

THE CANARD PUSHER

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If you are building a VariViggen from 1st Edition plans you must have newsletter 1 through 30. If you are building from 2nd Edition plans you must have newsletters 18 through 30. If you are building a VariEze from 1st Edition plans you must have newsletters from 10 to 30. If you are building a VariEze from 2nd Edition plans you must have newsletter from 16 through 30. If you are building a Long-EZ you must have newsletters from 24 through 30.

A current subscription for future issues is mandatory for builders, as this 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.

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 am each Saturday with flight demos of our experimental aircraft at approximately noon (weather permitting).

Annual Workshop/Seminar at RAF

The workshop/seminar this year will be on Saturday 28th November 1981. It will consist of a seminar by Burt Rutan and Mike Melvill from 9:00 am to 10:00 am. Flight demos from 10:00 am to 11:00 am. We will show our construction video tape at 1:00 to 2:30 pm and have question and answer from 2:30 to 4:30 pm.

Please bring folding chairs if you can. Lunch will not be served at RAF, but we will try to transport you to the "fast food".

RAF Activity

Since the last newsletter has involved; the Oshkosh convention trip, builder support, development of our RAF Model 77 sailplane, engineering flight tests of our RAF Model 73 Jet, flight tests of the RAF Model 68 Ansoil racing biplane, design of the RAF Model 78 and 79 commuter airliner for NASA wind tunnel testing, flying for several TV programs, laminar-flow flight measurements, flight demos, construction demos, and preparing a video tape to illustrate the flight test preparation of a new Long Long-EZ

RAF Aircraft on the tube.

Some very spectacular footage of Long-EZs, VariViggen and Defiant has been shot this summer and fall for several scheduled TV programs to be aired this fall - probably during November.

1. OMNI science series - network depends on area - generally at 7:30 pm Saturdays - 10 minute segment of spectacular formations, aerobatics and remote mounted cameras.
2. Whats up America - scheduled on cable TV-segment on Homebuilts - much of it Long-EZs at RAF
3. Guinness Book of Records - segment of Dick and Jeana's Long-EZ shot flying up the face of Angel Falls in Venezuela, South America.

Long-EZs are flown extensively

While the average homebuilt airplane is flown less than five hours per month, the high-utility Long-EZs are proving to be quite an exception. Based on reports from the Long-EZs now flying they are logging an average of 30 hours a month. The first five Long-EZs to fly logged a total of over 900 hours flying in their first six months of operation!

Video Tapes available from RAF:

We are pleased to announce the addition of a new video tape. This tape was premiered at Oshkosh '81 and was made by Ferde Grofe. It is called "Go-a-Long-EZ" and we sell it here at RAF (VHS or Beta) for \$49.95 plus \$4 for handling and postage. Go-a-Long-EZ is an audio-visual presentation of the subjects covered in Appendix I and Appendix II of the VariEze and Long-EZ Owners Manual: Preparation for initial testing, including weight and balance and initial flight testing.

We also have the building seminar tape called, "Building the Rutan Composite". This tape sells for \$59.95 plus \$4 for handling and postage. Both of these tapes were shown daily at Oshkosh and proved to be very popular.

EZ Clubs

Charlie Gray of Miami Lakes, Florida, has formed a group of VariEze/Long-EZ builders in the South Florida area. This is a very active group and have had several meetings already. Next meeting is at Charlie's house on Saturday, October 24th. This is a 'minimeet' and the next major meeting is December 5th, time and place to be announced. There were 52 people present at the last get together, so you can get some idea of the size of the operation. Charlie has been out to RAF several times in the past six months and is doing a tremendous job, not only organizing this south Florida group, but helping builders with construction problems. He is building 2 Long-EZs and is quite far along with both of them. Charlie has put out a newsletter, Eze Builders of Florida, that contains some useful builder hints and also covers the meetings. Write to Charlie Gray, 6893 Seagrape Terrace, Miami Lakes, Fl. 33014.

Art and Bonnie Lazzarini, P.O.Box 1691 Hailey, Id, 83333, Phone (208)788-3453 requested us to publish their names and address in the CP in hopes that other EZ builders in Idaho might make contact, perhaps share a beer and some moral support.

RAF conducting Instrumented Flight Test program for a major Aerospace firm.

The new aircraft is a scaled flight demonstrator for Fairchild Republic's proposal for the Air Force's Next Generation Trainer (NGT) program. The full-scale NGT, designed by Fairchild Republic is a two-place, highly fuel-efficient, twin engine turbofan trainer intended to modernize the Air Force T-37 fleet.

In early 1981 Fairchild Republic contracted Ames Industrial Corporation to design, build and test the scaled flight demonstrator. Fairchild supplied accurate lofts of the external shape of their NGT design. Ames hired Rutan Aircraft Factory to design the structure and systems and to conduct the flight test program. The scaled demonstrator is 62% of the size of the full scale aircraft.

Ames previously built the Rutan-designed AD-1 skew wing jet aircraft for NASA in 1978. The prototype scaled NGT construction effort, took seven months. The aircraft was shipped to Rutan Aircraft's facility in early September. After a six-day flight preparation, the first four flights were flown within a 48-hour time period. The aircraft's maintenance availability and flight reliability have been flawless. All flights completed the planned objectives with no mission aborts. All instrumented stability tests (except spin and airloads flights) were completed within a two week time period. The aircraft is now being fitted with an anti-spin parachute system and strain gauges to measure flight loads.

Flight tests to date have shown the Fairchild configuration to have the excellent flying qualities required for basic military flight training. Despite the small size of the demonstrator (1500 lb. gross weight and 21.8 ft. span), its handling qualities permitted the first four flights to be flown by four different pilots, one having no previous turbo-jet experience.

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The flight demonstrator was instrumented by Flight Systems Inc. Data flights include telemetered stability and control parameters to verify the calculated and wind-tunnel-measured engineering information. The use of the manned, scaled flight demonstrator produces higher quality data than other methods, particularly for areas such as spin susceptibility and spin recovery. The scaled flight demonstrator was built within a schedule and cost framework that compares in scope to conventional wind-tunnel programs. However, the added benefits of dynamic stability data and pilot qualitative information result in considerable improvement in the value of the findings.

The structure of the scaled prototype is composite-sandwich using oriented uni-directional carbon fiber or fiberglass for facings and spar caps and rigid closed-cell foams for core. The fabrication method is the moldless-procedure with full-core flying surfaces as developed for previous Rutan-designed aircraft such as the VariEze, Defiant, Long-EZ, Quickie, AD-1 and Ansoil biplane racer. Like the AD-1, the scaled NGT is powered by two Ames TRS-18 turbojet engines.

RAF hopes to conduct a similar scaled-demonstrator test program on our Model 78 commuter airline design. See the October '81 issue of Sport Aviation for a 3-view of the Model 78.

NASA Tests Long-EZ

Researcher Bruce Holmes and Research test pilot Phil Brown of NASA's Langley Center recently visited RAF to study the Long-EZ. Of particular interest was the measurement of the extent of natural laminar flow on the flying surfaces. Also, the stall characteristics and departure susceptibility. They had previously measured extensive laminar flow on their full scale VariEze in the Langley 30 x 60 wind tunnel. This was verified by flight tests at Langley of Bob Woodall's VariEze. They found essentially textbook-predicted boundary layer transition locations are being achieved with the airfoils on the EZ despite the presence of wing sweep and canard impingement. This is due to the stable contour that is achieved with our full-core composite construction.

The Long-EZ main wing airfoil was designed by Richard Eppler. It has a steep initial pressure gradient intended to provide a reasonable probability of laminar flow despite minor leading edge contamination. The Eppler computer code predicts 32% chord laminar flow on the upper surface for a perfectly smooth surface. As the photos elsewhere in this newsletter show, the sublimating chemical tests on Long-EZs N26MS and N79RA verify that the wings are achieving the full 32% chord laminar flow. Small insect remains on the leading edge forward of about 4% chord will not trip the boundary layer. Bugs aft of 5% chord will destroy laminar flow, as will the small bump of a paint stripe. We now have documentation of the boundary layer characteristics on all surfaces and intersections of the Long-EZ.

Also of interest to NASA was the departure-immune stall characteristics we have noted during our tests. NASA wanted to test the spin susceptibility to supplement the extensive data they have gathered on all types of general aviation aircraft. Phil put the Long-EZ through all types of extreme stall entry conditions: accelerated entries, vertical entries, etc. with all combinations of control inputs. He also alternated left and right rudder inputs at the dutch roll natural frequency, combining opposite aileron to add adverse yaw effects, at the maximum attainable angle of attack. Despite all combinations of gross misuse of flight controls, and attaining over 45 degrees sideslip, he was unable to obtain a departure from controlled flight. Phil left with the comment that he could find no way of inducing loss of control in the Long-EZ.

This is a stark contrast to the general aviation aircraft configurations he has been testing at Langley, all of them being relatively susceptible to loss-of-control or spin entry from any aggravated stall entry. Many of them have unrecoverable spin modes that require wingtip rockets or anti-spin parachutes to effect recovery.

Oshkosh Trip

RAF took four airplanes to Oshkosh this year. Burt and Pat flew in the Defiant (N78RA), Larry Lombard and his wife Janet took the prototype Long-EZ (N79RA), Sally and son Keith flew in Long-EZ (N26MS) and Mike and his mother Isobel flew the VariViggen (N27MS).

Mike and Sally departed Mojave early Thursday morning and flew via Las Vegas to St. George, Utah, where the Viggen had to land for fuel. While Mike was getting gas, Sally and Keith remained at 9500 ft. and circled. As the Viggen took off from St. George and climbed back to join up with Sally, the Defiant and the prototype Long-EZ arrived having left Mojave 30 minutes after Mike and Sally's takeoff. We flew as a flight of four for a while, then Burt decided to go on ahead and check weather, so he and Larry pushed it up and slowly pulled ahead. We were always in radio contact, even as Burt and Larry were descending to land at Aspen, Colorado.

Sally and Mike arrived at Aspen some 30 minutes later and Sally proceeded to make Mike look bad by landing in half the distance and making the first turn off!! Burt decided that it was really too late to continue (it was only 11:00 am!) so we tied the four planes down and went into town, where we spent a most enjoyable afternoon and evening. What a super place.

Next morning all four aircraft departed early, even so the density altitude was 10,800 ft. so Mike decided to transfer his mother into the Defiant for this leg. The Viggen got off ok, but rate of climb was down to 200/300 fpm. Both Long-EZs and Defiant got off and climbed well. We proceeded to Kremling VOR and then east over the Divide west of Boulder. We flew pretty much as a four ship until we started to run into a broken undercast. Burt and Pat went ahead in Defiant and found some holes and decided we should all land at Hastings, Nebraska for lunch. After lunch, Defiant headed out, while Larry, Sally and Mike flew in a three ship as far as Bascobel, Wisconsin, where Mike and Sally landed to fuel the Viggen. Then on to Oshkosh.

As you know by now, Oshkosh was bigger and better than ever. A number of Rutan Aircraft flew in during the week and Irene Rutan's "official" count was:

| | |
|------------|------|
| VariEzes | - 58 |
| Long-EZs | - 5 |
| VariViggen | - 2 |
| Defiant | - 1 |

John Benjamin's "Plane Vanilla" Eze (N40EZ) from Lancaster, Pa. won the designer's award. Don Jones, from Knoxville, Tn. received the runner up award for his excellent Eze, N300J.

It was a particular treat to see Ken Winter at Oshkosh. He flew up from Tulsa, Oklahoma, in his new VariViggen N31WW. It was so new, it still had a few unpainted panels but that did not keep him from flying it virtually every day in the fly by pattern. Ken and Mike flew in formation, quite a land mark occasion, since this was the first time two VariViggen had ever been in the air together, although 1981 was the 10th consecutive year that a single Viggen had been in attendance.

Five Long-EZs were at Oshkosh this year, two of them were also at Oshkosh 1980, N79RA, the prototype, and N21VE, Johnny Murphy's Sweet Music. This year Mike and Sally's N26MS and Dick and Jeana's blue renegade N169SH were there, and on the first day of the show, Dan McElroy flew in from Seattle, Wa. This Long-EZ is a story in itself. Dan had completed the plane exactly one week before Oshkosh, flew off the hours, got it signed off, and arrived at Oshkosh on schedule. Actually he only took delivery of his prefab fuel strakes from Task Research 2 weeks before Oshkosh.

All five of the Long-EZs have pilots of the fair set. Dan McElroy reports that his wife Ellie made the third flight on their Long and also flew 2 of the 3 legs to Oshkosh. Johnny Murphy had recently checked his daughter out in his Long and of course you already know about Sally, Pat and Jeana.

Fred Keller was there from Anchorage, Alaska, with his Grand Champion VariEze, and it looked just like it had been taken out of the mold! Absolutely gorgeous.

The Annual Eze Hospitality Club dinner was held on Wednesday evening, and it will be held on the same day and place (Butch's Anchor Inn) next year. We had a nice big room, even a speaker system, and it is safe to say that about 150 persons enjoyed themselves thoroughly. We are all indebted to the Real George Scott for making all the arrangements and acting as master of ceremonies. Super job, Geoarol Harold "Mule" Ferguson provided some good entertainment with his high class singing and his guitar picking.

The above report is from Burt's Mom, Irene, who did sterling work on the flight line, tracking down each Eze pilot, welcoming he or she and passing out the new Rutan Aircraft patches. We are indebted to both Mom and Pop Rutan for the excellent job they did at Oshkosh. Here is a list of the RAF type airplane and pilots at Oshkosh 1981.

| | | | |
|-------------------|------------------|--------|---------|
| T.J. Hazelrigg | Decatur, IL | N67EZ | VE |
| David Turansky | Buffalo, NY | N16DT | VE |
| Virgil Larsen | Denver, Co | N18VL | VE |
| Curtis Poulton | Delaware, OH | N79CP | VE |
| Earl Elms | Galena, Oh | N547EZ | VE |
| Bud Abraham | Dolton Il | N224DC | VE |
| John Friling | Lombard Il | N28JC | VE |
| Robert Rutledge | Springfield,IL | N28RR | VE |
| Joe Lawyer | Mesa, Az | N9039J | VE |
| Carl Gearhart | Allentown, Pa | N98CG | VE |
| George Holmes | Belmont, Ca | N104P | VE |
| Nat Puffer | St. Paul, Mn | N2NP | VE |
| John Benjamin | Lancaster, Pa | N40EZ | VE |
| Burt Rutan | Mojave, Ca | N78RA | Defiant |
| Larry Lombard | Mojave, Ca | N79RA | LE |
| Sally Melvill | Tehachapi, Ca | N26MS | LE |
| Dan McElroy | Renton, Wa | N80DZ | LE |
| Johnny Murphy | Cape Canaveral | N21VE | LE |
| Dick Rutan | Cape Canaveral | N169SH | LE |
| Ken Winter | Jenks, Ok | N31WN | VV |
| Mike Melvill | Tehachapi, Ca | N27MS | VV |
| Ronald Kapperman | Livermore, Ca | N16EL | VE |
| Bill Butters | Florissant, Mo | N235LB | VE |
| Tom Nussbaum | El Paso, Tx | N81TN | VE |
| Chuck Richey | Las Cruces, NM | N13EZ | VE |
| Willard Thorn | Canton, Ma | N899EZ | VE |
| John Jackson | Jackson, Ms | | VE |
| M. Stockton | Wichita, Ks | N51WC | VE |
| Lynn Coltharp | Tulsa, OK | N40LC | VE |
| Tom Richards | Seattle, Wa | N18TR | VE |
| Gerald Edmonds | Rock Springs, Wy | N81JC | VE |
| Ken Swain | Travis, Ca | N422 | VE |
| Ronald Atkinson | Fowler, In | N | VE |
| Elvin Kier | Fulton, Il | N5ZY | VE |
| David Morgan | Middletown, Oh | N68M | VE |
| Don Yoakan | Ft. Myers, Fl | N770DY | VE |
| Jonathan Sargent | Punta Gorda Fl | N75EZ | VE |
| Joe Macdonald | Allentown, Pa | N13JF | VE |
| Jim Trombino | Waukegan, Il | N46JT | VE |
| John Good | Brentwood, Tn | N66EZ | VE |
| Bill Rutan | Clearfield, Ut | N1WX | VE |
| Phil Supan | Santa Clara, Ca | N79PJ | VE |
| Don Youngs | Palo Alto, Ca | N33ST | VE |
| Richard Wallrath | Bakersfield, Ca | N34VE | VE |
| Bruce Tuttle | Roy, Ut | N958C | VE |
| Shirl Dickey | Murray, Ut | N60SD | VE |
| Norman Rossignol | Newington, Ct | N23NR | VE |
| Don Jones | Knoxville, Tn | N300DJ | VE |
| Byron McKean | McQueeney, Tx | N57EZ | VE |
| Clarence Langerud | Austin, Tx | N91CL | VE |
| Don Lee | Livermore, Ca | N35EZ | VE |
| Harold Ferguson | Boomer, Nc | N2286A | VE |
| Larry Hoepfinger | Cookville, Tn | N7AH | VE |
| John Fowler | Iowa City, Io | N82JF | VE |
| Bob Woodall | Adelphi, Md | N301RW | VE |
| Stephan Sorenson | Carmichael, Ca | N1185J | VE |
| Fred Keller | Anchorage, Ak | N3784D | VE |
| Bob Evans | Cody, Wy | N46EZ | VE |
| Lee Carlstan | New Orleans, La | N56LC | VE |
| Dick Cutler | Doylstown, Pa | N46RC | VE |
| Jud Bock | Omaha, Ne | N681JB | VE |
| Martin Pavlovich | Menomonee Falls | N810TC | VE |
| Joe Walker | St. Pete, Fl | N419JW | VE |

Our aircraft returned to California separately as each was planning different routes to visit relatives etc. In all, counting Oshkosh airshow demos, our Mojave RAF aircraft logged 110 hours and 20,000 miles on the Oshkosh trip without mechanical problems of any type.

Design Origins of Quicke-type Aircraft.

Because of the high amount of confusion on this subject lately, Burt has written an article that lists many facts not previously published. This article appears in the October issue of EAA's Sport Aviation magazine.

Mike and Sally's Long-EZ N26MS

Sally flew our Long to Oshkosh and back, put 37 hours on it and used only 1 quart of oil. We have 260 hours total time now, with virtually zero maintenance. We could not be more pleased with the airplane. It does everything as advertised and more. Most of our flying is to and from work, which includes a lot of take-offs and landings. When commuting we only fly 0.3 hours between landings. I estimate we have well over 500 landings at this time, and the tires look as though they are good for that many again. I am very pleased with the 500 X 5 tires, we get excellent tire wear and a super comfortable taxi ride. With a decent wheel pant the performance is still excellent.

Sally and I recently made a cross country trip to Fort Collins-Loveland for the Rocky Mountain Regional Fly In. This trip was 720 nm (828 sm). We flew from Tehachapi to Loveland direct, non stop. This took us over Las Vegas, Grand Junction and Long Peak (14,300 ft). Time was 4.9 hours, we burned 27 gallons of 100 oct. We indicated 120 knots at 13,500 ft (temp 1°C) for a true airspeed of 150.3 knots (173 mph). Our ground speed, block to block ws 147 knots (169 mph).

Our figures for the return trip were virtually identical. I flew out there and Sally flew back. Weather was perfect with virtually no wind. The route took us over some spectacular country, with the highlight being perhaps flying over the top of Long Peak, which is on the Continental Divide west of Loveland. The Long-EZ performed flawlessly, and handled this kind of flying with absolutely no problems. It was comfortable, both in the front seat and the back seat. Our relief tubes worked well, and I am very "relieved" we put them in! Noise level, with headsets, was very acceptable and I must say it was nice to listen to taped music to pass the time. Here is a break down of the trip.

Climb segment: 4000 ft (Tehachapi) to 13,500 ft.
 Fuel Used : 2.4 Gallons
 Time : 0.3 Hours
 Distance : 40 nm (46 sm)

Cruise segment :
 Distance = 720 -40 =680 nm (782 sm)
 Time = 4.9 -0.3 = 4.6 hours
 Gnd Speed = 680 = 148 knots (170 mph)

Fuel used 24.6 gal Fuel flow 5.25 gph.
 Economy 27.64 nm/gal (31.8 sm/gal)

The Long-EZ Owners Manual shows 4.8 gal/hr at 120 kt indicated at 14,000 ft (148 kt.true) at a gross weight of 1100 lbs. Correcting this to 1350 lbs results in 5.4 gal/hr and 27.4 nm/gal.

Thus, on this trip our Long-EZ did slightly better than the Owners Manual, and certainly more than satisfied Sally and I. We won best composite at the airshow, and really had a great time.

Engine Oil Analysis.

Gary Hertzler, owner of VariEze N99Ve, has made arrangements with Specto-Chem, P.O.Box 29074, Phoenix, Az 85036, to do oil analysis for Eze owners at FBO cost price. Contact Lou Brand, and identify yourself as an Eze owner/pilot, and Lou will send you sample kits for \$7.95 each in lots of 12 or more. The kits include a sample bottle and mailer. You send a sample of your oil, attention Lou Brand, and in return you will receive an analysis sheet showing metal present in parts per million. Spector-Chem has built up quite a history on aircraft engines, and can comment on your results with some authority.

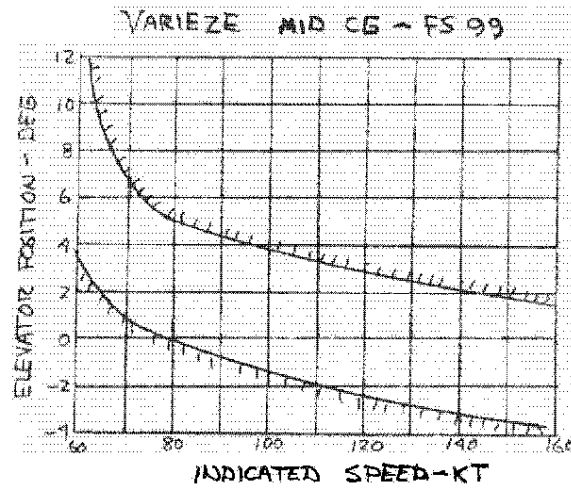
This is an excellent preventive maintenance procedure and we thank Gary for setting this deal up so that Eze flyers can take advantage of it.

Trimming the Aerodynamics of your EZ

Like any other aircraft, the trim and stability of a VariEze or Long-EZ depends on correct cg position and proper contour and incidences of all flying surfaces. There is an easy way to verify that your aircraft is rigged properly with the incidences correct. This involves flying at several airspeeds while monitoring the elevator position, then comparing your data with the design information. Measuring elevator position in flight is simple since the pilot can easily see an indicator attached directly on the elevator surface. If your EZ does not handle, perform and stall exactly as described in the Owners Manual it could be due to an improper incidence or contour of the wing, canard or elevator, and you should conduct the test below to see if your elevator is at the correct position. If the elevator position is not correct, your airplane may also have a large trim change when flying into rain.

Fabricate the plate and needle from .016 2024 aluminum. Paint the plate white and the needle black. Mount the plate to your outboard elevator fairing and the needle to the elevator (use 5 minute epoxy - it will later peel off without damaging your paint job). Calibrate elevator position (plus is trailing-edge-down) using your elevator position template from Chapter 11, page 6, making a mark on the white plate every 2 degrees.

Now, load your aircraft to the mid-cg position (99 for VariEze and 101 for Long-EZ). Fly in stabilized conditions, smooth air in level flight at 70, 80, 90, 100, 120 and 140 knots indicated. Plot your elevator VS speed data on the graph shown below. Your data should fall within the limits shown. RAF is interested to see the variations of this data occurring due to tolerances from one airplane to another. If you do this test, please send us your data whether or not it is within the limits shown.



Low-profile Locknuts.

The VariEze and Long-EZ extensively use the MS21042 locknuts. These are a high-quality all-metal aircraft approved-type locknut. One builder has reported cracks in several of his MS21042-4 nuts during installation. Our tests have shown that we can torque these nuts to several times the recommended limits and even abuse them enough to round the flats without failure. We have seen no failures in service. If you have had any failure of these nuts contact RAF describing the conditions of failure, purchase date and vendor.

CAUTION: nose gear shimmy can fail the nose gear fork.

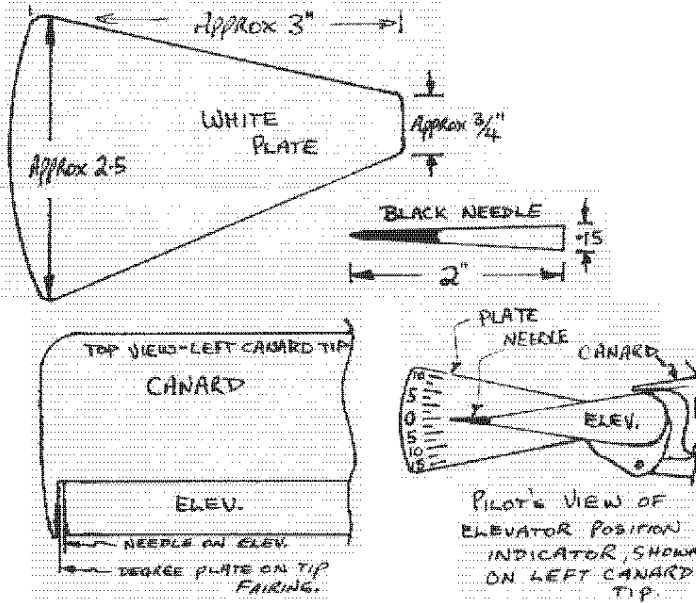
Many of us operating EZs are lax on checking the friction of the shimmy damper during preflight. This is EZ to do since we do not see the nose gear when parked nose down. Always check for the 2 to 4 lb. damper friction on preflight. If the damper is free, the gear can shimmy at high speed and fail the fork within 1/4 second. Further, the failed wheel can strike and destroy your prop.

Nose wheel rigged at the proper angle and having at least 2-lbs. friction damping cannot shimmy. Some airplanes have had a bent NG17 tube that binds under load. Then, the owner backs off on the friction adjustment to allow good taxi qualities. Then with little or no load (rebound) at high speed it can and will shimmy. If your gear pivot binds, making taxi turns difficult, check your NG 17 for evidence of bending, or ovalizing. Some time ago we increased the wall thickness on the Long-EZ NG 17 parts sold by Brock to handle the heavier loads. If your NG 17 is not perfectly straight, replace it with a steel tube of at least .125" wall.

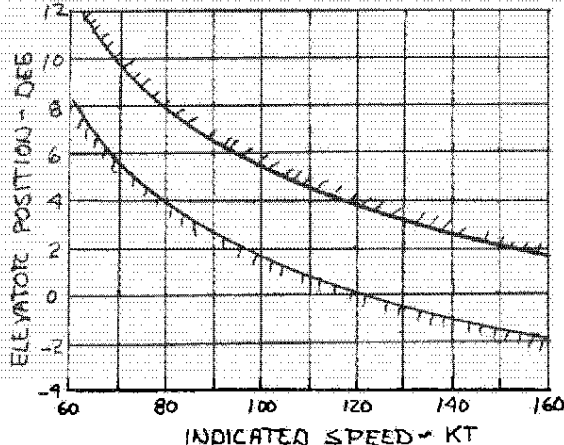
One of the reasons that the shimmy damper can easily get out of adjustment is that to get the proper force, the spring is coil-bound or nearly coil-bound. Thus, if a little wear or a slight bolt back-off occurs, the damping action is lost. To solve this, Brock is now having made a supply of springs with a heavier (.083 dia.) wire. New orders filled after October will have the heavy spring. Also, as soon as they are received (mid November) Brock will be sending the heavy spring to all who have bought the nose gear assembly. We have tested the heavy spring on N26MS and have confirmed that the adjustment bolt can be backed off a full half turn before losing adequate damping friction. With the old spring a 1/8 turn would result in inadequate friction.

The shimmy failures have resulted in the rumor that the nose gear fork is not strong enough. This is not true. The failures were due to high speed shimmy, not overload. Our nosegears have been extensively tested to in excess of design ultimate loads (CP #18, page 4) and during punishing development tests of the rough-field capability (CP #25 page 3). Also, the exact same assembly is currently operating at higher weights (2100 lbs) and speeds (90 Kts) in two jet aircraft, the NASA AD-1 and Model 73 NGT, without problems of any kind. Of course, the friction is checked during each preflight.

We strongly recommend that each Long-EZ and VariEze use the CP #25 spring shock in the nose gear system. This greatly relieves the shock loads experienced when encountering ruts, chuck holes etc.



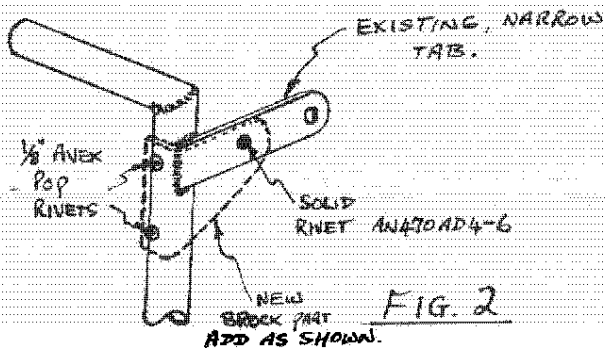
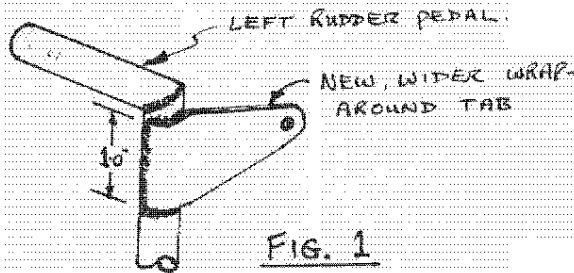
LONG-EZ MID CG - FS 101



Rudder Pedal Failure

There have been at least two cases of failure of the top tab which is welded to the rudder pedal, and to which the rudder/brake cable is connected. One case was a gas welded, homebuilt part, and this was attributed to a poor weld. Another case was a prefab Brock part, but according to the owner, the tab had been bent and then straightened cold. If this tab should fail, it will invariably fail while taxiing under braking load, when you need it most, and directional control will be lost.

As of this date (Oct '81) Brock-supplied rudder pedals have been modified per Fig. 1, to strengthen the tab. If you purchased your rudder pedals prior to this date, you can obtain from Brock a pair of tab reinforcement brackets. Brock part # LE2026R-1 and LE2026R-2, and these must be riveted into place over the existing tabs per Fig. 2. This will stiffen and back-up the weld which failed. Of course, you can also homebuild these brackets from Fig. 2. This is a mandatory change, see LPC # 86.



Six-inch Prop Extension

Last summer we learned from Rudi Kurth of Switzerland, Ed Hamlin and Bruce Tiff, that a longer prop extension spool would reduce the cockpit noise level and possibly increase performance. We collected accurate baseline data, then removed the standard 3-inch extension and installed longer ones. We have tested 4-inch, 5-inch and 6-inch extensions.

Most of our data was for the 6-inch extension. Results are as follows:
As compared to 3-inch, sound level at pilot's station and rear seat was reduced two and a half to three DBA at high speed cruise and climb conditions. Oil temperature on all three airplanes tested with the long extension was increased. Cylinder temperatures on one of the airplanes increased. There was no measurable change in the performance of any of the airplanes due to extension length. We have been reluctant to recommend the long extensions because any change in the propulsion/drive system of an aircraft must be thoroughly tested for long-term durability. We now have a total of 300 hours 6-inch time on Long-EZs with no indication of problems, and since the two 8-inch extensions on the Defiant have run 600 hours it appears that no mechanical problems are indicated. Thus, if you can stand a 20 to 30 degree rise in engine temperatures you can, with a 1.5 lb. weight penalty, achieve a significant noise reduction by using a 6-inch extension. Note that we have tested this only with Lycoming engines and cannot predict the durability of a Continental application. Also note that since the Brock spinner mates to the front flange of the 3-inch extension, it is not as well supported when using the long extension. Brock is now developing an aft bulkhead for his spinner to provide firm centering support regardless of extension type.

From the Builders and Flyers.

Eze builders of Florida. Charlie Gray hosted a dinner for EZ builders on Saturday 18 July '81 at 7:00pm. Dinner was at "Beefsteak Charlies". We adjourned to Charlie's large home and six car garage in Miami Lakes. Betty Gray had coffee, sodas, and cookies for us. (Maybe Charlie figured out that if everyone got heavier, his two Long-EZs will be the fastest). Charlie led the group in a discussion of current Rutan developments, then discussed the formation of a club. He felt the purposes of such a club should be things like dissemination of builder's hints, where to buy tools and supplies, a flying group, and encouragement to those starting or completing their project. Mr. Gray's ideas were well received by the group and it appears we will organize during our next meeting.

The 35 of us broke up into three groups. Some people watched the RAF composite education tape in the living room. The rest of the group then either formed small bull sessions or went through Charlie's shop to look at his two projects and tools, supplies, etc.. Many good questions came up in the shop so the flow of information was both diverse and extensive. The best part of the discussion was that there were pilots there who had finished their EZs, some close to finish, and many just starting along with a few just making up their minds. This led to more and better information coming out from diverse points of view.

The builders who were unable to attend missed a very fine evening. We started with Charlie G. giving each plans holder a folder with note pad and a large print of a delightful sunset taken by Charlie from aloft, we then ate a leisurely meal spiced with hangar flying and building. Finally we went and seriously talked about the costs, problems, and joys of EZ building. I hope those who did miss it are looking forward to the next meeting half as much as those of us who participated in the first meeting.

Robert Dunham,
FL.

Jerry Gruber of Elkhart Indiana, has been building his Long-EZ since 7-5-81. As of this date Jerry is almost ready for primer and to cap it all, Jerry has never even seen a VariEze or Long-EZ in the "flesh". His own Long is the first. Jerry has built his own fuel strakes and judging by the photo he sent us, he is doing excellent work. Jerry will have light IFR instrumentation and should be flying in 4 to 6 weeks.

Susan Smale of Bakersfield, California, called today and her Long-EZ is in primer paint and she is wet sanding ready for the top coat. Susan is doing very good work and is hoping to fly in 3 to 4 weeks. Susan is one of 4 girl Long-EZ builders whom we have talked with, all of them are coming along real well.

Don Shupe's observations at the start of his third year, since he started building "Puff" back in July of '76.

"I just looked up the original invoice from Aircraft Spruce for \$2009.11 on 7/6/76, I've met a lot of fantastic people and had bunches of super experiences. I've seen the people associated with EZs change too. In the beginning it appeared that EZ people were different than other people in aviation; different even from other homebuilders. They seemed to know what they wanted and dug in and did it. Not many were like the seven year builders I had seen so often with other homebuilts. Now I know that EZ people are different. There seem to be more aviators among us than among builders of other types of planes. We like to fly as much or more than we like to build. We like to talk, too, as much as anybody but, we like to fly more. Ed and Jo Ann Hamlin, Bernadette and "Puff" and I have flown together with "77EJ" probably more than 150 hours of our combined 1200 hours in our EZs and it seems to me that we talk less now in the air and on the ground because we have shared something that we don't have to talk about. When we flew over the Canadian Rockies from Victoria to Calgary together we sure felt good. We met a lot of great people and we got tired. We didn't notice that we were changing even though we were probably different from other people to start with having chosen to build this unusual plane we were changing more. The people most deeply involved with the EZ have changed even more. Burt is warmer and friendlier, Dick is happier, and I don't think that success alone can account for all of this. The plane and the people play a very important

part in what has happened to all of us. Bernadette and I fell in love with each other and the airplane all at the same time and it has only gotten better. If we are unable to fly "Puff" for a week or two or a month or two as when we changed engines; a part of us doesn't feel right. We fly another plane but that isn't what we need. We flew "Puff" over 280 hours that first year 1978 and spent more money than we earned but it was fantastic. We were the first EZ into a lot of airports. But we now know that it wasn't the novelty of the travel itself. It was the airplane and the intimacy of the three of us. We fly around the valley now, above the smog in the late evening, put "Puff" in the hangar and still shake our heads in the awe and wonder of what we have experienced together. For ten wild weeks in the fall of 1979 we commuted between LaVerne (near Los Angeles) and Reno, Nevada, sometimes up the Owens Valley (that can be a very nasty valley, we ran into snowstorms, had to stay at Mammoth one night til the storm broke) and sometimes we would fly the West side of the Sierras and then across the Sierras by Donner Pass. Those were always 3 to 3 1/2 hour flights, fast, using nearly all of our limited fuel capacity at 10 to 12 thousand feet. Even with electric socks my feet would be nearly frozen. November and December were bad, but there was never any question in our minds, there was no other way to make a trip except in "Puff". Once the weather was so bad we had to fly commercial. We were uncomfortable in the seat. The pilot handled the plane roughly and we had to sit and wait a lot. And we missed "Puff". We've owned other airplanes and they aren't the same and they don't do the same things to you. We've talked a lot to pilots of other planes. They don't seem to know much about airplanes. They fly but they don't seem to live it. They don't seem to have the zest for flying, or the need, may be that's really it. We have to do it. The other EZ people seem to be the same.

VariEze Weights.

Bill and Lynn Butters recently completed their VariEze, N235LB, and it is a beauty. They kept very accurate track of the weights throughout the building process. Their airplane is an excellent example, weight-wise. With an O-235 Lycoming engine, and light weight alternator, the airplane weighs 634 lbs empty.

Here is a summary of weights that Bill sent in to us. We are publishing it so that it may be used as a guideline for VariEze builders, much the same as the weight information from Mike and Sally's Long-EZ, which was published in CP 26 and CP27.

| Item | Bare Glass | F.Filled & Sanded | Finished |
|--------------------------|------------------|-------------------|----------|
| Rt wing | 34 (no wing kit) | 40.9 | 41.5 |
| Lt wing | 34 " " | 40.8 | 41.5 |
| R Aileron | | 4.2 | 4.5 |
| L Aileron | | 4.2 | 4.5 |
| Canard | 17.4 | | 19.8 |
| Canopy | | | 13.2 |
| Spar | 21.2 | | |
| Cowl | 22.0 | | 25.2 |
| Fuselage on gear | 174 | | |
| Engine with mags (O-235) | | | 196 |
| Prop ext. & bolts | | | 5.5 |
| Prop (Hegy) | | | 8.25 |
| Crush Plate & bolts | | | 2.5 |
| Carb | | | 3.5 |
| Spinner | | | 5.0 |
| Exhaust | | | 4.0 |
| Baffles | | | 4.5 |
| Alternator | | | 4.8 |
| Mag Leads | | | 8.5 |
| Engine mount & hardware | | | 6.5 |
| Radios | | | 7.8 |
| Seat belts | | | 10.0 |
| Instruments | | | 12.0 |
| Upholstery | | | 11.5 |
| | | | 624.0 |
| Phantom Weight | | | 10.0 |
| | | | 634.0 |

Question: Can I use a constant speed or variable speed prop on my VariEze or Long-EZ?

Answer: We do not recommend the use of this type prop, for several reasons. (1) weight on the tail (2) complexity and (3) the prop on a pusher like an Eze, gets a fore/aft bending load on each blade, twice per revolution as the propeller passes through the wake of the wing/centersection. This input can resonate and fail a metal prop or a metal hub assembly. Only the solid wood prop is known to have an adequate safety history for this application. An "experimental" variable pitch prop recently destroyed the O2 prototype. Also, as the following letter indicates, many or most prop developers experience failures which can prove fatal:

Gentlemen,
Rudi Kurth of Busswil, Switzerland who has a VariEze, has been working on an electrically actuated variable propeller. When completed he tried it in the Eze as a ground test stand. The propeller came apart within a few moments and ripped the engine out of the mounts doing considerable damage to the aircraft.

Whether this was due to poor design of the hub or the whirl mode I am not sure, but the propeller busted and that, for whatever reason, is vindication of the facts you presented to me. Again, thank you.

Sincerely,
James B. Fleming.

Builder Hints

Long-EZ
Ref: Section I Page 9-2 and 9-3

Attaching axles to the main gear strut: **CAUTION!** You must set the toe-in parallel to the WL, not 90 degrees to the strut as several builders have tried to do. The main gear strut should be mounted on the fuselage. A good idea at this point, is to stretch a tight wire down the fuselage centerline, at the level of the axle centers. This assumes your fuselage is upside down, with the main gear strut sticking up. Using a rasp or a course file, trim the faces of the strut where the axles will be mounted to roughly give you the correct toe in. Try the brake plates on, to be sure that they seat flat onto the axle flanges. You may have to file a small radius into the brake plate to get it to seat properly. Now, position the axles on the gear, the flat machined areas on the axle flanges should be oriented close to vertical, and the bottom of the flanges should be approximately 1/2 inch up from the bottom of the gear strut. The brake caliper must be oriented forward and the top (with the airplane upright) of the caliper will be level with the top longerons or WL. With these parameters, there is only one way that you can install the axle/brake plate/caliper assembly. When you cut the main gear strut to clear the caliper, be absolutely certain that there is a minimum of 1/16" between the caliper and the strut. The caliper must not be able to touch the strut at all, or you can have an intermittent or failed brake. Now, layup 3 plies of BID both sides of each strut and mount the axles using clamps to position the axles such that you can place a 24 inch steel carpenters square on the axles as shown on page 9-3 (section I). With the square held in position on the axle, measure from the forward tip of the square to the tight wire, (1/2 of dim.A) and from the heel of the square to the tight wire (1/2 of dim.B). The difference between these dimensions, (1/2 dim B) minus (1/2 dim A) should be a minimum of 0.1" to a maximum of 0.2". The smaller dimension is better, this is approximately 1/4 degree of toe-in, and will give excellent tire wear. N26MS was done this way and now has over 500 landings on the original set of tires.

Long-EZ. Ref: Section I, Chapter 6.

When you assemble your fuselage sides to the bulkheads, be sure to install the firewall first, then the aft seat bulkhead, the forward seat bulkhead, the instrument panel, F22 bulkhead and then F28. If it is done in this order you will have little trouble bending the sides. There may be a tendency for the foam to crack in the area of the aft seat bulkhead. To avoid this possibility, particularly when working in a cool or cold shop, apply local heat with a hairdryer, to the foam. This will greatly reduce any possibility of cracking foam.

Long-EZ elevator Templates

Ref: Section I Page 11-1, step 1.

A few builders have reported that they have cut the templates accurately, and still ended up with oversize foam cores after hotwiring the elevators. It appears that perhaps we allowed a little too much allowance for the hot wire burn-down. So when you make your elevator templates, go ahead and clamp them together, and sand down not just to the line, but you should sand virtually all of the line off. Check your templates carefully against the full size drawing on page 11-5. Remember that 2 plies of UND (the skin) will add only .018" to the size of the foam core. Be absolutely certain your foam cores are perfect before you glass the skins.

Long-EZ Pitot tube.

Ref: Section I page 13-10, step 6.

Install the pitot tube so that it runs uphill continuously from the tip of the nose to the airspeed indicator. The easiest way is to run it aft through NG31, then over against the left side, and all the way uphill to the airspeed indicator. The tube can be attached to the fuselage side with a few narrow strips of BID.

Homebuilt fuel/baggage strakes.

Ref: Section I page 21-7.

Builders have reported that they built the fuel strakes without installing the wings, and when they came to installing the foam block between the wing root and the diagonal rib (O.D.) the top of the strake was too high to fair in nicely with the wing. When you are ready to install the top cover on the fuel strakes, install the wing, and check with a straight edge that you will have a nice fit to the wing. If necessary, trim the O.D. rib down before installing the tank top.

Hot wire templates.

When making identical templates, (canard, elevators, etc.) clamp them together, and use your Disston abrader to sand them to exactly the same shape. This is also valid for canard jigs.

Hot wire cutting the canard.

Ref: Section I page 10-1 step 1.

An excellent suggestion for hot wire cutting the four foam cores for the canard is to use the outboard templates (no spar trough) only, to cut all four cores. Then use the inboard templates to cut the spar troughs on the two inboard cores. Caution: If you use this method you must leave the cores in the blocks weighted onto your table during the trough cuts. Otherwise, if the cores warp, the trough depth will vary incorrectly along the span.

This method makes certain that all four cores are identical, and also lets you cut well-defined spar troughs, with no wire lag in the corners.

Epoxy Balance

Paul Burch had improved his balance by glueing a Sears line and surface utility level (around \$3) to the beam. This allows you to see when you are getting close with the hardener, and also makes certain that the whole balance is level. Parallax errors are also eliminated.

Worm/Wormgear retract mechanism.

Some builders have experienced "chatter" when extending the nosegear while static on the ground. While this has never been a problem in the air, due to air loads, it is possible to minimize this by checking alignment of worm and wormgear, and also backlash between worm and wormgear. If you have fore-aft movement of the worm, add a washer to shim it snug. This will eliminate the chatter.

Wiring from the Wing to the Centersection

Cut a 2" dia. hole in the outboard bulkheads in the centersection spar, opposite the point where the wiring comes inboard through the hot wired holes in the wing cores. Mike bought some pin male and female plugs and sockets from Radio Shack and wired nav, lights and strobe lights through these plugs and sockets, breaking the wiring bundle a few inches inside the centersection spar. This enables you to reach in through the hole in the bottom of the centersection spar, and pull the wiring bundle down and out so that it may be disconnected in order to remove a wing. The comm. antenna (s) should of course also have a BNC connector at the same location. Mike ran his Nav/strobe light wiring bundle out through the wing, together with the comm antenna coax and has no perceptible interference. All this wiring is now brought inboard through a hole cut in the CS6 and CS7 bulkheads (a 1" dia hole is fine) and then inboard to just inside the fuselage sides at which point you can drill up to a 1/2" dia. hole in the forward bottom of the spar box, and run the wiring down through these holes into the area aft of the back seat bulkhead.

CAUTION! Do not drill through the lower spar cap.

Transponder Antenna

The transponder antenna can be mounted under the front seat thigh support, and this is where quite a lot of builders have located it, however, Jim Weir of Radio Systems Technology has cautioned that it may be possible that high powered microwave energy may be radiating in very close proximity to a rather sensitive part of the pilots anatomy. To put it bluntly, it may be a little like sticking your fanny into a microwave oven! In any event, no qualified person to our knowledge has tested this, so it may be prudent to laminate a sheet of aluminum foil under the thigh support. Microwave energy will not penetrate the thinnest of metallic foils.

Wicks Aircraft.

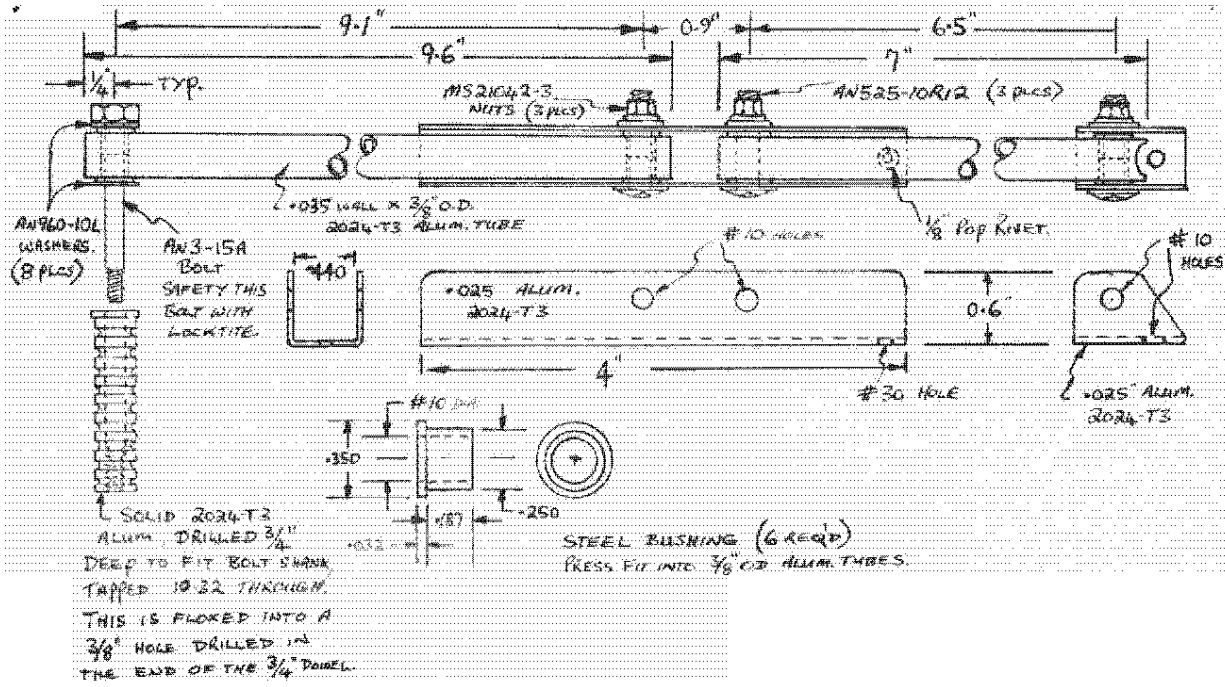
Now have brushable "Spray-Latt" canopy protective material in stock. They also carry the full line of VDO instruments and still have the Whelen strobe/nav light system (single flash) for Long-EZs.

Prefab 500 x 5 wheel pants, are now available from Aircraft Spruce and Wicks Aircraft. Hardware kits to install these wheel pants are also in stock. Instructions for installation of the 500 x 5 wheel pants are essentially the same as for the 3.40 x 5 wheel pants, except that 16 K1000-3 nut plates should be installed evenly spaced on the flange, instead of 11. .062 thick 2024-T3 aluminum is substituted for .032 for the mounting bracket. See CP 28, page 10 for these instructions.

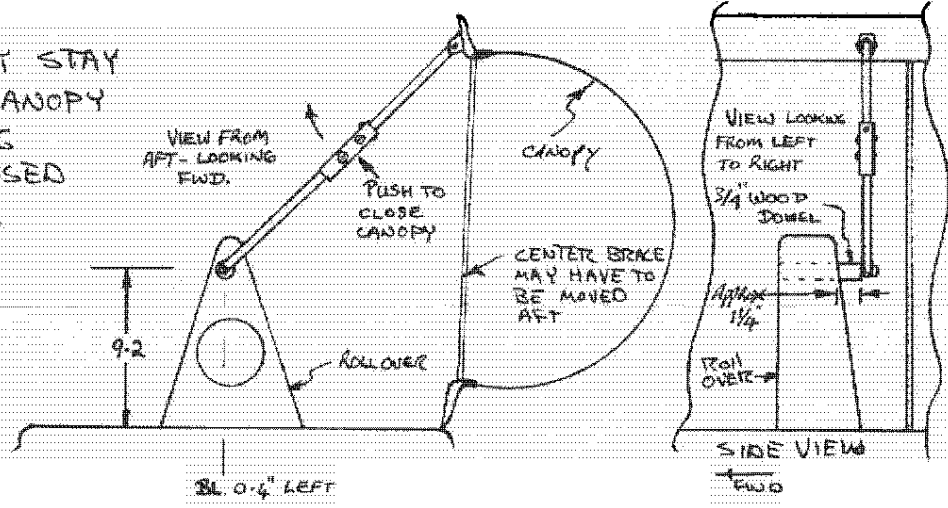
Long-EZ and VariEze "throw over" stay.

Many builders noticed these neat canopy stays on Burt's, Mike's and Dick's Long-EZs at Oshkosh, and requested information on how to build one. The original idea for this came from Bob Woodall who has one on his VariEze. He had his on at Oshkosh 1980. The stay is constructed from aluminum tubing (2024-T3) .035 wall x 3/8" O.D. and a few small pieces of .025 thick 2024-T3 aluminum flat stock. The small bushings shown were obtained from a surplus supply house in Los Angeles several years ago and we are not aware of a good source for these. The pivoting stay is mounted to the top of the roll over structure, we simply drilled a 3/4" dia. hole in the back of the roll over structure, and pushed a 3/4" wood dowel into the roll over, floxed it into place and layed up a ply of BID over it, inside the roll over to retain it. The other end is mounted to an additional hard point in the canopy frame, which is exactly the same as the rest of the hard points called out for, for hinges and canopy latches. This is not difficult to do even if your airplane is complete.

DRAWINGS NEXT PAGE



NEW CANOPY STAY
PREVENTS CANOPY
FROM BEING
BLOWN CLOSED
BY WIND.



PLANS CHANGES.

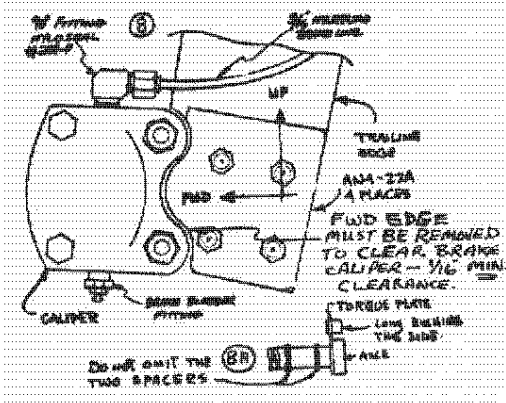
We at RAF, of course, cannot enforce a mandatory change, as FAA can on a type-certified aircraft. The regulations allowing amateur-built experimental aircraft recognize that the homebuilder is the aircraft manufacturer and, that the aircraft does not need to conform to certification requirements. This 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.

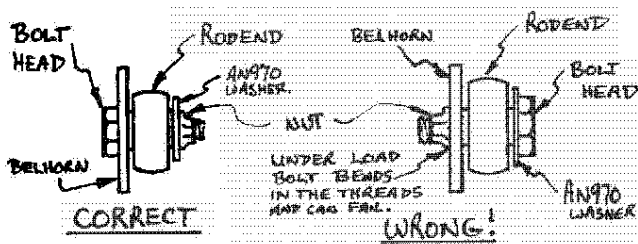
| Category | Definition |
|----------|---|
| MAN-GRD | Mandatory, ground the aircraft Do not fly until the change has been accomplished. |
| MAN-XXHR | Mandatory, accomplish the change at next convenient maintenance interval or within XX flight hours whichever comes first. |
| DES | Desired - strongly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

LONG-EZ PLANS CHANGES.

LPC #75 Section I, page 9-1, The axle bolt location in the sketch on the lower left is not accurate. See sketch below. Warning - Note that the 1/16" clearance between the main gear strut and the brake caliper is a mandatory requirement. The caliper must not be able to touch the strut or the wheel pant or you could have an intermittent brake or even a brake failure.



- LPC #76 Section I, page 11-5. "See detail page 5.4" should read " see detail page 11-4".
- LPC #77 Section I, page 19-18. Step 11. "Refer to chapter 6 and 7" should be "refer to pages 14-8 and 14-9."
- LPC #78 Section I, page. Antennas. Nav.antenna DES should be cut into two equal lengths from a 48" piece. Change the length to 22.8" long, not 24"
- LPC #79 Section I, page 2-4. Chapter 13 material list - SC fiberglass strut cover is listed twice.
- LPC #80 'A' drawings, page A-5. 2" x 2" x 1/4" aluminum ext. shown full size page 18-3, should be page 9-3.
- LPC #81 Section I, page 19-14. Section E-E. Detail A shows the rod-end bolt on the CS 132L belhorn reversed. Anytime a rodend is cantilevered off one side of a belhorn, the bolt head must be on the belhorn side, see sketches below:



- LPC #82 Section I, page 5-2, step 2. one ply of BID extend entire 103" length, this ply of BID should be at 45 degree and can be in several pieces.
- LPC #83 Section I, page 9-4. The AN960-1018 washers called out should be AN960-1016 and are not called out in the bill of materials on page 2-4. Add 4 more AN960-1016 to the 2 washers called out.
- LPC #84 Section I, page 21-5. Step 10. We omitted to tell you to micro a urethane foam block (2 lb.ft3 green) to the 'flat' leading edges of the strakes, see page 21-7, cure, then carve to match proper leading edge contour (ribs R23, R45 and the wing). Slurry the foam and lay up two plies of UND crossing each other at 45 degrees to the leading edge of the strakes. Lap this layup 1/2" onto the strakes top and bottom.
- LPC #85 'A' drawings, page A5, to right "shown full size, page 18.3" should be " page 9-3".
- LPC #86 Rudder pedal weldments. Before 10 hours of flight the top tab welded to the rudder pedal (see Section I page 13-3) must be reinforced per Figure 2, page this newsletter. Also change the full size drawings on page 13-3 to show the top tab per Figure 1, page this CP.
- LPC #87 Chapter 13, page 4. Change wall thickness on NG 17 to .188. Change wire dia. of spring to .083.

VARIEZE PLANS CHANGES.

- MEO Canard Pusher # 23, page 8. VDO 240-023 sender is not correct. The correct part number is VDO-360-025.
- MAN See LPC #75 on note concerning clearance required on caliper to strut.

ACCIDENTS/INCIDENTS

Take off Incident.

Byron McKean damaged his VariEze in an aborted takeoff. He took time off from the repair job to write the following story for us in the hopes that publishing this information may prevent someone else from having the same problems:

"The takeoff direction was to the SE with a mild left cross wind. The runway is 2650 ft. long, very narrow, and very bumpy and rough. There is considerable grass that is six to eight inches high growing onto the edges of the runway. There had been considerable rain in the early hours of the morning and there were numerous puddles of water on the runway. My takeoff attempt was intended to miss the majority of the puddles but my right wheel hit a long puddle causing the aircraft to veer about ten degrees to the right. I was near take off speed and saw the grass on the runway ahead of me so I attempted to lift off unsuccessfully. Seeing that flight was impossible I reduced the power, the nose dropped sharply breaking off the nose wheel followed by the nose strut collapsing into the retracted position. Additional resistance of the grass on the right side caused the aircraft to veer off the runway and into the muddy plowed field where the main gear collapsed and we all came to a stop. From the spot of the main gear collapsing to the stopped position was around fifty feet. I turned the switches off then got out and assisted my passenger out. There were no injuries other than my passenger having sore knees from pressure against the back of the front seat. We both wore seat belts and a two strap shoulder harness. The ELT did activate.

Later, upon investigation, I found a small piece of broken fiberglass wedged between the right brake puck and the brake disk. I was unable to rotate the wheel. Since the right wheel pant was torn off the landing gear prior to the main gear collapsing I now wonder if this could have caused more drag on the right side far greater than what the grass caused. Without this additional drag a "save" may have been possible.

I can understand now that when I hit the water and was pulled slightly to the right the wheel entered increasingly deeper water causing more drag and more turning to the right. There is that moment of delay while the mind digests what is happening until a response is initiated. That moment is too long.

It is interesting to me what thoughts go through the mind during the short interval of an emergency.

Some of my thoughts.....
 Look at all those puddles of water. Better choose a good path and try to miss most of them. Narrow runway, run the engine up full before releasing the brakes. 2500 rpm ok, oil pressure up, let's go. Boy is this a rough runway, nose bouncing, come on airspeed let's get the nose off this rough stuff. Ah here comes some airspeed, nose slightly off, not too much. Now here comes that long puddle, left cross wind, going to hit the water a little bit with the right wheel. Airspeed approaching lift off, my God that water is pulling me right, this isn't supposed to happen, come on airspeed, here comes that grass, can't hit that, can't fly if I hit that, try for a lift off, nose up ... up... nose is plenty high, if it does lift off can I fly out of ground effect, don't want to end up in the bay at the end of the runway, what if the wing drops and hits the ground, no good, won't fly, damn, hit the grass, noisy, lots of drag, being pulled to the right, this can't happen.... chop the power, keep wings level, bang! my gosh, I broke something, this is a crash. What an experience for my passenger, first time in a homebuilt and doesn't particularly like flying..... sick... sick... sick... there goes the main gear, here comes the field, turning right, keep it level, keep eyes open, keep thinking, look.... I'm still ok, hang on, brace, keep looking, it's stopped, I've really messed it up. Switches off, get out now, what about a fire, get my passenger out. We are both ok but look at my pride and joy, belly in the mud, mud everywhere, look back at where I've been!

My VariEze is equipped with a Compucruise computer that includes a fuel flow sensor. In order to use a fuel flow sensor on a VariEze you must install an electric fuel pump. I also installed a four-way fuel selector valve so that I could select a "by-pass" position in the event of a malfunction of the electric pump, flow sensor, or inline fuel filter.

I mounted the electric fuel pump and fuel flow sensor on the center section of the main landing gear behind the rear seat. I now recognize that this is a no no! When the main landing gear collapsed it tore the fuel lines loose. Had the fuel flow sensor and electric pump been attached to the fuselage or firewall no leak would have occurred. Even the gascolator that extends slightly below the firewall into the air intake scoop was undamaged".

Forced Landings

The following information was supplied by Bruce Muirhead, from Colorado:

"Dear Burt,
I guess I should report a couple forced landings we experienced.

The first was on an early frosty morning flight from Pagosa, Ne, over the Rockies to Boulder. I may tell the whole story in more detail another time but suffice to say here that it was a variation of the old "gas cap" story. The right cap didn't get secured, fell off on take off (damaging the prop some), but I didn't catch on until a temporary power loss got me to thinking over the Sangre de Christos. As Mary continued to report plenty of gas in the right tank but left running low, I was guided to make a sharp right turn and head for the plains.

There we spotted the Air Force Academy chapel and turned north, still at 12,000. A minute or two later, flame-out. We did a 180 and glided 20 miles, straight into the Academy's north-south runway, unannounced, uneventful and followed by lots of red tape.

The second was on the way to Taos for the IVHC fly-in just 35 minutes from here. Just over the mountains and letting down 25 miles from Taos it quit. fuel starvation on descent? Nose up - no luck. No reserve - faulty valve. A straight section of highway complete with a convenient turnoff made for another uneventful landing - at the New Mexico Port of Entry! Borrowed the officer's pickup, got five of regular, prop, run up ok, and took off on our "runway" for Taos. There most of the 19 VE pilots discussed my problem and the consensus was clogged vent line. That's what it was, though what I dug out of it was hardly enough to analyze. Even the little fuselage tank vent was plugged. Anyhow, you can bet those other 18 pilots at Taos will check their vent lines, and probably also,

Yours truly,
Bruce Muirhead.

RAF comment - we don't know why Bruce was unable to use the reserve tank to save the situation for both these cases - apparently the "faulty valve". You VariEze guys should always keep your reserve system in good operating order - its your redundancy to protect against vent clog, lost cap etc. Note: The Long-EZ while not having the reserve tank, has separate left and right pumped systems (which feed with a lost cap) and separate vents.

Engine Failure, on top, over Lake Michigan

A VariEze accident claimed the lives of a New York couple and their son enroute home from Oshkosh. The pilot was a low-time relatively new private pilot taking his first cross-country trip in the airplane, which had 49 hours total time. The following information is from a VariEze pilot who was flying with the Eze that crashed, and from FAA investigators.

The flight was heading east across Lake Michigan to save trip length even though it was over a solid under cast with tops at 10,000 feet. They were cruising at 11,500 feet directly over the center of the lake when the pilot noticed zero oil pressure. They continued another 10 to 15 miles when the engine lost power, then quit. The wingman noted that the pilot kept turning right during the trip and he had to keep instructing him to turn left to remain on course. He repeated this instruction as the pilot descended into the clouds in a right turn. Radio communication was lost when he tried to get him to switch to Muskegan Tower frequency for vectoring. Weather at the surface was a variable ceiling ranging from 500 scattered to 1500 broken to 4000 overcast.

It is not known whether the pilot became disoriented in clouds during the descent. The last call heard by the wingman was a very upset voice repeating 'engine quit, going down'. Flight service received a call of 'shoreline in sight' with no further communication. The aircraft crashed while in a turn in a down-wind direction at the far end of a 150 foot long clearing, immediately cartwheeling into trees. There was no way to survive a landing where the aircraft impacted. There was no fire. It is not known why the pilot selected the small clearing when the shoreline with alignment into the wind was apparently available to him.

Investigators determined the cause of engine failure to be oil loss through a broken oil pressure sender line. The line was aluminum tubing, flared with an incorrect automotive flaring tool. It fractured at the fitting sleeve where it had been previously bent 45 degrees.

The purpose of us printing details of this kind of tragedy in this newsletter is to alert those flying other airplanes to conditions that might cause another accident so that recurrence can be prevented. If you are flying an airplane that may have an engine installation that has not been inspected by a qualified A.I., ground it until it is adequately inspected for aircraft-approved installation materials and workmanship. All plumbing of oil and fuel lines must be of components approved for a certified installation. If you have aluminum tubing installed, replace it with approved flex hose before flight.

Canopy Emergency

Joan Richey, Los Cruces, NM experienced a canopy emergency in her VariEze. As is generally the case, she forgot to lock it due to an unusual break in routine. Her full story follows:

"Charles, and my instructor, Joe Gold, had started the Eze and said he'd like to fly it a little, too. so - I took off, flew over town and up the valley some, came back, landed, taxied up to where Joe was waiting, got out, he got in (engine still running), a friend came up and asked for a ride. Joe shot a landing, came back, jumped out, ran around the plane sniffing - smelled something burning. Took up the passenger, came back, changed passengers, said the radio had burned up. Took off, flew a short time, came back and I decided to fly again. "OK" says he "but don't even fool with the radio

because it's not working". Didn't turn off the engine. I climbed in, said I'd shoot 3 landings and take it to the hangar. I always fly with earplugs under the headset - didn't take time to put them in. That's #1. Engine hadn't been stopped - didn't do my standard check with run up. That's #2. took off and did not bring up the gear since I was just going to shoot landings. On turning downwind to base, the sound in the cockpit changed but I could not identify it (no earplugs). Base to final, the canopy popped up to the full throw of the safety latch. I panicked! All the stories Charles had told me and I had read of canopies coming open, all of a sudden, seemed to have culminated in funerals. My initial thought was "I'm dead". Tried to hold the safety latch down, tried to latch the canopy. After the initial panic, I remembered some words of wisdom in a CP that Charles and I had discussed. FLY THE AIRPLANE! Next thought - "Climb, gain altitude and latch the canopy". Third thought - "Land it!" By now, the panic is gone, I'm a little high and a little fast. Have not managed to trim it to landing speed. After all, a

girl's only got two hands and both are holding down the canopy! Actually, I manhandled it down, long and hot - luckily 12/30 at Las Cruces is 7500 feet. Let it roll to a stop and then drove it to the departure end of the runway. (Furthest from buildings and people). Stopped - knees weak could not latch the canopy. Opened it completely, latched it. TURNED ON THE MASTER - CHECKED THE SAFETY LIGHT AND BUZZER - turned around and took off on 12. Shot two more landings, took it to Las Cruces Aviation, met on the ramp by Joe Gold, illustrious flight instructor, and my brother who was about to go up in his Citabria. NO ONE EVEN NOTICED! but to me it was scary".

[Shopping]

New Long-EZ prefab parts available now: **FROM TASK**
Long-EZ fuel/baggage/strake kit, includes ribs and baffles - 16 pieces.
The kit is also available without ribs and baffles.

- 1 NG-31 Foam cut to plan and glassed both sides.
- 2 NG-30 Both laid up per drawings - predrilled 5 places
- 1 F6 with overlaps formed as done on page 13-6
- 1 F22 per drawings including doubler and extra plies
- 1 F28 Notched for assembly.
- 1 Instrument Panel, notched & drilled - except instrument and radio holes.
- 1 Front seat back - with notches and cut outs
- 1 Rear seat back - with notches and cut outs.
- 1 FSRC formed 90 degree - trim and install (**CONSOLE**)
- 1 RSRC formed 90 degree
- 1 FSLC - including 9.1" x 8" separate pc. per page 24-1
- 1 RSCL formed 90 degree - Trim and install
- 1 Front thigh support, formed & glassed, 2 ribs included
- 1 Rollover structure, formed, glassed rear closure insert included.

All of the above parts are vacuum bagged, prepreg, which results in lightweight, excellent-quality parts. We have a display of these parts at RAF.
Anyone who may have purchased prefab strakes from Task, and do not have installation instructions, write to Task. For more information, send a SASE to Task Research,
848 East Santa Maria St,
Santa Paula, Ca 930670
9805)525-4445

We have had two of B & C Specialty's excellent little alternators on test for over a year now. The belt-driven type for Lycomings has been running on the prototype Long-EZ N79RA for over 340 hours, and has been trouble free. The Continental, gear driven alternator has not missed a beat in the prototype VariEze, N4EZ for over 100 hours. Many of the alternators are installed in homebuilt VariEzes and Long-EZs, and we are not aware of any failures. Bill is to be commended for his excellent solution to our need for lightweight electrical power. Send Bill a SASE for a brochure with color photos.
B & C Specialty,
518 Sunnyside Ct,
Newton, Ks 67114
(316)283-8662

Note that Ray and Nova Cullen have moved, but are still available for anyone who needs assistance with Eze construction problems. Ray and Nova still continue to supply plans for seat cushions and survival kits for \$8. Mike and Sally's N26MS seat cushions are done from a set of Ray and Nova's plans.
Ray and Nova Cullen,
1607 First Street,
La Grand, Or 97850

For Sale: VariEze Main gear and other parts.
Contact: Charlie Willwerth,
215 Froman Dr,
Summersville, SC 29483

For Sale or Trade: Long-EZ main gear strut
Wants VariEze main Gear.
Contact: Alan Laudani,
11929 W. Diane Dr,
Wauwatosa, WI 53226
(415)453-8575

For Sale: Clear Plexiglass canopy for VariEze or Long-EZ, new, ex Airplane Factory, Dayton OH
Contact: Er Grootes,
Madiasandnes 85,
4042 Hafsvord,
Norway.

For Sale: 108 hp O-235-C1 Lycoming, 60 hours SMOH plus all accessories. \$2950
Contact: Dennis Jacobs,
526 Ridgecrest Dr,
Yellow Springs, Oh 45387

For Sale: Zero time O-235 Lycoming, for more information contact:
Ted A. Miller
1561 Fairlawn Street.
Oshkosh, WI 54901
(414)231-8232

This engine was overhauled through the Aviation Explorer Post 2692, Boy Scouts of America - all logs and parts replaced can be had from Ted.

For Sale: Continental O-200, still flying, total time 4070 hours, 270 hours STOIL, includes starter, generator, mags, harness and carb \$2300
Contact: Bill Spellman
(414)463-4255

For Sale: Continental O-200, firewall forward, all accessories. From a Cessna 150. 2400 TT, 1560 STOIL. Logs, prop and mount \$2495

Continental O-200, from a Cessna 150, complete engine with all accessories and logs \$1995
Contact: Lee Heron,
c/o The Airplane Shop
Caldwell/Essex County Airport,
125 Passaic Ave,
Fairchild, NJ 07006
(201)736-9092

For Sale: Continental O-200 rebuilt engine, (100 octane valves, new rod ends, pistons, balanced, zero time. Other parts available.
Contact: Hank Woolway,
1025 Palms Blvd,
Venice, Ca 90291
(213)392-2295

Performance Flight Testing Lecture.

This year at Oshkosh, Burt presented a lecture on basic methods to conduct performance flight tests and on data corrections and standardization methods. Many in the audience asked for a list of the equations used, so he promised to print them in CP #30. Room here does not allow a presentation of the total lecture with pilot techniques, but those who were in attendance will be able to use the information below:

Definitions:

| | |
|------|---|
| Ws | Standard gross weight |
| Wt | Test gross weight |
| Hi | Indicated altitude (ft) at 29.92 setting. |
| Hic | Altitude corrected for instrument error. |
| ΔHic | Altitude instrument error. |
| Hc | Pressure altitude (corrected for instrument error and static position error). |
| ΔHpc | Altitude static position error. |
| Vi | Indicated airspeed (knots) |
| Vic | Airspeed corrected for instrument error. |
| ΔVic | Airspeed instrument error. |
| Vc | Calibrated airspeed (corrected for instrument error and position error). |
| ΔVpc | Airspeed static position error. |
| Ss | Standard takeoff distance. |
| St | Test takeoff distance. |

Airspeed/Altitude Calibration

$$Hc = Hi + \Delta Hic + \Delta Hpc$$

$$Vc = Vi + \Delta Vic + \Delta Vpc$$

For speed correction using altitude correction from Tower - flyby method (approx, accurate only below 15,000 ft and 200 knots):

$$Vpc = \frac{100 \Delta Hpc}{Vic \left(\frac{9.2 + Hc}{3600} \right)}$$

Plot ΔVpc vs Vic with lines of gross weight.

Take off Performance.

Test two altitudes.
Test near the two standard weights.
Test with wind less than 5 knots

$$\text{Wind correction } S \text{ corrected} = S_t \left(1 + \frac{V_w}{V_{gs}} \right)^{1.85}$$

Where S_t = measured distance
 V_w = Wind component
 V_{gs} = ground speed at lift off.

$$\text{Weight correction } S_s = S_t \left(\frac{W_s}{W_t} \right)^{2.1}$$

Plot V_{to} - takeoff indicated airspeed vs S_s . Fair data and obtain distance at recommended V_{to} . Plot two weights, two altitudes.

Climb Performance. (Sawtooth climbs)

Record H1, H2, time, airtemp, V1, rpm, man. press, and fuel (for gross weight).

Test climb rate $R/Ct = (H1 - H2) / \text{time}$.

$$\text{Weight correction } R/Cs = R/Ct + R/Ct \left(\frac{W_t - W_s}{W_t} \right)$$

Plot R/Cs vs V_i at several altitudes. Select climb speed at 98% of best climb (fast side).
Plot density altitude vs R/Cs and vs V_i with two lines of different W_s .

Cruise Performance.

Record V_i , H_i , air temp, fuel, carb. temp, RPM, man. pressure, V_h (max horizontal speed - full throttle)

Calc BHP from Lycoming chart.

Calc prop efficiency (η) from NACA Gray 1943 chart.

$$\text{Power correction } P_{iw} = \frac{\text{BHP} \eta \sqrt{\sigma}}{\left(\frac{W_t}{W_s} \right)^{1.5}}$$

Where σ = ratio of air density to sea-level air density

$$\text{Speed correction } V_{iw} = V_{ic} \sqrt{\frac{W_t}{W_s}}$$

Plot V_{iw} vs P_{iw} , fair lines of altitude.

Plot V_h on density altitude V_s V_{iw} .

Add lines for constant % power - 75% and 50%

The RAF Model 68 Amsoil Racer

In late 1979 Burt designed an aircraft for Dan Mortensen to fit the specifications for racing biplanes. In 1980 Dan received sponsorship from Amsoil to build and race a prototype. The aircraft (N30ILS), built by a team in Sacramento, California, was completed in August '81. It was entered in the 1981 Reno Air Races in September. Although it turned several record-exceeding laps during a heat race, it finished only third in the final race due to several pylon cuts. The pylon cuts were the result of a roll deficiency in the control system.

Dan delivered N30ILS to RAF in October so we could evaluate it and help him complete its development. Except for the roll deficiency, which was caused by inadequate travel and stiffness of the controls, the Racer has proven to be an excellent flying aircraft with good firm flying qualities at its 240 mph racing speed. It's takeoff and landing distances and handling are good. Dan plans to make some improvements in its engine installation and propeller which should assure its racing success in the next season.

The Model 68 is very similar to the RAF Model 54 Quickie, using the reversed-stagger tandem wing concept with wheels at canard tips. It uses some previously unflown airfoils, which have been now shown by test to be delivering over 60% chord natural laminar flow. The NLF is attained even within the prop wash!

Of particular note is the use of the small horizontal "T" tail. The tail is an all-flying type and is geared to operate with the canard elevator control system. Note that this is the first use of a horizontal tail on Rutan-designed aircraft. Its purpose is to force the forward elevator to the proper positions to optimize canard airfoil camber for both the 250 mph straight-aways and the 4-q turns. Also, the horizontal tail fine-tunes the aeroelastic effects to increase pitch stability at very high speeds. Despite the use of carbon fiber in its construction, the Model 68 is a relatively flexible airframe for a 250 mph application. The design parameters for the tail were verified by the flight tests.

Oshkosh was 'big' this year. More people and planes than ever. But this year was special. There has been a VariViggen at Oshkosh for 10 years straight. The first six years were Burt's N27VV, the original prototype, now in the FAA museum, and then my Viggen N27MS, made its Oshkosh debut the following year and has been at the airshow for four straight years. 1981 was the first time more than one VariViggen was present. Ken Winter of Tulsa, Oklahoma, flew his very excellent Viggen in and I had the pleasure of flying in formation with Ken in the fly bys. Ken also was kind enough to give rides to a lot of Viggen builders during the week. Hopefully, this will give those builders a shot in the arm so to speak, and they should have gone home and really gotten busy on their Viggen projects.

I flew my Viggen out to Oshkosh and back. Our route took us Mojave to St. George, Utah, to Aspen, Colorado. Spent the night there and departed the next morning with a density altitude of 10,800 feet, climbed over the Divide west of Boulder, Colorado and flew to Hastings, Nebraska. From Hastings to Bascobel, Wisconsin and to Oshkosh. After Oshkosh we took the long route home via Anderson, Indiana, to Joplin, Missouri, to spend the night in Abilene, Texas. Next morning on to Alamo, New Mexico where we visited with our eldest son. From Alamo we flew via Albuquerque, Farmington, Monument Valley to Page, non stop. From Page we flew the Colorado river and over the Grand Canyon, then back home to Mojave. We covered 4600 miles and I put 35 hours on the tach. The Viggen required 2 quarts of oil, and that was all. My Mother was my back seat passenger, and she really enjoyed her trip in the Viggen. She says the Viggen is the greatest (but she may be biased!).

We almost had a third Viggen at Oshkosh. Arthur Schwartz started for Oshkosh and got as far as Youngstown Ohio, and was turned back by low visibility and rain. Arthur was keenly disappointed in not making it to Oshkosh, but reports that he has 116 hours on his airplane. He has flown in and out of all kinds of airports in various weather conditions, including 90 degree crosswind of 20 knots, without difficulty.

He reports another bonus of being a Viggen flyer - when you land, the crowds gather, people take pictures, and even want your autograph!, so he says to all VariViggen builders who have been taking it easy, and not working on their birds to "get busy and sample the pleasure and ecstasy with the feeling of having something unique, matchless and most beautiful".

Leonard Dobson made his first flight in his Viggen, shown in CP 29, on August 1st, 1981. He was not able to make it to Oshkosh, but he is having a great time flying his time off. His letter is printed below.

Terry Galbreath reports that he is making good progress and expects to have his Viggen on the gear by Christmas. Terry had been to Washington Hardware and got about 30% of his bolts there and says that you should take a bolt gauge with you.

Frank Stites sent a photo of his Viggen, and it requires only wing fuel tanks and canopies and it is ready. It looks excellent. Frank has the composite special wing. Arthur Schwartz flew up to visit Frank a week or two ago, so that should motivate Frank to get her in the air!

Keith Armstrong has requested that we have a VariViggen bull session at Oshkosh next year. I agree, Keith, and we will set something up. This year the builders organized something themselves, but unfortunately I was so busy with other RAF duties, I was unable to be there. Keith reports that he used "constant force" springs for the helper springs in his main gear. These are similar to what I used, and mine have worked perfectly. The biggest drawback to this type of spring is the price. You can obtain more information from:

John Evans Sons Inc.,
Spring Ave.,
Lansdale, Pa 19446
(215)368-7700

Keith used part # R433W and found that two per side were required.

The following is "Dobby" Dobson's report:

FIRST FLIGHT: The event was purposely kept low key, with no advance publicity on date or time. I had two fellow EAA members who were familiar with the Viggen to assist me. They each inspected the aircraft, and checked my weight and balance figures. They also made sure that I used my check list for pre-flight before they turned me loose, and got in the chase plane. At approximately 9:00 am, August 1st, '81 three years and one month after the start of construction, Rutan Vari-Viggen N73LD serial #533 lifted off at Georgetown, Texas airport. Some preliminary "pilot induced oscillation" and wing rock caused by nervousness and heavy handed input made the take-off a little wild. However, I established a rate of climb at about 800 ft per minute, levelled off at 3000 feet and then took a few seconds off to congratulate myself on my achievement so far. I did not retract the gear during this flight, and kept the speed below 120 mph. I spent the next thirty minutes getting acquainted with the airplane, and then made two simulated approaches and landings at altitude. Cylinder head temperature had been running on the high side so I decided to terminate the flight before I had completed my program. The landing was interesting. It is very difficult to break the habit of years of making stall landings. 2000 or so hours in Cessnas, Pipers, and Beeches doesn't make one an expert in a Viggen! Finding the correct pitch attitude is the tough part. I have an angle of attack indicator, but by the time I get it calibrated, I probably won't need it any more.

Second Flight: Was much more enjoyable because I was relaxed. Take-off and landing were beautiful. Handling in the air was delightful. My wife was a passenger in the chase plane, and she described the flight as that of a graceful yellow butterfly. Gear retraction and extension worked perfectly, and engine cooling was much better. (I had improved baffling). After 20 hours of flying time I have some observations, impressions, and advice for what it may be worth to some of you Viggen builders.

1. High speed taxi test and lift-offs: I found that a 4000 ft runway was not long enough for me. On my last run, I had to use a rough over-run to stop, and it was a helluva way to test the gear!

2. Brakes: Go back and read Mike's article on brake and master cylinder compatibility in CP #23 Page 9. I made the same mistake Mike did, and I should have made the correction when I first read about the problem instead of verifying it in my own aircraft.

3. Preparation for First Flight: Make every effort to get some time in a light weight homebuilt that has extremely sensitive controls. If you can fly a canard pusher, so much the better. If you can fly in the front seat, you have it made. Sit in the front cockpit of your Viggen with the fuselage propped up to about a six or seven degree angle, and pick out something in the cockpit, or put a mark on the canopy, so that you have a ready reference for that pitch angle.

4. Squawk Sheet: Correct any problems after each flight, or before flying again. Don't let them pile up. Nobody says you have to fly the restrictions off in a week or a month. Use the time to "fine tune" your airplane.

5. Program your test flights. My Viggen costs me about \$18 per hour to fly (just for fuel). That amounts to \$720 to fly off the restrictions. I intend for it to be a worthwhile expenditure, by making up my own flight manual on performance and flying characteristics, instead of just aimlessly flying around in circles.

6. Handling: I have heard and read many stories of homebuilders praising the ability of their creations to fly "hands off". My Viggen is not a "hands off" airplane. I neither wanted it to be or expected it to be in that category. Either I fly it or it will fly me, but I love it. I tweak the stick in any direction and it responds! It goes fast and it goes slow. I am constantly amazed at the abrupt, sharp turn capabilities. The first time I felt the tiny little nibble of the canard as it stalled, I laughed out loud like a kid with a new toy.

7. Viggen Production: Plans for the VariViggen have been available since 1974, but very few airplanes have been completed and flown, and that is too bad. Sure it's a complex airplane to build and sure it's not cheap, but it has sure been a worthwhile project. My Viggen is not a Grand Champion or even close to it, but

it sure draws a crowd. Hundreds of people have admired it both in the air and on the ground. I have approximately 50 requests for rides when the restrictions are flown off. Included in this group are a number of corporate pilots who fly Gulfstreams, Lears, MU-2s, King Airs and 421s. These are pilots who have to wear neckties when they fly, and generally don't get overly enthusiastic about any airplane.

I can only hope that this report from an enthusiastic youngster of 68, will get some of you guys back on the stick and finish your Viggens.

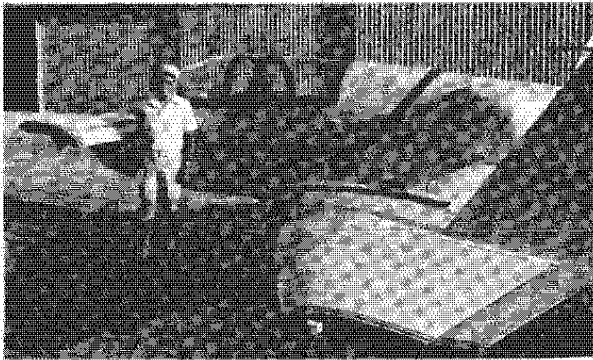
Statistics of N73LD:

Engine : Lycoming O-360 A1D 180 HP
 Prop : Hendrickson 70 x 70 Wood
 Empty Wt : 1236 lbs.
 Gross Wt : 1860 lbs.
 Fuel : Main Tank 30 gals.
 Wing - 6 gal each
 Range : 650/700 miles.
 Wing : Standard, composite construction
 with full span ailerons.

Thank you Mike and Sally for all your help, and also thanks to Burt for a good design and support during construction.

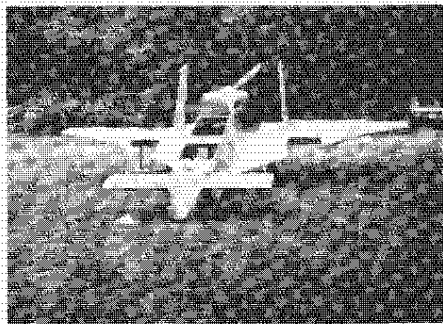
A special thanks to Jim Cavis of Scottsdale for getting me started on the Vigen project. Please, Jim, finish your airplane - you will love it.

Yours sincerely,
 Leonard "Dobby" Dobson.



Dobby Dobson with N73LD

Frank Stites' Vigen complete except the wing fuel tanks and winglets.



For Sale.

Lycoming O-360 180 hp. Zero since chrome major. New alternator, reconditioned magnetos. Can be either carburettor or fuel injection.
 Contact: James Belt
 18912 Silver Maple Way,
 Santa Ana, Ca 92705 (714)730-5835

Lycoming O-360A1A 180 hp Fresh major.

Contact: Dewey E. Straley
 488 Fairfield Ave,
 Gretna, La 70053 (504)362-8482

VariViggen project for sale

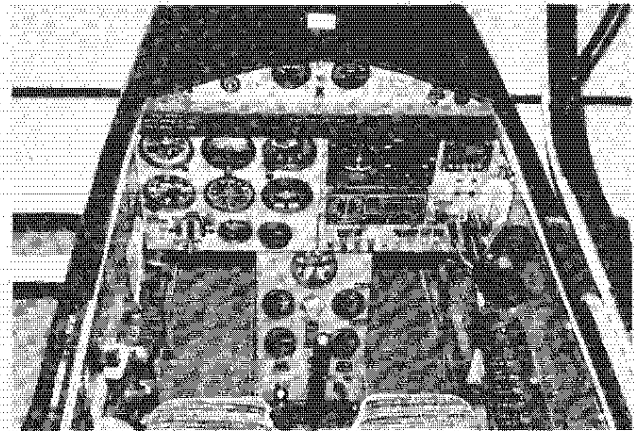
Contact: Mrs. M Crozier,
 1233 Dogwood,
 Chesterton, In 46304

Don Crozier was quite well into his Vigen project and had lots of parts to complete the airplane. Don passed away recently and Mrs. Crozier would like to sell the whole project.

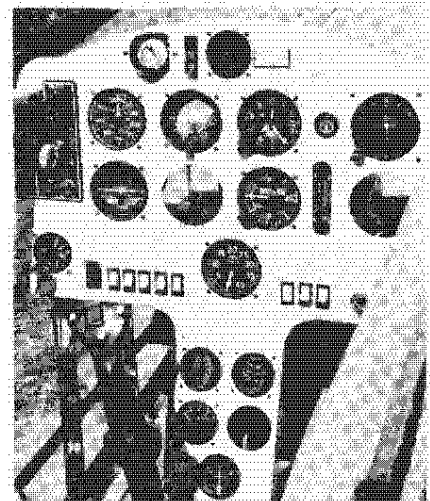
For Sale: VariViggen project, 1st edition plans with all updates, spruce kit, fiberglass parts, wing attach fittings, 500 x 5 wheels and brakes, master cylinders and brake pedals. Will trade for Long-EZ parts and plans.
 Contact: Ron Lorimor (415)967-0613

For Sale: VariViggen project. Plans, construction manuals, owners manual and tech. report. Fuselage 80%, canopy, cowling, wheels, brakes, etc. Much more.

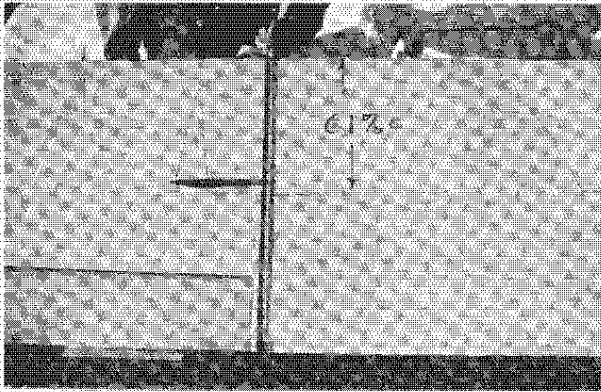
Contact: Al Lechiffard,
 1025 31st Ave., SW
 Vero Beach, Fl 32960 (305)569-2629



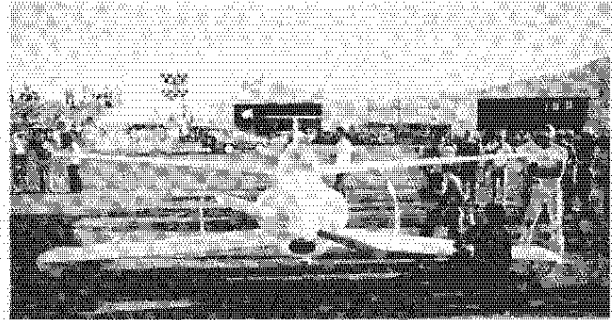
Dobby's well-equipped panel



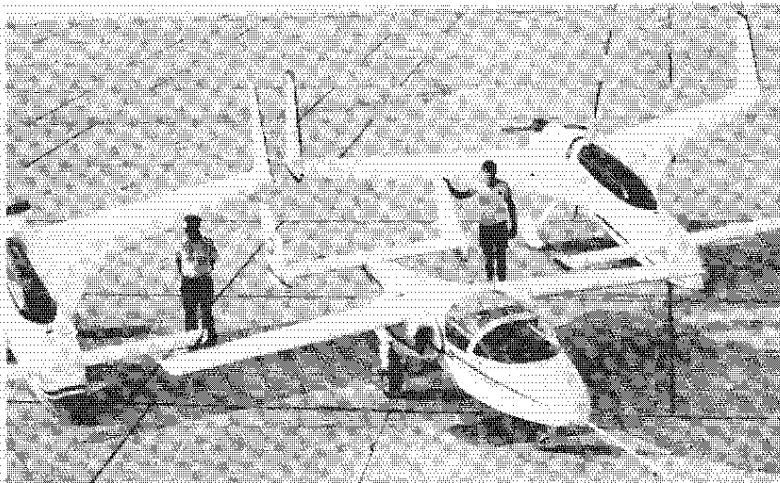
Gene de Ruelle's instrument panel in his Vigen.



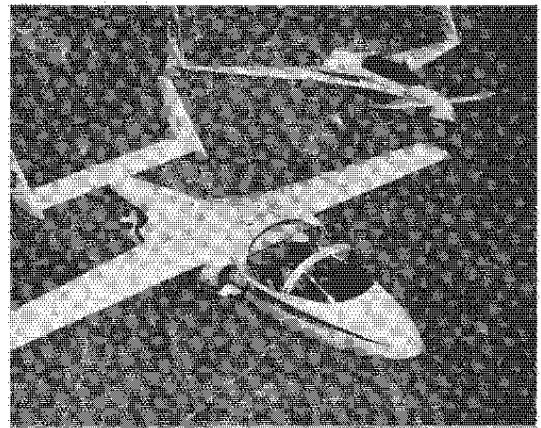
This highlighted photo shows the extent of laminar flow on the Model 68 Ansoil Racer. Note the loss of laminar flow caused by the strut transition and by several specks and insect strikes that cause a turbulent wedge of 15-degree angle.



NASA's Phil Brown and Bruce Holmes documenting the patterns of boundary layer transition on the canard of the Ansoil Racer. Note the small horizontal "T" tail.

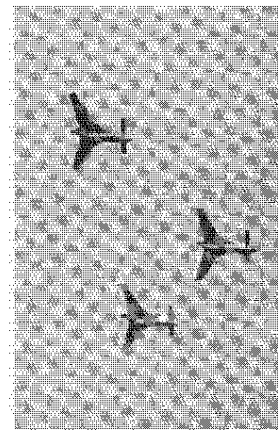
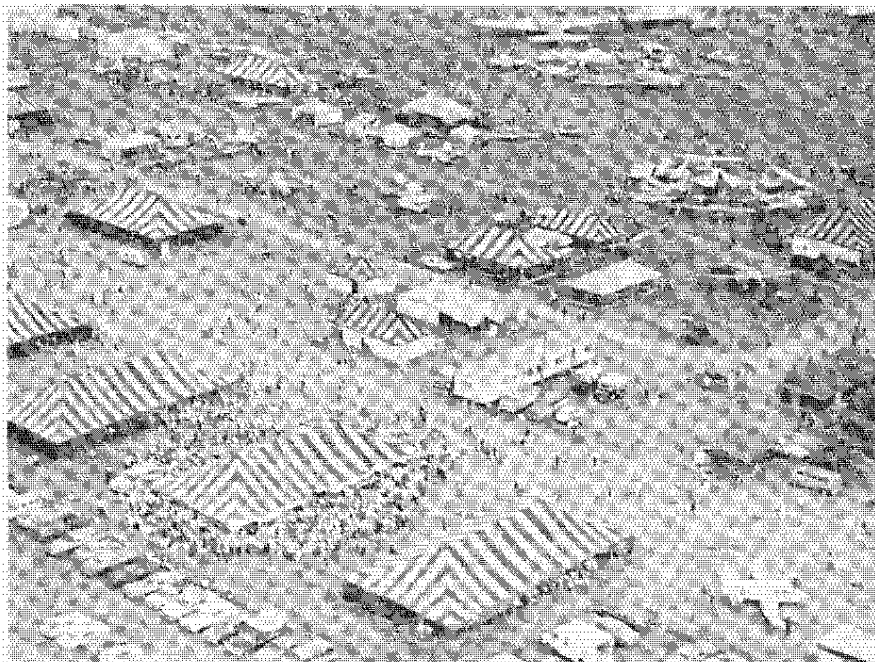


The Model 73 scaled-demonstrator of Fairchild's Next Generation Trainer proposal. Note its small size. At 842 lb. empty, and 21.8-ft span it is probably the world's smallest twin engine jet.



Mike Melvill is at the controls of the "RAF jet" here on its third test flight. The complete, instrumented engineering flight test program (except spins) was completed at RAF in an incredibly fast 15-day time period. The all-composite, moldless-construction prototype flight demonstrator concept is proving to be a valuable, economical engineering tool for aircraft development.

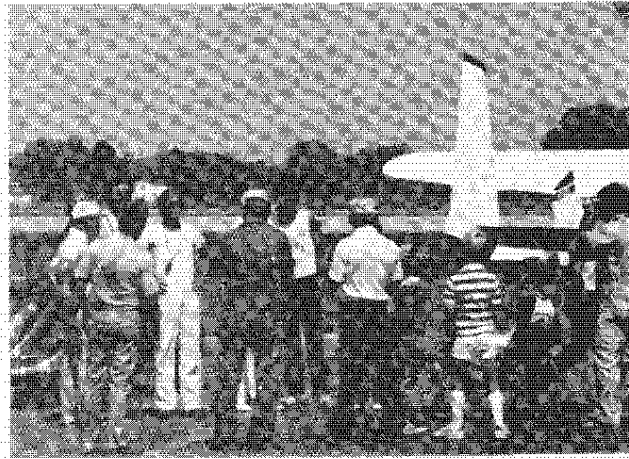
A portion of the grounds at Oshkosh. Guess where the Long-EZ forum is being held!!



Three Long-EZs in the flyby pattern at Oshkosh.

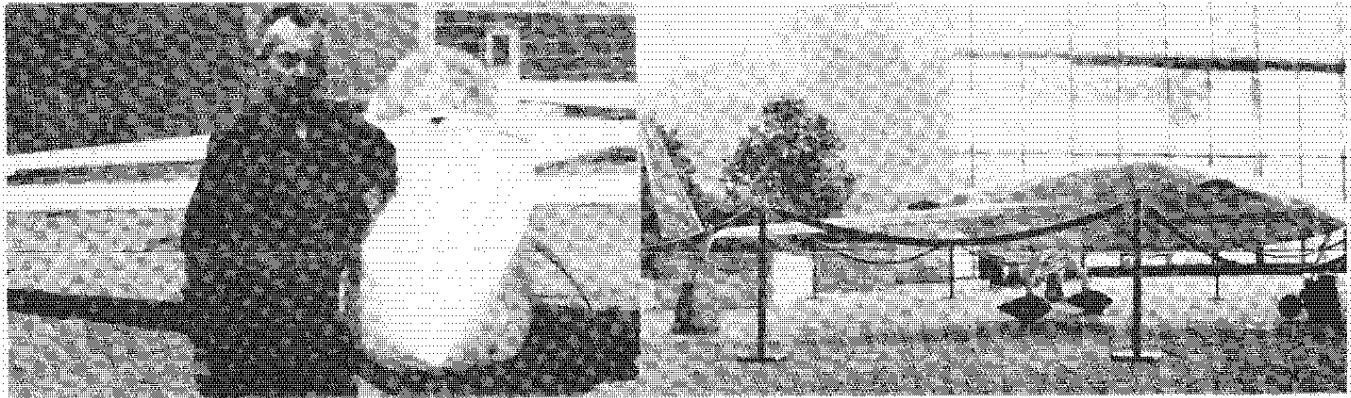


Jim Carlin and co-pilot (Lakeworth, Fl.) getting some early stick time in their Long. Jim's workmanship is superb.



John Denver at Oshkosh shortly after his flight in the Long-EZ with Mike Melvill. His assessment of Mike's Long "farr-r-out!!" Photo by Bill Ebken.

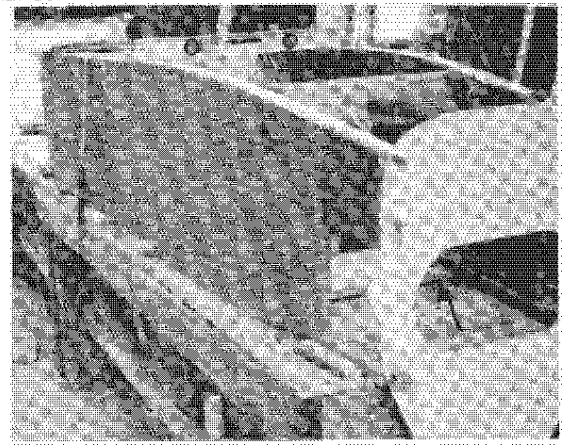
Bob Woodall's EZ on display at the National Air and Space Museum, Washington, D.C.



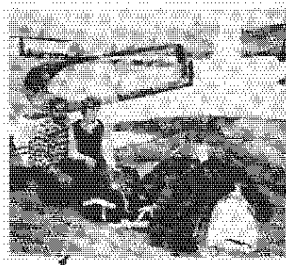
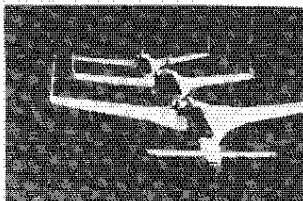
George Gilmer with his EZ, based at Santa Paula, Ca. George is 74 and has been flying since 1928! George built all the parts of this EZ, including wheels and brakes.

Charlie Gray's Long fuselage in the assembly stage. Note the blocks on the flat table to hold the sides in symmetric alignment. Also note the mid-section bungee cord to hold things down and in for cure.

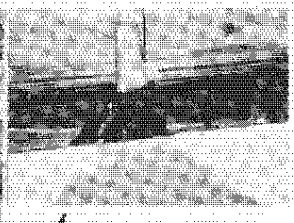
The mostly-alert group of EZ builders, watching the construction video tape at Charlie and Betty Gray's meeting in Florida.



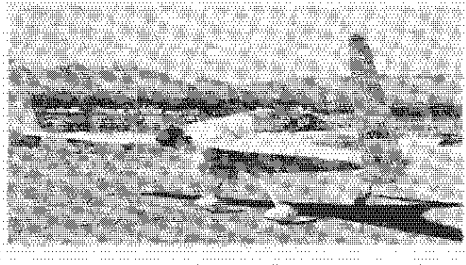
| Brief Long-Ez specifications/Performance | | | |
|--|---------------|--------------------------------|----------------|
| Engine Lycoming O-235 108 hp. | | | |
| Span | 26.3ft | Takeoff (solo/gross) | 550/830 ft |
| Area | 94.1sq.ft. | Climb (solo/gross) | 175D/1350 fpm |
| Empty Basic | 710 lb. | Cruise 75% 8000 ft | 183 mph |
| Empty Equipped | 750 lb. | Cruise 40% 12000 ft | 144 mph |
| Solo Weight | 960 lb. | Max range * 75% (solo/2 place) | 137D/965 mi |
| Gross Weight | 1325 lb | Max range * 40% (solo/2 place) | 2010/1430 mi |
| Max Fuel | 52 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 | | | |



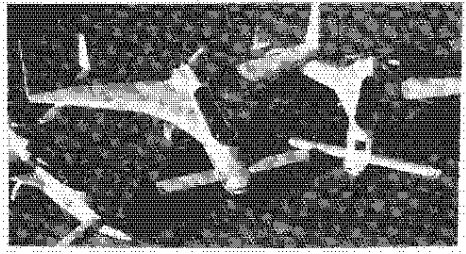
This amount of baggage fits nicely in the Long-EZ baggage areas. Baggage is accessible in-flight



Sally Melvill taxiing out for her first Long-EZ solo flight



Long-EZ parked nose-down with two VariEzes



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.

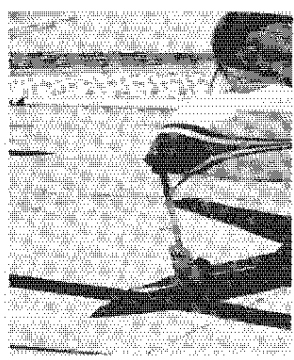
SECTION II - ENGINE INSTALLATION - This is a set of drawings and construction manual for the complete engine installation including mount, baffles, instrumentation, electricals, fuel, exhaust and induction systems, carb heat box and muff, cowling installation, prop and spinner.

SECTION IIC - Lycoming O-235

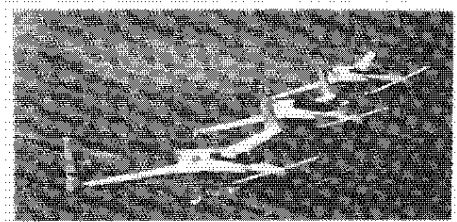
OWNERS MANUAL - This is the required operations handbook and checklists, including normal and emergency operation, detailed flying qualities and performance charts, maintenance, maiden flight procedure, and pilot checkout, etc.

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.

The nose gear retracts for parking and in flight



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



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

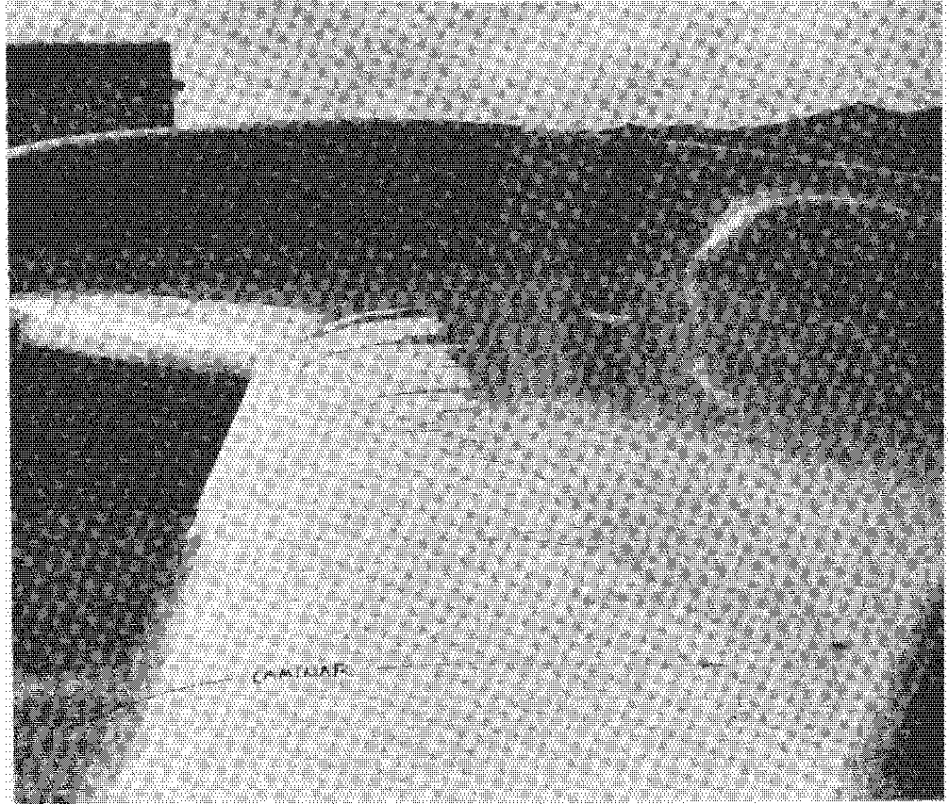
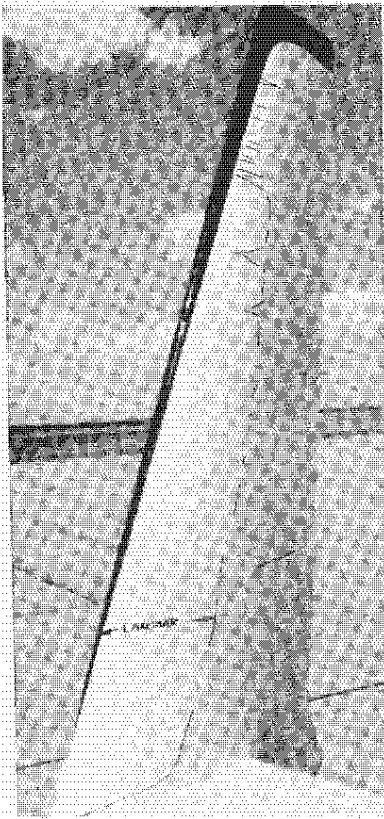
| Check items desired. | Price, includes first class mail to U.S. & Canada | Overseas, Airmail - U.S. Funds only |
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| <input type="radio"/> Long-EZ Owners Manual | 9.00 | 10.50 |
| <input type="radio"/> Long-EZ Landing Brake | 10.00 | 11.00 |
| 6% tax, 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**
- | | |
|--|--|
| <p>Near Los Angeles. AIRCRAFT SPRUCE 201 W. Truslow Ave, Bx 424, Fullerton, Ca 92632 (714)870-7551 Catalog \$4</p> | <p>Near St.Louis WICKS AIRCRAFT SUPPLY 410 Pine Highland, IL 62249 (618)654-7447 Catalog \$3</p> |
|--|--|
- 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

NASA
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Solidation chemicals: Applied to the wings of a wing and vertical fin
grow the wings of the aircraft. Note that the wing flow is induced
when the point of the wing is located at 45 degrees to the flow.



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

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Oct. '81

CP 30