

The C eCO

Experimental Aircraft Association • Chapter 393 • Concord, CA

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MAY 1994

YOUR 1994 OFFICERS

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MEMBERSHIP MEETING

May 25, 1994 (the 4th Wednesday of every month) @ 7:30pm; Old Buchanan Terminal Building, Concord Airport. Please wear your badges to help those of us who don't know you yet. Also bring chairs since we don't seem to ever have enough.

BOARD MEETING

Board meetings are scheduled for 7:30 p.m. on the Wednesday following the Membership meeting at Fred Egli's house. If you are interested in attending or have a matter you wish to discuss, please call.

POST-MORTEM... Northern California EAA Fly-In by Glenn "Just Trying to Help" Werner

Members of nine EAA chapters converged on Tracy airport with trucks, airplanes, tools, rope, food, sodas, raffle prizes, and boundless energy and started in putting things together to make a successful fly-in. We roped off a large parking area for cars. We separated "experimental" parking from "Antique/Classic" from "Spam-Can". We even moved some of the resident airplanes to comply with our plan. Things were really shaping up. By lunchtime on Friday, we had things looking pretty good. The weather by then was clear and a little breezy. By 3:00 PM, the planned start of the fly-in, the "...isn't that a nice breeze?" turned into "...we had better tie them down tighter!" I mean we could have held an iron kite flying contest. We had no problem enforcing the wing-walker rule though.

Some airplanes required two sets of wing-walkers to escort them to the runway, aim them into the wind while the pilot added power, then let them go to watch them ascend like a homing pigeon. There weren't many fly-bys on Friday.

Saturday was different. Not better, just different. The wind had blown in some nasty rain stuff (meteorological terminology) and parked it over the area for the remainder of the event. Volunteers and visitors alike did everything that you do at a fly-in. Breakfast was served on Saturday morning, lunch was served in the afternoon, raffle tickets were sold all day. They looked at the display aircraft which included the DeHavilland Comet, several Glasairs, Ezes, Cozys, RVs, and a Lancair.

We had a raffle drawing while ticket buyers stood in the pouring rain. This was quite a collection of airplane people. True Grit. In a temporary break in the weather, the gray Lancair did several high speed fly-bys (do Lancairs do any other kind?) with a spectacular climbout to 8000 ft. The highlight of the day!

The feed back I received from people who attended was that they liked the friendly atmosphere of a small fly-in. Without the encumbrances of closing the airport while someone jumps out of a perfectly good airplane with a parachute, only to descend unharmed to the ground. They like a fly-in that is "fly-in-able". We will endeavor to make succeeding fly-ins "Fly-in-able".

YOUNG EAGLES PROGRAM

by Lisle Knight

June 11th is International Young Eagles Day. If there are any participants who would like to make their flights on that date, please see me during our meeting so we can set up aircraft and flight leaders.

MAY PROGRAM

Our speaker for this month was supposed to be Brian Shul. He was an SR-71 Blackbird pilot, and is now an author on aviation's most memorable military hardware. Unfortunately he had to cancel at the last minute. As of press time Lisle is trying to find a suitable replacement.

MINUTES OF THE CHAPTER MEETING

held April 27, 1994

The meeting was called to order at 1930 hours by Fred Egli. There were 50 members and visitors in attendance. The minutes of the March, 1994, meeting were approved as submitted in the April, 1994, Cleco. The floor was turned over to Grace Ellis so that she could talk about her current campaign for County Supervisor. She needs our support, if she is going to win.

April raffle winners were Lou Ellis, Tom Smith and Don O'Neil. Winners, please remember to bring raffles prizes to the May meeting.

After the break, Martin Holman gave us a brief history of composite airplane design. Composites were first used around 1962 in the European sailplanes, because the composites could withstand higher G's than aluminum skins. In 1975 Burt Rutan designed the VariEze using "surf-board" technology. Martin thinks that the Long-eze was probably Burt's best design. Also in 1975 Tom Hamilton designed and built the Glasair, which became the first composite kit on the market. On the subject of Lancairs, Martin said that the Lancair IV was designed around the TSIO540 -- any other engine will cause CG problems. After many digressions, Martin finally talked about the Stallion, which he has designed to be a good utility airplane.

TREASURER'S REPORT (as of 5/9/94)

Savings:

Beginning Balance	\$2,668.15
Wayne Handley (Xmas Raffle)	(100.00)
Interest Income	<u>5.50</u>
Ending Balance	<u>\$2,668.15</u>

Checking:

Beginning Balance	\$1,442.55
Receipts	98.00
Disbursements	<u>151.40</u>
Ending Balance	<u>\$1,389.15</u>

JULY PICNIC

Once again it is time to begin the process that results in that event we all know as the Picnic or July meeting. Pete Wiebens has graciously volunteered (you didn't really think we would hurt that nice yellow plane did you?) to organize the event. He is now seeking people to provide hot dogs, hamburgers, buns, salads, plates, utensils, etc. There has been a slight change in philosophy regarding funding the soiree. It seems that our mad money went to the Tracy "rain festival," so this year we are experimenting along the lines of "pot luck" (homebuilt food?!). So we will have a sign-up sheet at the May & June meetings for members to pick their contributions. Or you can contact Pete personally at 933-7517.

WELCOME NEW MEMBERS

We had one new member attended the April meeting: Tim Glenn is building a Kitfox 5.

Calendar of Events

May 13-15 Camarillo EAA Chapter 723 Fly-In & Air Show

May 20-21 Luscombe Gathering, Columbia, CA
Judging, Spot Landings, lies. Tel. Art 209-432-4865

May 20-22 Hayward to Las Vegas Air Races.
All types aircraft. Bob Hecocks 408-867-1154

May 27-29 Watsonville Antique Fly-In & Air Show

This is the largest collection of vintage and homebuilt airplanes on the West Coast (over 500 display planes). This year's theme is the 50th anniversary of D-Day, featuring warbirds: P-51, P-47, P-40, F4F, F6F, F-7E, B-25, A-26, Sea Fury, TBM, B-17, B-24, etc. The Collings Foundation's B-17 "Nine-o-Nine" and B-24 "All American" are expected.

If you fly in, the field closes at noon, Saturday and Sunday. Check Flight Service for temporary tower frequencies. Follow the traffic! NO PASSING! The pattern gets pretty extended there.

Jun 3-5 Merced Antique Fly-in

Jun 5-6 Paso Robles Air Show & Formula One Air Races

Jun 10-11 44th Annual Porterville Moonlight Fly-In

Arrive Friday morning and set up your tent or check in. At 5 PM, there is an early bird dinner. The live band starts at 9 PM for dancing. On Saturday morning, the landing contest and bomb drop take place, followed by judging. At noon the ceremonies begin, with an airshow at 1 PM. Dinner is served again with music at 9 PM.

There are camping spaces on a first come first serve basis. They have restrooms with hot showers adjacent to the camp area. This place fills up fast, and if you don't get there VERY early, you will end up parking in the brush between the taxiway and the runway.

This fly-in is a great time with lots to do. There is a restaurant/bar on sight and the hangar flying runs rampant. Also, it's a very large event and there will be a temp tower set up.

Jun 11 EAA International Young Eagles Day

Jun 25 Georgetown CA - 3rd Annual AVSIG Fly-in

Jun 25-26 Redding Air Show
Thunderbirds. Tel: 916-222-4567

Jul 6-10 Arlington, EAA Fly-In & Sport Aviation Conv.
Tel: 206-435-5857

Jul 16 Chapter 393 Picnic

Jul 23 Solano Air Fair (Vacaville Air Fair)
Nut Tree Airport. Free parking. Free admission.

Jul 28-Aug 3 EAA Oshkosh '94.
Tel: 414-426-4800

Sep 2-3 EAA Chapter 376 End of Summer Fly-in.
Madera, CA - Call Jim Pratt 209-435-4742

MINUTES OF THE BOARD MEETING

The May 4, 1994 board meeting was called to order at Fred Egli's house at 1930 hours. In attendance were Fred Egli, Lisle Knight, Louie Goodell, and Ken and Linda McKenzie.

Discussed assisting Pete Wiebens with the July Picnic planning. Also discussed having Don O'Neil find a restaurant for the Christmas Dinner. Divided up list of unpaid Chapter members to be contacted by the board.

(SLOW) RIDE TO OSHKOSH

Don Baldwin (Teeny 2) is looking for people to share in an adventure this summer. He is taking his shiny new truck and large trailer (very popular at Tracy!) to Oshkosh this summer. He says there is room for three more companions; anyone interested in seeing some nice country at low altitude and is willing to share expenses (you will have a nice place to stay REALLY close to the airshow) should see Don at the meeting or call 685-1639. Don expects the trip to last approximately two weeks.

COMPOSITE WORKSHOP REVIEW

by David M. Parrish, as posted on the Internet
Newsgroup: rec.aviation.homebuilt

This weekend (posted 5/6/94), I attended the composite basics workshop put on by Alexander Aeroplane in Griffin, GA and I thought that others on the net would like to hear my impressions on the workshop and what I think are some very useful techniques presented.

First off, a little about the workshops and in particular, the instructor for the composite workshop, Stan Montgomery. Currently, Alexander is running three - two day workshops on basic composite construction, welding and fabric covering that are held in Griffin, Syracuse, Oshkosh, Trenton, Bloomington, Houston, and Lakeland and will soon be adding workshops on other topics like wood and metalworking. Stan also mentioned the possibility of three and five day advanced composite workshops and another workshop on finishing.

Stan Montgomery is a very good speaker, has a masters in chemistry, so he knows his resins, and was a military pilot and has built numerous homebuilt aircraft, so he knows airplanes and composite construction. He's also VERY passionate about composites. This has caused some - er - disagreement with illuminaries such as Dick Rutan, but anyone that can make a spar shear web out of heavy, finely woven bid glass and achieve 40% resin, BY HAND, and still use peel ply should be listened to seriously.

For those that don't have the foggiest what I just said, some extra information. The spar carries the weight of the plane through the wings, and the spar web carries the load between the upper and lower spar caps, forming a strong and very stiff I-beam inside the wing. In fiber/resin composites, the fibers carry the load while the resin keeps

the fibers together. If there is too little resin, the fibers don't stick together as well, and the part is weakened. If there is too much resin, which is much weaker than fiberglass, then the resin starts taking some of the load, and produces a weaker product.

The problem is, most homebuilders think that if resin is good, more is gooder. But anything above 60% resin, 40% glass, is actually weaker than 50-50 or 40-60 and is both heavier than it should be and more expensive, since any resin, from \$20 a gallon polyester to \$100 plus a gallon epoxies are expensive to buy.

Bid glass is a fiberglass cloth that has nearly equal number of fibers both along and across the bolt of cloth. Peel ply is a light weight and finely woven nylon or polyester cloth that is used as the last layer in a layup. When peeled off, it fractures the resin surface for a stronger bond with subsequent layups without using sandpaper, which damages the glass fibers on the surface.

Back to the workshop.

The syllabus had an ambitious schedule that we were unfortunately unable to keep up with because of time constraints. Even saying that, the most important points and procedures were hit upon. The first part of Saturday was a lecture that covered what composites are, safety with composite materials, and various techniques used in composite construction. Most of the rest of the two days was hands on building of a short section of a canard with interspersed discussions on other composite techniques, including a hands on vacuum bagging.

The construction of the canard started with a block of blue polystyrene foam and a pair of templates, so we had to hot wire out our own canard cores. Hot wire cutting the foam is a very intense few of minutes where you have to be aware of wire temperature, cutting speed, wire drag, tension against the template and exactly where your partner on the other side of the wire cutting frame is at on the templates. This is done by numbers around each template that one calls off and the other gives faster of slower cues as the pair cuts around the templates.

Once cut out, the leading edge just in front of the spar cap recess is hot wired off and the front edges of the trailing edge part were rounded so there are no sharp edges for the spar web to go over. Once rounded, the spar web area is filled with epoxy filled with microscopic glass balloons or Alexander's superlite filler. Both are very light in weight and prevent raw epoxy from soaking into the foam.

A quick, unsolicited ad for the superlite epoxy filler. This stuff is a very light weight filler that can be used in place of either Bondo or microballooned epoxy and was developed by Stan. It has a density at least half that of Bondo, doesn't shrink, is very sandable, and contains a built in chromate conversion for use on aluminum. It also contains an agent that helps fine entrapped bubbles rise to the surface and burst so pinholes are greatly reduced. The only thing I've tried it on so far is to fill an aluminum nose

gear fork, and it has very nice working properties. I'm definitely going to try it when I start finishing the wings on my Velocity.

Anyway, next Stan showed us how to a layup with 40% resin, yet still be fully wetted out. First he cut out two ply of glass cloth to approximately the right size, weighed them, and then placed them on a piece of plastic and poured on a weighed amount of epoxy to an exact 40% resin, 60% glass by weight ratio. He then put another piece of plastic over the layups and worked the epoxy into the glass. To evenly distribute the epoxy, he would occasionally fold the glass and work it some more, making sure not to crimp any folded glass and carefully applied heat from a hair drier to thin the epoxy out. When he was done, the layup was totally saturated with no white streaks indicating dry spots. Once this was done, it was applied to the canard core and a sheet of peel ply was squeegeed onto the surface, further reducing the epoxy content of the layup.

According to Boeing, this is impossible. They can achieve a 37-63 ratio, but only by using multi-million dollar autoclaves. While a 40-60 ratio takes quite a bit of experience, I was able to do a 50-50 layup with no problems on my first try. Wake up guys. Homebuilders are at least ten years ahead of anything that comes out of the big iron plants. The only thing that may come close would be the formerly Beech Starship, and it was designed by the homebuilder's homebuilder: Burt Rutan.

I do have one nit to pick with Stan on epoxy though. Being a chemist, he wants exact molecular ratios of resin to hardener, therefore the only way to do this is by weighing both the resin and the hardener before mixing instead of using an epoxy pump, which does do ratios by volume. For me, working alone, all that extra weighing of resin and hardener just takes too much effort and time. Assuming the pump is working correctly, the volume ratio is based on the weight ratio of the two components and the only weight ratio change would be from the DIFFERENCE in the expansion rates of the components with temperature. Since most epoxy systems has a 5% margin of error, I'm not overly concerned about this difference, but I am going to retest my pumper at various stroke lengths. Also, if you have a scale that can only register 2 grams and you're doing a batch of ten or twenty grams for a small layup, you may end up with an error greater than 5% anyway. Knowing the weight of the glass and the epoxy used in most layups I totally agree with.

Another neat technique he showed us was with unidirectional spar cap tapes. The tapes are only a few inches in width and produce a thick layup. The rovings are held together with a sparse cross thread, but any weaving in a glass cloth reduces the strength. What he did was find the single fine thread on the edge that held the cross thread in place and removed it after the tape was placed on the canard. Once it was removed, the cross thread was carefully removed, leaving straight, flat fibers

in the spar cap. That one even surprised the epoxy manufacturer that sat in on our workshop on Sunday.

Recommended tools were scales, layup rollers and a hair dryer. The scales are used for weighing the glass and epoxy to calculate their weight ratios. The rollers are for working out air bubbles and to distribute the epoxy. He was against using a paint brush to remove air (a process known as stippling) because it tended to break up bubbles instead of removing them. Layup rollers are shaped something like a small paint roller, except the roller is plastic or aluminum and has a grooved surface that allows entrapped air to escape. The hair dryer is probably his favorite tool. With it he can drastically thin the epoxy to improve wetting of the glass and speed up the setting time.

Another point he made was that all epoxy layups should be post cured at an elevated temperature. All epoxies have what's called the glass transition temperature, where it loses its strength. They all have a maximum transition temperature, such as 190 degrees Fahrenheit, but the actual temperature that it weakens is only thirty or forty degrees above the temperature that the resin was cured at. If it's 60 degrees when you make a wing, the wing will sag when the skin reaches only 90 degrees or 100 degrees. Not good if you fly down to Sun 'N Fun!

To fix that, after the initial cure is done, Stan post cures the part by heating it to 130-150 degrees for a few hours with the part supported so it doesn't bear any weight. This can be done by painting the part with black tempera and leaving it out in the sun or by putting it in an 'oven' made out of cardboard boxes and a small forced air heater.

All in all, I really enjoyed the workshop. There were some problems that I think were due to the newness of the workshop and limited time, but over all, it was well worth the \$150.

DREAM MACHINE (4 PLACE VERSION)

by David Doshay, as posted on the Internet
Newsgroup: rec.aviation.homebuilts

I guess I have passed the threshold of 'enough' requests to re-post my thoughts after my visit to the Velocity factory in Sebastian Florida. I was there in April 93. Damn, it was not supposed to take more than a year for me to get one. But on the bright side, the House from Hell is sold, and the new one, complete with 3 'car' aircraft building space, should be ready mid July. Then I can get back on schedule. I expect that I will be building by the end of this year.

So, here is the original posting:

This is the long overdue report of my visit to the Velocity kit manufacturing facility in Sebastian Florida. I was there on 12 April 1993, and I flew the demonstrator Velocity 173. It has a 200 hp engine.

The standard Velocity that used to be known as 'Big Orange' had just been transformed into a very bright pink to match a very large Pink Panther doll, and was not ready

for flight. The picture in this month's Kitplanes does not really capture how bright a pink it is.

I have previously visited 2 kit manufacturers, and I would highly recommend that everyone visit the factory of any plane you are considering. You will see things about the way they run their operation that you will not be able to learn any other way. In my other 2 visits (Dragonfly many years ago when Rex Taylor was in Arizona, and the Air Shark a few years ago in Florida) I realized that even more than being able to test fly the plane, you get a feel for the person selling the kit. The Dragonfly was interesting, but not the airplane that fit all my requirements. I was very impressed with the operation Rex was running and saw how he answered builder's questions over the phone. Knowing the kind of builder support he offered made it hard to decide against the Dragonfly.

When I saw Air Shark I quickly decided that this was a person I did not want to depend upon for ANYTHING good. He was an absolute flake and proud of it. The kit pieces were made poorly, and he bragged that he was writing the builder's manual just fast enough to keep the fastest builder informed. You can guess at how good that instruction manual was. No need to go on about the Air Shark, it was a singularly horrifying experience, but one that put me on my guard about people selling kit planes.

*****insert disclaimer here*****

I figure that I will be spending a few years building this thing, and I had better be in contact with the right kind of people considering the time and money involved. I want this to be fun, not a continual pain.

Back to the present and my trip to see and fly the Velocity: We arrive at about 8:00 on a very nice day. CAVU and only a slight breeze. It seemed rather dry for Florida, which was to my liking. The Velocity facility is a large hangar with a small nice machine shop and plenty of space for the collection of parts inventory and molds for laying up the fiberglass parts. They have 2 molds of each half of the fuselage, and parts were laid up and curing in each. The molds are quite rigid, and I believe that they are made in a way that will result in excellent uniformity from piece to piece. I have some experience making jigs, and these struck me as not so much professionally designed, but instead well done in a practical way. The entire area was dustier than I might have liked, but not in a way that would interfere with the ability to lay up parts. 2 people were setting up to do some glass work and 2 others were in the machine shop. In addition to the 173 demonstrator and Pink, 2 other Velocities were under construction. The inventory of parts is surprisingly large; there was a dozen or so of most every glass part, and considerably more of many of the machined metal parts.

I eventually found Duane Swing, the new owner, and he gave me an enthusiastic, but inaccurate, greeting of "Hello Mr. Doshay! I've read many of your faxes!" I have never sent a fax. I have called 3 times to arrange and verify my visit.

Duane showed me around the place, and discussed many of the ways that they have made the Velocity easy to build properly. They do most all of the critical work, like cutting the foam wing cores so that they will have the proper washout, and they include in the kit a number of preshaped leveling guides with the bubble level attached to simplify alignment and angles of incidence. The basic theme is that you level the bottom half of the fuselage, and then attach other pieces set to level with the leveling guide for that part.

Duane related a few stories of people who had ruined a part for one reason or another (including a crash) and that replacement parts were sent free of charge. In the case of the crash, which was caused by the builder misrouting a wire near the retractable gear, the bottom of the fuselage had been ground off. They took measurements and laid up a plug in the molds. The repair was thus high quality and really easy.

The overall quality of the parts is good, but not excellent. The gel-coated parts like the fuselage are finished very nicely. There are minor voids in the epoxy in some of the glass parts that I am quite sure will have absolutely no effect upon the strength of the parts, but someone as obsessive as myself will end up filling some of these parts with micro for a nicer finish. This is not to say that the layups were not wet-out properly. All of the glass was in epoxy. I am referring to cosmetic details only. The metal parts are very nice, and I am impressed with the completeness of the kit. A few parts cost extra, like a nice custom grip for the stick and a new panel that cants the radio stack toward the pilot, but stuff like the switches and motors for the electric trim system are included. Duane developed the retractable gear system for the Velocity before he bought the company from Danny Mahre, and like much of the rest of the airplane it seems to be the work of an accomplished practical tinkerer, as opposed to an engineer. He may be an engineer, I am only relating a personal impression. The retractable gear system is simple and it uses well made parts that were originally designed for another purpose.

There were 2 Subaru opposed 6 cylinder engines in the shop awaiting an installation into an airframe. The engine is said to be rated at 230 hp. Duane said that perhaps they will get it into the pink one by Oshkosh, but that they might not. One of the big issues for Duane is backup/redundancy for the computer that controls the engine. The details of how to get 2 installed so that one will be ready if the primary unit dies has yet to be fully worked out. The computer monitors the engine to control the mixture and ignition timing. Duane said that one interesting aspect of the stock engine computer is that it has a "get home" mode which defaults the mixture control for the fuel injectors to nearly full rich. This mode kicks in if some parts of the engine computer stop working right, or if the set of sensor readings indicate that "get home mode" is the right thing to do. We discussed briefly that there are people in the Silicon Valley area that make their

living reprogramming the PROMS in engine computers for folks that want more performance for their cars. There was a Ross reduction unit near the engines. It seemed well made to me, but I cannot claim to have any experience that would let me know what kinds of gears it takes to handle 230 hp. Duane told me that he had a little trouble with Mr. Ross over the gear ratio: Duane wanted the prop to turn 2700 rpm at the engine's peak hp. This report is plenty long enough without me commenting on that. Mr. Ross sent Duane what Mr. Ross thought was best. My main thought at the time was that those engines sure were dusty, much dustier than I felt comfortable with.

At that time Duane had to straighten out a problem with an order he had placed for foam. Before he went off to do that I mentioned that I had a list of what I would like to do on the flight. He clearly was not pleased, saying "The plane will do all of this, but you won't have any time to enjoy the flight. Besides, I only have so much time for a demo flight and I did not think it would take more than 30 or 40 minutes to do it all, and he said that a demo flight was usually about a half an hour. He then told me that he had 3 guys from Flight Safety International come by the week before expecting to all get in the plane and do loops and rolls. I explained that the stuff I had planned was just a standard set of tests of various stability modes, and I had no intention of doing anything ridiculous like acrobatics in a crosscountry plane, especially when fully loaded. Duane said something like - The plane flies very well, but it may or may not meet your specific criterion. My overall impression is that Duane is not much of a 'numbers' person, but has good intuition for what works and what does not.

The list of maneuvers I had was something I was given by a friend at NASA who is an Aeronautical Engineer with a strong interest in canards. His job is to do computer simulations to predict flight dynamics, and he has written a program to evaluate the dynamics of canard aircraft. I was attempting to get enough information to specify most of the inputs for his program, thereby allowing the code to predict the rest of the dynamics of the Velocity. His program has been used to predict behavior and modify other canard aircraft, and it seems to work well.

Until Duane was ready to fly I wandered around some more and watched the guys doing the glass work lay up the parts for the fixed landing gear. They were methodical and the parts were made in a very straight forward manner. The things they used to make the gear legs were cleaner than the floor or those engines, which accounts for why I feel that the integrity of the glass parts is not compromised by the level of dust in the shop.

When it was time to fly Duane seemed to be in a bit of a hurry, but I think that was because of how long he thought my list of maneuvers was. I had requested a weight and balance (very important for calculating dynamics) and fuel on board, but all I got was an estimate of about 25 gals of fuel. My wife Aviva (115 lbs) and 2 year old child (40 lbs including car seat) climbed into the

back, Duane into the right front, and me into the left front seat. Climb is the operative word. Getting into the Velocity looks harder than it turns out to be. I have had 2 operations on my lower back, and I cannot do any weird or strenuous twisting, and it was easy for me. To get in you put your rear on the strake and then swing your legs onto the pilot's seat, and then step to wherever you wish to sit. The only odd part of this is that the strake is high enough that a stool or a bit of a jump is needed to get one's rear up there. There is a new combination step and pito tube that lets you climb up, but it is a tad awkward and I really wonder how accurate the airspeed indicator is with the pito tube in that location. This pito tube location is undoubtedly in the downwash of the canard, may be in the up- or downwash of the strake, and I guess that I just have my doubts that it all works out just right. But, it is possible that the system has been calibrated. We did not discuss it.

Duane explained that the prop was new, and that they had not had the time to verify that it was optimal; that it really took full power to spin it 2700 rpm. I am sure that it is a new prop because Venky@belcore told me that he was in the plane when the previous prop had delaminated. The new prop is from a different prop maker than the last, and they are evaluating it. Sorry, but I do not remember the details on the prop.

We all wore headsets connected to a portable intercom mounted between and just behind the front seats. Aviva wrote down the numbers from the maneuvers and the comments that Duane and I made during the flight.

The cabin is wonderfully roomy, more like a car than an airplane. Duane is a pretty big guy, while I am tall but slender. I never thought that we would touch shoulders during flight. The arm rest provided by the storage compartment in the first foot of the strake does plenty for increasing freedom of movement. Plenty of headroom too. I am 5'11" and had perhaps 4" of headroom. The seating position is very comfortable, although I would move the seat back about 1.5 inches for my legs (Danny says this is no problem in the video tapes). I have been very uncomfortable in other kit planes I have tried sitting in.

The Velocity taxis easily, and uses differential braking for turning. I am a 230 hour Cessna 172 pilot and did not find the transition to not having a steerable nose gear difficult at all. A distinct difference between the Cessnas and Pipers I have flown and the Velocity is that the brakes are not of the 'toe brake' type, and the rudder pedals are not interconnected. Like many other aircraft of similar configuration, stepping on a rudder pedal moves only one rudder outward from the neutral position. The rudders are not able to move inward. This seemingly unusual pedal arrangement leads to a very simple and easy to control brake system: when you start to step on the pedal it activates the rudder, and when you push further it activates the brake for that side. The master brake units are Toyota and there are disk brakes with inner and outer moveable pads. The brakes work very very well. Duane

described the brakes as having much more capacity than the ones on my C172 on an aircraft that has a gross weight 100 lbs below mine, and 250 lbs below that of the newer C172s (but the lighter airframe still results in a greater useful load). This is true, but it is also true that the Velocity lands faster, and the kinetic energy going as mass times velocity squared, the extra capacity is in my opinion a great idea. I'll get ahead of the story a little to state that the breaks did work very well on the landing rollout.

With all of us onboard, Duane went through a very simple preflight check (I was away from the plane when everybody else got in and the plane was pushed out of the hangar, so I do not know what kind of external preflight he did): fuel level check in the clear tubes, radios and electrical switches off, ... start the engine. It was exactly 9:00 at engine start. OAT 75F, Pressure Altitude -160ft, altimeter set to 30.12 to indicate proper field elevation (although Duane was not too sure exactly what field elevation is ... "40ft, 80ft, something like that.") estimated 25g fuel. As I mentioned above, taxiing is quite easy to adapt to.

We applied power for takeoff at 9:05:54, flying straight out towards the ocean. At what Duane reported as 75% power (I missed the exact RPM) we trimmed for a cruise climb of 1200 ft/min at 115 mph indicated, and visibility was far better than my C172 trimmed for a cruise climb of 90mph. The visibility around the strake is also much better than I had expected. The view down is pretty good. The plane is also much the quieter in the front seats than my C172. Aviva said that she thinks the back seats are slightly quieter than in the back of the Cessna. Duane said that he is working with a company that will supply custom fit sound-deadening foam (a sheet of the foam that EAR ear plugs are made of). The projected weight is 30 lbs, and the company is claiming that it will achieve dB levels that Aviva and I both find unbelievable. I will not give you a number because we did not write it down and Aviva and I each remember a slightly different number.

At first the plane seemed light in pitch compared to roll, but quite quickly I decided otherwise: my C172 is heavy in pitch compared to roll. After just a few moments the controls seemed remarkably well balanced, although I thought that the distance the stick needed to be moved was small for all maneuvers except for a transition to the full pitch-buck. The stick has switches for aileron and elevator trim. I found it very hard to get toe elevator trim correct because the motors changed the trim too fast. The aileron trim worked very well. Duane told me that they have decided that they used the wrong gearing in this plane, and on all of the kits the elevator trim works at half the speed. That should be just right.

We leveled off at 1500 ft at 9:07:26. We slowed to a trim indicated airspeed of 85 mph (from now on I will just give the number, it will always be indicated mph). First Duane demonstrated the canard pitch buck. Full back stick occurred at 70 and the pitch buck was unmistakable. The amplitude of the change in elevation of the canard is about

2 feet, and the period is close to one Hz. There was no obvious roll tendency, and both aileron and rudder were shown to be effective. Duane gave the plane back to me while in the pitch buck, and I was impressed with the effectiveness of the ailerons, as well as that of very light rudder pressure. We descended just about 800 ft in about 90 seconds of this flight condition. Duane said that the normal sink rate is about 500 ft/min in the full stall mode. Duane increased power to "economy cruise" of 2400 rpm and we quickly climbed back to 1000 ft. We went back to 75% power for subsequent level flight. I had control of the plane when he increased power, and I did all the rest of the flying until we were on downwind for landing.

We turned southward to avoid another airport to the north. A 30 deg bank turn required almost no rudder to remain coordinated. Releasing the stick in the turn resulted in a very slight decent and the bank slowly decreased to about 20 deg. We settled in at 175 mph at 1000 ft, OAT 75, 2550 rpm (Duane commented that this was perhaps 75% power, but unknown because of the new prop). Duane said that almost no pitch change was required for a 30 deg bank, but that quite a bit was required if we roll to 45. I then rolled to 45 left and right, and then 60 left and right, and was very impressed with the control harmony. The balance between the stick forces for roll and pitch was very nice. Even at 60 deg of bank the required rudder pressure was light compared to what I am used to in the C172 (and every instructor I fly with tells me I am too light on the rudders ... I blame it on 2 ruptured disks). Duane mentioned that "rudder is only needed for really tight turns," and I am inclined to agree.

I checked for longitudinal stability in a general way: a quick pitch up and release resulted in a rapidly damped oscillation returning to level flight. The same for a pitch down held a moment to allow airspeed to build. I neglected to time the oscillation. Duane said that the plane would build speed very quickly if pointed down hill, and while it was true more than in my Cessna, it was nothing that made me think that the plane was getting ahead of me. The plane is so well balanced and stable that it is very easy to fly. In spite of Duane's warning that collecting flight data would keep me too busy to enjoy the flying, I was having a very good time.

We slowed for another series of MCA tests. This time I wanted to watch carefully the attitude of the plane at the bottom of the pitch buck. This is important in deciding if the plane can be landed at minimum speed. If the nose pitches down through the horizon, then you would not want that to happen near the ground, as you would destroy the nose gear or perhaps worse. We decreased power to 1150 rpm and trimmed for 75. The engine settled at 1100 rpm. Pulling back on the stick resulted in the pitch buck at 70 with a descent of 400 ft/min, and I believe that at the bottom the plane is level or slightly nose up. This is very good. I explained to Duane what I was looking for, and he said that when lightly loaded the plane has been landed in full pitch buck by Danny Mahre.

I increased power to 1700 rpm and trimmed for hands off level flight at 85. I flew in a slip, and noticed nothing odd. I then tested the dutch roll mode by abruptly kicking one rudder and observing the response. Dutch roll response is very important for comfortable flight in turbulence, and can be a real problem in aircraft of this configuration (winglets with rudders) because the winglet couples with the lift in addition to giving yaw control. The angle of attack of the winglet changes quite a bit when the aircraft is yawed, and this can change the effective lift from the main wing. In the dutch roll, the wingtip traces out an ellipse, and the ratio of the semimajor to semiminor axes, together with the number of cycles required for the motion to damp out, gives a good approximation of the dutch roll parameters. I explained to Duane my intent, and he expressed no reservations about this test, although he did seem a little surprised at how hard I kicked the rudder. I could count 3 but not 4 full rotations of the wingtip on each of 3 rudder kicks. The wingtip made an ellipse oriented vertically, with a ratio of one horizontally to 1.25 or 1.5 vertically. It would be better if the ellipse were flat instead of tall, but this ratio is described to me as quite fine (compared to the Defiant with a ratio of almost 6 which I was told is not good). We accelerated back to 170 and I did another rudder kick. This one was more abrupt than I had intended (and sometimes the bumps in the air are too) but the results were identical to the low speed test.

At this point we headed back towards Sebastian. I decided to try using both rudders at the same time, and as I expected, it led to a nice increase in the descent rate, but I did not get any numbers. In some ways I think I would try this before a slip as a nice way to increase descent rate.

We flew downwind at 100 mph at 800 ft and 1750 rpm, turned final at 95, the belly board went down at 90 and there was no noticeable pitch change. The wheels touched between 90 and 85, and the nose floated nicely down at 75. The time was 9:38, OAT 80, pressure altitude -140 ft. The plane stopped smoothly and well, using up just about 1000 ft of runway from touchdown. I am sure it could use less runway if landed slower and the nose brought down quicker, but it was a very smooth and comfortable landing.

Back at the hangar we made the expected small talk for a moment before someone came to have lunch with Duane. We went to the office and paid the \$50 test flight fee and bought the 6 construction videos and the builder's manual for the 173. The video and manual cost \$150 and the cost will be applied to the cost of a kit.

Over all I am impressed, far more than I expected. We have a few more projects to do on our House From Hell, and if nothing changes I will be getting a kit.

*****end original post*****

I guess I can now add that the 6 construction videos are not at all a slick production, but they get the construction details across, and that the builder's manual is something of a disappointment. If you decide to build a Velocity, you REALLY need to have read many pages

ahead because there are often directions on how to build a part followed by another set and sometimes a third set of directions on how to build the same part. You really need to be careful. My wife, a technical writer, has contacted Duane Swing, and he is open to the idea of having her rewrite the manual, but she is undecided on it.

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SOME INSIGHTS AND FLICKS OF OUR 1ST ANNUAL EAA NORTHERN CALIFORNIA FLY-IN

by Lisle Knight

Old Man Weather was obviously not an EAA member as he attended our fly-in on Saturday with a gloomy, gray and most of the time rainy appearance. However, there were at least up to 150 EAA'ers who braved the elements for our first greater Bay Area Wash-in, uhhh I mean Fly-in. So, with our spirits undaunted, we soared aloft to touch and go on the waviest chalk line to cross a runway for a spot landing... and would you know it, that the 1st Place Ultralight was actually threatened by a 172 and by a mere 18 inches! Bill Turner brought in Repeat Aircraft's DeHavilland DH-88 Comet, Grosvenor House... the ultimate in aerodynamic grace and beauty from the 1930's... it was something to behold.

A certain 1951 Bellanca Cruisemaster won Best Classic... Fred Egli's Brown and Yellow.

Our walk-around announcer, Larry Shapiro, was a cross between a road-side barker, a comedian, a salesman, and Don Rickles... God help us - he's returning for next year's event.

I do know for a fact, the time slot has been moved down the calendar to appease the weather makers and enroll Ol' Sol in EAA. Like everything else, all things need to be molded into shape and then developed into its final results... the organizational aspects of our fly-in will take a few years to develop into what we hope will be the Homebuilder's fly-in. Please help us support it in any way you can... it needs all our efforts to make it work.

This GP-4 breezed in between raindrops as slick as ... a wet runway... he was at idle he said... hmmm

DeHavilland DH-88 Comet

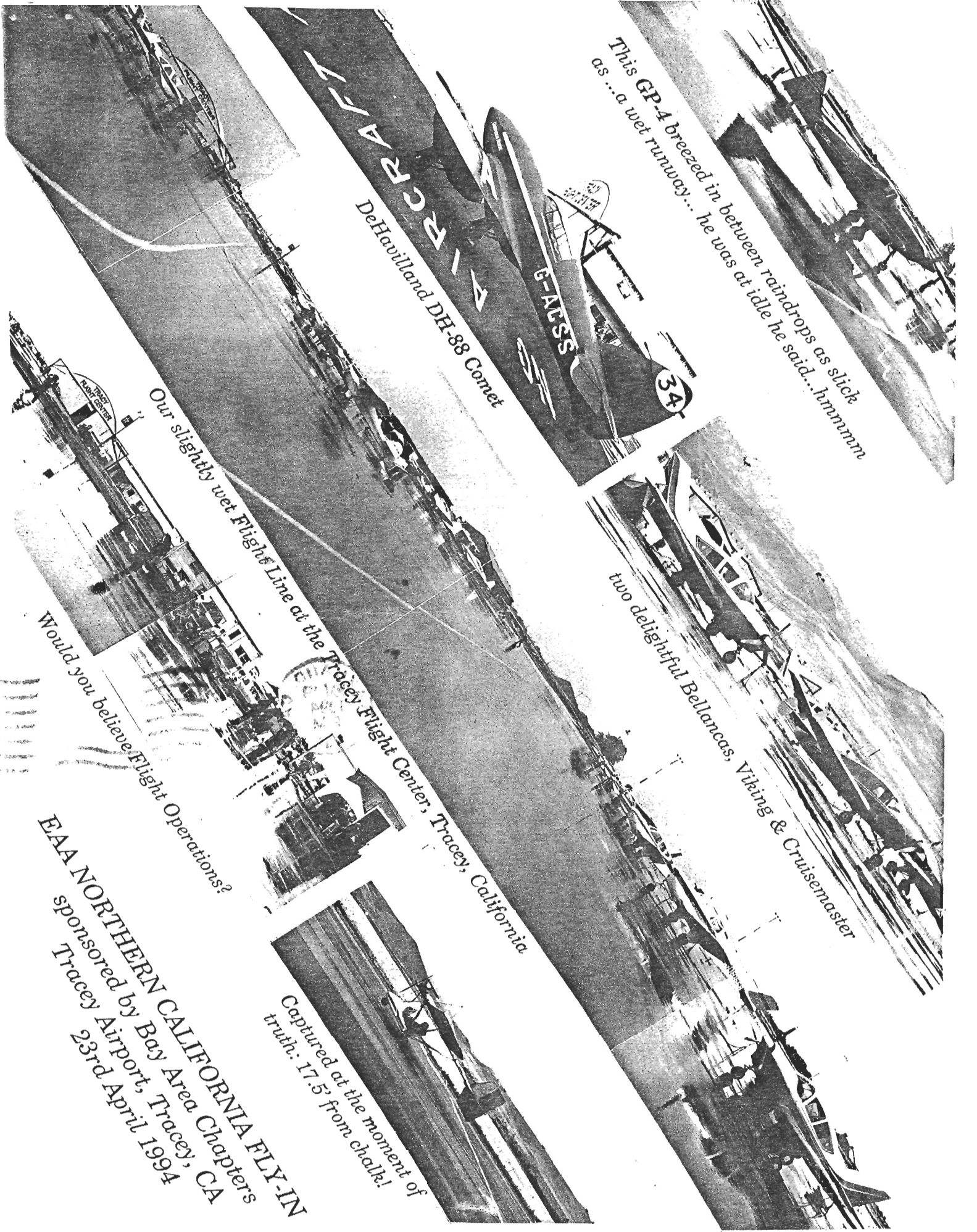
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