Changed out prop flange (45 minutes)

Glassed the HS into HS root (1/2 hour)

Worked on wing tip and landing light addition (1 ½ hours)

Learning note of the day: The jigs and tools developed by the Arion team are indispensible.

Great Week!!!!

And I now know what a wrench is…….

Note: Bear can be reached at - N5PB@aol.com

Below is **Paul's** Lightning as of 17 October 2008. **Bear** is working on the instrument panel and **"Moostang" Mike** is working his expertise on the Ford (make that Jabiru) engine.

# Jabiru Engine Seminar Review

# by Charles Gallagher

The September 2008 Jabiru engine seminar was attended by a full spectrum of the aviation community. From “no time” to “high mileage” pilots, potential builders to multi-aircraft builders, A&P's to IT experts, all came to learn and share. From the comments made by the attendees the objectives were met and exceeded. While the course is titled engine seminar you receive far more information than implied. If you are considering the purchase of a Jabiru engine, planning a kit build, in the build process, have a completed project, or provide professional maintenance, this program is all-inclusive.

While the syllabus is extensive a few highlights and observations are in order. The engine is CNC machined from billet steel and aluminum, combined with a six main bearing crank, this is a robust design suited for the "Outback", African jungle and flight schools. The "carby" and distributor ignition system follow the KISS theme to facilitate easy and low cost maintenance costs. As **Nick Otterback** progressed through all the engine components it was obvious that the design goal was met: simple, reliable, fool proof, and cost-effective.

When you consider the cap and rotor cost $20.00 and plugs cost $4.00 or less, each at your local auto parts store, vs. $24.00 for aircraft plugs; a very reasonable cost of ownership scenario is developing. **Mark Stauffer** presented the firewall forward portion of the program and offered many "nuggets" of wisdom and tricks to save time and money during the engine installation. There is a 2-cent part that can be added during the installation that will drastically reduce noise in your radios - you will have to attend the school to learn this one. We learned how to install the prop to stop horizontal to keep the wood prop in balance. **Pete Krotje** enlightened us on the proper installation and tuning of the Bing Carby, how to balance the fuel flow to manage CHT; also what is involved to match the jets to a specific airframe and prop.

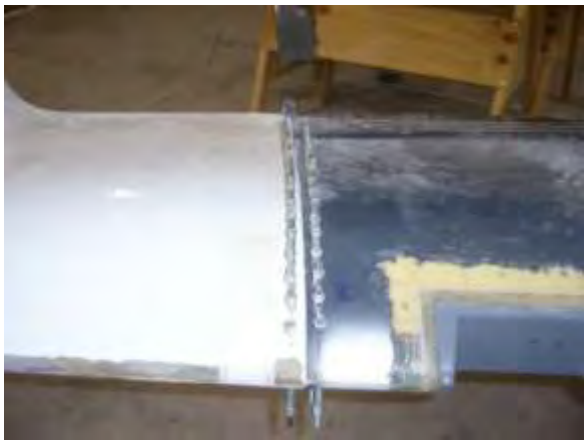
The fun part of the school was the hands-on training for valve adjustments and ignition tune ups. When in the field, you can set ignition gaps using a business card; it also works for the alternator gaps. On top of completing a 50- and 100-hour engine service, we completely disassembled and reassembled a 3300 six cylinder engine a.k.a. an engine overhaul. The weekend program results in a certificate of completion which should be applicable towards a "Repairman Certificate-Inspection" which certifies you to perform the annual inspection on your experimental aircraft. The FAA requires 16 hours of training for the inspection of light sport aircraft at an

approved program. This was not discussed at the seminar so Jabiru USA can clarify. I do know that you will be a better "steward of your ship" after attending the Jabiru USA engine school.

Note: **Charles Gallagher** can be reached at - crg326@yahoo.com

# News from the Factory:

Once again the new wing tips and wing tip extensions are in the “news”. **Nick** had a request from someone to make the new tip extensions removable so that they could be exchanged with the shorter tips at the whim of the builder. To further complicate the requirement, they wanted the removable tips to not be put on with screws and blind nuts as had been previously done on the prototype. **Nick**, always trying to please, has come up with a method to accomplish this as the photos below will show. I really don't understand why someone would want the tips to be removable as the new extended tips give both a slower stall speed and a faster cruise, but with **Nick’s** new “development” you can once again, “have it your way”.



**Nick** explains the process: The piano hinge is 1.5” aluminum leaf with a 3/32” pin. The trick is the tip skin is 0.060, the wing end skin is 0.030, and the 10 oz cloth is 0.010, so with 3 layers the end skin is now the same and the hinge can be laid in flush with the tip. When fitting the tip to the wing, getting the gap tight is a long process, but worth it to get the right look.

**Mark Stauffer** provided the following update on factory doings:

-We have now sold 79 Lightning kits and a total of 30 have flown.
-We've finished up **Bear's** second week and he'll be back the first week of November to finish up with a first flight hopefully around the 7th.
**-Bill Strahan** has finished his first week and his plane should be in paint sometime next week. Bill will come back for his second week the week before Thanksgiving and then finish his third week during the first week of December.
**-Nick and Mark Blanks** have been performing compliancy tests for LSA certification. All seems to be going well.
-We are in the final stages of getting the Brazil planes ready for shipment. Hopefully they'll be out the door in early November.

And speaking of Brazil, under the **"News from Dealers"** section, you can see a photo that the Brazilian dealer sent recently.

**Katie Bosman**, Lightning"s new pilot to help fly off Phase One test time, provided the following information when I asked her to write up something for the newsletter that would officially introduce her to all the newsletter readers. I have had the pleasure of flying with **Katie**, and she is a welcome addition to the Lightning team. Here is what **Katie** had to say:

Even though nobody in my family flies, I developed an interest in model aviation as a kid growing up in Wisconsin. In 1988 at the age of 10, my dad brought me to my first EAA Convention in Oshkosh. In 2001, I began a 7-year streak as an Oshkosh Vintage volunteer and started flight training in Rio Creek, Wisconsin in a BC-12D Taylorcraft. Two years later, while working as an intern in the EAA Youth Education department, I earned my private ticket, followed shortly by the instrument rating. In 2004 I moved to Tennessee to attend graduate school and finish my Commercial, CFI and Multiengine certificates. I worked at Middle Tennessee State University for two years as a flight instructor, mostly teaching in Diamond aircraft. During my last year at MTSU, I taught FAA inspectors from around the country how to use the Garmin G1000 in Diamond DA-40s. In July 2008 I began working as a corporate pilot flying right seat in a Pilatus PC-12 single-engine turboprop. When I'm not flying the Pilatus, I spend my time in Shelbyville test flying new Lightnings and bugging Mark and Mike about how to build airplanes. **Katie Bosman** can be reached at: katie.bosman@gmail.com

**Here is a photo from the last Lightning fly-in.**

**Look at all those beautiful aircraft in the Lightning hangar.**

# News from the Dealers:

On 27 October, 2008, I received an email from **Ivo Ramos**, of CIMAER Ltda., in Brazil. He included a photo, shown below, of the former N323AL which was the original factory demonstrator. It is now flying in Brazil as PU-LAY, and has been equipped with a new Jabiru 3300 engine and the new extended wing tips. The proud owner is Dr. Jacinto Lay and he is shown in the left seat in the photo. The Lightning is truly becoming an international success, with dealers and customers in Australia, Brazil and Russia.


**PU-LAY**, ready for flight in Brazil, with **Dr. Lay** at the controls.

# 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, Hedgesville, WV, 304-754-6010, www.greenlandings.com

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

**Sport Plane Dynamics,** Ed Ricks, Glendale, AZ, 623-695-9040

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

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

# News from Builders and Flyers:

**Linda Mathias** has developed a great experimental aircraft condition inspection checklist and agreed to share it with us. It is printed below for your information and use.

# Condition Inspection Checklist

**Aircraft Make/Model: _____**

**Serial #:_____ Registration No._____**

**Engine: Jabiru 3300 Serial #: _____**

**Date of inspection: _____**

**TT Airframe: _____ TT Engine: _____**

___ Remove or open all necessary inspection plates, access doors, fairings, and cowling
___ Clean aircraft and engine
___ Inspect fuselage and hull group:
- ___ Skin for deterioration, distortion, other evidence of failure, defective or loose attachment of fittings
- ___ Systems and components for properly fitting installation, no apparent defects, and satisfactory operation
- ___ Static ports are clean

___ Inspect cabin and cockpit group:
- ___ Ensure cleanliness and no loose equipment to interfere with controls
- ___ Seats and safety belts in good condition with no apparent defects
- ___ No breakage or deterioration of windows and windshield
- ___ Instruments are mounted and marked properly and operate properly
- ___ Flight and engine controls are properly installed and operate properly
- ___ Battery properly installed and charged
- ___ Other systems properly installed, in good condition, no apparent defects, and securely attached

___ Inspect engine group:
- ___ No visual evidence of excessive oil, fuel, or hydraulic leaks, if any, note sources of such leaks
- ___ Studs and nuts properly torqued and no obvious defects
- ___ Internal engine for cylinder compression and metal particles or foreign matter on screens and sump drain plugs. In case of weak cylinder compression, check for improper internal condition and improper internal tolerances.
- ___ Engine mount not cracked or loose and engine not loose on mount
- ___ Rubber engine mounts in good condition
- ___ Engine controls properly safetied, proper travel, and no defects
- ___ Lines, hoses, and clamps in good condition, tight, and with no leaks
- ___ Fuel screen and gascolator have no water or foreign matter
- ___ Replace fuel filters
- ___ Exhaust stacks have no cracks, defects and are not loose
- ___ Accessories are securely mounted and have no apparent defects
- ___ All systems properly installed, securely attached, in good general condition, and no apparent defects
- ___ Cowling has no cracks nor apparent defects

___ Inspect landing gear group:
- ___ All units are in good condition and securely attached
- ___ Aluminum spring gear has no deformities
- ___ Linkages, trusses, and members have no excessive wear, fatigue or distortion
- ___ Hydraulic lines are not leaking
- ___ Wheels have no cracks, defects; bearings in good condition
- ___ Tires properly inflated with no excessive wear or cuts
- ___ Brakes are properly adjusted

___ Inspect wings:
- ___ Left wing skin in good condition with no deterioration, distortion, or evidence of failure
- ___ Right wing skin in good condition with no deterioration, distortion, or evidence of failure

___ Both wings securely attached
___ Pitot heat operates properly
___ Ailerons securely attached and move freely
___ Flap hinges secure and in good condition

___ Inspect empennage group:
___ Elevator for skin condition with no deterioration, distortion or evidence of failure
___ Elevator properly installed, securely attached, and operates properly
___ Rudder for skin condition with deterioration, distortion or evidence of failure
___ Rudder properly installed, securely attached, and operates properly
___ Horizontal and vertical stabilizer skin in good condition with no deterioration, distortion or evidence of failure
___ Control cables in good condition and safetied
___ Hinges intact and no missing screws or hinge pins

___ Inspect propeller group:
___ No cracks, nicks or binds
___ Bolts properly torqued and safetied
___ Spinner securely attached with no cracks

___ Inspect avionics group:
___ Radios and electronic equipment properly installed and securely mounted
___ Wiring and conduits properly routed, securely mounted, and no obvious defects
___ Bonding and shielding properly installed and in good condition
___ Antennas securely mounted, in good condition, and operate properly
___ ELT operates properly and battery is current

___ Inspect miscellaneous items:
___ Exterior lights operate properly
___ Placards are legible

**Linda** can be contacted at: lbmathias@verizon.net

**Tex Mantell's** Lightning is progressing nicely as shown by these photos below. All the painting is done and it should be ready for the spring season.


**Tex's Interior**

# Upcoming Events:

**Next Jabiru Engine Seminar – 9-11 January 2009 at SYI.**

**US Sport Aviation Expo, January 22-25, 2009 at Sebring Airport**

**Sun-N-Fun is 21-26 April 2009 at Lakeland, Florida.**

**Virginia Regional Festival of Flight is 30,31 May 2009.**

**Oshkosh AIRVENTURE is 27 July – 2 August 2009.**

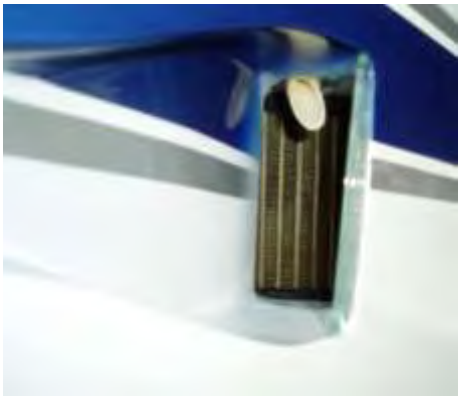
**The 2009 Lightning Fly-In will *probably* be 25-27 September at SYI.**

# Lightning Skunk Works:

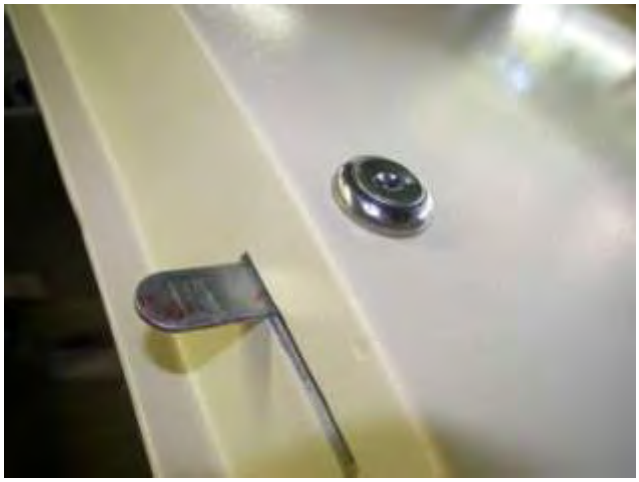
What is this aluminum “aircraft part” doing at a “fiberglass” aircraft factory? Anyone care to guess what aircraft it is for, who is building it, and why?

# Technical Tips:

The first technical tip this month is from **Jim Goad** of Florida. He came up with this idea to cool his voltage regulator with a PVC plastic blast tube to blow air onto the regulator that is mounted on the firewall. He gets his “blast” air into the PVC tube by placing it inside the top part of the oil cooler NACA duct as shown in the photo below. Although solid state regulators are not all that prone to fail, they are susceptible to heat and Jim"s idea looks good to me. Over the years I have had two of them fail that were mounted on the firewall of my Pitts. I feel certain that a system like Jim designed would probably have prevented those failures.



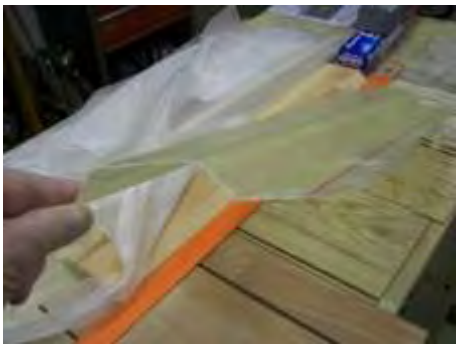
Below are two tech tips from "**Tex" Mantell,** from New York (I wonder if that is western NY?). The photo below shows how he installed a security lock for his canopy. **Tex** has one of the original canopy locking systems that uses the two sliding rods in each side canopy rail, and this system he developed can be easily made to work with that style of canopy. The new single latching canopy system, with the single overhead latch, could also be modified to add a security lock.



Next, **Tex** tells how he developed a rudder cable cover so that when he is flying with his "spurs" on, there is no way for the spurs to interfere with the rudder cables. **Tex** had this to say about the project:

Here is a project I found simple to do. It"s a cover for the rudder cables on the floor of the cockpit. It protects the cables and you dont have to worry about something getting hung up on them.

I made a mould out of a board and cut 45* off the sides, covered it with wax paper, and laid some fiberglass down and epoxyed the whole thing. I used some velcro to hold down the cover and put the rug right on top. **Tex**



Tex can be reached at: wb2ssj@frontiernet.net

# Other Items:

A recent discussion on another aviation list that I am part of prompted me to offer some thoughts on a subject that could be a problem for any of us. OK, raise your hands; how many of you have run an aircraft fuel tank dry? Oops, hands down; let me rephrase the question. How many have run a fuel tank dry without meaning to? There is a big difference between the two as I am sure you all understand. In one case, you messed up and forgot to properly manage your fuel on board and unintentionally ran a tank dry. In the other case, you possibly run a tank dry on purpose because you were managing your fuel the way you intended. In either case, **fuel starvation** (running the selected tank dry while other tanks still contain fuel) can be the result of several scenarios. Let"s discuss each of the unintentional fuel starvation scenarios:

-First, the pilot does not have adequate fuel to reach the destination on either tank independently, and does not properly switch between tanks. Thus, one tank runs dry with the associated suddenly quiet engine and a few seconds of panic or stark terror by the pilot. Hopefully the pilot will regain composure and switch to a tank with fuel on board.

-Another situation may be that the pilot does not properly confirm the fuel before flight and assumes the aircraft has more fuel on board at takeoff than is actually available.

-Thirdly, it may happen that when you switch tanks during flight, the fuel selector does not go firmly into the tank detent, thereby cutting off fuel flow.

-The pilot may not manage power and fuel flow in the manner planned, resulting in higher fuel usage than expected.

-Last possibility is that fuel siphons from a tank in flight and leaves the pilot with less fuel available than originally determined.

And speaking of fuel siphoning, if a fuel cap comes loose (or has a bad O-ring seal) the low pressure created on top of the wing in flight can cause significant siphoning and loss of fuel overboard. Float-type fuel gauges may not report the extra fuel loss, as the suction that pulls fuel out may also hold fuel floats in the full-up, fully-fueled position. Such losses would not be reflected in fuel totalizers or other integrated fuel management information; as far as a totalizer or glass cockpit GPS interface knows, if the fuel doesn"t go through the fuel flow system transducer, it thinks it"s still onboard the airplane. Part of your climb checklist should probably be to insure there is no sign of fuel leakage from the filler caps. Thank goodness the Lightning is a low wing aircraft. If you notice fuel leaking, land as soon as practical and refuel; that"s the only way to confirm how much fuel actually remains on board.

Most Pilot Operating Handbooks suggest selecting the fullest tank for landing. When do you do that? I suggest making that selection before you start your descent for landing and that if you have planned the flight properly, you should have adequate fuel for descent, landing, and a possible go-around for another pattern and landing without having to make another tank selection. If you can"t plan your flight to have enough fuel in a tank for descent, approach, landing and go-around/missed approach, in my opinion, you have not adequately planned your flight and enroute fuel stops.

Switching tanks is a multi-step process:

1. turn the auxiliary fuel pump on

2. move the fuel selector handle to desired tank,

3. wiggle the handle slightly to make certain it is firmly in the fuel tank detent

4. turn the auxiliary fuel pump off

5. leave your hand on the selector handle for several seconds while watching the fuel flow and or fuel pressure gauge. If flow or pressure begins to drop, turn the fuel pump back on and switch back to the previously selected tank to keep the engine running until you confirm you have fuel in the tank you tried to select and can again attempt to switch tanks.

One last point, **fuel starvation** is very different than **fuel exhaustion**. Fuel exhaustion is where the aircraft is totally out of fuel. You are now a glider pilot without intending to be working on that rating. If this happens, you really screwed up in several phases of the flight – preflight planning and judgment during the flight. I can understand having much higher winds than were predicted when you planned the flight, but as soon as your in-flight management tells you that is the case, it is time to land early and put some more fuel in the tanks. Just remember, the only time you can have too much fuel on board is when you are on fire.

OK, another show of hands - how many of you have run a tank completely dry in your Lightning? What happened? Was it what you expected? Did it start right back up when you switched tanks?

Since this issue of the Lightning newsletter is getting a little long, next month I will address the above questions and make a few other recommendations as to fuel management in your Lightning. How was that for a teaser to get you to look forward to next month"s issue?

# Final Thoughts:

In mythology, Adrastus was the king of Argos at the time of the conflict of Polyneices and Eteocles for the kingdom of Thebes. After a quarrel with another branch of the royal family he fled to Sicyon, where the king there made him his heir. He became king of Sicyon, and then made peace with Argos and returned there, giving his sister Eriphylē in marriage to Amphiaraus. To his court came the exiles Tydeus and Polyneices. The latter married his daughter Argeia, the former her sister Dēipylē. Adrastus undertook to restore them to their kingdoms and began by leading an army to set Polyneices on the throne of Thebes. When the expedition was defeated, Adrastus escaped, thanks to the swiftness of his horse **Arīon**, who was the offspring of Poseidon and Demeter.

And now you know the “rest of the story” and probably way more that you ever wanted to know.

Blue Skies,

*Buz Rich*

N1BZRICH@AOL.COM (Contact me directly for newsletter inputs – I need your help to keep this newsletter both interesting and informative.)