experimental aircraft association

THE LEADING EDGE

NEWSLETTER OF MUROC EAA CHAPTER 1000

Voted to Top Ten Newsletters, 1997, 1998 McKillop Award Competition

President	*Gary Aldrich*	*661-609-0942*
Vice-President	*George Gennuso*	*661-265-0333*
Secretary	*Kent Troxel*	*661-947-2647*
Treasurer	*Doug Dodson*	*661-256-7276*
Newsletter Editor	*Russ Erb*	*661-256-3806*
http://www.eaa1000.av.org		*February 2004*

Chapter 1000 meets monthly on the third Tuesday of the month in the USAF Test Pilot School Scobee Auditorium, Edwards AFB, CA at 1700 or 5:00 PM, whichever you prefer. Any changes of meeting venue will be announced in the newsletter. Offer void where prohibited. Your mileage may vary. Open to military and civilian alike.

This Month's Meeting:

PROJECT POLICE PROJECT PROGRESS PRONOUNCEMENTS

Tuesday, 17 February 2004
1700 hrs (5:00 PM Civilian Time)
USAF Test Pilot School Auditorium
Edwards AFB, CA

(*or the **Bail the Vice Kommandant Out because he can't find a Speaker Meeting***)

Well it's that time of the month sports fans. As you know your loyal **Vice Kommandant** usually has many program irons in the fire so as to draw on any of them for the current months meeting. As this month opened up I stoked the fires again and again and found that although the efforts were there, and the intentions were good, all of the irons had grown cold for this month.

So after a lot of head scratching and reviews of meetings past, I noticed that we have been remiss (*last seen January 2002*) in one of our chief responsibilities, that being the member project review and the nifty tool demonstration (Hey, look at this!).

So, take a second and think (I know it makes your head hurt, but bear with me) about something you can bring in and share with the group. I remember the last time we did this **Bill Irvine** brought in some mandrels that shrink and stretch aluminum—pretty nifty. And those of you out there building give us a little report on the project.

With that said, hopefully everyone will add to the meeting by sharing. It should be an interesting evening. As always, there will be chips, salsa, chocolate chip cookies and beverages for your snacking enjoyment with the usual solutions to the world's problems at the BK Lounge afterwards.

- George "Knife" Gennuso
Vice Kommandant

Pay Your Dues! Now! This Means You!

(If you have already paid your dues, please disregard this notice)

Send your cash, check, money order, or other legally negotiable instrument to any chapter officer, or pay online by PayPal® through the EAA Chapter 1000 web site.

Kommandant's Korner

I am, like most of you reading this newsletter, a firm believer in the "**Big Sky Theory**" or, "BST" for short. BST is the pilots' way of accepting and dealing with the risk of mid-air collisions. Briefly stated, BST maintains that there is a near infinite amount of three-dimensional

space in which we operate our air machines compared to the relatively small number of aircraft that share that space at any given time. This means that the chance that two aircraft will try to occupy the same physical space at the same moment is very, very small. The probability of such an occurrence could be compared, say, to the exceedingly small chance of one's winning of the big lottery prize. One of the favorite sayings about the lottery is; "If you don't play, you can't win". To paraphrase; "If you don't fly, you can't have a midair".

"But wait!", you say, "That's an unfair comparison. The lottery is a pure odds game and I can beat the pure odds of colliding with another aircraft in mid-air by my superior piloting skills, the top-notch maintenance of my equipment, aviating only in CAVU conditions, installing cosmic gismos to warn me of aircraft in my proximity, etc, etc, etc...THAT, will never happen to me!"

Those of us in the flight test business know better. Yes, you can "mitigate" the risk…but you cannot eliminate it. Whenever we take our aircraft aloft we accept a finite risk, or probability, that we will swap paint…or worse…with another aviator's steed. No one is immune from that risk, unless you "don't play/fly".

On 16 January 2004, my friend and partner, was flying the **Fightin' Skywagon** over the low hills of the Cummins Valley, near Tehachapi. It was a gorgeous day to fly, crystal clear winter skies, cool temperatures, and little wind. It was the kind of day that the pilots in the rest of the country dream about. The aircraft was operating magnificently, having just received a major engine inspection and a brand new prop (all chronicled in earlier 'Edges).

The pilot was at the top of his form, almost 6000 hours…ATP…TPS graduate…prime of his life with everything to live for. It was the middle of the afternoon, in uncontrolled airspace on a Friday, when most recreational flyers (the one's we "experienced" types tend to fear) were at work on the ground. And yet, witnesses would recall that the two airplanes drove unerringly towards one another and in a "grinding, tearing" moment, ended the life of my friend and changed the life of another pilot forever.

Dave Lazerson was 40. Many of you knew him. Though he wasn't a member of the Chapter, he was a fixture of the Edwards military and sport aviation community. Some may not have realized that in August of 1996 I practically begged him to join me in purchasing the "perfect Cessna 180" that I had found, but lacked a small portion to buy on my own. Up until then, I'd known Laze almost exclusively on a professional basis…though I knew he was an extraordinary person in every facet of his life. I knew he was a rare civilian graduate of the Test Pilot School. I knew he was the Chief Instructor at the Edwards Aero Club…and had, indeed, received many hours of his fine instruction myself. I knew Laze had a penchant for getting things done…a mover and shaker…the embodiment of "where there's a will, there's a way". Those qualities, and my respect for his flying skills, led me to recruit him back onto the staff the Test Pilot School and make him the Chief Soaring Instructor Pilot…despite the fact that I had just given him the checkout required to add on his CFI-Glider.

The deal we made that August day was awesome for both of us. I'd find out later that I needn't have begged so hard as he was in the throes of deciding to buy an airplane of his own. The Skywagon presented him with the opportunity to expose his growing family to sport aviation and to hone his considerable skills in a challenging airplane. The first flight we took together convinced me that I had the perfect partner. He prepared for it like it was the first flight of an X-plane. The same attention to detail and professionalism that I had witnessed when he was preparing me for my multi-engine instructor rating turned out to be just the way Dave did things. Despite the thickness of his logbook compared to mine, he deferred to my greater tailwheel experience and was the perfect student (I have found that the best instructors are usually the best students as well).

Over the ensuing seven-plus years, we would fly together once in a while. Mostly, it seemed, to get one or both of us the required flight reviews. I flew the Skywagon much more that he did, and sometimes, when his job or the weather kept him out of the 180 for a while, he'd call me up and just ask me to ride along, displaying the kind of judgment and self-assessment skills that meant I never, ever worried about Dave's flying "our baby". We spent far more time in the hangar together, ankle-deep in inspection panels and logbooks. Dave was an A&P…and recently an IA. These skills made it much less expensive to maintain and operate the Skywagon and allowed both of us to build confidence in our airplane and to refine it with the best equipment.

January 2004 was a milestone in Dave's extraordinary career as a Flight Test Engineer. He had just been selected to be the **Deputy Director of the Joint Strike Fighter Integrated Test Force**. This mouthful of words belies the awesome responsibility and authority that was included with his selection…at the tender age of 40. It seems, not surprisingly, that I'm not the only one who could recognize talent when I saw it. These new responsibilities would keep Laze closer to home than his previous job and he was thrilled at the prospect of spending more time with **Claryce** (7), **Symantha** (5), and, of course **Kelly**. He also was looking forward to another airshow season and entertaining thousands more people with his graceful glider acrobatics.

But January 16, 2004, the Big Sky Theory failed to protect my airplane and my friend. How could this happen? We may never know for sure. The NTSB will attempt to

make some sense of it…to list "contributing factors" and perhaps assign a cause. Nothing in the NTSB report will be able soften the loss to Kelly and the girls.

What we do know is that the finite probability that we all tend to push to the back of our consciousness came roaring back to claim an outstanding aviator and a rare and beautiful flying machine. Hopefully, even if you didn't know Dave, you'll think of him sometime when you are straining your eyes and swiveling your head to find that nearby aircraft you know is lurking out there…and redouble your efforts to keep the Big Sky Theory valid.

Keep flying, fly safe, check 6…and 12…and 3…and 9….

- Gary Aldrich
Kommanding

Giles G-202 Update—OUCH!

Hello all,

Everything was looking good to fly mid December but I broke the canopy on the 16th starting a taxi run. The clear acrylic bubble had to be replaced. This has gone well and all that is left is some prep and repaint of the interior of the frame. Much harder than the repair is just getting over the fact that it happened! (I was always worried about damaging the canopy since it seemed to take an incredible amount of time to build!) This is why the updates abruptly halted. Since I have received a lot of questions about what is going on, I decided to get an update out even if it is just bad news.

It turns out that we are in good company. **Chris Meyer** (a G-202 guru from Florida) informed me our aircraft was the 3rd G-202 in about 2 months to suffer a canopy break. All 3 incidents have in common some variation of simply forgetting to close the latch upon lowering the canopy down from its right side hinge position. The G-202 canopy, typical of an aircraft of this type, is rather fragile when not closed and locked down.

In installing the new canopy, I took the opportunity to reinforce the weak part of the framework (the aft composite section that fractured during the incident). Of course, better prevention practice will be the reason I am confident we will avoid future canopy problems.

Looking ahead to this month's 3-day weekend, we may get the chance to make some significant advances and have some great news to report next update.

As always, thanks for the interest and comments,

- Howard Judd

Giles G-202 Flies!

Everything came together at the end of a 3 day weekend and it finally happened **19 January** on the **Martin Luther King holiday!** After countless engine runs and inspections, taxi trials and careful examinations of the airframe we put our flight test plan into action.

During the years of building I had no worries about flight testing the aircraft but that all changed about 3 months ago when it was becoming obvious the aircraft was almost ready. The list was running short of items left to do. Now what? Was it built good enough? Are there any of those **Rumsfeld** "unknown unknowns?" And I fly big, heavy, sluggish tankers (some say "big enough to bend light"), am I ready for this small, nimble machine? Plenty to worry about...

A few more dual flights with lots of landings in the Extra 300 and some taxi tests in the G-202 gradually built confidence. On Monday morning, I went out for another high speed taxi run, powered up and lifted the tailwheel off the runway. The pitch and yaw control felt very positive and I taxied back and shouted to the team that WE ARE GO!

We briefed the 1st flight events. The co-owner **Dave** would fly with **Chuck Coleman** in his Extra 300. **Steph Corda** would handle ground flight test engineering and data along with **Nate Polumbo**. **Michelle Davis** would take care of everything else including pictures.

The Extra 300 took off first for the chase "airborne pickup" of the G-202. I must say sitting there on the runway with the chase counting down your brake release to that first takeoff must be the height of anticipation! Powering up, I picked up the tail waited just a few seconds and we were airborne and climbing briskly. I felt a great sense of relief that the aircraft control was very light and responsive and very close to a trimmed condition so I immediately informed the test team that I was "airborne and climbing and the airplane feels great." Leveling off about 4,000' over Mojave I realized I had forgotten to key the mic with all of those positive progress reports so the chase plane and the ground team heard only silence and were left wondering if something had gone wrong. No, just me not activating my thumb when I had something to say...

All the test events went very well. The aircraft was handling nicely enough to fly wing formation so I passed the chase plane the lead and flew some loose formation as we had briefed. Dave got some great air to air video from the chase. After 30 minutes airborne we returned to a much busier Mojave airport and the winds had picked up to 20 knots. Fortunately, Mojave has many runways so we chose the one with the least crosswind. After a lot of maneuvering to sequence in with all of that slow GA traffic, I finally porpoised my way onto the runway, got slowed down and taxied back. (I can't wait to see the video of that landing!) **Jon Sharp** of "**Nemesis**" fame was among the first to offer congratulations. Thanks Jon!

What a blast! I have such a profound sense of gratitude to the countless people who helped build this fine machine and who put up with me during the long, arduous process. The flight test team was first rate! **Chuck** and his Extra 300 did an outstanding job as chase. **Dr. Stephan Corda** did a super job of helping us prepare for the flight and recording all of my comments (once I started keying the mic). **Michelle Davis** for the great support, lunches, dry-erase board and markers, photos, and on and on. Of course thanks to all of you on my update list who read through these ramblings.

Wayne Handley had recently provided a few tips on conducting a first flight and concluded "it will be a day you won't forget!" He sure is right about that! As an Air Force pilot, it has been a huge privilege to solo a supersonic jet at age 23 and many other memorable events but this flight truly stands out as something very special.

Thank you,

- Howard Judd

DEDICATED TO THE MEMORY OF MR. DAVE LAZERSON, AN EXCEPTIONAL PILOT AND EXCEPTIONAL PERSON...

Preflight briefing with chase crew, Dave (center) and Chuck (right)

Last oil check. Stephan Corda assisting. Test events listed on the rear panel. Oh yes, this is the repaired canopy...

Airborne at last!

Congrats from a very gracious co-owner, Dave.

(*Next month—Dave flies the G-202 and shares his story—more cool pictures!*)

Last Month's Meeting

EAA Chapter 1000
Scobee Auditorium
USAF Test Pilot School, Edwards AFB CA
20 January 2004
Gary Aldrich, Presiding

A near if not record crowd (21) enjoyed an unexpected double feature this month. The opening act was video of the maiden flight (on 19 January) of the Giles G-202 owned by **Howard "Hojo" Judd** and **Dave Vanhoy**. Hojo was at the controls with Dave in chase with **Chuck Coleman** in the Extra 300. Our congratulations, with more than a slight bit of envy, as another "custom built" aircraft takes to the air.

The featured speaker was **Bill "Flaps" Flanagan** with an incredible presentation of "Fifty Years of Flying Wings", from the N1M to the B-2. Bill was able to provide insight into the early Jack Northrop designs and testing, through the B-35 and B-49, and on up to the B-2. Recall from Bill's bio that he is a retired USAF Navigator/WSO, TPS graduate, Northrop Grumman

employee and B-2 Combined Test Force member with over 500 hours in the B-2...so, he should know his stuff.

Members not in attendance missed a good one. Despite the jubilation of a first flight by one of our members, and an outstanding guest speaker, the meeting still had a solemn tone as we grieved the loss of **Dave Lazerson**. Dave was co-owner of the **Fightin' Skywagon** and was involved in a fatal mid-air collision over Tehachapi. Dave was an outstanding pilot, and a good friend. Our condolences to his family.

"Victory" was declared by **Kommandant Aldrich**, with the recommendation for "**Flaps**" to be "**super-sized**", which met with unanimous approval. The assemblage retired to the BK Lounge for our customary sumptuous dining experience. Our thanks and appreciation to Bill for an outstanding evening of hangar-talk.

- Kent "Cobra" Troxel
Secretary

Young Eagles Update

What a great year 2003 was for Young Eagles in the Antelope Valley! Through the efforts of 56 pilots and at least 30 ground crew, 927 (yes - nine hundred and twenty-seven!) Young Eagles were registered and flown in the Antelope Valley and surrounding areas, utilizing 8 area airports. This is well over double the 2002 total of 420. Over half of the total were flown since mid-September.
First and foremost, I want thank all of you pilots who donated your time and aircraft to the effort.

Those pilots flying Young Eagles in 2003:

Name	# YEs	Total Seats		Name	# YEs	Total Seats	
Herb Carlson		113	4	Olaf Landsgaard		6	2
Bob Souza		99	4	Dean Vander-Wall		6	4
Miles Bowen		64	4	Geoffrey Dille		5	4
Ed McKinnon		60	4	Mike Lerner		5	4
John Bush		42	2	Kirk Peek		5	4
Shel Simonovich		37	2	Paul Reukauf		5	4
Con Oamek		35	5	Beverly Vander-Wall		5	4
Paul Rosales		30	2	Paul Baldwin		4	4
George Sandy		30	4	Ozzie Levi		4	4
Christine Visco		29	2	Arnie Peterson		4	4
Wayne Babcock		26	4	Ted Rutherford		4	2
Kim Cummings		26	4	Michael Barnes		3	4
Don Gates		26	4	Dean Byers		3	4
Doug Dodson		23	4	Lane Carlson		3	4
Wen Painter		23	4	Lynn Crawford		3	2
Ted. Blaine		22	4	John Manduca		3	2
Eric Hansen		21	5	David Orr		3	2
Jonathan Ames		17	4	Kevin Prosser		3	2
Tim Cahoon		17	4	Doug Triplat		3	4
James Roberts		16	2	John Fisher		2	2
Bob Hoey		14	4	John Tumilowicz		2	2
Bill Hoverman		12	4	Bob Waldmiller		2	4
Jack Schweizer		12	4	Mark Backes		1	4
Steve Ivey		11	4	Landon Carlson		1	4
Ken Hetge		9	4	Pierre Hartman		1	2
Kevin Reilly		9	4	Mike Lamb		1	2
Frank Haertlein		8	2	Dave Sampson		1	4
Raymond Powell		7	4	Lee Trlica		1	2

Many of these pilots also generously made "good will" flights, flying Young Eagles' little brothers, sisters, parents, and ground crew, as well as members of the media. All these go a long way toward the overall success of the program.

Many thanks also to all of you serving as ground crew. Many served without signing up and I unfortunately misplaced several rally rosters, so if I have omitted your recognition here, please accept my sincere apologies.

2003 Ground Crew:

Gary Aldrich	Nancy Bass	Amanda Bowen
Miles Bowen	Rebecca Bowen	Maxine Cahoon
Joyce Clements	Kim Cummings	Shirley Cummings
Jack Dombovary	Della Dusel	Carol Flores
Mary Beth Gates	Jeff Harband	Ken Hetge
Mike Lerner	Jeff Luther	Brittney McCullough
Ed Mckinnon	Victoria Rosales	Lucia Sandy
Sharon Shipp	Linda Smith	Char Spencer
Karen Steinaway	Lori Ann Theisen	Beth Triplat
Tim Wallace	Tom Weil	Marlene Zebro

I would also like to thank the managers and staff of each of the following airports for their generous help and cooperation:

Apple Valley Airport	Cal City Municipal
Fox Field Airport	Inyokern Airport
Lone Pine Airport	Mojave Airport
Rosamond Skypark	Tehachapi Municipal

As I have stated in the last several rally reports, I have decided to retire from the position of Young Eagles Coordinator for Chapters 49 and 1000 after the Inyokern rally this coming Saturday. It has been a lot of hard work over the past 3 years, but has also been a LOT of fun and has paid dividends in satisfaction many times over by seeing the 1800+ smiling faces after their introductions to the wonderful world of aviation. Even if only a few were inspired to eventually take up aviation as their vocation or avocation, it has been well worth every minute of effort.

Sincerely,

- Miles Bowen

Miles & Gang,

Just wanted you to know that I used the EAA Chapters 49 & 1000 as an example of partnerships that develop between organizations that have benefited both the airport

and the community to the reps for the AV Board of Trade 2004 Outlook Conference. Really do appreciate your outstanding support over the years!

The other is a quick note to let you know that the FAA Flight Standards will be holding a seminar on Wednesday, January 21st, 6:30pm at our Airport Cafe. There will also be a presentation by the Digital Log Book Company on their new product, digitalized maintenance log books. Plus an added treat, an update from the Airborne Laser based at Edwards on their current mission. Hope you get the chance to make it out!

Take care,

- Tom Weil
Cal City Airport Manager

What The Erbman Meant To Say Was...

(*Leave it to **Paddles** to latch on to the one detail I wasn't real sure about but didn't bother to research...I thought it might not be exactly correct, and it wasn't. **Pete Moore** sure relished in slapping me around a little bit. Thanx, Pete, and it's been a pleasure entertaining you. Read as Pete tells you what I really meant to say...*)

Just got mine (*latest newsletter*), read it, and WHOOPS did I find you making an error. Switch contacts arc when they are opened (mostly due to reverse {induced} EMF in the case of starters, or the voltage difference in really high voltage circuits being able to leap across the contact gap before it gets really big). This arc generally causes material to be deposited to the cathode side of the contact, but does not create the "weld". It does do a good job of pitting the contact however. Can you remember setting points in a car distributor? (*Yep, been there, done that, got the dwell meter....*) I am really old, and still set them in my bug. I could demonstrate sometime if you need.

What actually welds the contacts shut is the initial inrush of current. Starters have been known to draw 1000 amps for a couple of milliseconds. Ohms law says Power dissipated is Current squared times Resistance. Now I'll admit that a tenth of an OHM resistance isn't much, but at the current squared rate of $1.0x10^6$ that be a lot of wattage them poor little 1/8 square inch spots have to dissipate. Them point tips get mighty hot, sometimes about 2500 to 3500 degrees, but usually for a little bit of time and in a very localized area of contact. That is what welds them closed. Starter solenoids are a prime example of early 1900's technology brute force.

FYI starter solenoids are HEAVIER than constant contact ones. Look at the weight in the ACS catalogue if you don't believe.

BTW thatz why I don't deal with them any more which is another story all together.

TTFN

- Paddles.

David Stits Memorial Brick

You may recall that last year **David Stits**, then EAA Chapter 1 (Flabobian) President and son of **Ray Stits** of fabric covering fame, was killed in a airplane crash. The word went out to EAAers everywhere suggesting memorials to David in the form of donations to the EAA Chapter 1 Hangar Building Fund. David had been leading the effort to build this hangar. Specifically, a brick for the plaza could be purchased for $49 and inscribed with up to three lines.

In recognition of our special relationship with the Flabobians, your **Board of Directors** voted unanimously to purchase a brick in the name of EAA Chapter 1000.

The executor of this decision, **Treasurer Opie**, did so, and as best he can remember, the inscription reads:

EAA Chapter 1000
Home of the Dreaded Project Police

Eventually we'll need to mount an "inspection tour" to go check it out to be sure. Now the Flabobians will have a continuous presence of the ***Project Police*** literally right under their feet.

Det 12 Update

Hey Erb!

An update from Det 12 here in Michigan.

It finally turned cold and snowy. I know many out there in Sunny CA won't understand, but we actually enjoy a change of seasons.

My little helper still thinks crawling is better than walking, but my real time adaptive controller (**Cassandra**) is getting into everything and talking up a storm. She even helped me change a light switch Saturday

Lisa is doing well and is getting more involved around the neighborhood and at church. This past weekend though she decided that it would be more fun to get the stomach flu so we spent Saturday night and Sunday morning in the ER.

As for me, the first semester went well with a lot of help from the midnight oil. There was a lot of time remembering how to work with differential equations and the like. Needless to say the Acroduster took a back burner to school and family. While progress has not stopped it has slowed to a trickle.

I have managed to keep the flying skills up by becoming a tow pilot at a local glider club. To keep insurance down, I don't get paid, and even pay $30/month dues, but I will get 4+ hours a month of real fun flying. It is up there with flying aerobatics and teaching.

Well as Lisa says it is time for me to go back and talk to the aliens. Lisa is convinced that is what I am doing, because as she says, "Math has numbers." Some how I can't convince her that all those little symbols are part of math.

Cheers

- Chris "Mom" Shearer
EAA Chapter 1000 Det 12, Ypsilanti MI

Strength of Riveted Joints – Results of Pull Tests

(*Reprinted with permission from* http://members.rogers.com/khorton/rvlinks/marvelrivets.html)

A couple of months ago I sent the following post to the So. Cal RV group. At the time I was not subscribed to the matronics list. Since the subject is real life testing I had done to determine the strength of improperly set rivets, I think you will be interested in the results. And since the bill just arrived ($280), I need to share the knowledge with a lot of people to get my money's worth!! Here's the post:

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 or with completed RVs (as will those planning on it in the future) 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 (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, i.e. 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 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 a stronger joint than a joint made of grossly under driven ones.

6. A grossly under driven AN 470 joint is much weaker than a grossly under driven AN 426 joint.

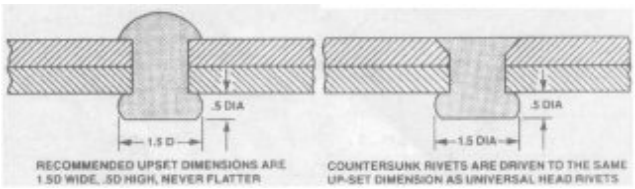
7. No joint was as strong as the parent material itself.

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 properly driven rivets.

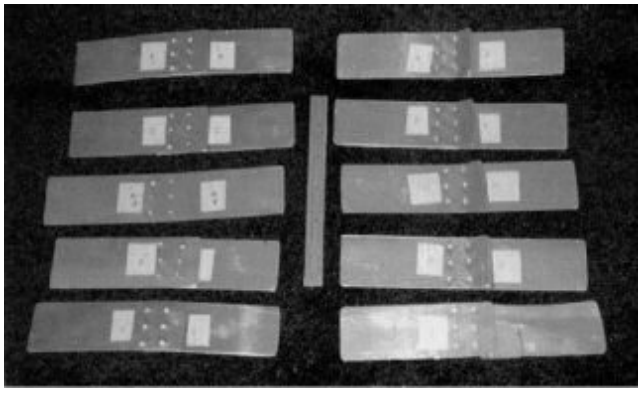
AN426AD-3 Table		
Condition	Force at Failure	Nature of Failure
Gross under	1650	Rivet tipping, head distortion
Slight under	1775	Same
Correct	2025	Same
Slight over	1975	Same
Gross over	1825	Sheet tear at rivet line

AN470AD-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

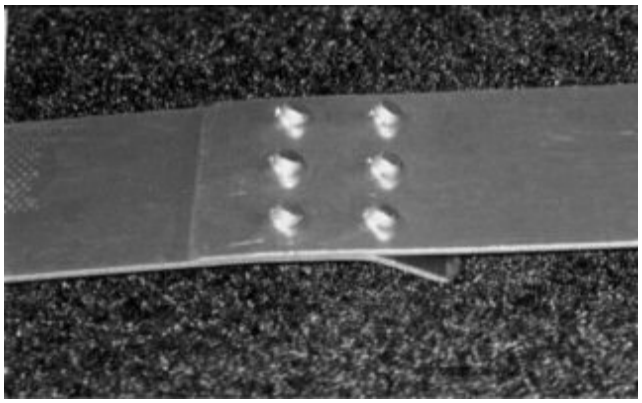
Anyway, those are some real numbers for an area we have undoubtedly thought about at one time or another. My opinions, FWIW: I think an occasional rivet that is slightly under driven or slightly over driven is utterly no big deal and can safely be ignored. We all have some of these flying in formation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



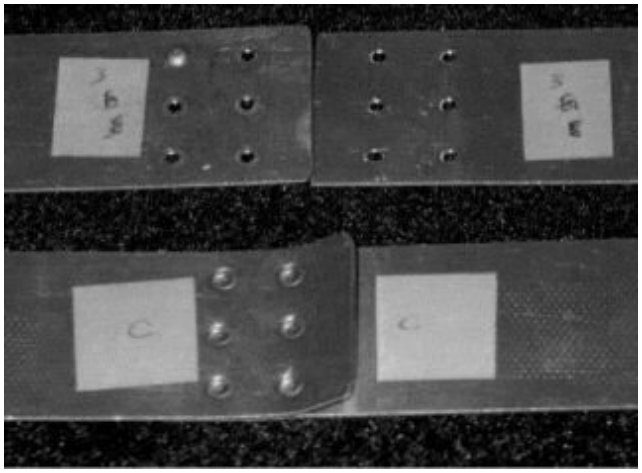
Photos



Shown above are the 10 coupons used in the test. On the left side are those riveted with AN470AD3 universal head rivets and on the right are those riveted with AN426AD3 flush rivets. In the latter case, both coupons were dimpled. A six inch ruler appears in the center to show relative size.

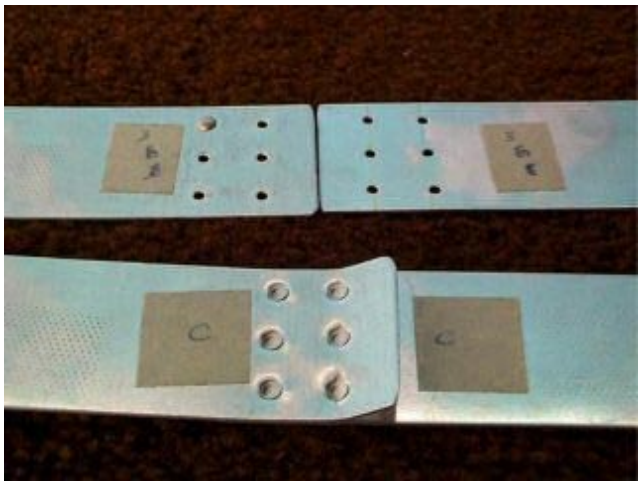


This view of the shop head side depicts the “rivet tipping” failure mode that appeared in all of the coupons riveted with AN426 rivets. The raised edge of one coupon occurred during the test and was a typical part of the failure.



This view shows the coupons with properly set rivets in their failed state. Most notable is the fact that the top coupon, riveted with universal head rivets, failed catastrophically with all six rivets sheared. Only one rivet head remained in place; the rest all popped out on failure. Note how little deformation exists in the rivet holes in the

parent material. In contrast, the lower coupon, double dimpled and riveted with flush rivets, is still intact. It shows deformed manufactured heads on top, and the tipped rivet pattern on the bottom as shown in the prior photo.



A closer view of the photo above, showing more detail of the deformation of the holes and rivet heads. As you view this, keep in mind that the failure of the top coupon with AN 470 rivets occurred at 1625 pounds of force and was catastrophic with all six rivets shearing simultaneously. In contrast, failure of the lower coupon was by deformation only at a force of 2026 pounds. The interlocking, dimpled joint is 25% stronger and when it fails, does not fail catastrophically. Which would you rather have on your wing skin as you start pulling more Gs?

- Bill Marvel
San Pedro, CA

Vintage Gliders Take To The Sky

(*Your Newsletter Editor, while under the guise of pretending to be "working" caught **Jeff Byard** out flying some of his collection at Mountain Valley Airport in Tehachapi on 28 August 2003*)

Favorite of the airport, the Bowlus Baby Albatross

Jeff Byard in his Christmas e-card photo

Project Police Aircraft Spotters Quiz

With the ongoing hope of enticing some of you to actually participate in your chapter's events, **Evil Editor Zurg** has directed that we present you with a picture of yet another rather obscure aircraft. Not content to just fill the letter of his ~~demand~~ request, we present you with two pictures.

Now your part is easy—simply identify the aircraft in these pictures and send that information to erbman@pobox.com or to the editor's address seen on the last page of this newsletter. Include any other information you know. Links to web sites with more info are a plus. Next month we'll tell you who (if anyone) was correct.

Do you have any pictures of really obscure aircraft? Send them to **Evil Editor Zurg** by any of the usual means for inclusion in this spot. Zurg recommends sending an e-mail to erbman@pobox.com as the easiest and most effective manner. Amaze and stump your friends.

Web Site Update

As of 6 February 2004, the hit counter stood at **88337**, for a hit rate of about 26 hits/day for the last month.

Just a reminder that the EAA Chapter 1000 Web Site is hosted courtesy of Quantum Networking Solutions, Inc. You can find out more about Qnet at http://www.qnet.com or at 661-538-2028.

Chapter 1000 Calendar

Feb 17: EAA Chapter 1000 Monthly Meeting, 5:00 p.m., Edwards AFB. USAF Test Pilot School, Scobee Auditorium. (661) 609-0942

Mar 2: EAA Chapter 49 Monthly Meeting, 7:30 p.m., General William J. Fox Field, Lancaster, CA. (661) 948-0646

Mar 9: EAA Chapter 1000 Board of Directors Meeting, 5:00 p.m., High Cay, 4431 Knox Ave, Rosamond CA. (661) 609-0942

Mar 14: AV 99's 14th Annual St. Patrick's Day Poker Flight, General William J. Fox Field, Lancaster, CA. www.exportcentral.com/av99s/

Mar 16: EAA Chapter 1000 Monthly Meeting, 5:00 p.m., Edwards AFB. USAF Test Pilot School, Scobee Auditorium. (661) 609-0942

Apr 6: EAA Chapter 49 Monthly Meeting, 7:30 p.m., General William J. Fox Field, Lancaster, CA. (661) 948-0646

Apr 13: EAA Chapter 1000 Board of Directors Meeting, 5:00 p.m., High Cay, 4431 Knox Ave, Rosamond CA. (661) 609-0942

Apr 20: EAA Chapter 1000 Monthly Meeting, 5:00 p.m., Edwards AFB. USAF Test Pilot School, Scobee Auditorium. (661) 609-0942

May 4: EAA Chapter 49 Monthly Meeting, 7:30 p.m., General William J. Fox Field, Lancaster, CA. (661) 948-0646

May 11: EAA Chapter 1000 Board of Directors Meeting, 5:00 p.m., High Cay, 4431 Knox Ave, Rosamond CA. (661) 609-0942

May 15: Thirteenth Annual Scotty Horowitz Going Away Fly-In, Rosamond Skypark (L00), Rosamond CA. (661) 256-3806

May 18: No EAA Chapter 1000 Meeting, You should have gone to the Fly-In above!

Jun 1: EAA Chapter 49 Monthly Meeting, 7:30 p.m., General William J. Fox Field, Lancaster, CA. (661) 948-0646

Jun 8: EAA Chapter 1000 Board of Directors Meeting, 5:00 p.m., High Cay, 4431 Knox Ave, Rosamond CA. (661) 609-0942

Jun 15: EAA Chapter 1000 Monthly Meeting, 5:00 p.m., Edwards AFB. USAF Test Pilot School, Scobee Auditorium. (661) 609-0942

To join Chapter 1000, send your name, address, EAA number, and $20 dues to: EAA Chapter 1000, Doug Dodson, 4431 Knox Ave, Rosamond CA 93560-6428. Membership in National EAA ($40, 1-800-843-3612) is required.

Contact our officers by e-mail:
President/Flight Advisor Gary Aldrich: gary.aldrich@pobox.com
Vice President George Gennuso: pulsar1@sbcglobal.net
Secretary Kent Troxel: ktroxel@antelecom.net
Treasurer Doug Dodson: dodsond@qnet.com
Technical Counselors: Gary Sobek gasobek@attbi.com
Ron Wilcox avi.ator@verizon.net Bill Irvine wgirvine@yahoo.com

EAA Chapter 1000 Technical Assistants

Composite Construction		
Doug Dodson	dodsond@qnet.com	661-256-7276
George Gennuso	pulsar1@sbcglobal.net	661-265-0333
Brian Martinez	brianmmartinez@cs.com	661-943-5379
Bob Waldmiller	waldmilr@qnet.com	661-256-0932
Wood Construction		
Bob Waldmiller	waldmilr@qnet.com	661-256-0932
Aluminum Sheet Metal Construction		
Bill Irvine	wgirvine@yahoo.com	661-948-9310
Miles Bowen	cessna170bdriver@yahoo.com	661-822-0806
Russ Erb	erbman@pobox.com	661-256-3806
Welding/Welded Steel Tube Construction		
Russ Erb	erbman@pobox.com	661-256-3806
Engine Installation		
Bob Waldmiller	waldmilr@qnet.com	661-256-0932
Doug Dodson	dodsond@qnet.com	661-256-7276
Electrical Systems		
Miles Bowen	cessna170bdriver@yahoo.com	661-822-0806
Instrumentation and avionics requirements for VFR/IFR		
Gary Aldrich	gary.aldrich@pobox.com	661-609-0942

Inputs for the newsletter or any comments can be sent to Russ Erb, 661-256-3806, by e-mail to erbman@pobox.com

*From the **Project Police** legal section: As you probably suspected, contents of The Leading Edge are the viewpoints of the authors. No claim is made and no liability is assumed, expressed or implied as to the technical accuracy or safety of the material presented. The viewpoints expressed are not necessarily those of Chapter 1000 or the Experimental Aircraft Association. **Project Police** reports are printed as they are received, with no attempt made to determine if they contain the minimum daily allowance of truth. So there!*

THE LEADING EDGE
MUROC EAA CHAPTER 1000 NEWSLETTER
C/O Russ Erb
3435 Desert Cloud Ave
Rosamond CA 93560-7692
http://www.eaa1000.av.org

ADDRESS CORRECTION REQUESTED

THIS MONTH'S HIGHLIGHTS:
REGULAR MEETING 17 FEB AT TPS
IN MEMORY OF DAVE LAZERSON
G-202 FLIES! PIX AND REPORT
RIVET STRENGTH TESTS

EAA™
The Leader In Recreational Aviation