THE CANARD PUSHER

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If you are building a VariViggen from 1st Edition plans you must have newsletter 1 through 35. If you are building from 2nd Edition plans you must have newsletters 18 through 35. If you are building a VariEze from 1st Edition plans you must have newsletters from 10 to 35. If you are building a VariEze from 2nd Edition plans you must have newsletter from 16 through 35. If you are building a Long-EZ you must have newsletters from 24 through 35.

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

The RAF hangar is located on the west end of the flight line at the Mojave Airport, Mojave, Ca. approximately 80 miles north of Los Angeles. You are welcome to come by and see our aircraft or to bring in any parts for our comments. We are normally open from 8:00 to 12:00 and 1:00 to 5:00 on Monday through Friday and 9:00 to 3:00 on Saturday.
Closed Sunday.
If you are planning a trip to see us, please call first to assure that someone will be here to assist you, since occasionally we are gone to flyins. When arriving at Mojave by car turn east at the Carl's Jr. restaurant to find the airport.

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

RAF ACTIVITY

Solitaire continues to occupy most of our time, what with plans preparation, and fine tuning the controls system and engine installation. We are close to a design freeze and are pleased with the little airplane.

We are very pleased to welcome Bruce Evans to RAF. Bruce will be working exclusively on Voyager and has already proven to be an excellent asset. Bruce built and is currently flying a very pretty VariEze nicknamed "Sky Slug". He has over 500 hours on his bird and does a lot of travelling, including many trips into the Baja Peninsula.

SOLITAIRE

Solitaire has been doing lots of flying. Einar Enervoldson, a NASA test pilot, and one of the SSA contest judges has flown many flights in it, in preparation for an upcoming pilot report article in Soaring magazine. This should be an interesting article as Einar went to a lot of trouble to calibrate airspeed and altimeter. We did a lot of flying looking for that elusive "perfectly smooth" air.

The Solitaire prototype has used a pitch control system that consists of two housed push-pull cables. That system, while being simple to install, induced friction that degraded the pitch flying qualities. Last week we built and installed a completely new pitch control system and stick, as well as a bungee pitch trim system. We are very pleased with the result. While we were at it, we installed adjustable rudder pedals to take care of the wide variety of pilots who will fly Solitaire. Remember, since the pilot sits at the cg, there is virtually no cg shift from a light pilot (100 lb) to a heavy pilot (200 lb). We felt that adjustable rudder pedals were essential.

We have been extensively testing the KFM engine for self launch. It has been flawless and provides adequate power. We conducted all of the engine tests with the engine fixed on a pylon. The airplane is now in the shop for the final change, which is to make the engine/prop assembly fold in and out. We are nearly there. We have had the KFM engine on a dyno, and have developed an excellent exhaust system.

Michael Dilley checked out in the Solitaire last week with no problems at all. Michael is a relatively low time (200 hour) private pilot, with no sailplane time at all. He had such a ball, we thought we'd have to shoot him down!

We will have the Solitaire up at Reno, Nevada for the SSA Annual Convention from 23 March to 27 March. It will be on display at the MGM Hotel at the Convention site.

We are working hard on the plans, but realistically it looks like it will be April before we have them available. Rest assured, we are doing our best.

"STEERABLE NOSEWHEEL FOR THE LONG-EZ ?"

We have worked very hard to develop a nosewheel steering system for the Long-EZ. This endevour has been a dismal failure so far. It really is a much more complicated problem than it seemed at first. We have had several different iterations installed including two totally new nosewheel forks. None of our efforts have shown enough promise to pursue. What it boils down to would be a major redesign of the rudder/ brake system, as well as the nose gear. At this point in time we are going to put this project very much on a back burner. The Long-EZ is such a simple, easy to maintain machine as it is, a change such as that suggested above, would necessarily make it more complicated and difficult, not to mention expensive to maintain. Of course this still leaves us with the need to be very conscious of the necessity to carefully check the friction damper before every flight. We have four aircraft here at RAF with the standard nose gear. These four aircraft have an accumulated total of over 2500 hours, and heaven knows how many landings. None of these airplanes has ever experienced nose wheel shimmy of any kind, and no nose wheel fork failures, even when N79RA was deliberately run over pieces of 4"x 4" lumber at speeds from 20 mph to 50 mph. Check your friction often and you will be rewarded with lots of fun flying - neglect it, and you will pay the price of a shimmy-induced fork failure.

From Irene Rutan - Burt's Mom

"Because of the overbooking last year at the VHC banquet and the inability to handle everyone, this year's banquet is for members only. Because of these limitations, I am wondering if there is enough interest in having a separate banquet on a different night".

If so, please contact:
Mrs. Irene Rutan,
8526 Calmada,
Whittier, CA 90605

Effects of rain or Surface Contamination on Pitch Stability and Control.

Last Canard Pusher we discussed again the effects of rain or surface contamination on the pitch flying qualities of the Long-EZ. This subject has been addressed and discussed in the Owner's Manual since it was discovered in 1975 that our VariEze prototype experienced a nose up trim change when encountering IFR conditions or flight in rain. This phenomena had not been encountered during our earlier experience with the VariViggen aircraft. At that time it was recognized that assessing the trim change due to boundary layer trim transition, (ie: due to leading edge insect accumulation or flight into rain conditions) would need to be accomplished in order to verify that the effect on the pitch flying qualities would not be adverse. Studies subsequently done using data from many different VariEzes did not reveal consistent results in that some of the airplanes would tend to trim nose up when entering rain condtions and others would tend to trim nose down when entering flight into moisture. Occasionally a VariEze was found to exhibit a relatively strong nose down trim change which would require several pounds of stick force to maintain the same flight condition and require a retrimming when entering or leaving rain conditions. The confusing result about the investigation was that there was an apparent disagreement between theory and flight test data. Theory would predict that if an airplane were relatively rough to begin with, the trim change should be less than that experienced than on a very clean well built surface in which a larger extent of laminar flow is lost when entering rain.

Experience with conventional airplanes and investigation of test data for wing sections in general revealed that when an aircraft enters rain, it's flying surfaces produce less lift at a given angle of attack and also the maximum lift is reduced resulting in a higher stall speed. At the time NASA was testing a full scale VariEze in the 30' x 60' wind tunnel at Langley and we asked Joe Chambers, director of those tests, to spray water on the aircraft and attempt to measure the change in lift and to compare that change with that found when the laminar boundry layer is transitioned by applying grit or tape near the leading edge. The results of those tests were published in the last CP and show a definite loss of maximum lift. The NASA wind tunnel tests indicated that a larger elevator deflection is required to fly in rain conditions.This was an expected result for some of the aircraft which had reported a definite aft stick requirement when entering rain.

We instrumented the VariEze prototye, N4EZ with an accurate elevator position indicator and gathered the elevator position versus speed data shown in the adjacent plot. Upon landing we applied grit and tape to the aircraft flying surfaces, wing and canard to provide a positive transition of the boundry layer at 5% of chord. This consisted of adding a "step" to the otherwise smooth surface of the airfoil that was sufficient to destroy all the laminar flow, a condition caused by either an accumaltion of insects on the leading edge, or flight in rain. We then added the fuel used during the first flight to bring the airplane back to the same exact gross weight and cg and flew again gathering the same elevator position data. As shown in the adjacent plot the elevator position required to achieve a given indicated speed was greater than with the smooth surfaces. It should be emphasized though, that the trim change that the pilot feels is not the same as the shifted elevator position since the transitioned boundary layer alters the pressure distribution around the elevator. Even though the elevator is more trailing edge down it does not necessarily result in an aft stick force. In the case of the VariEze N4EZ, the trim change due to the trim change transition (the force required to fly the airplane without adjusting the trim lever) is extremely small and is for most of the flight regime not noticable as a nose down trim change.

The NASA concern for a greatly increased stall speed, was not achieved as you can see from the data, the minimum speed achieved with the transitioned aircraft was higher, but only by approximately 1 to 2 knots.

While we are discussing the VariEze elevator data it is interesting to note the shape of these curves and discuss why the VariEze was designed in a way to provide natural stall limiting. Notice that as the pilot slows up, the normal stability requires a greater elevator position. The shape of this elevator position versus speed curve is similar to a conventional airplane at all speeds above approximately 55 knots. As the airplane slows to less than 55 knots however, the pilot notes that all of a sudden he requires a large change in elevator position to achieve a small reduction in speed. For example from the elevator position of 4° at 53 knots, the pilot can apply an additional 8° elevator and only slow down to 48 knots. As he pulls the stick back further the elevator itself and the canard begin to stall and the airplane "bobs" noticeably up and down. If the pilot pulls the stick back an additional 6° or more, (greater than 18° elevator position) the airplane begins a very apparent pitch bucking ie: the nose bucks up and down a couple of degrees approximately once every two seconds. This is a generally stable flight condition and the full use of yaw and roll control is retained. Compare this to a conventional airplane: when the elevator is brought back, a stall of the main wing and the airplane either drops or "departs" (rolls to one side or yaws into a spin).

Note that transitioning the boundary layer did not change the highly desirable shape of these curves, it only resulted in a minor increase in the minimum speed. Looking at the high speed end of the same plot shows that tripping the boundry layer did have a significant effect on the airplanes maximum speed. Reducing the surface deterioration reduced the maximum speed by nearly 9 knots. This is a significent increase in drag of approximately 20%.

Referring now to the data of Long-EZ N26MS, a definite shift in elevator position is apparent at all normal speeds. AFter collecting the clean data the aircraft was trimmed to 100 knots 'hands off'. Then, without changing pitch trim, it was landed, the tape applied, and the fuel burned was replaced to keep cg and gross weight identical. It was then flown back to 100 knots. Data show a 2 1/2° shift in elevator position and the pilot reported a 1 1/2 lb. pull force. Then, without changing trim, the aircraft was flown to 110 knots where it was again 'hands off' i.e. no stick force. Note that the force was the same (zero) even though the position was 2.2° different.

The minimum speed at 53 knots was uneffected by transition. This does not agree with earlier data from Long-EZ N79RA in which a 9 knot difference was measured. This points up the importance of recognizing that relatively small changes in contour (particularily with the GU canard airfoil) can adversly effect the transition characteristics.

Turning now to the Solitaire data, the pilot of the Solitaire could not feel any stick force trim change when operating between clean conditions and flying through rain showers. The transition elevator data, however, do show a minor trailing edge down trim change at speeds below 63 knots and trailing-edge-up trim change when faster than 63 knots. Remember, however that this is elevator position rather than stick force data and the changes seen here were not significant enough to be noticed by the pilot. As in the VariEze the minimum speed achieved when the surfaces were deteriorated with grit and tape were approximately 2 knots faster. The gliding performance was degraded considerably when the boundary layer was transitioned. The data shown are for powered flight with the self launch engine running at a constant power. A similar change is experienced during gliding flight except that the transition trim change "cross over" speed is reduced from 63 knots to 60 knots. With power off, the minimum speed achieved on the clean Solitaire is within 1 knot of that achieved with fixed transition. Note that the Solitaire has a relatively high amount of longitudinal stability in that the elevator position changes rapidly with speed changes. This condition results in large elevator deflections (approximately 6 to 8%) required for normal thermalling flight. This results in a trim drag that reduces

thermalling performance. Some fine tuning of the aerodynamics and cg range is being considered in order to see if improved thermalling performance can be achieved by reducing the large elevator deflection.

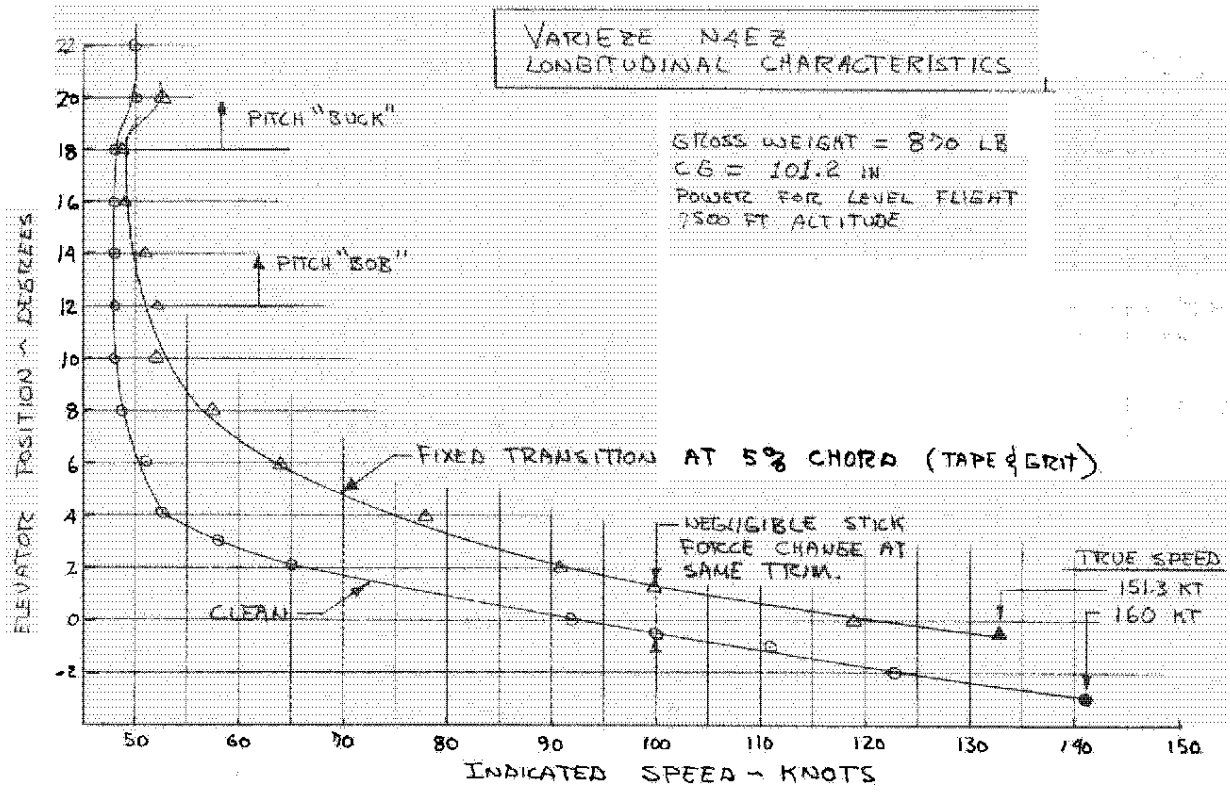
Referring to the Defiant data, tests show that with identical trim settings there was no stick force change due to fixed transition. Interestingly, the minimum speed with tape applied was less, probably due to the fact that the wing was more effected by the transition than the canard. This would result in a higher trim angle-of-attack.

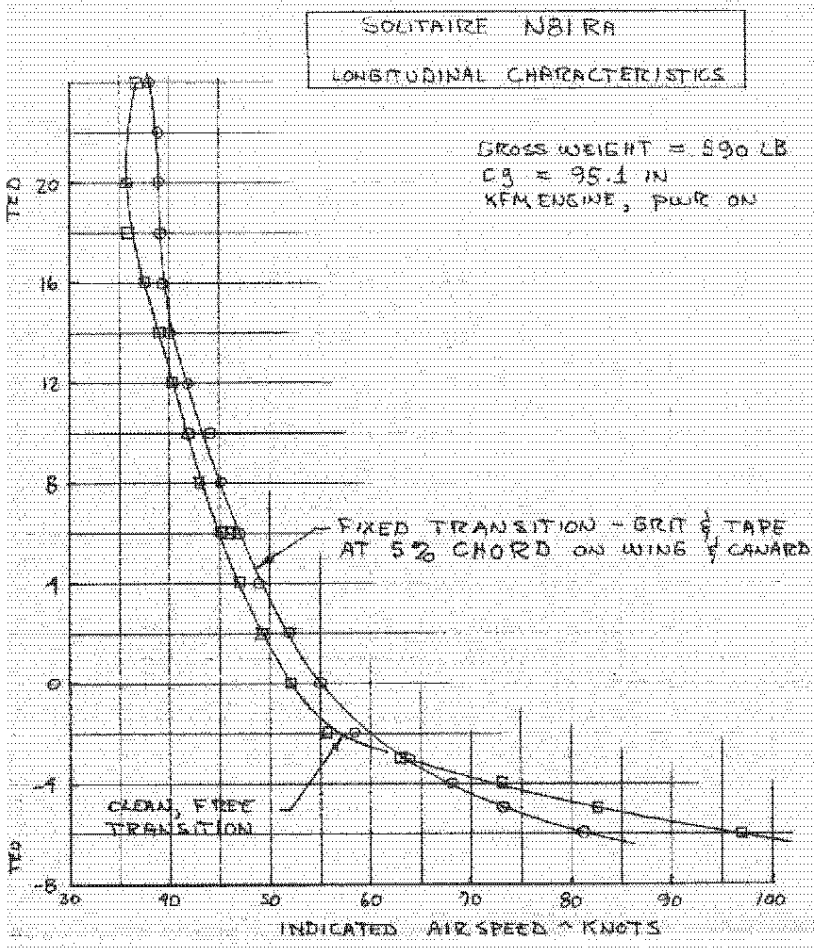
We recently read an unplublished article written by a retired NASA engineer, which claims that all canard-type aircraft have a strong nose down trim change when encountering rain and that this characteristic may generally be dangerous. The article also interpreted the strong stable break in the pitching moment characteristics of the tandem wing airplanes as a 'undesirable deficiency in elevator efectiveness at low speeds' rather than the desired characteristic of natural stall limiting that results in the safe flying qualities achieved by most of these airplanes. Due to the large number of errors in this unpublished article, the editors did not publish it. However, the author has succeeded in spreading rumors about these characteristics that some have attributed to our homebuilts. The author of the article has not flown any of the aircraft and had made some speculation based on reported results of other types that apparently do have strong or possibly unsafe trim changes in rain conditions. In his article he even goes on to caution a pilot from pulling back on the stick in rain for fear that the nose will drop sharply. These characteristics, of course, are not seen in our homebuilts. As you see from the adjacent plots, the nose up positive elevator required to reduce speed is achieved at all conditions up through the flight conditions at which the aircraft's nose 'bobs' or 'bucks'.
Rain or no rain, the VariEze, Long-EZ or Solitaire can be maneuved at normal speeds from base to final turns without fear of insufficient control power.

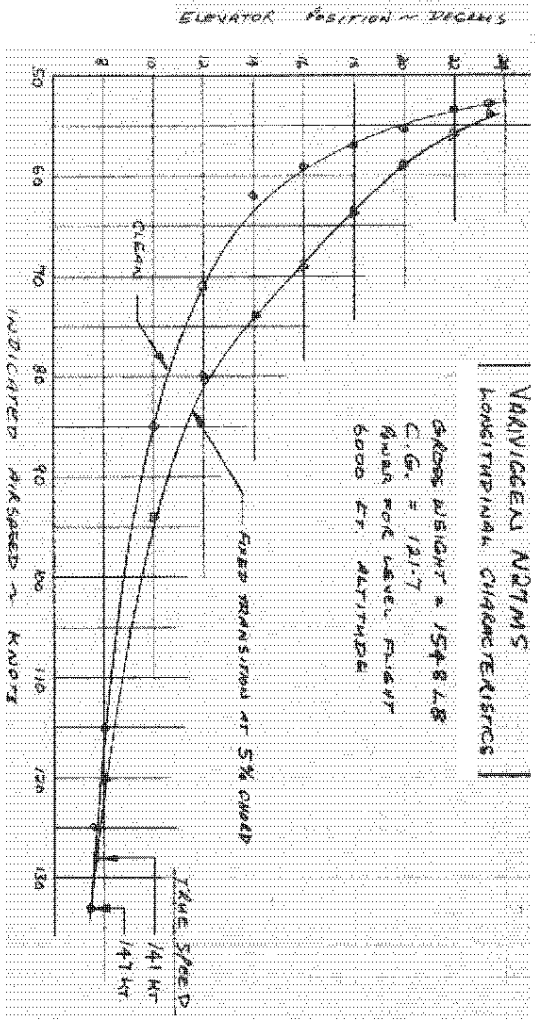
An analysis of the flying qualities resulting with fixed transition should always be done during the flight test program of any new design, be it a canard, tandem wing or a conventional tail aft configuration. This is a relatively simply test to do. It is done by simply applying a strip of masking tape approximately 1/4" to 1/2" wide down all the leading edges, (top and bottom) at approximately 5% of chord. The effect on stability and maneuverability of the Long-EZ or VariEze due to this transition will be noticable but not serious. For example, Mike and Dick both do low altitude aerobatic maneuvers with their Longs in driving rain conditions and notice only that that a higher force is required to complete a given high-g maneuver. The take-off performance in rain is degraded in rain conditions, particularly at forward cg, much as it is on a conventional aircraft.

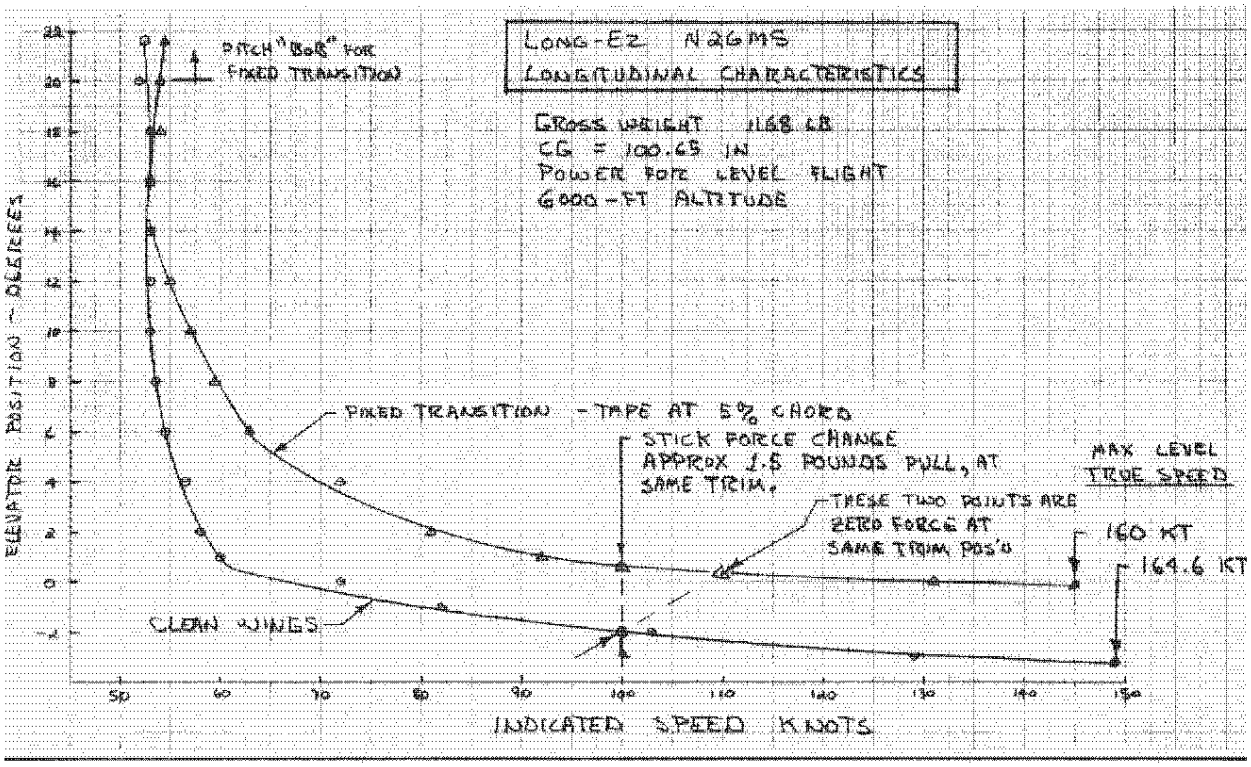
The following information is also interesting to note: The airplanes which exhibit a stronger nose down trim change in rain are generally found to be those that require too much trailing-edge-down elevator to trim in the clean (no rain) condition. One Long-EZ who reported a strong nose down trim change in rain, corrected his canard incidence by increasing it by 1° (which brought the elevator position back into the proper trim range) and thereafter found that the rain induced trim change was greatly reduced. You would think that if a very small contamination of the surface caused by a few bugs or rain would cause a noticable trim change, a large change would be experienced when the aircraft accumulated large build ups of airframe ice in iceing conditions. The opposite is true, ice has been accumulated on the Defiant and Dick's Long-EZ airframes without producing trim changes. Stall speeds increase, of course, similar to conventional aircraft.

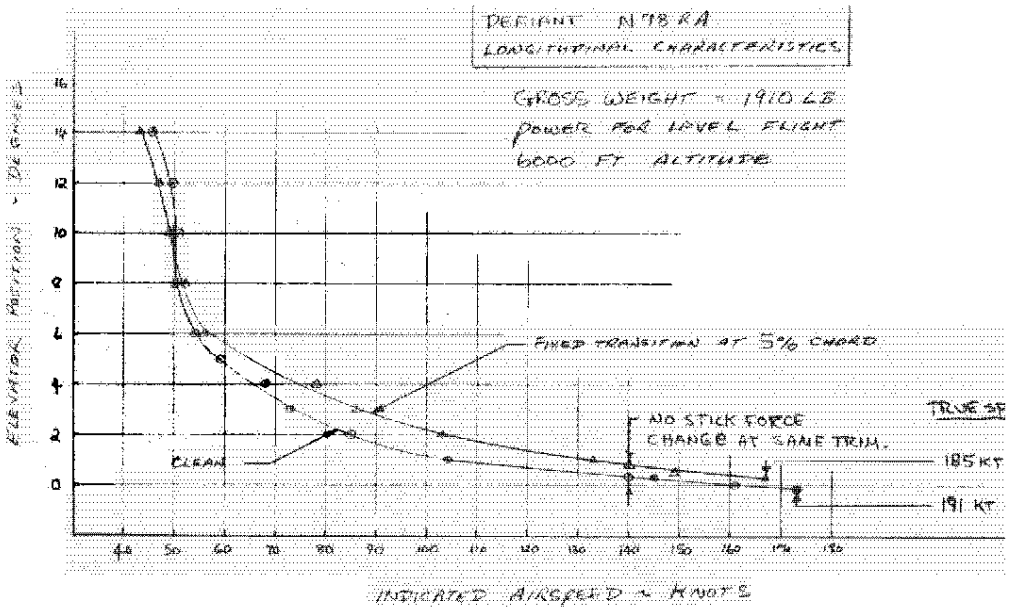
The GU type airfoils used on the VAriEze and Long-EZ are more suseptible to a change of lift due to rain than are more conventional, lower lift sections. The GU-type airfoils are not low drag sections, however and several attempts have been made to increase the performance of the VariEze or Long-EZ by the use of different airfoil sections. The original VariEze prototype N7EZ first flew with a NASA GAW-1 (now designated the LS013) section which resulted in unacceptable stall characteristics and a high stall speed. More recently some modern sections have been flown both with slotted elevators and with plain elevators on three different Long-EZs. None of those tests have indicated that a overall improvement could be achieved in the Long-EZ or VariEze due to an airfoil modification. Note that this does not apply to all tandem-wing types, it is quite probable that an airfoil improvement may be necessary or desirable on other aircraft which do not have sufficient control power at low speeds due to the transition of the boundry layer.




SOLITAIRE N81RA
LONGITUDINAL CHARACTERISTICS
GROSS WEIGHT = 890 LB
CG = 95.1 IN
KFM ENGINE, PWR ON
FIXED TRANSITION - GRIT & TAPE AT 5% CHORD ON WING & CANARD
CLEAN, FREE TRANSITION
INDICATED AIRSPEED - KNOTS


VARIVIGGEN N27MS
LONGITUDINAL CHARACTERISTICS
GROSS WEIGHT = 1548 LB
C.G. = 121.7
POWER FOR LEVEL FLIGHT
6000 FT ALTITUDE
CLEAN
SWEEP TRANSITION AT 5% CHORD
INDICATED AIRSPEED - KNOTS
TRUE SPEED
141 KT
141 KT


LONG-EZ N26MS
LONGITUDINAL CHARACTERISTICS
GROSS WEIGHT 1168 LB
CG = 100.65 IN
POWER FOR LEVEL FLIGHT
6000-FT ALTITUDE
PITCH "BOB" FOR FIXED TRANSITION
FIXED TRANSITION - TAPE AT 5% CHORD
STICK FORCE CHANGE APPROX 1.5 POUNDS PULL, AT SAME TRIM.
THESE TWO POINTS ARE ZERO FORCE AT SAME TRIM POS'N
MAX LEVEL TRUE SPEED
160 KT
164.6 KT
CLEAN WINGS
ELEVATOR POSITION - DEGREES
INDICATED SPEED KNOTS



New EZ First Flight

We have not reported first flight names since CP 32. The following list is those who, based on our information have made an EZ first flight. If you know of someone who should be on the list, please send us the name, address, N-number and date of first flight.

VariEze First Flights

Ray Little	N2CRR	CA
Bryce Ringsdorf	N37993	OR
Harry Davis	N3262D	OK
Bob Paulsen	N339EZ	CA
John Kevern	N222JK	NY
Mike Tozze	GEMMY	England
Frank Harris	N305Q	VA
Robert Demalignon	N77AX	AZ
Tommy Thornhill	N3252	TX
DR Stith	N1050G	CA
Ron Menzie	N718RM	AR
Troy Edwards	N1WX	CA
Pierre Marcotte	CGMEZ	Canada
Ray Larocque	N1344Z	FL
John Creel	N4UM	CA
Larry Praveck	N42231	OR
James Snyder	?	IL
Will McGreaham	?	CA
Hans Suckschwerdt	DEEZP	Germany
Bill Seibold	N6VE	AZ
Frank Poplawaski	N60P	TX
Dave Boldenow	N203DB	IL
Robert Wagner	N533VE	IA
Warren Martin	N75VE	CA
David Robertson	N45DR	OH
Jim Skilling	N23EZ	Ca
Larry Freeman	N17LF	OR
Earl Hildebrandt	N711EJ	GA
Dave Sollish	N625EZ	CT
Dan Hummel	N79DH	PA
Craig Gottschang	N30CG	GA
Irving Arnold	N2260Z	DE
Bruce Olsen	N30LY	WA
Lloyd MacDowell	N1182Z	CA
Bud Foster	N503VE	MS
Ralph Hallenborg	N141JR	CA

Long-EZ First Flights.

Chuck Busch	N143CL	CA
John Sheffels	N682S	MT
Davis/Wallace	N711QA	CA
Max Overholtzer	N141	CA
Gray/Gray	N553K	CA
Gerald Collins	N197GC	GA
Williams/Cortner	N95JV	MN
Jan Van Noord	N7VV	CA
Charlie Gray	N555LE	FL
Rodie Rodewald	N1344T	HI
Denny Park	N291P	TX
Prouts	N81KP	CA
Ken Clunis	N345KJ	CA
Roger Warren	N812EZ	FL
Luke Roosma	N1378X	IL
Scott Twitchell	N31349K	CA
Jacque Civetta	FPYOF	France
Judge King	N350JK	MN
Paul Schneider	HBYBW	Switzerland
Brent Bristow	N73BR	CA
Debbie Iwatate	N455EZ	WA
Sam McCaskie	N824SL	CA
George Cunningham	N3153N	CA
Frank Tifft	N307EZ	CA
Howard Lee	N373JH	CA
Jo Ostry	N21DQ	FL
Jim Hightower	N234LE	MS
George Scott	N486DS	TX
Robert Forest	N82CZ	CA
Robert Labonte	?	NH
Charles Auton	?	FL
Myrton Lerstang	?	FL
Norman Howard	?	CA

From the desk of Jim Weir - Radio Systems Technology:

"NO ANTENNA FOIL ON THE GEAR LEGS. NONE, NO HOW, NO WAY. Get the idea ? There have been a series of reports that the gear-leg antennas work very well when first installed, then gradually deteriorate over time. Actually, the "deterioration" seems most pronounced after a hard landing. The copper foil is not as resilient as the glass, and rather than flexing like the fiberglass, the copper tape breaks. Net result - lousy antenna operation.

Instead of copper tape, use a copper braid similar to Radio Shack 64-2090 (use 2 strips side-by-side) or Belden 8664. Every bit as good, but slightly harder to make, is to strip the black jacket from RG58 coaxial cable, remove the polyethelyne/copper center conducters, and flatten out the resulting braid. Install this on the gear leading edge or trailing edge, not at the maximum thickness, to avoid flex failures.

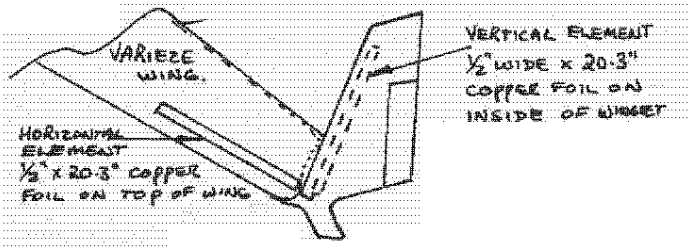
For those of you who have a broken antenna, I recommend removing as much foil as possible - - both elements of the dipole - - and glassing braid on the OPPOSITE leg. It would be a major job to strip the glass from the broken glass and remove it, so I suggest you just leave it alone.

Actually, if I was a-buildin' the airplane, and I didn't have the wing and winglet glassed yet, I'd go ahead with a winglet antenna like the Long-EZ has for the COM antenna.

Jim Weir"

On new construction VariEzes the "Long-EZ" comm antenna can be installed on the winglet and outboard wing as shown. Follow the instructions in CP 26, page 7 for the Long-Ez comm antenna.

Incidentally Jim recently checked the performance of a Long-EZ winglet COMM antenna and it's radiation pattern proved to be quite exceptional, much more uniform than the factory builts.



BUILDER HINTS

Canopy frame construction - VariEze and Long-EZ.
The following optional method includes several revisions to the plans procedure that make the canpoy frame easier to build:

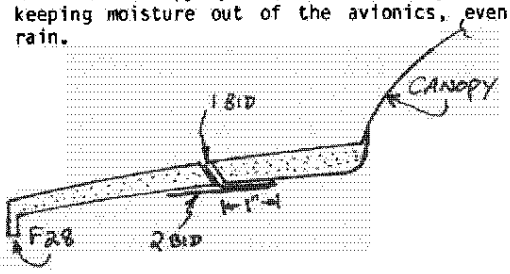
Cut out and locate the plexiglass canopy onto the fuselage per the plans. Using gray "duct tape" as a release, protect the fuselage longerons full length from the F28 to the firewall. The F28 bulkhead and firewall bulkhead should also be protected with gray tape.

Now working with 2" thick urethane foam scraps about 12" long, fit them all around the canopy per plans. They should be a reasonable fit to the canopy and to each other. Do not use micro to "glue" these blocks to each other and to the plexiglass, rather use Liquid X 40, foam-in-place (or an equivalent 2 lb/ft³ "pour-in place"-foam). Mix up small quantities and paint the liquid into the gaps and joints until the "frame is securely bonded to itself and to the plexiglass canopy. Within an hour you can carve the frame to the required shape per the plans. The "pour foam" joints will carve and sand almost as easily as the urethane and a whole lot easier than micro joints. Glass the "frame" per Long-EZ plans:

1st ply - BID at 45° overall (F28 to firewall)
2nd ply - BID at 45° overall
3rd ply - UND lengthwise, sides only
4th ply - BID at 45° front and rear only
5th ply - UND lengthwise, sides only;
UND side strips should lap 3" onto the front and rear BID.

Allow this layup to cure for 48 hours, then Bondo lumber stiffeners to the canopy frame per plans and remove the entire thing from F28 to the firewall. Turn it upside down and support it well on two saw horses. (Use Bondo to hold it firmly). Carve the inside (including all hard points per plans) and layup the same glass schedule as used on the outside, full length from F28 to the firewall. Allow this to cure 48 hours, then you can cut the front and rear covers off per plans. These edges can be treated in a variety of ways, flox corners and ply of BID is fine. Several builders have made lapped or joggled edges using dry micro for a more weather proof joint.

Mike recently installed a "drip tray" around the front cover to canopy joint, which really does a job on keeping moisture out of the avionics, even in driving rain.

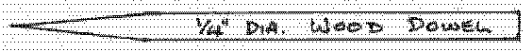


This is tough to install as a retrofit but can be done easily at the time of the original construction.

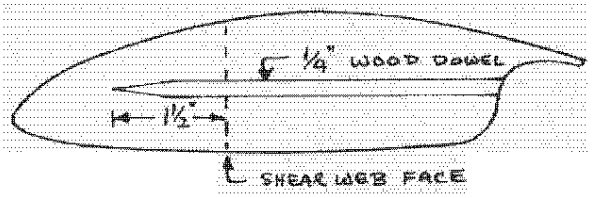
Canard Construction - VariEze and Long-EZ

Builder support on canards has been quite heavy, particularly in regards to getting the leading edge foam core bonded to the shear web, on the two inboard cores, in the correct position, vertically. If this is bonded on too low (relative to the airplane) the result will be a hollow lower spar cap and a bump in the top spar cap. This bump in the top cap is a problem, since it cannot be corrected. If yours is this way, our experience has shown that a small error here can usually be accepted provided a good job of filling with dry micro and fairing is done. The worst of this problem will be buried within the fuselage under the canard fairing block and usually will not extend much more than 10" to 15" outboard of the fuselage sides. A bump of up to 1/16" at the fuselage side, tapering to nothing at B.L. 25 each side, has not been detrimental to flying qualities.

A method we have used to eliminate this problem is as follows: Hot wire cut 4 canard cores. Before cutting the leading edge off the two inboard cores, obtain 6 pieces of wood dowel 1/4" diameter, 6 1/2" long, sharpen one end to a point just as you would sharpen a pencil.



Insert these dowels equally spaced into the trailing edge of the two inboard cores as shown. Push them into the foam, twisting them with your fingers. They should protrude beyond the shear web cut line by about 1 1/2". Now pull the dowels out and hot wire cut the leading edge foam cores at the shear web.



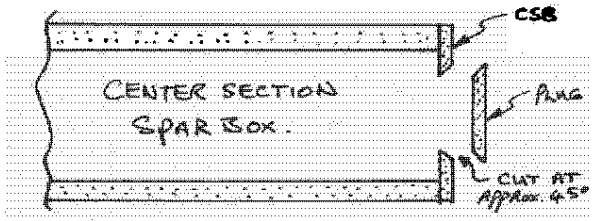
Jig the inboard cores, and layup the shearweb per plans. After this layup cures, drill 1/4" holes through the shearweb in 6 places where the dowels will go through (use a flashlight to locate the holes). Now bond the leading edge foam cores to the shearweb per plans, using micro. Paint micro onto the dowels and push all 6 of them in, until they are flush with the aft face of the canard. Complete the canard per plans. The dowels will guarantee that the leading edge foam cores are perfectly aligned and your spar troughs will be correct top and bottom. We recently built a canard using this method and ended up with a really nice contour, top and bottom, with no bump or hollow place in the spar cap area. Try it, you'll like it!

Spark Plugs - The new Champion REM37BY plugs are approved for both Lycoming O-235 and Continental O-200. On the O-235 L2C they are highly desirable due to the excessive lead fouling in these engines. For VariEze builders with close tolerances between cowling and spark plugs, the REM37BY plugs are 3/8" shorter than the standard REM40E plugs, which can mean the difference between having to install blisters on the cowl or not.

VariEze and Long-EZ CHT - On these airplanes, with "updraft" cooling, when we measure CHT at the spark plug base, if we install the temperature probe (washer type) on the bottom plugs, which is usual, we are measuring over 40° less than the temperature on the top plug. So keep in mind that if you have a marginally high CHT and are measuring at the bottom plugs, you may even be over the red line. For the record, Lycoming does not measure CHT at the spark plug base. All published data on Lycoming CHTs are taken at the threaded hole on the bottom of each cylinder head. When possible, this is the preferred pick off point.

Detecting fuel tank leaks - Most leaks can usually be detected by the tried and tested soapy water method. Occasionally however, a persistant small leak may exist that simply will not show up with soapy water. These leaks are probably located in the forward face of the

centersection spar, or on the fuselage side. A sure fire method to locate these leaks is to use a "Freon Gas Sniffer". These expensive gadgets can usually be borrowed from your local friendly auto airconditioning repair man. Simply spray a little Freon into the offending tank, pressurize it by raising the altimeter no more than 1500 feet. The Freon sniffer will quickly locate the leak. If the leak is inside the center section spar, you may have to cut through a CS5, CS6,CS7, or CS8 bulkhead. Cut a plug no bigger than you have to, to get your hand through. Cut the plug out at an angle so the plug can easily be floxed back in place.



Repair with two plies BID laping at least 1" onto the remaining panel. Now that you have the exact location of the leak, you can suck a 1500 ft. lower than ambient pressure, causing a slight vacumm. Paint warm epoxy over the leak area, working it in with a brush or rag. Do this for a couple of minutes. Then open the tank to ambient pressure. This is most important, since the epoxy that was drawn into the leak, would continue to be drawn in until the leak was once again there. You want the epoxy to cure in the leak area.

Incidentally if you intend to install position lights/strobes and/or antennas in the wingtips, you will need holes in the CS5, CS6,CS7 and CS8 bulkheads to run the wiring and coax through from the wings to the fuselage. A maximum of a 2" dia. hole may be cut through the center of each bulkhead.

Engine Vibration

Occasionally a builder/flyer will call with a mysterious engine vibration. Our own experience in this area has included, prop balance (never assume even a new prop will be in perfect balance), spinner not running true, baffling touching the cowl (the aluminum, not the neoprene asbestos, which obviously must lap onto the cowl), exhaust system touching the cowl, and one more we had not seen before which Nat Puffer sent in, the hose clamp around the intake manifold rubber sleeve (Lycoming O-235) was touching against one of the lower dynafocal engine mount donuts. This was not apparent at rest, nor did it occur at run up. Once the engine was turning up a high power, the torque was twisting the engine enough to touch at this point. The result was a high frequency vibration, that was extremely annoying, even worrying.

Cutting Glass Cloth

Marc Boram sent in this hint for easy cutting of glass cloth, both UND and BID. Marc uses a regular utility knife which is sharpened on emery paper before and during each use. The key to success is a large piece of sheet rock as a backing board for the fiberglass. The knife is pulled across the glass at a very shallow (5°) angle, with just enough pressure to cut slightly into the surface of the sheetrock board.

A straight edge is useful for holding the glass in place for straight cuts, but is not absolutely necessary. For curved cuts, lay out the patterns on the cloth with a felt tip pen, then cut them out with the utility knife. Good conservation of cloth and extremely rapid cuts are the result. Sharpen the knife blade often, and remember you can use both sides of the sheet rock.
Caution: Small strips of the cutting surface may contaminate your cloth, so inspect carefully and change your cutting surface often. Glass cloth must be kept obsolutely clean. If it is ever exposed to water it ever be discarded.

Sterling Primer

We are still using& recommending the Sterling Primer filler. While a few builders have reported experiencing problems, our own use of the material has worked well. The two part material should be thorougly mixed at a 50:50 ratio. Do NOT wait. You have only about 30 minutes of pot life. Either paint it on with a brush or spray it on. Do not leave it in your spray equipment for too long. This is a urethane material and if it sets up in your spray gun, that will probably be the end of your gun! One of the problems we have seen with Sterling has been pinholes. Dick Kriedel sent the following suggestion - do not use a cheap suction spray gun, these seem to produce many pinholes using the Sterling. Use a good quality spray gun such as a Devilbiss JGA502 with a pressure pot. Use fluid tip and needle "FF with a #704 air cap. This is a very large orifice on the fluid tip and the #704 air cap provides a 12" -14" fan. The advantages of using a large fluid tip is that you need very little air atomization pressure to move a lot of paint. The best combination is 15 to 20 PSI on the pressure pot and 25 to 30 PSI on the air atomization. A big advantage of low air atomization is that the overspray is almost non existant. Most of the paint stays on the work. We were able to spray Sterling, mixed with up to 25% by volume with micro ballons.

Sterling can usually be sanded within an hour, compared to over 6 hours when using feather fill.

Epoxy Ratio Pumps - The manufacturer of the ratio pumps, Michael Engineering, has asked us to pass on the following information regarding regular maintenance.

The check ball on the hardener side should be cleaned every 6 to 12 months. It is located just behind the brass fitting on the front of the pump body. The hardener tends to 'plate' onto the ball, which causes it not to seat perfectly. This allows hardener to drain slowly back and it may not flow on the first stroke of the pump at the next use. Simply take the fitting off, clean the ball and seat with solvent or newspaper, and replace the ball, spring and fitting. Another option is to "coin" the seat by putting the ball in place and striking it gently with a brass punch and hammer. This will assure a perfect seal. Be careful that the spring does not get caught in the threads when reassembling pre-1981 models.

Remember to subtract the weight of your containers before calculating the ratio, when checking your pump ratio.

FROM THE BUILDERS AND FLYERS

First flight from Debbie Iwatate.
"Long-EZ N455EZ flew for one hour on it's first flight October 31, 1982. It went so smoothly that we found ourselves thinking, "is that all there is to it!", after the landing. A big reason for having an uneventful first flight was our friendship with Bryan Giesler (VariEze 90331). By the time we were ready for flight testing the Long, I had accumulated almost 15 hours of back seat time and 3 hours of solo time in his aircraft .....that does wonders for a persons confidence! The only changes we have made to the plane are to change to REM37BY plugs, modify the upper brake arm (BA) to make it an inch longer to increase the braking effectiveness, and change the pitch trim spring lengths to gain more nose down trim authority. I have flutter tested up to 198 mph IAS, stalls are at 60 mph engine idle (straight forward and smooth) and 55 mph power on. We are burning about 4 - 4 1/2 gallons per hour average.

It took us about 2000 hours to build the plane (325 for the finishing) and that was spread over 21 months. We didn't cut too many corners on cost and our final cash outlay was around $18,000 (well worth every penny). Many thanks to you Mike, for your assistance every time I called for help.

Incidently, the nose (side) airvents work very well! Leading the air into the cockpit through eye-ball vents, we are getting fantastic ventilation. In addition we added "exit air" vents on the sides above the CC spar "deck".

We have 33 hours on the plane now and have been signed off by the FAA. Now we can settle into the maintenance routine and get our fly-in schedule made up for the summer of '83. Many thanks to Burt for making such a project possible to folks like us.

Take Care, Debbie Iwatate".

Debbie is the first female builder/flyer to complete and fly a Long-EZ. Congratulations !!!

FROM THE BUILDER/FLYERS

Paul Williams and Max Cortner write that they have over 150 hours on their Long-EZ, also known as "White Lightening". Max is planning on a honeymoon trip to the Bahamas this month and Paul will be flying it to Phoenix in February. Paul recently had a scary incident - pitch control disconnect in flight! Happily he landed uneventfully using the pitch trim system for pitch control. They had had the canard off to seal around it and when it was replaced, the clevis pin was pushed through from the outside, horizontally toward the center, so that the safety pin was easier to install. What they think happened was that the safety pin caught on the pilot's pant leg and was pulled open.. The pin eventually worked it's way out due to being oriented horizontally and the pitch control system was disconnected.

This is a very serious thing, we should all be aware of. First of all the clevis pin should be oriented vertically and should be installed from the top so gravity holds it in place. Secondly a piece of gray tape wrapped around the safety pin will stop it vibrating and protect it from inadvertantly being opened. One school of thought would be to install an AN3 bolt and locknut in place of the clevis pin. After all, how often do you remove the canard? In any event this connection should be on everyones preflight checklist.

ACCIDENTS AND INCIDENTS

The CP Newsletter reports accidents and discusses their conditions and causes, for information purposes for all operators. We have alway investigated accidents in the interest of determining information that we can disseminate to you to prevent recurrance. It should be recognized in our discussion of accident conditions or causes that generally this information is preliminary since it is published before the availability of the FAA accident report.

From Bruce Tifft, B & T Propellors.

"Bonnie and I have always enjoyed writing articles for the CP and the Hospitality Club newsletter about our wonderful trips and adventures in our VariEze. This article is not fun to write, but necessary. We feel it is very important to share experiences - good and BAD.

Our VariEze has been destroyed in an accident that occurred on November 20 at Santa Paula Airport. I was checking out a very good friend in the front seat of the EZ. Al is a top-notch pilot and is retired Navy with thousands of hours in all-types of aircraft. In fact, he checked out both Bonnie and me in different airplanes. As you can tell, he is a very competent pilot and one I did not hesitate to let fly the Ez from the front seat. Now, as many of you know, Santa Paula is a teriffic little airport, but is notorious for its short runway (2500), obstacles and obstructions at the end of the field, and unusual wind conditions at times. We have operated our EZ out of this field for over 4-years and thus far never had any problems. Burt has always warned about operating out of such a short field with the EZ. For 4-years we had no problems, however, when we needed that little margin for unusual conditions, it wasn't there! On this particular Saturday, we encountered a very severe wind shear, (a phenomenon that Santa Paula is also famous for). The airplane performed as usual, but we went from a substantial head wind to a tailwind. Just after liftoff, the EZ fell back to the ground with all three wheels. Not too many options were available - couldn't abort and couldn't gain sufficient altitude to clear the obstructions. Al navigated us through a very thin "eye of a needle" space. We went under some telephone lines and barely over a house. The landing gear clipped the very upper portion of the roof of the house, and the left wing collided with the T.V. antenna. This dropped the nose just enough to miss electrical wires carrying 440 volts.

Under the wires, a cable T.V. coax one inch in diameter went over the pitot tube and around the canard and stayed with us turning us around 180°. The airplane impacted the ground on the spinner and flipped almost inverted. Al remained in the front seat, and I was thrown through the canpoy. Dragging this huge cable slowed the plane sufficiently to allow us to escape with our lives and relatively few injuries. We also attribute our survival to the incredible strength of the EZ. We feel sure if we had been in a conventional airplane we wouldn't be here to write this story. Also, there was no post-impact fire, a fact that again saved my life since I was saturated with gasoline. We would also like to pass on our thanks to Jack Hooker at Hooker Harness Company. Al's seat belts were intact, and he had to release them to get out of the plane. I was thrown from the plane on impact, but my seat belts held through all that crashing around and when they did fail, actually pulled part of the fuselage with them. The shoulder harness attach straps were bent up past 90°. Certainly can't beat that for strength. Only one engine mount extrusion failed at a bolt hole, the mount itself let go. The airframe has been demolished, however, the Lycoming rep feels sure the engine is still useable and the front cockpit are pretty much intact. The radio and most of the instruments are still good. Al sustained a nasty cut on the back of his head, cut behind his left ear and miscellaneous cuts, bruises and aches and pains. I cracked my pelvis in two places, broke a rib, bruised a lung, had gasoline burns on my back and under left arm, and a burn on my left hand from pushing away from the exhaust pipe, also a nasty blow to left kidney and shoulder. However, we are feeling very lucky to be here.

As far as our B & T Propeller customers, I have been slowed down a bit from all this, however, I am back in the shop (with the help of a cane) and will get your props to you as soon as possible. Would appreciate any time you can give me if your project isn't ready to fly.

It was heartbreaking to lose our beautiful little airplane, but we have received so much support and expressions of caring from so many people that it really pulled us through this tragedy. Bonnie and I have often talked about what a terrific life-style we have enjoyed since having the EZ and all the wonderful people we have met and made friends through it. Our very deep appreciation and gratitude goes out to all of you who helped us through this difficult time (especially Mike and Sally Melvill, Les Faus, Frank and Margie Tifft).

Now, to end on a happy note ..... we have made arrangements to buy a very good friend's Long-EZ project. Chuck Gardner has modified the fuselage somewhat, but it is still basically a Long. Chuck has done impeccable work and we are thrilled that he will let us take over his project. Chuck was sensitized to the epoxy and felt he could not work on the plane, but had put so much hard work and love into it, he wanted to see it finished and flying. We'll work together on getting this accomplished. So, we will have another EZ flying before too long and join in again with all the fun and happiness that goes along with owning one of these terrific airplanes".

Comment: EZ builders/flyers operating over normal gross weights and out of short airports, take note!

A Southern California VariEze flyer/builder crashed into the bay on short final at Palo Alto, during a night approach. A critical nut and bolt which had not been installed correctly came loose, causing the airplane to suffer a pitch control disconnect. The VariEze was completely destroyed by the impact with the water at approach speed. The pilot suffered a serious back injury but was able to swim to shore.

A California VariEze pilot was fatally injured when his recently completed VariEze crashed. Eye witnesses reported hearing the engine missing, then finally stopping. The aircraft banked into a right turn, which rapidly developed into a tight spiral. Just prior to impact the engine roared into life. The aircraft was destroyed by fire after the crash. The accident is under investigation. Cause has not been determined.

A VariEze crashed on its first flight in Southern Indiana. The builder/pilot was fatally injured. The following report is from the pilot of a chase pilot.

"He was in no hurry at all to fly. Did not intend to fly. Took off, looked good, well under control, climbed to about 300 feet. Used runway 04. I was in a Luscombe. The VariEze made shallow turns, when he got on downwind, it was obvious that he was descending. His

turn and descent continued until he clipped the top of a low tree (30 ft) and then hit the ground. The airplane broke up, pilot was thrown out. Fire broke out about 5 seconds after the impact. Flight was not erratic and I feel that maybe something happened to the pilot, since he never made any recovery motion at all, did not retard the throttle at all to impact nor did he try to level the wings, nor did he try to pull up. He was about 59 year old."

Prop Windmill and Forced Landings

An EZ's prop will windmill at flight speeds above 65 to 70 knots. However, while practicing slow- flight or stalls at 60 knots or less, if your engine's idle is set too low, or you run out of fuel on one tank, the engine may not only quit running, but the prop may stop. Should this happen, and you do not have a starter, keep calm , switch tanks, verify mags on and mixture rich. Push the nose down and build up at least 135 knots (155 mph). The prop will begin to windmill at 125 to 135 knots and the engine should start.

A windmill start uses less altitude if you initially dive steeply to rapidly attain the 135 knots. If you are faced with a forced landing for any reason, pick out a smooth spot and execute a NORMAL landing. Extend the nose gear and speed brake and land as if you were on your home field, DO NOT try anything fancy. Make a normal landing. If there are obstacles in the field, guide the fuselage/cockpit between them.

Turbo Chargers and EZs

This subject is starting to come up more and more lately. Review - first, RAF does not recommend a turbo charger on a VariEze or a Long-EZ. These aircraft, when operated within the normal envelope and at normal gross weights are probably the last aircraft to need a turbo charger. They are excellent high altitude airplanes having the capability to climb well over 25,000 feet. Turbo chargers and their associated parts are heavy, 20 to 25 lbs for an average installation. This is right on the tail, absolutely the worst possible place to add weight.

A turbo charger installation without a constant speed prop is self defeating. If you keep your standard prop, your engine will over rev at altitude. If you install a larger prop to take advantage of the additional horsepower available at altitude, your engine will not be able to turn up enough RPM static, and you will have marginal, possibly even dangerous take off performance. Remember your turbo will not help at lower altitudes. (unless you overboost - a certain way to destroy your engine).

For accceptable take-off performance, you must be able to turn at least 2400 RPM static, (2500+ PRM is better). Constant speed props are not recommended at all. Weight, complexity, initial expense, maintenance cost, and unreliability while running in the wake of the wing/centersection are excellent reasons not to fool with these props. Use good judgement - the simple, lightweight, wooden, fixed pitch props have a good history and with care and attention to checking bolt torque at required intervals, can give long, reliable service.

Avoid First Flights with 'Zero-time-type'.

When your EZ is ready for first flight, relax, take stock, be honest with yourself. In this day and age there is no reason for a person to have to do a first flight "cold turkey". There are enough of these aircraft around now that there is little excuse not to at least get a back seat ride. If you do not feel confident, get an experienced VariEze or Long-EZ pilot to do your first flight. Do not let pride get in your way. Having an experienced EZ pilot do your first flight is very often the smartest move you can make.

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PLANS CHANGES.

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

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

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

LONG-EZ PLANS CHANGES

LPC #108 MEO — Section IIL, pages 7 and 13. The brake master cylinder is shown mounted on the inboard ide of the CS73 bracket on Page 7 , which is correct. It is incorrectly shown outboard of CS73 on Page 13.

LPC #109 MEO — Add the following to the parts listed on page 2-1 of the Long-EZ plans under "custom prefab parts" by Ken Brock Mfg.

Lycoming exhaust system
Dynafocal engine mounts
Conincal engine mounts
A484 back up rings (4 required 2 each)
J1.25 axle nuts (2 required)
LE2-LL landing light mounting kit
LMBG1 forward main gear attch brackets(2)
LMBG2 aft main gear attach brackets (2)

LPC #110 — Add the following to the Owners Manual, page 22 under "Engine Out"
"A windmill start uses less altitude if you initially dive steeply to rapidly attain 135 knots.

Clarification Plans Change LPC #82 , CP 30, page 9. This has been causing some confusion. This change was simply to clarify the orientation of the one ply BID called out in Section I, page 5-2. This ply is not an addition. It goes full span along the longerons and laps onto the inside skins 1/2", and should be at 45° to the longeron, not at 90° as some builders have tried to install it.

VariEze Owners Manual Change.

Add the following to the Owner's Manual, page 19, under "Engine Out"

"A windmill start uses less altitude if you initially dive steeply to rapidly attain 135 knots".

SHOPPING

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

RAF has T-shirts in stock. We have pale blue and cream shirts with a Long-EZ and the logo "Laughter Silvered Wings" for $8.00. We also have the white T-shirts with a cartoon type EZ on its nose with the logo, "I fly a nose dragger", at $7.00. All the shirts come in adult sizes, small, meduim, large and extra large. Some children sizes are also avaliable. The ladies shirt in both types is the french cut style. Don't forget to let us know your size and color preference.

We have the Long-EZ and VariEze silver belt buckle in stock in the both the rectagular shape and oval - small and large in both. $25 each.

Byron McKean's Compuflight is now available as an integral unit or as a remote mounted unit ready to install, including the "gizmo". Write for an order form.
Basic Compuflight $229.95
Remote Compuflight 259.95
Contact:
McKean Systems Inc.
Route 1 Box 429-B
McQueeny, TX 78123
512-557-6575

Batteries for VariEze and Long-EZ.

We have recently tried a manifolded battery made by Yuasa General in Reading, PA, called a Yumicrom battery. It is supposed to last 4 years if properly cared for and puts out a lot of power for its size and weight. Mike has two, part # YB14L-AZ, 12 volt, 14 amp batteries in his Long-EZ, which is a 24 volt system. They easily handle the load of starting the O-235 Lycoming. In the Solitaire, we use a part #YB16-B, 12 volt, 19 amp which would also be excellent in a VariEze or Long-EZ with no starter. We obtained these batteries with a neat battery charger from :

Cycle Battery Supply,
8104 South Freestone Ave.
Sante Fe Springs, CA 90670
213-698-2211

The battery charger is pocket sized, plugs into 10 volt AC like a calculator charger, and features a snap connector that eliminates reversed connections, that is wired permanently to the battery.

The Electric aircraft cabin heaters such as the one Mike has been testing in his Long-EZ, are now being manufactured and sold by:
Dolphin Marketing Ltd.,
9999 South 248th Street,
Kent, WA 98031
206-859-1999

Cabin Heat

These are excellent heaters, small, lightweight and reliable. Mike gave his a good test a few weeks ago when he climbed to 23,000 feet to do some fuel flow testing. The temperature was -25°C and yet he says his feet were quite comfortable.

The most important thing is to seal every little gap where air might blow in, as best you can. Make a cover to go over the top of the nose gear crank mechanism, between the NG30 bulkheads (2 plies BID). Seal around the canard to fuselage juncture, using RTV silicone. Seal the gaps fore and aft of the elevator torque tubes with soft sponge rubber, glue it to the canard and fuselage with RTV silicone. Be certain that there is no interference or friction with full elevator travel. Most important, your battery must be the manifolded type and it is mandatory that it is vented overboard. For 12 volt systems the 20 amp model will probably be best for most, while for 24 volt systems, the 16 amp model is fine. Mike uses a 24 volt, 16 amp model, since his Long-EZ is 24 volt. When using this cabin heater you must have at least 20 amp (10 for 24 volt system) alternator output above other drains.

FOR SALE

Factory fresh Lycoming O-235-L2C specifically built for Long-EZs.
Contact:
Norm Bender,
P.O.Box 30343, Memphis, TN 38130
901-794-0032

In the crate, new Lycoming O-235-C2C, 80 octane $6500
Contact:
Bruce Tifft,
8746 Ventura, Ventura, CA 93001
805-649-2721

1978 Lycoming O-235-L2C complete. 320 TT since new. $4900. Engine has been nitrited and all ADs complied
.
Call Tracy - 805-822-4668

Lycoming O-235-C2C - 1540 TT. All accessories.
Contact:
Big Sky Aircraft
P.O.Box 538, Lewiston, MT 59457
406-538-8150

Lycoming O-235-C2C - 1466 TT. All accessories except flywheel.
Lyco ing O-235-C2C - Zero since major, complete
2 Continental O-200 - Zero since major, complete.
Contact:
Frank B Johnston,
Box 32245, San Antonio, TX 78216
512-494-6608

Lycoming O-235-C - 36 hours SMOH, complete. $3700
Contact:
Gary Klippenstein,
Box 533, Altona, Manitoba,
Canada ROG OBO

Wes Gardner is still selling his excellent, reusable foam air filters. Wes has some other neat "EZ" items. A retrofitable fuel sight gauge, for those with poor translucency in their gages and an oil separator system that takes the place of the starter cover on an O-200 Continental and this is guaranteed to remove all traces of breather oil mess on your cowling. Wes is still working on a similar one for the Lycoming engines. Mike will be installing it shortly on his Long, N26MS.

Contact Wes for more information:
Wesley Gardner,
1310 Garden St,
Redland, CA 92373
714-792-1565

Original VariEze main gear and nose gear struts.
Contact:
Harlan Wilhelm
P.O.Box 87,
Post Falls, ID 83854
208-765-6027

Collins transponder, model TDR950 T50 Class IA, brand new, never used - $600
Contact:
Eugene Schreckengost,
Ridgecrest, CA
619-375-2064

Neal Johnson is updating his excellent plans changes/ builder hints index to include CP35 and additional builder hints not incorporated in the last issue. Price is $8.50
Contact:
Neal Johnson
1011 South Grand St.
Monroe, LA 71201

VariViggen News.

Sunday the 28 November '82, I visited with Charles Cowan and Bill Campbell at Rialto Airport, where they had their new Viggen N82VV, (see photo) ready for it's first flight. After a little problem with mag wiring, we got it running well and I went out and made the first flight. It flew just like the other Viggens I have flown, except it was down on power (later traced to mag timing). I did not retract the gear on this first flight so was unable to look at the high speed end of the scale. Congratulations to Bill and Charles.

We have been doing quite a bit of flying in 27MS lately in relation to some laminar flow testing Burt needed. It was most interesting to note that no.trim change at all was noticable to the pilot. N27MS has accumulated 575 hours to date. The original prototype N27VV had just over 600 hours when retired to the EAA museum. Arthur Schwartz has over 200 hours on his Viggen. Looking at our records, we show a total of 15 VariViggens having flown. It takes a long time and a lot of determination to build a Viggen!

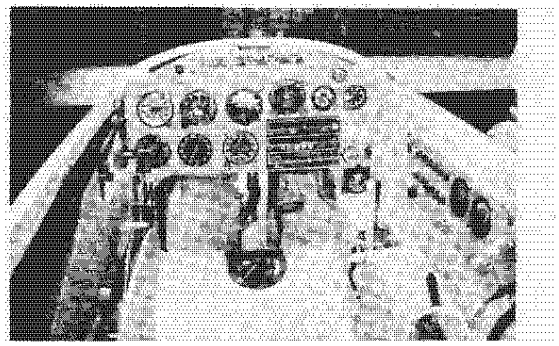
The list of Viggen builders who wish to share information and experiences has grown to 17. This list of names is sent to each of the builders on the list. If you are building a VariViggen and would like to have your name, address and phone included on this list, let us know. We update the list at newsletter time and it is mailed out to all those on it.

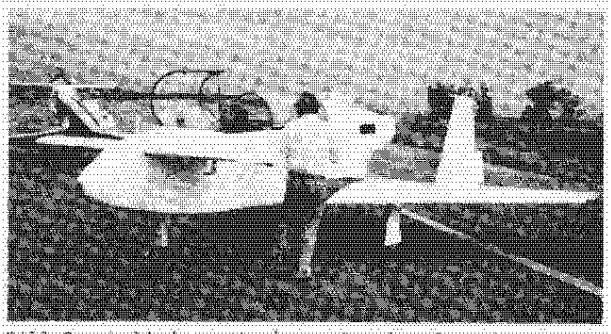
The amount of feedback we recieve from Viggen builders is virtually zero. A builder called the other day and was really upset that we devote most of the Newsletter to the Long-EZ and VariEze. The biggest reason for a lack of Viggen news is a lack of builders interested enough to get back to us. We have asked for builder/flyer input and the results have been dissappointing. If you want more information in this CP, send it in.

For Sale - Viggen project - contact:
Carroll Holzworth,
P.O.Box 26,
Ft. Morgan, CO 80701
303-867-2487

For Sale - Viggen project - contact:
Tom Gierhart,
916-459-3456 - Work
916-459-5329 - Home, after 6pm

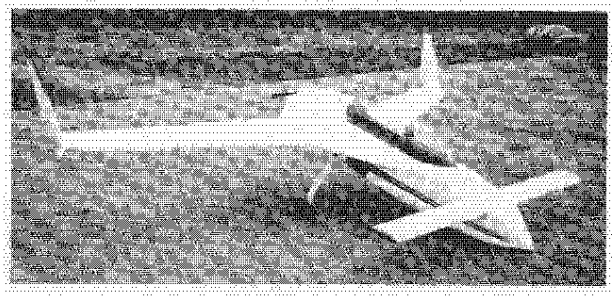
From Switzerland, Paul Schneider's Long-EZ, now flying Looks like a basic IFR panel. Note Space Saver Panel on the right.



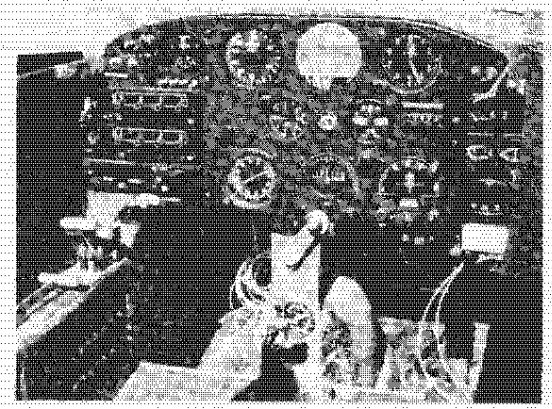


Bill Campbell (standing) and Charles Cowan's new VariViggen, N82VV, ready for first flight. What? Two Viggens on one airport ?!?!

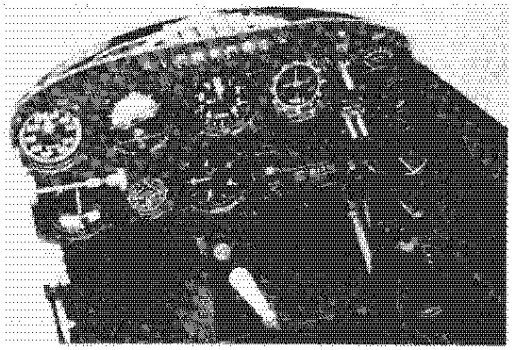
Dan Hummel's beautiful VariEze N79DH



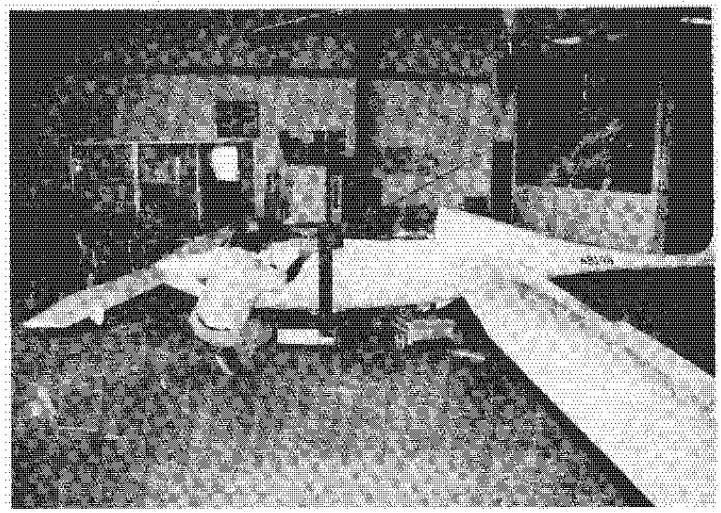
From "Down Under", Victoria, Australia. Jim Glinderman's idea of what a Long-EZ instrument panel should look like. Note circuit breakers on left console.



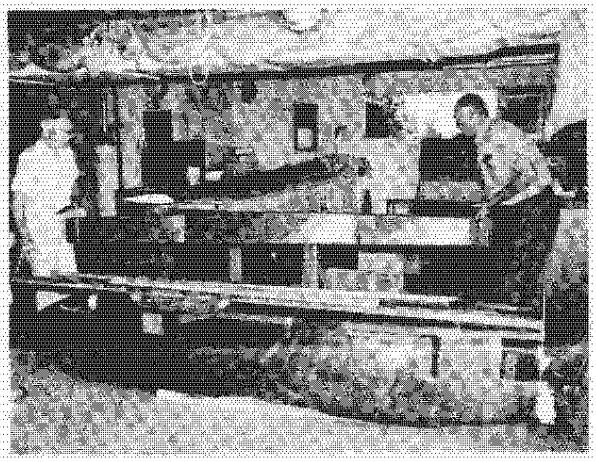
From England, Ivan Shaw's instrument panel. Registration: G-IVAN !



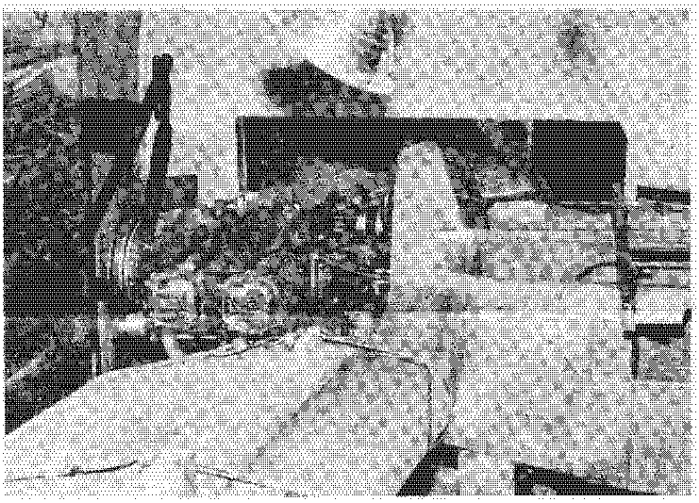
Burt and Mike preparing Solitaire for a flight at the SSA contest in Tehachapi.



Einar Enervoldson conducting a weight and balance on Solitaire before a performance test flight.

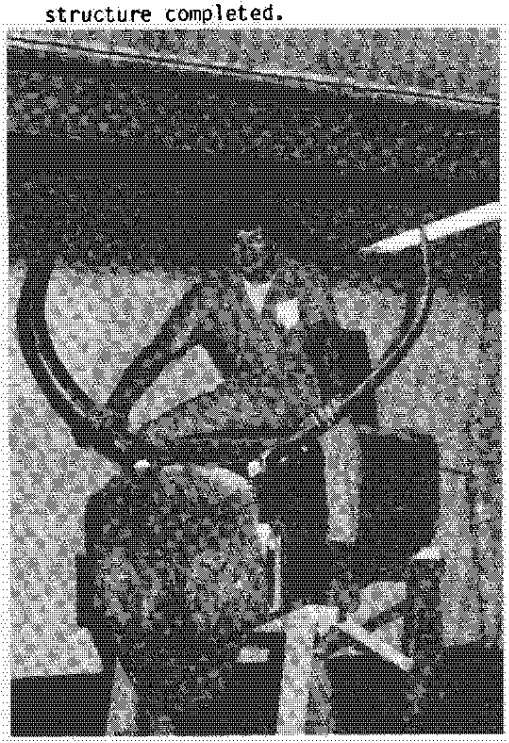


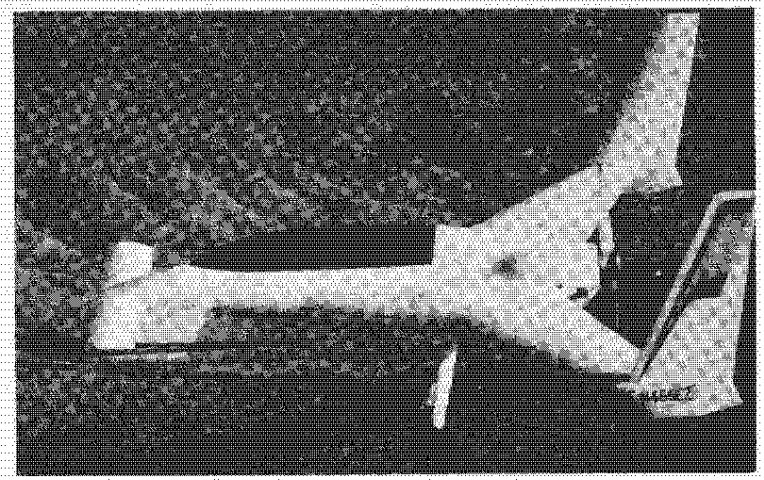
Bill Durland and Gordon Boyer, all major structure completed.



Dick Pretice cut a hole through his garage wall to solve the problem of installing both wings at the same time in a single car garage.

Mark Borom. Got the main gear on !!

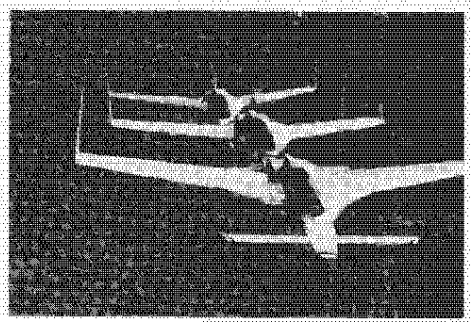


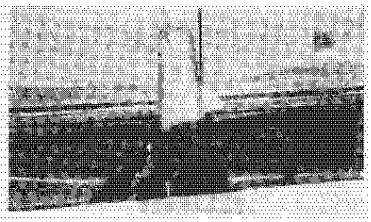


Debbie Iwatate - first flight of her Long-EZ

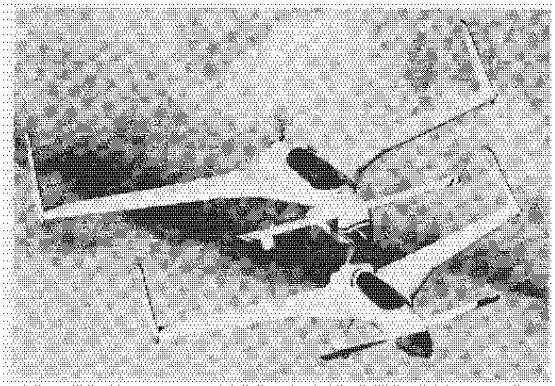
Brief Long-EZ specifications/performance.
Engine — Lycoming 0-235 108 hp.

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





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



LONG-EZ DOCUMENTATION

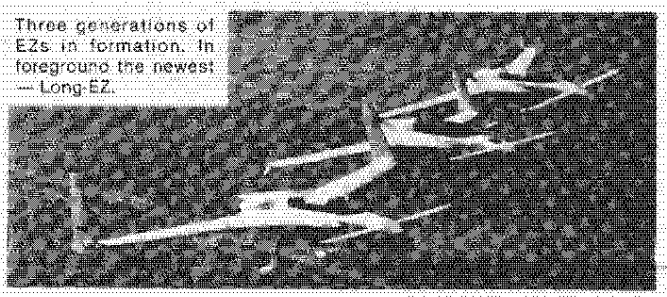
SECTION I — MANUFACTURING MANUAL — This is the complete education manual for composite materials and methods, also, the complete plans and construction manual for the entire Long-EZ except engine installation and landing-brake. The manual consists of a 180-page, bound 11" x 17" book plus 14 larger full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

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

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

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

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



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

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

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

ALL RAW MATERIALS AND PREFAB FIBERGLASS PARTS

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

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

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

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

Main and nose gear, fuel strakes, fuselage bulkheads.

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

Canopies are available from **RUTAN AIRCRAFT.**

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

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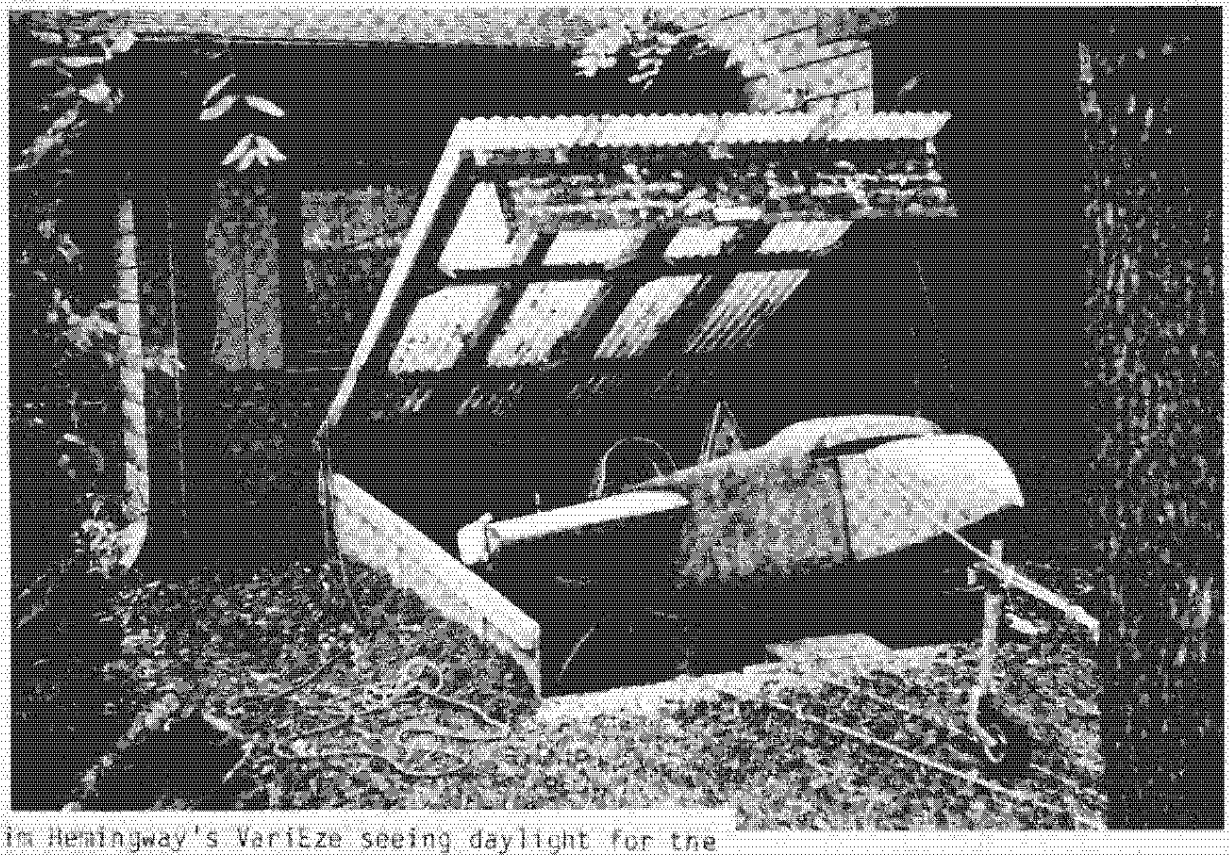

Jim Hemingway's Varieze seeing daylight for the first time.

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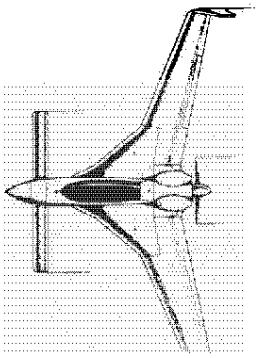
Mojave, CA 93501

first class mail



TO:

The line which appears above your name on your label contains two numbers. The first number is your subscription number. **PLEASE INCLUDE THIS NUMBER WITH ALL RENEWALS**, and state that you are a renewal. The second number is the last newsletter issue which you will receive. If your label says **LAST ISSUE -CP 35,** then this is your last issue and you need to renew.

Jan. '83

CP 35