

THE CANARD PUSHER

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Note! Price increase for the Canard Pusher Newsletter. This is due to the higher costs of the paper, printing and builder support. This is our first increase since CP# 1 in 1974.

If you are building a VariViggen from 1st Edition plans you must have newsletter 1 through 22. If you are building a VariViggen from 2nd Edition plans you must have newsletter 18 through 22. If you are building a VariEze from the 1st Edition plans you must have newsletters 10 through 22. If you are building a VariEze from the 2nd Edition plans you must have newsletter 16 through 22. 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 9:00 to 12:00 and 2:00 to 5:00 on Monday through Saturday.

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 fly-ins.

When writing to RAF always send a stamped, self-addressed envelope along if you have questions. If you are making an order, its 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 your reply.

RAF Activity since the July newsletter has included developmental tests on the Long-EZ, flyins to Oshkosh and Columbia and builder/flyer support. The Defiant program is inactive, awaiting financing.

COMPOSITE WORKSHOP - VARIEZE, VARIVIGGEN & QUICKIE
 A construction - composite seminar will be held at RAF, Building 13, Mojave Airport, Mojave, Ca 93501, on November 24th, 1979. Since construction methods are similar, we are doing this jointly with Quickie Aircraft Inc. There will be flight demonstrations of the Quickie, EZ, Long-EZ, VariViggen and Defiant, between 10 am and 11am. Lunch will be arranged from 11 to 12:30 and the workshop will run from 12:30 to 5 pm. Builders are encouraged to bring parts, particularly if you have a part that you are unsure of, bring it so that it may be inspected, or used to educate other builders. Mojave Airport is a two hour drive north of Los Angeles on Highway 14: 25 miles on the 335° radial from Palmdale Vortac. Bring folding chairs if you can, wrap up warm, it can be chilly at Mojave in November.

OSHKOSH 1979 - All of us at RAF flew to Oshkosh this year and had an enjoyable trip. We took two new aircraft - Long-EZ and Defiant, also Mike and Sally's VariViggen plus a Grumman Tiger. Due to an "off the cuff" comment to Jack Cox last spring we found ourselves committed to a non-stop Mojave-Oshkosh flight with the Long-EZ - Defiant. We were also scheduled to fly in the opening day airshow, so why not take off from Mojave to do it? After all, theres no arrival traffic at airshow time! So opening day we fueled up the airplanes, put three people plus baggage in the Defiant and took off on our 1780 mile trip. The flight was beautiful - excellent weather and good winds. Because we didn't

know how long we would orbit to wait our turn in the airshow the Defiant made a refueling stop at Laramie WY while the Long-EZ, not wanting to wear the tires unnecessarily, orbited over-head. We arrived at Oshkosh after 9.9 hours flying time (Long-EZ) and found we had to orbit about an hour for our slot in the airshow. Mike Melvill, who flew out two days before, joined us in the orbit and we did our three ship routine before the largest crowds ever at Oshkosh. Average speed for the Defiant/Long-EZ on the trip was 180 mph including the Laramie stop (189 mph stop not included). The Defiant burned 11.2 gal/hour, Long-EZ 5.4 gal/hour. Average tailwind was about 10 knots.

All three of our aircraft flew numerous times during the week in the airshow, fly by pattern and demos. One afternoon EZ pilots literally saturated the fly-by pattern with VariEzes. The Long-EZ flew, after the non-stop from Mojave, two airshows, a demo, a trip to Fond du Lac and a practice LBF lap and still had two hours of Mojave fuel remaining!

It was certainly exciting to see 41 VariEzes at Oshkosh. However, the icing on the cake was when the Grand Champion Custom Built award went to a gorgeous Canadian VariEze built by Norman Ross. See the October 1979 Sport Aviation magazine for an excellent article on Norm's airplane written by Jack Cox. Incidentally Norm also won the Grand Champion prize at the Tullahoma Flyin in Tennessee.

The following are those who attended the 1979 Oshkosh event:

N79RA	Dick Rutan	Ca (Long-EZ)
N78RA	Burt Rutan	Ca (Defiant)
N27MS	Mike Melvill	Ca (VariViggen)
N111EZ	Jeff Rose	Tn (VariEze)
N76WJ	J & W Melville	Ca
N66EZ	Bob Vaughan	Tn
N20VE	J.L. Murphy	Fl
N77LF	L. Foster	Ca
N240EZ	George Scott	Ga
N2NP	Nat Puffer	Mn
N752EZ	Steve Stuff	Wa
N34EE	Stan Hill	Ca
N2280K	John Neils	Mt
GCMEZ	Eric Taada	Canada
N7EJ	E. Freeman	Co
N22809	Ray Cullen	Or
N51WC	M Stockton	Ks
N37840	Fred Keller	Alaska
N18VL	V. Larson	Co
N770DY	D. Yoakam	Fl
N7WC	W. Curd	Mo
N91CL	C. Langerud	Tx
N57EZ	B. McKean	Tx
N837	B. Duarte	Tx
N27RG	R. Ganzer	Ca
N26JW	J. Wright	Mo
N4ZZ	Ken Swain	Ca
N90331	Bryan Giesler	Co
N9113A	W. Brin	Ca
N79PJ	Phil Supan	Ca
N301RW	R. Woodall	Ma
N123EZ	B. Muirhead	Co
N13CF	C. Cottle	W.Va
N25TB	Tom Bradford	Ky
N84ST	Ken Forest	Ca
GCVEZ	Norm Ross	Canada
N747TC	Ted Cassidy	Mo
N37S	River Stone	S.C.
N575JW	* J. Wagner	Mi
N17DR	* R. Williams	Mo
N5WJ	* E. Wielan	Mn
N41G1	G. Laurenzo	R.I.
N808CM	* Cal Molina	Mi
N48EZ	Ray Richards	Oh

* These pilots did not register at Oshkosh.

LBF RACE 1980 - We are planning a VariEze class within the LBF competition. (see October 1979 Sport Aviation). The VariEze is not designed as a race aircraft and is thus not competitive enough to win the LBF. However, a class for just VariEzes, with its own separate award/prize would be appropriate, competitive and fun. We are suggesting that EZ's enter under the single place rules rather than two-place so they do not exceed gross weight limits. They would thus compete with each other for a prize awarded to the best three category (L, B & F) performance for an EZ. See page 23 December 1978 issue of Sport Aviation for complete race rules.

We are looking forward to a lot of VariEze participation next year so start planning now. The only rules (besides the LBF rules) is that the structural materials and external shape/size of the airplane be per VariEze plans. Cleanup items like wheel pants, fairings, etc are legal. Any engine is legal. We are working on a sponsor for the prize money and will report on this in CP 23 or 24.

The following is a list of those EZs that have flown since CP #21. If you know of someone who should be on this list, contact us so they are included should an emergency safety advisory be necessary.

Bill English	Houston	Tx
Terry Brokaw	3 Rivers	Mi
David Morgan	Middletown	Oh
Lee Roan	Temple City	Ca
Stan Hill	Santa Barbara	Ca
J. Chestnut	London	Ky
H. Steinhoff	Goleta	Ca
R. Johnston	Tracy	Ca
Bill Stamm	Bellview	Wa
Bob Woodall	Adelphi	Md
G. Bowman	Tok	Alaska
John Collan	Louisville	Ky
Elsworth Hame[?]	Waynesburg	Pa
Ted Martin	Rosewell	N.M
Bruce Evans	San Deigo	Ca
Don Neary	New Fairfield Cn	
Cliff Winter	Huntsville	Al
Jim Trombino	Waukegan	Il
Jim Langley	Leavenworth	Ks
Roger Klemm	Champaign	Il
Joe Lawyer	Mesa	Az
Jeff Danes	Australia	
Greg Coln	N. Ridgeville	Oh
M Perry	Brookshire	Tx
K. Jeffers	Less Summit	Me
J. Steichen	Downers Grove	Il
F. Fergus	La Mirada	Ca
D. Freeman	England	
E. Pruett	Tracy	Ca
T. Gehres	Orlando	Fl
Dave Wenen	Littleton	Co
Edra Parker	Buena Park	Ca
D. Martin	Fresno	Ca
Ray Eby	Wilkesboroug	NC

VARIIZE HOSPITALITY CLUB FLYIN - A total of 18 Airplanes flew into Columbia, Ca over a two day period, 20 & 21 of October. Unfortunately it rained Saturday, but was perfect all day Sunday. The EZ from the farthest south was from Chino, unfortunately none of the guys from San Diego made it, due to bad weather. In fact, if weather had not been a problem, there was a potential of around 30 VariEzes flying in. The Defiant, VariViggen and Long-EZ flew in from Mojave. Don Shupe made up a few awards, Ed Hamlin - for Best builder support. Les Faus - for giving the most back-seat check-out rides and most hours (100 and 475 hr. t.t.). Bruce & Bonnie Tift - for Super Flyin coordinators. Dick Rutan - for a "Reluctant" Aerobatic Instructor. Everyone had a great time and all were in favor of doing it again soon. Probably January or Febuary, time and place, not decided.

VARIIZE FLYIN, GAINSVILLE, GA - The "Real" George Scott of Cumming, Ga, organized a flyin over the weekend of 20th & 21st October and had six VariEzes fly in. Three wards were given, Bob Woodall - the Longest distance award. Robert Vaughn - The best overall and the best interior. Jeff Rose - the spot landing contest.

VARIIZE OPERATOR EXPERIENCE - we recieved many favorable comments about this section of Newsletter 21, so we will plan to make it a regular column. Bruce and Bonnie Tift - "Here's a fun trip for a Eze owner. You leave on Friday - spend Friday night and half Saturday at the Hollister Flyin with eleven other Ezes. Then we left with three other Ezes (Hamlins, Shupes and Les Faus) and flew to Auburn for lunch. We spent the night at the Hamlins. Late Sunday afternoon we flew over to Mendocino but found it was fogged in - so we proceeded to Napa for a late lunch (San Francisco area).

Early Monday morning, the Shupes left for Los Angeles

and we proceeded north on our way to Paco, Washington. Flying over country like Mt. Shasta and Crater Lake was certainly a thrilling experience. We spent the week with relatives in Pasco - giving rides to the nephews and to a very nice hangar owner who gave us corner of his hangar for the week - you know how we can squeeze in. We participated in the Blue Skies fly-in the following week-end and did a few fly-bys for the spectators. The Shupes and Hamlins stopped for Saturday evening and then were off Sunday on their way to a Canadian vacation. Sunday morning we headed for Mariposa and then on home Monday.

The trip put 18 hours plus on our Eze which is the longest single trip we have had in our airplane and loved every minute. Perfect weather and perfect Eze performance made for a fun and inexpensive trip. We have total of 131 hours on the Eze now and are looking forward to many more enjoyable excursions".

The "Real" George Scott - "Interesting problem flying a VariEze cross country - I was east bound level at 5500 ft. Another aircraft appears to the right also east bound at the same flight level on a path that will cross slightly behind us. He thinks we are going backwards and since the aircraft to the right has the right of way he turns to the right to pass behind us! I'd sure like to hear his version of what he thought he saw and the evasive maneuver that followed!"

Larry and Janet Lombard - "just a short note in appreciation for the follow-up on the fuel contam. problem. Fortunately, our EZ shows a clean bill of health.

We flew the trek to Alaska via Alcan and had a wonderful vacation. We stayed with Tom Kuffels, Fred Kellers and fished a lot. Those folks up there are Great people. We flew the 2600 plus mile trip (one way) on about \$100 fuel and averaged 155.8 mph. Our longest leg was 770 miles at 4.45 hour and (with one hour reserve) Janet didn't show too many signs of fatigue. We were a tad over gross though - - - about 1130 for take off, really makes that C-85 grunt. We had many requests for buzz jobs by Canadian towers . . . and they wanted it in tight over the ramp, not out over the runway. . . very curious people about the EZ. Thanks again".

Dick Woods/Bobbi Cohen - "EAA Chapter 62 held their annual flyin at Hollister, Ca on July 13 1979. Each gal was asked to bring a cake for the dessert part of the Saturday night banquet. We've got so many VariEze's under construction in the chapter that Bobbi decided to contribute one of her own - an edible variety. The folks in charge of the dinner decided it looked too good to cut, so they planned to award it to the Grand Champion of the show - Larry Lombard's beautiful VariEze! Rather fitting, don't you think. (And we all did get to eat the cake finally on Sunday at a cook-out at Reid-Hillview airport). Here's a photo of the vanilla "VariEze". (Pg 11).

Otto Schimmel - "Enclosed are pictures of first flight which Dick Rutan flew in June 1979 at Mojave, Ca. N9036G, VariEze was built by George Gilmer, age 73 years young. Three years total time at Santa Paula airport, Ca. Total cost was about \$3600. George made al most every part. Wing fittings, wheel and brake system, throttle quadrant etc. He advises all builders, if Burt gives a measurement or method there is a reason. He believes that in all his years the VariEze and plans are the best there is. George started flying in 1929. But had one big thrill when Mike gave him a ride in his VariViggen".

Wilma Melville - possibly the only woman VariEze pilot, Wilma Dasche-Melville, has completed her 100th hour in the airplane which she and her husband John built over a period of 1 1/2 years. A P.E. teacher from the Torrance, Ca school district, she included the EAA Oshkosh fly-in in her schedule. Note: John built the EZ with Wilma's help, but he is not a pilot and is thus confined to the back seat!

Helma Hame] - "last May after I heard my husband Ellsworth groan over the changes in the last newsletter I made up the enclosed "poem". I wanted to send it to you, but Ells thought it was too corny. Well, I just mailed to you the announcement of Ell's first flight in VariEze N235EH and I decided to mail the "poem" too. You still might get a smile out of all that corn. It was a tremendously scary and exhilarating moment, when Ells started climbing. There is nothing in my life that can compare to the shudder and thrill I felt, not even the birth of our first child.
First the announcement -
She Flies.

1976

Summer: A dream, a wish, and a gigantic set of "How-to" plans.
Autumn: We take lessons, place our order with the stork and ready the nest.

1977

Winter and Spring: Ouch! What labor pains! It takes 6 months for the whole egg to arrive
Summer and Autumn: We are hatching. Every spare minute we are hatching.

1978

Winter: We have to keep the egg warm through the harsh Pa. winter, so we build an incubator.
Spring: Still hatching.
Summer: There she is: a complete bird, ugly, green and blotchy, but her wings are in the right place.
Autumn: We care for and feed an insatiable bird. She sure can swallow the dough.

1979

Winter: Her nervous system is maturing, her reflexes look good.
Spring: The great metamorphosis: The blotchy green fledgeling changes to coal black, then to shining white. But Dr. Rutan orders corrective surgery for her and all of her species.
Summer: She is whole again, and she has a voice after some hiccoughs and sputtering she purrs.

AUGUST 13 She is flexing her wings, she is airborne.

IT'S A BIRD! IT'S A PLANE! IT'S VARI-EZE N235EH!

Now the Poem -

St. Peter's Lament

St. Peter shook his balded head and scratched his grizzled beards:
I don't know what to make of this; it's positively weird.
Each ninety days a monstrous moan floats upward to the skies.
A sound so woebegone and sad, the angels wipe their eyes.
It starts to build around L. A., and by the second day
It echoes and reverberates across the U. S. A.
I strain to glean from all this din just one revealing word,
But what the voices clamor for seems freakish and absurd.
They wailed of "worm gears", shrieked of "cuffs" until I plugged my ears.
They howled for "rod ends" and such stuff, and now it's "landing gears."
I hear some fellow is to blame, some airborne desert chief,
A real designing so-and-so, who thrives on all this grief.
He tinkers, toys and tabulates and smells of gasoline.
He runs a backroom printing press, an instant-gloom machine.
He mails a little quarterly, the source of all distress
From desert hide-out to the world, it's called THE DOOMSLAY PRESS.
And every man who reads his news will instantly be changed.
Some grow morose, some snarl and snort, some end up quite deranged.
Some yell: "The ripper strikes again!" Some throw epoxy fits.
Some sob: "By Jove it's VariHard." Some drown their grief in Schlitz.
I yearn to zap that scoundrel now. I'm certain of applause.
But strange enough some heavenly host have rallied to his cause.
The Life Extension Service claims, because this fellow cared
A dozen men, who had been marked for reaping, have been spared.
The cherubs plead the poignant fact, that he's an ace, he flies.
Can I think ill of any man who reaches for the skies?
They've seen his wings; they call him kin; that sways me, I admit,
For flyers are a noble breed, a joy, and full of grit.
Is he a rogue or lily white? I only wish I knew.
I hear he's looking for new fields and brandnew things to do.
He says - this caper leaves me stunned, his brashness I deplore -
He just designed a better wing for my own angel corps.

LONG-EZ N79RA UPDATE - Today the Long-EZ has 102.4 hours, a new set of wings with different winglets, and longer ailerons. The standard VariEze wings did not work well and were abandoned after Oshkosh. We burned the midnight oil and designed and built a new rear wing system. The 23-degree L.E. sweep, Eppler airfoil, and wing attachments are similar to the Defiant. Improved foam core jiggling and glass layup methods were developed. The 42% increase in wing area was made with very little weight increase. The wing spar and center section spar overlap and are connected with three bolts in shear that allow an EZ wing incidence change with shim washers. We are very satisfied so far with the performance. We have excellent stall characteristics with a wide departure margin. We don't anticipate ever needing wing cuffs. The aircraft is very stable at full aft cg. This cg limit is reached with a Lycoming O-235 with starter, alternator and fuel pumps and a 125 lb pilot - no ballast. The approach and landing speeds are 5-6 knots lower than a VariEze. Deck angle is low enough that the over-the-nose-visibility is excellent at touch down with full aft stick! Useful load is increased over a VariEze, resulting in a single-place range of 1400 miles and two-place range of 800 miles. However, we're still not finished. At the new lower takeoff and landing speeds the rhino rudder effectiveness is inadequate which may force us to revert to the conventional winglet-mounted rudders (I see some of you smiling).

We are so encouraged with the new wings and overall flying qualities that we have applied to attempt a world class-closed course distance record this fall. Please understand the Long-EZ is not finished - its still in flight test and more things could change. But we are very close to a design freeze. Complete details on the Long-EZ and plans will be in CP 23. Please wait further questions till then - we need to get the work done!

TECHNICAL CORNER - We will plan to make the Technical Corner a regular feature of the Newsletter.

VariEze materials tested to support Space Shuttle - NASA's Dryden Test Center recently flew an F-15 fighter with a wing addition constructed of three pound urethane foam skinned with four plies BID/Epoxy. These wing additions were subsequently covered with space shuttle tiles, to test their ability to withstand loads expected during reentry. The bare BID/foam additions were flown to 1.5 times the max expected dynamic pressure of the shuttle - 1100 lb per square foot, at 1.4 mach, 660 mph indicated speed. This is a dynamic pressure of nine times that of a VariEze at red-line speed!

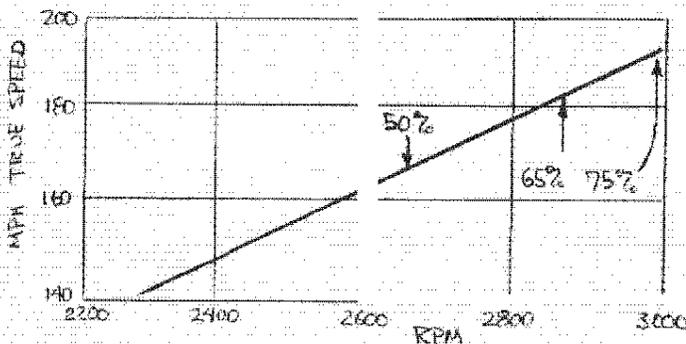
The equivalent flat-plate drag area of an entire VariEze is less than 1.5 square feet, or roughly speaking, an EZ has the same drag as a square flat board 14 inches on a side. With this small amount of total drag, adding drag-producing additions will have a large effect on the aircraft's performance. For example, a cross-over exhaust system will slow the cruise speed by 10-15 mph, due to the drag produced by the blunt bumps required on the cowling. This increment has been verified by everyone who has made this exhaust change. The bumps also cause turbulence that increases prop noise.

Moisture change - moisture on a wing from rain will effect its lift. This effect is small on a conventional aircraft, ie, the Grumman Tiger descends 500 fpm if untrimmed entering a rain shower, but is easily trimmed out. A Canard aircraft generally has a much larger trim change in rain because its high lifting wings are located far apart. We do not fully understand the reasons for this, but the following characteristics exist for most VariEzes: if a trimmed

EZ enters light moisture or light rain it will climb, requiring about 1/2 lb to 1 lb push to maintain level flight. In heavy rain, most EZs trim nose down, requiring a mild aft stick pressure to fly level. The trim change varies with speed, being barely perceptible at 70 knots and higher as speed is increased. One EZ flyer reported a heavy aft force required (15 to 20 lb) when making a 150-knot (172 mph) descent through a heavy rainshower.

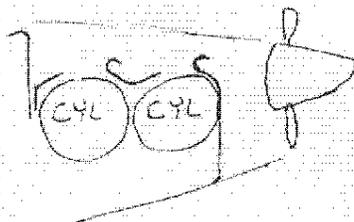
We often hear the following comment from EZ pilots who have just flown their airplanes, "my speed is low, I set the power for 2650 rpm (75% power) and only get 166 mph true". You are not at 75% power, just because you have set the rpm for that power on the Cessnas you are used to flying. Remember, the EZ has very wide speed range for a fixed-pitch prop. To get adequate take off performance, the EZ has to turn high rpm at 75% cruise. Refer to the following chart for a clean 0-200 EZ with Ted's prop and wheel pants. At 8000 ft and 2650 rpm you are generating only 49% power (a good economy cruise). To get 75% pwr at 8000 ft you have to use full throttle and turn 2990 rpm at a TAS of 193 mph. We generally do not cruise at 75% - we prefer 60% or less to conserve fuel and reduce the noise level. 60% gives a TAS of 178 mph and fuelflow of only about five gal/hour at peak EGT. Static rpm - if you have a static rpm of less than 2450, with the 0-200 or 0-235 engine, you will have poor takeoff performance, due either to too much prop or a sick engine.

Be sure your tach is calibrated. The hand held Heath kit thumb tach works well. Can even be used in flight, just point it back from inside the cockpit



FLYING HINTS - Check your aileron hinges for wear (particularly the inboard hinges) and lubricate with a dry graphite lube. Some builders have reported wear that stopped when lubricated.

Clarence Langerud reports solving his engine cooling problem. He added a 5" long 2" wide strip of .032 alum to the front baffle and bent a 1/2" radius on the center and aft baffles (see dwg)



For those who fly in rain and have had prop tip damage, Bruce Tiff of B & T Props has developed a wood prop with a hard rubber or urethane leading edge, that has proved impervious to damage at full throttle in very heavy rain. Note that B & T Props address was printed incorrectly in CP #21 and should be - B & T Props 8746 Ventura Ave., Ventura, Ca 93001 (805)649-2721

George Scott suggests a neat way to improve your proficiency before flying your VariEze. George used a Cessna 172, sat in the right seat, reclined the seat to simulate the seating position of the EZ, then go out and practice some high speed taxi, runway flights and landings. Do take a safety pilot with you in the left seat!

FLIGHT SAFETY BULLETIN - A VariEze experienced a forced landing due to engine failure caused by collapse of the induction hose. The owner had not safetied the wire and cord as per the instructions and drawing (Sect II A page 14 - 1st Edition, Section IIA page 17 2nd Edition, Section IIC page 13). If these are not safetied the cord can unwind, allowing the wire to twist and lie flat. Inspect your induction hoses. If they are not safetied, ground your aircraft until corrected. This bulletin was included in our fuel compatibility questionnaire.

Flight Research Inc, reports a service failure of the strut support tab of their VariEze R/H muffler. Their recommendations:

1. Inspect attachment tab regularly.
2. If tab has failed, weld on larger and heavier gauge tab prior to next flight.
3. If no certified welder is available, send R.H. exhaust unit to Flight Research Inc., for free repair.

BUILDER HINTS - Engine baffling - Lyc 0-235. When you cut your baffle material out according to Section IIC errors exist leaving the aluminum pieces short in some areas. Leave the Baffles about 1" too large, then trim to fit cowli. Leave 1/8" gap between the edge of the aluminum baffle and the cowling on trim before installing the rubber.

John Harris recommends a large farrier's horse shoe hoof rasp for shaping foam, roughing glass etc. We have found an excellent substitute for sand paper in the form of a Disston Abrader (course #401C) available at most hardware stores. Aircraft Spruce is now stocking the 401C. It is a long-life abrasive tool that's excellent for shaping curved fiberglass edges.

We recently tried a new product that is a big time saver. It is an acceptable substitute for dry micro in the finishing process. Stitts micro-putty (MP 1100) available from: Aircraft Spruce and Wicks. This is a polyester - based material similar to Bondo, but 1/3 the weight, cures in a few minutes and works and sands similar to dry micro. Caution: do not use on blue foam.

Steve Briggs found an excellent method of setting wing incidence. While wings are still in the jig, on the table (both root and tip water lines level) bondo a Stanley line Leveller (available at most hardware stores @ approx. \$1.60 each) to the outboard edge and parallel to the butline of you WA-1-1 wing fitting. Check that the root and tip water lines are level and that the Stanley is level before removing wing from jig. Use this level later to adjust wing to center spar (replaces the bonded board, from CP #12 page 8).

A finger tip saver when finishing featherfill through final color coat, use a sponge with sanding material bonded to it, sold at hardware stores as Quicksand/Auto Wetdry, Medium/course.

Nat Puffer sends this idea to check your epoxy balance for accuracy. Simply put 20 nails in the hardner cup and 100 nails in the resin cup, or for the new Safe-T-Poxy system, 43 nails and 100 nails. Nat says it works great.

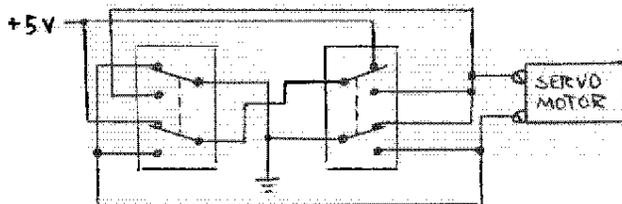
For those of you having difficulty drilling the 8 holes in each wing fitting, F.J. Wells recommends a Stanley drill Guide # 04-413 glued to the WA 1 fitting with beads of hot melt glue. Produces excellent, perpendicular holes.

Jake Bach reports that he modified his Michael's Engineering ratio pump per CP 21 and got 39-100 instead of the desired 43-100. He then switched the pivot from the left to right (hardner piston greatest distance from pivot) and that put him right on the money. We don't know why his pump is different than ours, but we caution you to be sure to check your ratio if you modify your pump - pump into two cups and check on a balance scale.

Don Yoakam reports that if you update from old to new style Rosehan brakes, be aware that toe-in may change. The backing plates are rough castings and may not attach in the same position.

Sam Cochran made a carb heat valve using two Campbell soup cans covered with two plys of B.I.D. His has over 100 hours with no wear or defects.

Solution to "backoff" of roll trim servo. Some EZ flyers have experienced their roll trim tab being forced toward neutral due to airloads in flight at high speed. Garth Shearing, Canada, a VariEze builder has pointed out that the servo cannot be backed up if it is shorted across the motor terminals. Yes, I didn't believe it either, but it's true - try it! The following circuit can be used, which requires two DPST switches - one for left trim, one for right. This wiring will provide a short for the motor at idle, locking it in position and provides protection from both switches being operated at the same time.



Shorting Roll Trim

Two momentary DPST switches.
(micro 8A2061)

The fuel tank vent can be covered in a steep climb and result in some venting of fuel. To avoid this (new construction only) position the vent tube 15" forward of its position shown. Enter the tank at the plans-position then rout the tube forward - this avoids conflict with canopy latches.

GOOD NEWS

Many of the VariEze operators have experienced inaccuracies in the designated engine instruments particularly the Tach. Because of this, on the recommendation of Jim Proctor of Shady Cove, Oregon, we installed a completely different line of instrumentation in the Long-EZ. This new instrumentation has performed very satisfactorily. We feel these are superior to what have been recommended before. Example - this new Tach runs independently of the magneto switch, using a very small sender that screws right on to the engine tach drive. This small sender will run two tachs. We were impressed with its accuracy and reliability. Our calibration of all these gages proved them to be accurate. (However, any instrument should be calibrated prior to use).

The Vendors are on line and this new instrumentation is being stocked by Aircraft Spruce and Wicks Aircraft Supply. Specific gages should be ordered as follows:

GAGE	PART #
Carr Electronic Tachometer	206
Carr Electronic Tachometer Sender (includes adapter kit)	207
Oil Temp. 120 - 300°F	VDO 310-014
Oil Temp Sender	VDO 323-057
Oil Temp Wiring Kit	VDO 240-023
Cyl Head Temp 100-600°F	VDO 310-909
Cyl Head Temp sender	VDO 323-701
Cyl Head Temp wiring kit	VDO 240-701
Volt Meter 8-16 volts	VDO 332-044
Volt Meter wiring kit	VDO 240-024
Engine Hour Meter	VDO 331-011
Engind Hour Meter wiring kit	VDO 240-024
12V Chronograph (clock)	VDO 370-022
Oil Pressure 0-150 psi **	VDO 350-044
Oil Pressure sender	VDO 360-004
Oil Pressure wiring kit	VDO 240-023

** This gage can be wired to include a low pressure warning light. We have this in Long-EZ.

SAFE-T-POXY - We have been using Safe-T-Poxy extensively here at RAF over the past 6 months. The new Long-EZ wings use Safe-T-Poxy. During this period the temps were warm 80° -100°, and the epoxy worked beautifully. However, lately with temps dropping down into 60 to 70° the Safe-T-Poxy wets slowly. This can be solved by placing a light bulb under the ratio pump to get the temp of both the resin and hardner up around 80 to 90°.

When mixing micro balloons with Safe-T-Poxy, only 3M B23, 500 (available from Wicks and Aircraft Spruce) glass balloons should be used. If you use Quarts Q-cell balloons, due to alkaline, the cure will be delayed, depending on temp as much as two or three days. Although it does ultimately cure, and is structurally ok, this much delay, particularly in finishing is not acceptable.

Safe-T-Poxy is now available from both Wicks and Aircraft Spruce, and is excellent in all respects. All physical properties are equal to or exceed those of RAEF and S. Safe-T-Poxy particularly excels in fuel compatibility and low moisture absorption. We continue to receive reports that Safe-T-Poxy has definitely solved the health problems of many people that are allergic to normal epoxies.

ROTORWAY RW-100 UPDATE

- Our latest information is that the prototype engine has been taken out of the VariEze and an aggressive test cell development run is underway. We are encouraged to hear that their advertising blitz has been put on the back shelf and the major effort is now on engineering development. We are also gratified to hear that the cam/valve overlap has been changed to allow hand propping. Without starter and ring gear the weight may be within VariEze limits. We are encouraged that the development is continuing and the performance and reliability will be determined. A new 100 hp aircraft engine is certainly needed. We wish B.J.Shramm all the success in his effort. We will continue to monitor this program and will test an engine when appropriate.

HIGH COST OF ENGINES

- We have been hearing a lot of complaining about the high cost of engines. True, a new engines' cost is approaching ridiculous. But, if you can find a partially run out engine it can be more of a bargain. The Long-EZ has a Lycoming O-235 that had 1400 hours and it cost us \$1500. It was installed without modification or repair. The Lycoming has a 2000 hour TBO so we can expect 600 hours flying on this engine (3-4years). When it is "run-out" - 2000 hours in 1982 it will still be worth what it cost us. Thus, its truly a low operating cost engine (zero \$)! This newsletter lists a 400 hour C90 at \$2800. If you run it out (1200 hour left) then sell it for \$1500 you have spent \$1.08 per hour for engine. If you buy a new or newly over-hauled engine at the high going cost, and sell it for run out cost, you will spend \$2 to \$3 per engine hour. Remember the majority of you will take years to put a few hundred hours on an engine. So, consider a 1/2 or 3/4 runout - its still a bargain. Run an add in Trade-a-plane (Crossville, Tn 38555), it works!

HOME BUILT PROPELLER

- We have just reviewed the plans for a home built VariEze propeller by Larry Weishaar and have tested a homebuilt prop built from his plans. The plans are a true manufacturing manual, very detailed. The 32 page photo-illustrated document contains a full size drawing and station templates and a considerable amount of technical information from cutting down the tree to the finished balancing. With these plans I believe anyone could build an excellent prop. But what about performance? We have in the past used Teds 56 x 76 prop as the standard because it gave about the best performance of any we have tested. Again we were impressed for we found Larry's prop to be every bit as good as Ted's and possibly a slight bit better in cruise. The sample prop was quiet and smooth and seemed to scavenge the engine cooling air better, as the climb CHTs were down 20 - 30 °F.

We are happy to give Larry our wholehearted endorsement and congratulations for an outstanding set of plans. A real bargain at \$17.50, they may be purchased from: Larry Weishaar, 1924 No 6th Street, Springfield, Ill 62702 (217)544-6085

DISTRIBUTOR REPORT

Aircraft Spruce and Wicks.

Both report VariEze kit and materials are all in stock. Partial or complete kit orders are being processed within a few days. Customers can pick up a complete kit with a one week notice. Both distributors currently stock RAEF, RAES and SAFE-T-EPOXY.

Ken Brock Manufacturing .

Ken has been doing an excellent job in stocking adequate quantities of the EZ components allowing prompt delivery. Ken now has a good stock of EZ prop extensions, axles, wing fittings, welded parts, crank nose gear assemblies, spinners, etc. Ken's spinner is a completed item, not a kit. It requires only the prop cutouts to install.

The Airplane Factory.

EZ canopies and Vigen canopies are in stock and being shipped promptly. TAF offers a + price replacement should you break your canopy for any reason in the first three years.

Fiberglass Parts.

The vendor for the VariEze fiberglass parts notified us last July that he was modifying his business operation and would discontinue manufacturing the nose and main gear parts, but would supply them until we could locate another source. At that time we decided that, since tooling for the main gear was wearing out, we would not arrange for the new manufacturer to produce this same item. Instead, we are developing a new gear, which is 40% stronger and made with an improved process. This gear is designed specifically for the Long-EZ, which has a gross weight 24% heavier than a VariEze. We plan to have only this new gear produced by the new vendor, and use it on both the EZ and Long-EZ. It is three to four lb heavier than an EZ gear. We have also developed an improved main gear attachment design which is now being tested on the Long-EZ. Once the tests are done and the new gear is in production we will make the gear (and gear attach design) standard for both the Long-Ez and new-construction VariEze.

Last month the fiberglass vendor informed us he would no longer produce any of the VariEze parts, after clearing his present backlog. We are busy setting up the details for a new vendor to produce the cowlings, nose gear cover, and nose wheel box. Unfortunately, due to time delays in transfer of our tooling (the old vendor needs to finish his backlog), there will be delays in the availability of these parts. We are taking this opportunity to address some improvements in cowlings shape to reduce aerodynamic drag and improve cooling. We should have complete details on the new parts in CP #23. Availability of all the new fiberglass parts is expected by mid December. Contact us after that date if you are needing parts before CP #23. We regret that this condition will result in delays for some of you. However, once these parts are in production they should be off-the-shelf, a considerable improvement over past availability.

In setting up the production and distribution of fiberglass parts with the new vendors, we want to be sure to have an arrangement that provides good service to VariEze customers. We would appreciate hearing feedback from those who have dealt with the old vendor so we can assess if any improvements are needed in the areas of pricing, availability, customer service, etc. Please let us hear from you.

FOR SALE

Because of an engine change, I have an unused Cassidy prop 58" x 67" suitable for a Lyc. 0-235 with an SAE #1 flange 4 3/8" bolt circle diameter.

Dewey Straley,
488 Fairfield Ave.,
Gretna, La 70053

Lyc. 0-235 for sale.

W.E. Clark,
116 West University Pkwy
Balto, Md 21210
(301)889-5092

Lyc. 0-235-CI for sale \$2200

Al Kramer,
Sal Val Aviation
Van Nuys Airport,
Van Nuys, Ca.

Dan Lee has found some small (1.15" dia) volt meters and ammeters, to check solar panel charging.

100 c Volt meter 0-15 DCV - approx \$30
100 c ammeter 0-500 DC MA - approx \$26.50

Available from - International Instruments

88 Marsh Hill Road,
Orange, Cn 06477
(203)795-4711

Lyc. 0-235-L2C complete with mags, carb, starter and alternator and fuel pump. 460 hrs. I.T. since new. Cranshaft flange bent .008" - \$2900
Bill Aronson - (805)256-2200

David Turansky, - - David has an excellent C.P.
433 Herkimer Street, || index , CP 10 to CP
Buffalo, N.Y. 14213 || 21 for \$3.00

Continental C-90-16L 400hr since new, \$2800
Dick Rutan at RAF (805)824-2645

Both Wicks and Aircraft Spruce are now stocking two excellent canopy seals. One, K-Strip is shaped  (Wick's Part # 44-57240) works great, and the other, P strip shaped  also works very well. These are sold by the foot and although they have an adhesive backing, you may need to supplement this with RTV or silicone.

Posters. RAF has a beautiful poster of our three ship formation - Defiant, VariEze and VariVigen (see back cover of this newsletter). This photo was shot by Budd Davisson. The poster is color, 18" x 23" and quality suitable for framing. They are available for \$2.75 each or two for \$5 at RAF. Add \$1 if ordering by mail to cover mailing tube and 1st class postage. Specify plain or autographed.

Defiant Film. Ferde Grofe's Defiant film has recieved some excellent reviews. General Aviation News - "Defiant is one of those rare short documentary films which left us wanting more" - "delightful film experience". If interested in purchase or rental send SASE to A.V. Library, 18139 Coastline Dr, Malibu, Ca 90265

Survival Kit

Ray and Nova Cullen (see CP 21 Page 2) 1116 6th Street, Tillamook, Or 97141, have developed an excellent accessory for the VariEze. It is a custom light weight survival kit designed to double as an additional thigh support for the rear seat. These are well done and we plan to install one in our airplanes. Contact them for price and availability.

VARIIZE LOSS-OF-CONTROL

We have just completed another series of flight tests on N4EZ to test its departure (loss-of-control) resistance. What prompted this is reports from two VariEze pilots in Texas that they experienced a partial or full snap roll at about 80 knots. These occurred below pattern altitude and fortunately the pilots managed to recover in time to avoid an accident. The maneuver was described as follows: Full aileron and partial rudder steady sideslip, then full rudder was applied which caused the airplane to yaw excessively and abruptly roll, experiencing negative g. Recovery with neutral control was prompt, but several hundred feet of altitude was lost.

The most surprising thing about these incidents to us was that control was lost at such a high speed - 30 knots above stall. Reinspection of our stall/spin test data and the NASA tests indicated no susceptibility to departure.

We then initiated a new test program to investigate this. Dick performed full rudder sideslip with N4EZ at all speeds and experienced no departures. Concentrating on the 80-knot speed range he then aggravated the yaw with abrupt rudder inputs while in a rolled attitude. On one of these he experienced a departure - a roll off in the direction of the slip. He then tried to repeat the maneuver and could not get a departure in over 20 attempts. We then adjusted the aileron and rudder rigging, moved the cg aft, and repeated the tests. Dick found that by learning a specific technique he could cause a departure nearly every time, if speed were above 75 knots and an excessive sideslip angle were generated. The departure generally consisted of an uncontrolled roll away from the rudder input direction. Recovery with neutral controls was prompt. However, on several of the maneuvers the yaw angle was extreme at departure causing a massive stall of the winglets and blanking of the upstream wing. The airplane then yawed past 45 degrees, abruptly rolled, and entered a 1 to 2 turn inverted incipient spin. The airplane always promptly recovered with neutral controls. If aileron or rudder were applied for recovery it could cause a further "snap" departure and delay recovery. Altitude loss on the worst of these maneuvers was as much as 1500 ft.

Why did we not find this departure when we did the original tests and the tests with cuffs in 1978 (CP #19)? The most probable reason is that most of those test were done at high angle of attack (full aft stick) which was thought to be the worst case. However, we have found that at lower angle-of-attack ie, 80 knots, the rudders can generate more sideslip than at high angle-of-attack, and thus can be powerful enough to stall the winglets in an accelerated yaw maneuver.

We were then faced with a decision on what to do: (1) caution pilots that the airplane can be departed when using excessive yaw inputs or (2) fix the airplane to improve its departure resistance. Since we feel strongly that good departure resistance is an important asset and design goal for the VariEze, we set out to attack # (2).

We have always known that the EZ has more rudder power than needed for normal maneuvers - a full aileron steady sideslip at low speeds requires only 60% of the available rudder to hold heading. The available travel is 3 1/2 inches, measured at the top of the rudders trailing edge. We then limited the rudders travel on N4EZ in various increments, 3", 2.6", 2.3" and 1.8". At each increment we flew tests to determine departure susceptibility and the necessary rudder authority for crosswind landings.

As expected, the departure susceptibility reduced as rudder travel was limited. After extensive testing and evaluation by three pilots we have N4EZ's rudder now rigged for a two-inch full travel. With this rigging, the following characteristics exist: crosswind landings up to a component of 24 knots are possible without tire scrub. The aircraft is not susceptible to departure during any normal maneuver. Thus, we are now recommending a mandatory rigging change to limit the rudders to two-inches of travel.

It must be noted that this may not guarantee total departure resistance. This may vary from one airplane to another, due to expected tolerances in things like winglet leading edge finish and shape, fuselage shape etc. Also, even at 1.8 inch rudder travel, Dick was able to induce a

departure by learning an unusual and aggressive combination of control inputs: full left aileron, full left rudder at 30° bank, then at 100° bank abrupt full right rudder. When this was done a departure was possible (not probable) even though the rudder was limited to 1.8 inches.

The important thing to note is that, even though this design is not as susceptible to loss-of-control as a conventional aircraft it should not result in over-confidence on the part of the operator. Assume your aircraft is susceptible to departure until proven resistant during your stall tests with lots of altitude and a parachute. Refer to the Plans-changes section of this newsletter for a caution note to be added to your owners manual and for instructions on rigging rudders to two inches.

FUEL/FIBERGLASS COMPATABILITY - This year at Oshkosh, Nat Puffer had a partial power loss on take off and safely aborted. The cause was found to be a large amount of orange gummy residue in the carburetor. Our concern was that there might be fuel/epoxy incompatibility, possibly due to the high-aeromatic automotive fuel he was using. In August we prepared and sent to all known VariEze flyers a detailed inspection procedure and survey questionnaire, to determine any trends. Applied Plastics (APCO) also conducted an aggressive accelerated ageing evaluation to determine if the aromatics used in high octane low lead fuel will deteriorate the epoxy. Results: APCO, RAES & RAEF showed a very slight amount of material extracted from the epoxy but well within acceptable limits. Under normal conditions such as the way VariEzes are used it would take years of exposure to extract even a trace. The new Safe-T-Poxy even under rigorous test conditions was essentially unaffected. Jim Tome ran some tests at a major midwest lab found that the aromatics in automotive and some aviation fuel 100LL will craze and leach out the hardner in a hardner-rich Lambert layup and this is probably what happened to Nat. Jim also found that the fuel additive "canned heat" and MEK can dissolve the new Safe-T-Poxy. The problems are with the aromatics the oil companies are using more and more of. This is explained more in our fuel compatibility AD letter.

Out of the 64 returned survey questionnaires, 52 had no problem at all, 10 reported a trace of gummy substance on the float/mixture needle valve. Several mentioned this could cause the valve to stick, this is becoming a common problem with many other aluminum-tank airplanes using 100LL. One reported a gummy substance in the bowl like Nats. We will be analysing this sample. Our conclusion is that the RAEFs and the Safe-T-Poxy when properly mixed should not deteriorate when exposed to aviation fuel. However, as a precaution we are recommending routine carb bowl inspection. If you are a VariEze flyer and did not receive our survey on the fuel contamination inspection/questionnaire, then we don't know you are flying. Write to us giving your N number, name, address, and date of first flight. We will send you the survey and add you to a confidential list. This list will be used only to mail you any urgent flight safety information.

VARIIZE 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 is been accomplished.
MAN-XXHR	Mandatory, accomplish the change a 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	Obsoluted by a later change.
MEO	Minor error or omission

- MEO Sect I Page 11-4 AN 960-4 should be AN 960-416 (2 places)
- MEO Sect I Page 17-11 2" thick top foam piece 12.5" should be 15"
- MEO Sect III page 2 #12 wire can be #18
- MEO CP #20 Page 5 65 lb fuselage weight should be 72 lb.
- DES Sect II Page 21-4 Rout vent lines 15" forward within tank
- MAN-GRD Sect I Page 19-12 Sect IV Page 28 Rudder travel - Mandatory change before next flight. Reduce rudder travel from 3.5" to 2.0". This can be done by cutting the cable and inserting both ends into a nicopress sleeve to shorten the length. Make fine adjustment with the fitting on the top of the master cylinder. The rigging check takes two people - one in the cockpit pushing full rudder pedal deflection and one measuring at the top of the rudder while applying a mild aft airload (about 3-5 pounds) on the rudder trailing edge.
- MAN-GRD Sect IV Page 30 Under power plant add "inspect induction hoses for correct safety of wire and cord". Perform this inspection before next flight.
- MAN-GRD - Sect IV Page 37.

Correct the CP 21 addition to read " before first flight clean and flush all screens, both carb and gascolator. Remove and clean out carb finger strainer and carb float bowl. Check for a gummy substance on the needle valve. Repeat this inspection each 25 hours for the first 100 hr. and 50 hrs there after".

MAN-GRD Sect IV page 19

Add the following paragraph
 "CAUTION - Avoid aggravated full-rudder, cross control side-slips at low altitude. The VariEze is departure-free at full-aft-stick stall speed. However, at higher speeds the rudders become more effective and a large enough sideslip angle can be generated to stall a winglet. If winglet stall occurs at the same time a roll rate is being generated in the opposite direction eg, full right rudder and full left aileron, the aircraft can depart controlled flight. Departure is evident by an uncontrolled yaw and roll. Recovery is normally prompt when controls are neutralized, however if yaw is extreme, the aircraft may rotate for several seconds and experience negative g. Use neutral controls until recovered (rotation stops). Total altitude loss in an extreme departure can be as much as 1500 ft".

MEO Sect IV Page 7

Add the following under fuel systems - " do not use fuel additives (such as fuel deicer) unless their compatability with fiberglass/epoxy has been verified.

VARIVIGGEN NEWS - by Mike Melvill

I flew N27MS to Oshkosh this year and had a super trip, flew in formation all the way there and back with a 180hp Grumman Tiger, piloted by Sally. The Viggen had to be flown at quite a low power settings in order to stay with the Tiger, at ground speeds around 140 knots (162mph). I only burned 7.8 gph average for the whole trip. Not bad for 180 hp.

We flew from Mojave via Las Vegas Nv, Provo Ut, Scottsbluff Nb, Rochester Mn to Oshkosh. The Viggen joined up with the Defiant and Long-EZ for several airshows during the week. From Oshkosh Sally and I flew (Tiger and Viggen) to Indiana to visit family and then via Coffeyville Ks, Tucumcari NM, Abq NM, to Mojave. It was a most enjoyable trip. I put 37 hours on the Viggen, she now has 366 hours and apart from adding 2 quarts of oil she required no maintainance. The only new Viggen flying since CP 21 is a French VariViggen, built as a flying test bed for the Microturbo jet engine. This very beautiful aircraft is powered by two of the diminutive jet engines (same as BD5-jet) located one above the other. The aircraft has only flown a few times, but reportedly is quite fast.

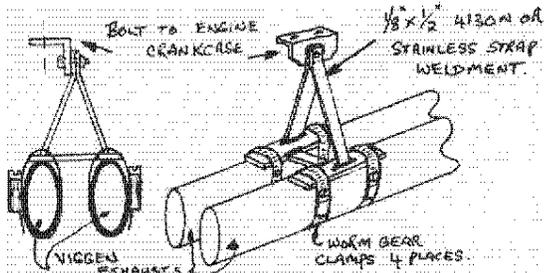
Unfortunately, since CP 21 there have been two VariViggen accidents, see page of this newsletter. Although causes are not known for sure, pilot proficiency still appears to be a problem. You must be current and sharp in several airplanes before attempting a first test flight in any new airplane. Do follow the owners manual to the letter. Do not omit the high speed taxi, and runway flights. If possible, get a checkout in a Viggen with an experienced Viggen pilot. All of you are spending several years and several thousands of dollars; don't throw it all away with careless flight testing.

I have a hunch that several Viggens are almost fight ready. When you are, give us a call, we will be glad to help you with your test program or provide a Viggen checkout.

I have only heard from a few Viggen builders, one Bertil Forner of Stockholm, Sweden, (see photo) reports good progress and has the basic airframe complete and is working on landing gear and control system. Russ MacMillan of Abbotsford B.C. Canada, reports that he is progressing slowly but surely, as do Frank Stites of Wayland Ma and a couple of builders in Texas.

VIGGEN BUILDING TIPS - When rigging your ailerons, be sure to set all belcranks at the fuselage stations shown on page 40 (1st Edition) and pages 46 & 47 (2nd Edition). Clamp AB4's and AB8's at the angles shown. The fabricate AB1's to AB10's to fit. This must be done correctly. It is possible for stick to lock over center if the belcranks are rigged at the wrong angles.

EXHAUSTS - The standard VariViggen exhaust system must be tied together and to the crankcase, in order to reduce the possibility of the pipes cracking. This has been in service on N27MS for 120 hours with no sign of a problem. See sketch.



ACCIDENTS

Since the last newsletter there have been two VariViggen and four VariEze major accidents.

An Ohio VariViggen crashed just after making a tower flyby, to check an unsafe gear. Ground witness (pilot) reported an object fell off the engine then the engine sputtered and quit. The aircraft rolled sharply left nose pitched up and the aircraft struck the ground in a high rate of sink. The pilot was fatally injured. Apparently the pilot tried to make a turn back to the runway but due to low altitude/airspeed the aircraft developed a high rate of sink and crashed before the turn could be completed.

A Michigan VariViggen crashed when the builder/pilot over-controlled in pitch just after his first take off in the aircraft. The aircraft was totally destroyed, but luckily the pilot survived with very minor injuries. The initial flights were flown by a qualified test pilot and he reported the aircraft was stable in all three axes and flew "practically hands off". All though the opportunity for a check out was available, the builder/pilot did not take advantage of it.

An Arizona VariEze crashed just after take off on its initial flight. The aircraft was destroyed and the builder/pilot received major injuries. We have requested but not yet received, more details on this accident.

A Florida VariEze crashed when the canopy came open just after take off. The pilot was attempting a 180° turn back to the airport when the aircraft pitched down rolled left and contacted the ground. The aircraft was destroyed, the pilot received serious injuries.

A Missouri VariEze lost power just after take off and received major damage in the ensuing off field landing. The owner/pilot and his new bride were not injured. The engine failure was determined to be water in the fuel.

A Colorado VariEze crashed during landing approach when another aircraft pulled out in front of him for take off. The aircraft was totally destroyed, the pilot received very serious injuries. We have requested but not yet received details on the accident.

The Michigan VariViggen accident was apparently precipitated by the pitch trim change with power change. An experienced pilot made the first few flights on this Viggen and reported it to be "hands off" in all three axes, with good flying qualities.

Without the invaluable benefit of a check out, the builder/pilot made his first take off and was "surprised by the sudden rotation and immediately reduced power". Of course, due to the high thrust line, this caused the airplane to pitch up even more. He then slowly

added power, but was probably slow enough to be sinking at this point, and the added power, pitched the nose down, only aggravating the situation. At this point the airplane was diving towards the ground, and as he put it, was as though at the bottom of a loop, and he smoothly applied back pressure to pull out, contacting the ground, wings level, but with enough force to virtually destroy the aircraft.

Fortunately, he was not seriously injured, but nevertheless, he has lost a very beautiful airplane, that he worked four years to build.

The pitch trim change with power on the Viggen is not extreme, nor abrupt, and is easily controlled. A low proficiency pilot can easily learn to compensate with the stick to maintain the proper attitude. However, on at least two instances we feel it has contributed to a serious accident with pilots who used abrupt power changes the very first time they were airborne and without the benefit of a checkout (see CP #12). What can we learn from this? Where possible, get at least a back seat check ride from an experienced Viggen pilot, with emphasis on the pitch trim change with abrupt power changes. Particularly at slow speed, and, above all avoid abrupt power changes at low speed until your proficiency allows.

Let me describe a normal take off in my Viggen N27MS Set half to full reflex (depending on condition, first flight only half) line up on the runway, smoothly apply full throttle with the stick held all the way back. (full aft stick). The airplane will accelerate to 55 - 60 mph and then the canard will begin to fly. As I feel the nose slowly rotate, I smoothly bring the stick forward to pin the nose at the attitude I want for climb. A few seconds later the mains break ground and I get the gear on the way up and run the reflex down to cruise position.

Now, if I maintained the stick all the way back all that would happen, would be a rapid rotation with the steepest climb you could imagine, provided the engine was running at full power, you would climb, but only at 300-500 fpm (depending on gross wt and density altitude). This is not a smart thing to do, even though it can be done in the Viggen, because the abrupt loss of an engine would leave you in a tricky position. Immediate forward stick would probably save the day, but you would have to be sharp!

When we look at the Viggen program so far, obviously we have a problem. This appears to be pilot proficiency and preparedness. Read the owners manual and this article over and over. In all cases where pilots were experienced they had no trouble with the airplane at all. However in two cases now we have seen pilots lose their Viggens on the first lift off in a pitch change with power change. While this has never been a factor for us, it apparently still is a significant factor for a low time, low proficiency pilot. In order to emphasize this, re-read the complete writeup on test preparation, pilot preparation and test procedure in CP #12 Page 11. Also, if your Viggen is ready to fly, come to Mojave to take advantage of our offer to allow you to gain some proficiency in N27MS before you begin your testing.

VIGGEN PLANS CHANGES

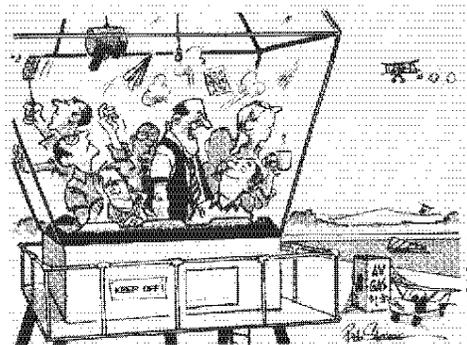
Owners Manual additions.

Placards

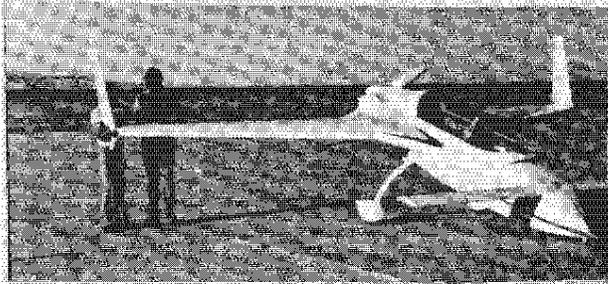
CAUTION! Trim changes with power-forward stick required when power is reduced.
(CP #13 page 9).

Minimum and maximum pilot weights must be placarded for the front seat e.g.

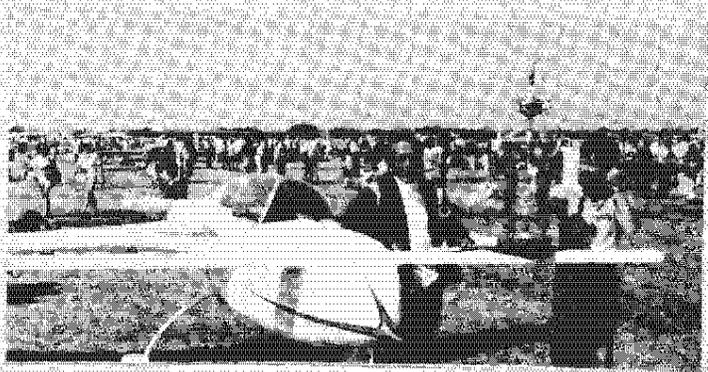
Min. Pilot wt	130 lbs.
Max. Pilot wt	210 lbs.



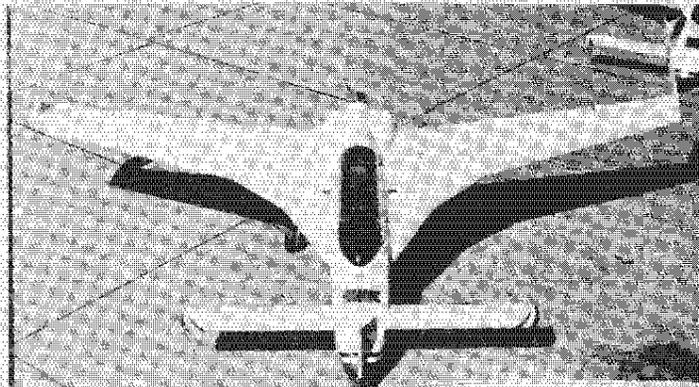
"That's not fair! You got to work the one that came through yesterday!"



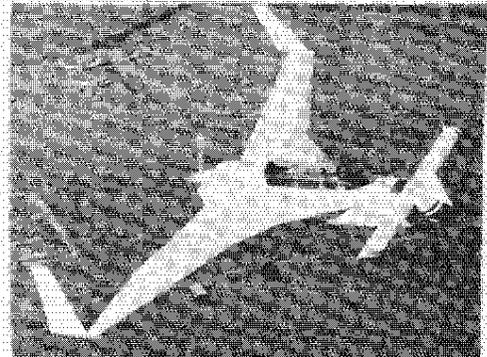
Norm Ross' EZ at RAF, on his way to Tullahoma.



Norm Ross & Jerry Finigan's EZ and Grand Champion trophy.



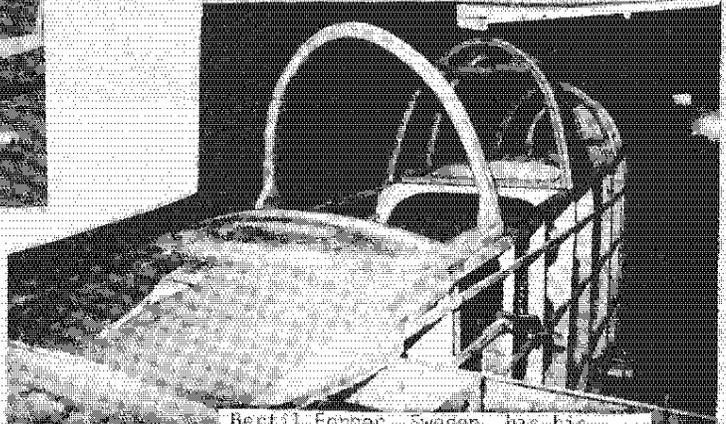
The new Long-EZ - note the wide-chord low sweep wing with long ailerons.



The new Long-EZ on its first flight



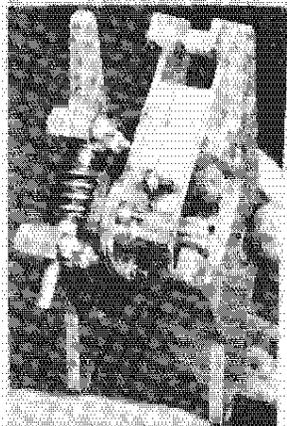
This comparison shows the 43% more wing area over the VariEze. Canard and elevator are identical.



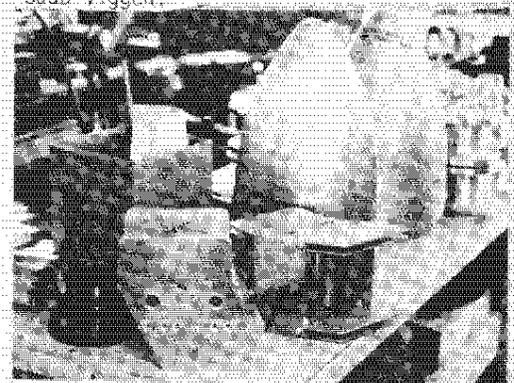
Bertil Ferner, Sweden, has his VariViggen ready for cover - maybe he can get a formation photo with a Saab Viggen!



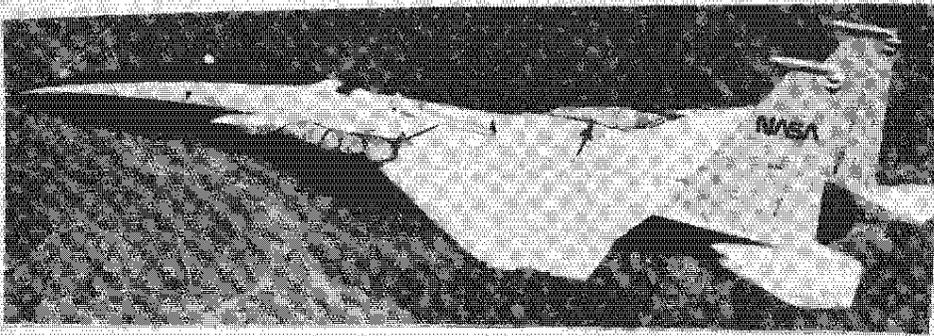
Ken Brock, with some of his stock of axles & prop extensions.



The Ken Brock nose gear crank assembly. Steel parts are cad-plated.



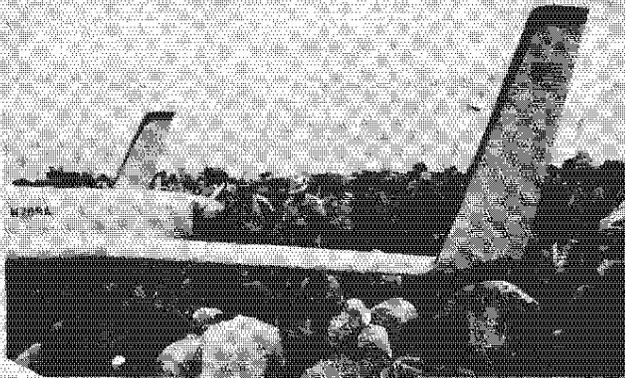
Wing fittings are shipped assembled.



Urethane foam/B10 epoxy additions on NASA F-15 Eagle.



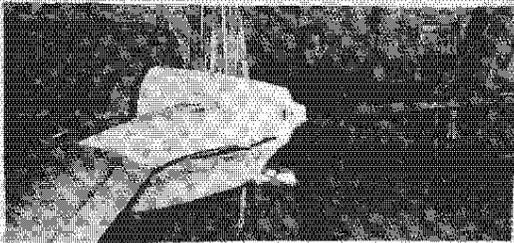
Bobbi Cohen's Vanilla VariEze.



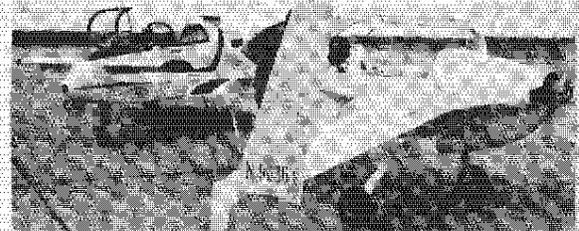
VariEze pilots bull session at Oshkosh under the shade of the Defiant.



Ellis Hamel with his new EZ.



R. Bazin, France working on tool for homebuilt cowl.



George Gilmor's EZ getting her first flight by Dick Rutan. Mike Melvill providing chase.

FLASH - This following section was added just as this newsletter went to press:

VARI-EZE SEAT BELTS RECALLED

When Johnny Murphy called with information about the accident in Florida, he reported that the pilot's seat belt had come open on impact. The FAA investigator also checked some other VariEzes in the area and found that with a little amount of manipulation the buckles would pop open. We went out to check our airplanes and "GASP" much to our shock ours also "popped" open, so easily in fact that we grounded our aircraft and will not fly one more flight with that style buckle.

The buckle is the series E 8000 made by EON Corp (see tag on nylon strap). This buckle is identified by its "cap-over" design in which the release is activated from either end by the cap. The cap extends over the sides and in the closed position its edges are flush with the bottom of the buckle. (see photo and sketch). The problem is that when the occupant is thrown forward, parts of his body, belt, clothing, objects in pockets etc, can be pressed against these edges of the cap and force them forward. This releases the belt. To demonstrate this to yourself grab the straps of the belt and pull the assembly firmly into your lap when your body is bent over the buckle.

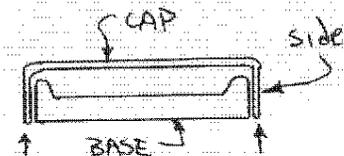
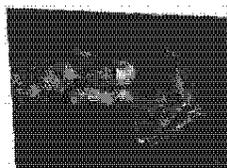
Our original thought was to install a "C"-channel under the buckle base that would provide a shield on the sides so the cap is not forced open in a crash. However, we are not seat belt designers and feel that a solution and replacement is the responsibility of the seat belt manufacturer. (EON). We set up a test demonstration of

the problem and presented it to the president of EON Dr. Cross. Dr. Cross agrees that the buckles are defective and in fact, was already working with FAA on a recall due to inadequate tongue engagement. EON has agreed to replace all belts at no charge to the customer.

We regret that this problem will result in your aircraft being grounded until replacement, but we must recommend that you immediately remove your seat belt assemblies both sides, (not the shoulder harness straps) and send them to EON for replacement. Do not send them to the VariEze distributor, send direct to

EON Corporation
2425 San Fernando Road,
Los Angeles, Ca 90065

Your replacement will be either a previous-design buckle without cap edges or an improved cap-over buckle with side shields.



VariEze

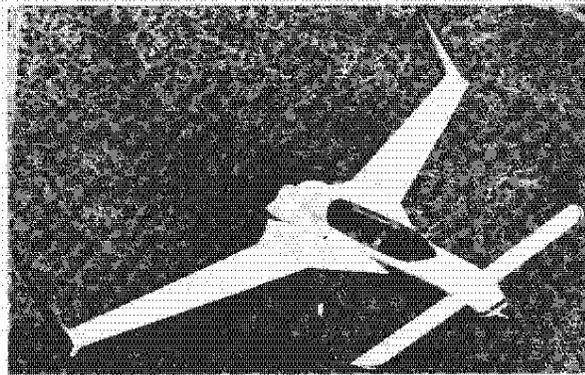


TODAY'S HOMEBUILT WITH TOMORROW'S TECHNOLOGY

THE AIRPLANE. The VariEze is a small, high-performance homebuilt sportplane. It can be built from raw materials costing approximately \$3500 (less engine) in about 1200 man-hours or from prefab parts and materials, costing approximately \$5000 in about 800 man-hours (about eight months spare time work). Its structure is a sandwich of high-strength fiberglass, using low-density, rigid foam as core material. The structure is fabricated directly over the shaped core, thus expensive tools and molds are not required. Composite-sandwich structure offers the following advantages over conventional wood or metal: less construction time requiring less skills, improved corrosion resistance, improved contour stability, better surface durability, dramatic reduction in hardware and number of parts, easier to inspect, and repair. The VariEze uses the small four cylinder Continental. The Lycoming O-235 without starter or alternator can also be used. The airplane has exceptional climb and cruise performance. It can carry two people 700 miles at 185 mph on less than 22 gallons of fuel. Frontseat passengers up to 6'4" and 220 lb and backseat passengers up to 6'2" and 220 lb. can be accommodated plus a modest amount of baggage in a suitcase. The airplane does not have full dual controls, but does have a backseat control stick. Due to its small size (only 67-sq.ft. wing area) it is not the airplane for installing extra equipment for IFR, night flying, etc. It can handle a simple electrical system with a single NAV COM and gyro instrument. These can even be powered with a solar panel, thus eliminating the heavy alternator. The VariEze is recommended for day-VFR operation only. Due to its relatively high landing speed (70 mph) and small tires, it is acceptable only for smooth, hard-surface runways. Its stability and overall flying qualities are superb. Once trimmed, it will hold attitude and level flight "hands-off" even in turbulence. Trim changes due to power, gear retraction, or landing brake are all very small. Its unique aerodynamic design allows it to be flown with full aft-stick, at less than 50 knots, without a stall departure or loss of control, and without altitude loss. The VariEze uses the latest aerodynamic features: NASA winglets, both wings cruise at best L/D, basic arrangement provides stall safety, stiff structure provides accurate contour maintenance, basic system's design eliminates or combines complex control systems, which saves weight, cost and building time while increasing reliability and lowering maintenance.

THE TEST PROGRAM. The VariEze test program was probably the most extensive and successful ever conducted on a homebuilt. It included basic flight tests for flying qualities, performance and systems, spin and dive test to FAR part 23 requirements, static load tests and landing gear drop tests exceeding part 23 criteria, environmental/thermal tests on structural materials/components, manufacturing methods testing, and many others.

THE HOMEBUILDER SUPPORT. The manufacturing manual is a literal education in using the materials and is a detailed step-by-step guide to construction using an illustrated format not common in aircraft plans. The Ruten newsletter, "The Canard Pusher", published since mid 1974, updates plans, provides building hints, etc. Complete owners manual provides all necessary information for safe initial testing and for normal and emergency operations.



VARIEZE DOCUMENTATION is available in six sections.

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 VariEze except engine installation. The manual consists of a 153-page, bound 11" x 17" book plus nine larger full size drawings. It includes 168 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. The manual identifies sources for all materials and all prefabricated components, NASA approved.

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 IIIA - Continental A65, C85, C90, D-200
SECTION IIIC - Lycoming O-235 - No accessories.

SECTION III - ELECTRICAL - This is an optional (not required) set of drawings and installation instructions for electrical system.

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

SECTION V - FINISHING THE COMPOSITE AIRCRAFT - applies not only to a VariEze, but to other epoxy/composite aircraft. Includes filling/contouring/printing/U.V. barrier/ color and trim.

SECTION VI - LANDING BRAKE - Complete full size drawings for an optional drag device. The brake dramatically increases the airplane's glide angle and deceleration in the flare. Without the brake the airplane is limited to runways at least 2400-ft long. With it, runways down to 1800-ft long can be used with appropriate pilot proficiency.

SPECS AND PERFORMANCE WITH 100-HP CONTINENTAL, FIXED-PITCH PROP @ GROSS WEIGHT

Take Off	900 ft	Range @ Max Cruise	700 mi
Climb	1600 fpm	Range @ Econ Cruise	850 mi
Max Cruise	195 mph	Landing Speed	70 mph
Econ Cruise	165 mph	Landing Distance	900 ft
Empty Weight	570 lb	Wing Span/Area	22.2' / 53.6 ²
Gross Weight	1050 lb	Canard Span/Area	12.5' / 13 ²

SPECS AND PERFORMANCE WITH 75-HP CONTINENTAL

Take Off	1200 ft	Econ Cruise	145 mph
Climb	900 fpm	Empty Weight	550 lb
Max Cruise	172 mph	Gross Weight	950 lb

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

ALL RAW MATERIALS:

AIRCRAFT SPRUCE & SPECIALTY CO 201 N. Truxtun Ave. Bx 424, Fullerton, Ca 92632 (714)870-7551 Catalog \$2	WICKS AIRCRAFT SUPPLY 410 Pine Highland, Il 62249 (618)654-7447 Catalog \$2
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KEN BROCK MANUFACTURING, 11852 Western Ave. Stanton, Ca 90680 (714)898-4366: Prefabricated components - wing attach assembly, nosegear machined parts, control system components, fuel caps, engine mount, rudder pedals. Catalog costs \$2.

THE AIRPLANE FACTORY, 7111A Brandtvista, Dayton, Oh 45424 (513)845-9872 or 233-7754 - Canopy. Send SASE

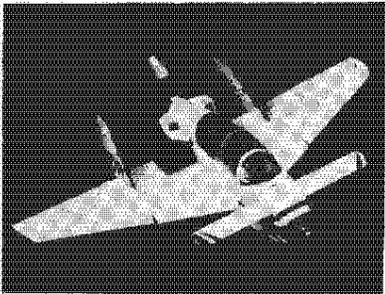
Check items desired	Price, including first-class mail U.S. and Canada	Air Mail Overseas*
VariEze info kit includes current issue of "Canard Pusher" newsletter	\$5.00	\$8.00
"Canard Pusher" newsletter published quarterly. One-year subscription	\$6.75	\$8.75
<input type="radio"/> Section I	\$139.00	\$153.00
<input type="radio"/> Section IIA	\$ 19.00	\$ 21.00
<input type="radio"/> Section IIC	\$ 21.50	\$ 23.50
<input type="radio"/> Section III	\$ 8.00	\$ 9.50
<input type="radio"/> Section IV	\$ 8.00	\$ 9.50
<input type="radio"/> Section V	\$ 7.00	\$ 8.00
<input type="radio"/> Section VI	\$ 10.00	\$ 11.00
<input type="radio"/> 3" tri-colored jacket patch	\$ 1.95	\$ 1.95
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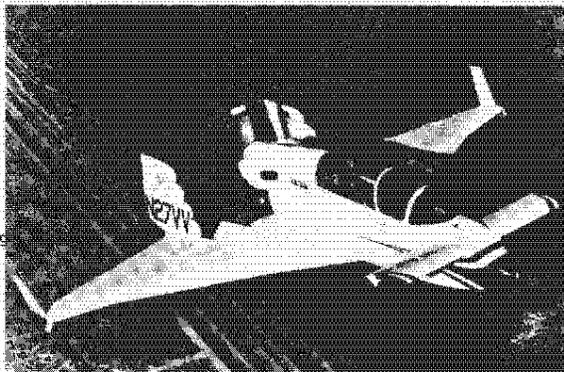
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VARIVIGGEN



Standard VariViggen

Special-Wing VariViggen



Performance with 150-hp, fixed-pitch prop, gross weight.	Take Off Climb	850 ft 800 fpm	Specifications Standard VariViggen	Canard Span/Area	8ft/18.3ft ²
Standard VariViggen Landing	Cruise	150 mph		Wing Span/Area	19ft/119ft ²
	Full Aft Stick	49 mph		Empty Weight	950 lb
		500 ft		Gross Weight	1700 lb
Performance with 150-hp. Special Performance Wing	Climb	1000fpm	Specifications Special Performance Wing	Wing Span Area	23.7ft/125ft ²
	Cruise	158mph		Gross Weight	1700 lb

PROVEN DESIGN

Complete flight test program completed; 600 hours on prototype with very little maintenance. Won the Stan Dzik trophy for design contribution, Oshkosh '72.

STALL/SPIN SAFETY

The VariViggen's safe flying qualities have been the subject of technical presentations for EASA, SAE, AOPA, AND AIAA. It will not stall or "mush in" like the common delta. At full aft stick (43kts) it will still climb 500 fpm roll over 50 degrees per second without rudder co-ordination, and make buffet-free turns. The prototype received the Omni Aviation safety trophy at Oshkosh '73 and the outstanding new design award at Oshkosh '74.

EXCELLENT UTILITY

Comfortable tandem cockpits, three-suitcase baggage area, and an adequate cruise speed provide unusual utility for a homebuilt airplane. Its unusual design turns routine travel into "fun trips". Gas service and other airport services have been better too! Take it home; it's road-towable with outer panels removed.

UNCOMPLICATED CONSTRUCTION.

The basic structure requires few special tools and can be built in a simple jig. The few parts that have double-curvature are available in fiberglass, ready to install. All machined parts are also available, as well as other prefab parts.

EASY TO FLY

Despite its unique appearance, the VariViggen has no unusual or pilot-demanding flight characteristics. It is easier to handle than conventional aircraft, particularly in gusty crosswind conditions.

THE FOLLOWING DISTRIBUTORS MARKET VARIVIGGEN PARTS.

AIRCRAFT SPRUCE & SPECIALTY CO. 201 W. Truslow Box 424, Fullerton, Ca 92632 (714)870-7551
VariViggen spruce kit, plywood kit, hardware, aluminum and fiberglass. Catalog cost \$3.

KEN BROCK MFG. 11852 Western Ave., Stanton, Ca 90680. (714)898-4366.
VariViggen prefabricated components: all machined parts. Catalog costs \$2.

THE AIRPLANE FACTORY, 7111-A Brandt Vista Ave., Dayton, Ohio 45424. (513)845-9872
VariViggen plexiglass canopy

BILL CAMPBELL Box 253 Phelan, Ca 92371
VariViggen brackets and fittings.

MONNETT EXPERIMENTAL AIRCRAFT INC., 955 Grace St. Elgin, Ill 60120 (312)741-2223
VariViggen molded fiberglass parts.

GUGEN BROTHERS, 706 Martin, Bay City, Mi 48707
VariViggen 105/206 epoxy and 403 fibers for wood construction.

GEORGE EVANS 4102 Twining, Riverside, Ca 92509
VariViggen welded nose and main landing gear. 1-1/4" sq. steel tube.

JESSE WRIGHT (VariViggen builder)
7221 S. Colorado Ct. Littleton, Co 80122
(303)771-5140
VariViggen prefab wood parts. Send 50¢ for list.

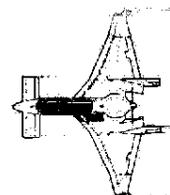
VARIVIGGEN TECHNICAL REPORT - Complete tech report describing the VariViggen two-place sportplane. Includes specifications, pilot report, dimensions, 3-view, stability and performance flight test data, construction cost, description of car-top wind tunnel, 8" x 10" glossy photo and current issue of newsletter.
Price - \$10.00 first class mail, \$11.50 Air Mail overseas.

VARIVIGGEN OWNERS MANUAL - Complete operational handbook including normal and emergency procedures, loading, operational record keeping. This manual is a must for those close to first flight.
Price - \$6.00 first class mail, \$7.50 Air mail overseas.

"CANARD PUSHER" SUBSCRIPTION - A newsletter designed with the builder in mind. Emphasis on distributing to all builders as many ideas, improvements, building tips, photographs, and flight reports as possible. Details mandatory, desirable, and optional changes to plans and to owners manual. A newsletter subscription and back issues starting with CP#19 are mandatory for those with VariViggen's under construction. Identifies new material sources as they become known. Published quarterly.
Price - \$6.75 per year first class mail, \$8.75 per year air mail overseas. Back issues, \$1.50 each.

VARIVIGGEN PLANS - SECOND EDITION. This is an updated, revised set of very complete drawings and construction manual consisting of a bound 11" x 17" book, containing many photographs, hints and instructions based on actual builders experience over the past several years. It covers the entire airplane, including the engine installation fuel system, and not only covers the original standard wing in both aluminum and foam or fiberglass composite, but it also includes the composite S.P. wing, ailerons, and rudders. The manual identifies sources for all required materials and all available prefabricated parts and components.
Price - \$165.00 first class mail, \$177.00 Airmail overseas.

VARIVIGGEN R/C MODEL PLANS - Complete construction plans for the 18" - size radio controlled model airplane built and flown to evaluate VariViggen spin characteristics. Designed for 4-channel proportional radio equipment and engine in the .35 to .65 cu inch size. 555-sq wing area. All balsa or foam/balsa construction. A maneuverable flying model with outstanding roll rate. Also shown are modifications required for a control-line model (70-ft lines, .19 to .45-cu inch engines)
Price - \$475 first class mail, \$5.50 air mail overseas.



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