Hangar Talk

The "Lightning" Newsletter

May 2010 - Volume 3, Issue 5

Bill Browns' Lightning of the Month

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

The newsletter goal is **to get the word out** on anything having to do with the Arion Lightning aircraft, and **to give a voice to Lightning builders, flyers, and anyone interested in this amazing airplane**. It is not only a way for the factory to provide Lightning news, but it is your newsletter as well. Its success will depend on you getting involved to spread the word and to help others that are considering a Lightning, plus building, flying, and maintenance tips. 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

And now, the rest of the news.

Sun-N-Fun Issue, May 2010 – This issue of the Lightning newsletter will center on coverage of the recently completed **Sun-N-Fun** convention and fly-in at Lakeland, Florida. All the Lightning pilots and enthusiasts that were able to attend had a great time sharing experiences with each other and enjoyed seeing the homebuilt, vintage, and warbird aircraft on display as well as the many aviation vendors. Once again, **World Record Earl** was the only Lightning to fly into the show and park in the homebuilt parking area. However, three other Lightnings were flown in and on display in the Arion booth and at the Light Sport Mall. **Jim Johannes** flew down from Shelbyville with **Nick** in N563J, **Ryan Gross** and **Greg Crouchley** flew down from Green Landings in Greg's jet, and **Mark** flew the latest LS-1, N346BR, which belongs to **Ed Ryan** and will be delivered soon.

Overall, it was a great show for the Lightning crew. As of the last day, they had sold three Lightning kits and one SLSA. Additionally, the overall Lightning group picked up another award as Jim Johannes' airplane was named Reserve Grand Champion Light Sport Aircraft. Congratulations to Jim for building such a beautiful aircraft. Photo coverage of Sun-N-Fun follows the Lightning of the month information.

Congratulations also go to another Lightning builder. Steve Biele, from South Australia, received the Best Overall Aircraft award at the Australian National Fly In for his Lightning, 19-5562. Super job, Steve. We have some more info and photos below.

Bill Browns' Lightning of the Month

N716MZ is kit number 50 built during 2008 in Neenah, WI. This is what I call the "compact model" – no wing extensions and original motor mount. The airplane is registered as an Experimental/Homebuilt and was originally setup with the ground adjustable Sensenich propeller and no leg fairings or wheel pants. That configuration flew like a LSA and is currently in the flylightning.net picture gallery.

In September 2009 I replaced the propeller with a Sensenich W62FK58, “the cruise prop”, and installed gear leg fairings and wheel pants. Now I can’t get the airplane to slow down. I have only been able to put 10 hours on the new prop and find that I am going to have to relearn the RPM ranges for flying in a pattern. At the other end of the scale, the airplane does 145 knots (below 8k MSL) at 2850 RPM, and 160 knots if I firewall the throttle.

The main avionics systems include dual GRT Sport HS EFIS, GRT EIS, Garmin GTX 330, SL-40, SL-30, PS 9000EX, and Digiflight IIVS. I have also installed a Fuel Guardian system and Flap Control system from Aircraft Extras and an Alpha Systems AOA. I have found this set of avionics give me good situational awareness and an easy cross country flyer. I’m currently in the process of installing GRTs backup battery system for my EFIS systems for a little extra redundancy. This panel can be found in the GRT and the Steinair (in progress picture) website panel galleries.

I fly out of Lewis University airport (KLOT) which is southwest of Chicago under the last Class B ring for O’Hare. Actually there are 6 airports including Midway within 20 miles of KLOT so the moving map traffic display is useful getting into and out of the area in addition to avoiding traffic going around the O’Hare Class B.

My younger daughter lives in Indianapolis and I flew down to visit the grandchildren at least once a month last year. An hour of flying versus 3.5 hrs driving each way. My other daughter lives in Denver, and now

that I am close to retiring, I'm thinking about flying myself out to visit her later this summer. Aside from that, I gave my 95 year old father a ride last year. He was an Army Air Corps flight surgeon during the WWII. He had a great time. Asked me about flying down to Indy with me this year to visit the great-grandchildren – sure, why not!

I've enjoyed building and upgrading the Lightning. The airplane has turned out to be very responsive but easy to fly. Over the last couple of years Arion has kept improving the design which I think is encouraging for the longevity and vitality of the design. When Lightning number 1000 takes to air will anyone remember the bungee cord pitch trim or auto pilot pitch control issues or main gear wheel shimmy?

Bill Browns

Bill strapping into N716MZ.

Proud Lightning builder, Bill.

The photos below show the new tow bar attach system that Bill Browns, and the guys at Lightning North Central, Neenah, WI, have developed. It is a neat system and a simple solution to moving your airplane around the hangar. Right photo is from the North Central demo Lightning.

Sun-N-Fun 2010 – Photos and Comments

As I mentioned above, Sun-N-Fun was great this year. Other than some slightly higher than normal winds (I only saw one airplane, a Luscombe, ground loop before the show started), the weather was outstanding until the very last day when there was some rain in the area. Overall, it looked to me like the total number of show aircraft (homebuilt, vintage and warbird) in attendance and the crowds were down slightly, but those that were there seemed to be serious aviation enthusiast and most of the vendors had good traffic by their booths all week long. That was certainly true for the Lightning crew – always lots of people looking at the Lightnings on display. An often heard comment was, "That's a beautiful aircraft."

In no particular order, below are the photos that Mark Stauffer and I took at this year's Sun-N-Fun fly-in. Thanks to Mark for sharing his photos with the newsletter.

The left photo shows Jim Johannes and Nick on the way to Lakeland in Jim's recently completed Lightning. N563J won the Reserve Grand Champion Light Sport Aircraft at Sun-N-Fun. Right photo shows Jim's panel and interior. Beautiful airplane and outstanding workmanship.

This photo shows the Lightning crew setting up on Sunday before the show officially started on Tuesday. Jim Johannes' Lightning is on display waiting for the admiring crowds that would look at it all during the show.

Above is Greg Crouchley's recently completed Lightning on display in the booth at Sun-N-Fun for the entire show. Greg and Ryan flew it down to Lakeland from Green Landings. Greg's interior and instrument panel (including his brand new iFly 700 GPS) is on the right. Greg was only at Sun-N-Fun for a day or so, as he had to go to China on a business trip. Well, that is what he said, but perhaps he just had a really big hankering for some Chinese food. Faakinsupa – Greg told me that was Chinese for great.

Ed Ryan's brand new LS-1 Lightning was on display in the Light Sport mall. Mark flew it to Lakeland and Ed was to fly it home from there. Dean from Green Landings spent most of the fly-in talking to potential customers in the Light Sport mall.

Jim's jet on the left with the Thunderbirds in trail overhead. Tex Mantell checks Greg's engine.

World Record Earl is welcomed to Sun-N-Fun by Bear Bryant on Thursday afternoon. Earl had some special help by Carlos Fernandez (photo on the right above) from Grand Rapids Technologies, Inc. in order to fly to Lakeland this year. Earl lives under the Atlanta Class B airspace and his transponder's altitude reporting was not working when Earl was ready to depart. I walked to the Grand Rapids booth, explained the problem to Carlos, handed him my cell phone, and Carlos was able to talk Earl through the process of "rebooting" his Grand Rapids altitude data input to the transponder. Now that is what I call outstanding customer support!

Above is Lynn Nelsen's jet during the Sun-N-Fun week. A big thanks to Lynn Nelsen for bringing his Lightning to the Lakeland South Airport from his airport home at Frost Proof, FL. Nick used Lynn's aircraft to provide demo flights to potential customers. Lynn is a long time Sun-N-Fun volunteer in the Type Club Tent where he mans the Ercoupe Club table. Great job, Lynn.

Interesting T-shirt seen at the show. But who would dare wear it?

Bill Strahan, Lightning builder, and Walt Boyd brought their new iFly 700 to Sun-N-Fun and seemed to always have a large crowd looking at their new GPS. I think Greg Crouchley was their first customer – before the show actually started. If you need a good VFR GPS, with a seven-inch screen that uses actual Sectional maps, take a look at their product.

The newest Lightning dealer, Moonshine Aviation, from DeLand, FL, was at the show all week and helped with the many potential customers. That's Olena on the left and Max on the right. They have completed their demo Lightning, but still had a few wiring connections to complete, so were not able to bring it to Lakeland. By the time you are reading this, their airplane should be flying. They showed me several photos of their Lightning and it is yet another beautiful example of this fine aircraft. Max confirmed that Olena was totally involved with the build and will be receiving the repairman's certificate. Great job. I look forward to seeing it at Oshkosh. Hopefully, they will send me some photos to publish before then.

Left photo is Buddy Carlisle on his new Light Sport Corvette. On the right, Ryan, Nick, and Doug "the hangar rat" K'berg, discuss the planned evening activities. See photo below.

On the left are Mark and Nick presenting one of two Lightning forums (Tuesday and Friday). The Tuesday forum was interesting because all the other Light Sport manufacturers had gotten together and raised enough money to hire the Thunderbirds to perform their arrival show just as Nick started speaking. It was loud. Moostang Mike is on the right – he bought a Triumph motorcycle in Florida. Anyone have a set of training wheels for a Triumph motorcycle?

Mark with Bill Beasley, one of the newest Lightning owners. He flew a demo ride with Nick at Lakeland South in Lynn's jet and then bought a kit with builder's assistance starting in June.

Tom Hoffman, Lightning North Central, on the left and Nick on the right, talk to a group of potential customers. The Lightning booth was busy all week long.

This photo is from the Lightning meeting on Friday. Earl and Bear enjoying the event.

Nick talking to the group while Tom guards the corn. Dana is filming on the right.

Tom still guarding the corn while Max, Olena, Dean and Ryan listen to Nick whistle Dixie.

Jim Johannes, on the right, is congratulated by the Sun-N- Fun Chief Judge for N563J receiving the Reserve Grand Champion Light Sport Award. Jim's jet is beautiful and well deserving of the award.

And speaking of Lightnings winning prestigious fly-in awards, I am happy to report that

Steve Biele's Lightning just won Australia's "Best Overall Aircraft" at their NATFLY over the Easter weekend.

Congratulations, Steve; that's a fantastic trophy.
More info below.

NATFLY is the national fly-in for Recreational Aviation Australia; however, it is open to anyone who is interested in aviation. Below is Steve's message to me with the great news about his recent award.

Gday Buz,

During the Easter long weekend in Australia our annual Natfly was held at Temora (central New South Wales). Here, more than 600 aircraft flew in, to share the passion of aviation with static displays, trial flights, fly market and many forums. My personal highlight was receiving the award for my Lightning 19-5562 - "Concourse De Elegance" Best Overall Aircraft.
What a thrill to receive this award.
See you at Oshkosh,

Steve Biele, Lightning Kit 35
Meadows, South Australia

After hearing the great news about Steve's award, I asked him to provide some additional info on his Lightning. Below is his latest response.

Hello Buz,

It is now 15 months & 130 hours since my Lightning, 19-5562, hit the sky in South Australia. Build time was well over 1000 hours having modified and completed all the aircraft wiring, painting, upholstery, engine and avionics installation. No checkbook building on this jet.

However, expert help was sought from friend Helmut Frensch, who spent many hours advising and assisting, such as adapting a fuel injection to the engine. After many hours of testing we are now happy with the smooth running and performance of the Jabiru engine. We settled on multi-point injection controlled by a Haltec FX10 ECU. Twin 50 mm exhausts were fitted. The most difficult task was to reduce the large EGT temperature gap between cylinders (from 150c to 50c). See picture of my working Dynon.

It took me a while to learn how to land proficiently (too many Jabiru hours) but in the air it is fun to fly and very maneuverable. The little kite loves to fly high where the best results are gained.

I run a 61" x 60"pitch wooden prop made by craftsman Brent Thompson of New Zealand. He will build to your requirements. His web address is well worth a look. (www.thompson-aero.com)

Overall, the Lightning, like any other aircraft, has to be flown for some hours to enable you to appreciate the true performance and handling. I can`t think of any other aircraft I would like to own and fly.

Steve Biele

I also received the following message about the NATFLY from another of my Aussie buddies.

Hi Buz

You are probably well on your way to SnF by now……wish I was there and not tied to this desk.

The new NATFLY gathering at Temora, NSW, was a great success with around 1200 aircraft staying or visiting….not bad for a country of 23 million. It was like a large regional fly-in in the USA. I had six guys staying at my hangar. Dennis Borchardt was doing great business with Lightning. It's still the best looking aircraft around. The new Piper Cruiser was there although this is aimed more at the training market. Nice looking plane though.

The aviation museum is having a flying weekend starting tomorrow so taking off in the Grumman……just a great little commuter. A friend of mine is flying a newly restored P-40 Kittyhawk so am looking forward to having a close up look at it.

Have a safe trip to Lakeland and look forward to seeing you at OSH.
Happy landings,
Paul
Paul Tyrrell
CEO
Regional Aviation Association of Australia

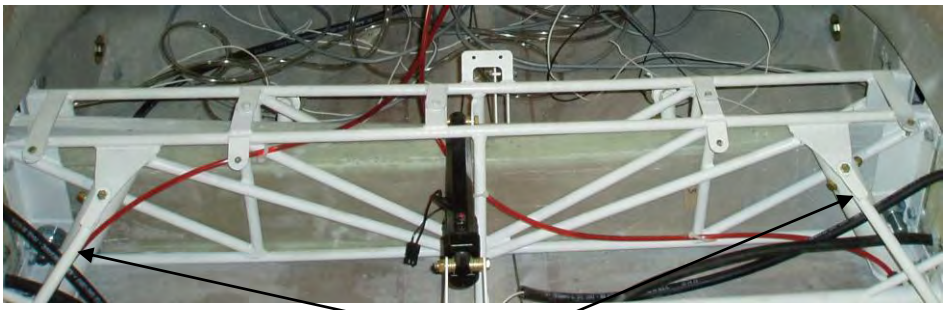
More photos of Steve's beautiful Lightning.

Steve's Lightning was also our Lightning of the month for July 2009.

Hopefully, other of our Aussie Lightnings were in attendance at the Australian NATFLY and can send some photos for a future newsletter. Again, congratulations to Steve.

News from the Factory

By now you have probably heard that the Lightning guys have come up with a modified landing gear for the LS-1 SLSA Lightning. This new gear was designed specifically for the SLSA Lightnings because they have the potential to be used in flight school operations. The flight training mission obviously has the potential to put some serious demands on an aircraft's landing gear, so to prevent any future limitations on Lightnings being used as full time trainers, the new gear was incorporated into the LS-1 design. It is the only real difference between kit Lightnings and the latest LS-1 design and the beefier (and slightly heavier) change is not needed by current pilots. The new design change is primarily in the way the gear legs mount into the central beam assembly (or spar box) and how the gear leg receptacles are braced. The braces on the original design were on the outer part of the spar box while the new system has the braces near the center. The new gear also gives the Lightning a slightly wider main gear stance. The photos below will show the changes.



New design. **Older design has the braces further apart.**

The new design has the braces near the center while the older design (right photo) had the braces on the outer part. The result is a more robust gear with a slightly wider gear stance.

This photo shows the difference in the slightly wider stance and track.

Here is a message from Nick explaining the gear change for the LS-1.

The main reason for the change was the factory built LS-1, and the possibility of it being in a flight school. The original gear is more than sufficient for a current pilot. It was designed to be a good gear and be lighter weight. We knew the offset to this would be a gear that, should it be dropped in hard, could bend but not break. We designed it to do this so the load would not transfer to the airframe and the only damage would be a $70 gear leg.

The new gear design is only slightly heavier at about 2 lbs a side so the weight vs. benefit in structure is reasonable. The new gear has a much shallower angle than the old gear. This allows no increase in aircraft height but a longer leg which can flex more and put up with abuse better, i.e., a longer bending moment with more flex. The leg is larger at the top and bottom than the old and incorporates multiple tapers to bend and flex appropriately.

Drop test with the old gear showed what we thought, a deformation of the gear when a dead drop from 20" is performed. However the gear did not fail.

The new gear is ASTM-compliant and went thru the above drop test with no issues and several other drop situations as well. In fact, due to our nature (guys trying to break stuff), we dropped the new gear over a dozen times from varying heights and never did it bend of fail in any way.

The new gear will eventually be added to the kit aircraft as well and the old gear will be eliminated all together. For now the new gear design can be part of a kit upon request. We have a few of the original gear boxes to use and those will be supplied with kits until we are out or if the customer specifically requests the new design. Either way, it is your choice.

Nick

There is one additional upcoming change that the LS-1 will soon have that is more of an aesthetic change than a performance or operational change. As most of you know, the original LS-1 used wheel pants that were adapted from the Jabiru aircraft. They looked OK, but Nick felt that something closer to the looks of the kit version would be better suited for the SLSA version. The type of wheel pants that he came up with give that look but offer no appreciable change in drag.

The photo below shows the new style LS-1 wheel pants that will now be used. Fantastic!

Current Lightning Dealers

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

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

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

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

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

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

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

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

Lightning Florida, Max Voronin, DeLand Airport, FL, 847-414-5928, ww.moonshineaviation.com

News from the Dealers

From Green Landings

On the weekend of 27 - 28 March, Greg Crouchley's Lightning, kit number 82, flew for the first time. Greg built his jet at Green Landings and it was the 52nd Lightning to fly. After the 40 hour test period was completed, Greg and Ryan flew it to Sun-N-Fun and had it on display in the Lightning booth.

Congratulations, Greg; it is a beautiful aircraft!!

News from Builders and Flyers

Ray Gage from Florida sent in the following note and photos of his Esqual with Lightning mods. Many of the current Esqual owners are updating their Esquals to incorporate some of the Lightning parts that provide an overall stronger, safer, and faster airplane.

Hello:
My name is Ray Gage, and I live in the Spruce Creek Fly-In, (later referred to as the Creek). We have North and South guarded gates, with six cameras at each which record the driver, their license to drive, and the vehicle's tag number. We just completed a nine camera, closed circuit system which monitors the runway, taxiway, and onsite businesses. There are about sixteen hundred homes here, with almost every model aircraft (around 600) total. Not all are pilots, with about 1/3 with hangars, and several dozen commercial hangars where residents have their aircraft businesses or share space for those who live in homes without connected hangars.

In a later report, I will give more information about the Creek, as it is a very special place to live. For non-pilots there is a Country Club, with an outstanding 18-hole golf course. More and more young families are moving in, which is great as so many of us are becoming senior citizens. Our EAA Chapter, #288, is very active, with over 150 members from around the area. Building is very popular here, with at least one plane completion per month. Lately, these are mostly RV's of various models.

Over two years ago my heart decided that it didn't care for my regular musical rhythm; and I ended up with a pacemaker. So that almost 50 years of flying was over for good. I had been very active in formation flying and air shows with the Red Star Pilots Association for eight years flying a Yak-52W. Of course, the plane and my Class II medical had to go also. Strange how we become so emotionally attached to our planes; as she taxied away it was hard not to shed a tear.

So for around six months I had an empty hangar and bummed rides with my friends. One night I saw a photo and ad in TAP for an Esqual. What the hell was an Esqual? The plane happened to be stationed at a grass strip about forty miles away. It was a cold and rainy day about two years ago when I drove up; the hangar door went up and I fell in love with this sharp looking little plane. At that time I knew nothing about Light Sport except what I had read in various magazines. The grass was very wet and the owner didn't want any rain or mud on his 2005 Esqual; thus it was a very short flight. At that time I didn't know any of my many A/P friends who knew anything about these planes or the Jabiru engine. Lesson, do not allow your desires and emotions to override common sense. There was no PRE-PURCHASE INSPECTION, and, after the purchase, the owner refused to give me any instruction or check rides.

So, the past two years were involved with multiple modifications, corrections, and parts replacement. Therefore, I am now finally flying a ship like Buz; an Esqual-Lightning; which now flies like a dream and attracts a great deal of attention wherever we go.

There is always something going on here with both our EAA Chapter, and a regular group breakfast fly out each Saturday morning; called the Gaggle Flight. Depending on the time of year, we have many "snow birds" here during the winter months. The number of planes flying with the group will vary each week between 30 to 50+. Most flights gather with approximate speeds and regularly fly together.

Each March we have a weekend Race-Rally. The race is on Saturday. When you sign up, mark your normal cruse speed, and the planes are divided into common speed groups. This year I signed up for the 120 knot group. You are given a cardboard plaque with your race number. I was number 45 this year. My group, of course, was the slowest, and we have many very fast planes here (at least five SX-300's who are 250-knot plus planes, etc.

This is a 100 NM triangular course. The basic rules are that when the flag drops, we were using runway 23; you had to climb straight ahead to 500 ft. before one could turn on course for the first checkpoint which was Palatka, 28J. If you turned to the northwest first leg before 500 ft., you would have a two minute penalty. When the flag dropped for #45, full throttle, nose immediately at 80 mph. She climbed like a rocket, and I was at 500 ft. just past the end of the runway.

The Creek is just 1/2 mile outside of the Class Charlie Daytona Beach (DAB) controlled space, and the outer ring has a 1,200 ft agl altitude limit. So had to stay at 800 ft. to the DAB ILS outer marker (FOLIG) and then under 1,220 ft. until out of their NW outer Charlie ring. Leg one is 48.6 NM from the Creek (7FL6) to 28J.

I have an old Garmin 286 and an autopilot (which was never turned on). The winds were out of the South, and 1,500 to 2,000 ft. seemed to give the best ground speed. I raced cars professionally for ten years, and thus I have great respect for engines. I ran the Jabiru between 2,950 and 3,000 RPMs

There were judges at each leg. The directions were to call out on the 28J unicom "race 45, three miles out." At 28J there are two runways that cross; that was where the judges were. You had to dive to 500 ft. so that they could see you when they noted your time. Then I made a 2-3 g 190 degree climbing turn toward the second leg, which is a small grass strip called Pierson for 27.3 NM.

Same deal as first leg, call with your race number on the unicom three miles out. Then turn almost directly East for the finish line at the Creek. Once again we were soon within the DAB outer circle at or below 1,200 ft.; the final distance is 24 NM. Had to cross our runway after the 3 mile out unicom call at 1,000 ft.; since the airport was still active, and we didn't want to interfere with the 800 ft. normal traffic pattern. When you crossed the finish line, you were directed as to which direction to land.

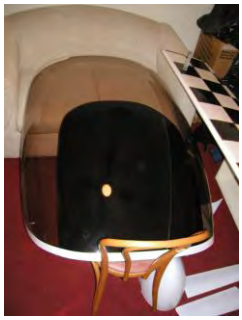
The winning places were kept secret until our EAA meeting Monday night. Frankly, I never even considered winning the 100 NM race. In my group was a new resident, Darrell Lowrance, who was flying his souped up 152, with all of the modifications, and a 150 hp engine. Since Darrell owns the Lowrance GPS company, I was sure that he would have the best equipment to keep him flying straight as an arrow. By the way, Darrell is an extremely nice, laid back gentleman, and one would never know how well that he has done in business. We are happy to have him in our community.

Anyway, at the meeting, they were passing out plaques for the first to third fastest in each speed group. When they called out my name as first place, I almost fell out of the chair. The average speed was almost 116 knots, which meant that with all of the descents, navigation, and climbing, the Esqual must have averaged 130 knots or more. The plane was the talk of the group. We know have two more Lightnings here at the Creek, also RV-12's and several other Light Sports. As our pilot population grows older, the class will continue to grow. You will note in the photos that I have now installed gear fairings. They were not installed before the race, so we gain another 3-5 mph. We have had a horrible winter here with too many rainy and freezing days. Plan this week is to do a smaller triangular course to measure the effect of the gear fairings.

In a later newsletter, as this is getting too long, will share some of the other Creek flying activities. We should all applaud all of the work and effort put in for us by Buz.

My best,
Ray Gage

Like other Esqual owners, Allan Maxwell from Louisiana, is modifying his aircraft with Lightning parts. Below are some photos of his progress so far. It's looking good, Allan, especially that checkerboard on the bottom of the wings. I can't wait to see the finished project.



And below is Allan's finished product. Great looking paint job. I am guessing he is a Saints fan.

Upcoming Events

Virginia Regional Festival of Flight, Suffolk Executive Airport, 22-23 May, 2010

Sentimental Journey, Annual Cubs return to Lock Haven, PA, 16-19 June, 2010

AirVenture, Oshkosh, Wisconsin, 26 July to 1 August, 2010

4th Annual Lightning Homecoming and Fly-In, Shelbyville, Sept. or Oct. 2010.

If you haven't been to one of the previous Lightning homecomings, start planning now to attend this one. You will have an absolutely great time. All of last year's creeper race winners will be back to defend their titles and we will once again plan to have several Lightning competitions that you will want to compete in.

Engine Clinic

The Top Overhaul, What's It All About

By Pete Krotje

Jabiru engines require a top end overhaul after each 1000 hours of operation. Several parts are replaced and others are reconditioned to return to new specifications. Here's a brief rundown of the procedure.

The engine is first disassembled to a point short of splitting the crankcase. Head are removed followed by the cylinders and then by the pistons and connecting rods. The distributors and dizzy spacers are removed.

The heads are disassembled by removing the valves, rockers and other parts of the valve train. Rocker shaft bushings are pushed out of the head and replaced with new. Valve guides are carefully checked for condition and clearance to the valve stem and are replaced if necessary. The valve guide replacement is very similar to valve guide replacement in aluminum auto engine heads. Old guides are cut out by machine. The resulting hole is carefully measured and made round. Then the new guides are turned down to the same measurement as the inside diameter of the hole in the head. This same dimension creates an "interference fit" where it is not possible to insert the valve guide into the head.

To get the guide and head to mate we must heat the head to 300 degrees while the guides are placed in the freezer. If all goes well the head will expand enough and the guide will shrink enough to allow the guides to be pressed into the head. When the head cools and the guide warms, we end up with a firmly attached valve guide. The inside bore of the guide is then reamed out to 7.04mm.

We then turn our attention to the valve seats. Seats are ground to reestablish the angles and face dimensions that will match those on the valve so that a good seal is achieved. This is done with a special valve seat hone in our engine shop. If seats are damaged it is possible to replace the seats. This is a special procedure similar to valve guide replacement but the temp extremes are more severe with the

head heated to 500 degrees and the seats cooled in liquid nitrogen. As you might guess we turn to an experienced shop to do this work with turnaround time taking about 10 days.

Cylinder barrels are next to be reconditioned. All are checked for interior dimension and for roundness. The cylinder walls are honed to restore the cross hatch pattern on the cylinder wall. This cross hatch is vital to maintain oil on the cylinder wall. The top edge is cleaned and made ready to mate with a head.

New bearings are installed in the con rods with new con rod bolts. This is done off the crankshaft with bearing blue. The inside of the rod is carefully measured and the blue shows us if there are gaps in the bearing to conrod interface. Any dimensional or irregularity in the rod must be corrected before attachment to the crankshaft.

New pistons with new rings are attached to the con rod with new gudgeon pins and new circlips. The conrod, piston, ring assembly is installed on the crankshaft. The cylinder barrels are eased over the pistons and rings and installed on the crankcase with new MS nuts. Nuts are torqued down and the barrels are rechecked to make sure they are still round.

New valves are installed in the refurbished head and are lapped to the seats to make a good seal. Rocker arms are installed along with new O rings. The oil feed line to the head is reinstalled with a new rubber Tee at the heads.

At the front of the engine a new woodruff key is installed in the oil pump drive end of the cam and oil pump clearance is checked. Clearance is very tight at .002 inch. New O rings are installed in the oil pump.

At the aft end the dizzy shafts are checked for wear and if ok are pre-lubed and the spacers are reinstalled. New distributor base seals are installed and new caps and rotors installed if required. All that's left is to finish buttoning up the engine and mount it on the test stand for the Jabiru break in procedure.

When we're all done the engine should be good for another 1000 hours. The cost for all this?? About $500.00 - $600.00 per cylinder.

Pete Krotje

For sales or service contact: www.usjabiru.com**, email:** info@usjabiru.com**, phone: 931-680-2800**

Technical Tips

The first technical tip this month has to do with your aircraft brakes - keeping your brake reservoir full and bleeding your brakes to keep bubbles out of the system. Here are my thoughts.

It is common practice for auto mechanics, especially shade tree auto mechanics (like me), to bleed brakes by filling from the top of the system and letting the fluid flow out the wheel cylinders

when you pump the brake pedals to get the air out of the system. Airplane practice should be just the opposite.

The normal way to fill airplane brake systems with fluid and to keep from introducing air into the system is to pump the fluid in from the bottom of the system to the top. This can be done by using a low pressure pump of some type. I use a hardware store type oil can with a pump handle. Others use larger plastic bottles (like spray canisters) that can be pumped up with air pressure. Using either type of pump, you attach a short piece of flexible tubing to the pump and then to the nipple (bleed valve) on the wheel brake cylinder and pump fluid in from the bottom until it comes out the brake reservoir. Actually, I normally start filling from the bottom on one side, then complete the task from the other side so that there is no air in either side of the brake system.

One other thought, it is a good technique to have someone watching the reservoir to let you know when it is full. Otherwise, since it is normally located on the firewall, you might overfill it and have a mess to clean up.

One other basic difference between airplane brakes and auto brakes is the type of fluid used. Cars use automotive brake fluid that is glycol-based. Do not use auto brake fluid. Airplanes use red hydraulic fluid such as the military spec Mil H 5605, or a petroleum or silicon-based brake fluid. Be sure to use the proper aircraft hydraulic fluid or you may find that the rubber O-rings in your brakes will not last very long.

Bottom line - filling the brake system from the bottom up takes care of filling the brake reservoir and bleeding the brakes at same time; therefore, no air in the system.

The Next tech tip, a recent question on proper grounding straps (due to engine starting problems) for the Jabiru engine, resulted in the following advice from Pete.

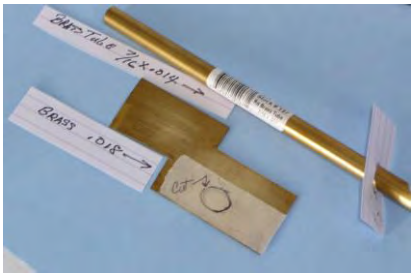
A small copper strap probably is not sufficient. You need a ground cable from starter to airframe that is as large as the starter cable itself. A welding cable of the #4 size is the norm. The starter service bulletin and all other bulletins can be found on Jabiru's web site - www.jabiru.net.au. If your engine has been starting OK in the past, but suddenly is not, then you may have another problem, such as a weak battery, corrosion in the distributor caps or rotor, old spark plugs with incorrect gap, or out of specification coil to magnet gap, etc. A little detective work goes a long way here.

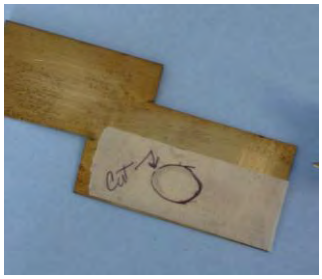
Pete

Jim Goad from Punta Gorda, Florida, sent in this month's last tech tip. Jim has modified his Lightning's canopy latching system to prevent it from lifting slightly while in flight.

Hi Buz

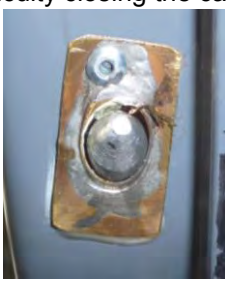
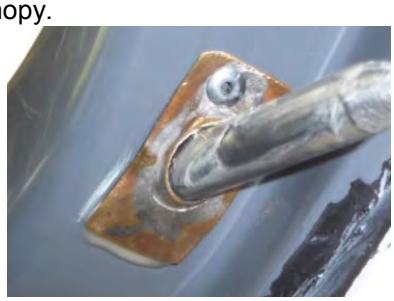
I am sending you some pictures of canopy latch rod housing that I made for my Lightning. I've always had trouble with the canopy latch on the passenger side, but not on the pilot's side. In the air the vacuum over the canopy lifted the right side enough that it would cause the rod to bend slightly and there would be a sizeable air gap between the canopy and the fuselage. Some minor wear and cracks developed where the rod comes through the canopy. The attached pictures shows the components and the method I used to build a guide to fit over the rod. The length of the rod has to be short enough that it doesn't hit the bearing block inside the canopy.






First you cut the brass plate and cut the tube at an angle then trace that on to the brass. Cut the opening in the brass, tack just the top with silver solder, slide it over the canopy rod and bend the brass sheet to the contour of the canopy. Try to solder the remainder of the brass sheet to the tube without dislodging the first solder joint. Do the final fitting and trim the portion of tube to the length you want to stick out.

Remember you want to move the tube up as far as you can vertically in the hole as this will tighten the canopy against the fuselage. Don't go crazy because it is very easy getting the rod to high and then you will have difficulty closing the canopy.


You can see the pop rivet which is mainly used just to hold the plate in place while the epoxy and filler set up.
Jim Goad (jng62433@aol.com)

Jim Goad's November 2009 Lightning of the month.

Flight Safety Tips

Several recent articles in newspapers, magazines and some aviation specific publications as well, have touched on the overall safety record of general aviation and homebuilt aircraft. Most of the reporting would have you believe that homebuilt aircraft have an abysmal safety record. In reality, the overall safety record of homebuilt aircraft is not greatly different from production general aviation aircraft. Actually, there are slightly fewer fatalities per aircraft crash in homebuilt aircraft, but they do have slightly more total accidents. I suspect that the overall fewer fatalities in homebuilt accidents are due to the fact that homebuilt aircraft generally have fewer seats. The overall mix of accident types is about the same, but the homebuilt accidents seem to include more low-altitude buzzing and / or aerobatic causes.

Now let's talk specifically about the Lightning fleet. With over 50 Lightnings flying we have a fairly good overall safety record, but there is always room for improvement. Other than one accident that was caused by a propeller loss, the other fatal accident was during transition training. There have also been several landing incidents during transition or flight training, so this is one area where some special attention can benefit future pilots transitioning into the Lightning. So if you have recently completed a Lightning or have purchased a previously flying one, getting good transition training from a qualified instructor is instrumental to a smooth transition in your new Lightning.

Flight training in the Lightning - Obviously the key to good transition training is finding the right instructor. One that is proficient and current in the Lightning is what you are looking for. Along that line, my top recommendation for Lightning transition training is to go to Shelbyville and fly with the instructors there. Next in line, would be going to one of the Lightning dealers to fly with their instructor. They have probably provided transition training in the past, so should have a good Lightning instructor. If you can't do either of the above, then finding the right instructor might be a little more difficult since very few instructors have previous Lightning flight time. You might try talking to any of the current Lightning pilots and asking for names of instructors they might know with Lightning experience. If you strike out here, then my final recommendation is to find a very experienced instructor (not a newbie) that has experience in *lightly wing loaded sport aircraft*. Suggest that they get a Lightning checkout and then when they feel comfortable to instruct in your Lightning, your transition training can begin.

Another thought. Up until now, pilots currently flying the Lightning represent a very wide variety of flying experience. We have everything from high time retired military and airline pilots to student pilots who are still working on their license. I suspect that future pilots transitioning to the Lightning will also represent this same vast experience level. Generally, the lower time pilots will readily agree that they need good transition training. However, occasionally, some of the more experienced pilots may think that they can just jump in a Lightning and have no problems. That attitude can be a problem, especially if they have not flown for some time or have no time in sporty aircraft or lightly wing loaded airplanes. So if you count yourself as an experienced aviator, beware this cavalier attitude. Approach your transition to the Lightning like you did in your past professional flying career. Do it the right way so you don't add to the overall accident/ incident rate.

Here are some additional thoughts. First, let's start by recognizing that it's smart to get proper transition training in the Lightning by an experienced Lightning instructor. Second, Lightning builders and flyers have been quite good about giving people rides in their airplanes. This is great for future sales, so keep it up. However, as part of your briefing for your "good will" ride, make sure they understand that if they decide to acquire a Lightning, they will need some specific transition training to insure their checkout goes without a hitch. That way you will be part of keeping the Lightning accident and incident rate low.

Finally, as part of the SLSA certification requirements, Nick has developed a transition training guide for the LS-1 Lightning. It is a syllabus of all of the checkout requirements and covers all the things that are different about the Lightning, such as the light wing loading and sporty handling. This type of formalized curriculum will go a long way in introducing pilots (and instructors) to all Lightnings. To that end, I suggest that everyone transitioning to the Lightning get a copy from Arion Aircraft in Tennessee and use it as your training guide. It's the smart thing to do. Have fun.

Lightning Skunk Works

How well do glass composite aircraft show up on radar? Not too good, especially if using a wooden prop.

Flight of two on Mig cap (combat air patrol). Your six is clear.

Other Items

Over the years the FAA has been tasked with keeping the accident rate down and is charged with the safety of the entire aviation industry. Instead of strengthening the overall situation by requiring strong pilot skill requirements they have instead tried to make airplanes easier to fly and less susceptible to stalls and spins. Although easier to fly airplanes are not bad, I personally think this has been the wrong priority. Why, because the stall / spin accident is still the number one killer and, as a result, insurance companies keep jacking up their rates to recover from losses due to "pilot error" accidents.

The pilot is still the weak link in the accident chain, not the airplane. To my way of thinking, building strong pilots through proper training with the correct emphasis on all piloting skills is the best way to lower accident rates. If you only require training in approach to stalls (not fully developed stalls) and no spin training at all, then new pilots are not fully trained in all possible aviation skills. So even with the so called easier to fly airplanes, we still have many "pilot error" accidents. For example, which type of airplane has had more stall / spin accidents, C-172s or Pitts Specials? Which do you think takes more pilot skill to fly properly?

Now don't get me wrong, I'm not suggesting that you go out and spin your Lightning. It's not approved for intentional spins. But you might think about going to a spin instructor and getting some training in spins and basic aerobatics and unusual attitude recovery. What I am saying is that good, complete and thorough pilot training in all aviation skills and staying proficient in all these skills with regular flights and practice is the way to prevent accidents. Practice all your required skills, including slow flight, stalls, landings, emergencies, cross-country using pilotage (map reading), etc. Stay on top of your game and have fun.

Final Thoughts

As an afterthought to the flying safety article above where we talked about lightly wing loaded aircraft, I invite any of you to come to Virginia and fly my 1940 J3 Cub Sport with me. Talk about lightly loaded wings, that "kite" has a wing loading of only 6.84 lbs/sq. foot. But, the controls are pretty sluggish, especially when compared to a Lightning. But it is a fun old bird to fly and I think you will enjoy the experience. Heck, we might even get Joe Mathias to pull out his Cub and we might be able do some formation training. Now that is fun.

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.)**