THE CANARD PUSHER

No.32 April 1982

Published Quarterly (Jan. Apr. Jly. Oct.) by
RUTAN AIRCRAFT FACTORY INC.
Bldg 13, Airport,
Mojave, Ca 93501
(805)824-2645

U.S. & Canadian Subscription	$6.75
Overseas (Airmail)	$8.75
Back Issues	$1.50

If you are building a VariViggen from 1st Edition plans you must have newsletter 1 through 32. If you are building from 2nd Edition plans you must have newsletters 18 through 32. If you are building a VariEze from 1st Edition plans you must have newsletters from 10 to 32. If you are building a VariEze from 2nd Edition plans you must have newsletter from 16 through 32.

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 question". This will speed up your reply.

Saturday Demos. - Every Saturday (except when gone to airshows) RAF conducts a demo at our shop at the Mojave Airport. We start the presentation/discussion at 10:00am each Saturday with flight demos of our experimental aircraft at approximately noon (weather permitting).

RAF Activity

Since CP 31 has involved development of structure, controls, landing gear, and propulsion system for our self-launch sailplane, the Solitaire. In addition, our Grizzly research STOL aircraft has completed it's basic land-plane flight test development effort. Due to a higher priority on the Solitaire and to some consulting commitments we are not pursuing the Grizzly amphibious floats at this time. We may begin that this fall.

The Solitaire development was delayed by propulsion system problems, however a redesigned configuration is now running smoothly in our test stand and we expect to be into flight testing by mid May.

RAF has made a "few" covers of magazines since the beginning of '82. The following is a list. The first three are photos taken by our own RAF photographer, Pat Storch.

Popular Science - May
Homebuilt Aircraft - April
Aviation Week and Space Technology - January 25
AOPA Pilot - April
Plane and Pilot - April
Private Pilot - April
Homebuilt Aircraft - May

SEMINAR IN FLORIDA

In February Burt and I flew to Miami, Florida (in a Lockheed L-1011) where Burt was the speaker at EAA Chapter 37's annual banquet. I was lucky enough to tag along, and I must say I really enjoyed the banquet. The food was good, Burt's talk and slide show, as always, was great and being in the company of so many VariEze and Long-EZ builders and flyers was neat. Charlie Gray, a Long-EZ builder organized the whole affair, and did a super job. A really nice touch was that each person at the banquet received a water glass, with a Long-EZ printed on one side and the Chapter logo and date printed on the other.

The next morning Saturday, Charlie drove us to the Fort Lauderdale Executive Airport, where Burt and I gave a composite seminar to about 300 people. At least two Long-EZs and two VariEzes flew in and I was pleased to be invited to fly Jack Fehlings gorgeous VariEze "Yellowbird". Burt and I spent a couple of hours talking to builders, before the seminar, and several things were noted on both Long-EZs that were there. Smooth contour on wings, canards and winglets is really important if you are to get the performance you expect. Paint stripes along the leading edges of wings and canards are only acceptable if there is no masking tape joggle. A joggle like this can trip the boundary layer and transition good, low drag, laminar flow into high drag, turbulent flow. NASA tests on our Long-EZ has shown that destroying all the laminar flow can cost you up to 11 knots!

Prior to the seminar, Charlie Gray had got hold of a reject canard that we looked at and Burt agreed that it should not be installed on an airplane. We decided to do an informal static load test to destruction. So we called for people weighing about 175 lb. people. With Burt positioning each person for correct load distribution, we proceeded to try to fail the canard. We got 18 people (not an easy task, very little room!) on it before we finally got a few minor cracks. At this pint, Burt calculated we had 11.54 g's on it, and it still would have got the airplane home. It did not fail catastrophically. Someone must have photos of the 18 people on it. We did'nt get one, unfortunately.

The seminar went well, we both enjoyed the opportunity to answer questions, look at parts, and do some hands on, hot wire cutting, layups etc. When we went back to Charlie Gray's home, both of us were a little "hoarse" but it was fun. Sunday, on the way to the airport, we visited a couple of Long-EZ projects, wish we could have seen more of them. There are a lot of Long-EZs under construction in the south of Florida. Thanks to Charlie and his wife Betty for showing us such fine hospitality. Charlie should be flying his Long before to long.

SCALED COMPOSITES, Inc. : HELP PART II

Many thanks to the people who have submitted resumes in response to the ad in CP 31. The response was more than we expected. We haven't yet selected people for the positions offered but will have made the selections by mid to late summer for hiring in September. All those who wrote to us will be contacted, so please be patient with us. SCALED has purchased a new Computer Assisted Drafting package and we are looking for an enthusiastic engineer/draftsman to use it. The system is based on the Apple II + microcomputer and runs in PASCAL, so some experience there would be helpful. We also need a bookkeeper/accountant (any MBA dropouts out there?). The receptionist/executive secretary position is still open for the right person, the French speaking requirement is no longer necessary but the word processing experience is.

NEW RAF POSTER NOW AVAILABLE. SEE BACK COVER.

MIKE & SALLY'S LONG-EZ

N26MS has been spending more time in the hanger than usual due to bad weather, while the weather in Mojave is almost always acceptable it certainly is not in Tehachapi, so during the two to three months of winter type weather, we have been driving, and what a pain that is! On top of that it actually takes more fuel to drive our Honda Accord to work and back, than it does to fly the Long!

Even so we have managed to put some time on her, she is just over one year old and has 320 hours total time. I did an annual inspection last month and found very little, I adjusted the rudder travel, relined the brake shoes, changed the oil, topped off the batteries, checked brake fluid level and that was about it. Engine health is excellent with compression like new on all four cylinders.

The airplane has proved to be exactly what I had hoped, a low maintenance, high utility, high speed, economical cross country airplane. I have been testing a small electric cabin heater for the past month or so. This heater is STC'd for any aircraft, and came to me from Steve Franseen, 1245 S. Tennyson, Denver, CO 80219. Steve is a Long-EZ builder and is the distributor for the heater. Contact Steve if you are interested.

The heater I have is a 12v 16 amp heater, with an advertised capability of heating a 50 cubic foot area. On the ground, static it is much more than you need. In the air at a normal cruise speed around 160 kts. true, in my Long-EZ, it is marginal with an outside temperature of -14 C. This is primarily due to the many air leaks that I have, around the elevator tubes, the nose access hatch, etc. I am sure that with close attention to sealing the nose of your Long-EZ from all leaks, this little heater will do an adequate job. I am going to be testing a 24 v, 16 amp heater, which has an advertised capacity of 80 cubic feet, in the next few weeks and will report on the performance in the next CP. The heater is well made, has a built in fan and safety cut out. It is also internally fused. It completely eliminates the problem of carbon monoxide contamination, and is easy to hook up. I installed mine in less than an hour.

I have also recently installed a Compucruise and flo-scan fuel flow transducer. I elected to use a flow-scan series 100-A, which has a range from 1.5 gph to 15 ghp. It is a real kick to fly with this gadget on board, as you can really keep track of your fuel management. Once calibrated, it is accurate, and measures fuel burn in 1/100ths of a gallon. The only apparent drawback I have found is that the Compucruise, even with the display turned off, will drain a 12 volt 25 amp hour battery in less than two weeks. This is no problem as long as you use the airplane at least once a week. But I would recommend a master switch to shut the Compucruise down completely if you don't intend flying for extended periods. This of course drops out the memory and your fuel flow calibration, but it is not difficult to reenter.

We have entered our Long-EZ in the Cafe 400 race, and are looking forward to it. We expect to be quite competitive, with the race being extended to about 400 miles from 240, and a requirement to climb from sea level to 10,400 feet and back. What with the Long-EZ's high aspect ratio and low induced drag, we should make a good showing.

Sally recently had a #99's" meeting at the Bullhead City Airport, on the banks of the Colorado. This is a nice little cross country of about 190 nautical miles each way. We passed up both the Long-EZ and the VariViggen. Son Keith went in the back of the Long with Sally and I flew solo in the Viggen. A beautiful day, with a 26 knot tail wind took us there at 7500 feet indicating 120 knots with an average ground speed of 162 knots (187 mph). The return trip against a 26 knots head wind found us flying low, from 100 feet to 500 feet AGL. Crossing the desert at low altitude at 140 knot indicated is really fun, but in the Viggen it really burns up a lot of fuel. Which meant we had to land at Barstow-Dagget for gas. A quick low altitude dash from Barstow to Mojave and I tallied up the fuel burned in each airplane for comparison. While the Viggen with its 180 hp Lycoming, used 24.7 gallons,the Long with its 118 Lycoming, used exactly 12 gallons and carried two people. This is a good comparison showing the difference between a low aspect ratio (requiring lots of horsepower) VariViggen and a high aspect ratio, low induced drag (requiring very little horsepower) Long-EZ, both flying at the same speed and altitude, the Viggen averaged 8.8 gph, while the Long averaged 4.4 gph.

EZ-CALC?? FUEL FLOW INDICATORS.

The EZ-Calc system as discussed in several previous newsletter, has apparently been dropped and will not be available. A lot of builders have seen the Zemco Compucruise, an automotive driving computer, in the prototype Long-EZ and as a result, several VariEzes and Long-EZs have these installed. RAF has never come out and recommended this installation however, since we were and still are very concerned with the fuel flow transducer that comes with the compucruise. This transducer has a tiny passage way for the fuel, and it would take only a minute piece of foam or other contaminate to shut off ALL fuel to the engine. This is not at all acceptable and any EZ pilot currently using this set up should ground his airplane until it has been changes. Also, the pressure drop is too great for a gravity system.

Byron McKean of Seguin, Texas, has done a lot of development work with the compucruise and he has come up with a system that works great. I have one in my Long-EZ (N26MS) and am very satisfied with it. What it consists of is the basic Zemco compucruise computer, but the transducer is discarded and an aircraft-type flow transducer, made by Flo-Scan, Seattle, Washington is substituted. Byron has also devised a neat little gadget he calls a 'Gizmo', that you can readily build yourself with parts from Radio Shack. This enables you to dial in your ground speed, and then you can get all of the functions out of the compucruise. In effect this gives you a poor mans DME, with accurate fuel management information. I installed mine in my Long, in two pieces. I literally cut the compucruise in half and remote wired it so that the keyboard is flush mounted into the right console just aft of the stick, and the display is mounted up at the top of my instrument panel. This was not difficult to do and it looks and works great. I have continuous information regarding fuel flow, in GPH, as well as fuel used and fuel remaining. I also have battery condition (voltmeter) inside and outside air temperature, a count up timer, a trip timer, and with ground speed and trip distance 'inputted', time to arrival, time to fuel exhaustion, etc. etc. On top of that it has an accurate digital clock. I am delighted with mine and would recommend anyone who is interested in a fuel flow indicator to go with this system. Contact Byron McKean,

Rt 1, Box 429-B
McQueeney, TX 78123 (512)557-6575

For $12.00 Bryon will send you a very complete letter with wiring diagrams, sources for parts, part numbers, prices, literally everything you need to know to make the installation. We must stipulate that we recommend this installation ONLY if you use the Flo Scan fuel transducer. Do <u>not</u> use the compucruise transducer.

SUN 'N FUN FLYIN, 1982

Irene and George Rutan (Burt's Mom and Dad) again made the trip east and did an excellent job representing RAF. Irene managed again to get all the EZ pilots names and aircraft numbers. Everyone who went to Sun 'n Fun agreed that it was one of the nicest airshows ever.

RAF type airplanes were very well represented, and by the end of the week, Irene had logged in 28 VariEzes and 5 Long-EZs. She reported that they had a ball, chatted with all the pilots, and also managed a ride in the Dragonfly!!

Dick and Jeanna flew out in their Long-EZ (modified) and Dick did a super job of putting on evening airshows.

The now traditional race that Dick started three years ago, was held again. Steve Woods did the officiating and 8 airplanes entered. It is interesting to note that a standard O-235 powered Long-EZ won, after handicap correction. He was only 7.4 mph slower than the fastest VariEze.

We would like to thank all the people that did such good work for RAF. Johnny Murphy, who put on an excellent forum, Dick and Jeanna for helping Johnny and Dick for his airshows. Steve Woods for organizing the race, and, of course, our special lady, Mom Rutan for her tireless work on the flight line.

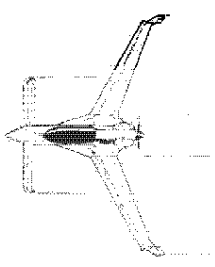
RAF Aircraft at the 1982 Sun 'n Fun Flyin.

Long-EZ.

N169SH	Dick and Jeanna	CA
N21VE		FL
N506EZ	Dr. Sparkman	FL
N141NH	Neil Hunter	FL
N81HM	Herb Sanders	TN

VariEze

N29T	Stewart Shannon	IL
N778CB	Curtis Berry	TN
N55EF	Howard Thompson	AL
N64592	Bruce Evans	CA
N770DY	Don Yokam	FL
N75EZ	Jack Sargent	FL
N115AM	Sam Cachran	FL
N25RR	Robert Ridihalgh	IO
N15RL	Roger Longsway	FL
N111DR	Don Riley	
N711VE	Steve Alexander	IN
N86DH	David Hersterlee	GA
N301RW	Robert Woodall	MD
N91CL	C. Langerud	TX
N444EZ	Jack Fehling	FL
N2286A	H. Ferguson	NC
N40EZ	John Benjamin	PA
N80SH	Seth Hancock	
N36SD	S. Darlington	IN
N14KM	Kurt Duncan	FL
N82JF	John Fowler	IO
N25RH	Rick Himerick	TX
N83DL	David Langston	GA
N80EK	Elvin Kime	MO
N8493W		
N810TC	M. Pavlovich	WI
N56EZ	Steve Woods	FL
N2UM	Paul Mason	FL



Results of the 1982 Sun 'n Fun Race.

1.	Paul Mason	186.4 mph	O-235 Lyc.	VE
2.	Herb Sanders	184.4 mph	O-320 Lyc.	LE
3.	Jack Fehling	182.4 mph	O-200 Cont.	VE
4.	Bruce Evans	181.0 mph	O-200 Cont.	VE
5.	Neil Hunter	179.0 mph	O-235 Lyc.	LE
6.	Bob Woodall	169.6 mph	O-200 Cont.	VE
7.	Rick Himerick	168.0 mph	O-200 Cont.	VE
8.	Don Riley	152.0 mph	O-200 Cont.	VE

Handicap Results.

(Planes were handicapped for engine size, wheel pant, etc.)

1.	Neil Hunter	184.00
2.	Jack Fehling	179.4
3.	Bruce Evans	178.0
4.	Paul Mason	176.4
5.	Herb Sanders	170.4
6.	Bob Woodall	169.8
7.	Rick Himerick	168.0
8.	Don Riley	152.0

VARIEZE HOSPITALITY CLUB

Seven VariEzes, Kappermans, Hamlins, Wilsons, Days, Moores, Lees, and the McFersons got together at Imperial in Southern California, they then flew south across the Mexican border to Mexicali, where they cleared customs with no problems, filed flight plans, ($4.00 each) and flew en mass down the east coast of the Baja peninsula to Loreto. Four fantastic days were enjoyed by all. One day they all flew on south around the tip (Cabo San Lucas) and up the west coast to the whale breeding area, then turned east, stopping at La Paz, and then back to Loreto. The only incident was Alan McFerson blowing a main tire, no problem though, Ron Kapperman had a spare! The flight north to Mexicali was smooth and uneventful. From Mexicali to Calexico (to clear U.S. customs) had 5 VariEzes on final, when someone at Calexico suddenly noticed them and came on the unicom frequency "caution Calexico traffic, bunches of VariEzes in the pattern, they're thicker than flies!". A great trip with perfect weather, as Ron Kapperman put it, "It could not have been any better".

EZE FLY-DRIVE-IN GET TOGETHER.

APRIL 24th 10:00a.m. to 4:00 p.m.

Place - Brookenridge Air Park. (Southwest of Chicago)
960 86th Street, Downers Grove, IL 60516
21 DME miles out on 050 radial Joliet VOR
27 DME miles out on 305 radial Chicago Hts. VOR
West end of runway 9-27, 2800 feet, MONITOR 122.9

Activities- Weather permitting - Picnic or hanger flying
Hosts will provide soda, bratwurst, buns for $1.50 per person to cover costs.
Bring pictures, parts, anything of interest.
PLEASE tell us if you are coming. 312-985-6671
Bring a salad or desert if possible.

Note - This is a private strip that is sensitive to the concerns of non-aviation neighbors so please use standard left hand pattern at 1500 msl. NO buzzing or touch and goes. No fuel. Our parking is limited, let's limit the fly in to EZEs only if possible.

Bring any ideas for other activities in the future, bring family. Hosts - Talbors, Steichens and Gutches.

CLUBS - A Long-EZ club has been formed in the Chino, CA area. With 26 members already, this is a fast growing club.
For more information contact - Dick Kreidel.

4422 Acorn Street,
Yorba Linda, Ca 92686

CP32 P53

SAF-T-POXY REACTIONS

In CP 31, we asked for reports from anyone who has experienced a reaction while using the SAF-T-POXY. To date (April 4) we have received 47 letters, all of which have been sent onto Applied Plastics, the manufacturer.

It is still difficult for us to access the extent of the epoxy sensitization. Less than 3% of the builders sent reports of problems, but we must assume that many of you did not bother to write. Applied Plastics are presently reviewing your reports and investigating the problem. They recently sent in a random SAF-T-POXY sample for testing and it again came back a zero on the SPI scale from zero through 10. For perspective, a common industrial epoxy, 815 has an SPI 6, while the RAE epoxy has an SPI 3. SAF-T-POXY is an SPI 0.

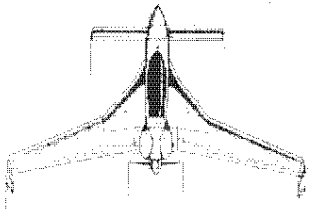
Applied Plastics is developing a very thorough pamphlet covering the use of SAF-T-POXY and precautions to take to avoid the reaction in the first place. They also have suggestions to help you get around the problem. If you are having a slight reaction and are using SAF-T-POXY, be absolutely certain that you do NOT have MEK or acetone or lacquer thinner in the shop at all. Just breathing the fumes of these solvents can render you vulnerable to the epoxy. Getting these solvents on your skin is asking for trouble. If you are using gloves (NEVER use Ply 9 and gloves together, it is either gloves or Ply 9) try using different types of gloves, even surgeons have allergic reactions to some gloves. Try using thin cotton liners under your gloves, this soaks up sweat, and will show you if you get a break or tear in the glove. While sweating you can sometimes be more vulnerable to allergies. A method that has worked well for some builders is to use only Ply 9, and to stop at least every two hours, wash your hands and arms thoroughly with a good borax soap (Lava) paying particular attention to scrubbing under finger nails and around your cuticles. Dry your hands, reapply Ply 9 and return to the layup. Do not exceed the two hour period. Wash up as often as necessary during a long layup. If your sensitivity to breathing the fumes is severe, full-face respirator can provide a solution. (W.W. Grainger # 5X803 is an example).

To summarize, cleanliness is the 'biggy'. Do not allow epoxy, solvents or any industrial type materials, to come in contact with your skin, not ever. Wash thoroughly, often. Use a good respirator and/or ensure that you have adequate ventilation. If you still have problems you might consider switching to the RAE epoxy system. This may sound silly, (an SPI 0 to an SPI 3), but the fact is you may be reacting to a particular chemical in SAF-T-POXY, that may not be in the RAE system. This has worked for several builders. The allergic reaction healed and they were not bothered again. Beware though, RAE is definitely more toxic. Take all possible precautions when using either of these systems. Finally, if you still have problems, let us know so that we can keep giving the manufacturer this data. Plastics good feed back.

LYCOMING O-235 ENGINE INSTALLATION

If you bought a new engine from Avco Lycoming and specified it for a Long-EZ, your engine should be set up correctly for an oil cooler and a standard oil screen housing, not a full flow oil filter, which will not fit.

Those builders who purchase a used engine should check the following items: If you have a full flow spin on oil filter, it must be removed, so must the AC adapter that is bolted to the accessory case. There is a thin aluminum plate between the AC adapter and the accessory case, this must also be removed.



Now you need to purchase a standard oil pressure screen housing, Lycoming Part # 68974, and oil screen, Lycoming Part #62817, and a gasket for the screen housing, Lycoming Part # 61173.

The assembly should be bolted to the accessory case, and your oil temperature probe installed in the tapped hole in the aft end of the screen housing. If you install an oil cooler, you will also need to purchase a spring, Lycoming Part # 69436, a plunger, Lycoming Part # 62415, and a gasket Lycoming Part # STD-294. The plunger and spring should be installed under the large plug screwed into the top left of the accessory case. Not all accessory housings have this port. However if housing is machined for cooler it is provided. The plunger and spring are required if you have a standard oil screen and housing and an oil cooler. The plunger regulates oil to the cooler (oil cooler bypass).

There is another option available and it is an oil screen housing with a thermal valve assembly port built into it, together with a tapped hole for your oil temperature probe. This housing is Lycoming Part #69510, screen is Lycoming Part # 62817, and thermal valve assembly is Lycoming Part # 75944.

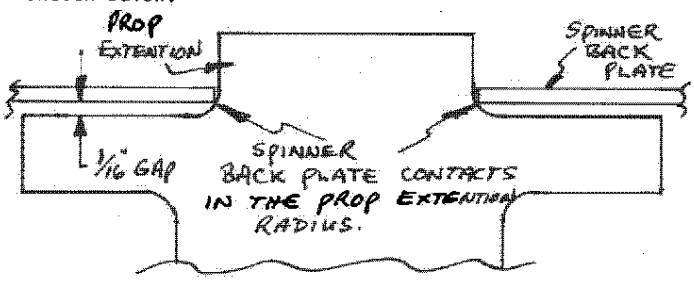
If you choose to use this screen and housing you must not install the plunger and spring (#62415 and #69436). This is a situation with either one system, or the other, never both. If you choose not to install an oil cooler, you need only to install the standard oil screen and housing (#62817 and #68974). You should install the plunger and spring, or the thermal valve assembly and housing. However, your oil temperature will run hot, close to or at the red line, which means excessive wear in your engine.

O-235 L2C engines from Cessnas 152s. These engines do not have provision for a mechanicial fuel pump. The fuel pump is mandatory for a Long-EZ, so you either have to get your accessory case machined (Avco Lycoming will do it and so will Air Engines, Florida) or buy an accessory case from any O-235 that is already machined. Be careful about using an accessory case off an O-320 or O-360. While these parts will bolt on perfectly, they may not have the correct oil ways machined into them to lubricate the idler shafts. Again Air Engines, Florida can do this for you. You will also require a timing gear with the cam lobe on it and a pushrod.

BENDIX MAGNETOS IN A LONG-EZ ?

This question comes up more and more in spite of the subject being covered in Section III, Page 3. The fact is that we tried to install Bendix mags on a Long-EZ and there was an interference between the left mag (right of airplane) and the aluminum extruded angle on the right side. This interference occurs right in the area required for timing adjustment, so we called out only Slick mags. Slick mags are smaller and much lighter and in our opinion and experience every bit as reliable, particularly the newer rebuildable Slicks. We do admit though that we never really researched into the problem, possibly there might be a relatively simple fix that would allow the use of the Bendix mags, anyone who has seriously addressed and solved this problem should let us know. We do not want to get into any changes to the engine, adapter plates etc., since engine reliability is of paramount importance, and we can not recommend a change that may hurt reliability.

CAUTION Spinner/prop extension compatibility. This is a real gotcha! We installed a new prop extension on N79RA, which was not manufactured by Brock. We then installed a Brock spinner on this extension. The center hole in the spinner backplate was a close fit on the center locator on the prop extension. Unlike a Brock prop extension, this one had a rather large radius machined at the flange face, which did not allow the spinner backplate to slide all the way on, see sketch below.



This is a dangerous situation, and difficult to detect because the flow guide prevents a visual inspection.

We installed the prop, torqued the bolts to the 18-20 ft/lbs we normally use, and tracked the prop tips accurately. At this point, the prop bolts were tight, the prop ran true, but the prop was not being squeezed against the prop extension. Rather it was pressing only against the spinner back plate, in this case a very stiff 1/8" thick backplate, that was able to support the torque value of the bolts, without going back against the prop extension.

We flew the airplane for several hours, blissfully unaware of the problem. Last week Dick used N79RA to take a business associate to the Santa Monica airport. On his way back he got to within 20 miles of Mojave when a strong vibration became apparent. It steadily worsened, to the point that he elected to turn back to the closest airport at Rosamond. The vibration became much worse and then abruptly went away. Dick thought he had thrown a rod, set himself up for an emergency, dead stick landing on the 2300 foot, Rosamond runway. Dick touched down on the numbers, made the turn off and rolled into an empty tie down. Not until he got out did he realize he had lost the prop and spinner.

Looking at the marks on the drive lugs it is plain to see what happened. The 1/8" aluminum back plate gradually gave way, allowing the bolt tension to relax. Without this friction between the crush plate and prop extension flange to drive the prop, it begins to be driven by the drive lugs and prop bolts in shear. This state of affairs can only continue for a very short space of time, before the bolts fatigue and then, of course, the prop/spinner comes off.

This is a very serious situation and anyone who has a Brock Spinner mounted on a prop extension that is made by someone other than Brock (obviously the Brock extension is completely compatible with a Brock spinner) should immediately ground their airplane and check this out. The problem can be cured by decreasing the radius in the prop extension, or increasing the diameter of the hole in the center of the spinner back plate.

CAUTION

When installing your engine mount, we tell you to set the mount on the extrusions leaving approximately .030 gap between the mount and the firewall, see Section IIL, page 7. This is true if the mount is perfectly straight, however you should check to see that it is, by measuring from the firewall to the aft of the engine mount and verifying that the mount is at the correct fuselage station as shown in Section IIL, page 14 for conical mounts and page 15 for dynafocal mounts. Bear in mind that even though the mount is accurately welded up on a fixture, when it is normalized by heat treating, it is possible for the weldment to warp, creep or otherwise move enough that if you rely on the .030 measurement, you may have an engine that is not correctly located. Correctly installed, you engine crankshaft should be aligned with the zero buttline, plan view. Side view, the crankshaft should have 2 degrees of down thrust, (± 1 degree) that is to say the spinner end is higher than the accessory case end.

CAUTION - ROTATION SPEED

Several things influence rotation speed, and thus take-off distance. The fuselage station of the axle centerline is very important. You should hold this within 1/2". (see Chapter 9 and the back cover of Section I). Toe-in of your mains also has a powerful influence on rotation speed (not to mention tire wear!) Accept nothing less than a total of 1/4 of a degree to 1/2 a degree. (N26MS has 1/4 degree toe-in, and still has the original tires, with over 700 landings, 320 hours in one year). If your tires are showing excessive wear, do not accept it, remove the axles and shim them until the toe-in is correct. This can be done quite easily by laying up one or two plies of BID on the strut and bolting the axles back on, gently tightening the bolts until the correct toe-in is achieved (by crushing the BID layup into a taper). allow the layup to cure, then torque the axle bolts to their proper value of 75 inch/lbs. ft/lbs). You could also use a commercially available taper shim. Aircraft Spruce sells them in various taper values.

Tire pressure can also influence take-off roll distance/ rotation speed (as well as tire wear). check your tire pressures regularly.

Ground attitude of the airplane can also cause long take-off rolls. Your Long-EZ or VariEze should sit level to slightly nose up on level ground, when loaded to gross weight. If your airplane has a pronounced nose down ground attitude under the above conditions, it should be corrected. Note that a nose-down attitude during construction is normal, before the weight of the engine and wings are added.

CAUTION - CP, is the latest and best information. We still have questions on this subject. If we put information in the Canard Pusher, it supercedes the information in the plans, and is the correct information to use.

CAUTION - left magneto confusion.

This is a problem that could lead to a serious injury. We at RAF have always considered the left and right mags to be as called out by the engine manufacturer. Even though this puts the left mag on the right side of a pusher aircraft, it is still correct to wire your mags and mag switches according to the engine manual. If you wire your EZ mag switches reversed from the above, obviously you will not have problems, but should you ever sell your EZ, or lend it to another pilot, he or she could get hurt if they tried to start it on the wrong mag (without the impluse) this is particularly true with Lycomings, most Continentals have both mags with an impluse. The impluse allows the spark timing to be at top dead center for easy starting, then advances for normal running. If a pilot attempted to hand prop his engine with the timing set at 25 degrees before top dead center, which is what he would have if he had the right mag switch hot, instead of the left, on a Lycoming powered EZ for example, he is likely to have the engine backfire and injure his hand. It is for this reason that Lycomings and some Continentals are always started on the left mag. If your engine had a tendency to back fire, check to see that you have the correct mag grounded.

CAUTION

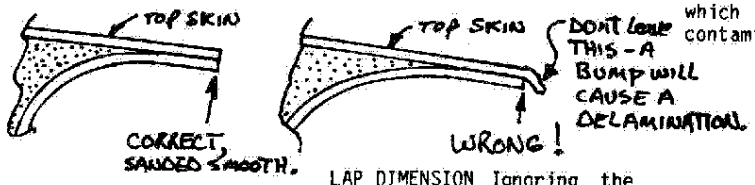
Carb heat on Continental O-200 installation. If you have a Continental O-200 in your EZ, you should test the carb heat for effectiveness. This can be done by slipping a thermometer into a small hole in the hose that connects the carb heat valve with the carburetor. This takes two people, a pilot to sit at the controls and hold the brake while he pushes the throttle to maximum power. The other person should stay well clear of the prop and should insert the thermometer into the induction hose and note the temperature rise after carb heat is applied. There should be a heat rise (carb heat temp minus ambient temp.) of at least 90 degrees F. If not, you should increase the size or efficiency of your carb heat muff on the exhaust system. Lycomings are not nearly as prone to carb ice as are Continentals, but do not take chances, check your carb heater.

CAUTION - SEDIMENT IN THE RESIN OR HARDENER.

Hardener - This is a result of temperature cycling and is not acceptable. Do NOT use hardener or resin that has a cloudy sediment, or solid lumps at the bottom of the container. You must not strain these lumps out, rather you must heat the material as described in CP 29-5 until it goes back into a clear solution, before attempting to use it.

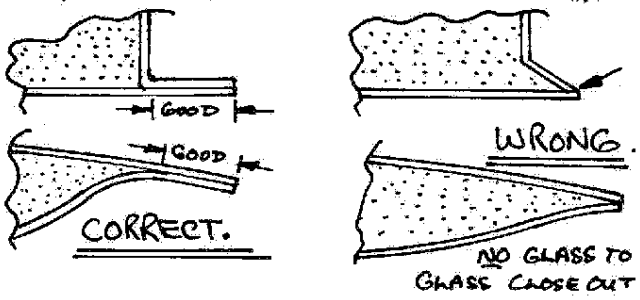
CAUTION - TRAILING EDGE CLOSE OUTS.

It is very important for structural integrity, that you ensure that your trailing edges of canard, elevators, wings, ailerons, winglets and rudders meet the prescribed minimums in the plans. Do not accept delaminations in the trailing edge glass to glass area. Even the smallest delam can get moisture in it which will freeze and expand when you climb through the freezing level, and thus delaminate further and further with each occurrence until it could weaken the overall integrity. About the quality of your trailing edge glass to glass close outs - accept nothing less than perfection in this area. Always sand smooth every lap after cure - do not leave them joggled as shown.



LAP DIMENSION Ignoring the proper procedure here could result in serious consequences, even structural failures! Here is a list of these areas. The minimum dimension should be considered an absolute minimum. If you don't meet this criterion it requires repair before you fly.

	Glass Lap Dim Shown	Minimum Acceptable Lap
Canard	0.45"	0.3"
Elevators	0.25"	0.2"
Wings	0.6"	0.5"
Aileron cut outs	1.0" (top) 0.75" (bottom)	.75 (top) .52" (bottom)
Ailerons	0.5"	0.3"
Wing Root Rib	0.6"	0.4"
Winglets	0.6"	0.4"



CP#32 pg 6

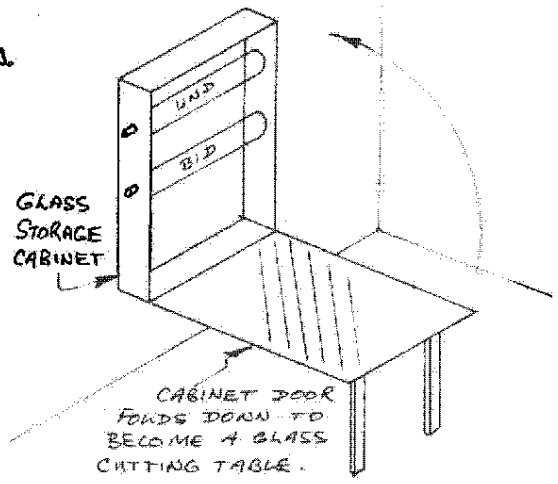
CAUTION: Nose gear pivot. Correctly installed, the pivot axis should be between vertical and 5 degrees from vertical with the top aft See sketch on page 13-1 Section I. We recently saw a Long-EZ that had the pivot oriented top forward. Under these conditions, the nose wheel is susceptible to violet shimmy which will fail the fork. Never taxi or fly an EZ if the shimmy damper is not set within limits.

BUILDER HINTS

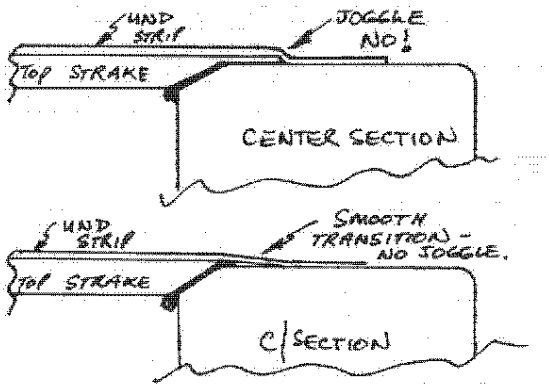
Clarification on use of various pop rivets. Anywhere on the airframe where you are installing nutplates, on hinges, access panel, etc., use 3/32" dia. flush pop rivets, or solid aluminum rivets. When installing aileron hinges onto the ailerons, use 1/8" round head pop rivets (Avex 1601-0410, or cherry MSP 43) rudder hinges are installed into the rudder using flush pop rivets (avex 1604-0412 or cherry MSC 43). CS2 elevator hinges are installed on the elevator using flush pop rivet (avex 1604-04 or cherry MSC 43)

Zoletone cockpit interior paint, is now stocked by both Wicks Aircraft Supply, and Aircraft Spruce. This paint really dresses up the interior, and is easy to apply. Mike used charcoal gray #40-59, and applied the Zoletone directly onto the bare fiberglass. You should scuff the shiny glass interior with 40 grit sandpaper before spraying the Zoletone. Mike did not use a primer or undercoat, the Zoletone is adequate UV protection without a primer.

Jim Heir, Colorado Springs, CO sent in an excellent suggestion for maximum utilization of space. He built a storage cabinet on the wall of his garage, with a large door hinged at the bottom. He stores his rolls of UND and BID glass inside and when he needs to cut glass, he pulls down the door, which has two legs hinged on it, and it becomes his cutting table. He also marked the surface of this table with a magic marker with 45 degree and 30 degree and 90 degree lines every 6 inches. This makes it real simple to cut the necessary glass pieces, then close and latch the door, which keeps the rolls of glass from becoming contaminated.

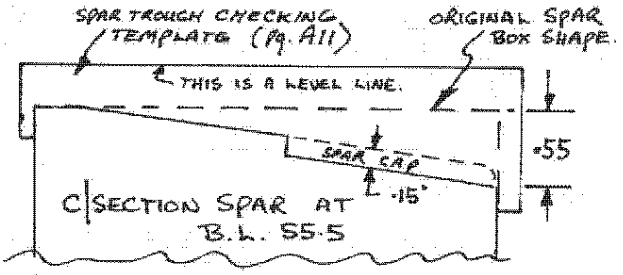


When installing the Task Research fuel/baggage strakes, be certain to remove all peel ply, from inside and out. There should be two plies of peel ply, about 5" wide oriented diagonally, (See Section I, page 21.-4) which will leave a slight depression once they are removed. This depression will be filled with the one ply UND strip that laps from the top of the centersection spar, diagonally forward and around the leading edge of the fuel strake. This holds true top and bottom. Do not forget to remove the two plies of peel ply. Important This one ply of UND strip must lap from the strake onto the centersection spar smoothly, without a joggle. Sand any joggle into a smooth taper before the UND strip layup. See Sketch. NEXT PAGE.



Centersection Spar Clarification. A few builders have been having problems understanding the sketch in Section I, page 14-2, top right. This sketch is correct, and it shows the line you should follow on the aft face of the spar box, when you cut through the CSI foam aft face. The dimension .55" at the outboard ends is correct. The spar cap at this point is only .150" thick (top cap) and .113 thick (bottom cap). This is because the spar box top tapers to match the wing root airfoil. If you look at page 14-9, Section C-C you can see the original outside shape of the spar box shown as a dashed line. If you measure down the aft face (CSI) from the original top aft corner to the foam under the shearweb, layup #5, you will see that it is .55".

Note how the spar cap templates (page AII) set this taper. The template outside edges are level waterlines.



PLANS CHANGES.

We at RAF, of course, cannot enforce a mandatory change, as FAA can on a type-certificated 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 #95 DES

Section I, page 16-2, step 3, paragraph 1, last sentence. Pivot hole drilled to 23/64" (0.359). This results in an extremely tight interference fit, (0.016) and it would work better using a letter "U" drill (0.368) & better yet if you then ran a 3/8" press fit reamer (approx. 0.373) through the hole.

LPC #96 MEO

Section I, page 21-5, drawing at lower left. Material for fuel valve mounting bracket should be 0.062 2024-T3 aluminum. The fuel valve handle should be trimmed down to clear the instrument panel.

LPC #97 MEO

Page A-14, lower winglet, tip template. The arrow pointing inboard is correct, the words, "this side for It .....", etc. are reversed. The side shown is for the right winglet, transfer numbers to the other side for left.

LPC #98 OBS

Section I, page 22-6, center drawing - delete "yaw trim bracket".

LPC #99 DES

Section I, pages 14-10 & 14-11, sections E-E, F-F, G-G & H-H. The UND layups #3 & #4 are incorrectly shown to lap onto the CS7 & CS8 bulkheads. The words describing this layup on page 14-2 are correct. Layups #3 & #4 are layed up onto CS2 & CS3 in sections E-E & F-F, and only onto CS1 in sections G-G & H-H.

LPC #100 MEO

Section IIL, page 6, left side, center of page. "you will now have 4 AN509-10R8 screws ....." should be 3 AN509-10R8.

LPC #101 MEO

Section IIL, page 37. Add to the Brock parts list - two spacers, part # SP-5. These spacers are used as stand-offs to bolt the gascolator to the fire wall.

CLARIFICATION

Section IIL, page 37. Part # LL-4 is used to stand off the mixture cable clamp, and is shown as a 5/8" long stand off tube on page 16. Part # LL-3 (page 37) is used inside the AN111-4 bushings in the throttle & mixture arms, and is shown as a 1/4"X3/16"X.25" spacer on page 17.

FOR SALE

For those who would like to purchase an orifice fitting, rather than make one (CP 31, page 5, 2nd paragraph). The orifice fitting (a 45 degree elbow) required in the oil pressure - sensor line is available from:

Yingling Aircraft,
P.O.Box 9248,
Mid-Continental Airport,
Wichita, KS 67277
316-943-0231

Order Part # 0752037-3 for $21.50 plus $2.00 for postage and handling. We recently saw an excellent little panel light - very light weight, low drain and adjustable. This light is available from:

David Hoffman Products,
1009 Old Mill Road,
Auburn, AL 36830

For Sale - Lycoming O-235-C1, 1200 total time, zero since major. Standard crank and cylinders oil pump. A.D. complied with. $4,500 - cal 707-433-6480

CP #32 Pg 7

For Sale - Lycoming or Continental Engines.

Norm Bender,
Box 30343 AMF
Memphis International Airport,
Memphis, TN 38130
901-794-0032

For Sale - Brand new B & T propeller, 59 x 75 for Lycoming SAE #2 flange $230. Call 916-624-2119

For Sale - VariEze propeller, Great American, 56 x 68 used for 30 minutes. $200 delivered.

Call 203-666-3560 after 5pm EST
Norm Rossignol
122 Eagle Drive,
Newington, CT 06111

Bob Hansen, Long-EZ builder/flyer (N7LZ) has developed a neat program for use on a hand held TRS-80, pocket computer. Bob's goal was to replace the Owners Manual with the computer. The pilot has only to answer the questions posed to him by the computer to get all the significant performance answers.

Bob admits that there may still be a few bugs in the program, but feels that it is a big jump over starting from scratch. Bob will sell any builder/flyer a commented program listing and a magnetic tape cartridge for $5.00

Bob Hansen,
22319 Marilla Street,
Chatsworth,
Ca 91311

Spectro-Chem, oil analysis, a service we mentioned in CP 30, page 3, has had a price increase. Their price is now $8.95 per kit in lots of twelve or more.

Spectro-Chem
P.O.Box 29074
Phoenix, AZ 85036
602-253-6515

Contact Lou Brand and identify yourself as an EZ builder/pilot.

VIDEO TAPES

RAF now has available a two cassette volume that contains the original "Building the Rutan composites" as well as "Flying is VariEze", "Defiant" and "Go-a-Long EZ". All four programs run for a total time of 2:41. All of the above for $99.95.

We still have the single cassette of "Building the Rutan Composites", running time is 1:36 for $59.95

California residents should add 6% sales tax and shipping to anywhere in the U.S. and Canada is $4.00, all foreign orders, add $8.00. Both of the above are ava able in the European PAL system.

For Sale - Lycoming O-235 (80 octane), 600 hours total time since new. NO recent A.Ds apply, removed from Piper Clipper and pickled. $1,800.00

Dan Duncan
405-439-2473

WANTED - Original main gear ~~strut~~ for VariEze.

Roger Kelm
11020 Harlan
Westminster, CO 80020
303-466-4719

Main Gear and Nose Gear Struts. Of all the parts manufactured for the VariEze and Long-EZ, the ones that have provided the most challenge for us has been the S-glass gear struts. The original manufacturer began producing them in 1976. In July '79 he disontinued production, following a series of manufacturing and marketing difficulties. At that time we were unable to locate a shop who could produce the parts at an acceptable price. A better manufacturing method was required. RAF then developed the production equipment and began producing parts. RAF's policy is to only sell plans and not parts, so in mid 1980 we turned the equipment over to Task Research after it was well proven by producing 200 shipsets. RAF continued to retail the gear so we could inspect each one for quality. Task's quality has been superb, a mold-offset problem being solved with new, expensive metal tooling. Satisfied with Task's capability, RAF now no longer retails the struts.

The main struts are $326.00 and nose struts are $58.50 contact Task directly.

TASK RESEARCH INC. - has for immediate delivery,
Main gear struts,
Nose gear struts,
Fuel baggage strake kits - 16 pcs. including ribs and baffles.
Fuselage Bulkheads - side consoles & roll over structure. SASE for info sheet.

Task still have a few reject strake pieces at the discounted prices. Go to Task to inspect.

Task Research Inc.
848 East Santa Marira,
Santa Paula, CA 93060
Order Phone # 805-525-4447

SOARING IN A LONG-EZ?

A month ago, on a Sunday, Mike was up over the Mojave Airport in N26MS. He was doing a fuel flow evaluation. It was a very windy day (50 knots at the airport) but clear. During the course of the test the right tank was deliberately run out of fuel, to the point that the engine quit completely prop stopped, at which point he found himself climbing at 800 fpm! he stated his elapsed timer and 42 minutes later, having gained 3,100 feet of altitude he gave up and returned to the airport. The strong lift over Mojave airport was apparently a wave condition, and had he been dressed better (warmer) he could have stayed up for much longer. He had to come down due to being very cold, not because he run out of lift. Someday, dressed more suitably, he intends to try again.

Mike and Sally's son Keith, was involved in an accident about a year ago, which left him without the use of his legs. Keith had always wanted to fly the Long-EZ, and toward that end, Mike recently installed a temporary rudder/brake system in the rear cockpit. Keith has now flown a total of 5 hours in the front seat and is doing very well. He is hoping to go all the way through his private pilot's license in the Long-Ez. As far as we know Keith is the first paraplegic to fly a Long. Mike and Keith are working on a rudder brake system that will be hand controlled from the front seat. The Long-EZ has worked out amazingly well in this application. Keith's only prior experience was about 2 hours in a glider. He has not made a bad landing so far.

VARIVIGGEN NEWS.

Another VariViggen first flight to report. We do not have any details or photos, but Bernard Duneman (N33VV) from Minneapolis, MN. Bernard wrote us a note saying that his first flight was on November 16, 1981 and everything went well. At this time he is progressing towards having the restrictions flown off and he expects to make Oshkosh. Congratulations Bernard!! Judging by letters received from builders/flyers, we could have four or five Viggens on the line at Oshkosh '82! Now that would be something.

N27MS continues to run well, unfortunately I don't seem to have time to fly her as much as I used to, but when I do, I am always impressed at the rapid roll rate and outstanding crosswind capability. I don't believe there is a light plane that handles better in a crosswind, at least I have not flown one. I have just done an annual inspection on the Viggen, and the only discrepancy was a crack in the aluminum carb heat box. This same problem occurred once before at about 40 hours, I rewelded it and it has held up ever since. This time I removed the offending part, which I made myself originally, so hopefully that problem will go away. Frankly I was very pleased to find so few problems. I lubricated the nose and main gear retract systems, and checked for wear, neither system required adjustment. Surprisingly I have not adjusted them since before first flight, four and a half years ago. Not flying her as often as I used to I have noticed that I neglect tire pressure checks. This caught me out the other day when I pulled the valve out of the inner tube in the nose wheel tire. I had to replace the tube, but it shows that tire pressure must be checked. My Viggen is a little heavy at 1252 lbs. empty, so I use a little higher tire pressures than what is called for in the owners manual. For my airplane I have found 45 psi for the mains (Goodyear 500 x 5, 6 ply Flight Custom II) and 50 psi for the nose. I have been getting excellent tire life, and would recommend these pressures, particularly if your Viggen is close to my empty weight.

Incidentally, I use 100 psi in the nose strut, and I have seen virtually no loss of pressure. I have only inflated it if I have been working on it, changing fluid, etc. It has been literally flawless. Another area where I have seen degradation has been the exposed wood around the rims of each cockpit. This wood was originally painted with clear epoxy, and has been degraded by ultra violet and then moisture has got into the wood and cracked the surface. I will need to scrape it down and re-seal it, perhaps with Saf-T-Poxy (low water absorption) and then I will paint it with an ultra violet barrier. Those of you who may be at this stage should give this some thought. Do not leave unpainted any epoxy or wood surface that is exposed to sunlight.

The canopy latches should be given very close attention. The plans built latches are by far the best and safest. Those of you who have seen my Viggen will know that I have had several different latch types on the airplane. For my own experience I cannot recommend what I have done. I have had my front canopy open in flight on three occasions, any of which could have resulted in an unpleasant accident. After the first two incidents, I changed my front canopy latch to a pretty fancy aircraft grade type of latch that provides a "safety" position as well as a locked and unlocked position. I was entirely satisfied with this, and felt that there was no way for it to happen again. Wrong! Circumstances can really get you in trouble. To make a long story short, I failed to lock it and for some reason the "safety" feature also failed. So I took off, hurrying to catch up to Sally, just as I was joining up with her, at only 200/300 feet, my canopy opened. I saw it out of the corner of my eye, and grabbed it with my left hand just as it reached its maximum open position. I pulled it down, moved out of formation, held the stick between my knees, and locked the canopy. My heart was going 19 to the dozen, and I consider myself lucky to have got away with it. When something like this happens, it is quite frightening, and you really feel a strong urge to panic. You must quell this, and CONTINUE TO FLY THE AIRPLANE and then lock the canopy. The reason for bringing this up again, is that I occasionally hear from people wanting to change things, including canopy latches. The best advice I can give is DON'T. Remember that we have built the airplanes per the plans and flight tested them and all of their systems. The plans built parts such as canopy latches, will work as advertised, as will fuel systems, etc. If you change any of these things, remember, when you first fly, you will be testing untried systems that may or may not work. Be prepared to take whatever action may be necessary in case you have a problem.

Speaking of problems, several builders are still using the cable driven main and nose gear systems. Based on my own as well as almost all the Viggens that have flown, I feel you are taking an unnecessary risk. ALL of the cable driven systems that I know of, have had at least one failure. The worm/ worm gear and chain systems installed in N27MS and called out in the second edition of the VariViggen plans, has performed flawlessly, and is the only system currently recommended by RAF. We do still have plans available for the main gear retract system.

Several builders have called or written, asking if there is a VariViggen club, or if not, could one be formed. I think this is a good idea and would be happy to try to form such a group. Any builders willing to help others, show their projects or completed airplanes, talk on the phone, answer written questions, or just provide moral support, and are willing for me to provide their names, addresses and phone numbers to enquiring builders, please let me know.

FOR SALE - VariViggen project. Fiberglass parts, wing attach fittings, 500 x 5 wheels and brakes, master cylinders and brake pedals. Will trade for Long-EZ parts.
Contact. Ron Lorimor.
P.O. Box 992,
Yreka, CA 96097
(916)842-3008

Elmer Hamerick reports that he purchased a flap motor, complete with ball screw, 2 micro switches, (out of a Cessna 150) which he intends using for his reflex drive. Elmer purchased the flap motor from:

Ellington Aircraft Salvage,
30982 E Broadway,
Toledo, OH
419-666-2440

A similar flap motor is also shown in the latest Wag-Aero catalog, page 50 . Part # 1-205-000

A letter from VariViggen owner, Len Dobson.

N73LD, Serial #533 was built from the first edition VariViggen plans, including the cable retract system. However, before skinning the aircraft I removed the cable system from both main and nose gear assemblies as it was far from being trouble free. About the time Mike came out with the drawings for his gear modification, I had already devised and installed a chain drive system. This system appeared to be quite reliable during ground tests so I completed the aircraft. All went well for approximately 100 landings. However, I had not anticipated the stretching of the chain with continued use. Even though I had installed idler sprockets in the system, they were apparently not enough to take up the slack in the drive chains caused by the stretching.

On December 1, 1981 while landing at Brenham, Texas in a 30/35 knot cross wind the right down lock cam MG 5, slipped out of the notch on beam MG 4, putting all the side load on MG 6 push rod and MG 5 cam.

The gear had been extended on the down-wind leg, and I had three green lights on the panel on final approach. The limit switches on my gear system are expensive aircraft type environmental micro-switches, and they

were adjusted for positive over-center down lock. The slack in the chain combined with the poor configuration of the notch in beam MG 4, (which I had purchased from a vendor), caused the cam to slip off the beam and fracture. (See drawing) I had rolled about 200 feet after touch-down right down the center line with the aircraft under full control, when a sharp gust hit the aircraft from the left. I heard something snap, and the right wing tip dropped to the runway. I was still rolling at about 60/65 mph, and I was unable to keep the aircraft on the runway because of the drag. The infield adjacent to the runway was quite soft and muddy from recent rains, and as the nose wheel dug in, the strut and nose gear assembly tore out of the side bulkheads F 12, 16, 17 and 31 between F20 and F 32. For just a brief split second it felt as though the Viggen was about to cartwheel, but it fell back as the nose gear folded, and then the left main collapsed inward. At this point the aircraft was completely flat on the bottom, and it skidded on the wet grass on its belly with mud and grass flying over the canopy for about 300 feet before coming to a stop.

Retrieval was accomplished without further damage mainly through the efforts of my good friend Dr. Norman Gabriel and Brenham, Texas who is also a Viggen builder.

I was quite surprised and pleased to see how well the airframe stood up. My only injury was a bruised right toe caused by the rudder pedal tearing out. Damage to the Viggen consisted of moderate skin damage to the belly, nose wheel well bulkheads, right brake line, right rudder pedal, entire nose gear assembly except for the wheel and fork, and the main gear retract system.

My VariViggen is flying again, but this time with the Melvill gear modification, and believe me - don't fly without it !!!! The modification was difficult to retrofit with the skin on, but not impossible - nothing comes "EZE" on the Viggen. The modifications and repairs took about three months, "Blood, Sweat and Tears" went into making it a much better ship than I had before.

New World Records Set by Long-EZ

Dick Rutan, who has set three world distance records, two in Long-EZs and one in the VariEze prototype, is at it again. This time, joined by Jeana Yeager, they have set five new speed records. World speed records are categorized by weight and by distance flown. Separate records are recognized for female pilots. The weight category is C1b, for light planes under 1000kg (2205 lb). Speed records are recognized at distances of 3 km. 500km, 1000km and 2000km. due to the Long-EZ's capability of flying long distances at high speed Dick and Jeana attempted to break the following previous records:

Speed C1b absolute closed course.

500km	USA	G.Mock	Aero Com 200	1965	206.7 mph
1000km	USA	H.Fishman	Waco Meteor	1969	200.4 mph
2000km	CZECH	L.Stastny	Sokol CK-CLE	1956	173.7 mph

Speed C1b female closed course.

500 km	(none set)				
1000km	CZECH	V.Touzimska	Sokol L-40	1980	131.4 mph
2000km	CZECH	V.Touzimska	Sokol L-40	1980	128.9 mph

To put things in perspective, the 2000 km speed record requires a full throttle dash at low altitude a distance equal to a trip from Los Angeles to Dallas! Dick and Jeana's non-standard Long-EZ (O-320 Lycoming and some structural mods) attains a true airspeed of 223 mph (194 kts) when clean. This slows to 212 mph (184 kts) when all the leading edges are clobbered with bugs (loss of laminar flow). Speed records are set by block speeds, however, resulting in losses due to wind and turns at each end of the course.

The attempts were not as easy and straight forward as one might have hoped. On Dicks first attempt, he experienced a broken aluminum fitting (remember CP 31 changes) in the fuel system which dumped about 5 gal/hr through the engine compartment - luckily no fire, but it resulted in inadequate fuel to go the distance. Two of the record runs were done in rain showers, resulting in extensive prop damage at the 3000 rpm condition he was running. In all the attempts, the O-320 logged over 25 hours of time at 108% of rated power, at 11% over rated rpm, without problems. The Microlon manufacturer sponsored the attempts. The engine was treated with Microlon oil treatment. Room here does not permit the full story of the attempts - this should appear in the aviation press. Attempts in all record categories were successful, the new world records are listed below. Long-EZs now hold 7 world records!

Record	Pilot	Dist km	Speed mph
Absolute	Dick	500	211.51
Absolute	Dick	1000	207.84
Absolute	Jeana	2000	204.58
Female	Jeana	500	207.10
Female	Jeana	1000	205.00

LONG-EZ FIRST FLIGHTS.

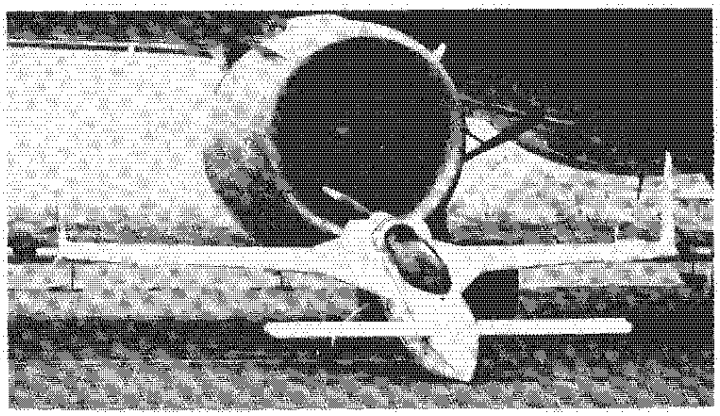
There are now 16 Long-Ez's flying, that we know of. If you know of one not shown in CP 31 or below, please let us know his or her name, address, N-number and date of first flight.

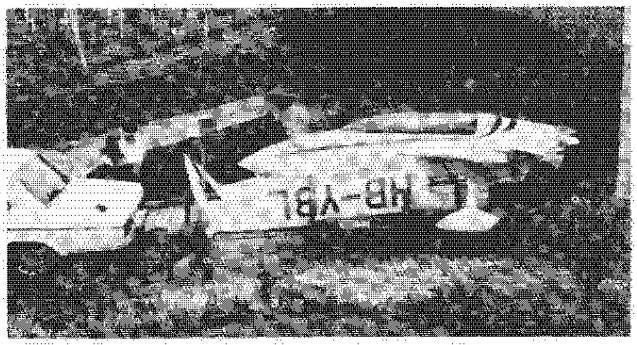
Herb Sanders	TN	N81HM
Bryce Heffley	CO	N76AB
Paul Adrien	MA	N46AA
Sam Harris	MS	N766SP

VARI-EZE FIRST FLIGHTS.

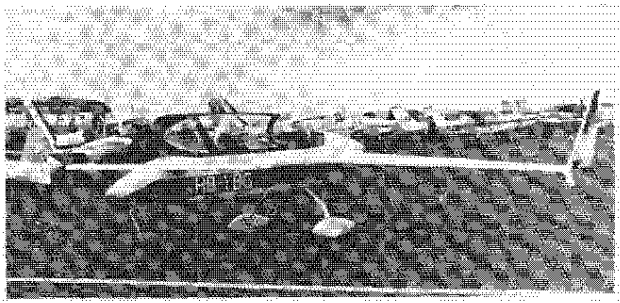
Since the last report , the following Vari-Eze's have flown. If you know of one not shown below or in a previous newsletter, please let us know his or her name, address, N-number and date of first flight.

Shirl Dickey	UT	N60SD
Dave Cherwink	MD	N78JH
Earl Ellis	OH	N547EZ
Dale Collins	IL	N224DC
George Holmes	CA	N104P
Bill Butters	MO	N235LB
Tom Richards	WA	N18TR
Gerold Edmonds	WY	N81JC
Ronald Atkinson	IN	
Joseph MacDonald	PA	N13JF
Don Youngs	CA	N33ST
Don Jones	TN	N300DJ
John Fowler	IA	N82JF
Stephan Sorenson	CA	N118SJ
Curtis Barry	IN	N778CB
Dan Patch	CA	N862DP
Bob Zahner	FL	N1RZ
Steve Good	IN	N79SG
Ernie Joiner	CA	N444EJ
Terry Hastings	CA	N80TC
Doug Westin	NY	N42DW
Jack Walker	FL	N52EZ
George Ehlers	WA	N1122
Bill Marsh	CA	N404EZ
Wayne Dize	VA	N2DZ
Seth Hancock	TX	N80SH
Kurt Duncan	FL	N14KM
Richard Jones	MD	N314RJ
James Selzer	NV	N4266X
Robert Abresch	TX	N80KB
Charles Hammond	TX	N11CH
Stephen Alexander	IN	N711VE
Wally Loewen	CA	N80WL
Dan Zoerb	TN	N715DD
Ed Regis	WA	N80340
R. Martin	AZ	
Harold Wilcox		N112EZ
Raymond Johnson	CA	N555EZ
Stan Rawllins	WA	N301SR
Charles Dunn	KS	
Bob Cummings	CA	N774
Sam Sweeney	CANADA	NOG 1HO
Yves Leipert	FRANCE	FPYKO
Henri Christ	FRANCE	FPYIP
Pierre Casals	FRANCE	FPYJO
Laurent Morelle	FRANCE	FPYHT
Kjell Prytz	NORWAY	

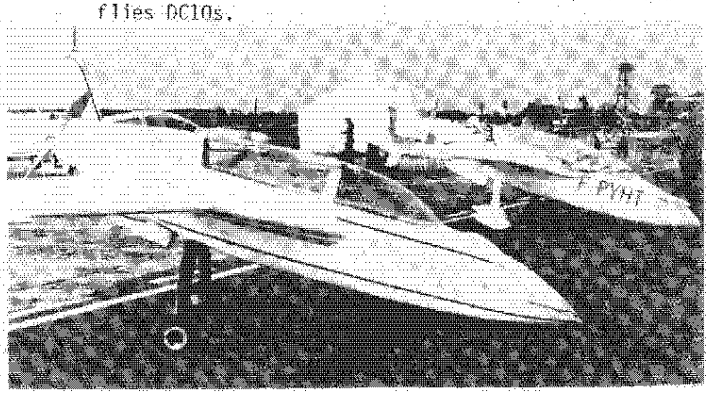




← Robert Schubiger, Switzerland. He keeps his VariEze at home, hangers are difficult to get and very expensive. Robert is an airline pilot and flies DC10s.

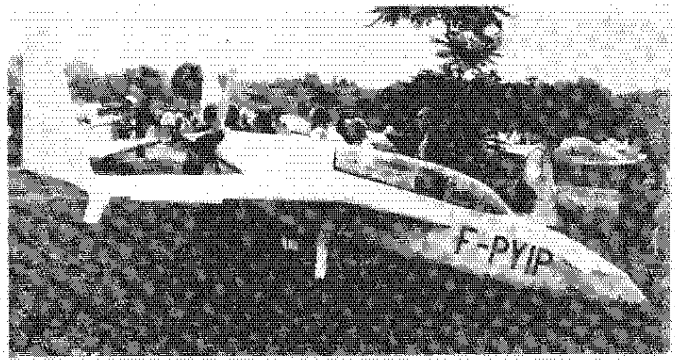


Rudi and Dane Kurth's Varieze, was the second EZ to fly in Europe. Rudi attends many airshows all over Europe. He is seen here at Leicester Air Show in England.

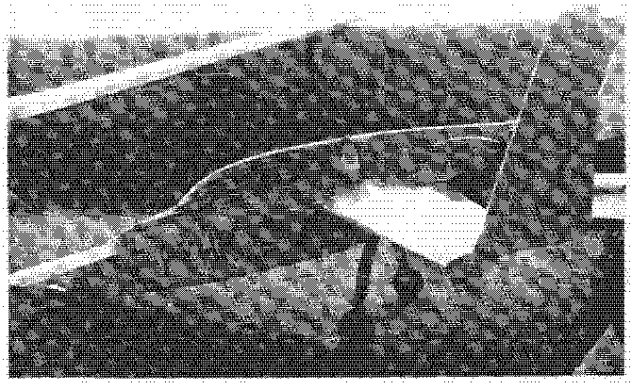


Monsieur Morelle's (F-PYHZ and Monsieur Guimbal's (F-PYHT) also at the Leicester show.

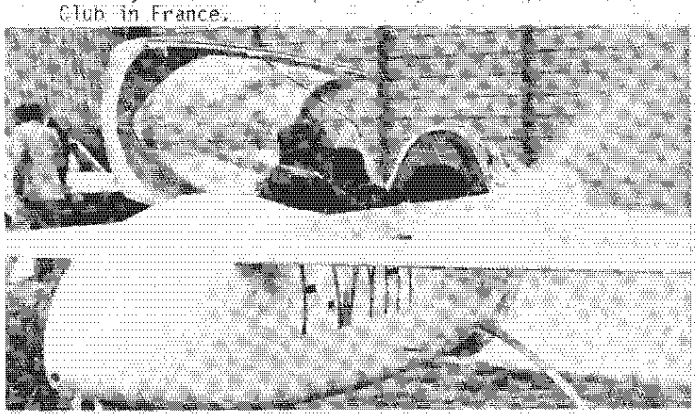
G-LASS, the first VariEze to fly in England, owned by Don Foreman and the holder of several point to point world record.



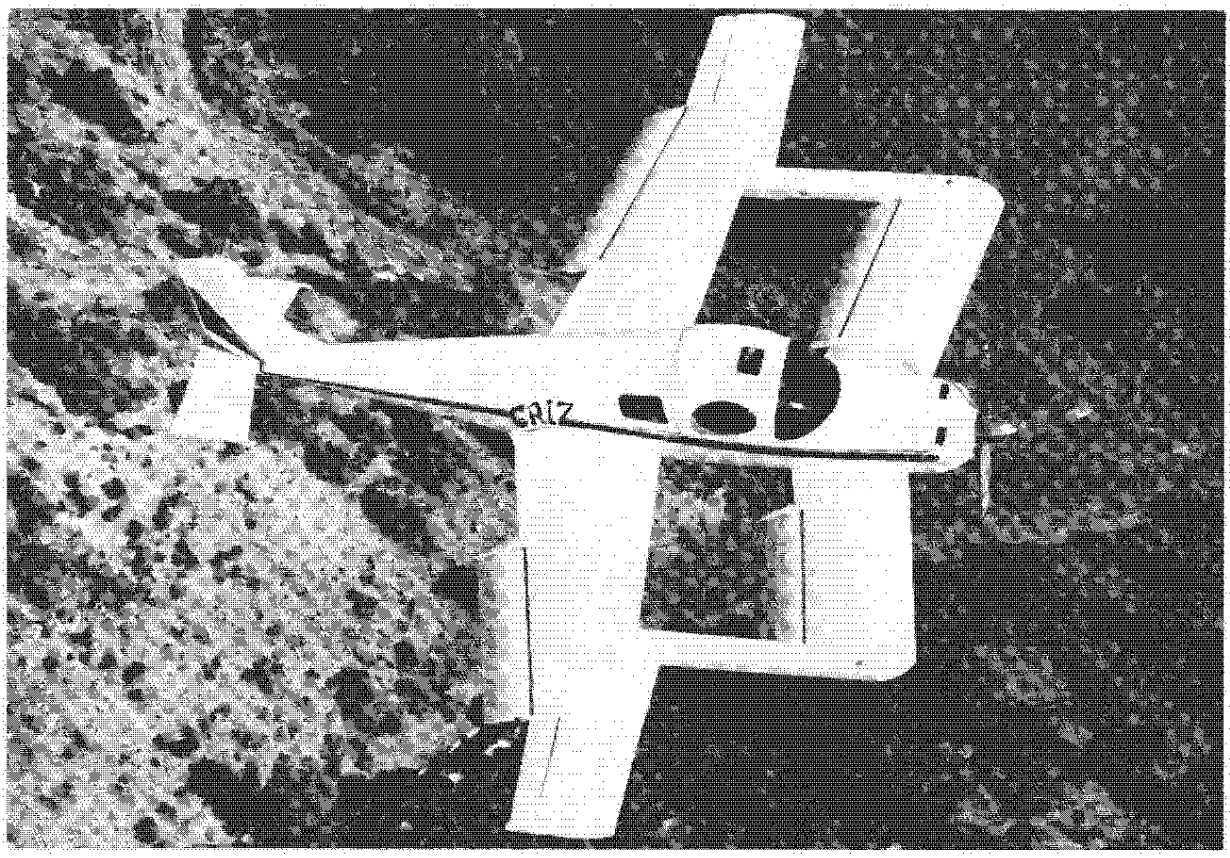
F-PYIP, is owned and operated by the Peugeot Aero Club in France.



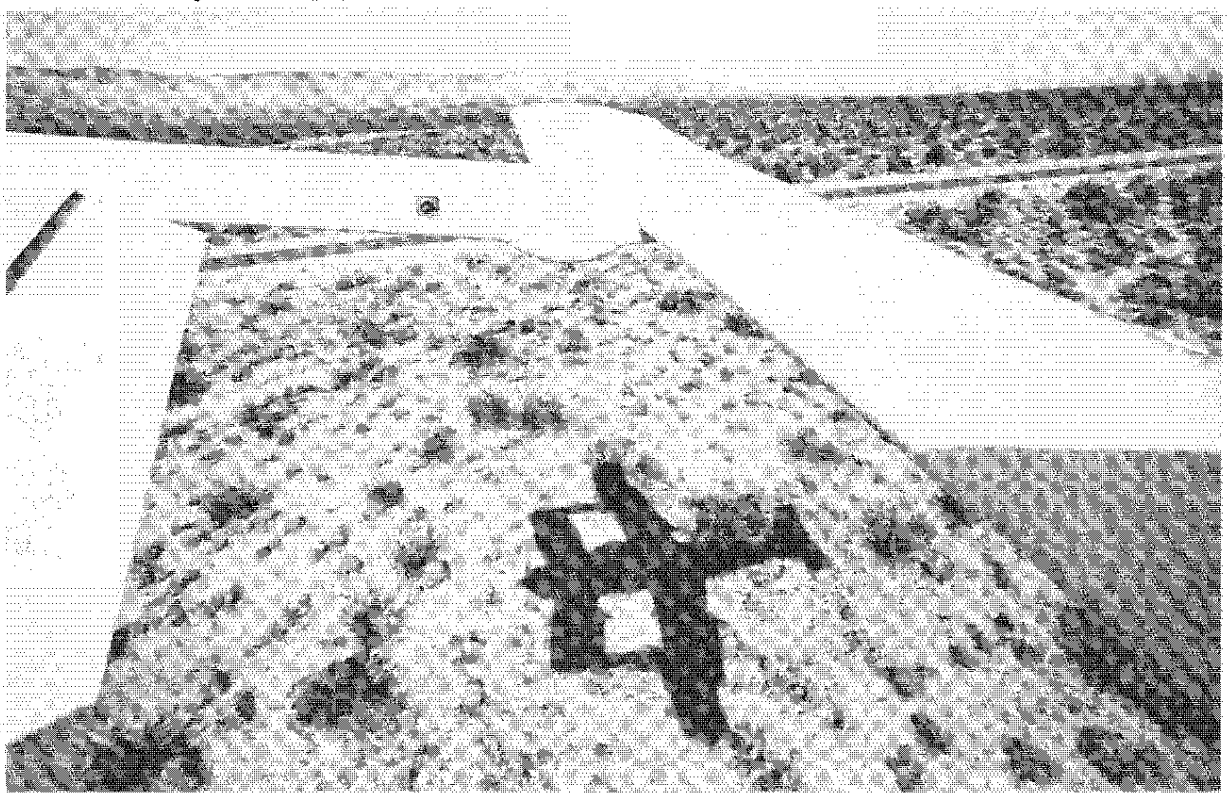
F-PYHR is owned by Monsieur Briquet



Monsieur Morelle taxiing out for his first flight



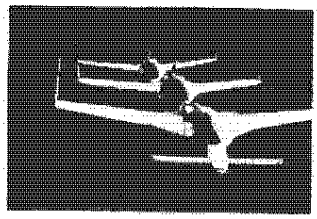
The Grizzly, shown above in slow flight with full flaps. The Griz has been a low priority project because of other commitments, but is a lot of fun to fly, and Burt and Mike fly her every chance they get. The photo below was taken out the right 'blister' window, and shows 60% flaps down, the fuel gauge and fuel sump blister on the fuel tank (wing interconnect) and her shadow framed by the wings and fuel tank. Photo by Pat Storch.

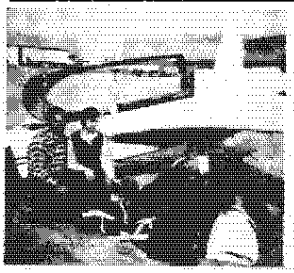


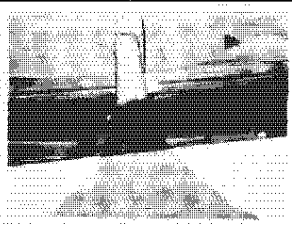
Brief Long-EZ specifications/Performance
Engine Lycoming O-235 108 hp.

Span	26.3 ft	Takeoff (solo/gross)	600/950 ft
Area	94.1 sq.ft.	Climb (solo/gross)	1750/1250fpm
Empty Basic	750 lb.	Cruise 75% 8000 ft	189 mph
Empty Equipped	800 lb.	Cruise 40% 12000ft	146 mph
Solo Weight	1000 lb.	Max range* 75%(solo/2place)	1380/1150 mi
Gross Weight	1325/1425 lb	Max range* 40%(solo/2place)	2070/1690 mi
Max Fuel	54 gal.	Ceiling (solo/gross)	27000/22000 ft
Cabin L/W/H	100/23/37 in.	Landing dist. (solo/gross)	450/680 ft.

* 40 minute reserve.







This amount of baggage fits nicely in the Long-EZ baggage areas. Baggage is accessable in-flight.

LONG-EZ NOW APPROVED FOR GRASS FIELDS.

Rutan Aircraft has recently tested a spring loaded "shock strut" which was installed in place of the MS 9 / NG10A nose gear strut on Long-EZ. This, combined with 500 x 5 tires, was tested by progressively taxiing over 1" x 2"'s, 2" x 4"'s and finally over two 2" x 4"'s, one on top of the other. The results showed a very significant increase in the rough-field absorbtion qualities of the landing gear. Taxiing over stacked 2" x 4"'s resulted in very acceptable loads, with a satisfactory ride.

We then flew N79RA to an average grass strip and conducted takeoffs and landings at a range of weights and cg positions. Also, taxi tests in tall grass and undulating surfaces was satisfactory. A Long-EZ with the spring strut and 500 x 5 main tires is now approved to operate from average grass fields. This does not mean it is acceptable for gravel or unprepared/rough surface. The prop damage that can result from operating on gravel is unacceptable. The spring strut will be available from a Long-EZ distributor as an option.

LONG-EZ DOCUMENTATION

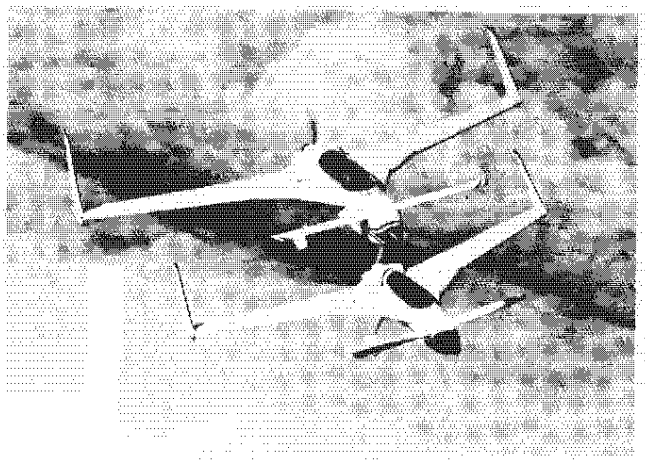
SECTION I - MANUFACTURING MANUAL - This is the complete education manual for composite materials and methods, also, the complete plans and construction manual for the entire Long-EZ except engine installation and landing-brake. The manual consists of a 180-page, bound 11" x 17" book plus 14 larger full 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 electical system, fuel system and finishing procedures. The manual identifies sources for all materials and all prefabricated components.

SECTION II - ENGINE INSTALLATION - This is a set of drawings and construction manual 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.

SECTION II - Lycoming O-235

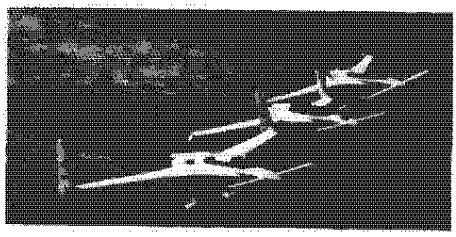
OWNERS MANUAL - This is the required operations handbook and checklists, including normal and emergency operation, detailed flying qualities and performance charts, maintenance, maiden flight procedure, and pilot checkout, etc.

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



Rutan Aircraft Factory Inc.
BUILDING 13, MOJAVE AIRPORT
MOJAVE, CALIFORNIA 93501
TELEPHONE (805) 824-2645

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



Check items desired.	Price, includes first class mail to U.S. & Canada	Overseas, Airmail - U.S.Funds only
◯ Rutan Aircraft Information Package-complete data and photos of all Rutan Aircraft designs.	$ 5.00	$ 6.00
◯ "Canard Pusher" newsletter. Published quarterly. One year subscription. Approx 10,000 words per issue.	6.75	8.75
◯ Long-EZ plans. Section I	198.50	212.50
◯ Section IIL Lycoming	21.50	23.50
◯ Long-EZ Owners Manual	9.00	10.50
◯ Long-EZ Landing Brake	10.00	11.00
6% tax, if Calif. order Newsletter not taxable.		
TOTAL		

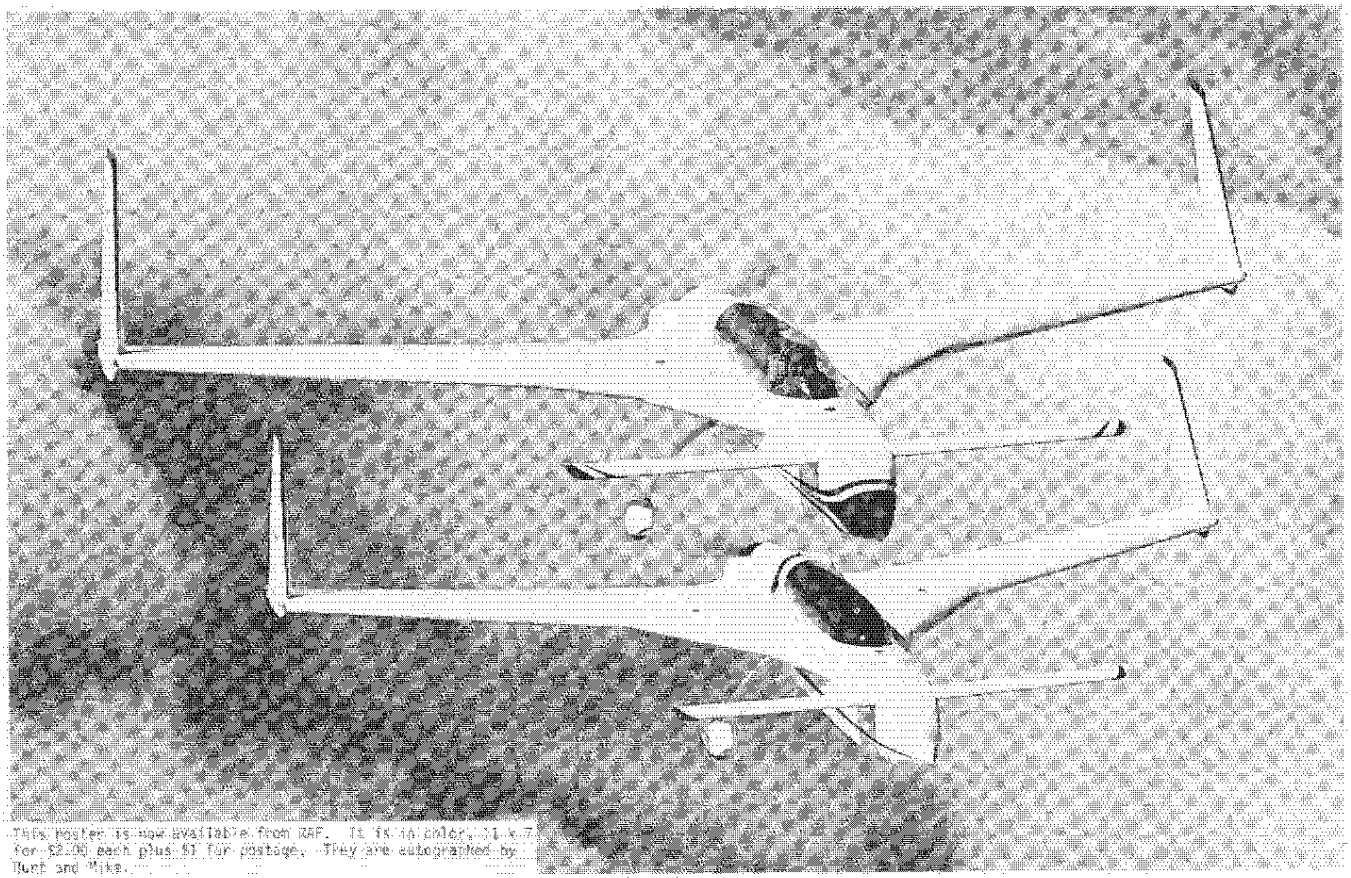
THE FOLLOWING ARE RAF-AUTHORIZED DISTRIBUTORS OF LONG-EZ MATERIALS AND COMPONENTS. CONTACT THE DISTRIBUTORS AT THE ADDRESSES SHOWN FOR THEIR CATALOGUES AND DESCRIPTION OF ITEMS.

ALL RAW MATERIALS & COWLINGS

Near Los Angeles.	Near St.Louis
AIRCRAFT SPRUCE 201 W. Truslow Ave, Bx 424, Fullerton, Ca 92632 (714)870-7551 Catalog $4	WICKS AIRCRAFT SUPPLY 410 Pine Highland, Il 62249 (618)654-7447 Catalog $3

KEN BROCK MANUFACTURING, 11852 Western Ave., Stanton Ca 90680 (714)898-4366: Control system parts and all machined or welded parts, fuel caps, engine mount rudder pedals and exhaust system. Catalog $3

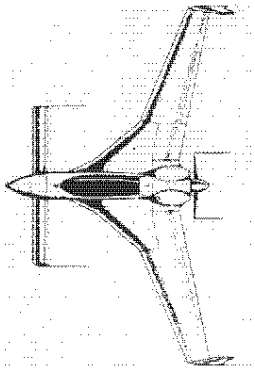
PLEXIGLASS CANOPY BUBBLE, NOSE & MAIN GEAR STRUT
RUTAN AIRCRAFT FACTORY INC.
BUILDING 13 airport
Mojave Calif 93501



This poster is now available from RAF. It is in color, 11 x 7 for $2.00 each plus $1 for postage. They are autographed by Burt and Mike.

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

first class mail



TO:

The line which appears above your name on your label contains two numbers. The first number is your subscription number. **PLEASE INCLUDE THIS NUMBER WITH ALL RENEWALS,** and state that you are a renewal. The second number is the last newsletter issue which you will receive. If your label says **LAST ISSUE -CP 32,** then this is your last issue and you need to renew.

April '82

CP 32