

The Lippisch Letter



Experimental Aircraft Association Chapter 33

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The Lippisch Letter is the monthly publication of the Dr. Alexander M. Lippisch Chapter (33) of the Experimental Aircraft Association, Cedar Rapids, Iowa.

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First Flight Velocity XL RG N724X

By Rich Guerra

On 12/08/01, Velocity XL RG N724X passed it's FAA airworthiness inspection with flying colors. DAR, John Murphy, was very complimentary and imparted much useful information regarding the finer points of building and flying kit-planes during his inspection, which was much appreciated. N724X weighed in at a patriotic 1776 pounds. The rest of the day and most of the next was spent checking and rechecking fasteners and bolts, connecting the last bits of instrumentation and systems. Finally, it was time! In the final hours of a beautiful Florida day, test pilot, Mike Manary belted in, fired up the engine and taxied forth. With the appropriate paperwork, N724X became legal to fly, but it still wasn't an airplane. This all changed on 12/9/01. With a throaty roar and a graceful leap into the air, a new Velocity was born!

N724X flew straight and true and has required no adjustments to wings or control surfaces. After some cautious maneuvering, Mike started to wring out the plane

(Continued on page 2)



Rich proudly holding his newly won airworthiness certificate

(Continued from page 1)

and was having so much fun, I think he almost forgot to come back! We could see some of the maneuvering from the ground - it was a joy to behold! The first flight lasted almost an hour. The engine ran smoothly with no significant cooling issues. After a flawless landing, an excited Mike Manary described a wonderfully smooth and downright fun test flight.

Want to ride along on the first flight and see for yourself? Take a look at my web site <http://www.cardiology.uiowa.edu/r Guerra/velocity/> , hop over to the 'First Flight Video' section, strap yourself in and enjoy the ride!

Those following on my website have seen the details of installation of a small video camera in the lower winglet of the plane. The untested wingletcam was running during the first flight. It exceeded all my expectations! The footage is beautiful! The video is 9 minutes, 14 seconds long and is saved in 3 different sizes in QuickTime format. It contains highlights from the hour long first flight. They are large so be warned!

Now the fly off period begins. There are a number of minor squawks still to be addressed, mostly wiring and avionics issues. I'll be posting some more info as testing progresses regarding engine cooling, stall and top speeds, etc. One thing is for sure, for this pilot used to a C172RG, it's fast! I was shocked by reaching an altitude of 10,000 feet in what seemed a blink of an eye! What a fantastic experience!

There are so many people to thank! I am indebted to Malcolm Collier of Hangar 18 for his guidance, his patient sharing of his knowledge and expertise and for his unwavering standards of excellence in the ongoing quest for the best possible Velocity. I continue to be in awe of his uncanny ability to take a great

(Continued on page 3)



Photo by Rich Guerra



Photo by Rich Guerra



Photo by Rich Guerra

(Continued from page 2)

kit and find ways to improve upon it. With his help, I've tried to share with the community, for the benefit of all, the details of his myriad innovations and refinements of construction techniques on my web site. I am also indebted to his crew, wonderful people every one, Brad Flecker, Ruthie Jay and Jason Fleming and test pilot, Mike Manary, for their assistance in this project. I'd also like to thank the denizens of the Velocity, Canard Aviators and homebuilder's lists for sharing their collective wisdom.

Special thanks to builders John Leder, Mitch Ide and Ken Tonyman and Terry Schubert of CSA for their help and support and the Swings for supporting a truly wonderful kitplane.

And most especially, I'd like to thank my parents, Ricardo and Inez, for teaching me that no dream is impossible.

At the end of the day, a beautiful rainbow appeared, seen over N724X, through the hangar door (see 'More Flights' section if you don't believe me!). I'd like to think it was a sign, a good omen if you will. Is there, in truth, a Velocity at the end of the rainbow rather than a pot of gold? For me, I believe it is so. This project has enriched my life beyond words. It has brought me closer to my parents for which I am grateful. I've made new friends all over the world. I've learned a tremendous amount about areas of knowledge into which I would have never dreamed of delving. Whole new worlds are now open to explore! It's been a LOT of fun and will continue to be! It is also my hope that in sharing the beauty of this wondrous machine and the magic of the 'footless halls of air' in which we pilots tread not only to fellow aviators, but also the general public, I can in some small way help dispel some of the fear of things aviation now so prominent in people's minds.

Once again, thanks to all for their support! Now that I am more mobile, I hope to meet more of you face to face!



Kit (Without Fast Build Options)

Canopy Woes

by David Koelzer

As many of you may know, when I am not composing a fascinating, insightful and Pulitzer Prize quality newsletter for our chapter, you will most likely find me pounding on something in my garage. For the past three years that something has been a Sonex or at least I hope it will be soon. My latest task has been constructing the rather unique canopy of the Sonex. Those that remember the Moni will recognize the long sloping windscreen of a Monnett design. Unlike the Moni, the glass on a Sonex is in two parts; the windscreen and the canopy bubble. The windscreen starts right at the top of the firewall and comes back to a hoop just ahead of the pilot. This part is fairly easy to make since it is simply a flat sheet of Lexan wrapped around the hoop formers. I figured I would start with this so I could develop the skills I would use on the bubble canopy. The bubble, however, is blown from Plexiglas, which I will later find behaves very differently than Lexan. However, since ignorance is bliss, I merrily went on my way using my band saw to cut the windscreen to shape, smoothing the edges with a belt sander and easing the corners with a deburr tool.



Photo by David Koelzer

Everything is going well and I begin to wonder why I had heard so many horror stories about cracked canopies. Obviously those people just did not know how to work with this stuff. Being quite full of myself, I figured I was ready to go onto the Plexiglas bubble. I had picked up the bubble last year at Oshkosh and stored it in my basement ever since. The Sonex factory recommends storing the canopy in a warm place to help cure the Plexiglas. I figured if the Plexiglas had not cured itself after 18 months then I should consult Dr. Kevorkian for one of his patented “cures”. While the factory recommends using a bandsaw to trim the canopy, I did not think I could handle the canopy well enough by myself to run it through my bandsaw. So rather than asking for help, I decided to leave the canopy stationary and cut it with my Dremel tool and a cut-off wheel. This seemed to work well but rather than cutting the Plexiglas the cut-

(Continued on page 5)

(Continued from page 4)

off wheel was more melting its way through the bubble. I was not concerned though, figuring the extra heat was just helping to “sear” the edge. Later I would realize that the rapid and localized heating and then rapid cooling was setting up tremendous stresses right along the edges of the Plexiglas. Much like taking a hot jar out of the oven and running cold water over it. (Oh, so I suppose YOU never did that to your mother’s prize canning jars?)

For now though everything was just fine. After the cut I would move the canopy back onto my plane to check the fit. I did not take the time to sand the edge smooth, removing any stress risers before I tried to move the large unwieldy canopy, again by myself. However, I was getting away with it and the canopy showed no signs of being worse for the wear. Soon I had it trimmed to shape and I started to drill the necessary holes for the rivets. I was prepared for this though. Rather than using regular drill that can some-



time dig in too hard and crack out the opposite side, I had purchased special drills just for the Plexiglas. These drills have a special 0° rake that is easier on the plastic. Some builders say you can just take regular bit and just drill into concrete to dull the bit just enough so that it will work well on Plexiglas. Others recommend heating up a bolt and just burning a hole through the material, “searing” the edge in the process. I think this practice is too much like the “hot jar and the cold water” accident just waiting to happen.

Heat can be useful, but too much heat can also cause problems. Fellow Sonex builder David S. Petri CDR NAVSPACE/OOD put it this way: *Honestly, warm plexi is the easiest to work with... not hot, just warm. Since the canopy is toast, try to experiment. Put a chunk in the freezer and then drill/cut it and then warm a chunk to varying temps and drill/cut. That'll do two things... 1) Show you where you need to be working in the temp regime and 2) Give you more practice (and confidence) drilling and cutting plexi. Working with plexi you are concerned with viscoelastic modulus, which is simply the shear stress divided by the sum of the elastic shear deformation and the displacement by viscous flow. There are four major categories of Mve... Rigid, Leathery (yes, leathery), Rubbery and Viscous. Increase the temp and Mve transitions through these phases. If I apply stress to a plexi coupon it will eventually flow and relieve the stress. If applied too quickly in the rigid phase, it will exceed the Mve and fail... this is what's*

(Continued on page 6)

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*going on with your canopy! Here's the problem with cutting/drilling plexi. You are putting stress within the matrix that the plexi must relieve. If the stress exceeds M_{ve} of the material at that temperature it will fail (read crack), if below M_{ve} it will eventually flow out. The warmer the plexi, the lower the M_{ve} , the faster the stress loading rate can be applied... ie. drill/cut. This is because the structure is allowed to flow to correct for the stress. Plexi has only two choices... above the M_{ve} curve it cracks, below the M_{ve} curve it flows (the rate depends on the temp). Dig this... when you orbital sand the edge of plexi, you're not really removing stress risers (like everyone thinks) as much as you are **LOCALLY WARMING THE PLEXI** and allowing it to flow and relieve the stress!*

So what I gather is, that at certain temperatures and given time, Plexiglas will easily flow to relieve high stress areas. However, high localized heating and rapid cooling will lock in the stresses because the material will not have enough time to flow naturally to a low stress state. Of course, I knew none of this while I was doing this work (at least the first time) But back to the story:

I used my special bit to drill my holes and I even took the time to deburred the holes but again rather than asking for help, I moved the canopy by myself. The Sonex canopy bubble is also unique in that it is not blown to its final shape. It is more like a flat bubble that is just slightly bulged. Then that is wrapped over the canopy frame to give the canopy its final shape. The sides also tend to bulge out slightly and as I pressed these sides flat, things started catching up with me. As I was inserting the clecoes to hold the canopy side flat, I heard a sickening sound. With a snap, a 3" crack popped up the side of my canopy. My immediate reaction was to scream out some things similar to "darn", "shucks", "son of a gun" and "fiddle de de". After I calmed down, I continued clecoeing and then another small crack ran up the side prompting me to start another round of even more "colorful" phrases and metaphors. Including, among other things, calling the canopy's lineage into question, comparing its characteristics to type of fertilizer and suggested where it might go when I am done with it, but of course, not quite in those exact words. After exhausting my entire repertoire of profanity, I set about deciding my next move. Most of the options I thought of involved a large axe or a chainsaw but I finally settled on stop drilling the cracks and see if I could salvage this canopy.

Stop drilling turned out to be trickier than I thought. As I pressed the drill to the Plexiglas the crack would spread even farther. Finally I found that if I backed up the opposite side of the material and drilled just slightly ahead of the crack, I could catch the crack and keep it from spreading. With the cracks stop drilled I went to remove the canopy once again and as I lifted a huge crack raced right down the middle nearly splitting the entire canopy in two. To my surprise, I found myself inventing new profanity which was hither to unknown by civilized society and which I cannot include here without violating a large number of City Decency Ordinances and U.S. Postal Codes.

After briefly entertaining the idea of flying the first open-air Sonex, I finally gave up and ordered a brand new canopy and vowed to do everything the right way this time. To my delight the protective plastic covering on the Plexiglas was left on when new canopy was blown. Previously the Monnetts were removing this covering before the blowing process but one day when they forgot to remove the covering they found the Plexiglas blew into shape just fine. I, in turn, have left this covering on through out the construction process to protect against scratches. When the new canopy arrived, I brought every heater I could find into my garage and turned them on full blast raising the temperature to a toasty 85°. Previously I was working at a room temperature of 60°, which may have been part of my problem. I also asked a fellow

(Continued on page 7)

Sonex builder over to help me with moving the canopy lessening the chance of applied point loads that could start a crack. Rather than a Dremel and a cut-off wheel, I cut this new canopy with my band saw with a 14 TPI blade. While I thought this would be unwieldy, it turned out to be quite easy with partner cradling the canopy as I guided it through the saw. This time after cutting I immediately sanded the edge before I move the canopy and risked starting a crack. Again I used my belt sander with a fine grit paper to even out the edges, remove the saw marks and bring the edge right down to the mark. I was careful with the belt sander though. As the Plexiglas heats up from the friction of sanding the belt will really begin to dig in and remove a lot of material.

After the belt sander, I sanded the edge by hand with very fine sandpaper to ensure that all stress risers were removed. And I again used my special bits to drill the Plexiglas. I also drilled the holes over size so that there would be room for expansion and contraction with changes in temperature. Rather than rivets I tapped the holes and used screws so I could more precisely adjust the pressure I applied to the Plexiglas. Once I had the canopy in place I put a heater inside the cockpit, set the temperature to 100° and let the canopy cook for a couple of days. This temperature is well below the melting point of Plexiglas but it is warm enough to help the material flow and relieve the internal stresses. All these techniques and practices seem to have worked because my new canopy is finished and shows no signs of cracks but then again I still, to this day, have not uncrossed my fingers.



Last Meeting

By Tom Olson

Our last meeting was the annual Chapter Service Award Presentations, holiday dinner, and gift exchange. This event was held at Bishops in Lindale mall. They did a fine job for us this year, holding both rooms for us, providing plenty of space to spread out and dine in comfort. I was also very impressed with their food. Many thanks go to Bishop's for the use of their room and service provided. Service awards were presented to our tech counselors, Flight advisor, Young Eagles Coordinator and Officers for the last year. Special thanks also went to the team that planned and arranged support for the B17 visit. This team consisted of Todd Millard, Dave Yeoman Senior, Jack Rezabek, and Ron White. As usual the gift exchange presented some interesting interaction between members. The most surprising gift was the empty box Steve Ciha opened up when one of Bishop's ornamental presents got mixed up with ours. If you missed it this year, start your planning now to attend next year. Best wishes to all for a happy new year in 2002.

Next Meeting

By Todd Millard

Our next meeting should be a real treat. Dave Lamers will present a video on spin training and unusual attitude recovery. Dave helped create this video for the International Aerobatics Club (IAC) to educate its members. While this topic is important for our day to day flying, it is absolutely critical for those of us interested in or experimenting with recreational aerobatics to understand spins and spin recovery. It is easy to botch a loop or hammerhead and end up in a very unusual attitude or even an inverted spin. Having both flown competition aerobatics for a number of years in a Pitts and instructed others, Dave has a wealth of knowledge on this subject. The meeting is Friday, January 4th at the Hills Bank and Trust in North Liberty. Take the North Liberty exit off I380 and head east about 2 miles to Highway 965. Turn right and the bank is a few blocks south on the west side of the road. The doors will open at 7:00 pm presentation is at 7:30 pm. Come early to enjoy the refreshments and socialize.

Officer's Column

By Todd Millard

Hi, I'm Todd Millard, your new president. I appreciate the opportunity to fill the big shoes of the past presidents. Although I have been a member of the EAA for over 15 years, I never belonged to a local chapter. I didn't realize what I was missing. Since I joined this chapter two years ago I have thoroughly enjoyed the camaraderie with all of you plane crazy and the chance to experience many different types of aircraft. Hopefully I can help this chapter grow stronger and make it even better over the next two years. One of the changes that I would like to make is to get everyone more involved in the chapter and provide an opportunity for more diverse perspectives. To do this, I am proposing that we spread the responsibility for planning and conducting the meetings around to everyone in the chapter. A three member team would be assigned to each meeting and be responsible for the program and events. The meeting program could be focused on someone's project, ride-sharing, educational talks or whatever the team wants to do. With the size of our chapter each of us would only be responsible for a meeting about every two years. I believe this approach would be a great way for people on the team to get to know each other a little better and make us all feel more a part of the chapter. Ultimately the health of the chapter is directly proportional to the strength of the bonds between us. I would like to discuss this proposal at the January meeting and make a decision at that time. If you are unable to make the meeting, but would like to share your thoughts, please feel free to call or email me, or send an email to the online group at eachapter33@yahoo.com. So that we can start planning, here is the tentative meeting calendar for the first next months. The first meeting of the year is Friday Jan 4th at the Hills Bank and Trust in North Liberty. See the Next Meeting article for more information. The next meeting will be Friday, Feb 1st, again at the Hills Bank and Trust in North Liberty. The program is tentatively an introduction to IFR flying. Friday, March 1st or Saturday March 2nd will be the annual Ladies Night event. We could be in for a real treat this year as Max Dirks is working on getting Paul Poberenzy to be the speaker!

I am excited about the upcoming year. I look forward to getting to know all of you better, learn lots of new things, and share in our love of aviation. Fly safely. Todd

EAA Chapter 33 Application & Questionnaire

Dues are \$15/year. Make check payable to:

EAA Chapter 33, c/o Steve Ciha; 5290 Sutton Road; Central City, IA 52214-9712

Name: _____ EAA #: _____

Address: _____

City: _____ State: _____ Zip: _____

Daytime Phone: _____ Evening Phone: _____

Email Address: _____

Copilot's Name: _____

Pilot Ratings: _____

Aircraft Owned & Flying _____

Aircraft Under Construction: _____

I think our chapter could be better if: _____

I would like to see our chapter: _____

The thing I like least about our chapter is filling out surveys but I also dislike: _____

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Place
Stamp
here

EAA Chapter 33
c/o Steve Ciha
5290 Sutton Road
Central City, IA 52214-9712

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Who is This Guy, Anyway?

By Todd Millard

Although I have only been with the chapter for a couple of years, I have met many of you and share your love of aviation. As with most of you, I fell in love with airplanes as a kid and built my share of models and radio control airplanes. I took my first few flying lessons as a senior in high school and was hooked, but didn't have the money to continue. I took more lessons in college, but again ran out of money. It wasn't until about 3 years ago that I finally go my license, 17 years after my first lesson. After a year of renting airplanes, I was able to convince my wife that having our own plane would be much more practical. I don't think she really bought the argument, but relented anyway and after much research purchased a Skylane in January 2000. I had also started taking my instrument lessons about this time and received my instrument rating in March of that year. The Skylane was initially hangared down in Iowa City next to the Rezabeks' and Graff's Skybolt. After the Young Eagles event in Iowa City that year, Steve Rezabek offered me a ride in the Skybolt and I was hooked. Shortly thereafter I bought a share of their Skybolt and have been loving it ever since. This past couple of years has been a fulfillment of many dreams that I have had since childhood. I have camped under the wing of the Skylane at Oshkosh the last two years, flown as far as Florida and the Black Hills, and learned to fly a taildragger in an open cockpit biplane. As I have accomplished each step, my love of planes and flying rather than diminishing, continues to grow. While I am not a homebuilder yet, I love planes as much if not more than flying them, so it is only a matter of time. Over the years I have accumulated a half dozen information packets and videos on Kitfoxes, RV's, etc. For now though, my main "homebuilding" project is working on electronic medical software for my wife's practice and to hopefully serve as a base for my next company. I am excited about the upcoming year. I look forward to getting to know all of you better, learn lots of new things, and share in our love of aviation. Fly safely. Todd

Editor's Rant

By David Koelzer

You may have noticed on the previous pages an application and survey that is pre-addressed and can be sent in with your dues check. We have provided this because the Chapter leadership is very interested in hearing your views, suggestions, ideas, and even your complaints. The Chapter exists for its members and we all need to let the chapter know what we want from the chapter. Do you want to see more (or less) technical demonstrations, celebrity speakers, time for socializing, community projects, ride sharing events or project visits? If we could have the meeting at a different location, time, or day, then where and when would that be? Or do you like meetings just as they are? Let us know that to before we start changing things that are just fine the way they are. How about that newsletter? Would you like to have that editor keep his half-baked opinions to himself? Are the newsletters to long? To short? What kind of articles do you like to read? Fewer spelling and grammatical errors like you would to see?...? Or maybe writing with a less obscure sense of humor?

Let us hear for you. All it will cost you is a few minutes and a \$0.34 stamp and if you have email, save yourself a stamp and email your comments to david.koelzer@home.com

Fly Market

FOR SALE: Sharps Paint Spray Gun and pressure regulator, If you are interested, please call Ralph Driscoll at 438-1802 Central City. Ralph is a past chapter member and this may be the same gun he used on the Lippisch prototypes. His stories alone are worth the call.

FOR SALE: 25% Share of 1941 Stearman Biplane NC64712 based in Iowa City. The owner is selling his share because he purchased the major share of a newly restored Stearman that is now kept in the hangar next to this one. 220hp Lycoming, full electrical system, radio, Loran, smoke system. Well maintained, always hangared and flown regularly. \$17,500. John Ockenfels 319-351-3461 evenings or 319-351-2848 daytime.



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In The January 2002 Issue...

Time for annual dues. Beat the rush and send yours in today!

Chapter 33 Calendar

January 4 7:00 PM Chapter meeting,
Hills Bank, Dave Lammers & Spin
Training

January 26 EAA Chapter 1331 Ski
Plane Chili Fly In Wautoma, WI (Y50)

February 1 7:00 PM Chapter meeting,
Hills Bank, Introduction to IFR Flying

February 1-2 Midwest Aviation Main-
tenance Symposium, Gateway Center
Ames

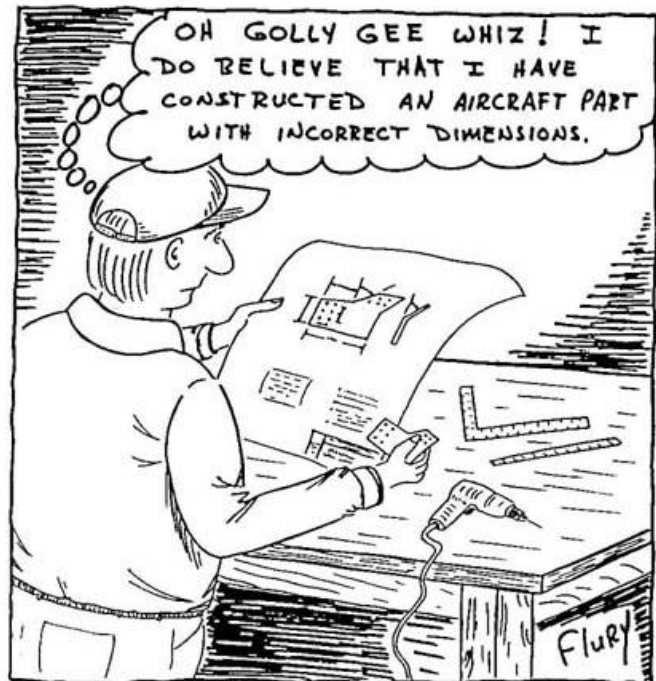
March 1-3 Iowa Flying Farmers Con-
vention Ramada Inn, Mt. Pleasant

April 7-13 Sun 'n Fun, Lakeland, FL
(Editor: Come on spring.)

Check out our Chapter's email group on the web:
<http://groups.yahoo.com/group/eachapter33/>

The Funnies

by Wayne Flury



What your mother thinks you say when this happens.