A Racing Fool

Tom "Hooter" Coughlin - Some of you guys may know me from 'Sun n Fun" I, along with Stan Shniderman (Stan cheated and left before I did), made that 2,000+ mile trek from Santa Monica, California to Lakeland, Florida. I went for the express purpose of entering my Long-EZ in the Sun-Air Race. You see, **I'm a racing fool.**

With full fuel, oxygen, and LIGHT SPEED ENGINEERING ignition, wheel pants, and prop, I left SMO at 0700 local, which is the earliest the Socialist Republic of Santa Monica will allow departures, did a slow climb out of the LA basin, careful to stay under the TCA, above minimum altitude and in contact, like a good little boy, with the myriad ARSA's, TRSA's, MOA's, as well as military bases that dot the LA landscape. I finally reached the Banning Pass near Big Bear. Only one more TRSA, Palm Springs, lay before me and freedom.

About then, 30 minutes out of LA, level at 17,500 ft. and just as I was about to relax a bit, that magic black box we call LORAN blinked it's big eyes, stuck out it's tongue, laughed at me and gave up the ghost. Oh well, back to basics, the extra work makes the hours pass faster, especially when you are up there by yourself. Another thirty minutes and Lake Havasu slipped under my winglet. I knew I was smoking but didn't have any real numbers, for I had not brought my whiz wheel, calculator, or brain along for the ride. About this time I decided to play with Ms. LORAN (sounds kinda kinky, huh?) for I remembered something about a new mid continent chain and low and behold Ms. LORAN came alive. I must have pushed the right button. She said that I was clipping along at near 200 Kts. I was throttled back to less than 65% power and leaned so far back the plan view of the airplane looked like a zipper. This is possible with an electronic ignition system and without blowing your pistons through the cowling due to detonation. LIGHT SPEED's new system automatically advances the timing based on manifold pressure, thereby, removing from the equation the ever present brain fade.

As I passed Childers, TX and some rain clouds blowing out of the Gulf of Mexico, carb ice raised its ugly head. I looked back to check the fuel, I had plenty, about one half tank per side. Dallas was just over the next hill and I was sure with the fuel on board I could make Shreveport, LA. So on I sputtered. During the next ten miles or so something happened between synapses in my gray matter. I got **common sense** and returned grudgingly to Childers. Just as I entered the pattern, after giving up a ton of energy and time on the descent, the engine smoothed out. Should I climb back out and try for Dallas? Turning from base to final, my common sense must have been working overtime, for the next thought that exploded in my head was, "well maybe there is a restaurant."

"Nope" was the reply from the worn out cowboy, that looked as though he might be able to spin a yarn or two. How bout a candy machine, was my next try, slipping into my natural southern accent. A simple "Yep" was followed, ever so slowly though, by "Broke though." "Cocola machine?" came my begging request careful not to use "pop" for that would have been a dead "ferener" (foreigner for you city folk) give-away. "Yep and I'll buy" he said shaking his head. I guess he thought I needed all the help I could get.

"In like Flynn", I thought. Now to get the cowling off and check the now non-existing ice, get my year old emergency Rice Crispy chocolate bar from the hell hole, fill up, and I'm outa here!

The weathered cowboy was good to his word. He sprank for the Coke, filled me with fuel, and some tall tales about flying, lauded the aircraft, and generally became a new friend. I think the next time I'm within 100 miles of Childers, TX I'm going to make a pit stop.

Into the EZ, off the runway and with a high speed wing-wag I was southeast bound, "Lakeland, Florida here I come". As the miles rolled under the nose and dark approached, my thoughts turned to that pain caused by my stomach twisting itself around my backbone. I had Tyler, Texas VOR center-punched as I started my let down. With the humongus (who knows if I spelled it right?) low sitting in the Gulf, I was beginning to wonder if I was going to make Lakeland. After refueling the plane and me, flirting with the waitress, (**of course** I was wearing my Tom Cruise flight jacket.) and checking the weather, I decided to put space between me and that monster churning out in the Gulf. I noted, during my walk around, that I'd had a mid air with another aviator. A complete wing, minus the bird, had attached itself to my wing about three inches inboard of the winglet. No damage, not even a dent. I wonder what would have happened to a metal airplane?

Into the air again. The time was uh..... let me see, **dark** except for the occasional short lived glow emanating from the cumulonimbus that were far too close to the south west. As I slow climbed out, the hours droned on. The lights from towns with memory charged names, Shreveport, LA, Jackson, MS, Mongomomery, AL, Tifton, GA poped up like a galaxy in the distance. They grew to recognizable towns and then disappeared under the nose.

As I passed Tifton, my neurons started shaking hands. I noticed the towns below me were becoming blurred under an under cast. On the radio, Altanta was forecasting fog and other bad things for Lakeland. After flying all day I wasn't ready to shoot an approach to minimums, with its ever present possibility of a missed approach. I did not have the approach plates for Georgia or

Florida and the working gyro was a non TSO'ed turn and bank. After adding the slight technicality that I am not a current IFR pilot, I decided to turn back to Tifton.

As I approached Tifton from about 30 miles east I noticed the fog was really rolling in. Down went the nose and it was pedal to the metal. "Here I come Tifton." I wondered if a white scarf would have been appropriate.

The airport was clear, I found the unicom frequency, keyed the mike about twenty times in rapid succession, slamed the EZ on final and realized I was about 100 miles an hour too fast for a safe landing. On came the power for a go around, cross wind, down wind, base to final, I did it all again and again as, once more, I was too fast. Upon returning to the pattern I noticed the fog encroaching upon **my** airfield. I also wondered if the people of this sleepy little town were tired of me buzzing their houses at 2 AM. As I set the EZ up on final, landing check complete, I found that I was again too fast. "To Hell with this noise. I'm putting this baby on the ground", slothed through my head. I then flew a carrier approach, crunched my sweetheart on the deck, caught the number two wire, cut the power, slammed on the brakes, and when I was down to something less than the speed of light, two thousand feet of runway lay in front of me. I wonder if fatigue does that to you.

I extricated myself from this over tight shoe of an airplane, removed my new upholstery, flung it under the wing, plopped down, covering myself with my flight jacket and a $400 bomber jacket, a Christmas present from Dad. My last thought before going comatose was, "Wow! This is barnstorming!"

The next coherent vision, thought or whatever, was this stately black man walking away from me and muttering something about the coffee being ready in the office in a couple minutes. My mouth tasted as though I had been licking the tops of pool tables. A hangover would have felt better. I managed to erect myself, grab my bedding and follow him into the office. I got his permission, and this time, crashed in the pilot's briefing room, not bothering to wipe the dew from me or my things. I awoke in a couple of hours, not knowing even if I was on planet Earth.

I dragged myself out into the brightness of the FBO, received the "who is this nut?" looks from everyone except the black man. He seemed to have seen it all before. I then explained that **"it"** was an O-320 powered Long-EZ **racing machine and I was on a mission from God!!** paid for the fuel taken on board, pulled my Berlin Avionics baseball cap over my bloodshot eyes and launched the EZ and myself into the bright south Georgia sky.

Approximately seventy nautical miles out of Lakeland, I started picking up the radio traffic from Sun n Fun. "Get in line over the power plant .....turn left at the orange ball." "Hey, I'm going to make it," came the first thought in about an hour. Then came the dreaded words....."We are closing the field to all traffic in 30 minutes." I had slow climbed to 11,500 feet to get the push from the storm in the gulf. It was now my friend. Again I pointed the nose down about 100 feet per minute, slammed the throttle through the instrument panel and yelled into the canopy, **"Sun n Fun here I come."** With race RPM's showing on the tach and a solid 225 knots on the LORAN, the approach to Lakeland was soon in sight. Just as I was about to throttle back, a Lear jet reported that an EZ had just passed him. "Naw, I think I will leave the throttle in just a little while longer."

After the trip, the landing was pretty much mundane except for .....oh that's another story. After landing and getting to EZ parking, I was informed to leave my stuff in the aircraft and exit the area immediately because the air show was to start in two minutes. Nothing like cutting it close. I must be an adrenaline junkie.

I found Stan and to make a long story as short as possible, he informed me, as only he can, that there were no more race slots left. With a Black Bart grin, he said he had gotten the last slot. Yes, he did rub it in a bit. He offered his hospitality though, and said I could sleep on the floor of his motel room. I took him up on it and paid him back by snoring all night long.

Race day broke CAVU, after a gully washer thunderstorm. Stan and I beat feet for the airport, for you see I had a bit snivelling to do. I found Charlie Gray, the race manager / organizer and approached him with my best sad eyed hound dog look. With this one big old tear in one eye, I did the manly thing, and just kind of whimpered my way into the race. I paid Stan back again by taking first place to his second place in our class. I love it - love it - **Love it!**

I did put Charlie on the spot and I appologize, I have had a taste of organizing an affair and appreciate what he and his crew does. Just an excellent job, that's all. My name just happened to have fallen through the notification crack.

A line was added to Charlie's newsletter and I wonder to whom it is addressed. **Next Year no entries on day of race. No! Not one! NONE!! Get the Picture?** Yes Charlie, I got the picture.

Ok Central States guys and gals you now know just what kind of racing fool I am and I have just been informed that you had a race without me. Now that gets my dander up. So Katey bar the door. Look out people, I'll be there next year.

KCGIG 92

EZ/XP - A Long-EZ the Miller Way

All of us who have ever built anything, have probably thought - "If I were doing it again - - - - - ". That second chance rarely comes to EZ owners. They either stick with what they have and make modifications or build a different kind of airplane.

Ken Miller is one of the exceptions, however. He first built a Long-EZ and put over 500 hours on it before deciding to build the ultimate Long-EZ. He calls it the EZ/XP.

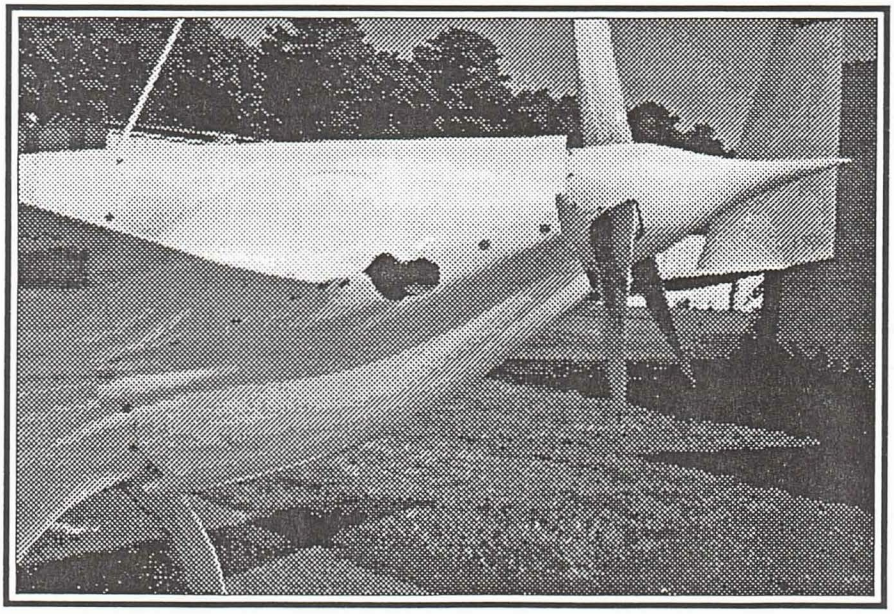
If one looks through the last several years of CSA newsletters one finds many articles, written by Ken, detailing changes to his EZ to make it a more comfortable, lower maintenance, and higher performing airplane.

Attention to control friction and free play makes an airplane that moves "right now" when the stick is rushed. Vance Atkinson's style Roncz canard with dihedral can be seen in the photos. The canard tip vortices should pass above the main wing thus reducing drag.

Ken built his own cowl to get the cooling style and lines he wanted in order to maximize speed by decreasing cooling drag. The airframe is pretty clean so major gains are hard to come by. Cooling drag is one of those areas not normally attended to.

The Ellison throttle body is fed induction air via a belly scoop while the O-320's cylinder cooling is handled through arm pit inlets. Notice the clean inlet shapes and the way they are extended out beyond the slower fuselage boundary layer air flow.

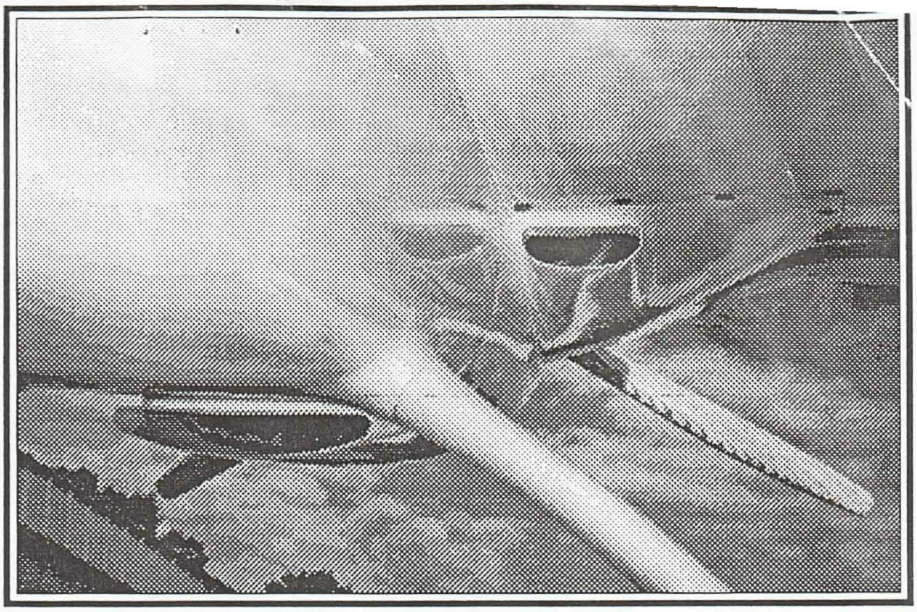
The outstanding finish is evident in the reflections. This bird has had a lot of prep. You may remember that Ken was the author of the excellent article on finishing in the April 92 Newsletter Several other articles were also con-



The photos reveal a great deal of craftsmanship but fail to show the attention to detail that Ken has put into this beautiful airplane. You just have to see it to appreciate it. See it at Lakeland. Ken will be the guy with the huge grin.

tributed to share building hints, maintenance tips, control bearing installation and safety tips. He even devised a nifty little gadget to locate the upper winglet accurately.

The EZ/XP incorporates many refinements which help it attain a top speed of 220 in level flight. Ken was also one of the first to contribute an article on the electrically activated landing brake. The EZ/XP will be at Sun-N-Fun for it's first major cross country and fly-in. I expect it and Ken to do well.



Long-EZ Variant Fuselage

Christopher Sharsky (CA) - I plan to make low cost fuselage parts available to interested people who want a jump start on their project.

The fuselage will be modified to feature: balsa core with ready to paint finish, dual pre-molded canopy frames with pre-fitted glass, nose baggage compartment, wider cabin and larger passenger space, retractable nose and optional retractable main gear, flush landing light, and is retrofitable to existing aircraft.

I am interested in talking to all who have comments, suggestions, or are interested in having such a fuselage.

Contact me weekday evenings Mon-Thurs 6-9 PM at (415) 321-5066, by E-mail cps @ aerometrics.com or:

Cygnet Aerospace
P O Box 124
Palo Alto, CA 94301

Engine Mount Wanted

I need a conical type engine mount for an O-235 or O-320.

John Hess
8174 Eagle Ridge
West Chester, OH 45069
(513) 874-9911

Engine for Sale and Prop Wanted

O-290-3 Lycoming - 1942/43 vintage - rare military aircraft engine - looks good, but no logs. . . prefer to trade for a Continental O-200 or C-90.

I'm also looking for a used Vari-Eze prop usable as a spare.

Contact: Cindy Drozda
5000 Butte Street #183
Boulder, CO 80301
303-440-3579

Trade Wanted

Want to trade 84 Harley soft tail very customized show bike for Long-EZ or Vari-Eze. Painted white & turquoise by "Horst". Call Emery Lee (415) 773-8851

New Supplier of Nifty Stuff

I recently got a brochure of interesting items from Wayne Lanza. He has developed a Vari-Eze/Long-EZ electric speed brake kit which claims to be light weight and require simple installation The kit is $250 from Wayne at:

9425 Honeysuckle Drive
Sebastian, FL 32976
(407) 664-9239.

One of the neat things about this kit is Wayne's idea to make the brake closing have self adjusting action. See the next page for how he does it and to see a sample of the installation drawings.

Over the years I seen no professional solution to the problem of marking our airplanes' switches and gizmos. I once did an article on how to screen print your own panels but that was apparently too much work as few builders ever do that.

Wayne now has solved that problem and offers professional looking sub panels for intercoms, warning systems, aux audio jacks, fuel quantity indication, etc. He has a DG face with *a canard silhouette on* it and many other things. Give him a call for the full story.

You Cozy Mark IV people might want to check out his switch breaker panel. The more people he gets for the order the lower the final price can be.

PPZAD - A Remarkable Story

Those of you who attended OSH 94, no doubt, saw an O-235 powered Long-EZ parked on the end of a row displaying a different registration number, PPZAD. This airplane and very capable pilot are no newcomers to long trips.

Andre Deberdt and PPZAD of Sau Paulo, Brazil have now returned home after 97 hours in the air covering 13,000 nm and 5 new countries.

Many Long-EZ drivers have dreamed of making long distance flights but not many have actually done it. Just last year, Andre and PPZAD traveled from Sao Paula to ..... OOPS! That is Andre's story.

PPZAD, A long way from home

To Chile in a Long-EZ

Andre Deberdt (Brazil) - PPZAD is flying again after a two year reconstruction due to a take off accident. The following modifications were introduced in order to increase it's already fantastic usefulness: Klaus's ignition, spinner and wheel pants, bigger fuel tanks, an extra back seat tank, a larger air filter, spin-on oil filter, direct exhausts, NACAs for cylinders 3 & 4, storm scope, GPS, HF transceiver, oxygen system, a cabin heating system and a 60 A alternator.

Since I had made these mods to go far, fast, and efficiently I decided to go to Chile where I was to act as international judge for the "8th Rally Championship" with the Brazilian team and to fly the Long-EZ.

I wanted to try to establish a record of "speed over a recognized course" for our category with the FAI. The route was Rio de Janeiro to Santiago, non-stop, some 1600 nm in 13 hours.

Take off with 90 gallons of fuel and a max gross weight of 1,700 pounds from SBGL, a 13,000' long runway in Rio at 00:10 UTC on October 19, 1993 was emotion filled. It was a little difficult as, even with no wind, I had to constantly ride the left brake. After 3,000' the plane jumped into the air.

I suspected the wheel drag was caused by broken brake pads and not the true cause, another main gear softening after the long 5 mile taxi distance. I have the fiberfrax, aluminum foil, and steel plate installed but that didn't prevent the event.

En route, I had to go around a very strong cold front and endure an almost constant 30 kt head wind. I finally arrived at Mendoza, Argentina after 14 hours of flight, with a 4 hour delay. As it was too late to attempt the crossing of the cordillera, I landed there and, as you can imagine, it was a very exciting landing. Expecting problems, I made the landing very cautiously on the left wheel but, when finally the right one made contact, the tire exploded as well as the entire assembly of pants, brakes, etc.

Sure enough, I soon had the entire airport circus around. Help was quick to free the runway and push the wounded bird to a hangar.

In one hour the only specialist in composites in town, me, was working on PPZAD and had the gear fixed in less than 12 hours. Composites are so easy, just glue it! Next day I made a short test flight before weather grounded us (another Brazilian in an Arrow Turbo 2), for 4 days.

Now a few words about mountains, you North Americans can be prod for having Mt. Ranier and Alaska's Mt. McKinley but think about Chile with it's 25,200' Mt. Aconcagua. Having a MEA of FL 260 gives you appreciation of the crossing. It has to be essentially visual in order to see the road through the pass at 12,000'. Theoretically the crossing could be made at 13,000'. The crossing has to be made before noon and preferably early in the morning. The pressure difference between Mandoza and Santiago must be no more than 1 millibar. Up to 3 millibars difference and it is turbulent, but manageable. If the difference is more than 3 millibars the turbulence will destroy any airplane.

On the second day I tried to cross but the road was overcast so I flew 2 hours south where the MEA was FL 180 and attempted the crossing IFR. The OAT was -22 degrees C. After 2 hours I had my feet frozen until above my knees. The worst, however, happened only about 10 minutes before crossing. **The engine quit completely !!** I lost a thousand feet almost immediately. . . Quick and automatic actions such as nose down, carb heat, mixture rich,switching tanks, and pumping the throttle brought no results. A quick 180 and emergency transmission were effected. I went back over a VOR at the city of Mallargue, where

the controllers told me I would have no problem at all to go down and land if I wanted to. It was completely IFR, overcast from 4 to 12 thousand feet but good visibility in rain.

I went down to 8,000' before the engine gave life signals again, coughing a lot, but in a few more minutes regaining full power.

I decided I had enough and returned to Mendoza, 2 hours away. I flew over the top at 12,000' without any more problems. I had cold feet and was quite shaken by the happening.

Now what happened? What froze? WIth no visible moisture, tops were at 12,000' and I was at 18,000'. The OAT was much too low to form carb ice and too high to freeze gasoline -- -- until today it is still a mystery.

During descent the engine was occasionally giving bursts of power. Many things were tried and observed: mixture and throttle were moved to different positions, the electronic ignition was not faulty as the mag gave the same behavior. All temperatures went to almost nothing. My only concern was to not let the prop stop turning. On the ground at Mendoza a full inspection and testing of all systems were effected but nothing abnormal could be detected, but for the prop very dirty because of the mixture too rich at the altitudes I flew. Coming back at the top of the clouds was a deliberate attempt to have some carb icing formation, but it didn't.

On the 5th day we (the Arrow pilot and I) were finally able to cross the mountains, a little late, at 12:00 due to the complex paperwork for customs in Argentina (lots of tipping) It was terribly turbulent and the poor guy in the Arrow in front of me was reporting horrible things such as 40" MP and descending 1100' fpm. This was at 14,000'--scarey thing. Knowing what was ahead, I climbed up to 16,000' and suddenly encountered an updraft that put me at 17,000' where I went my way. I dared not to put a hand on any control, leaving "George" do the work. After 30 minutes that appeared hours and in headwinds of more than 50 kts the Long-EZ was put in acrobatic attitudes. Finally, the Pacific was in sight and we landed at Santiago International.

The return trip, 10 days later, was anticlimactic and made easy by crossing at 8 AM at 17,000'. It was an incredibly beautiful sight being beside the majestic Aconcagua in all its splendorous snowy 25,200'. Again "George" was doing the flying and I was doing the filming.

I will be able to claim the record Rio to Mendoza with FAI but I intend to try the Rio/Santiago trip again next year in better conditions. It's just too beautiful!

Vari-Eze Canard Flutter

Many people witnessed high speed canard flutter at Rough River this weekend. The pilot indicated his Vari-Eze made a high speed pass down the runway at 180 kts IAS when the canard began rapid up and down 18" oscillations. Power was reduced from the 3,100 RPM setting and back pressure on the stick was applied. The **flutter stopped before the canard failed,** thank God! The rough air apparently excited the canard in its near red line speed.

Charlie Airesman reported the pilot removed the canard after seeing post flight glass fractures along both sides of the canard's top fairing. Inspection revealed the CN-2 canard alignment pin bushings had slipped out of the alignment pin tabs, thus allowing the aft portion of the canard to move. Someone had added a considerable piece of lead to the CS-11 weight in attempt to balance the elevators. No weight was added to the CS-10 outboard station. An old CP calls for only **MINOR** weight addition and then it must be split between CS-10 and CS-11.

Todd Bettenhausen, Velocity builder from Indianapolis, caught the whole event on video. It was a terrifying piece of documentation. If your elevators have been repainted or repaired be sure to recheck balance and test fly at high altitude before returning the airplane to normal service. The consequences are life threatening. Let's **stop doing things which endanger the experimental certification privilege** we have.

Prop Wanted

Need: cruise propeller, SAE #1, for Lycoming O-235 Long-EZ, Great American 62 x 64 or comparable preferred.

904-461-6912
Rick Lavole
26 Marshview Drive
St. Augustine, FL 32084-5873

Bead Buster Sales

Bill Oertel (CA) - EZE-LIFT is now taking orders for the TC BEAD BUSTER, a light weight portable device to break down aircraft tires/wheels. In a handy carrying bag just in time for Christmas - $75

EZE-LIFT
3216 Bronco Lane
Norco, CA 91760-1817
(909) 734-7569

Ellison TBI Bulletin

Terry Yake (KS) - If you use an Ellison throttle body injector you should have received bulletin 94-01 dated June 7, 1994. Call them at 206-271-3220 for a copy. An inspection, and possible repair, of the throttle attach linkage must be performed before further flight. It seems a couple airplanes (one of Ellison's and a Jungmeister) had a disconnect of the throttle cable and the TBI.

Lamb-Chen Shin Tires

Walter Renko (MI) - I called Lancaster, PA for the 11 x 4.00 x 5 tires as listed in the July newletter. I found they will now be sold only through the California branch. The price is seven dollars and change. They are 8 ply rib tread. Call 213-636-2364.

Editor note: They're getting greedy!! I just paid $45.01 tor two tires delivered to my house. 9-22-94.

Another World's Record For Gary Hertzler

EZ Does It

Gary Hertzler (AZ) - "Ontario Approach, this is Vari-Eze N99VE, 25 miles east of Homeland VOR at 10,500 ft. Request transition to Homeland for a 180 turn."

"Vari-Eze N99VE, Ontario Approach. We've been waiting for you. Approved as requested. Will Call your turn."

Two hours down and 14 more to go I thought. All of that planning over the past 3 months is paying off. Fuel consumption and time are better than planned, the air is smooth, no significant wind, and the moon is full. Couldn't ask for better conditions. Looks like a go for the record . . .

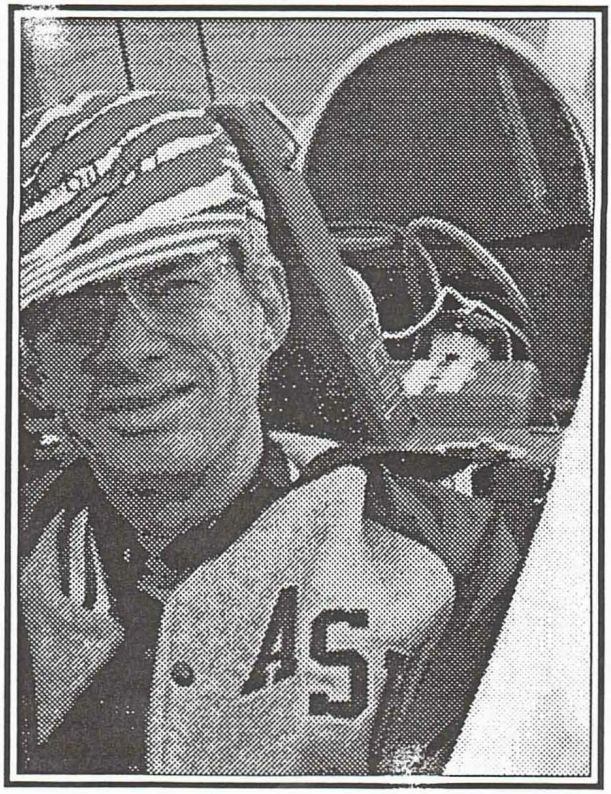
It was almost ten years ago, on the weekend of July 14 and 15, 1984, that Jeanna Yeager set the same closed course world's record for aircraft weighing between 661 and 1,102 pounds in the same aircraft, N99VE. Jeanna circled a course from Bakersfield, CA to Merced and back for a total of 8 laps and 2,428 miles. several hours later I followed up with a distance over a straight line departing Mojave, CA and flying non-stop to Martinsburg, WV, just west of Washington, DC for a total of 2,214 miles - - two records in one weekend. Turning 50 this month, and needing a mid-life crisis thing to do, nothing seemed more appropriate than to test all the improvements I have made to the plane by getting both distance records in my name.

In each of the old records, the plane averaged about 150 mph and 50 miles per gallon. Since the fully loaded take off weight was right up against the maximum of 1,102 pounds allowed for the class, my weight over Jeanna's meant that I would be carrying about 10 gallons less fuel. Aircraft improvements, since that time would have to make up the difference.

Since 1983 I have been very active in the CAFE 400 events, taking my share of trophies, like those shown in the Sport Aviation article. To be competitive with people, like Klaus Savier, in his very efficient and fast Vari-Eze and Gene Sheehan with his highly refined Q 200 prototype, took some dedicated effort to constantly modify and test, looking for every last knot of speed and efficiency.

Major changes since the original records are: addition of custom designed high compression pistons for the Continental A-65, lower drag wheel pants replacing the original "football" shaped pants, an Ellison throttle body injection carburetor, a modified oil tank and induction system to accommodate a low drag cowl, and an electronic ignition, supplied by Light Speed Engineering with manifold pressure regulated spark advance.

An exhausted "smile" after almost 16 hours in the air.



Getting Ready

After I finish a typical modification, I try to gauge how much effort was expended for the speed gained; some mods are more successful than others. The wheel pants are perhaps the highest payoff of any mod to date, adding about 5 knots to my top speed. The pants are carved from a single block of foam with a top planform using a 65-025 symmetrical airfoil. The side view is driven by the requirement for a constant pressure distribution at each station down the pant.

To achieve this, the angle that the top and the bottom of the pant make with the waterline is the same as the angle that the left and right side make with the line of flight. All of the flow lines appear laminar, traveling straight aft without curling back. A plug and female mold were made, on which two layers of glass were laid up. The finished weight was about 1.5 pounds per pant.

The original A-65 was designed with 6.5:1 compression in the days when general aviation fuel over 80 octane wasn't readily available. It is well known that the thermodynamic efficiency of a piston engine increases as a function of compression ratio. After several iterations (some not so sucessful) I designed and had constructed, by a custom automotive piston manufacturer, a set of forged 9.0:1 compression ratio pistons. I also installed a set of modern technology automotive rings with a 3 piece oil control ring

and a Total Seal gapless 2nd compression ring. As a result, I average about 25 hours per quart of oil and have very low idle manifold vacuum reading of about 7 inches. Crankcase blow-by is almost non-existent.

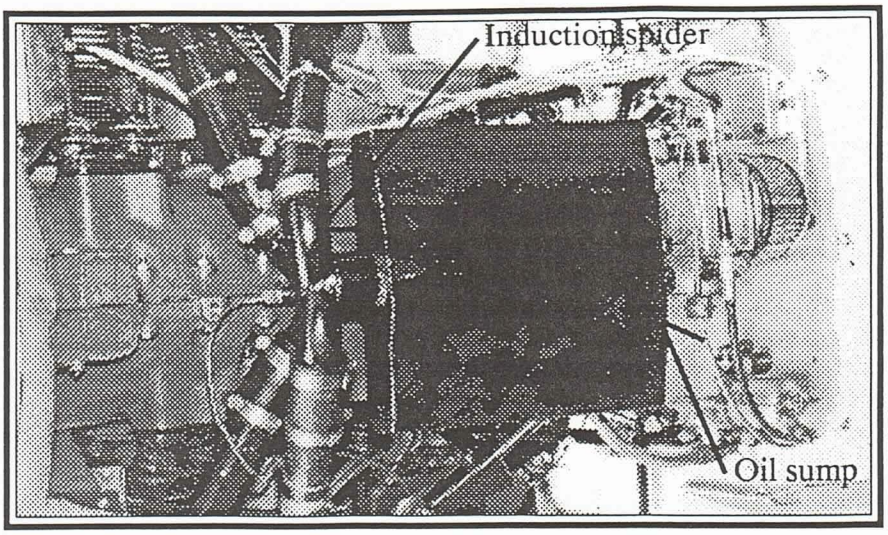
The Ellison throttle body injection unit has become a familiar piece of equipment in the homebuilding community. The ability to lean much beyond a conventional carburetor, and still run smoothly, gives nearly a 10% savings in fuel consumption.

The Ellison is mounted horizontally in front of the oil tank to allow the installation of a low profile cowl. The induction tube passes through the tank and exits at the distribution spider *(see top photo)*. The induction air heating lowers volumetric efficiency somewhat thus reducing maximum power, but provides a longer mixing length to give better fuel distribution prior to reaching the spider. Since efficiency is the primary goal, the trade off was worth it. Also an added benefit of oil cooling eliminates the need for an oil cooler.

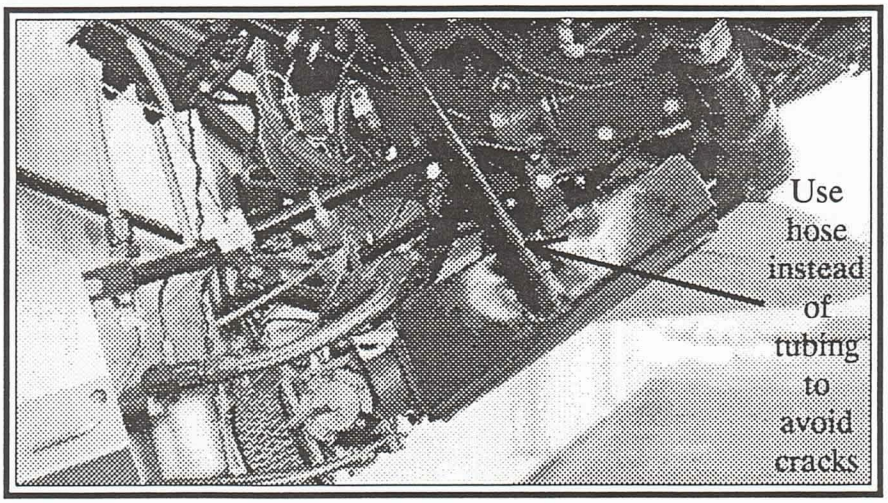
Over the years, I have had three different engine cooling systems on the airframe. When originally built, being convinced that Burt's way was the only way, I installed the conventional EZ pitot cooling scoop.

Since that time, I have had the flush NACA scoop, and now the "arm pit"scoops. The arm pit scoops show a slight advantage over the flush scoops, but this is one of those modifications where the speed increase per hours spent is very poor. The place where this modification is a real winner is in the way it looks and how it cools the engine. Head temperatures in cruise are in the 260-280 F range. Many other aerodynamic cleanup changes that contribute to overall efficiency, can be classified as attention to detail, such as fairings and leak sealing.

The standard magneto is designed with fixed timing to give detonation-free operation during worst case operation (maximum power, hot day sea level condition). At high altitude, where conditions are cool and power is reduced, the optimum ignition timing is considerably advanced to account for a much slower flame travel within the combustion chamber. The light weight electronic ignition, supplied by Light Speed Engineering, replaces one of the magnetos with an electronic processor and a set of ignition coils. The system senses manifold vacuum and adjusts spark advance up to a maximum of 17 degrees above the nominal setting. The effect of this advance is dramatically illustrated at altitude by noting a 50 RPM drop when switching from the full advanced setting of 43 degrees back to the nominal setting of 26 degrees.



Long straight mixing induction tube goes through oil sump



Clean bottom cowl lines are the resultant of a great deal of engineering and modification.

All of these efforts to increase efficiency have also paid off in speed. When first constructed, the plane would not quite reach 180 mph. Recently, at an EZ racing event held at Wendover, NV over the Bonneville Salt Flats, the airplane turned 204 mph on a 125 mile triangular course. Not bad for a two-place plane with 170 cubic inch displacement engine at 7,000 ft density altitude.

Flying the Record

I had not given much thought to going after a second record and was even unsure that the aircraft had the capability of breaking the existing record until I received encouragement from Dick Rutan at this past year's Oshkosh event.

On the trip home I started doing some serious data taking. Calculations confirmed that, indeed, the aircraft had the range necessary to beat the old record if the empty weight had ot crept up over the years. To my surprise, my attention to weight additions had paid off. The empty weight, with auxiliary fuel tank installed, was about 10 pounds more than at the time of the previous record attempt. This gain more than accounted for all those "essentials" such as LORAN and autopilot.

Next I contacted Art Greenfield of the NAA and received all the forms necessary to sanction and certify a World's Record. Turnpoint verification can be accomplished by either a NAA certified observer of the FAA. I chose the FAA route and contacted the Approach Control people at both Phoenix and Ontario, CA. Both groups were delightful to work with and anxious to help in any way they could.

The NAA, US certifying authority for the Federation Aeronautique Internationale (FAI), requires that a NAA observer must witness the aircraft weighing, barograph installation, gas tank sealing, takeoff, and landing. Klaus Savier, NAA member and present record holder for the 1000 and 2000 kilometer speed record in his Vari-Eze, filled the requirements for a qualified observer.

Planning for the right time takes a little bit of common sense and a lot of luck. Since part of the flight occurs at night, I wanted the moon to be as full as possible in case an off-airport landing would be necessary. On the weekend of October 30/31 the moon was at its full brightness. The closed course turn points of Chandler, AZ and Homeland VOR on the eastern edge of the LA basin were chosen for the low altitude terrain and the safety of paralleling Interstate 10 the entire route.

As the departure time approached, the Santa Anna conditions which fanned the fires in the LA area were developing. The airplane gods were smiling, however, and what was forecast to be peak wind conditions all weekend actually varied from light and variable to 10 knots from the south at altitude.

Klaus flew to Phoenix in mid-afternoon on Saturday the 30th to help in final preparations of the airplane. We fueled up, less an anticipated 4 gallons and parked the plane. I went home to try to get some sleep. After a largely unsuccessful attempt to rest, I dressed with ski pants, down booties, and a warm coat. Leroy Castle, local EAA member and keeper of the Arizona EAA Council platform scales showed up at the airport at about 9 PM.

TURN POINT	ELAPSED TIME(HR)	LEG TIME(HR)	LEG MPH	FUEL BURN(GAL)	LEG FUEL BURN(GAL)	LEG BURN RATE(GPH)	LEG MPG
P10							
	1:57	1:57	159.5	6.3	6.30	3.23	49.38
HDF							
	3:59	2:02	153.0	11.65	5.35	2.63	58.14
P10							
	5:59	2:00	155.5	16.75	5.10	2.55	61.00
HDF							
	7:58	1:59	156.8	21.87	5.12	2.58	60.76
P10							
	9:58	2:00	155.5	27.12	5.25	2.63	59.25
HDF							
	11:57	1:59	156.8	32.09	4.97	2.51	62.59
P10							
	13:57	2:00	155.5	37.22	5.13	2.57	60.64
HDF							
	15:50	1:53	165.2	42.49	5.27	2.80	59.03
P10							

SUMMARY:

ELAPSED TIME(HR):	15:50
AVERAGE MPH:	157.1
TOTAL FUEL BURN(GAL):	42.49
AVERAGE GAL/HR:	2.68
AVERAGE MPG:	58.55

P10=CHANDLER, AZ.
HDF=HOMELAND VOR
LEG LENGTH=311 STATUTE MILES
TOTAL LENGTH=2488 STATUTE MILES

After rolling N99VE onto the scales, I climbed in with all needed equipment. Fuel was added to bring total weight up to the 1,102 pound class limit before Klaus sealed the tanks. Total fuel was calculated to be 49.3 gallons. My conservative "how-goes-it" chart said that I would need 48 gallons to make four laps of the predetermined course for the record. At 10:50 PM I departed into the night for Homeland VOR. The rest is history. The plan went off without a hitch. Fuel flows, engine temperatures and all the electronics worked flawlessly. At each turn point, I beat my anticipated times, speeds, and fuel flows. Taking data with a calibrated fuel flow meter at each point, I generated the previous page's summary:

After all the concern for adequate margin, I landed with almost 7 gallons of fuel on board or almost 400 additional miles possible. At this writing all of the paperwork has been submitted for final NAA and FAI approval.

The CAFE Challenge formula, as explained in Brian Seeley's October 93 Sport Aviation article, measures an aircraft's ability to carry a payload over a 500 mile out and back course in a fast and fuel efficient manner. Although the requirement to climb to 10,000 feet within 25 miles of the takeoff point limits participation to aircraft with higher power loading, I calculated my score using the first and last leg from the above data. The resulting score of 146 compares favorably to the benchmark score of 131 set in the Catbird earlier this year.

What next? Well, I may try to better my existing, but somewhat vulnerable 1984 straight line record. I know that, with favorable wind conditions, a distance of over 3,000 miles is possible. Also, I have a freshly overhauled O-235 Lycoming sitting on the work bench ready for installation. Speed records ???

The Central States Newsletter has done an excellent job of informing the EZ builders and flyers about modifications that have met with some success. However, **we must realize that when we deviate from the original prototype, we are incurring a degree of risk.** Not all of the changes which I have done over the years have been successful.

Twice, **I have had forced landings** because of experimentation; once with a siezed engine caused by insufficient piston clearance and the other with a controllable pitch prop with a failed pitch change mechanism. When you elect to make modification to your aircraft be sure that the change away from the plans is well proven by others or that you are a competent designer and have thoroughly studied all the possible ramifications.

Poor Workmanship

Editor note: Robert and Valerie Harris have purchased several Ezes to rebuild and resell. They have seen some things that should not be. Do you know of airplanes like these? We must guard against such sloppy workmanship ever leaving the garage lest we lose the unique Experimental certification procedure we have in this country.

Robert Harris (TN) - We had two Vari-Ezes this year and just purchased two Long-EZs and a Cozy this fall. One thing you might pass on to our members relates to workmanship and quality control.

The last three Vari-Ezes we owned all had under balanced ailerons. One of them, with 100 hours TT, had the canard incidence set at six degrees nose up. We blew the engine on the first flight, however, the landing was uneventful. Valerie said the gray hairs caused by that airplane make me look more distinguished.

For Sale

Male inlet for Long-EZ - $25. Complete set of Brock landing brake linkage (all LB 1-21 parts) - $75.

Larry Danner
407-288-2117

Snap Roll in an EZ??

Jimmie Hays (AZ) - During the third test flight I had a most interesting experience. I couldn't get my landing gear to extend after a pressure switch failure which disabled my electro-hydraulic system. I was able to gravity drop the mains but the nose gear failed to extend fully.

I left the pattern with the idea of trying some G's to get the nose gear down. Knowing that too much speed would keep the nose gear from fully extending, I slowed to 80-90 knots and pulled the stick back fairly sharply - - make that **WAY WAY !!** too sharply.

In a heartbeat the airplane was over the top in a snap roll left. I completed the roll and found, somewhere along the way, I had lost elevator feel. I pushed the nose down and, finally after two eternities, started to get elevator feel back. I very gently recovered to level flight.

This maneuver does prove to be another way to get a reluctant nose gear down and locked. Please be assured the next time I use it though, I'll certainly have a lot more altitude than I did on this occasion. I did not have vortilons installed during this little episode, contrary to the absolute insistence of the designer that the aircraft not be flown without them.

Of course, I now have vortilons firmly in place, triple redundant switching of the down side of the electro-hydraulic system, and the airplane is finally clean again.

Y'all be careful.
See you at **KCGIG 94.**

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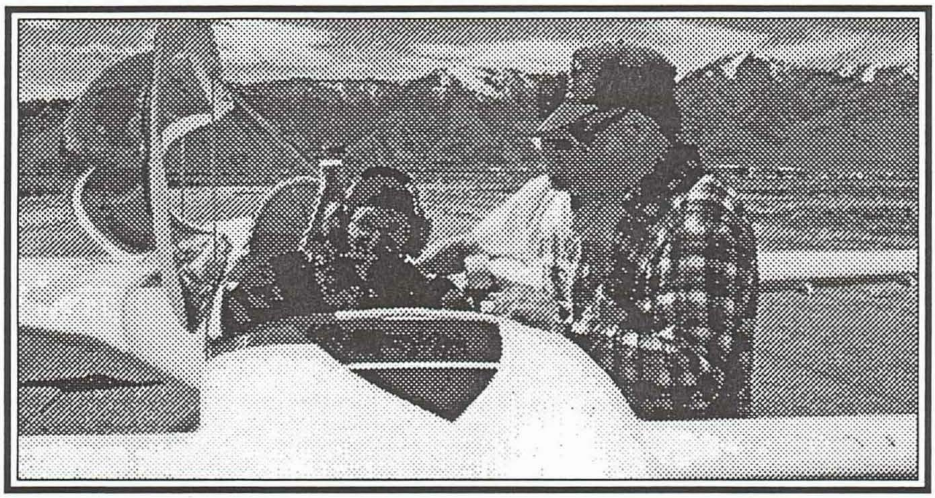

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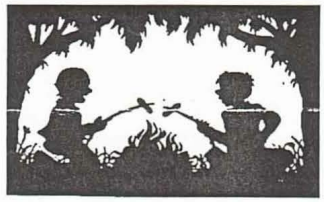

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Jim Price Sets World Altitude Record

Jim Price (MI) - NAA/FAI WORLD ALTITUDE RECORD ACTIVITY
Current status- On 5/5/96 I did an officially certified flight, corrected for temperature and barometric pressure to a little over 35,000 feet at Douglas County Airport (MEV), NV. near Lake Tahoe. This is above the current (Dave Timms - Long-EZ) World Record of 30,400 feet, and appears to be above Bruce's Pushy Galore unofficial record (he submitted 32, 990 to the NAA) by the required 3%. It would be great to see the record continue in the hands of a Long-EZ - YES!! It should be about two to three months before I have the official nod and the Class C-1a **WORLD RECORD.**

Flying up there is a bit tough. The canopy frosts up and it's cold (61 F. below zero). Not being able to see out, I used the hand held GPS to tell where I was; the moving map worked great. ATC requested my altitude a bit too often for my liking (my encoder blanks altitude above FL300). This required me to lift my mask to talk into my microphone that was below my mask. They couldn't hear me too well, and I lost the seal of my mask by my nose from pulling the mask out of position & couldn't get it to reseal. This caused moisture to build up on one of my lenses. I'll go with an "in mask" mike next time. *Ed - Yes there is a next time proposed.*

ATC wouldn't let me use the airspace that I wanted to fly in. Maybe with improved communication we could work this out. I hand held a video camera to tape the instrument panel gauges. I wouldn't do that again as it's too hard to fly and film at the same time. We made up an "over the shoulder" camera mount for my next run.

WORLD CLASS PEOPLE- I wanted to name all of the outstanding people who assisted me with this high altitude project, but according to Terry there just isn't room to list them all. I don't know how one properly recognizes these folks who gave so freely of their extremely busy lives, but I do know that it certainly is an honor to be associated with them. A couple of special people who were instrumental to my success in Nevada were Central States members Dave Jones and John Grubb with the Carson City EAA Chapter 403 who volunteered to adopt me and my project. Their help was invaluable.

Safety- If you ever plan to take on a project like this please do your homework. This activity can be hazardous. I was able to link with Lt.Col. Sam Holoviak at the U.S.A.F. School of Aerospace Medicine (at Brooks AFB), Dept. of Aerospace Physiology and he helped prepare me for this flight. I like his style, he came across with a couple of statements like - if you don't do this it could kill you, do you understand? It surely got my attention!

Emergency back up oxygen, understanding the "bends" and knowing where there was a pressure chamber close by in case I got them, back-up area airports in case I got trapped on top of a cloud deck or had another form of an emergency, being prepared for the canopy frosting over and the bitter cold was all worthwhile and "required learning". IFR partial panel skills need to be up to speed. My (Jeff Rose) dual electronic ignition system had the means to retard spark timing to 6 degrees before top dead center which allows the engine to idle way down. The low RPM allows the prop to act as a big speed brake in case of an emergency descent. These are just a few of the items researched and planned for and I still have more to learn yet.

Aircraft development - I first removed and weighed all extras. I was able to get my O-320 Long-EZ down to 842 lbs. empty. I was going aft CG, within the envelop, so I had to come up with a means of putting weight forward. I ended up with my 1/2 hour fuel reserve and my oxygen system up in the nose. Then I needed to come up with some other improvement ideas.

I made a proposal to the University of Michigan Aero Space Engineering Department and Dr. Kauffman set up a research "HIGH EZE Team" for me. Their test pilot Professor Bill Ribbens examined the ARMY Long-EZ data and suggested we try vortex generators. We decided to wind tunnel test to evaluate the effects of vortex generators. We found that on the Roncz canard a 25% increase in lift can be obtained with a 2% drag penalty at a high angle of attack. Not Bad! I ran a combination that provided slightly less drag and lift. I wanted to make sure that I would not go into a flat stall so vg's were added to both the main wing and the canard.

Bill Bainbridge gave me a light weight alternator which drives off the Lycoming vacuum pump pad. It's 8 amp output allowed me to use a very light weight battery.

Testing my modifications was a bit of a concern. Mike Melvill experienced a flat stall in the development of the new canard; from listening to his story, I knew that I didn't want to go through that. I tufted the main wing and the canard in my flight testing so I could see that the canard would stall before the main wing. This process worked well. I still did all my early testing up high and with a parachute.

This has been a truly extraordinary learning opportunity, and again I would like to thank everyone that has been involved. Be well and fly safely.
Jim Price hilong@aol.com

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7 miles up in a Long-EZ !!

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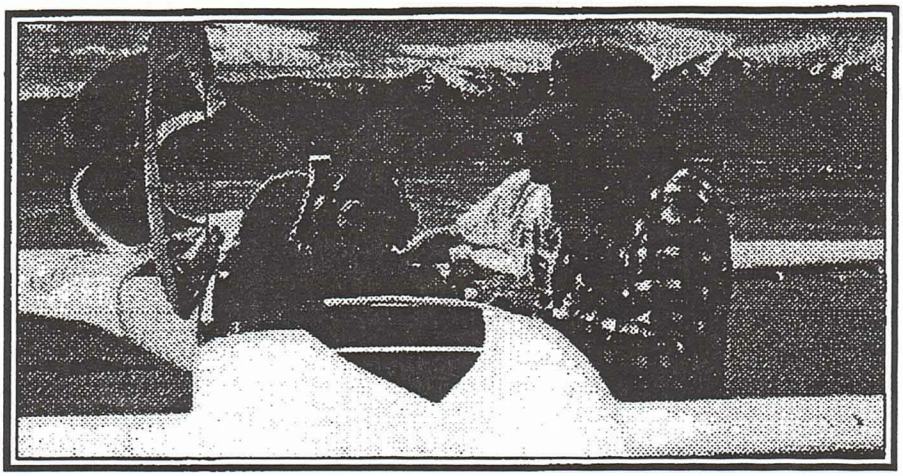

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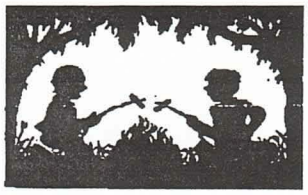

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Another Resin System?

In the April issue Chris Mitchell reported Hexcell (maker of Safe-t-Poxy type & Epolite 2427) resins had sold the resins to Fiber-Resin Corp.

The latest CP reports the new owner has discontinued the resin, leaving many builders with a resin compatibility problem as other RAF approved resins have also been discontinued.

You may remember, in CP 77, that Scaled Composites stopped using the Safe-t-Poxy product when it was found to contain a very low percentage of MDA (a known carcinogen) and styrenes (highly allergenic).

Scaled Composites now uses a Gougeon Brothers Inc. (517-684-7286) resin system that is free of MDA. This resin is called PRO-SET. I requested a technical information package and found it was designed for fabrication of fiberglass, aramid, graphite, and hybrid composites using wet-layup, vacuum bag and resin infusion laminating methods.

PRO-SET Laminating Epoxies consist of four resins of different viscosity and three hardners with different cure rates. Resins and hardner combine to create ten different epoxy mixtures, each with unique handling and cured physical properties. You need to select the proper resin - hardner combination. Some combinations require post curing if final stage cure is to ever be reached. A call to Mike Melvil at RAF found they use the slow cure material and post cure it. Mike has constructed an entire airplane with it and has constructed his Long-EZ aux fuel tanks with it. He is very happy with the product!

PRO-SET mini pumps provide accurate dispensing of PRO-SET epoxy. One full stroke of the resin pump and one full stroke of the hardner pump provide a proper ratio.

An other resin option has entered the market. Former Hexcell product manager and Cozy Mark IV builder, Gordon Bowen, (801) 394-5537, decided not to let Safe-t-Poxy technology die. He has introduced E-Z Poxy, 9315 resin and 9317 hardener, a near exact replacement for Safe-t-Poxy.

It seems that the early 2427 system had stability problems and reacted to moisture and CO_2 in the atmosphere. It developed a "cottage cheese" consistency. The product has since been modified to be more tolerant but seems to still have stability problems in very humid areas. I have had a batch of styrene and MDA free 2427 in my garage ratio pump for a year now and there has been no "cottage cheese" change in its consistency. I have kept a small light bulb burning in the epoxy cabinet to keep humidity down.

High moisture causes decrease in physical properties of all epoxies! Mike reports Scaled Composites uses desiccant in the epoxy pumps at their Mojave location. If they do that in dry Mojave imagine the humidity problems in Gulf coast states.

The E-Z Poxy has been introduced to offer an alternative for those wanting a product with a 20 year history of performance. It seems **less effected** by high humidity than the 2427.

I contacted Gordon and he stated the E-Z Poxy is much more stable than the 2427. He further directed me to contact Jeff Russell of AeroCad (910) 961-2238 to learn of the problems he had with the 2427 in a humid North Carolina environment. His article follows in this issue.

The latest Canard Pusher reports, "RAF can not comment on whether you should use E-Z Poxy, which more than likely contains MDA. It is up to you to ascertain how much MDA is contained in E-Z Poxy."

If you decide to use E-Z Poxy, RAF recommends the EZ-10 and EZ-84 combination. This sytem is available from Spruce (GA or CA) or Diversified Materials of San Diego.

A call to Mike Brown at Wicks (June13) found that 2427 is in stock and will continue to be available as long as the manufacturer supplies it At this time they are uncertain if the will market the E-Z Poxy. PTM&W and the old RAE systems are also in stock. Mike indicated 2427 and PTM&W were not resins of his choice. He feels PRO-SET and E-Z Poxy properties are far superior.

Amine Blush in Resin

Jeff Russell - AeroCad (NC) - We have used the following resins and have found very different results in our testing: Hexcel RAE 2426 resin and 2176, 2177 hardener, Hexcel EPOLITE 2410 resin and 2183, 2184, 2187 hardeners, Hexcel EPOLITE 2318 resin and 2316 hardener, Hexcel 2427 resin and hardener, PTM&W 3660 resin and PR2032 hardeners (fast and slow) 5 different types, CLEARSTREAM EPOXY, WEST SYSTEMS 105-5 resin and 205, 206 hardeners for finishing, ALPHA - POXY for finishing, and RYCHOR EPOXY for finishing.

The climate conditions in which you work will most effect the way an amine base resin will work for you. The only non amine base resin system we have used is Hexcel's EPOLITE 2183, 2184 and 2187 hardeners. The bad thing is these hardeners contain MDA and styrene. These Styrene-Monomer based systems dissipate water as they cure so that amine blush or other water related problems go away.

Amine blush is caused by high humidity and by the amine group in the resins and hardners accepting CO_2 and H_2O. This is noticed as a white film around the lids of a laminate or by a thin film that gums up your sand paper. People often think their resins are not curing and that they have been supplied faulty materials. The real culprit is amine blush caused by high humidity and high temperature

As temperature increases, the air can hold much more moisture and CO_2.

Higher temperature also increases the number of reactive sites available and sets up the perfect condition for amine blush to occur. With all this technical goop set aside, most builders only want to know how to prevent amine blush or how to cure the problem that they now have on their laminate. The following are remedies for amine blush:

1. Use peel ply. Amine blush forms most generally on the outer most portion of the lay-up. By using peel ply the amine blush is removed when the peel ply is removed, leaving a laminate free of amine blush and ready for secondary bonding.

2. Use a high quality resin, or a fast hardner. The length of time that resin is uncured is the length of time of exposure for the formation of amine blush. Reduce this time and you will reduce the amount of amine blush.

3. Cap all resins as soon as possible. This reduces exposure to the elements that cause amine blush. (DO NOT USE EPOXY PUMPS) Humidity and fiberglass and core material will effect how a laminate will turn out too.

4. Work in a controlled environment if possible. It is often hard to have a temperature and humidity controlled shop, but we can do our lay-ups at times when the temperature and humidity is not extremely high as we frequently see it in North Carolina.

5. Amine blush can be washed off with a clean cloth and warm water once the initial cure has occurred.

6. Sanding will remove the amine blush and also gum up your sandpaper. **Amine blush must be removed before subsequent or secondary laminates or lay-ups are initiated. If the amine blush is not removed, the interlaminar sheer strength is only as strong as the amine blush.** I find that the easiest method is to purchase a high quality resin that is not susceptible to amine blush and use peel ply. By doing this, I get the best of both worlds. I get a resin that is easy to work with and that has higher qualities in virtually every area. I reduce sanding work and lighten my laminate by using peel ply. With these issues in mind, we use only EPOLITE 2183, 2184, 2187 hardners which eliminate amine blush.

We, at AeroCad, have had bad results testing Amine base hardeners. On a glass to glass bond (tape glassing cured bulkheads in place to other cured glass) the tape glass would peel off like it was bonded to wax paper. We also found fully cured laminates to have poor peel strength between plies. Vacuum bagging also produced the same reaction.

We deal with 80 to 90 percent humidity in our areas most of the time. We feel you should always test your resin systems to see if these types of problems come up. Most of our peel strength problems were seen in the winter time. The longer the cure rate the more moisture that seemed to creep into the laminate. We had material reps examine the problems we found in our testing and, surprisingly, no answers came from them.

Our fix is to just use Styrene-Monomer base hardners.

RAF is in the desert with almost no humidity so they will not have our high humidity problems. Use all resins as if you are a Guinea pig in your area. TEST - TEST - TEST until you know the resins will work for your needs in your area.

We also found that the T_g *(glass transition temperature)* was not what the resin manufacturer said it was. We took nose struts made of S-2 glass and sample resin from manufacturers and post cured it, slowly stepping up to 190°. We would then let it cool and re-heat it to 160° then 170° and so on until the resin became rubbery. Some samples would only reach 160° and others maybe 180°. Are resin manufacturers lying to us as end users? They told us to expect 10-20% lower T_g values because we were not in THEIR lab. If that is the answer you can expect from them, you had best TEST - TEST - TEST.

VHF Antennas in Long-EZ/Cozy Aircraft

Tony Rothwell (Australia) - I am building a Cozy 3 and am at the stage where I was making the winglets. I did some calculations and figured I knew better than the original designer of the radio antennae. I thought that each half of the VHF communications dipole should be around 22.6" rather than the 20.3" specified. I made one winglet antenna to the book dimension and one to my dimension and covered both.

Wrong! Fortunately, in those days I worked for the Australian Civil Aviation Authority and knew the fellow who ran the measurement and calibration laboratory. I took the winglets to the lab and had them measured for "bandwidth" and resonant frequency.

The plans built, 20.3" antenna was tuned nicely to 124.038 Mhz and the reflection co-efficient was less than 0.4 from 114-135 Mhz and less than 0.3 from 117 to 130 Mhz. Clever me had produced an antenna tuned to 111.04 Mhz, way down near the bottom of the navigation band and with a reflection coefficient below 0.3 only from 108 to 116 Mhz. Truly woeful!

I had to carry out an operation and shorten each antenna leg to its correct figure then repair the holes. More work and a heavier airplane resulted. I wish I could say I had truly learned a lesson and not made any more changes but it wouldn't be true.

I just hope my IO-320 with an MT prop delivers results to justify the weight and the cost. With a little luck, I'll know within the year. Gee doesn't work interfere with building?

For Sale

Cozy III, $16,000. All glass work done, primed and ready for engine, instruments and paint.
O-200 Vari-Eze for sale, $15,900, low time, light weight electric starter, etc.
Call Chuck (352-637-1184

Eze Racing

Rob Martinson (CO) - My races were like the Thrill of Victory and the Agony of Defeat, or the other way around. I raced in the Sun' n Fun Sprint and the Sun 100, now called the Whitman Memorial. In the Sprint, Troy, AL to Bartow, FL, I knew Charlie Airesman and I would be close but not nearly as close as it turned out. *(Rob, at 208.3 mph, was 2 seconds behind Charlie at 208.9 mph.)* I was delighted for Charlie as he is a gracious winner and most deserving. He has helped me and a lot of others so much! As expected, Klaus is in a class by himself. Two days later I got better results in the Sun 100.

In the first race I encountered what I had been concerned about but couldn't test. I have been experimenting with spark plugs for some time and thought I had a good combination. I could not test sea level performance at maximum manifold pressure, however, as I live well above sea level near Denver.

During my descent in the Sprint Race I encountered what we later decided was pre-ignition, caused by too hot spark plugs that were pre-igniting the fuel. This caused a loss of power and loss of concentration on the part of the pilot and, needless to say, a loss of valuable seconds. Oh well, this is what racing is all about.

The following are canard results from the Sun' n Fun races:

Sprint (Pelican Class)

1st - Klaus Savier Vari-Eze 201.6 knots
3rd - Charles Airesman Vari-Eze 181.69 knots
4th - Rob Martinson Vari-Eze 181.13 knots
6th - James Gabrick Vari-Eze 153.07 knots
8th - Josh Rubin Vari-Eze 134.71 knots

(Flamingo Class)

4th - Roger Crupper O-320 Long-EZ 160.53 knots

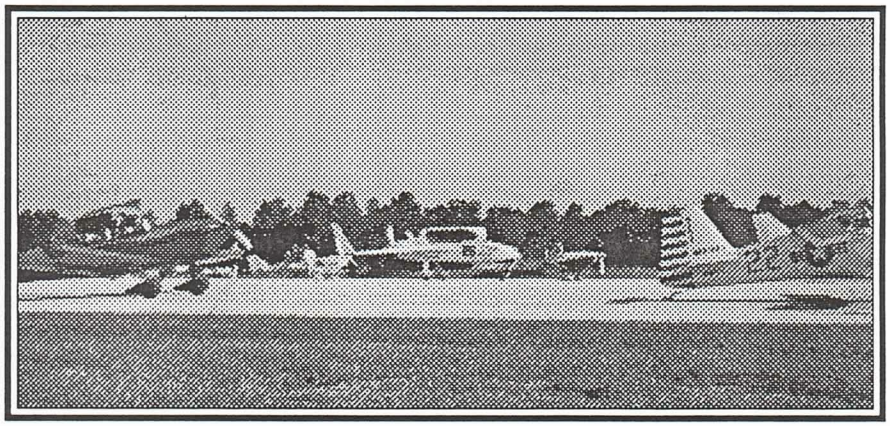
ED. It was interesting that the first place in this class, a Glasair1RG with considerably more power and retractable gear, would have placed in 5th place behind Rob if the Glasair would have raced in the Pelican Class.

Sun 100

1st - (class 1B) - Rob Martinson Vari-Eze 184 knots

Canard pilots at Troy, AL before the Sprint Race.
(L-R: Rob Martinson, Jim Gabrick, Roger Crupper, Klaus Savier, Charlie Airesman, Josh Rubin)

Rob's Vari-Eze in the Sun 100 line up awaiting race start



Hot Glue and AV Gas Update

Bruce Hughes (HI) - I read in the last newsletter, p 17, under Hot Glue and AV Gas that "tanks be coated inside with epoxy or vinylester resin". Maybe you should tell everyone to be sure that the vinylester resin to use is Dow Derakane because other vinylester resins may not stick forever according to what EAA's Tony Bingelis says.

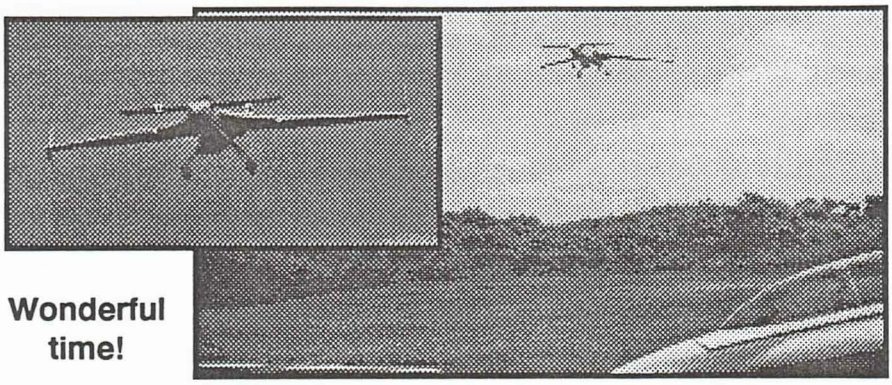
1996 Florida Gathering

Jesse Groh (FL) - For the second year Joanie and Jack Fehling held a terrific EZ fly-in at Tailwinds Airpark on Tuesday, April 16. The date was selected since many EZs would be in the area for Sun' n Fun. While Joanie and her helpers were setting up a delicious display of cold cut sandwiches, Jack and others were busy helping park arriving EZs at the airstrip.

Then all ears heard a different sound to the west. It almost sounded like shock waves building up on an airfoil. Everyone thought it had to be a Tomcat en route to Avon Park AFB but it couldn't be because the sound was getting closer and louder and was too pronounced. So all thought it had to be a Skymaster or a Mustang at warp speed! The suddenly two winglets appeared to the west. Surprise, it was Klaus Savier in his ultra efficient Vari-Eze! As Klaus turned final a Long-EZ was still clearing the runway. He added the coals and the go-around was immediate. Pretty impressive!

Back at the food tent, stories were told by all, including Judith Saber. She told how she started manufacturing prop extensions basically as a hobby. That turned into a full time job due to the high demand resulting from her outstanding machine work.

Central States would like to thank Joanie and Jack for, once again, hosting a super fly-in and for providing us with the best potato salad in the east!



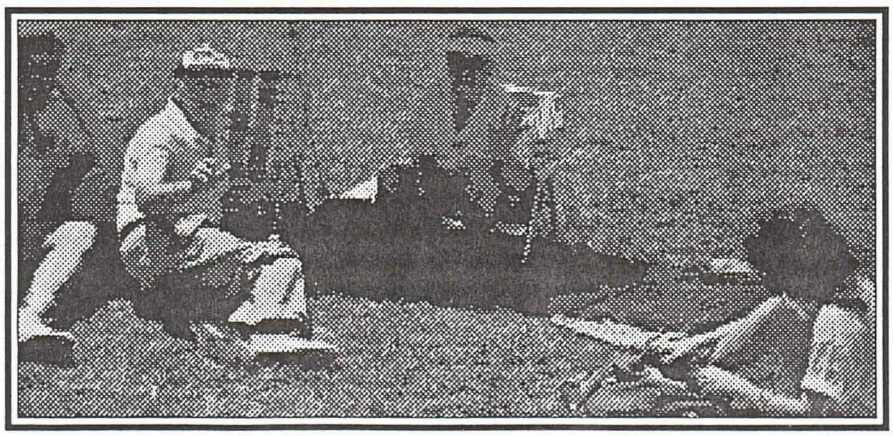
Wonderful time!

Great Food!!

Perfect location

Tremendous Hospitality!!

A BIG Thank You to Jack & Joni & the Florida Folks!



Whatta Guy!

It was rumored that Sid Stiber, sage Long-EZ guru from Shelter island, did the gentlemanly thing at Sun' n Fun. He was quoted as saying, "You boys run along and race. I'll stay here and protect the womenfolk."

KCGIG94 Forum Samples

I did not get to all the forums, but did visit most of them. I have pulled a miscellaneous list of "interesting tid-bits" that I did not know before or that went contrary to things I had been doing. Please bear with me as space does not permit me to do justice to the tremendous speakers who presented at the **KCGIG.**

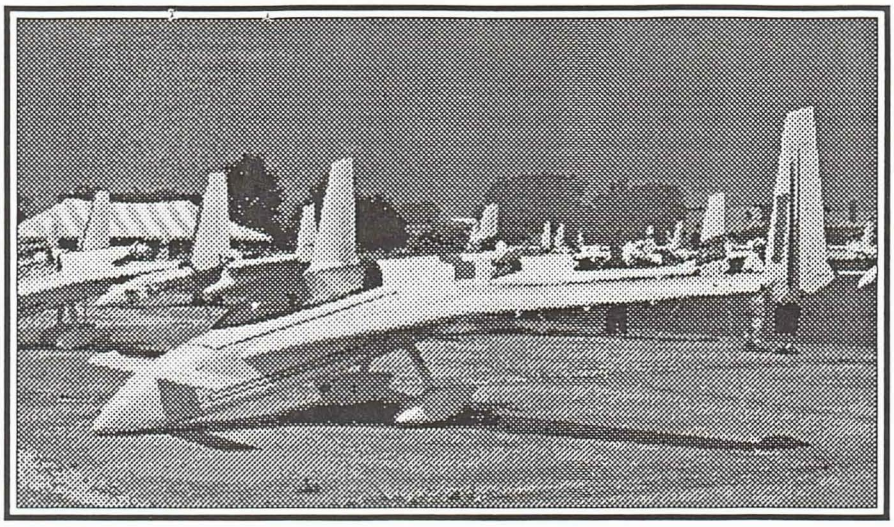
Norm Howell's list of test pilot rules:
1. Have a plan.
2. Fly the plan.
3. Dear God, please don't let me *&#@+ up.
4. Got any Beemans?

Gary Hertzler's performance tips: "Electronic ignition is a definite improvement! The combustion flame travel speed slows with decreased manifold pressure and leaner mixture." That means the higher you go, the more retarded your ignition timing causing more of your fuel to be burned in the exhaust system instead of inside the engine. Retarded timing will, thus, keep the EGT's much higher. He runs an inductive electronic ignition and figures the system is worth 4-5 mph.

Gary removed the cusp in the winglet of the Vari-Eze to get less drag. He made the outer winglet surface flat by sectioning out a 3/8" wedge from the inboard surface and then covering with BID at 45 degrees. Next the outter face was filled with micro to get a flat surface.

"Cooling drag is a fruitful area for drag reduction" The Berkut style armpit scoops that are out about 1" in the slip stream cause more drag than the ones against the fuselage. The offset is needed in jet engine applications where there is a need for even pressure to the first stage compressor. Piston engines don't need that, so why build in more drag?

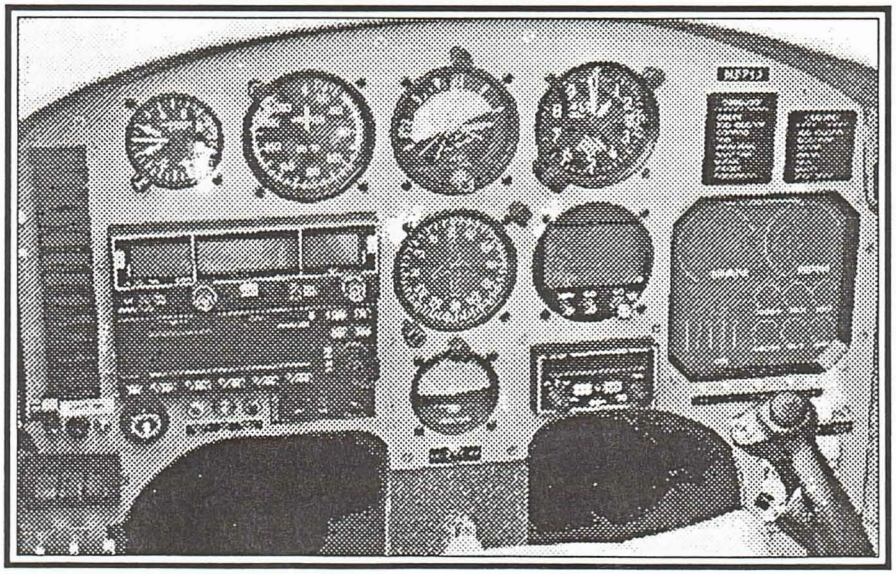
Gary's new O-235-C2C uses L2C pistons with special piston rings giving better sealing and 25 hours per quart of oil.



Jerry Peck's Kansas Long-EZ , N12NC won Best Exterior award

Norm Dodge's Arizona Long-EZ, N42ND, won Best Interior award

Jay Greene's Alaska Long-EZ, N271J, won Best Instrument Panel award



PP-ZAD To Europe, OSH and Home (part 3)

Andre Debert (Brazil) - The VIP parking place at OSH is reserved for aircraft that has distinguished itself in Sport Aviation. Located at the main entrance near the tower everyone sees it entering the flight line. PP-ZAD was in honorable company with the French Coyote that a couple piloted from France and the RV-4 that came from Australia.

Sunday the 29th was scheduled for the much awaited "Glass Overcast". I had been invited to participate in this formation of flight of many canards. The event would open with flybys of one each model designed by Burt Rutan. I would have to attend the briefings as the Long-EZ selected was mine.

As always, time at OSH flies by quickly. Robyn Laing, the dynamic lady in charge of the Japanese television team, literally took complete care of me. I was invited to join them for dinner at the only Chinese (they couldn't find a Japanese one) restaurant in town. They also wanted to host me in one of the private guest houses commonly found during the OSH week. During my stay with them I learned much about the, strange for us, race. They are so dynamic, so organized, and so industrious to the point of fanaticism but at the same time sympathetic and hospitable.

At 7AM after a large breakfast, I found them collected in an animated discussion. They had already been working for 2 hours debating the previous day's results and determining the current day's tasks. Prospects, team goals and individual task assignments were then established. We then departed for the field. I felt I was opening up OSH for the morning as there were so few people there at that hour.

My association with the Japanese TV crew permitted me complete and free access everywhere. I used this many times to see things not normally seen by the regular visitor.

I went immediately to the long rows of parked EZs. Many had come to pay respect and honor to Burt. The 3 hours I spent waiting for the start of the briefing were well spent debating the respective qualities and features of our marvelous flying machines. Everyone wanted to know how ZAD could have almost 21 hours of endurance and could routinely take off overweight and land without breaking the landing gear.

Glass Overcast organizers were able to put together 28 canards for the fly by. More could probably have been flown with more training. It was quite a feat to gather that many inexperienced EZ pilots and have them trained for formation flying in so short a time. It would be a beautiful sight. They would all take off in advance of show time, join together outside the airport area and fly down the runway. During that time we would organize the opening squadron composed of a Quickie, a Vari-Eze, a Vari-Viggen, a Defiant, and my Long-EZ.

After a long delay to access the beginning of runway 18 we finally took off. I was beside the Defiant flown by Mike Melvill, who gained speed and altitude rapidly. We made 5 low passes over the runway, turning to the right in front of the tower, as Burt told the story of his creation and the adventure of ZAD to nearly a million people over the PA. The Glass Overcast formation flew over our heads as our 5 different canards flew in the fly by pattern.

I was overwhelmed with the event of flying my Long-EZ in front of this very select crowd at our mecca, Oshkosh. It was so great but it ended too fast. Too soon we had to land and return to parking. Dozens of people were awaiting me for more tales.

Not being a professional writer I find it impossible to describe Oshkosh. I prefer to leave this task to the many media that are there. I am afraid I am too biased and you would only hear of glass and canards.

During OSH week a hurricane "Erin" was demolishing the southern states. Several Brazilian friends had to leave early to join their families that were trying to escape this beast. In the Wisconsin area an approaching cold front was threatening our happiness for the next several days.

I had intended to leave OSH on Wednesday, spend Thursday in Fort Lauderdale doing a 100 hour inspection, conduct business on Friday, rest on Saturday and travel to the Caribbean on Sunday. I was stuck between the hurricane and the cold front, neither of which I wanted to look at closely. Erin was hitting Florida close to Orlando while the cold front had already brought rain and strong wind to OSH.

Wednesday night the marvelous Weather Channel, from which I didn't take my eyes for an instant, was finally showing the weekend to be much quieter.

Thursday I departed OSH under gray skies with fuel enough to make it to Florida going around any weather left by the hurricane. The fuel weight would not allow me to climb directly over FL110 and Chicago Center wanted me over FL 150 to overfly them. I was vectored over the lake and after 4 hours of rain and turbulence the weather became better.

Indiana and Tennessee passed under our wings and I was about to overfly Georgia without seeing it once again. An hour later Atlanta Center raised doubts about my possibilities of reaching Florida or any other points on the Atlantic coast. CBs were scattered all over Florida reaching north to Jacksonville. They suggested several alternatives that I wrote down just in case. Center had a little difficulty understanding that a small experimental homebuilt airplane could have come from the

Canadian border in the center of the country, try to reach lower Florida and if unsuccessful, return north to the Canadian border without refueling.

I continued on course listening to the pilots chatting on center frequency about fighting the CBs.

The fact is I must have a certain prestige with CBs because as I proceeded on course they seemed to run away to the west. Over Jacksonville I turned south and watched the CB formations vanish to the west. I landed at Fort Lauderdale Executive Airport after a little over 11 hours. My ground speed had been only 107 kts due to vectoring around Chicago and the constant head winds.

The next morning I spent on business and in the afternoon completed the 100 hour inspection. All was Ok except for lead fouled spark plugs and an exhaust pipe that had to be rewelded.

This time I decide to discover another island of the Caribbean on the way back to Brazil. The spectacular St. Marten (Saint Martin for the French) was only 8 hours away.

I departed Sunday morning to cover the 1114 NM of blue water full of little tropical paradises along my well known Airway "A 55". The weather forecast was for clear sky with possible thunderstorms in late afternoon, as expected for this time of year. After 8:08, at an average ground speed of 134 kts, I landed at "Princes Juliana" airport on the Dutch part of the island of St. Marten.

After the routine bureaucratic formalities, in which the abundant distribution of "general Declarations" were as always welcome, I hired a taxi to go to the French part of the island looking for a comfortable hotel to spend a couple days relaxing.

This part of the island is considered a French province and still depends administratively on Guadeloupe. It is very beautiful and enjoyable. It is more organized than the Dutch area that gained its independence from Holland very recently. That section suffers the consequences usually associated with this process.

I had anticipated the delight of dining on giant lobster but was denied that pleasure. They were in reproduction season and it was not permitted to capture them. However, I was virtually in France and I could expect to satisfy my gluttony at any of the numerous restaurants available. My eating was limited to Sunday and Monday as Tuesday would be of abstinence in preparation for Wednesday's long and difficult journey back to Brazil.

I hope the lovers of St. Marten will forgive me, but frankly I was disappointed. I expected much more but all I saw were a collection of modern buildings of dubious architectural taste. A cluster of hotel and casinos, which tried to imitate Las Vegas, but only impressed the poor dazzled tourist of the third world.

Phillipsburg, capital of the Dutch part, is smaller than the district where I live but has traffic jams that compare to those in the biggest capitols. I rented a little car, just to be able to see the island without fatiguing myself too much while walking under the hot sun. I returned it the next day after driving less than 20 miles in 2 days.

On the other hand, Marigot, capitol of the French part on the north side of the island is a delicious little village. It looks like one in the provincial part of France. Long walks along its typically colorful commercial streets are delightful. One of the most attractive parts (for me) were the restaurants with their typical French dishes and the long beaches covered with very fine thin sand.

I could have stayed there for weeks but, too soon, the departure date from this little paradise arrived. This 1470 nm leg, the longest of the trip back, would be probably the most tiring and difficult. This was due, in part, to a four and a half hour section between Barbados and Cayenne in French Guyana over water with no alternatives and poor communication. The famous TCZ *(tropical convergence zone)* was always active this time of year and it awaited me.

Without explanation, the international airport "Princess Juliana" was not operating by night and I had to accept take off when they would be open thus requiring a night landing at Belem.

The Caribbean overflight to Barbados was uneventful with good weather. Then a 20 kt head wind developed that created doubts of reaching Belem. The alternates were a little far away so I planned a fuel stop at Cayenne.

Close to the South American continent the winds changed direction from the sea to the land as is usual at the end of the afternoon. In less than an hour they were tail winds that more than compensated for the previous head winds. If they continued I could reconsider and proceed again direct to Belem. This would be much better as I did not like to land on the scorching Guyana located right on the equator.

Shortly after Cayenne, and already over Brazilian territory, I began to detour around several tropical formations. I was successful until I went suddenly into one of them over the state of Amapa. It wasn't a fully developed CB but it made me work harder. Torrential rain made it difficult to maintain control of the airplane. I nearly gave up to turn east and try a path to the east over the shore.

Such a deviation would jeopardize my range so I decided to continue ahead. These formations usually end as abruptly as they begin. After minutes that seemed hours I was suddenly out in bright clear sky.

At 21:00 local time, after 11:55 hours, I landed at the "Val de Caes" airport. The chief of the base, Colonel Mark de Matos, had left instructions to take care of us. I went directly to bed as I felt suddenly tired and had no interest in eating.

Thursday and Friday were spent in rest and relaxation. I was expected to arrive at Sao Paulo at about noon Saturday and this would force me to depart from Belem very early in the morning.

Saturday, August 12 at 02:07 we departed on the last leg of the long and adventurous trip. Meteorology predicted good weather for the entire route with head winds and thick damp haze in all southern Brazil. This is a common occurrence which I expected to dissolve by arrival time.

The bright and clear night permitted me to see the lamentable spectacle of fire grounds all over the states of Tocantins and Goias. As far as eyesight would permit, fires illuminated the entire sky. Sunrise is always a wonderful sight. This one was especially beautiful ás nature tried to compensate for the crime of inconsiderate and greedy men. The brightening sky diminished the luminosity of the fires.

After 4 hours of flight and close to "Porto Nacional" I began to hear the airliners coming from the northern hemisphere headed south to Sao Paulo and Rio de Janeiro. All their destinations were closed due to haze so thick you could cut it with a knife, as they used to say in France.

It was a general race toward alternates and Brasilia was best at this time. I was laughing in my beard, that I keep thick for this purpose. I knew the thicker and faster forming haze was the quickest to dissipate. I knew I would be able to make it to Marte without any problems.

Wind forecasts over the continent usually aren't accurate. This time they unexpectedly switched to my tail and would make me arrive too early at my destination.

Abeam of Pocos de Caldas, in the middle of the state of Minas Gerais, Brasilia Center called informing me the squadron "Omega" would be awaiting me over Atibaia. Squadron Omega is the formation flight of Cherokees our airclub sends to welcome me when I have just completed an extraordinary feat such as the Africa flight last April. (The airclub president informed me later I would have to stand still for some time after this flight or else I would have to help finance the welcome home formation flights.)

Squadron Omega joined up with me as the leader, Decio chided me. "What is the matter captain? You want to spoil the party? All the media, members and officers of the airclub, all your friends and family are expecting you to arrive at 14:00 and here you are at 12:00. - - "

So, we landed at Jundiai, a small airport some 50 miles away from Sao Paulo and waited there enough time for the party preparation.

This is it I thought, one more record attempt blown away. I could have claimed Belem/Marte at an average ground speed of 140 kts.

As always, the reception at Marte, my home base, was exciting and intense. After the usual fly-by formation with the Cherokees I finally landed putting an end to one more astonishing adventure.

From the runway I could see all the mob composed of friends and relatives incessantly applauding. Emotion took me up completely, and for a moment I forgot the intense fatigue of the last legs of the trip. They were all there, Ruy the president, many members of the airclub, ABRA and ABRAEZ, and even my wife, daughter and grand-daughter were there to pay tribute to one more feat of a great airplane: the Long-EZ, PP-ZAD.

After cocktails, speeches, and a copious lunch, it was finally time to return home.

CONCLUSION

We were able to demonstrate once more the efficiency, versatility and safety of little airplanes and primarily experimental homebuilts.

We traveled routes that many reputed to be impossible or too dangerous to be made with a single engine.

We confirmed that an airplane and accessories, not necessarily of aeronautical standard, are extremely reliable, if operated within limits established by their manufacturers.

Nature and its diverse phenomenons are to be respected always. Hurry is not only an enemy of perfection but also of flight safety.

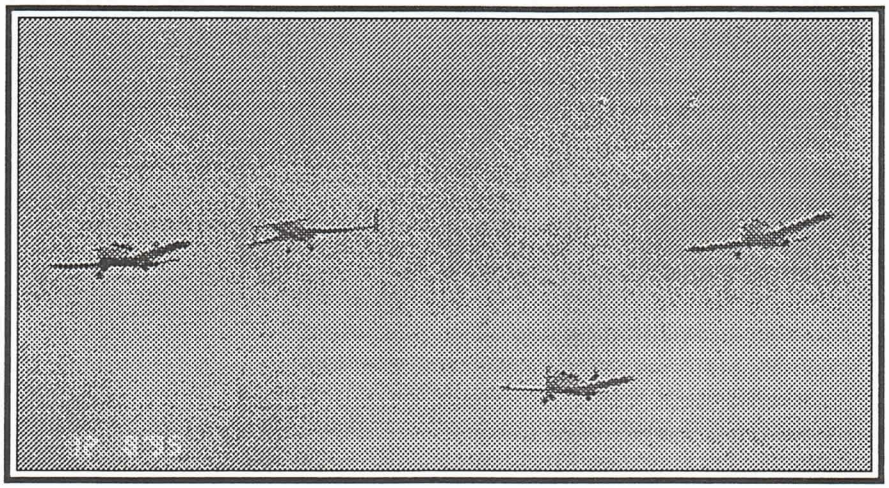
I cannot deny that luck was almost always with me, but I also helped a bit in that sense. Having no boss or tight schedule most of the time helped considerably. I was able to make the right decisions and select alternatives adequate to face the elements with security.

PP-ZAD flew for 130 hours and covered 16,480 nm in 5 weeks, resulting in an overall average ground speed of 126.5 kts. More than 10 countries were visited and 2 ocean crossings were completed with entire safety.

Modern electronics helped in communication, navigation as well as supervision and operation of engine parameters.

The so called "Experimental Aviation" phrase says it all. Our experiences are being used in all fields of engineering and life. We are helping discover innovations that contribute to easier life for all.

PP-ZAD will now begin a well deserved long period of stillness, but not too long, however. You know him to have a fear of getting rusty.



Sao Paulo Aeroclub's formation team, "Squadron Omega", escorts Andre home from his final record setting adventure

Systems 3 Paint Report

Jim Voss (Russia) - I used Systems 3 paint for my Long-EZ. It was easy to use since it was water based, but it was difficult to get a great finish for a lot of reasons. I eventually was happy but it took **hundreds** of hours and lots of elbow grease. That is enough for me to recommend to fellow builders to try another paint. Now, after flying for 2 years, (and always being hangared), the real reason for builders to avoid this paint is that it doesn't hold up. It is starting to craze - thin cracks in the surface that looked like hundreds of parallel razor cuts.

At first they could only be seen with the light glancing off the surface at just the right angle, but now have grown to be visible any time and I will eventually have to re-paint (OH NO!!) In some places, the crazing makes small pieces that then crack and flake off. I had applied the paint religiously in accordance with the manufacturer's directions and with several consultations by phone, so I think it was applied correctly. The bottom line is - -

Don't use Systems 3 paint !

Condolences

Most of you know that our friend, very long distance Long-EZ pilot/builder, Andre Debert, lost his life on March 14 in Santiago, Chile. He had just attempted another Rio to Santiago speed record flight (see CSA Oct 94) and was relaxing in Chile. He had been invited to fly in an airshow and was practicing a roll over the runway. Half way through the roll he apparently realized he was too low and tried to reverse it. A wing tip hit the ground and the resulting crash proved fatal for Andre.

I shall miss his wonderful personality and exciting EZ adventure stories. We have all lost by his passing but have gained so much by having him in our group!

Eternal tailwinds my friend.

Alix Deberdt, daughter of Andre (Brazil) - March 14th, 1996 our beloved Andre took off for the very last time, he will be terribly missed by all of us. He used to say, "The sky is the limit, this planet will become too small for me!" Now Andre, at last, the Universe is the limit.

The family would like to thank you for the priceless support received in this painful moment.

Editor: In case any of you wish to send condolences, the address is:

ASCOM
Rua Joaquim dos Reis
51 S/03 04727-150
Sao Paulo - S. P.
Brazil

Help - I Need Input

Many EZ drivers are looking engine repair in the face and do not know where to go for **good work**.

I propose an article based on your input. If you have a shop that did good work for you and the engine is performing well we want to know about it. Please take the time to contribute your success story for the benefit of other EZ drivers.

CSA Mail Label Policy

Policy has been to not sell the membership data base mailing list. I have run free ads for organizations who I felt promoted safety, education or canard flying on an available space basis. The policy was established originally when we were hit with demands for ad space and membership address lists by a couple nefarious EZ parts builders. We did not want Central State's good name to be associated with them.

I have been contacted by an aircraft materials education workshop wanting to send flyers directly to CSA membership. I feel their intentions are honorable and they are offering a CSA goal, education. I **do not** plan to sell the data base but might make the mail labels available to that organization at cost. I know some of you are concerned about being on too many data bases. I feel this move can attract more people to experimental aircraft construction and raise our awareness of materials and processes so we may build better airplanes.

I want your input before I make a policy decision on this subject

Fastener Failures

The number of amateur-built aircraft is increasing and unfortunately so is the incidence of reported fastener failures. An FAA Designated Engineering Representative (DER) from Oregon investigated the reports and found a common link. The following was paraphrased from the report.

His research "strongly suggests that **fasteners are under torqued far more often than they are over torqued."**

It seems a fastener is far more apt to fail if it is assembled with insufficient preload. This preload is commonly referred to as torque. Unfortunately the preload can be wrong even if the apparent torque input is correct.

The commonly accepted "torque" procedure is just a way to attempt to control preload. It appears to be very precise as some mechanics have a fit if you are 1/2 pound off on torque setting. It, however, has been demonstrated that this pre load procedure is very poor and unpredictable. It is subject to many variables including assembly technique and friction. Any friction will obviously reduce the pre load applied to the bolt.

To reduce this error all fasteners should be at least like new with clean, smooth, properly plated, and **properly lubricated**. Proper torque sequence must also be followed to prevent uneven preload on the fasteners.

The DER pointed out that "any fastener which is loaded in tension must have a preload which is higher than any load which will be imposed in service. So long as preload exceeds service load, the fastener will not experience any cyclic stresses and will ordinarily have an infinite fatigue life." If the service load exceeds the preload then the fastener will be cyclically stressed resulting in further loosening and preload loss. The fastener will then fail depending upon the number of cycles and the load imposed.

I have seen some builders who believe that a bolt is a bolt and local Handy Andy hardware bolt is just as good as a Lycoming bolt for holding things together. This is not true. AN bolts are not an automatic solution to all fastener problems. There are many special case situations where the fastener material must be able to hold a higher than normal preload and therefore require a special bolt. Engine case bolts, connecting rod bolts, case studs, etc have a much higher than normal strength and require torque values that would destroy AN or hardware store fasteners. Do not substitute AN hardware for special OEM hardware!

In summary, the DER made the following recommendations we should follow." At the very least, use only a high quality calibrated and certified torque wrench. Assemble everything according to approved instructions and follow them to the letter. Then go back and double check everything twice. Never re-tighten a critical fastener such as a propeller bolt if found loose in service. Replace it!

But, before doing anything else, investigate the cause of the loose fastener and look for other damage. **Treat the cause, not the symptom!"**

Engine Failure Caused by Switch

An off airport landing was made following total engine failure caused when both ignition sources failed to develop enough power to fire the spark plugs. It seems the builder had connected both coil negative terminals together at a switch. The switch controlled an electronic tachometer and had an internal ground fault. The coils overheated and failed to produce enough energy to fire the plugs.

Though not typical in our engine installations, I thought it wise to point out this problem for those trying to tie the Equus electronic tach to both a mag and an electronic ignition.

Alexander SportAir Center Builder's Workshop Schedule

The following is a listing of Alexander Sportair composite workshops. The two day **Composite 1** Workshop will be of interest to those starting **scratch built** moldless construction similar to what is used in building EZs, Cozys, Defiants, E-Racer, etc. Students will build a portion of a canard.

Please check with your aircraft's designer to see it the presented methods and materials are acceptable for your aircraft project.

The two day **Composite II** Workshop is appropriate to those who are considering construction of **kit built** airplanes like the Berkut, Glasair, Lancair, etc. Vacuum bagging, bonding, glassing panels and general laminating will be experienced.

Cost of each course including materials and comprehensive workbook is $199. Phone 800-WORKSHOP or write:

Alexander SportAir Workshops
219A Barry Whatley Way
Griffin, GA 30223.

July 13-14 Arlington, WA
August 24-25 North Hampton, NH
September 21-22 Frederick, MD
October 12-13 Mesa, AZ
November 2-3 Lakeland, FL
November 16-17 Griffin, GA

Vari-Eze Project

Major glass work done on fuselage, wings and canard. Ailerons and elevator fabricated but not attached. Nose gear and main gear not attached, material available for winglets and rudders. Plans, early Canard Pushers, full set of instruments, cowlings, Jiran pre-fab tanks, Cleveland wheels brakes and tires are included. I have over 800 hours and $3,000 - $4,000 invested. Sale price: $2,000 FOB Harvest, AL.

Contact:
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