

T.W.I.T.T. NEWSLETTER



Flugwerft Oberschleissheim Horten IV after full restoration: old wings and new construction centerpiece. Picture by R. Storck.

T.W.I.T.T.

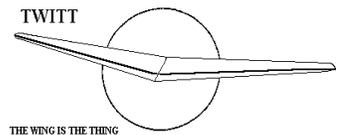
The Wing Is The Thing
P.O. Box 20430
El Cajon, CA 92021

HAPPY HOLIDAYS
HAPPY NEW YEAR



The number after your name indicates the ending year and month of your current subscription, i.e., 0412 means this is your last issue unless renewed.

Next TWITT meeting: Saturday, January 15, 2005, beginning at 1:30 pm at hanger A-4, Gillespie Field, El Cajon, CA (first hanger row on Joe Crosson Drive - Southeast side of Gillespie).



**THE WING IS
THE THING
(T.W.I.T.T.)**

T.W.I.T.T. is a non-profit organization whose membership seeks to promote the research and development of flying wings and other tailless aircraft by providing a forum for the exchange of ideas and experiences on an international basis. T.W.I.T.T. is affiliated with The Hunsaker Foundation, which is dedicated to furthering education and research in a variety of disciplines.

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Meetings are held on the third Saturday of every other month (beginning with January), at 1:30 PM, at Hanger A-4, Gillespie Field, El Cajon, California (first row of hangers on the south end of Joe Crosson Drive (#1720), east side of Gillespie or Skid Row for those flying in).

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PRESIDENT'S CORNER

This one almost didn't make it out on time. I just don't know where the time between newsletters goes these days, but they sure seem to be coming closer and closer together. I hope you enjoy this issue since I kind of threw it together rather quickly so it could be sent to the printer.

We have a good mix of letters from members and other who have directed messages to us in the past month. There is one message asking about electronic delivery of the newsletter, which we haven't discussed very much lately. As more people become connected to the Internet, maybe it is time to reconsider offering a dual level of membership, one for hardcopy and one for electronic. Of course, it doesn't mean that someone who wanted the hardcopy couldn't also receive the electronic version for the same hardcopy subscription rate. I would be interested in your thoughts about this subject again to see if there is more interest.

One of the distribution methods could simply by an e-mail message just letting you know the newsletter was on the website and ready for downloading. This would get you the issue about a week earlier depending on where you are located in comparison to southern California.

The Board of TWITT wishes everyone the happiest of holidays that you can enjoy with family and friends. We also hope everyone has a great New Years celebration as we move forward into 2005 and learn more about the benefits of flying wings.



**JANUARY 15, 2005
PROGRAM**

The January program will feature **Dave Rasp** who will be talking about the work of his father, August Rasp, during his years at Mississippi State doing aviation flight-testing. We expect he will have some new material he acquired while at a foundation meeting in November, and that some of this will include the Horten testing.

So if you haven't already gotten your new 2005 calendar, this should be a good reason to go out and get one so you can mark the date.

We are anticipating on having a speaker in March and will have more information in the coming newsletters as we obtain it. So, also make a mark on your March calendar for the third Saturday, because you won't want to miss it.



**LETTERS TO THE
EDITOR**

November 10, 2004

Mitchell Stealth 11:

I currently own the Mitchell stealth 11. It is not a copy of the U2. It looks more like a B10 with a lot of changes to the platform and airfoil. I am, currently flying a Bright Star SWIFT and would like to get the Stealth in the air. It needs a little repair and an optimized faring/pod. I would also span it out to 44 ft but am concerned about the Culver twist distribution. You can find the Stealth in a [U. S. Hangliding Magazine](#), Nov. 1994, page 22. It is not a very complete article but it shows the glider. I have flown it on short car tows 4 times not to any altitude. I got tired of being a test pilot, lots of broke body parts over the many years of curiosity.

I may be reached at this email or 951-674 5664.

Norman Castagneto
BKim186901@aol.com

(ed. – This was an answer to one of the questions we have on the website, which I have included as a reminder of what it asked.

Subject: Mitchell U-2...
Date: April 7, 2003

I'm trying to find a picture of what is supposedly the last U-2 wing Don Mitchell built. It won the Western Design Homebuilt contest. It was called the Stealth 11. I'm told there is a picture of it in your (TWITT) archives. Any ideas?

Vince Tracey
ixlan2@mcleodusa.net
www.sadlervampire.com



November 13, 2004

TWITT:

On my yearly holidays with friends in Naples, Florida, so I am sending you my renewal. Thank you very much for the very instructional TWITT Newsletter made by you after much work. It is so nice to see aviation activities in the US and looking back at the highlights of the US aviation history. I send you a few photos from the Deutsches Museum Munich, especially the Flugwerft Oberschleissheim section with the Horten IV on display. Recently a non-profit organization, Felix Kracht Foundation, has a replica of the H IV under

construction, hoping to fly it next year. Kracht was a member of DFS and flew a first pilot over the Austrian and Swiss Alps in 1936.



ABOVE: Horten IV on the ceiling of the old hanger in Oberschleissheim. On the floor are the Hoberstadt V (1912) and Fokker D VII (1918).

After my book "Flying Wings" I am working on a brochure of the works of Burt Rutan with the title "The Second Conquest of Space – Burt Rutan The Successful Aircraft Designer of USA". The 150 page brochure is full of the better known of his work with the development of some 45 experimental types and the Space Ship 1 for the X-Prize contest which he has won.

I am working in the library here with the aviation literature, "Aviation Week and Space Technology", etc. Maybe you know of some about Rutan that would also help with my research. I would be pleased to hear from anyone.

Thank you very much for all. With best regards,

Rudolf Storck
Bruckmeierweg 2
82041 Deisenhofen
GERMANY

(ed. – Thank you for writing and for the pictures. I hope our holiday in warm, sunny Florida were good. So if anyone knows of some good research documentation that covers any of the many Rutan designs, please Rudolf know.)



ABOVE: Scheibe Mis 13E and AV 36 (D-8273) and Muscular II all hanging from the ceiling. On the floor are the a Focke Wolf FW-44 and Cessna 195.

November 16, 2004

TWITT:

P lease renew my subscription to TWITT. Enclosed is a check for \$30. Twenty is for the subscription and ten goes to the refreshment fund.

Here are a couple of names for the Unsung Heroes of Aviation list;

The late Don Mitchell.
Steve Morse, the designer and co-manufacturer of the SWIFT and Millennium foot launched flying wings.

Michael Alexander
Modesto, CA

(ed. – Thank you for the donation, which I am sure those who attend the meetings will enjoy.

I agree with the added names and am sorry I hadn't thought of Don earlier.

November 15, 2004

Although I am sure most of you who are hang glider enthusiasts probably already know this, but Bill Bennett was killed in a motorized hang glider accident. I have included a brief account of Bill's contributions to the sport of hang gliding over the years. It is excerpts from the obituaries section of the San Diego Union Tribune, November 21, 2004, covering the life of Bill Bennett who died on October 7, 2004 while being recertified in a powered hang glider at Lake Havasu City Airport in Arizona. His death gradually became public through word of mouth in the hang gliding community and, was now being covered in the media.

Nicknamed "Birdman," Mr. Bennett, an Australian, introduced the modern controllable glider to the United States in 1969 with exhibitions in California before going on to perform high-flying stunts across the country. In one of his earliest stunts, he glided around the Statue of Liberty on July 4, 1969, before landing on Liberty Island.

He achieved a series of milestones in hang gliding, becoming the first to fly higher than a mile, soar more than 200 miles while under tow and pilot a motorized hang glider, according to "Sky Adventure" by Jim Palmieri. He set a 10,000-foot world record when he launched a glider by a hot-air balloon.

"Probably his most significant role is he helped to make hang gliding a household word," said Josh Criss, a hang glider pilot who interviewed Mr. Bennett for a documentary. "He was really extremely dedicated and a fearless promoter of the sport."

Through the 1970s and 1980s, Mr. Bennett's hang gliding company, Delta Wing Kites and Gliders of Los Angeles, helped pioneer the basic design of modern gliders, along with improvements such as emergency parachutes and Mylar-coated sailcloth, said Richard Boone, Mr. Bennetts' former chief designer.

He has been honored by the Soaring Hall of Fame, NASA's Space and Technology Hall of Fame and the Francis Rogallo Hall of Fame. The Smithsonian Institution's National Air and Space Museum displays gliders produce by his company. He was the hang gliding stunt double for actor Roger Moore in the James Bond film "Live and Let Die."

To the world of hang gliding and the aviation community in general, he will be missed.

TWITT:

Found this picture in a book titled Guide to Homebuilts by Peter Bowers, copyright 1969. It reminded me of a Roland Payen. I got the image from a website of twin pushers and other free flight oddities. Hope you enjoy.

Sincerely,

Larry Routson

(ed. – I am sure that we have probably had some of these pictures in past newsletters, but they are a good reminder of what was being done in the past. I have extracted the pictures from the websites noted below each series.)

This was Marion (Jim) Bakers attempt for a "midget racer" in the late 50's, early 60's. It was limited to an 85hp engine and the only choice available at the time was the Continental, 4 cylinder, air cooled engine. MB-1 Delta Kitten - Tailless, Lippisch-like delta. All-metal construction, tricycle gear. Winner EAA Design Trophy 1961. Those who flew the plane found it gentle and orthodox in response. Building cost \$2,000. [N57A].

The engine, propeller, main wheels and tires and part of the cowling was taken from a scrapped Cessna 140. The aircraft wasn't really pretty but still very interesting and it flew well.

MB-1 "Delta Kitten" Specifications:

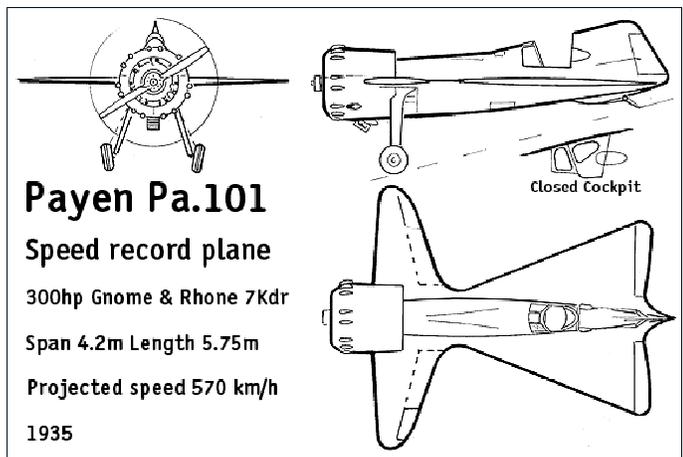
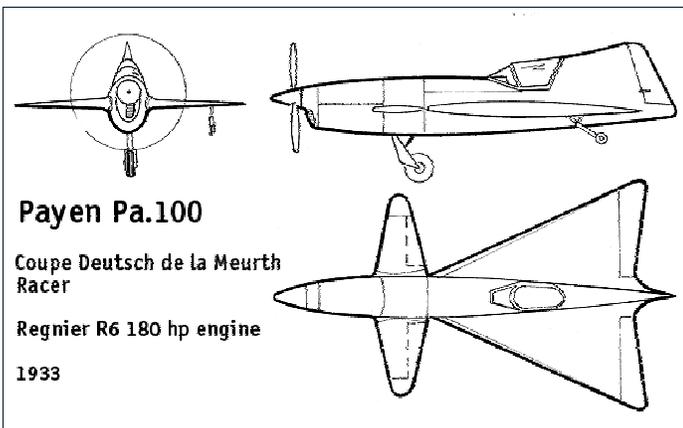
Span	18'
Cruising Speed	120 MPH @ 2400 RPM
Length	13' 3"
Top Speed	140 MPH
Empty Weight	584 lb.
Dive Speed	200 MPH+
Engine Cont.	C-85-12
Landing Speed	65 MPH
Rate of Climb	1000 Ft/Min.
Takeoff Run	500 Ft.





Baker MB-1 Delta Kitten (85 h.p. Continental C85 engine) (Howard Levy)

<http://x-plane.org/forums/lofiversion/index.php/t9215.html>



<http://home.att.net/~dannysoar2/Payen.htm>

November 24, 2004

Membership

Good afternoon:

What would the cost of membership be if the newsletter were to be emailed, rather than posted, please?

Adrian Peatman
 Gloucestershire, UK
 <atp@chosen-hill.gloucs.sch.uk>

Thank you for writing and asking the question. We haven't established a price for electronic delivery members, but the process has been discussed several times. My initial thought would be \$10 US to help cover the monthly cost of the ISP connection. This would also qualify you for access to the member's only section of the website, which right now contains about 2 1/2 years of back issues that can be downloaded.

Sometimes the files become rather large due to the number of pictures or illustrations, so I would need to know if you can take large files or whether you would need them compressed?

I look forward to hearing back from you about whether the price is reasonable for the electronic delivery, and the method you would require for the file sizes.

Sincerely,

Andy Kecskes, President

November 25, 2004

Dear Andy:

I would have no problem with \$10, only with the method of payment -your website says no credit card transactions. As to file size, that's not a problem: as a school, we have an enormous broadband "pipe".

I am very interested in building a U2 over here, but getting type acceptance would be very difficult, the UK has no Experimental category. I've just made contact with Hughie Lorimer and his Sgian Dubh project: are there any more TWITT enthusiasts in the UK?

Best wishes,

Adrian.

(ed. - This is another of those messages that is a long overdue answer to one of the questions we have had on the website for over a year. The answer probably was of no use to the student, but I thought it pointed out some interesting concepts to be considered for a BWB.)

Flying Wing Transport

In response to your inquiry on TWITT, a blended wing would be better for a 1,200,000 pound transport because it would allow a longer central cargo bay. Start your research by looking at the huge flying wing transport built by the Horten brothers in Argentina (post World War 2). It had a huge central pod for crew, cargo, etc.

Start by designing your cargo bay, then determining how big a wing, engines, etc. you need. You may want to park tanks 2 or even 3 wide to shorten the cargo bay. Also remember that paratroopers are happiest/quickest exiting side doors, so you need doors on both side 1 meter wide by 2 meters tall.

<riggerrob@hotmail.com>

That was in response to the following:

My name is Rudaba Khan I am a final year aerospace engineering student. For our final year design project we must design an ultra heavy lift aircraft (max payload approx 1,200,000 lbs). It must perform paratrooper drops, lapse drops and be able to carry ten tanks. As a part of our conceptual studies we are looking into the feasibility of a flying wing design for such a role, particularly the blended wing body design.

Could you please provide any assistance on the matter especially in regards to why a BWB flying wing design would be better than a flying wing design such as the YB-49 or the B2 bomber. Any assistance would be much appreciated. Thank you.

Kind regards

Rudaba Kha
fskhan@bigpond.com

(ed. – Here is more filler taken from the pages of the Nurflugel bulletin board. I thought these pieces had some interest.)

November 24, 2004

Horten HXc Moyes Version

Koen,

On your site, you ask the question about the wing fences on the H Xa. There were no fences on

the H Xb, yet the H Xc had fences again. Andy Kecskes captured a comment I made on them back in 1998:

"A comment was made about the small vertical surfaces on the H Xa. Al noted that they were used as stall fences because of some control surface problems.

They do contribute a lot of drag but were necessary to improve the effectiveness of the elevons. He did get rid of them on the H Xb and the drawings of the H Xc also don't show any fences. Phil Burgers noted that the Urubu (H Xvc) that is being restored in Argentina was used as a prototype tester of these fences for eventual use in the I Ae 38 cargo plane to have a positive yawing moment."

The fences on the H Xc drawing and as shown on the restored H XVc (I Ae 41 Urubu) in Argentina has the actual fences that were to be used as the experiment on the H Xc. the eventual goal was to put them on the I Ae 38 cargo plane (and they were put on the aircraft when it was flown, please see the pictures in Horten/Selinger/Scott "Nurflugel" book or on Doug Bullard's www.nurflugel.com site). But in the case of the H Xa, they were necessary to prevent stall control problems. I might be able to dig that up from one of Argentine articles I have from Roberto Tacchi or Rogelio Bartolini...

I have to once again publicly acknowledge the help and encouragement I had from many sources for this: Reinhold Stadler, Peter Selinger, Phillipe Vigneron, Bill Moyes, Juan Manuel Mascarello, and Phil Burgers. Honorable mention to Bruce Carmichael, Andy Kecskes, Russ Lee, Geoff Steele, David Myhra, Jan Scott, Edward Udens, and Paul MacCready. To those I have forgotten, that is an indictment of my memory and not to the help I received from you.

Al Bowers
<al.bowers@dfrc.nasa.gov>

November 14, 2004

Subject: RE: Re: Koen's Low Aspect Ratio Project - report

Regarding Koen's investigations of using a prone pilot position, there are some good drawings of the semi-prone arrangement used in the Horten H-IV in the Horten-Selinger book "Nurflugel". I understand from pilot reports that this arrangement was very comfortable for long flights, in fact more comfortable than a conventional seated arrangement.

On the other hand, the arrangement used by the Wrights was extremely uncomfortable. I got a fair amount of time in the 1903 Flyer simulator a year ago

when I was volunteering with the Wright Brothers' Aeroplane Company. Even after just a few minutes, my entire back and neck started to complain.

The Wrights abandoned the prone position after they started making longer flights including sustained turns in the 1905 Flyer. Apparently the "G" forces in even a shallow turn, pulling downwards on their heads, would give them terrible cricks in the neck. They decided that the drag penalty of upright seating was an acceptable alternative to a lifetime of pain.

The Horten H-IV and its siblings had better support for the pilot, including the pilot's chin, which is probably a key item. Also, they were at a slightly better angle, and the drooping of the legs downward into that lower pod undoubtedly helped the lower back comfort situation. Most of the accounts of prone pilot arrangements I've read talk about it as being much less comfortable than an upright seating arrangement, but the Hortens' arrangement was supposedly more comfortable. I'd study theirs closely.

You might also study the arrangements used in modern hang gliders, although I'd have to say that my own hang glider experience with both seated and prone arrangements found the seated arrangement much more comfortable in flight.

Don Stackhouse @ DJ Aerotech
 djaerotech@erinet.com
<http://www.djaerotech.com/>

November 14, 2004

Suggest that you build a mockup of the prone position; bottom alone should suffice to determine a useable prone position, and go from there. If I recall the Horten correctly, entrance was from the top. If it works for you, use it. If not then go back to square one.

Best of luck

Harry Thode
 <harry685@cox.net>

November 17, 2004

Subject: Re: Mach 10 With Their Hair On Fire!

Hi Al,

Curious why they did not recover the X43A with parachute or other system after the record flight? Would have been nice to get the plane back, possible Smithsonian display?

Doug Bradford
 <doug92626@yahoo.com>

Doug,

To save money. I know it's hard to believe that on a nearly quarter-of-a-billion dollar experiment you can't get the vehicle back in order to save money, but it simply wasn't possible without adding another \$100 million or so for recovery. The vehicle was so dense by the time it was closed out and ready to fly, there was not enough spare room inside for anything bigger than a softball (a sphere of about 4 inches diameter). This was due mostly to the choice of using gaseous H2, silane, and an extreme high-pressure (about 10k psi) fuel pressurization system (not pump fed). The plumbing was a nightmare inside the vehicle. And getting valves to work was a very hit-or-miss proposition because the technology was pushed that hard (you know, that's something else we will never get credit for; but the next time someone needs a high pressure valve, THAT technology will exist on the shelf READY TO GO without development for very low cost). After it was all done, there wasn't even enough room for a ballute to deploy just before hitting the water and to use as floatation. The product from all of this is the data...

It's still a good day here.

I have to say, it was very bittersweet though. It was the last flight of the B-52B 008. That aircraft turned 50 years old in April this year. It launched about 1/3rd of all the X-15 missions, and it launched ALL the lifting body missions. Gordon Fullerton (ex-astronaut) flew left seat and Frank Batteas was right seat. They did one touch-and-go (for proficiency!?!) before popping the chute...

Al Bowers
 <al.bowers@dfrc.nasa.gov>

From: Doug,

“Okay, I believe that this was a left-over from the old X-30 program. How come the X-30 program petered out anyway?”

Lack of money, will, and technology. Indeed, the X-43A is the left-overs from the X-30A National Aero Space Plane (NASP).

It is too bad that all the leftovers aren't so good. Like X-33, X-34, and X-37. At least on X-38, the technology was developed and is sitting on the shelf ready to go.

Can somebody point me to the URLs to clue me in on some of these projects and their leftovers?”

Al's Response:

X-33:

<http://www.dfrc.nasa.gov/Gallery/Photo/X-33/index.html>

<http://www.dfrc.nasa.gov/Gallery/Photo/SR-71-LASRE/index.html>

This one was the SSTO Shuttle replacement that was pursued (rather aggressively) for several years in the late 1990s. It was cancelled after several things made it politically unpopular (the final straw was the failure of the composite cryogenic tanks in a ground test, plus the inability to make the LASRE experiment for the aero spike rocket flight worthy). The X-33 would have been a subscale tech demo of SSTO technologies flown out of Edwards to Dugway on a Mach 8 mission.

X-34:

<http://www.dfrc.nasa.gov/Gallery/Photo/X-34/index.html>

This one was a development of the Pegasus air launched booster idea. Except X-34 was reusable. It would have resulted in an autonomous, recoverable, Mach 8 rocket which satellites could have been launched from as well as a hypersonic testbed for research (a scramjet experiment was proposed for this once as well, long ago). The two failures that resulted in cancellation were the inability of gaining reliability with the rocket engine (an ablative throat rocket called FasTrack) and a failed ground test of the autonomous system.

X-37:

<http://www.dfrc.nasa.gov/Gallery/Photo/X-37/index.html>

<http://www1.msfc.nasa.gov/NEWSROOM/background/acts/x37.html>

This vehicle was a tech development effort at Shuttle replacement technologies (not a replacement vehicle).

However, it suffered from mismanagement at the top in defining requirements (hard to hit a target unless you know what target to hit!). It did have some useful ideas incorporated, including autonomous landing (with a good degree of contingency flexibility built in) and autonomous mission management on-orbit. However, as a tech demo it's not going to be relevant to our next generation of crew vehicle (Exploration System's Crew Exploration Vehicle or CEV). This one will fly and test some of the autonomous landing capability, but then the technology will be shelved (ala X-38).

AGA is such a cool idea it HAS to be done. Maybe not in my career, maybe not in my lifetime, but someday it HAS to be done. Can you see it in your mind's eye? I can. I'm reading "Engineering and the Mind's Eye" by Ferguson. According to Ferguson, I'm still an engineer because I can see those things. I'm not completely brain-dead yet...

Al

November 26, 2004

SPACESHIP ONE NOTES

Bob Storck
<bstorck@sprynet.com>

From a friend:

I just had the extreme pleasure of speaking with Mike Melvill yesterday, the pilot of SpaceShip One's first two flights above the Karman line of 100 km. MSL, and with his wife. He gave a 45 minute presentation to the Aircraft Owners and Pilots Association conference in Long Beach on Thursday, and got a several-minute standing ovation. I was able to speak with him for a short while after his talk.

Since he was speaking to pilots, he didn't have to translate for the "general public" or pull many punches. He spent almost half of his time going over the flight controls and the entire cockpit layout inside of SpaceShip One, explaining how it is flown. I think this

is the first time this has been explained publicly in such detail, and it was amazing. There are actually four separate flight regimes, and each is flown differently. Just after launch, it flies like a piper cub, using a joystick and rudder pedals with mechanical linkages to the controls (no hydraulic assists).

When it goes supersonic, the aerodynamic forces are too high to be able to move the stick, and the controls are subject to flutter. So they use an electrically powered trim system, flown using the "top hat" switch on the joystick and a couple of grips on the arm rest of the pilot's seat. (There are backup switches to the left of the instrument panel, which had to be used on one flight.) This moves the entire horizontal stabilizers, not just the elevons on the trailing edges.

Eventually, they get high enough and the air gets thin enough that they can again use manual controls, although the response is totally different than lower down. But that goes away as they exit the atmosphere; the Reaction Control System nozzles are then used for maneuvering in space. Coming back down, the pilot has to reverse the sequence. There is no automated switchover of control systems; the pilot has to remember to move from one system to the next at the right times.

The rudder pedals are not linked. Each controls one of the two vertical stabilizer rudders separately. You can push both rudder pedals at the same time, and get a fairly effective speed brake, with both rudders canted outward. Push both fully forward and they engage the wheel brakes. But these are not very effective and are only really useful for steering input during rollout. The real brake is on the nose skid: a piece of maple wood, with the grain aligned down the centerline of the airplane. He said it was the most effective braking material they could find.

Stephen, we talked about G forces on Tuesday, and I got some of it wrong. He says that he gets hit with about 3Gs kicking him backwards as soon as he lights the rocket motor. He's supersonic within about 9 seconds later. But he immediately starts to pull up into an almost vertical climb. So he also gets over 4.3Gs pushing him down into his seat just from that maneuver. The combined force is "very stressful" and Mike says it's "important not to black out" at that point. He's going 1880 knots straight up within 70 seconds. On re-entry, the aircraft goes from being absolutely silent while in space to generating a deafening roar as it hits the atmosphere again. He's going about Mach 3.2 by that time, and has to survive about 5.5Gs for over 30 seconds, and lesser G forces for longer than that, as it slows back down. It sounds really intense, both as he explains it and on the radio.

A couple of interesting side notes: SpaceShip One has a standard "N" registration number; but it is

licensed as an experimental "glider". Apparently there was a huge bureaucratic hassle trying to license it as a rocket powered spacecraft, which they just sidestepped by calling it a glider. I asked him if it had a yaw string; he laughed and said that would have burned off. By the way, the registration number is N328KF, where 328K is the number of Feet in 100km. (White Knight is N318SL - Burt Rutan's 318th design.)

Mike says that the flight director system (called a TINU) was developed completely in-house by a couple of 28-year-old programmers, and is absolutely fantastic to fly. That's why they don't need a yaw string. But I had heard over the radio that Brian Binnie had rebooted the TINU just before the landing approach during the X2 flight, and it took quite a while for it to come back up. So I asked Mike what that was about. He says that during re-entry, the TINU loses its GPS lock. So it keeps trying to go back to catch up, re-interpolate and compensate for the missing data, and this keeps it a little behind in its actual position calculations. The pilot has no straight-ahead vision at all, so they have a real issue landing: they can't see the runway! The way they do it is to fly directly down the runway at 9000 feet; then they do a (military style) break and fly a full 360-degree pattern right to the landing. The TINU gives the pilot a "blue line" to follow and a target airspeed (which produces a given rate of descent). If the pilot follows the blue line, right to the break point and through the two 180 degree turns, it will put him right onto the runway at whatever touchdown point he selects. But the TINU has to be absolutely current when this is going on. So at something above 15,000 feet they reboot the TINU and get it re-synched with the GPS satellites again before setting up for the landing!

He also talked in detail about the rocket motor, and had photos of its insides after firing. The nozzle throat actually ablates as the motor burns, enlarging the interior throat diameter as the burn progresses. He described the problem they had on the June 21 flight: The rocket motor nozzle was skewed by about 1/2 degree to one side. This generated a surprisingly high lateral torque trying to turn the aircraft. If it had been up or down pitch rather than lateral, the controls could have handled it; but the lateral yawing forces were too great for Mike to compensate as the atmosphere thinned. The result was that he was pretty far off course. Mike says he reached apogee, rolled the spacecraft over, and was surprised to see the Palmdale VOR directly beneath him. That was 30 miles away from Mojave and a long glide home. He says its amazing how fast a relatively small deviation can produce large distances when you're going Mach 3!

For one of the static burn tests, they had fire and safety crews all standing a mile away, ready to duck if

anything went wrong. In the middle of the test, Mike and Burt Rutan walked up to the front of the motor assembly and felt the pressure vessel that contains the N2O. Mike knew he was going to have this same thing strapped onto his back soon, anyway, and he wanted to know how much it vibrated, how hot it got, and how loud it was. It was deafening, literally. It turns out that, with the nozzles they use at high altitudes, it's actually not that noisy inside the spacecraft. But he still wears hearing protection.

Scaled Composites seem to have fabricated quite a bit of the rocket motor themselves, including the N2O tank (which is also the structural core of the spacecraft) and the nozzle casings. It would be interesting to hear from Michael's friend exactly what parts SpaceDev designed and what they manufactured.

November 19, 2004

Subject: Espenlaub Story

Some years ago when I was flying sailplanes in the Tampa FL area, one of the "group" was Peter Espenlaub. The rumor was that his father was killed test flying a flying wing for the 3rd Reich. I'm curious if anyone knows, or has some leads about this story.

In a video of a seminar about the Horten H X Sailplanes, Al Bowers presenting, there is a Q&A following the presentation. I believe it is Bruce Carmichael that gets up and tells a story about an Espenlaub showing up at the Wasserkrupt, in the early days, with a sailplane that had a higher-than-ever-before aspect ratio. Later, someone said they taught his son, Peter, to fly hang gliders, and that he flew sailplanes in Florida, so obviously it was father/son connection. The flying wing rumor has intrigued me for years.

Sadly, Peter died some years ago in a crash of his Piper Cub.

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Hello,

There were two Espenlaubs. Gootlob and Hans, Gootlob (or Godfried?) flew rocket powered gliders of his design in 1929 and early 1930s. He was helped by his (younger?) brother Hans.

I will have to check my archives as I have a book in progress about the early rocket fliers, but I believe Espenlaub was injured in a rocket glider crash.

Regards

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<http://www.luft46.com/hpmpub/hpmpub.html>



ABOVE: 9th. August 1970, Neil Armstrong (USA) with the german glider pioneers Willi Pelzner and Gottlob Espenlaub (right) visiting the Wasserkuppe. Source: http://www.pilotenbunker.de/Unbek_Helden/Espenlaub/espenlaub.htm

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