Hangar Talk

The "Lightning" Newsletter

September 2009 - Volume 2, Issue 9

The recently retired Prototype – "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 happenings at Arion Aircraft, and **to give a voice** to Lightning **builders and flyers**. To be successful we need your inputs. So it is not only a way for the factory to provide Lightning news, but it is your newsletter as well, and its success will depend on you getting involved to spread the word and to help other builders and flyers. So think of this newsletter as an ~~-e~~xchange of information publication". Send your inputs directly to: **N1BZRICH@AOL.COM.**

Contents in this issue:

And now, the rest of the news.

This month's Lead Story is another "travelogue" by Dick Cleavinger, our very own Lightning high altitude expert from Boulder, Colorado. Dick tells us about his recent flight to Sandpoint, Idaho to visit an aviation museum and attend an EAA fly-in. I am sure you will enjoy his words and great photos. Thanks, Dick.

Also in this issue you will find a short flight evaluation article on the newly ASTM-certified Special Light Sport Lightning, N325AL, the LS-1. Yes, the article is shorter than flight evaluations I have written in the past because, well the LS-1 is a Lightning, and so it flies like a Lightning. Simple as that. I hope you enjoy reading about flying the LS-1 as much as I enjoyed flying it. Once again, Arion has come up with a superb aircraft - superb in its performance and flying qualities, superb in its strong, safe construction, superb in the quality, and superb in looks. Yep, it looks like it is going Mach 2 just sitting on the ramp.

Now, enjoy Dick's latest article:

SANDPOINT, IDAHO, FLY-IN

By Dick Cleavinger

I took part in a fly-out arranged by the Grandby Colorado EAA chapter 1267 to Sandpoint, ID, July 17 – 19. My companion was Lee Wadleigh, a long time friend and CFII. The plan included attending the Sandpoint EAA fly-in, visiting the museum of Dr. Forrest Bird, and touring the Quest aircraft factory, makers of the Kodiak turbine powered STOL aircraft. We left Boulder, Colorado, (KBDU) Friday morning, at 6:15, and refueled at North Bighorn County airport, WY.

The approach to Sandpoint is strikingly beautiful. Lake Pend Oreille is a large, deep water lake. It was used by the Navy for developing submarine systems, including nuclear power, during and after WW2. See photos below:

We landed at (ID19), the private airstrip at the Bird compound. During a 40 year career in the Army Air Corp / Air Force, Dr. Bird developed oxygen systems for unpressurized aircraft (like the B17and B24) and respirators for surgery and medical patients. He modified a PBY Catalina amphibian to a four engine configuration and used it to tour the world teaching medical folk the use of his respirators.

Dick's Lightning on the right.

The museum at his compound contains several of his 18 aircraft, all of which he keeps in flying condition. He has memorabilia and uniforms from the 1st and 2nd World Wars, and an extensive display of the respirators and breathing equipment that he developed.

That's Dick

After touring the Bird property we flew the 8 miles to KSZT, put our planes to bed for the night, and had a grand Italian dinner in downtown Sandpoint.

Saturday morning we attended the Sandpoint EAA Fly-in. Had a great breakfast and saw lots of nice airplanes.

In the afternoon we toured the Quest factory. Quest aircraft was formed to develop an aircraft to replace the obsolete aircraft used for Christian missionary work in remote places of the world. The goal was an STOL aircraft with high load capacity that used jet fuel instead of 110LL that is apparently harder to get in out of the way places. The turboprop Kodiak which they began delivering in 2007 is the result of that development. It can take off and land in less than 1000 ft, climb at 1500ft/min, and has a 3100 lb. useful load.

After the Quest tour we visited the city beach on Lake Pend Oreille, and had dinner at a delightful restaurant on the beach.

We flew home Sunday morning, stopping for fuel at Greybull, WY, which has a bone yard for a collection of obsolete firefighting aircraft.

The weather was great the whole weekend.

Dick Cleavinger, Lightning #42

Boulder, CO

LS-1 Flight Report:

On the way to Oshkosh I stopped by Shelbyville to catch up on the latest factory happenings and to fly the LS-1. I wanted to write a flight evaluation for the newsletter on N325AL, the very first ASTM-certified Light Sport Lightning. I had previously flown the majority of the required flights for Light Sport ASTM certification in the "silver demo" with it in a light sport compliant configuration, and then flew all the required spin tests in the prototype Lightning. After the actual Special Light Sport certification paperwork was received from the FAA, Nick then flew off the required flight time on N325AL, so this was to be my first real flight in the certified Lightning LS-1. On the date of my flight in N324AL, 17 July 2009, it had 55.8 total flight hours. This time included the required test hours, the recent trip to and from Sun-N-Fun, and quite a few demo flights that Nick had provided for potential customers.

First, a quick review of the main differences between the "Go Fast" standard Lightning and the Special Light Sport model will show that the most noticeable difference is the longer wing span. The standard wing is 27' 2" (91 square feet) and the light sport has a 30' 6" span (102 sq. ft.). Most standard Lightnings weigh in at about 825 pounds with a 1425 lb. gross, and the LS-1 model will be closer to 800 pounds with a gross of 1320 lbs. Some quick math with these numbers indicates that the standard version has a wing loading of 15.7 pounds per square foot, while the light sport model is only 12.9 lbs. /sq. ft. (about the same as my J3 Cub). Along that same line, the power to weight ratio at gross weight is 11.9 pounds per horsepower for the standard model and the light sport works out to only 11 lbs. /HP. If you look at both the lower wing loading and the higher power loading for the sport model, and then you factor in the lower pitch of the prop, you will start to understand the great takeoff and climb performance that the light sport model can achieve.

In addition to the longer wing, another noticeable difference is that the LS-1 has different wheel pants and no gear leg fairings. These changes were required to keep the airplane from going too fast for light sport rules. The wheel pants on the LS-1 were adapted from the Jabiru line of airplanes and as such are easier to install. See photos below:

Some other differences, based primarily on the ASTM specifications, are G loading of +4 and -2 for the light sport model, whereas the standard Lightning is +5 and -3.8. Of course, the basic airframe and wing construction are the same for both models and you probably remember that the original Lightning wing was tested to + and – 11 Gs. Enough said.

On the day of my flight at SYI, the OAT was 82 degrees F and the DA at field elevation was 2200'. The wind was 280 at 9 knots for takeoff, but by the time I landed it was blowing 280 degrees at 15 knots. On runway 36 that works out to almost a 90 degree crosswind right at the demonstrated cross wind limit of 15 knots. No problem for the Light Sport Lightning.

For this flight I had a full fuel load of 30 gallons on board (22 gallons are standard with 30 gallons being an option) and I had loaded the cockpit baggage area so that my takeoff weight was right at gross, or 1320 pounds. The prop was a fixed pitch wooden 60ZK53 Sensenich and I certainly agree with Nick that this is a great prop for the Light Sport Lightning. It provides outstanding takeoff and climb performance and cruise speeds that are exactly in line as specified by the light sport rules.

Takeoff was quick, and short, even on this relatively hot day. In the climb I quickly accelerated to best climb speed and in less than five minutes I was at 6,000 feet MSL (density altitude of 7,500'). The overall rate of climb, even on this hot day, worked out to just over 1,200 feet per minute. I would normally have leveled off at 5,000' for my initial flight checks, but clouds dictated 6,000' if I wanted to have a clear area for cruise speed checks. My normal procedure on an aircraft flight evaluation is to do stalls first so that I am close to gross weight. So after a few quick clearing turns, I started a series of clean and dirty stalls. Without going into specific details, let me just say that the clean stall that day occurred at 40 knots and had a slight right roll. Note, I was sitting in the right seat (solo) so that may have been the cause of the slight right roll. Why was I in the right seat? Because, I prefer flying with the stick in my right hand and the throttle in my left hand. Hey, I have some 4,000 hours in fighters, another 1,000 in Pitts Specials, and probably another 1,000 in similarly configured sport aircraft, so that is what is normal to me. The 20 degree flap

stall occurred at 30 knots, again with a slight right roll, and the 30 degree flap stall again had a slight right roll and occurred at, well, I don't know. It occurred below the speed at which the EFIS starts to show the airspeed, which is 30 knots. My best guess would be somewhere around 28 or 29 knots. Hey, that is about the same as my J3 Cub. Maybe wing loading really does mean something.

A quick speed run at 6,000' with 2850 RPM set resulted in 110 knots (126 MPH) true airspeed. After a climb to 10,000' (DA of 12,000') I started to play with the HACman mixture control leaning system that Nick had recently installed. For more info on this system, see the article on it in the August 2009 Lightning Newsletter. At this altitude I was sure that the Bing carb would be running rich and I would be able to see if the HACman system would allow me to lean the carb enough to see any definite results. And the answer to that question is yes, I was able to lean the Bing enough to see results in both the fuel flow and EGTs. For example, at 10,000' MSL with the RPM set at 2850 and the Bing in its normal "rich" condition, the hottest EGT was 1305 degrees and the fuel flow was 6 gallons per hour. I then started leaning the HACman cockpit adjustment knob and slowly got the EGT to increase to 1350 degrees for the hottest cylinder (#6). Guess what? The fuel flow dropped down to 5 GPH – a savings of 1 gallon per hour. Hey, this thing will soon pay for itself in fuel savings if you cruise at the higher altitudes on your cross country trips. True airspeed at this setting was 118 knots (136 MPH). Darn, that is good for this altitude and on only 5 GPH. One other data point for this flight – WOT resulted in 3100 RPM and a true airspeed of 128 knots (147 MPH). The Jabiru engine being able to turn up 3100 RPM is pretty darn good at a density altitude of 12,000' while pulling along the high drag wheel pants and no gear leg fairings. Good show.

OK, now that we have some impressive performance numbers for a light sport compliant airplane, how does it really fly? Another guess what. It flies just like all the other Lightnings – super. I have flown quite a few light sport aircraft and the Lightning beats them all. There is absolutely no comparison in performance, in stability during all flight regimes, or just plain old aircraft handling. It has that same sporty Lightning feel. But don't just believe me, talk to Carl and Pat Beatrice. When they were deciding which light sport aircraft to buy, they literally flew all of them out there, and then they chose the Lightning. But hey, don't just believe me or Carl. Take a demo flight with Nick and I am sure you will agree. The Lightning is "top dog" in the light sport world.

One final comment and I will wrap this up. I mentioned up front that the winds for landing on this flight had increased to 15 knots which is right at the direct crosswind max demonstrated limit. The Lightning handled it with no problem, and I even used 20 degrees of flaps. Normal landing calls for 30 degrees, but with the light wing loading that the Lightning has, 20 degrees (or even less) works well for me in a heavy cross wind. If it had been a gusting crosswind, I would probably have used even less flaps.

One note: I noticed that the rudder cables on N325AL were slightly slack. Hey, if you are using a lot of rudder for a crosswind landing you notice that kind of thing. It is normal for any cables to stretch some after they are first installed. So if your Lightning has been flying 6 months or has about 50 hours, you probably need to re-tighten your rudder cables. Buy or borrow a cable tension measuring tool and set the cable tension to about 30 pounds. You will instantly notice much improved rudder response and authority.

Having some maneuvering fun in the LS-1.

News from the Factory:

In last month's newsletter we reported that the "silver demo", N324AL, had been sold to Richard Edzel from Lawrence, Kansas. As an update, after the Oshkosh show was over, Nick and Richard flew it back to SYI from OSH on Monday, doing some in-flight training on the way. They completed Richard's checkout on Tuesday morning and then Richard headed back to Kansas. I know Richard is enjoying his new jet.

Since then, the Tennessee team has started construction on a new demo aircraft and it should be quickly completed. I think I remember them saying they have reserved N326AL with the FAA as the "N" number for this new demo Lightning. It will be built as an Experimental Amateur Built (EAB) kit instead of being built to the ASTM-certified SLSA standards. Nick did tell me that the paint scheme will be the same as N325AL, the crème and maroon LS-1, but that the colors will be crème and blue on this new EAB demo Lightning.

Lightning Sales Update:

Mark reports that they have now delivered 78 total Lightning kits in the past 3 years and that 44 of them have flown. That represents a 56% completion rate. Amazing.

One last note, Nick just reminded me that Greg Hobbs picked up two kits for his Arizona dealership while he was in Wisconsin and that the Shelbyville crew just sold another kit to a customer from Huntsville. Looks like more and more people are deciding on the Lightning even in these tough economic times. That should tell us something about the outstanding product that the Lightning represents. Great performance and great value.

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


Dominion Air Services – LS-1 sales, Skip Hartman, Gordonsville (KGVE), VA, 540-832-5515

News from Builders and Flyers:

Great news! Another Lightning has flown. This first input in the News from Builders and Flyers section comes from Tex Mantell.

On 6 August, 2009, just after returning home from Oshkosh, Tex made the initial flight in his Lightning, N251TM. Tex had received his airworthiness certificate just prior to departing for Oshkosh, but weather and other obligations caused him to delay his first flight until after his annual trip to the EAA convention. Tex had kit number 9 which was the first Lightning kit "out the door" from Arion Aircraft, and he built it at his home in New York. His Lightning is the 44th to fly. Congratulations Tex!!! This is the third airplane that Tex has built – a Kit Fox with a Jabiru 2200 being the first and a Pitts "Pedal" being the second. See photo below.

Tex has promised to send us some photos and a report when he has some more time on the airplane and gets a chance to install the wheel pants. In the meantime, below is another photo that we have run before showing his highly qualified test pilot.

The next input in this month's News from Builders and Flyers section is a continuation of an article from last month about Stephen Hacker's Lightning build at Brennand Airport in Neenah, Wisconsin. He has turned his build into a family project with help from two of his daughters, Laura and Lesley. I know you will enjoy the continuation of Steve's Lightning building project. Below is Steve's latest message to me:

Buz: When you came to Brennand a few weeks back, you met my 2nd daughter Lesley. About a month earlier, Laura, my oldest daughter joined me also on the build, and she wrote the story below.

Laura graduated this past June from the University of Wisconsin at Madison with a Finance major, and she now works for BMO Capital Markets in Investment Banking in downtown Chicago.

Steve

Like Father, Like Daughter

By **Laura Hacker**, daughter **of Stephen Hacker**, Lightning builder/pilot

Laura and Steve - getting some cockpit time.

I remember when my dad first told me he wanted to take flying lessons. I was intrigued — was this a classic mid-life crisis with a unique twist? Or a real interest? I started to believe the latter after seeing his enthusiasm after his first few classes, and after I caught him looking at planes and hangars online, I knew he was hooked. It didn't take me long to join him. We'd go on walks and have long chats about airplanes. They were more like Q&A sessions during which I'd ask questions and he'd give great, detailed answers that I only understood about half of, but I was still fascinated. I felt so special when my dad—the guy I always go to for advice—would ask for my advice on something he was so passionate about.

When my dad invited me to come with him to Brennan Airport and help him build a plane, I was so excited. I love any chance for good father-daughter bonding time. I realized I was in over my head when I arrived, and my first task was to ~~-~~grab that bolt" and I was dumbfounded, but everyone was extremely patient with me and always went out of their way to help me. Before I knew it, I had upgraded from nuts

and bolts to electric drills and rivet guns, and I had donned the name —Laura the Riveter." (In fairness, I must admit that nearly every other rivet I did had to be redone!)

Laura, Steve and Pete Carlson – at H&S Aviation.

In only two days, I can say that I rode in a Lightning and a helicopter, met some great people, and was in lots of pictures (adorned in goggles and pretending to work with heavy machinery), and last but not least, I helped build a plane! I must say—my new favorite conversation starter is, —So this one time, when I was helping my dad build an airplane…"

Hey Steve, who is going to get the FAA Repairman's Certificate, Laura or Lesley?

The following info came in from Paul "Bear" Bryant on 23 August. He talks about changing out his aircraft landing and taxi lights to the Aero LEDS that we covered in last month's Lightning Newsletter. For more info go to: www.AeroLEDS.com

Buz,

I've recently updated my landing and taxi lights. The halogen ones I had were pulling too many amps and I replaced them with the Aero LEDS. I spoke to the engineer there about the placement and heat sink capabilities. As a result, it would be an easy switch out of the halogens and replacement with the Aerosun 1600. I had to modify the current location only slightly as the Aero LEDS are just a little bit larger than the halogens we installed in Shelbyville. I was able to use the same type of installation as I had done in Shelbyville and did not have to use the Aero LEDS frame/install kit. Here's a picture of the install. I now draw about 2 amps vs. the 7 or so. Working with the folks at Aero LEDS was pleasant and I was able to take advantage of a nice discount.

I also recently decided to purchase a canopy cover because I wanted extra protection against the rain and sun, especially here in Florida. I went thru Bruce's Custom Covers. I believe they are the ones who did the first Lightning cover. They too were good to work with as I wanted to have a custom color, Lightning logo and my N number.

As you can see from the picture they did a very nice job, were pretty quick with the manufacture and delivery.

Bear

This next input was received from Jim Langley on 18 August:

It is with very mixed emotions that I wish to let you all know that as of today, there is a new owner of N730AL. I officially sold my aircraft to Larry Boyer today and for me, this was a very emotional moment watching him fly it away from the airport. After a year and a half of building my Lightning and interacting with you all, this is a very hard time for me, but I want you all to know that even though the airplane is gone, your friendship is not. Hopefully my income situation will improve over time and I will build another, time will tell. Nick, start working on the wide body Lightning, (just kidding).

Jim's Jet

To all, Larry is a great guy and will be a plus to the Lightning community. He is an avid Rotorcraft builder and flier, so he's a little wacky, but that will fit in with the rest of us. I will be updating him with all the necessary links and instructions on how to join this group and become an active member of this circle of Lightning builders and fliers.

I plan to stay involved even though I no longer own a Lightning. Maybe I can con, uh, I mean talk Larry into letting me hitch a ride in my, uh, I mean his Lightning to the next Lightning fly-in in September!

Anyway, thanks all of you for your friendship. I know it will continue.

Jim!

Jim's Jet was on the recent cover of Aviators Hot Line.

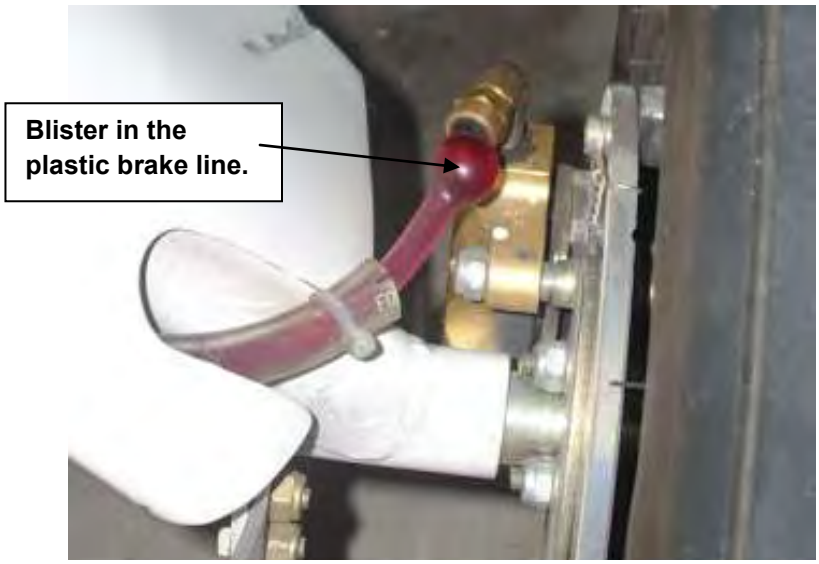
Safety Items:

This month's Safety Item could actually also be included in the technical tips section, but since it could directly affect the safe operation of your Lightning aircraft, I decided to include it in this section.

Paul "Bear" Bryant sent in this change that he has made to his airplane based on an incident that he had and discovered after "riding the brakes" while taxiing. Riding the brakes resulted in a heat build up on the brake assembly. If this heat buildup is excessive the plastic brake line near the brake assembly may expand and bubble up (as happened to Paul) or even rupture due to the heat. For pilots not used to flying aircraft that are steered with brakes, it is not unusual for them to ride the brakes without really knowing it. One such situation is when taxiing in a heavy cross wind that will require constant steering correction with the brakes. I have even heard of brake fires on heavier aircraft that rely on brakes for steering. So watch out for riding the brakes. If the heat buildup is excessive, you may rupture the plastic brake line and lose all braking capability. Paul covers his fix below:

Folks,

After one of my local flights to a breakfast fly-in, I was cleaning my aircraft and noticed a loose nut on my wheel pant. Thinking it might be stripped, I decided to investigate further which resulted in the removal of the complete wheel pant. To my surprise I found a blister in the brake line just before the fitting going into the caliper. I called Nick in SYI and asked if he had seen this before and said he had. Nick said it is a result of riding the brakes. (Didn't know I was doing that, but something I need to pay attention too.) I pass it on so that others might know of the potential brake line rupture under extreme heat. Here's a photo of the blister.



Here's my fix which I ran by Nick and several builders here in Clearwater. I wanted to be somewhat assured that the nylon brake line would be far enough away from the heat source as to not blister again and use something that would work with the compression fittings. I opted for copper tubing, but stainless steel or aluminum will also work. I even got an input from a RV-9 builder to use Teflon coated, stainless

steel braided tubing which I might use later, but the copper tubing was very easy to work with and shouldn't have any problems. But I will continue to keep an eye on them.

Basically, cut a 4" piece of ¼" copper tubing and inserted it into the fitting; then used a double female compression fitting between the copper and nylon. Re-bleed the brakes. Seems to be working fine now and hopefully I won't have to worry about what's happening under the wheel pants. Here's a picture of the modification. The Leg Fairings and Wheel pants fit back without any issues.

Bear

This photo shows the copper tubing that Bear added.

Upcoming Events:

11 - 13 September – Jabiru Engine Seminar at SYI.

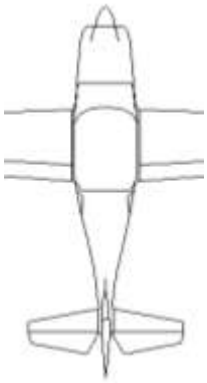
25 - 26 September - Lightning Fly-In at SYI.

-Note: 25 Sept is Dana's birthday.

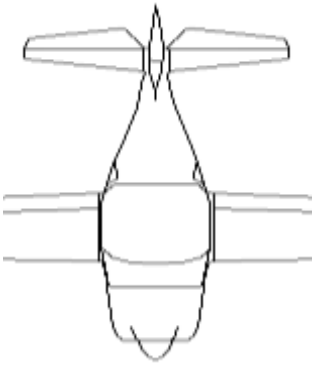
13 - 15 November – Jabiru Engine seminar at SYI.

Lightning Skunk Works:

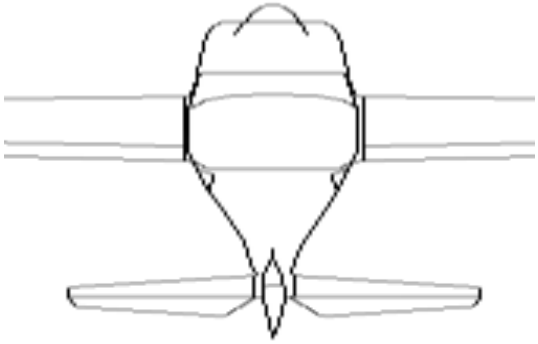
Jim Langley's comment above about Nick developing a "wide body" Lightning reminded me that actually in past issues of the Lightning Newsletter, the Skunk Works section has mentioned several developmental projects along that line. If you look back to the very first issue you can read about a blended body design being worked on. Likewise, in issue 2-5 you can get an early glimpse of the Lightning FM (family model) that is under development. However, a basic "wide body" fuselage is certainly doable if there is enough interest. Below are preliminary three view drawings of several possibilities. Let Nick know if you are interested.



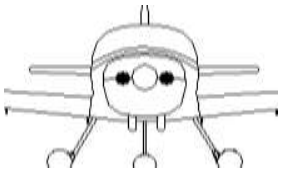
Standard



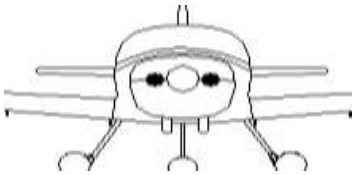
Wide Body



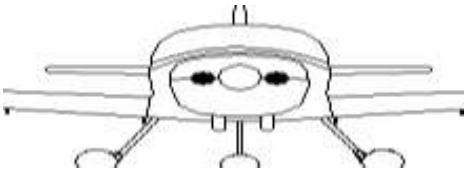
Really Wide Body



LS-1



LS-1WB



LS-1RWB

Technical Tips:

The Technical Tips Section is where current Lightning builders and flyers can share what they have learned from the day to day operation of their aircraft. Thus, it is a chance for future and current builders to learn from the experience of others and perhaps make changes on their aircraft projects.

This month's suggestion is from Lynn Nelsen. Lynn talks about a simple solution that he came up with to safely jack up his Lightning when you need to change a tire, or for working on the brakes. Remember, usually a simple solution is the best kind of solution to any problem. Here is Lynn's suggestion.

Hey Buz: I got fed up with not being able to easily jack my airplane and made an adaptor this morning. I used 1/2 in thick steel tubing easily obtained (Lowe's or Home Depot) and drilled a 9/32 hole through the tubing and then cut it off in the middle of the hole, so the entire thing was 2 inches long. This seems to give the jack a little more clearance by letting it go partially past the axle bolt. I used it right away, and it seems to work fine. I will enclose a couple of pictures.

Those with a fairing covering the axle end will have to remove the fairing first.

See you in a month.

Lynn

Above photos show Lynn's simple gear axle adapter to add in jacking.

Below is Lynn's beautiful jet in sunny Florida.

One last item for this month's Technical Tips section is the write-up below for a throttle body fuel injector system made by Rotec for several aircraft engines, including the Jabiru. I just recently became aware of this system, so have no specific knowledge other than what I have read. If you know anyone that is using one of these on a Jabiru 3300 it would be interesting to get an update from them. But for now, if you want to do away with your Bing carb and install a system that includes a mixture, you might want to take a look at this set up. Their web site is: http://www.rotecradialengines.com/TBI/TBI.htm

Note: This write up is from their web site, so obviously they are "very positive" about it. Also note, this is from the Rotec radial engine, not the Rotax line of engines that also use the Bing carby.

ROTEC's TBI - 40 (Throttle Body Injector)

The Rotec TBI-40 is the lightest, most compact and simple Throttle Body Injector on the market today. Its unique fuel distribution system makes it a pleasure to set up and operate. With excellent power per CFM and with the smoothest mixture control gained via the leverage of a mechanical fuel injection bar. Both the throttle body and remote fuel regulator are CNC machined from the highest grade aircraft Aluminum billet stock.

Fuel pressure and delivery are controlled via the Rotec "on demand" fuel pressure regulator which is connected to the inlet side of the throttle body and supplies the precise amount of fuel to the injector bar. This system is truly self regulating and is not affected by the fluctuation of fuel levels or pressures. The superior atomization of the fuel is easily observed and reflected in greater performance and economy. Regular carburetors do not atomize the fuel nearly as fine or as well. Ultra fine atomization leads to the reduction of mixture temperature and as a result the density of the incoming charge is greater and more power packed. Put simply it burns better.

Also with the TBI-40's absence of any butterflies in the air stream the total wetted area and drag is greatly reduced, resulting in more throat area for the same size bore.

Another advantage of the slide throttle control is that unlike the butterfly valve, the fuel mixture is not deflected into the side walls of the inlet track where the mixture tends to accumulate and loose the benefit of fuel atomizing, The Rotec TBI-40 does not deflect the mixture into the side wall and so the mixture remains freely and completely atomized.

The Rotec TBI-40 is easy to set up and can run a wide range of fuel pressure from 0.5 to 6.0 psi. It can even run in gravity fed mode too. The TBI-40 is of course not attitude sensitive as it has no float chamber so can run perfectly fine upside down!

Starting the engine from cold is simply a matter of depressing the diaphragm over ride button on the Rotec fuel supply regulator, this in effect gives the engine a squirt of fuel while cranking. Typical primer nozzles can also be utilized if the airframe has existing primer systems. Idle speed is set via typical throttle aperture stop and bypass mixture screw which sets the idle fuel mixture.

Rotec Engineering is offering the TBI-40 as an option over the regular Bing which is supplied as standard on the Rotec R2800 and R3600 radials. The Rotec TBI-40 is perfectly suitable for all Rotec radial engines and will attach to the typical Bing rubber coupling. This coupling makes the TBI-40 ideal for retrofitting many other engines including the Jabiru engine range for which it will retrofit directly. On request Rotec can supply a variety of custom engine couplings to suite any Experimental engine including Lycoming and Continental engines.

The slide throttle and mixture levers are controlled via typical Bowden push pull cables. The air cleaner side of the TBI-40 is of the standard aviation four bolt flange, designed to fit the standard range of aviation air intake ducting.

Rotec advises that Carburetor heat is a mandatory requirement and that it is for experimental use only.

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Other Items:

1920 REGULATIONS FOR OPERATION OF AIRCRAFT

1. Don't take the machine into the air unless you are satisfied it will fly.
2. Never leave the ground with the motor leaking.
3. Don't turn sharply when taxiing. Instead of turning sharp, have someone lift the tail around.
4. In taking off, look at the ground and the air.
5. Never get out of a machine with the motor running until the pilot relieving you can reach the engine controls.
6. Pilot's should carry hankies in a handy position to wipe off goggles.
7. Riding on the steps, wings, or tail of a machine is prohibited.
8. In case the engine fails on takeoff, land straight ahead regardless of obstacles.
9. No machine must taxi faster than a man can walk.
10. Never run motor so that blast will blow on other machines.
11. Learn to gauge altitude, especially on landing.
12. If you see another machine near you, get out of the way.
13. No two cadets should ever ride together in the same machine.
14. Do not trust altitude instruments.

15. Before you begin a landing glide, see that no machines are under you.
16. Hedge-hopping will not be tolerated.
17. No spins on back or tail slides will be indulged in as they unnecessarily strain the machine.
18. If flying against the wind and you wish to fly with the wind, don't make sharp turns near the ground. You may crash.
19. Motors have been known to stop during a long glide. If pilot wishes to use motor for landing, he should open throttle.
20. Don't attempt to force machine onto ground with more than flying speed. The result is bouncing and ricocheting.
21. Pilots will not wear spurs while flying.
22. Do not use aeronautical gasoline in cars or motorcycles.
23. You must not take off or land closer than 50 feet to the hangar.
24. Never take a machine into the air until you are familiar with its controls and instruments.
25. If an emergency occurs while flying, land as soon as possible.

Final Thoughts:

Because I fly,
I laugh more than other people,
I look up and see more than they see,
I know how the clouds feel,
What it's like to soar above the earth,
To fly along side with birds,
To feel freedom in a thing called a stick….
Who but I,
Can slice between the untouched skies,
And feel the wind beneath my wings,
To see the unclimbed peaks,
The rainbow's secret?
The real reason birds sing?
Because I fly,
I envy no person on earth.

Author-Unknown

Blue Skies,

Buz Rich

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