

THE CANARD PUSHER

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If you are building a VariViggen from 1st Edition plans you must have newsletter 1 through 34. If you are building from 2nd Edition plans you must have newsletters 18 through 34. If you are building a VariEze from 1st Edition plans you must have newsletters from 10 to 34. If you are building a VariEze from 2nd Edition plans you must have newsletters from 16 through 34. If you are building a Long-EZ you must have newsletters from 24 through 34.

A current subscription for future issues is mandatory for builders, as this is the only formal means to distribute mandatory changes. Reproduction and redistribution of this newsletter is approved and encouraged

The RAF hangar is located on the west end of the flight line at the Mojave Airport, Mojave, Ca. approximately 80 miles north of Los Angeles. You are welcome to come by and see our aircraft or to bring in any parts for our comments. We are normally open from 8:00 to 12:00 and 1:00 to 5:00 on Monday through Friday and 9:00 to 4:00 on Saturday.
Closed Sunday.

If you are planning a trip to see us, please call first to assure that someone will be here to assist you, since occasionally we are gone to flyins. When arriving at Mojave by car turn east at the Carl's Jr. restaurant to find the airport.

When writing to RAF send a stamped, self addressed envelope along if you have any questions. If you are placing an order, it's best to keep it separate from a request for an answer to a builder question. Mark the outside of your envelope "builder questions". This will speed up your reply.

RAF ACTIVITY

RAF has undergone several changes since Canard Pusher #33. Burt's new company Scaled Composites Inc. is officially off and running. Scaled's new building is going up rapidly next door to RAF. Roger Houghton and Doug Shane have both joined Scaled and Larry Lombard has moved to Task Research in Santa Paula.

This has left RAF with Burt, Mike and Sally, Trish Palmer and Michael Dilley. Michael Dilley was heavily involved in the construction of the Amsoil Racer. He is also an expert prop carver and is proving to be a very valuable asset. Both Michaels are presently hard at work drawing Solitaire plans. RAF is shooting for a target date of January 1983, when we hope to have the Solitaire plans available. Prefab parts will be developed and should be ready at about the same time. In between, development continues in the Solitaire's engine department. We have just installed our third engine, this one is a KFM 107E and it looks promising.

RAF has agreed to join with Voyager aircraft (Dick and Jeana) to build the Voyager. Work is currently underway. This will be an interesting project due to the very latest state-of-the-art technology being used. Voyager will be built at RAF and should be flying in the summer of 1983.

We are also developing a new, steerable nosewheel (fork and lower casting) which will be retrofittable to both VariEzes and Long-EZs. This project is in the early stages of development, so please don't call us for information. When it is successfully developed and flight tested it will be available from Ken Brock, perhaps around Christmas time.

Soaring Society of America Homebuilt Contest

The final stage of the contest was held over the Labor Day weekend in Tehachapi, California. This was most convenient for RAF, since Mojave is only about 20 miles east of Tehachapi which allowed us to make an airborne arrival. Burt flew the Grizzly towing Mike in the Solitaire from Mojave, west over the mountains where Mike released and did a little soaring while Burt descended and landed at Fantasy Haven. Mike then flew a short arrival show including hammerhead stalls and loops before landing.

The Solitaire was very well received and closely examined by the large crowd on hand. We removed a wing to allow the judges to see how it was done. Two of the judges flew the Solitaire which was towed as a pure sailplane behind the Grizzly. The two judges, Einer Einervoldson and Walt Mooney flew the Solitaire in formation with a Schweizer 1-36 (a 31:1 L/D) and the Solitaire was faster and did not loose altitude as quickly.

On Sunday morning the judges' decision was announced. The Solitaire was declared the winner by a unanimous vote.

During the three day weekend, the Solitaire was flown many times, self launching using the Normalaire Garrett two cylinder engine and by being towed both by the Grizzly and the Pawnee. After the contest, Mike self launched the Solitaire and flew back to Mojave. We have flown almost 50 hours in 78 flights. The longest flight was self launched, the engine then shut off and thermalled for two hours and 21 minutes. Eight pilots have flown the Solitaire at this time.

RAF-Developed Composites fly in the NASA Space Shuttle

The structural components in the Utah State University "Getaway Special Package" (a student project) flew on the latest NASA Space Shuttle mission using the basic RAF composite construction methods almost exclusively. Long-EZ plans, chapter 3 was the text used. RAF is proud to have helped the USU student package become the first and only package to be completed, accepted and flown.

Congratulations to Don Jones of Knoxville, Tennessee. Don's beautiful VariEze was selected to receive the Wright Brothers Award at the 1982 Dayton International Airshow and Trade Exposition. Don's VariEze also won an award at Oshkosh 1982 for Outstanding Workmanship. It really is an excellent example and Don deserves these prestigious awards.

Oshkosh 1982

RAF was well represented this year at Oshkosh. Burt and Pat flew the Defiant via Salt Lake City and Wichita. Dick flew his Long-EZ and Jeana flew Mike's VariViggen. Michael Dilley and Doug Shane drove the van pulling a trailer with the Solitaire on board. Mike flew the Grizzly and Sally their Long-EZ. This was interesting as Mike trued out at about 107 knots and burned 10 gph, and Sally in the Long burned 3.6 gph, and that included occasionally flying circles around the Grizzly (literally!). Everyone arrived safely at Oshkosh, although this year we all had to skirt around and under low ceilings and rain.

There was an impressive display of Rutan aircraft featuring; 16 Long-EZs, 64 VariEzes, 2 VariViggen, 1 Defiant, 1 Grizzly, 1 Solitaire, 1 Cozy, 1 Gemini and 1 Amsoil Racer. This year was the first time for the Grizzly, Solitaire, Amsoil Racer, Cozy and Gemini. Cozy and Gemini are privately built derivatives using the flying surfaces of the Long-EZ. In addition to all of this, the scissor wing AD-1 from NASA was there. The AD-1 of course, was designed by Burt in 1977 and was the result of an unsolicited proposal to NASA by Burt in 1975. The AD-1 was flown every evening in the airshow by NASA test pilot Tom McMurtry.

The Grizzly and the Solitaire were flown in the fly bys and the afternoon airshows. The Solitaire flew under its own power and was towed by the Grizzly as a pure sailplane demonstrating its 32:1 L/D for the first time at an airport other than Mojave.

One of the highlights of the convention for RAF, was the gathering of all of the Burt Rutan designs for a photo session in front of the announcer's stand. Eleven different aircraft types were parked in a loose circle around the NASA AD-1, while press photographers snapped hundreds of pictures. (SEE BACK PAGE)

After the incredible Oshkosh week was over, all the RAF folk pressed on home. The only change being that Burt traded with Mike and flew the Grizzly home, stopping at several small grass strips. Several times, while flying into the teeth of a 20 knot headwind, Burt was heard to mutter something about wanting his Defiant back!

The annual trek to and from Oshkosh every year is a major undertaking for RAF and although it is always fun, it is also very tiring. It was good to be home and all had a safe journey.

The following EZ Flyers flew into Oshkosh '82. Our thanks to all of them for making it such a successful show. "Mom" Rutan pleads once again for photos of your aircraft for her book. She says "many thanks to all who have sent photos in, but I'm still missing a few!"

VariEzes.

Baker	N14EZ	Ca	Kapperman	N16EL	CA
Curtis	N778CB	TN	Langerud	N91CL	TX
Benjamin	N40EZ	PA	Larson	N18VL	CO
Hirsch	N203DB	IL	Lawyer	N9039J	AZ
Boos	N41EB	IL	Lee	N35EZ	CA
Boyer	N95EZ	PA	Loewen	N80WL	CA
Brokaw	N224DC	MI	Lonsway	N15RL	FL
Butters	N235LB	MO	MacDonald	N13JF	PA
Coltharp	N40LC	OK	Mason	N27GM	MI
Cutler	N46RC	PA	Maricer	N22ZC	NM
Day	N999JD	CA	Marsh	N404EZ	CA
Dickey	N60SD	UT	McKean	N57EZ	TX
Dunn	N42CD	KS	Mondary	N500EZ	IN
Ellis	N547EZ	OH	Monnia	N81TM	OH
Fay	N23FF	CA	Patch	N86ZDP	CA
Fehling	N444EZ	FL	Pavlovich	N810TC	WI
Ferguson	N2286A	NC	Povlton	N79CP	OH
Foster	N77LF	CA	Rossignol	N23NR	CT
Fowler	N82JF	IO	Rutledge	N28RR	IL
Friling	N28JF	IL	Sorenson	N118SJ	CA
Gardner	N13WM	CA	Stockton	N51WC	KS
Gehres	N56EZ	FL	Swain	N2ZZ	CA
Geisler	N95F	MT	Seibel	N101MW	IL
Good	N66EZ	CO	Seibold	N6VE	AZ
Grove	N82GR	CA	Snyder	N412EZ	IN
Hazelrigg	N67EZ	IL	Stewart	N429T	IL
Hertzler	N99VE	AZ	Tiftt	N115EZ	CA
Himmerich	N25RH	IL	Thornhill	N325Z	TX
Hoagland	N1335D	IL	Trombino	N46JT	IL
Hoepfinger	N7AH	IN	Walker	N419JW	FL
Hornbeck	N76PG	MO	Wilson	N999EB	CA
Jones	N300DJ	TN	Williams	N17DR	MO
			Yoakam	N770DY	FL

Long-EZs

Adrien	N46AA	MA	Rutan	N169SH	CA
Burks	N102LE	CA	Sanders	N81HM	TN
Collins	N197GC	GA	Sheffels	N6825	MT
Wallace	N711QA	CA	McElroy	N80DZ	WA
Gruber	N401EZ	IN	Melville	N26MS	CA
Hanson	N7EZ	CA	Norris	N555PN	OH
Hunter	N14LZ	FL	Van Noord	N7VN	CA
Rodewald	N1344T	HJ	Williams	N95JV	MN

VariViggen

Melville	N27MS	CA			
Winters	N31WJ	OK			
Rutan	Defiant	CA	Ganzer	Gemini	CA
RAF	Grizzly	CA	Puffer	Cozy	MN
RAF	Solitaire	CA			

Kerrville, Texas Flyin.

If you want to enjoy an easy going, no rush flyin, Kerrville is a must. Mike and Sally flew N26MS with Bruce and Bonnie Tiftt in their yellow bird from a join up over Big Bear, California to Kerrville, Texas in seven hours. We made one stop in Lordsburg, New Mexico.

Usually a gas/pit stop is uneventful but not this time. Bruce landed behind 26MS and as we were taxiing in, Bruce calls on the unicom "Lost my front wheel". Into action comes the VariEze Hospitality Club. Mike climbed back into 26MS and flew to Los Cruces and borrowed the front fork straight off Charles and Joan Richey's VariEze!! Within in an hour we were in the air.

Kerrville is in the rolling hills of Texas with a quite large river running through town. There were about 16 VariEzes and Long-EZs. Friday night the EZ people got together for supper and the "tall tales"!! On Saturday evening the EAA chapters gave a really super banquet. Before the airshow started on Sunday 6 VariEzes and 2 Long-EZs took off and flew a loose formation flyby. It was a most enjoyable flyin, very relaxed with just great Texas hospitality.

International VariEze Hospitality Club. by Don Shupe.

The club was founded several years ago to encourage and promote hospitality, travel and support by people interested in VariEzes and composites in general. We publish a quarterly newsletter that contains a list of members that is updated on a yearly basis with quarterly supplements. We publish the letters we receive from members and try to provide the latest information available on flyins, published info of interest and survey data that we collect at flyins. Members are expected to provide shelter and comforts to other members in need according to the hosting members ability to provide these courtesies at any given time. Courtesy demands that members give expected hosts as much advance notice of the intent to visit as possible. The most common complaint we get from members is that they do not get visited frequently enough.

We sponsor flyins several times a year at various locations around the country as a function of member interest and availability of members who are willing to do the organizational work required. The complexity of the flyins varies from the highly organized extravaganza produced by the Richeys of Las Cruces NM at Taos to the more informal "do it yourself" flyin at Loreto, Baja. Members seem to like the flyins and attend in large numbers if the weather is good and advance notice sufficient.

By support, we mean that as possible we fly parts and repair equipment to members that are stranded anywhere in the world where we have members. We have delivered props to people who have had to make emergency landings and had them back in the air in less than four hours. Members who have been helped are expected to pay the costs of the help they have received but nothing else is expected of them. Many members have used this service which is especially comforting when you are traveling in country far from home where you don't know anyone except the names on your membership list.

If the preceding describes an organization that seems to fit your needs and interests, contact IVHC, 2531 College Lane, LaVerne, CA 91750. Enclose a check for \$6.00 State side and \$8.00 overseas membership.

Long-EZ Squadron I

This is a Long-EZ builder/flyer club. Anyone with Long-EZ plans or building a Long-EZ in the Los Angeles basin area is welcome to write to the address below for information on the club and its purposes. This club is not for people with a general interest, but is for serious builders and only Long-EZ builders. The club is very well run and has meetings once a month. They put out a monthly newsletter to the 48 paid up members. There are organized committees to assist builders in various areas such as electrical, engine installation, structure and even plan interpretation. The club tries to have interesting speakers at their meetings and members are encouraged to bring parts to the meetings for constructive criticism. There are two Long-EZs completed and flying and two others that are close. This group is builder support orientated. There is little or no social aspect.

Contact : Long-EZ Squadron I
7000 Merrel,
Chino Airport, CA 91710

Would you like to take your Long Ez from Honolulu to Dakhosh? And if you can get it together, go the 4500 miles non-stop? I started planning on day one. The first cloth was cut 12 March 1981 and Dakhosh 82 looked like an easy goal. "Coffin Corner" goals in homebuilding are not recommended as they can unwind your main spring and money supply.

Long Ez construction went along very easily. This was my third composite homebuilt. The first flight was on 7 June 1982. Dakhosh looked easy, but wait! The Loran wasn't working yet neither was the ADF nor the Compuclus nor the SSB radio. It looked like the NAVCOM was inadequate for IFR. The new transponder was dead and 1344T needed 40 hours faster. It was flying great so I filled the tanks and by 16 June I took 1344T to the EAA Big Island Chapter 780 meeting with the first 40 hours flown off. It was looking good, but wait! The Compuclus had been calibrated, however the Loran wouldn't work with it on. With the Compuclus off, the ADF was only 20% effective and the Loran still wouldn't work. The core of the problem is that it's a fiber glass airplane and has no ground plane or counterpoise and none of the normal metal shielding found in aluminum airplanes. Add dirty power to this and the dirtiest electrical noises of all, the Compuclus, and a lot of time can be spent solving the noise problem. Actually once I got a system of detection, location and elimination going it was okay, however this cost me almost 30 days of down time. It can be done in less. Here's how I did it. Note: if you do not need any low frequency COM or NAV gear, you may disregard all of this and simply live with the noise as VHF is high enough not to be affected.

I started by disconnecting everything: battery, voltage regulator, alternator, p-leads at the engine, and all radios and appliances. I then used a small inexpensive transistor radio and tuned off a station. I started the engine many times checking for electrical noise using the transistor radio to ferret out each source, following up and down the wires inside both cockpits, into the engine bay and all over.

Here's what I went through. I replaced the mag switches as they were poor quality and arcing inside. I replaced the Kubota tractor alternator as it was noisy and short on output. I had to add a toroidal type coil and 2 capacitors to the Compuclus airspeed gizmo to quiet the oscillator and then seal the box with copper tape to keep the residuals inside. I then added magneto suppressors to the mags which didn't help, so I disassembled both mags and found a coil shorting in one. Then I removed the suppressors, because I didn't need them. The squeakiest noise of all was the voltage regulator. It sounded like ignition noise. This wasted a couple of days because my detection system broke down. I just couldn't believe it wasn't an ignition harness problem. The Prestolite transistorized regulator needed 2 coils and 2 capacitors which quieted it about 85%. It was never perfect. The Prestolite alternator had a whine that ordinary suppressors wouldn't quiet. I added 2 of the largest hash chokes available, which together with 2 capacitors and a lot of trial and error finally gave me fairly quiet power.

Back to the cockpit. Early in construction, before glazing, the single side band (SSB) HF antenna was run from the top tip of each winglet down the leading edge of the wings, wing strakes and around the nose. I installed a switcher so that the Loran could share the antenna except when transmitting on SSB. Sharing this antenna didn't work. Loran is too sensitive to noise and I still had a low level of noise. The Loran antenna placement problem eluded me until just a couple of days before departure. It was refusing to work in a fiberglass airplane. I had tried everything and was about to give up when it came to me. I dug a hole in the lower left winglet and put the Loran antenna pre-amp inside. I then ran a coaxial lead to the set and used 10 feet of .020 stainless wire with a small sinker out the aft of the lower winglet (trailing wire antenna). A quick test, hop confirmed that the Loran was now working better than it ever had in the shop. I had essentially removed the Loran antenna as far as possible from all noise. The ADF required a lot of trial and error with the sense antenna. The best solution was a piece of copper foil tape from the nose up to the canopy rail and aft along the rail to the rear bulkhead. It was a little short so I looped it up and over the head rest. Wrong. I wasted about a day of trial and error to figure out that I was too close to the voltage regulator with this antenna and had to keep shortening the length until I got it. The ADF now worked, but less than satisfactorily. It worked to Dakhosh, but prior to the Oakland-Honolulu return leg it quit, consumed a 200 dollar bill and worked much better. A prudent navigator always has a backup and on the return leg it was worth every cent of the repair. Let's flash back to getting ready.

Mid-July and I was still searching for an adequate bladder tank for the rear seat. It was an impossible search so I started foam and fiberglass auxiliary tanks. Wow! This took a week. The front tank held 25 gallons, the rear 37. Luckily the plumbing and vent system was already in and approved. The auxiliary tank system test flight was go.

I haven't mentioned the Compuclus because it defied all efforts to quiet the noise. I simply turned it off to use the low frequency navigation or COM gear. This requires turning the Compuclus off and reprogramming it for use when you need it.

Shielding is a big part of noise control when going beyond a NAV/COM. I used shielded wire in the main power and regulating system and used it generously anywhere I suspected noise would be generated and transmitted in the wire bundle. Hindsight says I should have considered putting the wire bundle in an aluminum tube.

There were only two days left to departure. The NASA pocket autopilot was almost ready. Before proceeding, the electrical noise was checked and flunked so I abandoned that effort. There wasn't time anyway.

The total effort was not without a lot of help. I never could have been ready without Sherry Eminger doing all the flight planning; Richard Eminger on weather; Sandy Moats on auxiliary tanks; Ann, my daughter, on programming the Loran and Rollie Moran and Jon Michelle on electrical problems. My wife Rosemary, bless her soul, ran the myriad of last minute errands.

The day before launch I still had to weigh the total loaded aircraft and work a weight and balance. I had weighed 755 pounds night IFR equipped and now weighed 1814 pounds with 127 gallons of fuel, me, the Loran, ADF, SSB, life raft, sea chest, survival gear, candy, sandwiches and water. The weight and balance was dead center in the first flight box.

I told Sherry to plug in the 7 knot tailwind forecast over the Pacific and that I would work out the winds over the mainland when I got there. I went to bed at 1500 hours. Launch was scheduled for 0430 and I slept until 0400.

On the advice of a NASA flight surgeon, I wore a set of full length anti-embolism stockings and in addition, took an aspirin a day for a week prior to the flight to prevent clotting. Other than that, the only personal preparation was to wear warm loose clothing. Of special help was a down vest with removable, velcro attachable sleeves made by my daughter, Jill.

A last check of wind and weather showed no change so I started the last minute countdown. It didn't go too smoothly and I was an hour fifteen late on launch.

The Loran gave good track information and I split the Golden Gate, however, because of the Loran ground station layout and the fact that I want Loran station to Loran station (Honolulu to Fallon), cross-track was sketchy and primarily DR. I had a couple of big shocks over the water. The first was at 15:48, which was the over water planned flight time. There was no West Coast. Obviously the wind wasn't as planned. There was no VOR and no ADF information. Only the Loran said I was on course, so all I could do was keep trucking. Two hours later the shock sort of wore off. The moon had come up and gone down. Wow! It was dark and lonely out there by myself. The engine quit! I changed from auxiliary to wing tanks very quickly and it started right up. I

was two hours overdue on the flight plan to the West Coast and only had 12 hours of fuel left. How lucky I really was would not be realized for another two hours. It was almost 4 hours over flight plan before the over water portion ended. Almost any other airplane in this class would have gone down in the water. "Lucky you fly the Long Ez."

I had picked up a 14 knot head wind versus the 7 knot tail wind forecast. It didn't take a lot of calculating to figure out what to do. It was quite obvious that it wouldn't go to Dakhosh as planned. So rather than cross the Rockies at night and then have to land in Nebraska, I stopped in Sacramento.

The next morning I went to prep the Long Ez to depart for Dakhosh and discovered a piece missing from the prop. I called Bruce Tiff at Dakhosh for consultation. He said to take a like piece from the other blades and try it for balance. I filed the piece out (3" x 3/8") and gave them both a little varnish. It ran up okay so I launched for Dakhosh. The winds from RNO to STL were the first tail winds I'd had, but they shut off at STL. The Loran was working like a charm, giving me lat and long, steering info, miles off course, miles and time to go, mag heading and ground speed. I was going from way point to way point. It sounded the horn at each way point where I would punch the next end way I would go. This was living. The West Coast Loran station stayed on until Nebraska then the Great Lakes chain came on. Loran coverage all the way (The Loran used was a CL195 from SRD Labs, 281 McGlincey Lane, Danville, California 95008.) This particular Loran is a ferry pilot favorite. It is small, portable and has a 99 way point storage capability. I was able to pre-set all reporting points over water as well as enroute VOR's on the mainland from HNL to OSM and back to Seattle.

From Sacramento, it was 12 hours to Dakhosh to find the field closed for a thunderstorm. I diverted to Fond-Du-Lac and arrived after dark, meeting hordes of people in the same boat as me: no place to stay. After 3 hours, I finally slept in the airplane. It wasn't easy sleeping in the airplane. The worst part was that the airplane wouldn't hold a heading and I kept banking and turning for a long time even after I'd fallen asleep with one recurring nightmare. The engine would be dying away and suddenly go silent. I would wake up with real fear open the canopy and let in more of those damn Wisconsin mosquitoes.

The numbers for Honolulu to Dakhosh were 4497 statute miles, 32 hours, 125 gallons, 140 MPH, 3.9 GPH and 36 MPG.

The trip back to Honolulu was not uneventful. The empty rear auxiliary tank had a pinched vent line and imploded on let down into Oakland. Again "Lucky You Fly The Long Ez". Ray Johnson of San Francisco, a Hospitality Club member, took my busted tank in at 9 in the evening and had it repaired by 11.

The launch from Oakland was late because of the auxiliary tank. A small leak, undetected in the initial repair, was easily repaired on the line with 5 minute epoxy, but required defueling and refueling which took about 2 hours of valuable air time. The lesson learned was: never launch late and force yourself to land at night after a long flight. Give yourself a break. A night arrival isn't tough, but things can go wrong. For me it was again the weather forecast. It turned out that I was two hours over my ETA, Honolulu, and in that two hours, there were lots of buildups, no really big ones, but it was raining in each, rough and dark. I certainly hadn't planned it that way. I knew on this flight I was shooting for a lot smaller target than the West Coast and these additional complications provided plenty of distraction and tension. I was in contact with Honolulu Center and they wanted to know where I was and my ETA, which was a really hard question. The Loran and ADF said, "Dead Ahead", but the ETA part was an unknown. I knew I was on track. I just didn't know where. Hey, relax, I had to keep telling myself and the Center. You're flying the Long Ez with 12 hours of fuel remaining.

The Hawaiian VOR's came on one at a time and all ended well, but I had made it grossly harder than it had to be.

If you plan to make a similar trip, give yourself every break you can on landing as well as on launch. For example, I would never recommend take off or for that matter IFR flight at high overgross in visible moisture. This is a problem which is personal to individual Long Ez's. To get the idea, load your Long with 140 gallons of fuel then try to pick up the nose. You are going to need help. It is heavy.

On take off and in flight, the wings and the canard together must lift the total load. If you have less than a perfect canard/elevator and if your Long Ez pitches down in moisture, you will at some overgross reach a pitch control limitation. It may be at 2100 pounds, it may be at 1800 or way down at 1600 pounds. Again this is personal to your craftsmanship. If you are considering long range overgross operations in your Long, be sure to provide your very best flight test data pertinent to this problem in your owner's handbook.

As I was planning and getting ready for this trip, I was often asked, "Why?" It's not why. It's "Why not?" Mountain climbers are for the most part forced to climb mountains others have already climbed. In a Long Ez, you have countless originals to climb. Lucky you fly the Long Ez.

W. A. "Rodie" Rodewald
48-361 Crozier Drive
Waialeale Hawaii 96791

September 30, 1982

FAA CHECKS WHILE BUILDING YOUR EZ

It has recently come to our attention that several builders are building Vari-Ezes and Long-EZs and have not contacted their local FAA. This is not the way to do it! It is very important that you inform the FAA that you will be building an airplane, and they in turn, will tell you when they will need to inspect it and how often. You cannot expect the FAA to come out and sign off your finished aircraft if they have never had the opportunity to periodically inspect it during its construction. Each FAA inspector will have slightly different methods, some will want to see shear webs, and other specific parts, while others will not. You need to get to know your individual FAA inspector and work with him so that he can be helpful to you. This should be done before you ever start construction. If you are already building and have not yet contacted your FAA, stop where you are until you have made contact and have received instructions from them as to what it is they want to inspect. Do not fool around with this, it is entirely possible for you to end up with a very expensive static display model.

AUTO FUEL IN COMPOSITE FUEL TANKS

RAF has recently received many requests to use auto fuel in VariEzes and Long-EZs. RAF cannot approve or disapprove the use of auto fuel. We can advise though, and we do not recommend using any auto fuel in a composite fuel tank. This is because of possible toluene content and its effect on the epoxy matrix. There is no way to be positive that the auto fuel you buy does not contain toluene (or possibly other potentially damaging aromatics). This is especially true of the unleaded or low lead auto fuels, which can leach the uncured epoxy residues out of the inside laminates of your fuel tanks, including the aft wall of the tank, which is your center section spar. The damage may be very insidious and may take years to become obvious. Safe-T-Poxy is much more resistant to aromatics than the previous RAE epoxy, but may still be effected in the long term.

PREFAB PARTS FROM OTHER THAN DESIGNATED DISTRIBUTORS

RAF has received many requests concerning the so-called pre-fab parts occasionally seen advertised in Sport Aviation or Trade-a-Plane. RAF categorically does not recommend any of these suppliers. Our experience has been negative in every case. In fact, there are currently at least two builders involved in legal action in an attempt to recover their money. We have seen a canard supplied to a Long-EZ builder by one of these companies. It was the worst example of workmanship we have seen. Beware of these suppliers, they may or may not provide you with the parts you require and if you do receive any parts, you may never know if the parts are correctly built or structurally sound. Once a part such as a canard or a centersection spar or a wing is built, there is no way to verify if in fact all of the layups have been included and if they were done correctly.

CABIN HEAT

WE have been testing the small electric heater mentioned in CP32, page 2, for several months now. We have been satisfied with it. The one we have is a 24 V - 16 AMP heater and more than adequate. For a 12 volt installation, the 20 AMP model gives approximately the same performance. These heaters are small, very light weight and put out adequate heat. They do however require an alternator. Our heater is mounted above the nose wheel well and blows heat forward at our feet. We have two manifolded motorcycle batteries and feel that the manifolded battery is mandatory with this type of heater since batteries do put out hydrogen gas while they are being charged. The manifolded battery dumps all gasses overboard.

The name and address given in CP 32, page 2 as a source for these heaters is no longer valid. Unfortunately as we go to print, there is no supplier. The guy who invented these heaters and built all of them so far, is

just not set up for production. He is currently negotiating with a company to manufacture the heaters. As soon as we have a name, we will publish it.

FROM THE BUILDERS AND FLYERS

Long-EZ First Flight Report.

"Dear RAF,

First flight of Long-EZ N158TG was on September 3, 1982. It now has 21 hours on it with only minor problems and adjustments. With equipment shown including strobes, nav lights, landing light and big alternator but no starter, empty weight is 800 pounds. Performance appears to be right with the handbook with O-235 L2C engine and B and T 62 x 66 prop.

I am 6 ft 9 inches tall and pilot seating is very comfortable. My seat cushion is 1" thick in the seat increasing to 2" in the thigh support and back seat. Also, the rudder pedals are 4 1/2" forward of standard and the pedals themselves are 3" taller. I have been to 12,000 ft and to 140 knots indicated which would be 185 mph true.

I am very pleased with the aircraft and wish to thank RAF again for the clarity of the plans and the quality of support.

Best wishes,
Tom Garrison"

Long-EZ N81KP - First Flight Report.

"July 5, 1982 marked the date for the first flight of Long-EZ N81KP. WOW! What a fantastic feeling to finally rotate, lift-off and fly after 23 months of construction. It is indeed rewarding to have a safe and uneventful first flight. Thank you Mike for flying chase! It was reassuring to have you at our first flight.

Mike you mentioned that it is unusual to see a first flight in which some small problem did not arise. We feel the way to avoid these problems is to find and resolve all squawks prior to that first flight. This attitude, of course, should carry right on through the life of the airplane for every flight. It is just too late to worry about problems when you're in the air.

N81KP now has 50 hours and has been flying flawlessly. The performance of N81KP meets or exceeds all the data in the Pilot's Handbook (based on the use of wheel fairings) and as yet we have not installed our wheel fairings. We are using a Lycoming O-235 L2C (118 hp) with a B&T 62 x 66 prop. The basic empty weight is 811 lbs. and this includes the standard alternator, vacuum system with D.G. and A.H. and "extra-cushy" upholstery.

Regarding the high speed taxi testing in preparation for our first flight: Our tests were conducted at Chino Airport using runway 21/3 which is 6200 feet long. This was about the right length needed to achieve canard flying speed (50 kts), rotate, hold attitude and lift-off (60-65 kts) to 5-10 feet altitude, then touch back down and stop. This enabled us to get a good feel for the landing flare and develop roll control (which is substantially quicker than most general aviation aircraft).

We are certainly grateful to all those people at RAF who so patiently and courteously answered so many questions. Truly this kind of builder support helps dreams come true!

Sincerely,
Paul and Kim Prout". (Father and son)

Neil Hunter reports that he feathered in the paint stripes we saw on his leading edges and he picked up 7 mph (TAS)! Neil and his son flew their Long-EZ non stop from Merritt Island, Florida to San Juan, Puerto Rico in

7.9 hours. An average fuel burn of 5.3 gph gave a ground speed of 138 kts (159 mph). They spent the weekend with James Brandt, a Long-EZ builder who is almost ready to fly. Neil was able to check James out in his Long. James says he will be at Oshkosh '83. Neil flew his Long into Oshkosh '82 and to Kerrville, Texas.

Caution

Wes Gardener had a scary experience in his VariEze when the nose up trim spring on his pitch trim system (Long-EZ style) suddenly broke. It made a loud noise with the aircraft pitching nose down. Wes thought he had had a midair. He had trouble pulling out because the nose down spring was pulling the elevator into the nose down position. He got back to his home base ok, but was quite shaken. As if this was not enough, it has since happened to him twice. Should it ever happen to you - remember, FLY the airplane. Even with a broken trim system, it will still fly normally.

Rain Effect On Lift

We recently received a letter from Owen Billman, reporting on his Quickie accident in which moisture on the airfoil decreased his ability to climb. The result was a destroyed aircraft after striking tree tops. Our answer to him contains some information of interest to EZ flyers. While our research on rain effects is not complete, the information is published here in order to clear up some misinformation floating around.

"Dear Owen,

Thank you for sending along your account of your Quickie experience.

The subject of rain-induced boundary layer transition and its effect on trim and performance is one that we have been investigating for several years now. Tests have included fixed and free transition measurements of six different airfoil shapes on the VariEze, Long-EZ, Ansoil racer and Defiant. Full scale moisture tests have been conducted in the NASA Langley 30 x 60 wind tunnel. I have not published an account of these tests because they still contain some contradictory results. For example, theoretical predictions call for the largest trim change to exist on the well-contoured aircraft that normally have the most extensive laminar flow. Just the opposite is true - the best contoured ones have the least trim change in rain!

The trim change of the Long-EZ and VariEze in rain is generally mild. Most trim down in rain, about 25% of the VariEzes trim nose up. There have been several reports a strong nose down trim change, outside of the pitch trim capability. In general, these have been fixed with a correction of canard incidence or elevator shape. I know of no rain-induced accidents with the VariEze or Long-EZ, however several have reported extensive increases in takeoff rotation speed and take off distances.

Again, there are variances from one airplane to another. We have done low-level aerobatic maneuvers in driving rain with our Long-EZs without noticing any major difference in maneuverability. We have no operational limitations for flying in rain except to throttle back to save the propeller leading edges from erosion.

Fixed transition test conducted by applying grit on the leading edges (at 4% chord top and bottom) has shown that maximum lift is reduced significantly, increasing the minimum speed by about 8 knots. The NASA wind tunnel tests (see the adjacent plot of CL with fixed, free and wet surfaces) seem to predict that the EZ has about half the degradation in rain as for fixed transition. This approximately four to five knot increase in minimum speed while wet generally is not a problem since we all seem to fly a bit more conservatively in the weather.

Our tests with new airfoil designed to reduce the rain-induced trim have not led to changes on the Long-EZ since they have all shown degraded low speed performance (less lift). The low Reynolds-number of 0.5 million is a particularly difficult section design area. The Defiant's canard operates at twice the RN. It has a

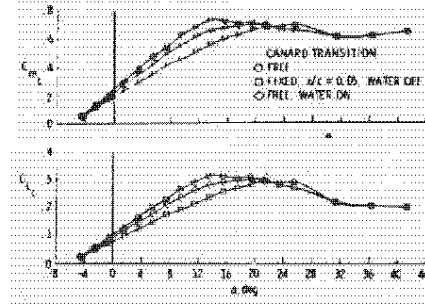
very mild nose up change in rain and no measurable effect on take off speeds. The Defiant doesn't have a trim change with airframe ice. Long-EZ N26MS has a moderate nose down trim change with rhime ice.

Concerning your Quickie and others that have near equal-area tandem wings: we have not conducted fixed transition or moisture test on these, but based on your and others experience, it appears that the transition effect on maximum lift is more severe. This is apparently due to the double effect of loss of CL and the inability to trim to an adequate angle-of-attack.

I have referred your letter to Quickie Aircraft Corporation. They no doubt will be conducting tests and/or making recommendations or improvements to prevent recurrence of your accident.

Best Regards,

Burt Rutan"



(a) Lift and pitching moments

Effect of water spray on canard aerodynamics.

ACCIDENTS AND INCIDENTS

A southern California VariEze headed for Oshkosh flew into trees in a steep box canyon east of Salt Lake City airport resulting in two fatalities. The weather in the mountains east of Salt Lake was clobbered with low clouds. A pilot who departed Salt Lake City just before said that he would not have tried to go east, due to low ceilings and poor visibility. The pilot apparently selected the wrong canyon thinking it was the main pass that would lead him through the mountains.

The pilot and passenger of a California VariEze were fatally injured in northern California. According to the NTSB, the pilot was giving a friend a first ride, made a low altitude pass over the runway, started to climb and as the aircraft passed over the lake shore began a barrel roll to the right. The airplane only completed about 270 degrees of the roll when it struck the surface of the lake.

The pilot of a southern California Long-EZ was seriously injured and his passenger suffered a broken hip when the airplane crashed into a dry river bed. The eye witnesses to the accident reported that the airplane was doing aerobatics. It appeared to enter the beginning of a loop, did not have enough speed, fell out of the maneuver. The engine stopped, (negative "g" will cause a carbureted engine to suffer fuel starvation) the aircraft nosed over and spiralled down to about 100 feet, where its wings were leveled and it descended until it struck the ground. The aircraft hit a 20 degree embankment almost wings level and slid forward only about two feet. There was no fire, although the right fuel tank was ruptured.

Incident - A VariEze pilot from Colorado reports that his VariEze received extensive damage during an aborted take off. A thunderstorm was located at the upwind end of the runway, so a downwind take off was initiated. Unfortunately the runway sloped uphill in this direction. The pilot aborted at about 3/4 of the runway length, but was too late to stop on the wet runway. The aircraft ran off the end, crossed a ditch, went through a barbed wire fence and down a rocky embankment. The pilot was unhurt.

Don't allow yourself to be deluded into thinking that you cannot get into trouble in your VariEze or Long-EZ. These aircraft are tremendous confidence builders, but they are still aircraft and unless treated with respect, will bite. A VariEze pilot, trying to fly through a canyon near the Snake River, encountered such a severe down draft, that he only just managed to execute a 180 turn. He lost 2000 feet and recovered less than 300 feet from the ground. He had previously believed that no matter what, his VariEze would get him out of trouble. Don't push your luck. We recently checked what would happen to a Long-EZ, with full aft stick, both rudders all the way out, nose gear extended and engine at hard idle. The airplane developed a sink rate that varied between 950 fpm and 1250 fpm. This was also tried with the prop stopped. You cannot expect to walk away from this kind of impact. 1250 fpm is 21 feet per second or 14.5 mph. You must get the nose down and build enough airspeed to have sufficient energy to arrest your descent with a flare.

A VariEze pilot from Northern California flying from Stockton to Florida, heard a 'different' noise but before he could do anything, one exhaust stack (original style) cracked off and went through the prop removing about 17" of one blade. The vibration was so severe that it broke both mag wires and failed the mixture cable/spring assembly. He pulled the mixture and switched off both mags. When this did not work, he turned off the fuel valve and finally the engine stopped. He made an uneventful landing on a highway near Zuni, New Mexico. He found that the top engine mounts had failed and the engine was lying in the cowling. This pilot stayed very cool, flew the airplane and kept thinking all the way. Don't forget to fly the airplane.

The reason we report accidents and incidents such as these above, is in the hope that someone may benefit by the experiences related. Aerobatics can be fun, but they can also be very dangerous, especially at low altitude. RAF does not recommend aerobatics in either the VariEze or Long-EZ. Apart from the obvious reasons, airfoils, no inverted systems, etc., both of these aircraft are extremely clean and will build up speed in a dive with frightening rapidity. A competent aerobatic pilot can do some of the positive "g" maneuvers, however it takes very careful speed control and anyone contemplating such a thing should take a course in aerobatics from a professional.

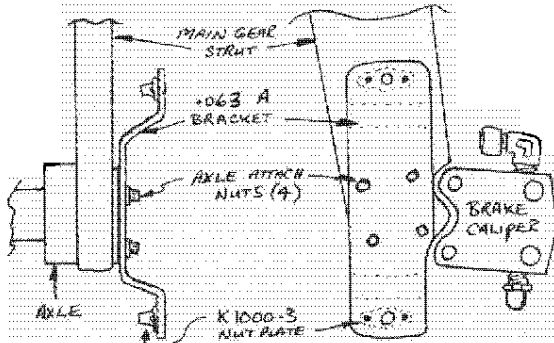
Because of the excellent flying qualities of the Long-EZ it is a temptation to do more than that for which we are qualified. Do be aware of this, get the necessary training before going out in your VariEze or Long-EZ and "train" yourself.

Installation Instructions for Prefab Wheel Pant from Aircraft Spruce or Wicks Aircraft. (500x5)

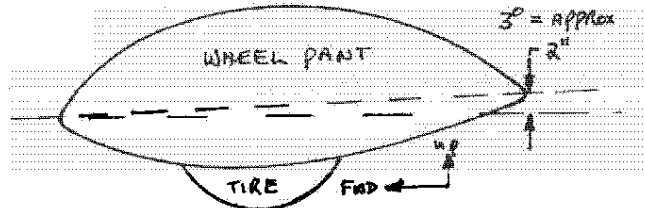
NOTE: All twelve prefab fiberglass parts are labeled (six left and six right).

The approximate tire clearance cut out is scribed and the axle centerlines are marked.

1. Make an aluminum bracket as shown using .063 2024T3. Mount this bracket vertically on the inboard side of the main gear strut using the four nuts that attach the axle.

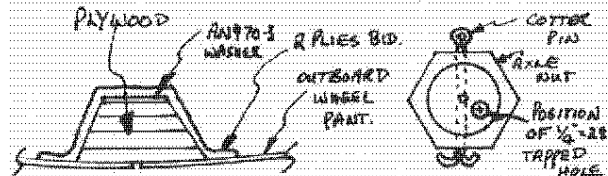


2. Cut out tire clearance hole in the bottom of the outboard pieces.
3. Use gray tape (duct tape) to tape the two halves together.
4. Fit the four prefab corner pieces into their correct positions by reaching in through the tire clearance hole. The proper position of these parts are marked on them (ie, right bottom aft). Using a #30 drill bit, drill four evenly spaced holes through the three long corner pieces and the inboard wheel pant half. Drill three evenly spaced holes through the short piece marked, bottom forward and the inboard wheel pant half. Drill three holes through each corner piece and the outboard wheel pant half. Install clecos in these holes as you drill them.
5. Drill four #18 holes, evenly spaced, through the outboard wheel pant half into each of the three long corner pieces and drill three evenly spaced holes through the outboard wheel pant into the short corner piece.
6. Remove the clecos and separate the two halves. Pop rivet K1000-08 nut plates inside the 4 corner pieces.
7. Use a gray tape or saran wrap release on all edges not to be bonded and sand the inside of the halves and the matching corner pieces dull.
8. Reassemble two halves to check for a good fit to each using AN 525-832R7 and clecos.
9. Leave screws in place and remove clecos to disassemble.
10. Apply a generous coat of wet floc to all surfaces to be bonded - reassemble using flush head pop rivets in place of the clecos. Allow to cure.
11. Drill a #30 hole at the marked axle centerline and position the inside half of the wheel pant on the strut using the #30 hole as a guide for correct height and tire clearance hole as a fore-aft guide. Position the wheel pant approximately 3 degrees nose down for least drag at cruise. Drill two #30 holes through the inboard pant half and .064 aluminum bracket and cleco inboard pant to aluminum bracket.



12. Drill a #30 hole approximately 5/16" below or to one side of the marked axle centerline (see sketch) and fit outboard pant into position. Push a small wire through the #30 hole to measure the distance from the outboard pant to the end of the axle. This will be about 1 1/2". Remove the outboard pant and make a wood pyramid shaped block, the correct height and floc it into place on the inside of the outboard wheel pant. Layup 2 plies of BID lapping .7 onto the pant.

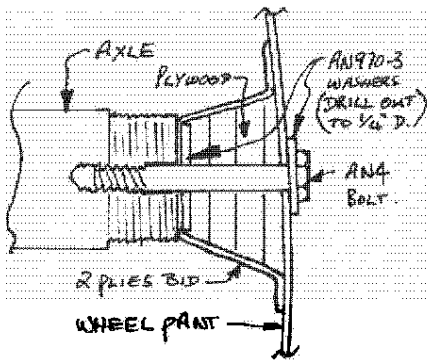
13. After this cures, drill through the #30 locating hole with a 1/4" drill. Refit the outboard pant half and drill through the 1/4" hole into the end of the axle, approximately 1/4" deep. Use a #3 drill and drill the hole 3/4" deep and tap this hole with a 1/4-28 tap. (CAUTION - this 1/4-28 tapped hole is not drilled in the center of the axle due to the cotter pin location, rather it is drilled offset per sketch).



14. Use an AN4 bolt and wide area washer to attach outboard pant to axle, such that the bolt grip extends through the wood and glass pyramid block into the axle, this assures that no shear loads are transmitted through the bolt threads. See sketch.

15. Drill #10 holes through inboard wheel pant half and .064 aluminum bracket. Remove pant halves and rivet K1000-3 nut plates to .064 aluminum bracket.

16. Sand and finish wheel pants and reinstall.



Parts Needed.

- 2 - AN4-20A Bolt
- 2 - AN970-3 Washer
- 30 - AN525-B32R7 Screws
- 4 - AN3-5A Bolts
- 4 - AN960-10L Washers
- 4 - K1000-3 Nutplates
- 30 - K1000-08 Nutplates
- 30 - Pop rivets - 1/8 Avex # 1604 04 -12
- 68 3/32 Cherry pop rivets MSC-32

PLANS CHANGES.

We at RAF, of course, cannot enforce a mandatory change, as FAA can on a type-certified aircraft. The regulations allowing amateur-built experimental aircraft recognize that the homebuilder is the aircraft manufacturer and, that the aircraft does not need to conform to certification requirements. This allows experimentation by the homebuilder, giving him the freedom to develop new ideas. FAA achieves their goal of providing adequate public safety by restricting the homebuilder to unpopulated areas and to solo flight until his aircraft is proven safe.

It is the homebuilder's responsibility to maintain, inspect and modify his aircraft as he desires. However, we at RAF feel that part of our job is to provide information to the homebuilder in the form of recommendations that, in our opinion, are required for him to achieve a satisfactory level of flight safety.

Category	Definition
MAN-GRD	Mandatory, ground the aircraft Do not fly until the change has been accomplished.
MAN-XXHR	Mandatory, accomplish the change at next convenient maintenance interval or within XX flight hours whichever comes first.
DES	Desired - strongly recommended but not requiring grounding of the aircraft.
OPT	Optional - does not effect flight safety.
OBS	Obsoleted by a later change.
MEO	Minor error or omission.

LONG-EZ PLANS CHANGES

- LPC # 103 DES Long-EZ Owner's Manual page 21, first paragraph, "carbon dioxide-type" should be "dry type fire extinguisher".
- LPC # 104 MEO Section I, page 20-2, second paragraph, "3rd ply is on the upper surface only" change "surface" to "winglet" to clarify.
- LPC # 105 MEO Section I, page 6-3. The 1" x .7" x 3" wood doubler should be glassed over with 1 ply BID @ 45 degree, lapping .4" onto F28, top longeron and fuselage side.
- LPC # 106 DES Section I, page 22-3, system II with alternator. The wiring diagram does not show an alternator circuit breaker between

the B+ alternator terminal and the battery. This protection is very important and the circuit breaker should be sized to the maximum output of the alternator. For example a 35 amp alternator should have a 40 amp breaker.

LPC # 107 MEO Section I, page 19-8, step 10 clarification. The oot of the aileron should be cut at 90 degrees to the trailing edge along the line on the top skin to the hinge line ddefined by the 5.9 dimension. This cut is a vertical plane and will not pas through the point on the bottom skin that is defined by the 7.6" dimension.

VARIIZE PLANS CHANGES

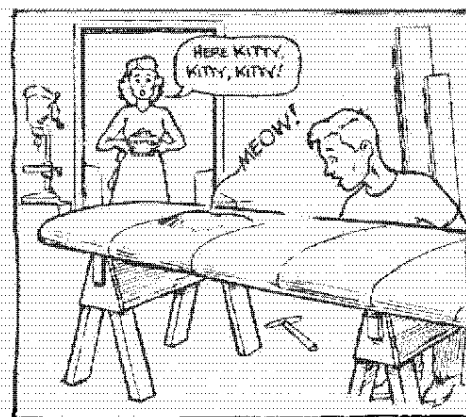
MAN Aileron hinge pins must be saftied. The hinge pins can vibrate out of the hinges as the wing trailing edge wears away. The best way to safety the hinge pins, is to remove the pins, cut them 1/4" shorter. Reinstall them and drill a small hole through each end of the hinge knuckle and safety with a piece of safety wire. See sketch.



FOAM SUBSTITUTES

We have approved a new PVC foam, Divinycel, which is various shades of tan to light brown. It is a good quality and also cheaper. This foam is a direct substitute for all of the Klegecel PVC foam called out in the bill of materials. If your kit contains tan colored PVC foam, check carefully to be sure that you are making parts from the correct density foam.

Old Specs	New approved sub.
Type R45, 3 lb/ft3 8 pcs. 32x48x.35" dark blue	Type H45, 3 lb/ft3 8 pcs. 34x47x3/8" tan
Type R45, 3 lb/ft3 5 pcs. 24x48x.8" dark blue	Type H45, 3 lb/ft3 5 pcs. 26x47x3/4" tan
Type R45, 3 lb/ft3 2 pcs. 24x48x1.6" dark blue	Type H45, 3 bl/ft3 2 pcs, 26x47x1 3/4"tan
Type R100, 6lb/ft3 2 pcs. 35x44x1/4" red	Type H100, 6lb/ft3 2 pcs, 34x37x1/4" tan
Type R100, 6 lb/ft3 1 pc./ 6x10x1 red	Type H100, 6lb/ft3 1 pc. 6x10x1 tan
Type R250, 16 lb/ft3 2 pcs. 26x37x2 red	Type H250, 16 lb/ft3 2 pcs. 26x30x1/4" tan

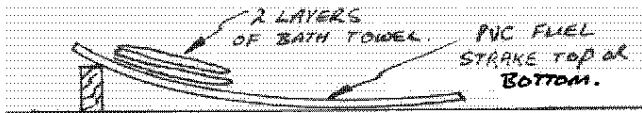


From KINGS RIVER RUNOFF, Fresno, California Chapter 376.

CP34 P37

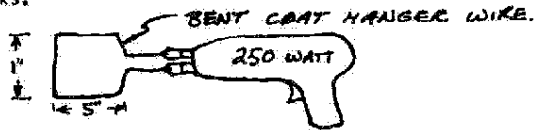
BUILDER HINTS

A good method to form the foam for the top and bottom fuel/baggage strakes is as follows: support the foam appropriately; place two layers of dry bath towels at the area to be curved, soak the towels with 4 to 6 quarts of boiling water. The foam will easily form to the desired shape. Allow to cool, remove the towels and be certain not to glass over the foam until it is completely dry.

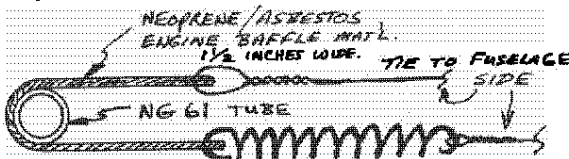


Sam Harris suggests leaving the hardener out of acrylic enamels on parts such as elevators and ailerons. The weight of the finish will thus be reduced by almost 50%. Sam also suggests substituting 601 fuel hose for the 303 called out, it is easier to use in the small space.

Brent Parsons suggests taking a coat hanger wire, bend it to form a 1" wide 'u' shape about 5" long and install it into a 250 w soldering gun. This can be used to rapidly and cleanly remove the blue foam in the canard for installation of the high density foam blocks.



Gerald Collins reports that he had a problem with his nose gear retract system. When he taxied over rough ground, occasionally he noticed the handle would turn perhaps a half turn. He paid no attention, until taxiing at no more than 10 mph over rough asphalt, he was suddenly looking down at the taxiway. The retract mechanism had bounced out of the over center position. This put all the loads on the cast iron worm gear, which stripped and let the plane down hard on its nose block. Nose damage was minimal. To minimize the possibility of this occurring, be certain that your nose gear box is mounted at the correct angle so that when it is down and locked, it is well over center as shown in the plans. The installed system generally had adequate friction to prevent backoff. However, if your mechanism becomes loose and allows your gear to extend a little in flight, you can install a spring loaded friction lock. (See sketch)



Ray Cullen reports good success with small "mud flaps" on the wheel pants. After three months of hard operation, prop nicks are minimal. The small "mud flaps" are made from plastic coffee can lids pop-rieveted to a 3" x 1" bracket made from .018 stainless (firewall material). These flaps should have at least 1/4" of clearance from the tire.

Gary Hertzler has had a "fender" on his nosewheel for some time and it too is a big help as far as prop damage. Gary made his fender from 3 plies BID and it has a small "mud flap" of engine baffle material (neoprene/asbestos) or the plastic coffee can lid would probably work fine. These mud flaps should be quite close to the runway, if they are too long, they won't be after one take off!

Mag Switch Location - Ken Clunis sent this in and it is an excellent idea. Ken put his mag switches on the left side of the roll over structure. In this position they are easy to see from outside the plane, particularly if

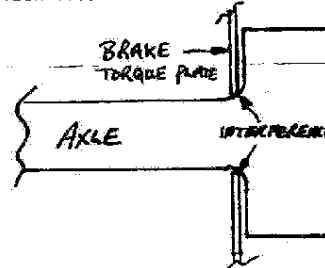
you hand prop your engine and, they are convenient to operate with your left hand while seated in the front seat. Of course they are accessible to the back seat passenger, should the pilot ever become incapacitated.

28 Volt Electrical System - The main advantage of going to a 28 volt system is that all of the wiring is 1/2 the size (actually 3 wire sizes smaller). This is a considerable weight savings. All lamps, strobes, radios, etc. are available in 28 volts and the used market prices are generally less than the more popular 14 volt. Two motorcycle batteries wired in series do an excellent job. They should be manifolded and 12 V - 15AMP hours minimum, such as you would find in a Honda 350 cc. All of the wiring can be pushed through a lightweight plastic or teflon tube 1/2" to 3/4" diameter installed down either side, from the aft seat bulkhead to the instrument panel. These can be floxed or siliconed into place. If you ever have to add a wire or two, it is easy.

Ken Clunis mounted his transponder vertically in the right forward baggage strake, against the fuselage side. It is easy to read and easy to operate with your left hand. His antenna (RST type) is in the right side of the centersection spar, as far outboard as possible, ground plane must be horizontal with the antenna vertical and pointed down.

Spar caps - wings, canard and centersection - Be sure to peel ply these spar caps, or you will wear yourself out sanding prior to installing the skins.

Brake torque plates - Check to see that the torque plates fit flush on to the axle flange. Occasionally the hole in the torque plate will interfere with the radius between the axle and flange. Careful filing or grinding of the corner in the torque plate will allow a perfect flush fit. See Sketch.



If you are installing a VariEze cowl on your Long-EZ, you may find the bottom cowl does not match well to the wing root, after cutting the cowl to the correct width. Paul Adrien came up with a neat solution. He simply glued a piece of styrofoam or urethane foam to the wing root. Then shaped it to fit the gap between the wing root and the lower cowl. Glass over the foam with 2 plies of BID. This makes a nice transition without reshaping the cowl and leaves more room in the cowl for the exhaust. See Photos.



CAUTION - Ray Cullen painted his exhaust system white using Krylon high temp paint, per the instructions. After about 3 hours of flight, the engine abruptly stopped on the take off roll and could not be restarted. Complete disassembly of the carburetor disclosed the problem. The carb induction tube and venturi area were full of white paint chips, which had flaked off the exhaust system. Apparently when carb heat was used, the paint chips were drawn into the induction. The air filter was clear. Ray blew the carb out with air and sand blasted the exhaust. The engine started immediately and he has since flown 60 hours with no problem. The moral: do nothing to your exhaust system that could possibly introduce foreign material into the carb heat system.

Nose Wheel Shimmy

We have cautioned EZ pilots about nose gear shimmy damper adjustment in the last two Canard Pushers, yet we still have EZs losing their nosewheels. It is a fact that your nosewheel fork will fail if you experience shimmy on landing or take off. It is also a fact, that if the friction damper is correctly adjusted, you will not have shimmy at all. The nosewheel fork will not fail due to a normal landing. It is very strong, the original fork has been grossly overloaded to the point of failing the NG15A casting and/or the 1/8" aluminum plate on the forward face of the NG15A casting. Yet the fork was not damaged. This has occurred several times. We are satisfied that the fork will fail only if it shimmies. Therefore if you keep the friction damper adjusted and check it regularly, you will not have this problem. Every time you extend the nose gear, just before you get into your EZ, hold the nose wheel clear of the ground and use your foot on the trailing edge of the nosewheel tire to check the friction. You will soon get "calibrated". You should have to push or pull 3 to 5 lbs. to pivot the fork.

When taking off, try to rotate positively, hold it down until you have the proper speed, then rotate smoothly. Try to keep the nose wheel from touching back down or skipping, this is when shimmy is most likely, at the instant of a light touchdown. The same applies to landing. Hold the nose wheel off until you are traveling as slowly as possible. Then let the nose down and hold it down with forward stick. Do not let it skip. Avoid nosewheel touchdown at very high speed.

If you follow these simple steps you will minimize any chance of shimmy and therefore the chances of losing a nosewheel. The prototype Long-EZ still has the original thin wall fork and with over 680 hours, has never experienced any shimmy. N26MS has almost 500 hours with probably more take off and landings than the prototype and it too has not had nose gear problems. Dick and Jeana have the high time Long-EZ with over 700 hours and also have not had shimmy or nose wheel failures. There is a lesson here - get into the habit of preflighting your nose gear. Keep you friction damper correctly adjusted.

SHOPPING

The Long-EZ lithograph, shown on the back page of CP 33 is available from RAF. This drawing was done by the well known aviation illustrator, Jim Neuman. It is a must for anyone building a Long-EZ. It is printed on heavy linen paper. The price is \$10 which includes postage and handling. California residents, please include 6% sales tax.

RAF has T-shirts in stock. We have pale blue and cream shirts with a Long-EZ and the logo "Laughter Silvered Wings" for \$8.00. We also have the white T-shirts with a cartoon type EZ on its nose with the logo, "I fly a nose dragger", at \$7.00. All the shirts come in adult sizes, small, medium, large and extra large. Some children sizes are also available. The ladies shirt in both types is the french cut style.

RAF has available the "Long-EZ Plans Changes and Builder Hints" done by Neal Johnson. These are most useful as they are organized by chapter order. The price is \$7.00. They are also available directly from:
Neal Johnson,
P.O.Box 51,
Monroe
La 71201

Task Research fuel strakes with ribs and baffles - on sale November 10, 1982 for \$884.00. 50 sets only. No orders will be taken before November 10. Mail orders only with a 50% deposit. NO phone orders will be taken. NO exc tions.

Write: Task Research
848 East Santa Maria
Santa Paula, CA 93060

B & C Specialty Products

518 Sunnyside Court
Newton, KS 67114
(316)283-8662

B & C has several different alternators to fit both Continental powered and Lycoming powered VariEzes and Long-EZs. 12 volt, 8 amp, 10 amp, 12 amp and 35 amp alternators are available.

B & C Specialty Products is proud to make available a new and better way to cut your fiberglass cloth! It is a heavy duty knife with a rolling disc blade (similar to a pizza cutter). It can be used with either hand, may easily be used with a straight edge and will cut glass cloth, leather, paper, vinyl, etc. The knife also has a built in retractable safety cover. The blades are replaceable and are made out of high quality tungsten steel for long life (1 3/4" diameter). Use a piece of styrene plastic as a cutting surface.

The knife comes with one blade for \$9.00. Extra blades are \$3.50 each.

Special Introductory Price

1 - knife with blade	\$9.00
1 - Extra blade	3.50
Shipping and handling	1.75
Total	\$14.75
SPECIAL	\$12.75

Harold Hoffmann

Box 641,
Winsted MN 55395
Continental 0-200 - Half run out
Please write - no calls.

Peter Spanovic

187 Ben Franklin Dr,
Reno, NV 89509
702-786-7525
Continental C-85 - for sale or trade for a Lycoming GPU

C.G.Reinmuth

3933 South 48th Street
Lincoln, NB 68506
Original VariEze main gear strut

Fred Sanders

3207 Wildwood Dr
Huntsville, AL 35801
(205)534-8186
Lycoming 0-235 CI - approximately 100 hours since chrome major.

Bob Coon

26 Cloverdale Street
Pittsfield, MA 01201
New improved "Canard Pusher" index now available. Eleven pages includes newsletters #16 through #33. \$3.95 includes postage.
Bob also has the cutaway drawing of the VariEze. Printed on 17" x 24" paper, it is suitable for framing. While they last - \$4.95 each or \$10.00 for three.

Wes Gardner

1310 Garden Street
Redland, CA
(714)792-1565
Wes has available a reusable carb foam air filter that is suitable for VariEzes and Long-EZs. Mike Melvill and Dick Rutan have these filters on their Long-EZs and are pleased with them.

The Compucruise with the aircraft grade Flo-Scan fuel flow transducer, together with the "gizmo" to dial in ground speed, will soon be available from Byron McKean. It will be available in several different configurations. Byron will be stocking all 3 items and will build them to suit, that is, you can remote mount the keyboard or display, or mount them together. Contact Byron for brochure and order blank.

Byron McKean
RT #1, Box 429-B
McQueeny, TX 78123
(512)557-6575 NO collect calls.

VARIVIGGEN NEWS

N27MS almost did not make it to Oshkosh this year. I flew the Grizzly out and the Defiant back, so was not able to fly her myself. Jeana Yeager volunteered! After a short check out, she spent an hour or two practicing landings at Mojave, then carefully cleaned and polished the whole airplane. I don't think the Viggen has ever been so clean! We had to install a 25 lb. Tead shot bag way up in the nose, because Jeana only weighs 100 lbs.

Jeana did not have any problems with the Viggen. I demonstrated the pitch trim change, with power changes and also the high sink rate with power off. We practiced a few simulated power off landings, then she was ready and she honestly never made a bad landing. Jeana had a ball on the way to and from Oshkosh. The only squawk was a short in the number one comm radio, caused by water. Just over 30 hours was added to the log book, bringing the Viggen's total time to 560 hours. Thanks, Jeana.

Ken Winter once again flew his Viggen to Oshkosh. If you remember last year it was painted only in primer gray. This year it was sporting an excellent paint scheme of red, white and black. Ken called it a "commanding" paint scheme and he is not kidding.

No other Viggens made it. Len Dobson had to have surgery on his hip just three days before Oshkosh, so was unable to make it. He did have it at the Kerrville, Texas Flyin. Except for the color of the trim, it looked almost exactly like mine! Arthur Schwartz had more bad luck this year. Last year he flew as far as Youngstown, Ohio from his home in New York. This year, he actually got beyond Oshkosh. He arrived early, so decided to visit friends in Iowa. Near Cedar Falls, Iowa, the aircraft experienced a stuck valve. He landed and had a mechanic repair the problem and took off only to have another valve stick. This time he had the mechanic check all the valves, both inlet and exhaust. Somehow, during all this, the back cockpit canopy was opened and not locked closed. Arthur took off and was climbing out when the back canopy opened. It cracked and pieces of plexiglass went through the prop and damaged one vertical fin. Arthur shut the engine down and managed to make it back to the runway executing an excellent landing. Arthur returned home to New York for a second prop and some epoxy and plywood. He repaired the bird, and flew it back to home base. Maybe next year, Arthur?

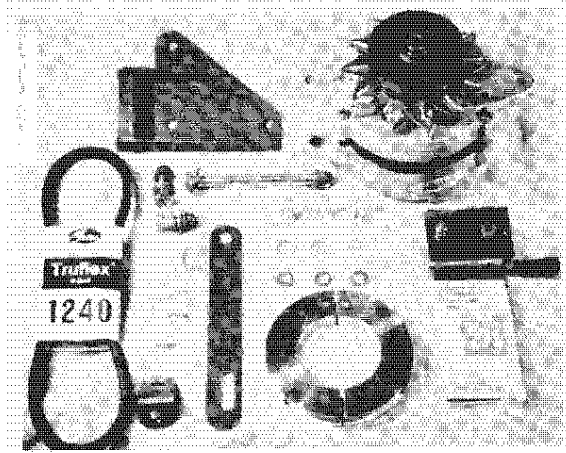
Bill Campbell's Viggen is ready to go at Rialto Airport in California. It may have made its first flight by the time you read this. We heard rumors of a Viggen ready to fly in Canada. Rumor has it that this Viggen has a 6 cylinder Franklin engine. Let us know if you know of this aircraft.

Jim Cavis has sold his Viggen engine, firewall aft and has the rest of his project for sale, all or part of it.
Contact: Jim Cavis,
8220 E Plaza
Scottsdale, AZ 85253
(602)945-0430

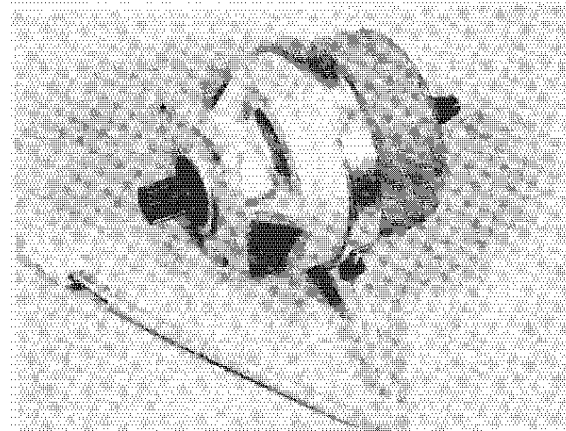
Helped Wanted

Scaled is still in need of a few good shop bodies to start after Christmas. Work will include helping with layups, building tooling and jigs, sweeping floors, etc. Salary range \$5-7 per hour.

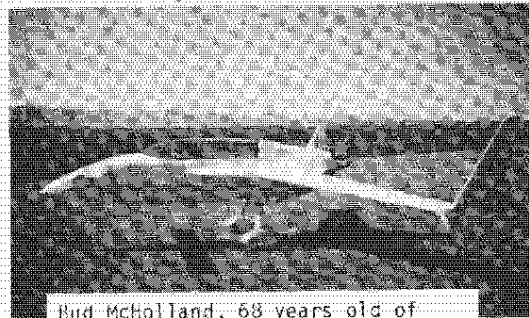
Contact: Herb Iversen,
Scaled Composites Inc.
Hangar 78 Airport,
Mojave, CA 93501
(805)824-2842



35 Amp alternator kit for a Lycoming powered Long-EZ. Total weight = 9.3 lbs.



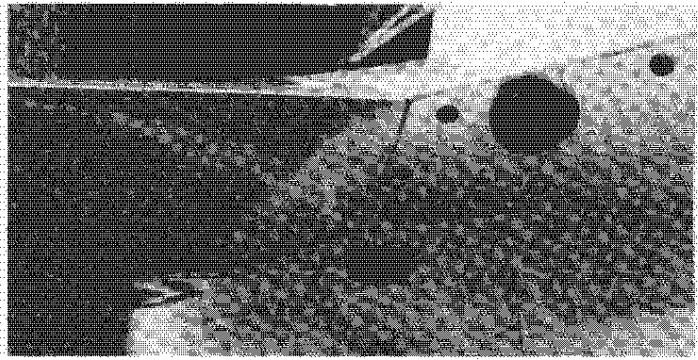
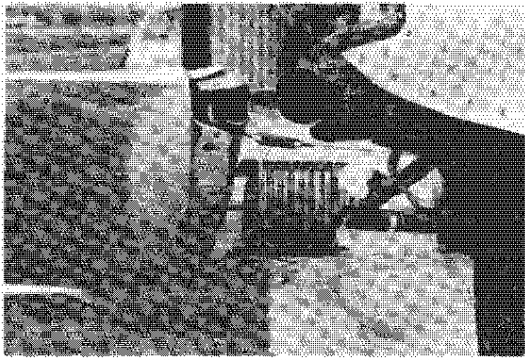
B & C Specialty Products 12 volt 8 Amp alternator, mounts on the vacuum pad of any Lycoming engine
Total weight = 3.8 lbs.



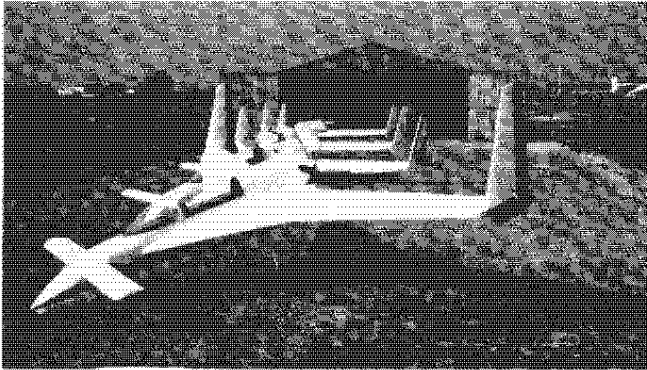
Bud McHolland, 68 years old of Sheridan Wyoming built and flight tested this beautiful VariEze. It is one of the cleanest we have seen.



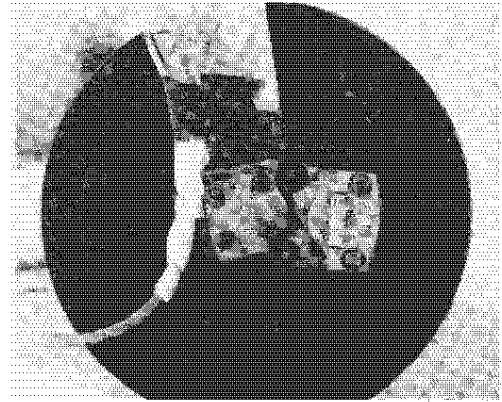
This is a cake!! Paul and Kim Prout of Chino, California gave a big "thank you" hanger party after the flawless first flight of their excellent Long-EZ N81KP



Dr. Paul Adrian's Long-EZ wing root to cowl joint. He had a VariEze cowl and used this very neat method of matching his lower cowl to the wing and left himself plenty of room for his exhaust system. See "Builder Hints", page 8.



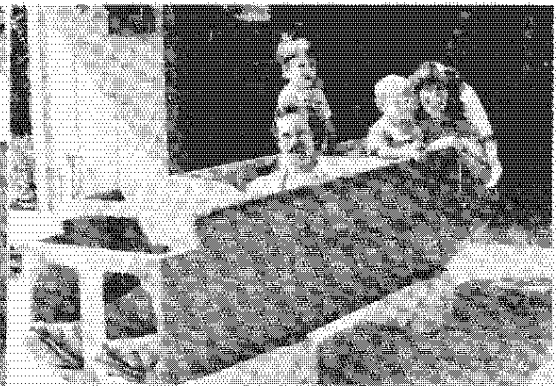
J. Civetta's Long-EZ, the first to be completed in Europe, on the ramp with three French VariEzes at La Grande Motte, France.



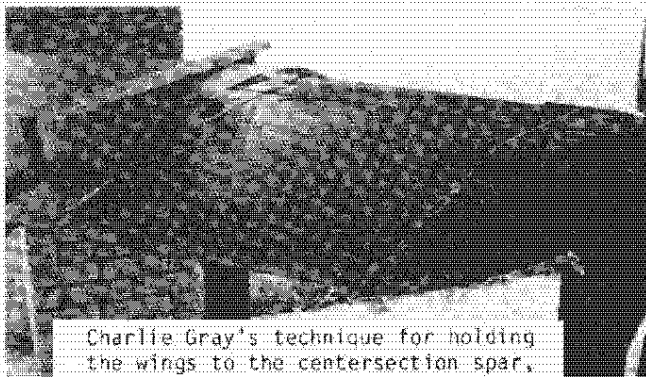
Main gear on N26MS, showing location of axle bolts, brake caliper, brake line & relief tube (insulated with fiberfrax). The wheel pant bracket has been removed for this photo.



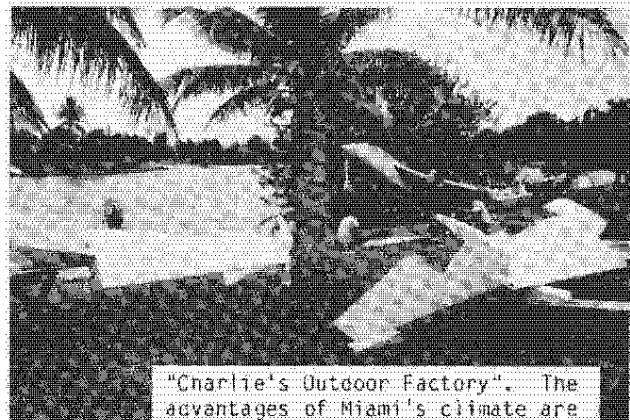
Al Coha (San Diego VariEze builder/flyer) Bill Allen and Ivan Shaw standing by Ivan's beautiful VariEze "Mistress" at Staverton Airport in Gloucestershire, England.



Mike Rhodes and family, "trying it on for size".



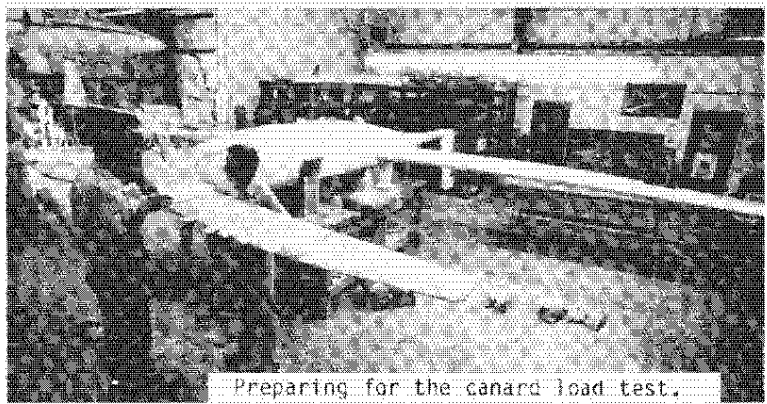
Charlie Gray's technique for holding the wings to the centersection spar, prior to drilling in the attach bolt holes. Hardware store turnbuckles and cable - neat!



"Charlie's Outdoor Factory". The advantages of Miami's climate are obvious in this shot of Charlie's Long-EZ in the final stages



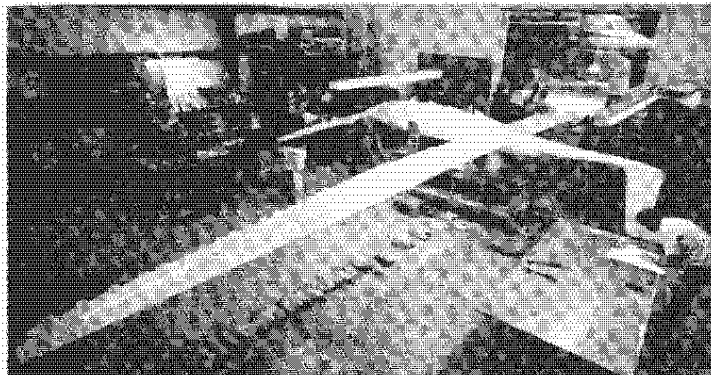
Ultimate (1.5 x design limit) load on the Solitaire's vertical tail



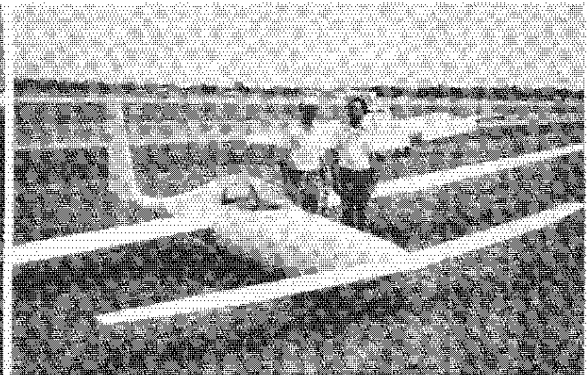
Preparing for the canard load test. Solitaire is well supported about 48" above the floor.



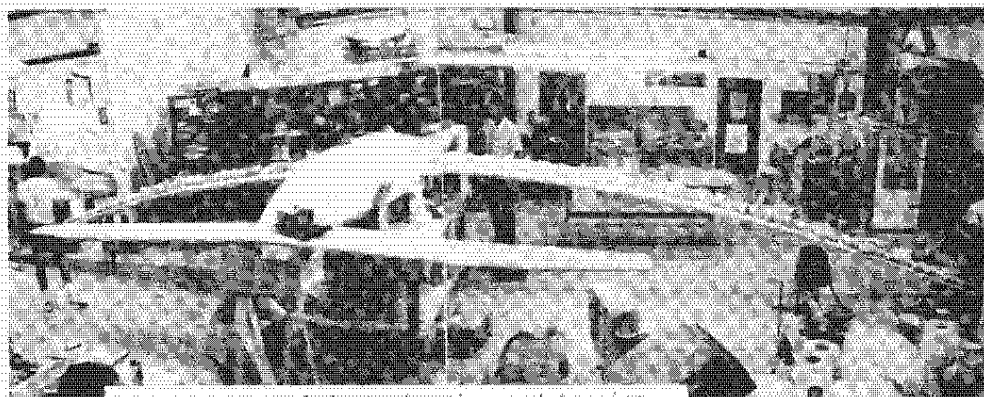
Design limit, 4.67 'g' on the Solitaire canard. The lead shot bags are positioned aft of the center of pressure to simultaneously simulate design limit torsion.



Ready for the main wing load test - note NGT jet trainer, suspended from the hangar ceiling.



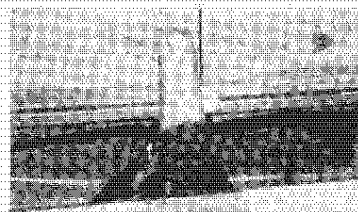
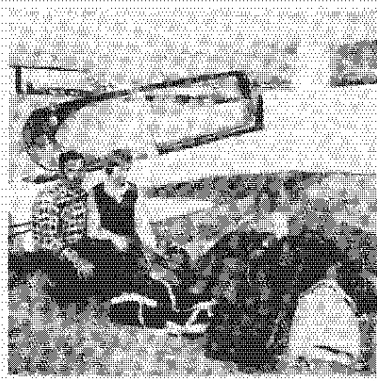
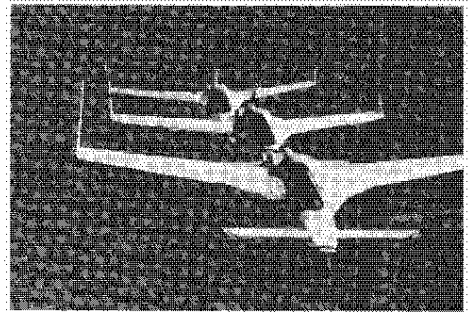
Mike Melvill and Michael O'Leary with Solitaire after the evening airshow at Osnkosh, '82.



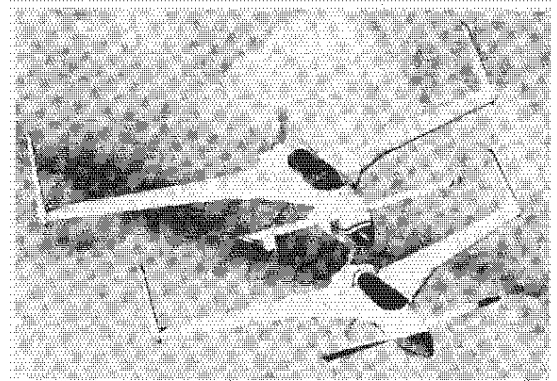
Main wing at ultimate bending and torsion (1.5 x design limit, 4.67 'g'). Wing tips deflected over 46"!

Brief Long-EZ specifications/performance.
 Engine — Lycoming O-235 108 hp.

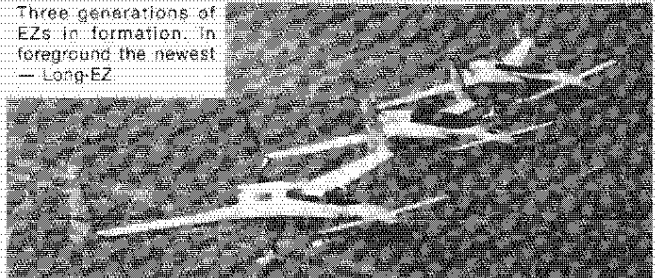
Span	26.1 ft.	Takeoff solo/gross	600/950 ft
Area	94.8 sq. ft.	Climb solo/gross	1750/1250 fpm
Empty Basic	750 lb.	Cruise 75% 8000 ft.	186 mph
Empty Equipped	800 lb.	Cruise 40% 12000 ft.	146 mph
Solo Weight	1000 lb.	Top Speed — Sea Level	193 mph
Gross Weight	1425 lb.	Max range* 75% (solo/2 place)	1380/1150 mi
Max. Fuel	52 gal.	Max range* 40% (solo/2 place)	2070/1690 mi
Cabin L/W/H	100/23/37"	Ceiling (solo/gross)	27000/22000 ft
		Landing distance (solo/gross)	450/680 ft
		*40 minute reserve	



This amount of baggage fits nicely in the Long-EZ baggage area. Baggage is accessible in-flight.



Three generations of EZs in formation. In foreground the newest — Long-EZ.



LONG-EZ DOCUMENTATION

SECTION I — MANUFACTURING MANUAL — This is the complete education manual for composite materials and methods, also, the complete plans and construction manual for the entire Long-EZ except engine installation and landing-brake. The manual consists of a 180-page, bound 11" x 17" book plus 14 larger full size drawings. It includes many photos, over 800 drawings and illustrations, and over 65,000 words. The builder is led step-by-step through the entire construction of the airplane, including electrical system, fuel system and finishing procedures. The manual identifies sources for all materials and all prefabricated components. A video tape is available covering all aspects of building the moldless fiberglass/foam sandwich construction. The tape covers the latest methods used to obtain the optimum weight, strongest fiberglass layups. This presentation will help both the first-time and experienced builder attain quality aircraft workmanship.

SECTION II — ENGINE INSTALLATION — This is a set of drawings and construction for the complete engine installation, including mount, baffles, instrumentation, electricals, fuel, exhaust and induction systems, carb heat box and muff, cowling installation, prop and spinner.

OWNERS MANUAL — This is the required operations handbook and checklists, including normal and emergency operation, detailed flying qualities and performance charts, maintenance, maiden flight procedure, and pilot checkout, etc.

A video tape is also available which covers the weight and balance procedures, taxiing tests and first flight.

LANDING BRAKE — Complete full size drawings for the landing brake device. This is the large drag plate that extends from the bottom of the fuselage for landing approach.

Check items desired.	Price, includes first class mail to U.S. & Canada	Overseas Airmail — U.S. Funds
<input type="checkbox"/> Rutan Aircraft Information Package — complete data and photos of all Rutan designs.	\$ 8.00	\$ 9.00
<input type="checkbox"/> "Canard Pusher" newsletter Published quarterly. One year subscription. Approx. 10,000 words per issue.	6.75	8.75
<input type="checkbox"/> Long-EZ plans, Section I	198.50	212.50
<input type="checkbox"/> Section III, Lycoming	21.50	23.50
<input type="checkbox"/> Long-EZ Owners Manual	9.00	10.50
<input type="checkbox"/> Long-EZ Landing Brake	10.00	11.00
<input type="checkbox"/> 6% Sales Tax, if Calif. order. Newsletter not taxable.		

The following are RAF-authorized distributors of Long-EZ materials and components. Contact the distributors at the addresses below for their catalogues and description of items.

ALL RAW MATERIALS AND PREFAB FIBERGLASS PARTS

Near Los Angeles
AIRCRAFT SPRUCE
 201 W. Truslow, Box 424
 Fullerton, CA 92632
 (714) 870-7551
 Catalog \$4

Near St. Louis
WICKS AIRCRAFT
 401 Pine Street
 Highland, IL 62249
 (618) 654-7447
 Catalog \$3

Prefab machine parts such as, control system parts and welded parts, fuel caps, engine mount, rudder pedals and exhaust systems.

KEN BROCK MANUFACTURING

11852 Western Avenue
 Stanton, CA 90680
 (714) 898-4366
 Catalog \$3

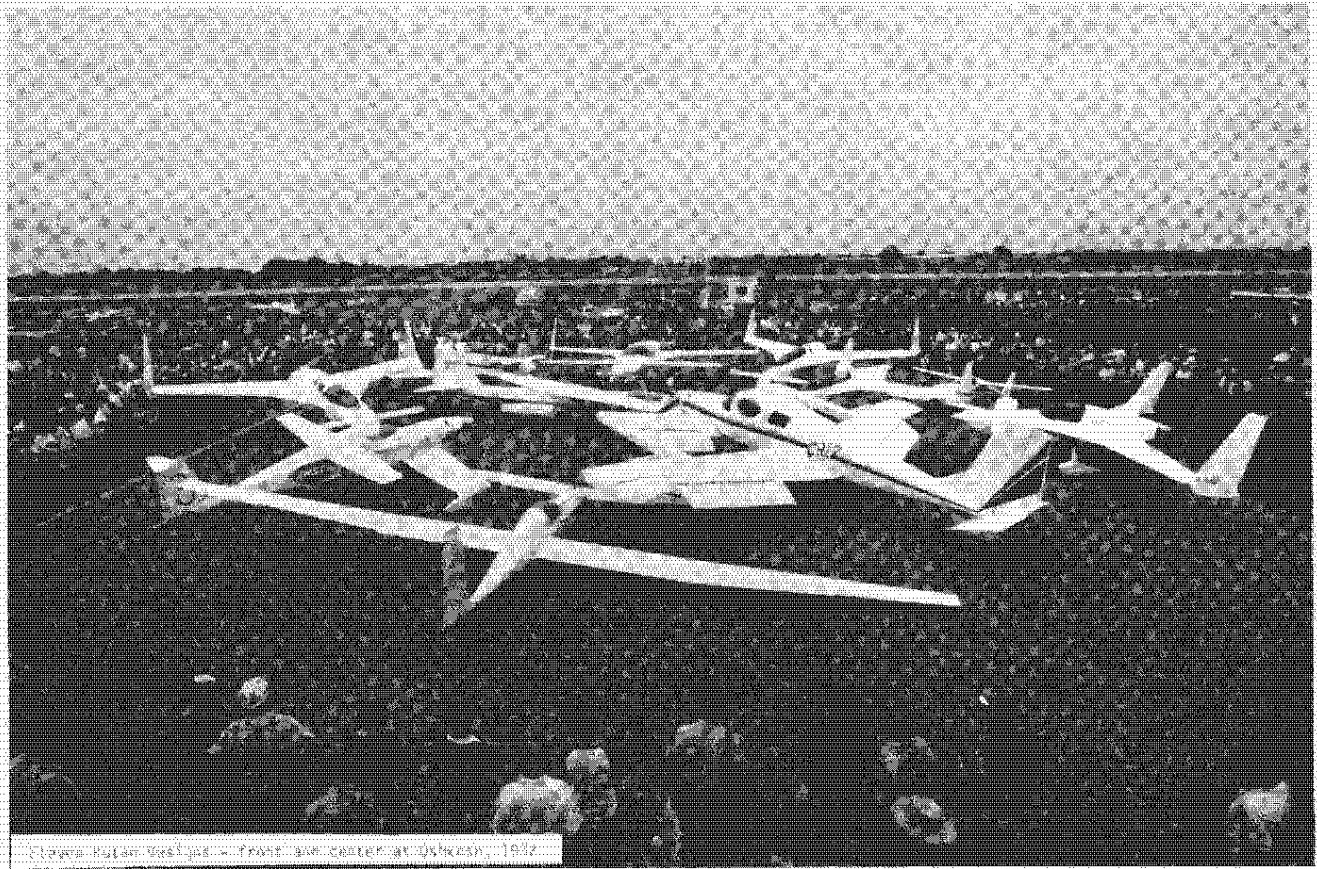
Main and nose gear, fuel strakes, fuselage bulkheads.

TASK RESEARCH INC.
 848 East Santa Maria
 Santa Paula, CA 93060
 (805) 525-4545

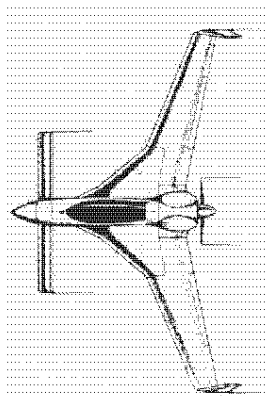
Canopies are available from **RUTAN AIRCRAFT**.

Rutan
Aircraft
Factory

BUILDING 13, MOJAVE AIRPORT
 MOJAVE, CALIFORNIA 93501
 TELEPHONE (805) 824-2645



**Rutan Aircraft Factory
Building 13, Mojave Airport
Mojave, CA 93501**



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Oct. '82

CP 34