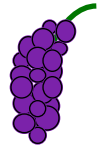


THE GRAPEVINE



EAA CHAPTER 663 Livermore, California

Vol. XXV, No. 1, January, 2005

There is a very fine line between "hobby" and "mental illness."

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BOARD OF DIRECTORS

BOB FARNAM	462-6355
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DICK JENNINGS	862-2345
GEORGE STEVENS	945-6504

MEETING AND PROGRAM

Our January meeting will take place at 7:30 P.M. on the 6th of January in the Terminal Building at the Livermore Airport. Our program will be a fascinating evening learning about what is probably the most precise satellite experiment ever to attempt to verify certain aspects of Einstein's theory of gravity and space. Come prepared to take notes, exam to follow.

MINUTES: GENERAL MEETING EAA CHAPTER 663, 12/2/04, 7:30 PM KLVK TERMINAL BUILDING

Chapter president Ralph Cloud called the meeting to order.

Two guests introduced themselves.

Ralph congratulated Harry Crosby on the first flight of his RV-6. Harry was not present to share

his smile.

The minutes for the November meetings were approved as published in "The Grapevine".

Treasurer Sharon Constant reported a total of \$2,288.61 in chapter funds.

Business: Arrangements for the Annual Dinner, 1/29/05, were discussed. Good food, (conventionally) heated room, speaker, Flying Magazine writer Lane Wallace, all for \$25 per person, how can you beat that!

The trailer committee, Barry Weber related the events leading to rediscovery of the trailer he had built years ago to haul around his Q-200 project. He will check into its condition and availability.

Tool czar Bob Farnam reported the cable tensiometer is still missing; the search continues.

Bob Cowan is making arrangements to have people from Stanford's Gravity Probe B come and explain their work on a very intricate satellite measuring gravity in space.

Ralph discussed his work with the **Airport Master Plan Advisory Committee.** Summary: There are lots of people living around the airport that do not share our passion for things flying.

Announcements: Next board meeting will be 12/16/04 7:30 at Ralph's place.

Break and then program: Bill Jepson passed to Roger Hansen who arranged to have chapter Life Member Tom Moore come and do a "Show and Tell" on his newly completed RV-7A which is powered by an Eggenfellner Subaru 6 cylinder engine. Tom led a question and answer session. The meeting then adjourned to the "T" hangar containing Tom's airplane, a beautiful and impressive project. Thank you Tom.

Some adjourned for pie.

MINUTES: BOARD OF DIRECTORS MEETING, 12/16/04, 7:45 PM, RALPH'S PLACE.

Members with the initials RC, BC, LF, BJ, JM, DJ, BC and DC were present.

Details of the **January dinner** were discussed. The last day to get reservations will be January 15th. John Goldsmith is coordinating with Lane Wallace the speaker.

Ralph has submitted the **chapter roster** to EAA headquarters. Those without EAA numbers listed on the web site were not included. This insures that our events will be covered by EAA insurance.

Bob Cowan is passing the **Young Eagle Coordinator** to Eric Helms.

Bob Cowan has arranged to have Shannon K'doah Range make a presentation on the at our January meeting. (Suggestion: check <http://einstein.stanford.edu/> for more information on the subject.) It should be interesting.

Meeting adjourned for pie.

Respectfully submitted,
Bruce Cruikshank, Secretary

SPACE SHIP ONE

From the Canard Aviators' group, unknown author

I just had the extreme pleasure of speaking with Mike Melvill yesterday, the pilot of Space Ship 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 SpaceShipOne, 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.

Mike 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: SpaceShipOne 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 re-booted 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 what ever 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 gen-

erated 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.

FROM AFGHANISTAN, THE STORY OF THE WEEK

From EAA 338

So we are up in the mountains at about 0100 hrs looking for a bad guy that we thought was in the area. Here are ten of us, pitch black, crystal clear night, about 25 degrees. We know there are bad guys in the area, a few shots have been fired but no big deal. We decide that we need air cover and the only thing in the area is a solo B-1 bomber.

He flies around at about 20,000 feet and tells us there is nothing in the area. He then asks if we would like a low level show of force. Stupid question.

Of course, we tell him yes. The controller who is attached to the team then is heard talking to the pilot.

Pilot asks if we want it subsonic or supersonic. Very stupid question.

Pilot advises he is twenty miles out and stand by. The controller gets us all sitting down in a line and points out the proper location.

You have to picture this. Pitch black, ten killers sitting down, dead quiet and overlooking this 30 mile long valley. All of a sudden, way out (below

our level) you see a set of four 200' white flames coming at us. The controller says, "Ah-guys-you might want to plug your ears". Faster than you can think, a B-1, supersonic, 1000' over our heads, blasts the sound barrier and it feels like God just hit you in the head with a hammer. He then stands it straight up with 4 white trails of flame coming out and disappears.

Cost of fuel for that: Probably \$5,000

Hearing damage: For certain

Bunch of terrorists thinking twice about shooting at us: Priceless

ANNUAL EAA CHAPTER 663 HOLIDAY PARTY

The annual dinner is coming January 29 at the Alamo Women's Club, 1401 Danville Blvd. in Alamo . Festivities (drinking, lying about flying and such) begin are to begin at 6:00 pm, with dinner at 7:00. We will have the same caterer as last year. Price is a measly \$25 and must be paid to Ralph, Larry or Sharon by the 15th of January so that we can give the caterer an accurate head count.

For those uncertain of the location of Alamo or the Alamo Women's Club, there will be maps available at the January meeting

The menu: **Appetizers:** Vegetable Plate, Seven Layer Dip and Meat Balls

Salads: Caesar and Spinach

Main courses: Baked Chicken with herbs and natural gravy and Tri-Tip Beef

Desserts: Pies to be selected by Larry Fish

The Program: **Lane Wallace:** She writes a monthly commentary for Flying magazine as well as doing feature articles for them (and us.)

This is a map???

_____ Danville Blvd _____ 1401 _____

_____ Stone Valley Off ramps _____ < _____
_____ I -680 _____ > _____

ALL MEMBERS, NEW AND RENEWING, PLEASE FILL THIS FORM SO THAT WE CAN GET THE DATABASE UP TO DATE AND COMPLETE.

EAA CHAPTER 663 MEMBERSHIP APPLICATION/RENEWAL FORM

NAME _____ NEW () RENEWAL () DATE _____
ADDRESS _____ CITY _____ STATE _____ ZIP _____
E-MAIL ADDRESS _____ HOME PHONE _____ WORK PHONE _____
FAX# _____ WORKFAX# _____ EAA# _____ RATINGS _____
PROJECT _____ FLYING? _____ HOURS _____
SKILLS, PROGRAMS, I CAN GIVE, ETC. _____
NAME TAG YES () NO () NAME TAG INFO _____ HANGAR No. _____
SPOUSE _____

Please give or send this completed form with a \$30 check (**No cash**, please) to:

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