experimental aircraft association

THE LEADING EDGE

NEWSLETTER OF MUROC EAA CHAPTER 1000

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

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http://www.eaa1000.av.org *June 2009*

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:

T-38 Flights For All My Friends!

"Evil" Bill Gray
Tuesday, 16 June 2009
1700 hrs (5:00 PM Civilian Time)
USAF Test Pilot School
Edwards AFB, CA

Have you ever had an urge to fly a T-38? You figure your uncle owns the airplanes (your Uncle Sam, that is) and as a taxpayer, you should get a chance to try one out. You've watched Iron Eagle (but won't admit it, except for the part featuring Rosamond Skypark) and figure all you need to do is get a flight suit, hide your identity under a helmet (which would really draw attention to you since real USAF pilots carry their helmets to the jet), and just walk out on the flight line and climb up the ladder.

If you tried that, you might get more attention than you bargained for, not to mention you wouldn't enjoy it. However, we have an alternative method of compliance that will keep you out of trouble with the feds and give you almost the same sensory experience without the inconvenience of wearing uncomfortable, hot clothing or testing your g-tolerance. As a special bonus, we guarantee that you won't damage any aircraft, even if your landings look like **Erbman's** last couple (ask **Houdu** about those).

How do we do that? Back around 2004, USAF TPS Chief Pilot **"Evil" Bill Gray** started to hatch a plan to build an engineering simulator that could be used to train budding Test Pilots and Flight Test Engineers. The plan was to not only replicate what happens in the airplane at minimal cost, but also to replicate what **could not** be done in the airplane at all! This project would become known as the "**Evil Bill Sim,**" and was declared operational last year.

Besides flying a T-38 to landing on the Edwards runway, you can try loops from low altitude. You could do inverted flight over the runway. You could do multiple aileron rolls without puking your guts out. But so what? You could do that in almost any simulator. But what about flying the T-38 with an aft cg? A forward cg? A missing stabilator? A broken yaw damper? An unstable stick force gradient? Something else devilishly evil? You could even fly a T-38 using a side stick—try that in the real airplane!

"Evil" Bill will probably give us an overview of how the simulator was developed and its capabilities for training and research. Then we'll throw **Knife** into the seat so he can show us why he should have joined the Air Force and gone to pilot training instead of sifting through issues of *Sport Aviation* on his garbage route. Don't laugh at his flying, though, because we're putting **YOU** in the seat next!

What If They Didn't Give A Fly-In And Everybody Came?

EAA Chapter 1000
High Cay
Rosamond, CA
9 May 2009
Gary Aldrich, Presiding

The May fly-in, formerly known as the **Scotty Horowitz Memorial Going Away Fly-in BBQ and Clambake** was held at **High Cay**, the high desert estate of **Doug** and **Gail Dodson**.

Now, you're probably asking "Who is **Scotty Horowitz** anyway?" Well, maybe not. But if you are, Scotty was a founding member of Chapter 1000 who just happened to become an astronaut, thus we had to send him off to Houston or the Cape or wherever astronauts go. (Note to reader: This is not intended as a **Chapter 1000** endorsement of the NASA astronaut program, nor an

implication that all or any chapter members will become astronauts. Your results may vary.)

The interesting thing is that somewhere along the way, Scotty became the master of time and space and was able to have his namesake BBQ slash fly-in actually occur BEFORE the newsletter you are now reading was published, so it's like I'm in an episode of Back to the Future, hence you were able to read about this LAST month in the **Kommandant's Korner**. It's kind of like a reverse TIVO or DVR thing. As the **Amazing Criswell** said, "we are all interested in the future, for that is where you and I are going to spend the rest of our lives, whether we want to or not". (http://en.wikipedia.org/wiki/The_Amazing_Criswell)

Rosamond International Airport (ROX), with its freshly repaved runway, greeted fourteen visiting aircraft and over 2 dozen guests. Actually, fourteen and a half aircraft (we pushed **Russ Erb's** ***Bearhawk*** from next door). The spot-landing contest had been discontinued due a lack of anyone's enthusiasm to sit around in the heat at the end of the runway. The **People's Choice** contest had also been discontinued, again due to laziness in not getting the cheesy award plaques.

Guests enjoyed expertly grilled hot dogs and assorted accompanying sodas, chips and cookies as a small fund-raising effort.

Non-Fly-In HQ, where guests enjoyed hot dogs, chips, and high fructose snacks

Miles Bowen's Cessna 170B and Pat Fagan's "Smokey Bearhawk"

Erbman's "Three Sigma" *Bearhawk* on center stage the day after its Third First Flight

The host aircraft, the Strike Mooney, greets visitors from its traditional position

Mercedes Eulitt flew in her RV-6A still sporting temporary 12 inch N numbers from a recent trip out of the country

Mike Duggan flew in his RV-8A with another RV-8. This RV-8A was featured in our December 2005 newsletter. He explained the Navy TPS paint scheme as he was in the Navy and built an experimental airplane. Where did he figure the Navy would have an experimental airplane? At Navy TPS, of course. No, he didn't attend Navy TPS.

***PPO* Gary Sobek brought his RV formation flying group to the non-fly-in.**

William Leonard's RV-6

David Richardson's RV-7

Former *PPO* Ed Dutreaux made his triumphant return (wearing his vintage black *PPTAF* shirt) in his RV-4

Mike Duggan took off early in front of the hyper-critical *Project Police*

- Kent "Cobra" Troxel
Minister of Propaganda

Kommandant's Korner

ORM... "Operational Risk Management"…a term that weighs heavily on the minds of the Edwards aviator community these days. With the recent loss of two highly skilled flyers in as many months an unprecedented era of safe flight testing has ended (or, hopefully, just been interrupted). It's easy to adopt an attitude that says the statistics just caught up with us…very much like we did when **Challenger** blew up. The tired old saw, "Aviation in itself is not inherently dangerous" remains true but the type of flying done in the flight test business pushes that statement to the edge of contradiction. The rest of the old saw, "…it is terribly unforgiving of any carelessness, incapacity or neglect" is also apropos though these three dangers in **Captain A. G. Lamplugh's** (British Aviation Insurance Group, circa early 1930s) quote are a bit too strong for this scenario. But, after such a long stretch of safe and successful test/training execution, isn't it human nature to become relaxed, comfortable…dare I say, complacent? If any good can come from the deaths of two friends it is to snap the risks we face back into sharp focus…to reset the little byte in the back of every aviator's brain that causes us to say, "Hmmm, what could go wrong, here?"

This morning I was forced into an ORM decision. The mission was to fly several spouses of graduating TPS students on "space-available" flights in gliders at Tehachapi's Mountain Valley Airport. The weather was assessed (by the assembled group of pilots) as "marginal". A strong low off the coast was pumping moisture in the form of low clouds and rain through the Tehachapi Valley. The clouds were occasionally obscuring the normal glider pattern and the surrounding mountain tops. Eternal optimism had us standing at each available window and willing the evaporation of the clouds. The risks? Well, in this case, the risk of bodily harm or aircraft damage was minimal…but the risk to the overall mission was related to the objective of generating a safe and enjoyable experience for a group of non-flyers. Taking off with a seasoned aviator into marginal weather is something that can be done safely and can result in a positive learning experience. Taking an individual who may already be skeptical of motorless flight into the turbulence and restricted visibility can be a negative, often life-changing event for the passenger (and maybe for the aviator-spouse as well). So, we weighed the risk and I made the decision…no spousal flying today.

Now I am faced with the next decision. A **Fightin' Skywagon** mission has been planned for this weekend to ferry **Anne** and **Pixel** to Concord (KCCR) and then to proceed on with ***PPO*** **Doolittle** to a little private strip where a group of like-minded aviators are gathering for an annual party. The weather-guessers are saying that this unseasonably crummy weather pattern will exist well into, if not through, the weekend. Terms like "VCSH" and "TSRA" abound in the TAFs. Once again, the risk assessment focuses not so much on the danger (probably minimal) as on the "fun factor". Tune in next month to see the outcome of this ORM exercise.

Fly safe and check 6!

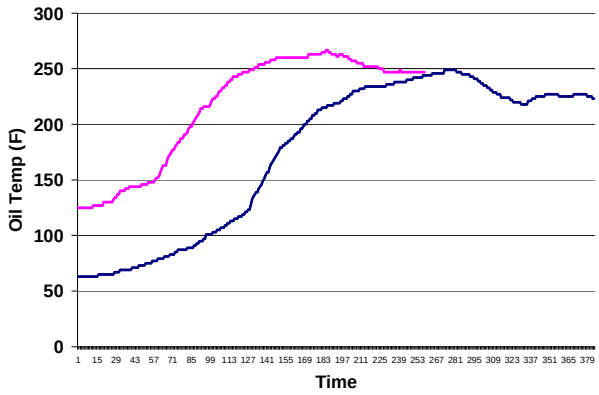
- Gary Aldrich
Kommanding

Three Sigma Vernatherm Follies

After listening to the thoughts of my fellow aviators at the Chapter non-fly-in and doing some research and testing, I have reason to believe that a faulty vernatherm (thermostat) is a key cause of my oil temperature problems. This seems to be separate from (but related to) the high CHT problem.

What I have learned about vernatherm theory of operation: When cold, the tip of the vernatherm is retracted from its seat. The oil pump has two outlets—one to the oil cooler and another into the oil filter adapter. Because of the pressure drop through the oil cooler, the majority of the oil flows straight to the oil filter and back to the engine. As the oil temperature comes up, the tip of the vernatherm extends to its seat, blocking the path from the oil pump straight to the oil filter. The only path left for the oil then is from the oil pump to the oil cooler to the oil filter and then to the engine. Read about it yourself at http://ellis-assoc.com/uploads/Anatomy_of_a_Vernatherm.pdf .

If the vernatherm doesn't extend sufficiently to seat and block the flow of oil (against 80 psi of oil pressure) the oil continues to bypass the oil cooler. The oil cooler is useless without a functioning vernatherm.



This plot is of the oil temperature vs time for the last two flights. The magenta line is the trace from the "second first flight" last June, and the blue line is from the "third first flight" last Friday.

The important thing to notice on this plot is that there is no significant change in slope around 185 deg F. The vernatherm is supposed to be fully extended by 185 deg F, blocking off the bypass and sending all of the oil through the oil cooler. Thus, by 185 deg F there should be a lessening of slope as the oil cooler starts functioning. Even if the oil cooler was of insufficient capacity, the temperature would climb slower. (Remember the eventual

stop to the increase in oil temperature was because I reduced the throttle to return to the airport)

The vernatherm installed was the same for both of these flights, and was the one that came with the engine, so there is no telling how old it is. Based on these data, I was led to believe that the vernatherm was not sufficiently closing the bypass port.

So how do we find out if this is really the problem? Are we not testers?!

I searched for information on testing vernatherms and found http://www.rvproject.com/20050409.html written by **Dan Checkoway** about the similar experience of **Paul Rosales** and **Gary Sobek**. The best part was that it included pictures of what to expect.

They did their test in old airplane oil. Other web sites suggested that the test could even be done in water. I went for the in-between and heated up some vegetable oil in an old coffee can with a candy thermometer. After the oil was over 200 deg F, I lowered my vernatherm into it. It immediately...did nothing. Thinking I was done, I took some pictures and turned off the fire. Looking again, I noticed a slow movement in the vernatherm. I waited until it stopped expanding and then measured its position. I then removed it from the oil and allowed it to cool, then re-measured its position. After some very complicated subtraction, I determined that it had moved a whole 0.180 inches.

Old coffee can, vegetable oil, and digital thermometer

Vernatherm in the retracted position, with safety wire for handling

That's some hot oil

Vernatherm before expanding

Vernatherm after expanding, but not enough

After testing, vernatherm clamped for cooldown

According to http://ellis-assoc.com/uploads/Anatomy_of_a_Vernatherm.pdf, "the stroke on the valve will be 0.194 inches and the return stroke will be 0.235 inches". I don't know why there are two different measurements there, but a key point is that my measurement was shorter than both of them.

According to Checkoway's page, when they tested a known good vernatherm it "immediately expanded about 3/8" or more."

So it would seem that my Vernatherm is moving, but not moving enough. It may also be moving slower than it should, which may indicate if it did reach the seat it might not have enough force behind it to close the bypass against the oil pressure. I also found the following quote on some forum:

[quote][i]Originally posted by RBY3576[/i] [br]Bob and Paul, We have several 172's in our fleet, and of the 160 and 180 hp Aircraft's we have had several concerns with high oil temp and then with the temp came the slight drop of oil pressure. Our field elevation is at 4234' and density altitude reaches 8500'-9800' on our warmer days. Of the 5, we found the Vernatherms were not closing far enough for the oil cooler bypass. If you pull the vernatherm and boil test it, the Lycoming manual will give you the specs required for full open and closed position measurements. The old V/T p/n 75944 should be discarded, and the new vernatherm p/n for the latest and greatest is 53E22144. The parts are cheaper through Cessna than Piper or Lycoming. We dropped all the temps by 20 degree's and oil pressure has been stable. Jerry [/quote]

My vernatherm is p/n 75944 as stamped on the part. My plan is to do as this quote suggests, to discard my p/n 75944 and order a 53E22144 to replace it. $184.85 plus shipping from A.E.R.O.

I've replaced just about everything else on this engine, so why not replace the vernatherm too? At the worse, the oil temperature problem won't change. At best, the oil temperature regulation will start working properly.

- Russ Erb
Three Sigma Troubleshooter

(*Lest you spend your days in suspense, all of Three Sigma's cooling problems would eventually be solved to the point where normal flights are possible. Stay tuned to future newsletters to find out how.*)

Slide Rule (A Book Review)

Slide Rule is an autobiography of **Nevil Shute**, successful novelist; aka **Nevil Shute Norway**, successful aeronautical engineer and founder of the aircraft company **Airspeed Ltd**.

The author tells about his early youth and fascination with mechanical things, especially airplanes.

He worked for **deHavilland** and left in 1924 to become the **Chief Calculator** for **B. N. Wallis** in the design of the successful R-100 Airship. (Wallis later became famous for the Vickers Wellington geodesic construction and for inventing the bouncing bomb used by the *Dambusters*.)

An artist's rendition of the ill-fated British Air Ministry's R-101. The Air Minister was killed in the crash. Wallis's R-100 had a successful flight from England to Montreal.

In 1930 during the depression **Nevil** found a benefactor and started **Airspeed Ltd** for the manufacture of small airplanes. He writes about some of the intrigue of weapon buying during the Italian war in Ethiopia.

By 1940 **Nevil** was forced out of the company and **Airspeed** became a division of **deHavilland**. All this time **Nevil's** hobby was writing novels which successfully sold more than 4-million copies by 1954.

Every aircraft engineer and administrator should read this book to be aware of:

(1) The absurd problems encountered when the British Air Ministry was designing the disastrous R-101 airship in direct competition to the private company who was designing the R-100 under contract with the same Air

Ministry. The Air Ministry also had to approve the R-100 drawings.

The factor of government politics deciding safety and first flight of a new design leads to trouble. (My opinion is that this happened to the **Bell-Boeing V-22** some 50 years later. And the **Challenger** disaster too.)

(2) The formation of **Airspeed Ltd** shows how important proper use of personal wealth can be to a society when an economic depression hits. (No person gets a job from a poor man.)

(3) The history of **Airspeed Ltd** demonstrates what happens to a company when investors, who do not understand the nature of the company, start to control the boardroom. (This is the same situation that precipitated the formation of **Pratt and Whitney Aircraft Engines** circa 1927 by key **Curtiss Wright** engineers.)

I cannot say that foreknowledge of the history presented in the book would have made any difference in my career decisions but I would have understood better what was happening around me.

I can heartily agree with **Nevil Shute's** last words: *"....for once a man has spent his time in messing about with aeroplanes he can never forget their heartaches and their joys, nor is he likely to find another occupation that will satisfy him so well, even writing novels.*"

"Slide Rule" is out of print but is available at Barnes and Noble out of print and rare books.

The internet has a lot of info on the R-100 and R-101.

By The Way, do you young readers know what a "slide rule" is? It is included in the "Coat of Arms" of the USAF Test Pilots School. An E6B is a specialized "circular" slide rule. Maybe an article on "what a slide rule is" in the future?

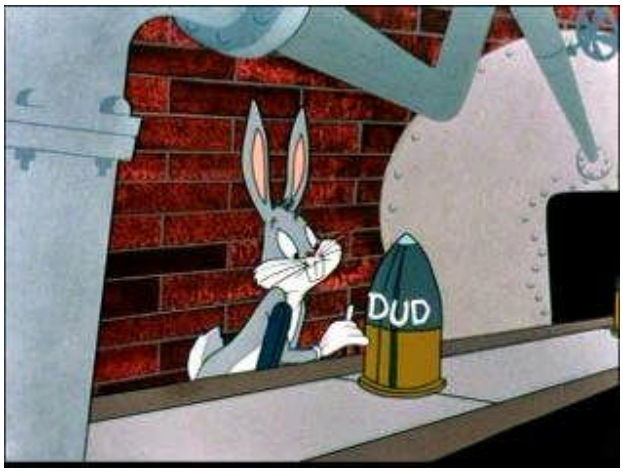
Has anyone used "logarithms" or even know what they are? Engineering technology does change but history is important so the same mistakes are not made by every generation (winged autogiros (1930's) and winged helicopters (1960's)).

- Lee H. Erb, aka **Erb the Elder**
EAA Chapter 1000 Det 5, Arlington, TX

Finally, The Complete Story Can Be Told

The previous picture was taken of **George "Knife" Gennuso** on 11 April 2006 while serving the local populace by exhibiting the B-17G *Aluminum Overcast*.

Erbman's intent in the photograph was to recreate a classic Bugs Bunny cartoon image. Unfortunately, he had no idea where to find said image. Well, he finally came across it while reviewing historical American cinematic footage. The "Short Feature" in question (that's "cartoon" to you and me) was *Forward March Hare*. Here are the subject images.



Knife's ears are a little shorter, but otherwise a good match.

Web Site Update

As of 7 February 2009, the hit counter showed **125273**, for a hit rate of 15 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

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

Jul 7: EAA Chapter 49 Monthly Meeting, 7:00 p.m., General William J. Fox Field, Lancaster, CA. (661) 948-0646

Jul 14: EAA Chapter 1000 Board of Directors Meeting, 5:00 p.m., High Cay, 4431 Knox Ave, Rosamond CA. (661) 609-0942

Jul 21: EAA Chapter 1000 Monthly Meeting, 5:00 p.m., Edwards AFB. USAF Test Pilot School, Scobee Auditorium. (661) 609-0942

Jul 25 – Aug 1: Bearhawk/Skywagon Deployment to OSH. Sign on now! (661) 609-0942 or (661) 256-3806

Aug 4: EAA Chapter 49 Monthly Meeting, 7:00 p.m., General William J. Fox Field, Lancaster, CA. (661) 948-0646

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

Aug 18: EAA Chapter 1000 Monthly Meeting, 5:00 p.m., Edwards AFB. USAF Test Pilot School, Scobee Auditorium. (661) 609-0942

Sep 1: EAA Chapter 49 Monthly Meeting, 7:00 p.m., General William J. Fox Field, Lancaster, CA. (661) 948-0646

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

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

Oct 6: EAA Chapter 49 Monthly Meeting, 7:00 p.m., General William J. Fox Field, Lancaster, CA. (661) 948-0646

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

Oct 20: 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.

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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
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http://www.eaa1000.av.org

ADDRESS SERVICE REQUESTED

THIS MONTH'S HIGHLIGHTS:
REGULAR MEETING 16 JUN @ TPS
NON-FLY-IN REPORT
VERNATHERM FOLLIES
SLIDE RULE BOOK REVIEW

EAA™
The Leader In Recreational Aviation