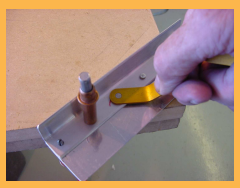
EAA Chapter 1410 High River Newsletter

EAA 05003 JULY, 2005

Inside:



You don't want to miss our

Upcoming Meetings

Reflections on A Lifetime in Aviation

Hal Rainforth will share his long and distinguished aviation career with our group.

Whether Weather

Ken Grandier, Commercial Pilot, meteorologist & lecturer will make you a safer pilot through a better understanding of aviation weather.

Join us on August 4th and share your ideas for a cross border round robin with a neighboring EAA Chapter

Oshkosh is a Life Experience

Lauren Paine Jr

EAA Summer Love: Regional Fly-ins

Chapter 1410 was ' a presence' at the Northwest Regional Fly-in in Arlington, WA, where our group campsite was right on the flight line (thanks, Val). You will no doubt recognize Jack & Jean, Val & Jim, Eileen & Rob, Nancy & Mick. You may not have met 'Jack-in-the back', Jack Rochette, and Glasair builder fromWhitehorse, our friend, Joe Bachhafen. The food was great and the conversation was no doubt, inspiring, although sometimes inaudible.

Volunteering: The Heart of EAA

Volunteering takes many forms at regional Flyins. Chapter 1410 provided countless hours of service that made the Arlington Flyin a great success.

Notably Jim and Jack R. provided the garbage detail (both certified garbolagists). Val provided financial support for the flyin, through collection of admission fees from tight-wad homebuilder pilots, and Jack D literally wore his legs out selling memberships at the EAA tent.

At the close of the flyin, Jim and Val took the 'Sterling' out and moved a building free of charge for the local Chapter. Now that's volunteering!!

The big excitement this week is *AirVenture*, the largest aviation convention on the planet. Some of the 2005 headliners are:

SpaceshipOne/White Knight, the first home-built spaceship
Steve Fosset and the Virgin Atlantic Global Flyer
Glacier Girl, *the magnificent WWII P-38F Fighter that in 1992 was recovered from beneath 200 feet of ice in Greenland...making its inaugural appearance...*

If you haven't done so already, get your passage to OSH.....You will learn, laugh, walk, talk, enthuse, profuse (on a high fat and beer diet) and finally return home ready for a rest or back to work, if you can possibly reprogram your fond dreams of all you experienced at AirVenture.

EAA Summer Love Continued....

Fly-ins and airshows: our own favorites, this summer

High River: (Right): The Joy of Flight

Arlington (Middle): Fun and Friendship

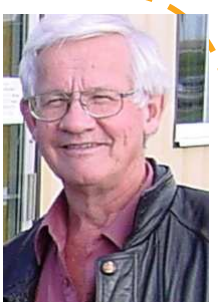
Yuba City (Bottom of Page): eavy Metal

Next Week: Airventure Oshkosh


Young Eagle: Bailey Poile
Pilot: Roger Baines

President's Message

JACK DUECK



On July 5 and 6, I attended a meeting called by Transport Canada, in Toronto. The discussions of these two days centered around the 'Canadian Amateur Aircraft Rule'. Our operational regulation covering homebuilt aircraft is the: "Exemption from Section 549.01 of the Canadian Regulations and Chapter 549 of the Airworthiness Manual". What this means is that we as homebuilders are 'exempt' from the regulatory rules and regulations governing certified aircraft.

In attendance were Transport Canada officials from BC, Alberta, Ontario and Quebec. Also in attendance were: Adam Hunt from COPA, Gary Wolf and David Moore from RAA, Kathy Lubitz from UPAC, Marlene Gill from LAMAC (also the proponent of the new 'Personal Aircraft' initiative that we spoke of in our 2nd. Newsletter), and I, representing EAA.

Left to Right: Marlene Gill, LAMAC; Jeff Langford, TC (ON); Dave McNabb, TC (AB); Gary Wolf, RAA; Wayne Juniper, TC (ON), Chair

In 2002 changes were made to this regulation that allowed owners to seek professional help to build their aircraft. The intention of the rule, however, remains as initially scripted: "the major portion" meaning that 51% of the structure must be built by the builder, and the purpose of the project must be "for the builder's education and recreation". Today, it is entirely legal for an amateur-built aircraft to be crafted in Canada without the builder/owner ever touching a wrench or tool. This rule change has been severely tested with broad interpretations by builders; in some cases where the kit is supplied to a pro-builder and the owner picks it up when it's completed, never being involved with the building process. This meeting's initial day was spent in clarifying this Rule. In an effort to avoid re-writing the entire Rule, we tried to add informational notes that would be guidelines for the builder/owner. Specifically these are:

Page 3 Appendix A, Part I-Procedures, Para (1): *"personally oversee" means overall control of all aspects of the project, including knowledgeable participation in all required inspections."*

Page 5 Appendix A, Construction Standards, Para (15): *It is the responsibility of the builder(s) to demonstrate their participation and overall control of all aspects of their project, including knowledgeable participation in all required inspections.*

Information Note:

In order to demonstrate personal oversight, the builder is expected to establish records that include decision making and a description on how overall control of the project was maintained. These records should clearly document the builder's oversight of any professional assistance and the identity of the person(s) providing the assistance.
All communications with regards to the project will be between the builder and the Minister or his delegate

and finally:

Page 6, Appendix A, Construction Standards, Para (15) 4): Any materials may be used. . . after careful evaluation by the builder *and documented in the project records.*

The original wording of "for the builder's education and recreation" was scrapped when pro-building assistance was allowed. These informational clarifications are an effort to re-instate the intent by adding the words, "knowledge" and "participation". They are, in fact, an effort to save our homebuilding freedoms by tightening up the builders' responsibility. (Please note that 'builder' is used for 'owner/builder', and 'pro-builder' is used for 'hired gun'.

Left to Right: Adam Hunt, COPA; Sean Fleming, Kitplane Builders, Marlene Gill, LAMAC

The afternoon of the first day ended with a site visit to Kitplane Builders, a pro-builders' firm in Mississauga. Two brothers, Sean and Paul Fleming, run this enterprise in conformity with the Canadian Rule. This will also be the site of our upcoming EAA SportAir Workshop in Toronto, September 24 and 25, 2005.

Our second day was spent with a specific concern of Transport Canada. A Lancair 4P, with about 300 hrs. TT, was imported into Canada from the USA and registered as a Canadian Amateur-built aircraft. Here, it is undergoing major modifications in a Pro-builder's firm. Modifications include: replacing the IO-540 Lycoming with an Allison turbo-prop; necessary modifications to the firewall to accommodate the new powerplant; the addition of a belly fuel tank which changes the aerodynamics of the fuselage; wing-tip fuel cells manufactured by an outside vendor; a wing fence to reduce strobe-flash issues to the cabin; unproven pitot/static ports; "thumper" de-ice equipment on both the wings and the horizontal and vertical stabilizers;

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Featured Article: Riveting Research

From the Tech' Desk

By: Bill Marvel
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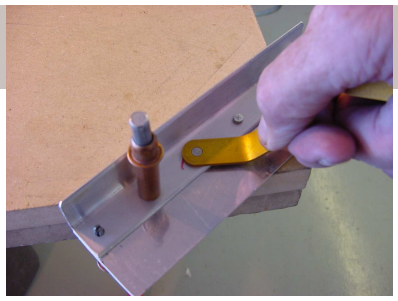
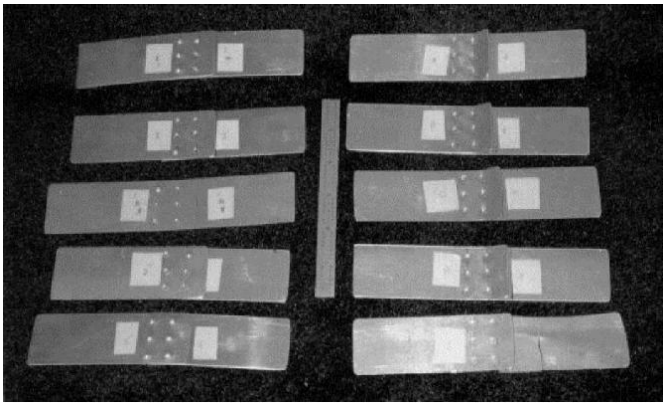


Two days ago I got around to doing something that I had planned last year -- actual pull tests on riveted aluminum coupons to see how critical it is to drive rivets to the correct height. All of us building . . . have had to wonder which imperfect rivets to drill out and which are OK. The answer is obvious when there is a severe cosmetic problem, but when strength is at issue, how much does a slightly under or overdriven rivet affect strength? How much does a grossly under or overdriven rivet affect it? Frankly, I had made the decision that the risk of damage from drilling out a flush rivet is greater than the benefit of doing so, unless an obvious cosmetic defect or really bad rivet is at issue. Now I have some hard data to go by.

What I did was to make up 10 test coupons. Each of these consisted of two pieces of .032 2024-T3 sheet 1.5 inches wide and 4 inches long. These two pieces were overlapped by 1.5 inches and riveted together with two parallel rows of 3 rivets each. Of the 10 total coupons, five involved the use of universal head AN 470 AD3 rivets and the other 5 used AN 426 AD3 flush rivets. In the latter case, both pieces of aluminum were dimpled at each rivet location, as is routinely done in Van's airplanes.



In fact, the coupon construction is similar to the double rivet line where the lower outboard wing skin overlaps the lower inboard wing skin. This joint is loaded in tension normally for positive G flight and gave me the idea to mimic it for the pull tests.

Before getting into the results, let me ask you a question. Please think about the answer before proceeding. Just how many pounds of force do you think it would take to destroy one of the sheets used in making up the coupons? Remember this is .032, 2024-T3 sheet 4 inches long and 1.5 inches wide with no holes or rivets in it. Think about grabbing and suspending it at one end with some sort of clamp across the entire 1.5 inch width and then hanging weights on the other end from another clamp. How much weight would it take to break this .032 inch thick sheet? Would a 100 pound set of barbells do it? A 500 pound set? A 1200 pound small car? A gross weight RV8 at 1800 pounds? A gross weight Grumman Tiger at 2400 pounds? More than that? Come up with some sort of gut feel before proceeding. I was surprised by the answer. You may or may not be, depending on your knowledge in this area.

Since some of you will cheat and read on, I'll hold the answer for a moment! Each of the 5 test coupons, both with the universal head rivets and the flush head rivets, was riveted to a different degree. One was grossly under driven, one was slightly under driven, one was correct per the rivet gauge, one was slightly over driven and the last was grossly over driven. The slightly under driven and slightly over driven rivets were such that you would probably need a rivet gauge to detect them -- I did this because I suspect that most of the rivets in our planes fall into this category. The grossly over and under driven rivets were really gross. The over driven were squashed nearly flat and the under driven were barely set at all. I did this to see just how poorly a joint make of this sort of gross error would hold up. You would easily see these and know there was a problem immediately. You'll find the results interesting.....

The idea was to put each coupon in a pull test machine and expose the riveted joint to a slowly increasing force until it yielded. This was done at a structural test lab in Paramount (a Southern CA city) that works mostly with civil engineering construction materials. A stress/strain graph was running and we monitored it to see the first indication of joint failure as indicated by a decrease in force required as the coupon stretched, cracked, broke in two, sheared or tipped rivets, etc. I was interested in the force required to cause the initial failure, as well as the nature and appearance of that initial failure; ie, what actually happened first. We agreed to stop the machine at the incipient indication of failure, thus preserving the coupon in its early failure state without destroying the joint completely. I was very curious as to how things would fail and really had no idea other than the thought that the dimpled, flush riveted joint would probably be stronger than the undimpled one with the 470 universal head rivets. In contrast, one of the owners of the lab came in to watch and thought the opposite would be true. In his 50 years in the business, he had never seen this test done. What do you think would hold best?

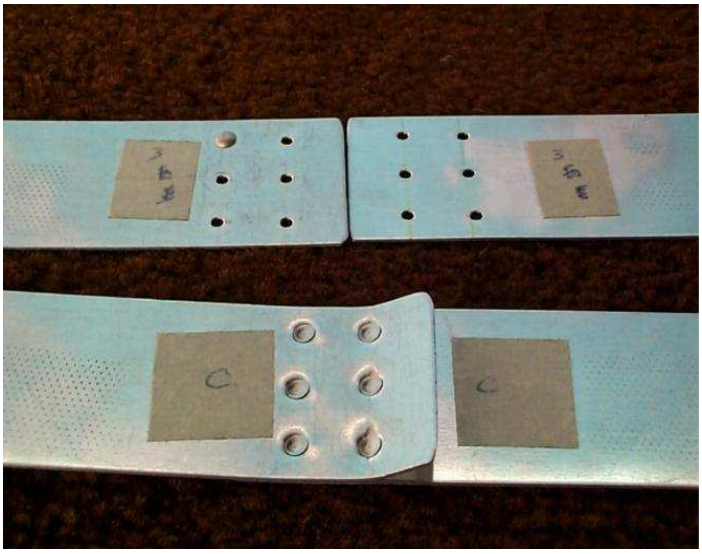
That said, here is the answer to my prior question. A force of 2300 pounds was required to break the test material with no rivets or holes in it. It failed catastrophically shortly after some initial stretching was noted. I had no idea that a cross section of this 2024 T3

Continued Page 5

Riveting Research Continued...

sheet, .032 inches thick and 1.5 inches wide, would sustain anywhere near that load. Frankly, I was surprised when it passed 1000 pounds and still going strong.
Before showing you the numbers, I will give a brief summary of them:

1. The dimpled, flush riveted construction was stronger, but not by as much as I had thought. However, and this is really important, initial failure of the dimpled construction was generally not catastrophic and occurred as rivet tipping and rivet head distortion. In contrast, initial failure of the AN 470 undimpled construction was generally catastrophic by rivet shear. I am really happy Van uses the flush riveted, double dimpled joints throughout most of the airplane!
2. Slightly under driving or slightly over driving a rivet makes an observable and thus measurable difference in the joint strength.
3. Slightly over driving is stronger than slightly under driving and results (in my opinion) in an insignificant difference in strength as compared to properly driven rivets.
4. In the one test of slightly over driven AN 470 rivets, the joint was



actually stronger than with properly driven rivets. This may have just been the luck of the draw for this single sample, so I wouldn't put any real faith in it.
5. A joint made of grossly over driven rivets is stronger joint than a joint make of grossly under driven ones.
6. A grossly under driven AN 470 joint is much weaker than a grossly under driven AN 426 joint.
7. No joint was as strong as the parent material itself.

To summarize the summary, try for properly driven rivets but realize that minor over driving is preferable to minor under driving and results in nearly the same strength as does the condition of the properly driven rivets.

AN 426 AD 3 Table

Condition	Force at failure	Nature of failure
Gross under	1650	Rivet tipping, head distortion
Slight under	1775	23
Correct	2025	Same
Slight over	1975	Same
Gross over	1825	Sheet tear at rivet line

AN 470 AD 3 Table

Condition	Force at failure	Nature of failure
Gross under	1100	Rivet tip plus one sheared rivet
Slight under	1600	5 sheared rivets!!
Correct	1625	6 sheared rivets!
Slight over	1750	6 sheared rivets!
Gross over	1500	Rivet tip plus sheet tear at rivet line

Anyway, those are some real numbers for an area we have undoubtedly thought about at one time or another. My opinion, FWIW: I think that an occasional rivet that is slightly under driven or slightly over driven is utterly no big deal and can be safely ignored We all have some of these flying in formation in our airplanes. A line of them would be another matter. Even an occasionally grossly over driven rivet is probably OK, especially if getting rid of it would cause damage. And if under driven too much, just whack it again. Hope you learned something from this. I certainly did.

. . try for properly driven rivets but realize that minor over driving is preferable to minor under driving and results in nearly the same strength as does the condition of properly driven rivets.

Rx for Feeling Good:
Time, an old hangar, an old airplane, and a light warm rain falling

Lauren Paine Jr

Chapter memberships are $25 for singles and $35 for families, along with current membership in EAA. Contact Jessica Pugh or any "Chapter Volunteer"

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Young Eagles: Jessica Pugh
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AVIATION EVENTS SUMMER, 2005

July 25 to 31	Airventure, Oshkosk, WI
August 4	EAA Chapter 1410 Monthly Meeting, High River Airport, 1900 h.
August 24 to 28	50th Anniversary of Homebuilt aircraft in Canada at Goderich, ON
September 4	Ron Jansen's Fly-in, Coaldale

There are many more events and fly-ins taking place throughout the summer and fall. If you have notices or events you would like to see posted, please contact the editors and we'll include them in the upcoming newsletters

Book Review
*Flying South by Barbara Cushman Rowell

*Ten speed Press
Toronto & Berkely, 2002

A timid girl, determined to break out of the capsule that encloses her safe, calm and ordered existence and to choose a "life of adventure", flies her pressurized C206 a *25,000 mile, 57 leg journey through Latin America and the recesses of her soul*. The inward and outward journey are authentically documented and presented in Rowell Cushman's account of this journey.

My 'peer reviewers' have assessed this book as specific to women and certainly Barbara's connection to my own experiences was quite real. The book, in essence is about the many faces of fear for people who fly outside their comfort zone. The book is based on a challenge to a low time, though instrument rated pilot to join a friend in his own airplane and to fly across the rugged, uncharted places of South America; to cope with foreign and different standards in weather briefings,,in flight planning, even in language. The friend leaves the expedition and Barbara and her husband fly on to continue the adventure.

Reminiscent of Hemingway, Barbara reflects on her adventure , "I could have found many reasons not to fly my single engine airplane to Patagonia – but I would have missed the greatest adventure of my life. Even though I may have slain my fears one by one this time, I know they'll be back. And when they return, I'll fight them off again. Anything worth doing in this life, comes with risk, and risk is never without fear."

If you like aviation books for their transport to new places and new challenges, this will be the most evocative book you have read. Beautifully illustrated by the author and by her husband, National Geographic Photographer Galen Rowell, this book has unrivalled visual appeal well worth the $32.50 Price tag. You will keep it in your 'current' stack for years, if only to have another look at the photographs that remind you how awesome flight can be.

President's Message Continued...

complete dual glass cockpit EFIS systems, integrated with auto-pilot systems that can be controlled remotely from the ground; and the list goes on. The current bill has topped 1.4 million dollars Can.

Transport Canada requires a pressurized turbo-prop to have an approved manufacturer's maintenance and operating procedure. The manufacturer of this 4P (an amateur builder in the US), has no such thing. Today I learned that the Minister has rejected this aircraft's exemption. Someone may have a huge problem on their hands.

The outcome of this meeting was the unanimous decision to recommend to the Minister that a CARAC appointed working committee be set up to evaluate the initiation of a new class of non-certified aircraft that could accommodate just such an example. It can be argued that with the development of newer high-tech aircraft such as this and the Legend, Comp Air and Comp Air Jet, the Epic and Epic Jet, the amateur-built class no longer fits. If a person wishes to build the 4P example above as a homebuilt, (providing he fulfills the intent and Rules of the Amateur-built class), he could do so. On the other hand, if he wanted to have the same aircraft presented to him without his involvement in manufacture, he could do so in this new non-certified classification. This latter case would no doubt require ongoing airworthiness to fall into the A & P category.

The added benefit to this 'new classification' approach is the concept of keeping the Amateur-built aircraft class "pure". Amateur aircraft have evolved phenomenally since our first tube and fabric, and wooden homebuilts, of the 1950's. Nevertheless our freedoms remain precious, and the 'non-commercial, 51% major-portion' rule is our mitigating defense against liability, both for the builder and the kit supplier). This new classification would clearly differentiate the boundary between homebuilts and others.