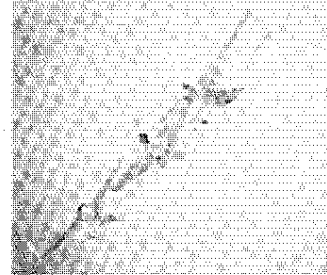


THE CANARD PUSHER

NO. 20

APRIL 1979

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If you are building a VariViggen from 1st Edition plans you must have newsletter 1 through 20. If you are building a VariViggen from 2nd Edition plans you must have newsletter 1 through 20.

If you are building a VariEze from the 1st Edition plans you must have newsletters 10 through 20. If you are building a VariEze from the 2nd Edition plans you must have newsletter 16 through 20.

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 Wednesday through Saturday.

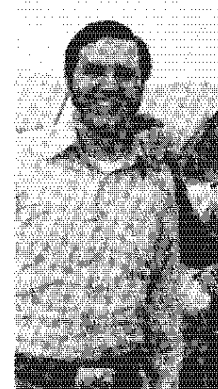
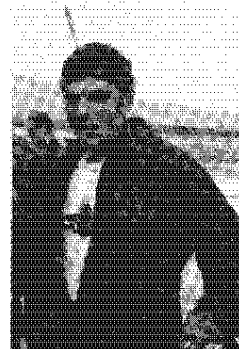
If you are planning a trip to see us, please call first to assure that someone will be here to assist you, since occasionally we are gone to fly-ins.

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



RAF ACTIVITY since the January Newsletter has included construction of a new EZ, builder support, development work on the Defiant, and extensive flying of our Defiant, VariEze and VariViggen for airshow practice. We have flown a three-aircraft airshow demo each Saturday at Mojave for the last several months. The new EZ under construction (N79RA) should fly by mid May. It will be powered by a Lycoming O-235. It will be the test aircraft to flight-test the Jiran prefab wings.

The adjacent photos show the RAF crew, so you can become better acquainted with those who you may only know as a voice on the phone. Sally and Mike Melvill, builders of N27MS, the award-winning VariViggen have been with us since October. Both are excellent pilots as well as airplane builders. Their experience in building both a VariViggen and an EZ and in understanding the needs and problems of the homebuilder, is a most important asset to RAF. Also pictured are Dick and brother Burt Rutan. Dick joined RAF a year ago after a 20 year hitch as a USAF Fighter Pilot.



CONGRATULATIONS! to the following who have made

VariEze first flights since the last newsletter:

Dan Lee	California
Darl Hess	Florida
George Dirks	New Mexico
Jim Ball	Missouri
Gary Johnson	Texas
Mr. Griswald	Arizona
Ray Cullen	Oregon
Carl Gearhart	Penns
Brian Giesler	Colorado

There are probably more, but these are all we're aware of. Be sure to give us a report when you fly. This is very important to us so we can best support others. In particular, if you have had any problems or have found any improvements that would aid other builders, be sure to let us know so we can pass them on in the Canard Pusher.

THE AD-1 was delivered to NASA's Dryden test center last month and immediately began taxi tests. It is now being instrumented with a data system and should be flown in June. The AD-1 started as an unsolicited proposal by RAF to NASA in December '75. RAF did the detailed design between May 76 and Feb 77 under a \$12,000 contract. AIC, of Long Island N.Y., won the construction contract and started construction in December 77. They delivered the flight-ready aircraft, including a static load test, in February 79 for a total contract cost of \$239,000. Until recently, the aircraft industry did not believe it was possible to design and build a manned, skew-wing, twin-jet research aircraft for less than several million dollars. It is interesting to note that the total work done by RAF and AIC was done at a profit and at far less cost to the taxpayer than the NASA tasks of overseeing the contractors and doing a simulation!

While we expect the AD-1 to provide the basic subsonic skew-wing stability data it was built to provide, we expect its major impact will be that it is possible for the government research agencies to procure a truly low-cost aircraft, working with a small contractor and employing the moldless composite construction similar to the VariEze.

DEFIANT We have decided to proceed with a type-certification program on a light twin based on the Defiant prototype. It's cabin design is completely different from the prototype. It has a clamshell door with roomy seating and baggage for five adults. Specifics on its configuration, performance, etc will not be released until it is in flight test in late 1980. Certification is anticipated in late 81 or early 82. Meanwhile, we continue to gather operational data on the Defiant prototype, N78RA. Last week it flew nonstop from Mojave to Wichita (1265mi) at 17,500 ft, at 175 knots, burning only 5.4 gal per hour per engine, landing with 1 1/2 hour fuel onboard. It is being evaluated in the IFR environment, including approaches at minimums, a zero-zero takeoff (actual IMC), and light ice on four occasions. It has seen 270 hours of very vigorous testing of all types including aerobatics and spin-attempts, and has yet to cut a flight short due to a precaution of any kind. Due to the fact that we are doing this program with very few people and very low overhead, we will not have time to respond to questions, etc on the Defiant for the next two years. We plan to be very low key on release of any information or promotion of any type. This newsletter will report any releasable progress as we proceed. If you do want an advance look at the Defiant's capabilities and are interested in beautifully-done sound film, send a SASE to Ferde Grofe, 18139 Coastline Dr. Malibu, Ca 90265. for his flyer on the new film "Defiant".

JIRAN'S PREFAB WINGS - STATIC TEST Burt, Dick and Mike were present when Fred Jiran static loaded his VariEze prefab wings and centersection. NASA was also there, and had installed 24 strain gauges all over the wings and centersection spar. The wings were loaded to the design limit of 7.5 gs with no problem whatsoever. In fact, due to a calculation mistake we had earlier loaded them to 8.25 gs and almost twice the expected torsional loads. The strain gauges verified adequate stress margins at all measured locations. We will begin a thorough flight test program on these wings and center section (the same ones that were used for the static proof loading) here at RAF next month. Look for a full report in CP #21.

CAUTION - OVERWEIGHT! It has come to our attention that some VariEze builders are operating their VariEze's in an overweight condition. This is a high risk activity and an extremely hazardous practice.

Every VariEze builder should know, the maximum gross weight is 1050 lbs. Under certain restricted conditions this can be raised to 1110 lbs. for takeoff only - (see CP # 14, page 5). Attempting to operate above these weights and/or using higher than recommended horsepower, definitely raises your risk above an acceptable level.

Takeoffs, landings, off-field landings, maneuvering, or flight in strong gust conditions may result in an accident that could destroy your aircraft. Never operate above the recommended gross weight. An accident can compromise the freedoms of all homebuilders. Please do not let it happen.

VE STALLS Dan Lee, of Livermore, Ca has installed wing cuffs per CP #19. Prior to cuff installation, Dan had on four occasions experienced divergent wing rock, resulting in departures and spiral recovery - rolling dives. (CP #19). His post-cuff installation flight report follows: "I did not get a stall with or without power, only a slightly perceptible wing rock, power off at full aft stick. The overall effect on slow speed flight control is great, as is the improvement in confidence and peace of mind". Do install the cuffs exactly as shown in CP #19.

VE EXHAUSTS There are now at least four VariEze's with over 300 hours, two of these are O-235 Lycoming's one of which has standard exhausts as per Section IIC with no problems. O-200 Continentals, have not been so fortunate. The muffler system though heavy works very well, at this point we have removed it and consider it to be a proven exhaust system. In its place on N4EZ we recently installed an exhaust system designed and built by VariEze builder Herb Sanders of Memphis. This is the exhaust that exits out of the trailing edge of the cowling. We only have 25 hours on it so far and Herb has 70 hours on his, so it is too early to be certain, but so far it looks good. It is not as quiet as the muffler system, but is half the weight, and simplifies cowling removal. We shall have to wait until we have 150 hours or so on the system before we categorically recommend it, but the concept and workmanship is good.

The cross-over system is structurally sound and does increase power. However it cannot be adequately faired on a VariEze to prevent massive airflow separation in the aft closure. This causes high prop noise and a 15 knot speed penalty.

We will be testing an entirely new system on our new EZ.

CLARIFICATION - VARIEZE ENGINE WEIGHT

240 lbs is mentioned as a maximum weight of engine, prop, prop extension, exhausts and spinner in Section II. This weight is the maximum allowable vibrating mass and does not include engine mount or cowling. Maximum engine and accessory weight is 215 lb.

WIDE CHORD ELEVATOR - STABILITY AND STALLS Many builders have been confused about the various aerodynamic effects of shortening the canard and widening the elevator. The reason for the confusion is that the effects are not what one would immediately think. Hopefully the following discussion will clear the air:

Question - the wide chord elevator is bigger and thus gives more effect per degree - why doesn't this make the controls more sensitive?

Answer - sensitivity is more a function of effect per stick force, not displacement. True, the wide chord increases effect per degree by about 12%, but the distance from the elevator's center-of-pressure to its pivot is twice as far, thus stick force per effect is nearly doubled.

Question - I understand why shortening the canard moved my airplane center of pressure (and cg range) back 1.2 inches due to less area on front. But, why didn't the cp move back forward, when I installed the wide-chord elevator, thus increasing canard area?

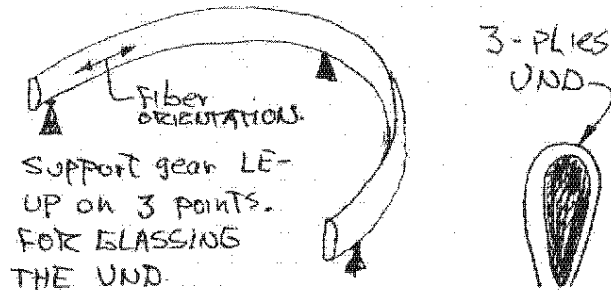
Answer - The wide chord elevator has a negligible effect on aircraft static stability for two reasons, (1) the elevator "floats" when angle of attack changes. Thus it's area has much less effect on stability than the fixed canard area. (2) The wide chord elevator results in less, not more, aspect ratio, as compared to the area added by increasing canard span.

Question - Since the wide-chord elevator has more aerodynamic power, it should be able to drive the airplane into a deeper stall, correct?

Answer - No, the airplane's maximum angle-of-attack is limited by the stall angle of canard airfoil. Adding more elevator can get it to stall with less elevator position, but it will still stall at the same angle, and still limit the aircraft to a safe attitude without stalling the aft wing. Note that even though a large elevator can increase the maximum lift coefficient of the canard, larger elevators actually decrease the stall angle and thus cannot increase the angle seen by the aft wing. The aft wing angle is the main factor for stall characteristics.

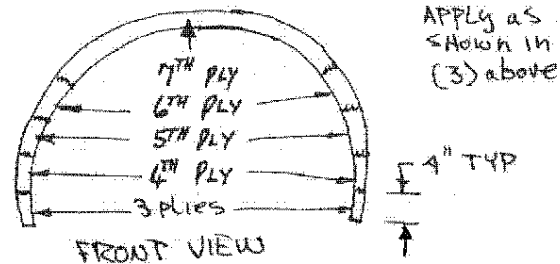
LANDING GEAR There have been two reported main gear failures, in which we suspect 'creep', since these occurred on overweight airplanes in hot temperatures. The failure was on top of the main gear strut between the mounting tabs, and showed up as a wrinkling or buckling of the BID wrap. This may have been aggravated by not "setting" the gear (ref. CP #18 page 5). Main gear "creep" will also show up as a slow long-term reduction of wheel camber or increase of gear spread (distance between wheels). We now recommend the following:

- 1) Be sure to 'set' your gear after every flight
- 2) Inspect the top of the main gear strut, between the tabs, through the hole in rear seat bulkhead occasionally
- 3) For new VariEzes under construction. Sand the entire gear strut dull and lay it trailing-edge down. Using RAEF, layup three plies of UND spanwise from axle to axle, draping each ply from trailing edge over the leading edge to trailing edge. Be sure fibers are straight. After cure, sand trailing edge smooth and apply the two plies of BID, one from the leading edge and one from the trailing-edge, per CP #15 page 6. Before laying up the attach tabs per CP #14 page 6. These three plies per side of UND will stiffen your gear about 15%.



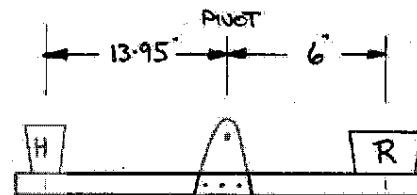
- 4) If wrinkles, or loss of camber, or spread is noted in operation, remove the main gear strut, remove wheels, axles and brake lines. Strip off the tabs and thoroughly sand the entire strut. You may see evidence of compression fractures on the top surface of the gear. These can be repaired as follows: Lay up seven plies of UND, three plies from axle to axle (per #3 above) and the remaining four plies lay up 4" shorter on each side progressively, (see sketch). Then apply the BID and tabs, per #3 above.

REPAIR - IF GEAR HAS COMPRESSION DAMAGE.



EPOXY Applied Plastics has sent out about 20 samples of the new low toxicity epoxy, but it is too early for us to have received any reports. We have used it here at RAF on our new EZ. If we receive positive results on the toxicity tests and the system passes all structural and workability tests, it will replace the current RAE systems.

While we are on the subject of epoxies, I would like to remind you to be as accurate as you can when using your ratio balance. Make sure the pivots are clean and work freely. Mixing epoxy requires far more accuracy than mixing polyester (boat resin). If you think of your resin as a bunch of "threaded bolts" and of your hardener as a bunch of "nuts", you will see that only with a perfectly accurate mix do you have one "nut" for each "bolt". Only the molecules "bolted together" as it were, do any good. So the greater accuracy you use to ratio your resin-hardener, the stronger your epoxy (and VariEze) will be.



SCALE FOR NON TOXIC EPOXY SYSTEM ONLY.

4.3 PARTS HARDNER TO 100 PARTS RESIN.

CONTROL SYSTEM ROD-ENDS The VariEze control system is unusual in that it uses the small HM-3 rod-ends in its primary controls. Aircraft normally use the 1/4" hole HM-4 as the minimum size. Justification for this is that the control surfaces are small, sized for the low forces required for a sidestick control. Thus, the design safety factors are still larger than in normal control systems. However, the small HM-3 rod-ends are relatively fragile if they are subjected to bending or twisting loads. These loads do not exist in operation, but they can occur when the canard is being removed, or at the stick if the roll stops are not adjusted correctly. We recently heard from a builder who broke an HM-3 while he was installing his controls! This is a very serious concern, since there is no redundancy in the pitch system to save the airplane if one should fail in-flight. This is not as serious in the roll system, since the airplane can be steered with rudder or the other aileron. Due to the relative frailty of these rod-ends, we are recommending that you immediately replace the four primary pitch rod-ends with HM-4's as shown in the adjacent drawings. This includes both ends of the CS136 tube and both ends of the CS102 tube. Note that two CS201 spacers are required for each rod-end on the CS102 pushrod to allow sufficient roll travel. They are steel, 5/16 OD x 1/4 ID x 0.1 long. Also, the two CS111 spacers are replaced by CS202 spacers. Four of the CS1 inserts now are CS1A (1/4" x 28 thread). Note that this change also effects the parts list on several bolts, washers and nuts. Drawings for CS1A, CS201 and CS202 have been supplied to Brock so he can manufacture them. Aircraft Spruce and Wicks have all the new hardware in stock. If you are retrofitting you can drill (#3 drill) the CS1 spacers and tap 1/4 x 28 thread.

VARIIZE PLANS CHANGES

Section I
pg 18-1 add "see CP #20 for installation of three plies UND on strut before the BID wrap".

Section I
chap 19 add "pitch system rod-ends from the elevators to the front stick (four total) have been changed to HM-4 size. See CP#20 for details".

Section I
pg 2-1
& 2-2 Revise the bill of materials as follows to reflect changes required to change to the HM-4 rod-ends.

Subtract

(4) HM-3	(1) AN3-11A
(4) VECS13	(1) AN3-15A
	(1) AN3-16A
(4) MS21042-3	(1) AN3-7A
(2) CS111 Spacers	(4) AN 315-3
	(4) CS1 inserts

Add

(4) HM-4	(1) AN4-7A
(4) CS201	(1) AN4-12A
(2) CS202	(2) AN4-16A
	(4) AN316-4
(4) MS21042-4	
(4) CS1A inserts	

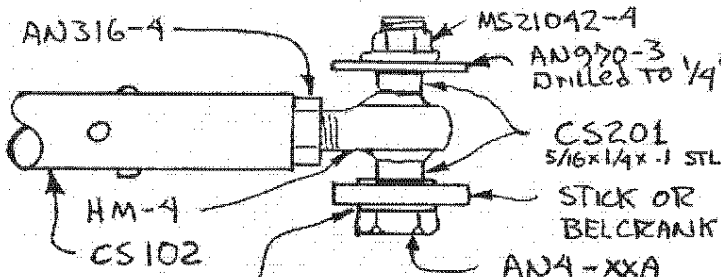
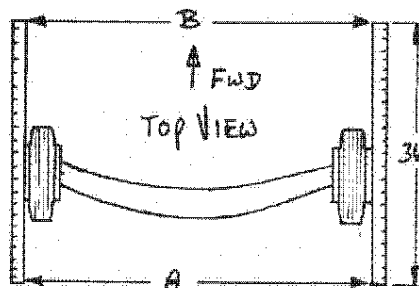
BUILDERS HINTS When you cut BID or UND, mark the cloth where it will cross the center line with a fine felt marker. This mark can be very helpful in perfectly aligning such layups as canard spar caps, etc.

Draw lines (broad felt tip marker) on your glass cut-out table at 45° to the sides on 6" centers. This is a big help when cutting BID.

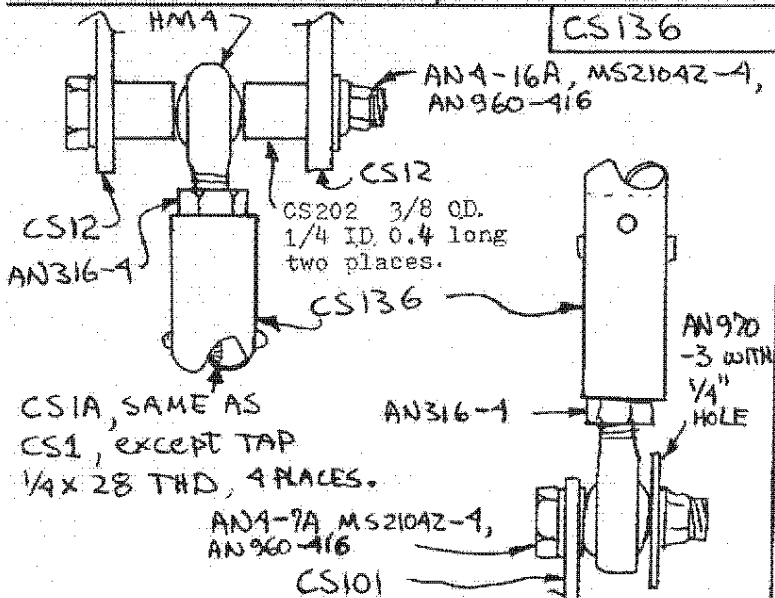
Be careful when storing foam blocks, not only can sunlight ruin it but rats and mice love to dig tunnels in it!

Finding fuel tank leaks. Purchase a can of Freon from your friendly auto air conditioner repair man, and borrow his Halogen gas sniffer. (This may require some persuasion!). Squirt some Freon into the offending tank, replace the cap, and pressurise the tank, (blow into the vent) Use the sniffer to locate the leak or leaks, mark them carefully and repair per CP #14 pg 10. This method will find even the tiniest pin hole leaks.

Check your maingear toe-in. This can really effect the life of main tires. See the accompanying sketch, and clamp or hold one 36" long straight edge on the outside of each main wheel, be sure it touches the rim both fore and aft of the axle. Position of the straight edges fore and aft is not important, as long as they are the same. Measure accurately the distance between the ends of the straight edges at 'A' and at 'B'. For 1° to 2° of toe-in per wheel. A-B=0.3" to 0.7"



AN960-416 BOTH SIDES OF BELCRANK CS102-BOTH ENDS



An excellent cowling idea from Herb Sanders— Instead of glueing your cowling rib to the bottom cowl, glue it to the main wing root. This allows you to better fair the cowling in with the wings, and makes it simpler to remove the cowl, as either the bottom or top cowl can be removed independantly of each other without hitting rudder cable or aileron tube. This requires four more camlocs (or screws) on each side in the bottom cowl. The only time this would not be convenient would be for the builder who intends to trailer his EZ to and from the airport, requiring frequent wing removal. We have modified N4EZ to this configuration to test the Jiran kevlar cowl and are very pleased with it.

Jim Eggleston wired up his instrument panel before installing it in the fuselage. He then bound all the wiring into a harness, color coding the wires and tagging each wire. The harness was then removed and the panel installed. See photo.

Jim also reports that he used dead soft .016 aluminum, called handyman's metal, obtainable at the hardware department of Montgomery Ward's in rolls, to make his hotwire templates. This material can be cut to size (after paper templates are glued on) with ordinary scissors.

Before flexing VECS3 hinges into your canard, bondo small wood blocks adjacent to the VECS3's and overhanging the slots cut in the canard. VECS3's can now be clamped to these blocks, templates can be removed from under the elevators, and the elevator travel can be checked before final potting in flox. Leave clamped until set. This tip from Minnesota's EAA Chapter 587.

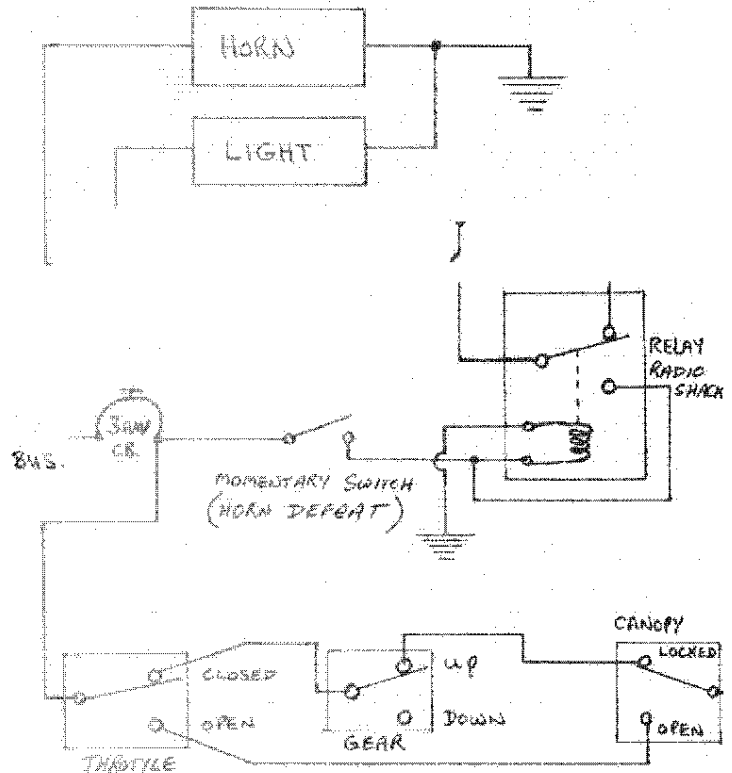
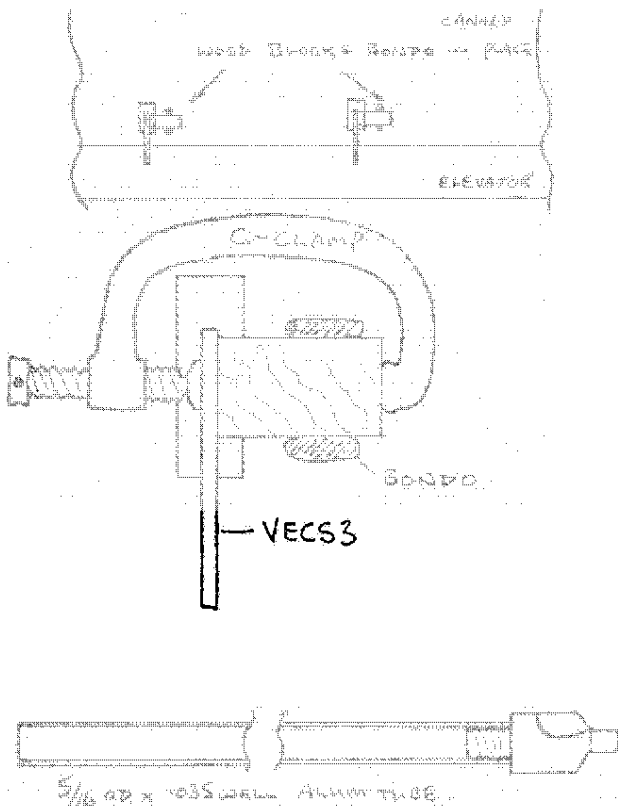
When countersinking difficult to reach holes, e.g. 3/16" dia holes in engine mount extrusions, a 9" long piece of 5.16" dia x .035 wall aluminum tube can be used. Drill and tap a 1/2 x 28 thread in one end and screw in a 100° countersink with a 3/16" pilot.

Many builders have requested a summary of weights of each individual part. These are weights of the parts before any finishing.

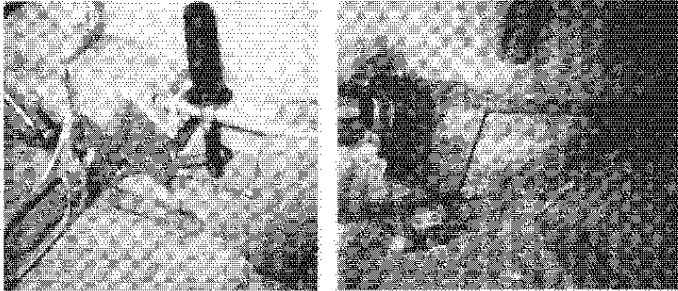
Complete wing/winglet aileron assembly	43 lb
Above, after finishing	46 lb
Winglet before cutout for rudder	2.6 lb
Canard (142")	16.5 lb
Elevator (left)	3.6 lb with balance weights
Elevator (right)	3.3 lb with balance weights
Wings (each)	34.0 lb
Ailerons	3.5 lb
Center Section Spar	21.0 lb
Fuselage (at end of chap. #12)	65.0 lb including C/S spar
Canopy (end of chap#22)	14.5 lb

When cutting out small BID circles, as in bolt hole reinforcement on NG30's, fold up BID cloth strips to requ red number of plies (30) and clamp between two scrap pieces of 1/2" plywood (firewall material). Vice grips work best. Now cut through plywood and glass with fine tooth coping saw or band saw. Presto perfect circles of BID!

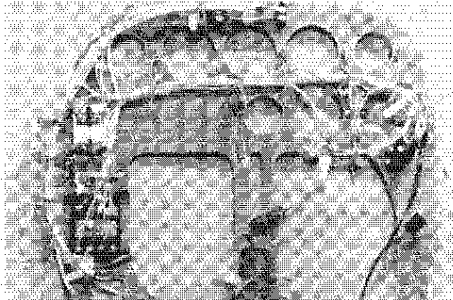
Gear and canopy warning - this system has a resetting defeat feature. The main advantage is the ability to silence the horn, while doing gear-up, slow flight or descents. The light stays on as long as the throttle is retarded. Each time you cycle the throttle the horn will sound and will have to be re-silenced. This eliminates the possibility of switching the warning system off during gear-up descents, and forgetting to rearm it for the landing approach.



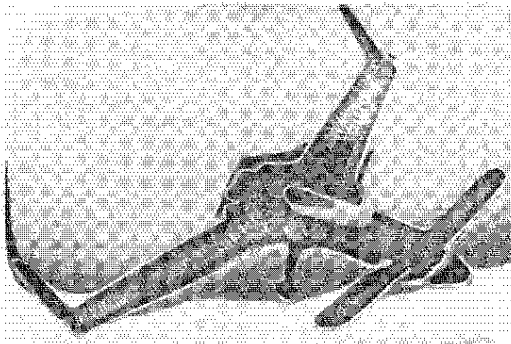
Side consoles and control system installation - a simpler way. The adjacent photos show how we did it on N79RA. Note how only the forward three inches of the aft console is installed. After controls are installed the remainder of the console will then be permanently installed. Note how large cutouts are removed from the forward console to get access to the stick and forward belcrank. After controls and trim springs are installed we will fabricate a three ply glass removable cover over the stick area.



HMI4 (1/4") ROD ENDS SHOWS



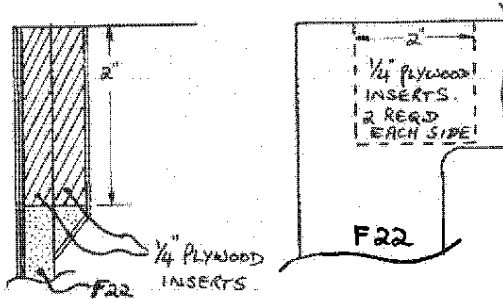
JIM EGGLESTON'S INSTRUMENT PANEL



PVC FOAM COLORS

Several builders have accidentally used 9mm PVC foam for their F22, F28 and instrument panel bulkheads. The confusion has arisen through variations in color of the PVC foam. Rather than going by color check the thickness and obvious density. The 5mm (.2") high density foam is more dense than the 9mm (3/8") It has a smoother texture - finer cells than the 9mm, which has a coarse texture with a larger cell structure. If you are one of the builders who has made this mistake, here is the fix. The only area that is a structural problem, is F22 where the canard lift tabs are attached.

To stiffen this area you should dig out the foam as shown (use a 1/4" drill) and make four (4) 1/4" birch plywood inserts (scrap firewall material), which should be a nice snug fit, and should be glued in with wet flox.



This mistake will, of course, also necessitate longer VECN1 bushings. This fix will provide adequate bearing strength, and structurally the airplane will be more than satisfactory.

SHOPPING

D and J Coats have come up with a really fine VariEze belt buckle, see photo. It comes in a brushed or polished finish. Orders can be turned around in three to five days from receipt of order.

Write - D & J Coats,
P.O. Box 2679
Taos, N.M. 87571

Radio Shack has a 12v warning horn suitable for gear/canopy warning. Model #273-051 for \$1.89

Calctro, G.C. Electronics, of Rockford Illinois 61101, has a mini meter # D1-941 in the 0-500 ma range for \$10. that measures 1 1/8" square, and is good for measuring power out put of your solar cell.

Bud Gross, an E-Z builder has designed and built expressly for a VariEze, a really good looking trailer. He will send you a flyer with pictures for \$1.00 and SASE, or you may order construction drawings for \$20.00.

Write - C.A.Gross,
392 Tiger Tail Drive.
Arroyo Grande, Ca 93420

ROTORWAY RW-100 ENGINE IN VARIEZE - Our earlier plans to test this engine this spring in N4EZ have been postponed. Several items must be improved by the engine's manufacturer before it will be acceptable for us to begin the installation test: Currently, the installed weight of this engine, including the accessories required for it to operate is above the maximum allowable weight for the VariEze. The engine needs an alternator because of its electric fuel pump requirement and a starter since it cannot be hand-propped. It currently has no provisions for alternator or mechanical fuel pump, yet needs 3 psi fuel pressure. The current configuration at 92 BHP and greater than 240 lb (installed) is marginal for a VariEze.

We are, of course, hopeful that this or any new engine will become available to supplement the availability of Continental and Lycomings. We are working very closely with Rotorway and will do our best to support and assist in its successful development. When Rotorway prepares a configuration that we consider acceptable for the VariEze, we will immediately begin an aggressive flight test program with it in N4EZ to develop the information necessary to make a determination on its acceptability and to prepare an appropriate Section II.

However, our ethics require us to caution our builders to beware of any new product until it has been adequately developed and tested.

WANTED

855ph Continental C85-12F
Earnest Deel
3710 Maple,
Warren, Mi 48091
(313) 756-3794

NOTE!! Can't find an engine? Run an ad in Trade-a-plane, crossville, Tenn 38555, and let us know what kind of response you get!

FOR SALE

0-200 A Continental, '0' since major, 100 octane valves, balanced, with all accessories, including prop extension, VariEze engine mount, Section IIA.

~~Conlar Carter
P.O. Box 7366
Van Nuys, Ca 91409
(213) 761-4636~~

Continental C-90-8F with 0-200 cam - 100 hp. '0' since major. No provision for mounting starter or alternator, very light \$3,100.00. Call (904) 878-5858

Michael P. Fisher,
has brand new Continental 0-200 as well as remanufactured 0-200 engines for sale at reasonable prices. Write him at 8800 Coventry Drive, Sturtevant, WI 53177

A lot builders have reported excessive costs for engines. It seems most insist on a 0 since major engine. Why not use a half run out engine? It runs cooler than a new overhaul and can give years of operation before next major. Both our VariViggen and VariEze prototypes N27VV and N4EZ started life with 1300 hour SMOH engines. We just now bought an 0-235 Lycoming for our new EZ for only \$1500. It has 1350 hours and was removed from a Yankee for installation of an O320. We expect to get a full 700 hours before overhaul, a bargain for \$1500!

ACCIDENTS since the January newsletter there have been two VariEze accidents.

The first accident was in Michigan, when a VariEze was attempting to land. It was slow on final, developed an excessive sink rate, hit hard then cartwheeled while bouncing about 30 feet into the air, and coming to rest inverted in a snow bank. Other than a small abrasion on one knee the pilot was not hurt. The EZ was substantially damaged. The pilot had 2.5 hours in his VariEze, all operating from a large airport. He had not flown in the previous three weeks due to bad weather. On this flight he was attempting to land on a 2850 ft runway with power lines and trees on both ends in a 10 knot cross wind. The runway was covered with snow except for a 45 ft wide path in the center and there were 3.5 foot high snow banks on each side. Ground witnesses reported the pilot attempted two landings but got slow on each and went around. On the third approach he once again got real slow in a nose high (estimate 30°) attitude, developed heavy wing rock, and a high sink rate. He hit hard, spread the main gear strut straight out and then caught the snowbank and cartwheeled.

The second accident occurred March 7th. Just after take off from the Tims Airport, Austin, Tx. The take off and initial climb to a few hundred feet were observed to be normal, then the aircraft appeared to lose control, descending in a very steep angle and crashed about three miles from the airport. Both occupants died instantly. The aircraft had over 80 hours flying time. It had been tested extensively and had never demonstrated any unusual flight characteristics, according to the previous owner. Working with the FAA investigator, we found no indication of structural failure, control disconnect or engine failure. An examination of the canopy locking system revealed that the canopy was not locked at impact. The aircraft was equipped with the canopy safety latch and its damage showed the canopy was open approx. 1 1/2" and engaged in the safety latch at impact. There was no canopy unlatched (light/horn) warning system nor inside canopy closing handle installed. The aircraft was within the allowable gross weight and slightly aft of the aft cg limit.

The pilot had just recently purchased the aircraft a few days before in Alabama. He had a total of about 10 hours in the VariEze, mostly cross country time. According to the previous owner the pilot experienced considerable difficulty checking out in the VariEze, even though he had several thousand hours time and was Lear rated. Before the pilot left Alabama, the previous owner had made it clear that he was marginally qualified in the aircraft and should improve his proficiency before carrying passengers.

Since the canopy was unlocked at impact it would indicate the pilot had failed to complete his take off check list and took off with an unlocked canopy. It appears that the distraction of the canopy opening against the safety latch, combined with a possible panic stricken passenger (it was the passenger's very first airplane ride) might have caused the pilot to lose control of the aircraft.

There are three other documented cases of VariEze canopies opening in flight. All three were able to control the airplanes to a landing, even though they were holding it down with fingers outside the canopy frame (two inches open). With canopy open (2") in the safety latch, other than a moderate wind blast, VariEzes can be controlled and landed normally. The following is a first-hand account of such an incident by Les Faus. "Burt asked me for few words about how it is to fly a VariEze with the canopy open. Mine opened at about 50 ft and 100 mph. I fortunately had a back seat passenger that I could rely on. Between the two of us we were able to close the canopy without too much trouble. With the canopy full open, the plane tends to pitch up and to the right. I put the stick into the left front corner and eased back and just held it straight until we could ascertain the damage. The back seat passenger held the canopy closed while we flew 15 miles to another larger airport for landing. The airplane flies well with the canopy being held with your hand around the frame. About 2" open. At that time there was no safety lock on mine. The only damage to the canopy was the center arrow stock broken by the back seat passenger trying to close the canopy. If this happens to any of you, don't panic. The airplane is controllable and can be saved. It sure gets the hair up the back of your neck at the time though!"

Note: In 1977, Peter Krauss had a similar opening on take off while flying solo and he held it down and landed while using his right hand for control and throttle.

Any kind of accident is unfortunate. It would be even more so, if we did not try to find out why and try to prevent it from happening again. Possibly both of these could have been prevented if the pilots had carefully followed the procedures in the owners manual and newsletters, especially in the area of initial flight testing and pilot proficiency. We urgently request that the guide lines established in the operations of this aircraft be followed. Review them, be sure the warning systems are installed and operational. Follow the owners manual to the letter.

To review an Air Force adage on how to handle any emergency.

1. Maintain Aircraft Control
2. Analyze the situation
3. Maintain Aircraft Control
4. Take proper action.
5. Maintain Aircraft Control

Many have crashed light aircraft due to doors coming open, even though the airplanes fly acceptably well with the open door.

Be aware of your proficiency and the capabilities of your aircraft and don't stretch either one. Never operate at the edge of any limitation unless you need to and your proficiency is excellent. This applies to everything - weight cg, red line speed, approach speed, airport size, allowable g - etc. Limits are just that - Airplane limitations. Flight near the limitations normally require more pilot skill on any aircraft, particularly high-performance ones.

CANOPY SAFETY PHILOSOPHY

There aren't many things on the VariEze that a pilot can forget that will hurt him. Failure to extend the gear prior to landing will only cause superficial aircraft damage. But forgetting to lock the canopy can be a very serious problem. I see some EZ's flying without the safety latch or a warning system and ask, why? The response is "I am a good pilot, I always use a check list and would never forget it". Let me categorically state that no matter how good or conscientious you may think you are there will develop a set of circumstances that will lead into an error of omission.

All of us here at RAF have, at least once, taken off without locking the canopy. Each time it happened was when the "normal" procedure was interrupted by something abnormal, such as a change in runway, followed by an immediate takeoff clearance. This can and eventually will, happen to you. Having separate, redundant latches that you have to close, will not protect you. You need the catch and warning to protect you when you forget.

Some of you have found that the stainless steel SC1 catch (CP#17 pg 6 is difficult to carve out. We have released a drawing of it to Brock, so he can have them punched out and should have them available for sale.

We have seen several cases of EZ's getting to slow on final, rounding out too high and landing hard. In one case this was attributed to an error of 30 mph in the airspeed indicator. This will not happen if you fly by attitude. If you cannot see the horizon over the canard

you are getting far too slow - go around and try again. One good technique is to fly final at a speed that puts the canard three to five degrees below the horizon. You should always be able to see the runway over the nose, then start the flare and fly it down to the runway in a controlled rate of sink to touch down, without ever flaring the canard above the horizon. This will give the shortest distance, since an extended over-flare will use up a lot of runway.

Remember, if you sell your EZ, you have the responsibility to inform the buyer of any deviations from the plans. Also, be sure the new owner is thoroughly knowledgeable with the owners manual, operational procedures, newsletter, and that he should keep up to date with a subscription to the Canard Pusher. This is the only AD system and all VariEze operators must subscribe.

VARIVIGGEN NEWS

Builder Reports - Jim Saunders of Miami, FL has flown a really superb VariViggen, N17VV, basically white with red, orange and yellow trim, that has to be the prettiest paint scheme I have seen. Congratulations Jim. Unfortunately after logging only 12 flight hours on his Viggen Jim had a main gear malfunction. His right main collapsed on landing, due to a broken cable, which caused substantial damage. However he has redesigned the main gear system and repaired all the damage and is ready to fly once again. Jim, we are all looking forward to a complete flight test report, and hope to see you at Oshkosh.

Jim Edgar flew his Viggen N101JE on March 13, 1979, he had previously had problems with the cable in the gear retraction system, and in fact had his nose gear collapse on a high speed taxi run. He has repaired it and says it flies hands off. He hopes to make it to Oshkosh.

John Poehner, of Flushing Michigan has his Viggen, N29X, complete and ready to transport to the airport. He only awaits hangar space, and then we should get a first flight report. Lots of luck John

Ken Guskott reports that his Viggen N106VV, is very nearly complete. He is in the final stages of engine/cowling installation now. He hopes to fly in early summer, and says he will be at Oshkosh.

Charles Allen has just completed his canopy installation and reports good progress.

Ken Winter and C.M. Schwartz both have their Viggens upside down and the bottom skinned. They had the foresight to apply the dacron to the bottom while the aircraft was inverted. When I built N27MS, I was not that smart, and ended up putting dacron on the bottom, with the aircraft on the gear, and that is quite a trying job!

We have one Viggen well along in Australia and at least three in New Zealand. Obtaining parts that far from suppliers can be a problem. Des Whitfield reports that a fiberglass cowling for the Viggen cost \$1100 to get to New Zealand!

At least two builders have completed the main gear system as used in N27MS. This is now standard in the Second Edition of the VariViggen plans. For those of you with the first

edition who may want a set of the drawings for the main gear system, these are still available from me, here at RAF in Mojave for \$10.00 a set.

I now have on record seven VariViggens that have flown and at least two more that are complete and ready to fly. Who know, maybe we will be able to put up a three ship or four ship formation of Viggens at Oshkosh! Now that would be neat.

VARIVIGGEN SHOPPING

Tony Manis reports that he recently obtained a set of rubber shock donuts for the main gear from Borg Warner in Toronto Canada. These parts are listed as - Borg Warner #31-2014
Anchor #31-2014
Amr. Parts #2-204

and all are exactly the same part. Since quite a few builders have reported difficulty in obtaining these parts, I would appreciate information from anyone who knows of a good source.

Bill Campbell is once again in a position to make pulley brackets and associated metal parts for the Vigger. He also has a large supply of the original 2 1/2" dia LS-806 pulleys available. Anyone interested, please write to Bill at - P.O.Box 253
Phelan, Ca 92371
(714) 249-6218

For sale - VariViggen project - contact
Bob Eldrige (805) 965-R107

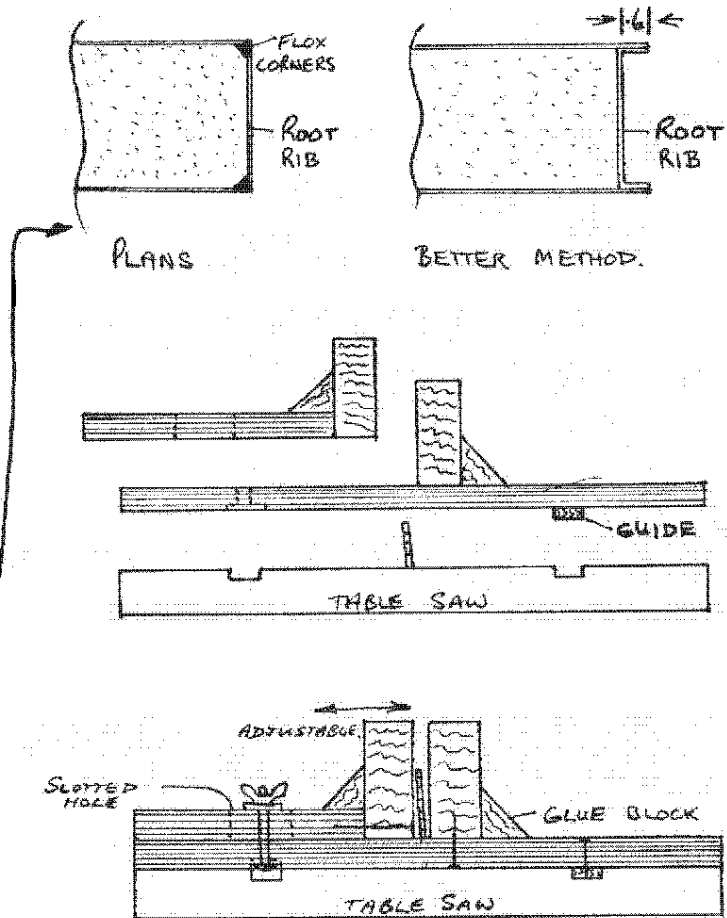
VARIVIGGEN BUILDER TIPS

For those of you building the S.P. wing or standard wing in composite, the S.P. wing plans showed the wing root as two plies of BID with floc corners. We now recommend a better method of laying up the root rib, which is stronger and allow for much easier fitting of wing root to inboard wing, as you can trim the edges for a perfect fit. This can also be used in the S.P. wing aileron tips. See sketch. Layup top and bottom skins normally. Then, after cure, remove .6" of foam from root of wing (or aileron) with a router, dremel, or knife. Sand the exposed inside of the skins, and layup two plies of BID at 45° to form the root rib. This method is used in the Defiant and make a stronger corner.

Don Alspaugh of Lithonia Ga, sent in this suggestion for a scarfing jig. The Vigger strength comes from its stressed skin. Good scarf joints of at least a 10:1 ratio are essential.

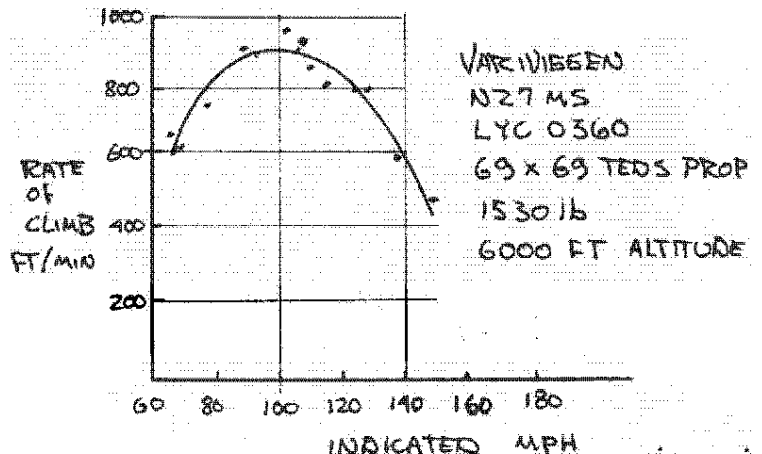
- 1) Cut a piece of 1/2" or 3/4" plywood the same size as your table saw top, and clamp it below the surface, to the table with the saw blade below the table, and a guide piece in the miter gauge channel.
- 2) Turn on the saw, tilt the blade to 5°. Raise the blade to approx. 3 1/2"
- 3) Select a straight 2" x 4" cut to the length of the table, and lay it parallel to the saw blade just about touching the blade. Accurately mark its position.
- 4) Remove the plywood top and 2" x 4" and glue and nail it into place.
- 5) Cut a second piece of plywood, cut elongated holes as shown for carriage bolts, and glue and nail another 2" x 4" to its edge.

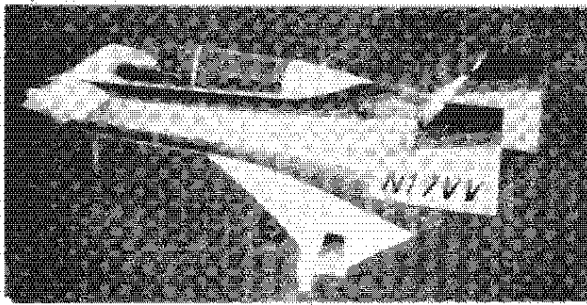
- 6) Place this piece of plywood on top of the first piece. Mark the location of the carriage bolt holes, drill two holes in the first piece of plywood and counterbore them from underneath, so that the carriage bolts are recessed flush.
- 7) Clamp the two pieces of plywood together using large washers and wing nuts, and replace the fixture on your table saw.
- 8) Test cut a few scrap pieces and adjust it until the correct sharp edge is obtained (no feathering). Now nail through the plywood into the piece in the miter gauge channel. This piece should be glued. See sketch.



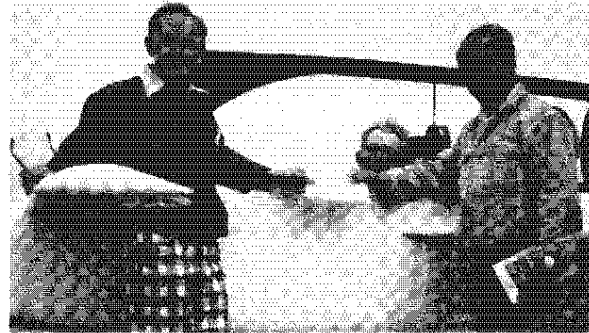
VARIVIGGEN OWNERS MANUAL CHANGES

The best rate of climb speed is not correct in you owners manual, and should be corrected to read 104 mph, not 80 mph as shown. VVOM pg 11. See climb chart below.

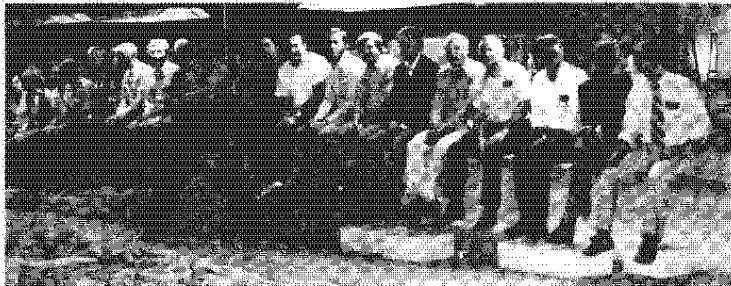




JIM SAUNDEZ'S Viggen
ON FIRST FLIGHT



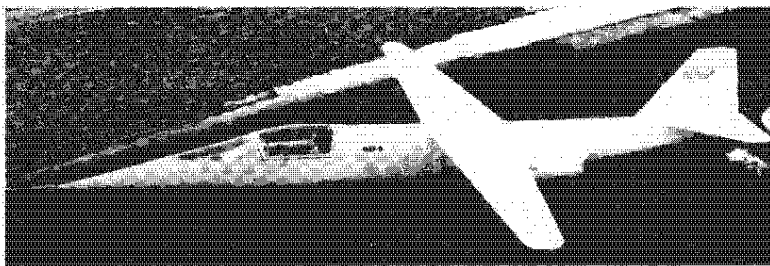
"I am enclosing a picture of the big day---June 14--- when Jess N. Larson, GATO inspector representative from the Minneapolis office, presented me with the airworthiness certificate. The picture shows myself on the left receiving the certificate. In the cockpit is Leo Zeug, my co-builder, who won the coin toss and made the first flight. I followed ten minutes later. The airplane flies beautifully."
Ed Wieland



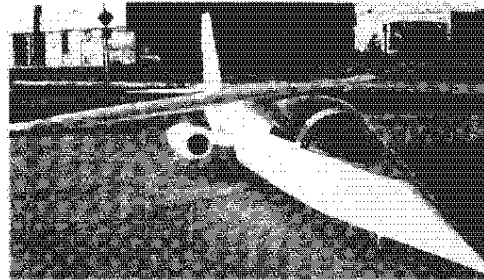
EVERYONE IS RELAXING ON THE AD-1 WING
AFTER LOADING IT TO 5-5-3 WITH LEAD SHOT
BAGS



JIRAN-PREFAB VARIÉZE WING
AT 7-5-9



AD-1 WITH WING STRAIGHT

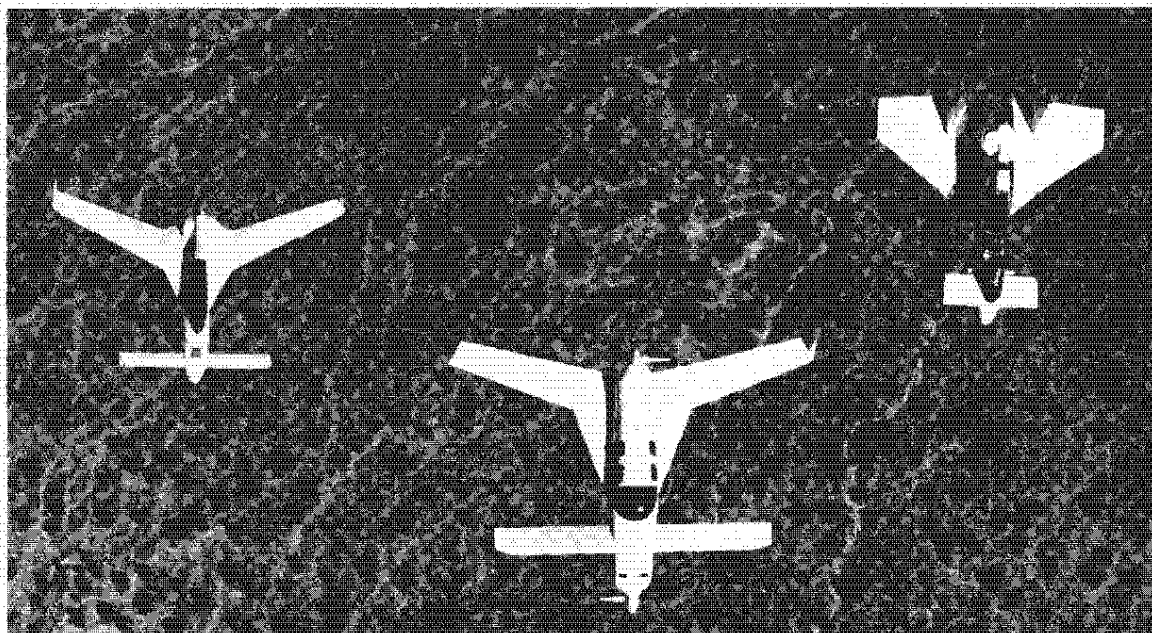


AD-1 WITH WING AT 60° SKEW

N4E2 VARIÉZE

N78RA DEFIANT

N27MS VARIÉZE



Dear RAF,
 We have over 280 hours on our airplane, and everywhere we travel people are very pleased and excited with your Eze design because we are generally very satisfied with it especially since we took the toe in out.

We have over 50 hour flying time with other Ezes, Ed and Jo Ann Hamlin, John and Wilma Melville, Les and Olga Faus, and Bruce and Bonnie Tiff. And we have all talked about organizing a VariEze club. So enclosed is a copy of our club's information, and you know, of course, that we would be very much appreciative if you would please print it for us in the newsletter soon.

Please let us know if there is any cost.
 Thank you,

Very sincerely yours,
 Donald Shupe.

VARIIZE HOSPITALITY CLUB

Non profit organization to put VariEze pilots in touch with other pilots or builders who would like to share their homes for one or two nights with travelling VariEzers. The idea is to increase communication and friendship between VariEzers and to provide an alternative to expensive motels and car rentals. In addition, we will hopefully have people who could help with parts and repair when needed within a hundred miles of so of every airport.

If interested, please send a check of \$2. with a clearly printed 3 x 5 card to Dr. Donald Shupe, 2531 College Lane, La Verne Ca 91750, phone (714) 593-1197.

Last name First name Date
 Address, state and town Telephone
 Airplane #, hours on it or % complete
 Number of people you are willing and able to accomodate at one time.
 Most convenient hours to contact you
 Other conditions:(and valuable information such as - airport hangared, other close airports, condition of runway and length of runway)

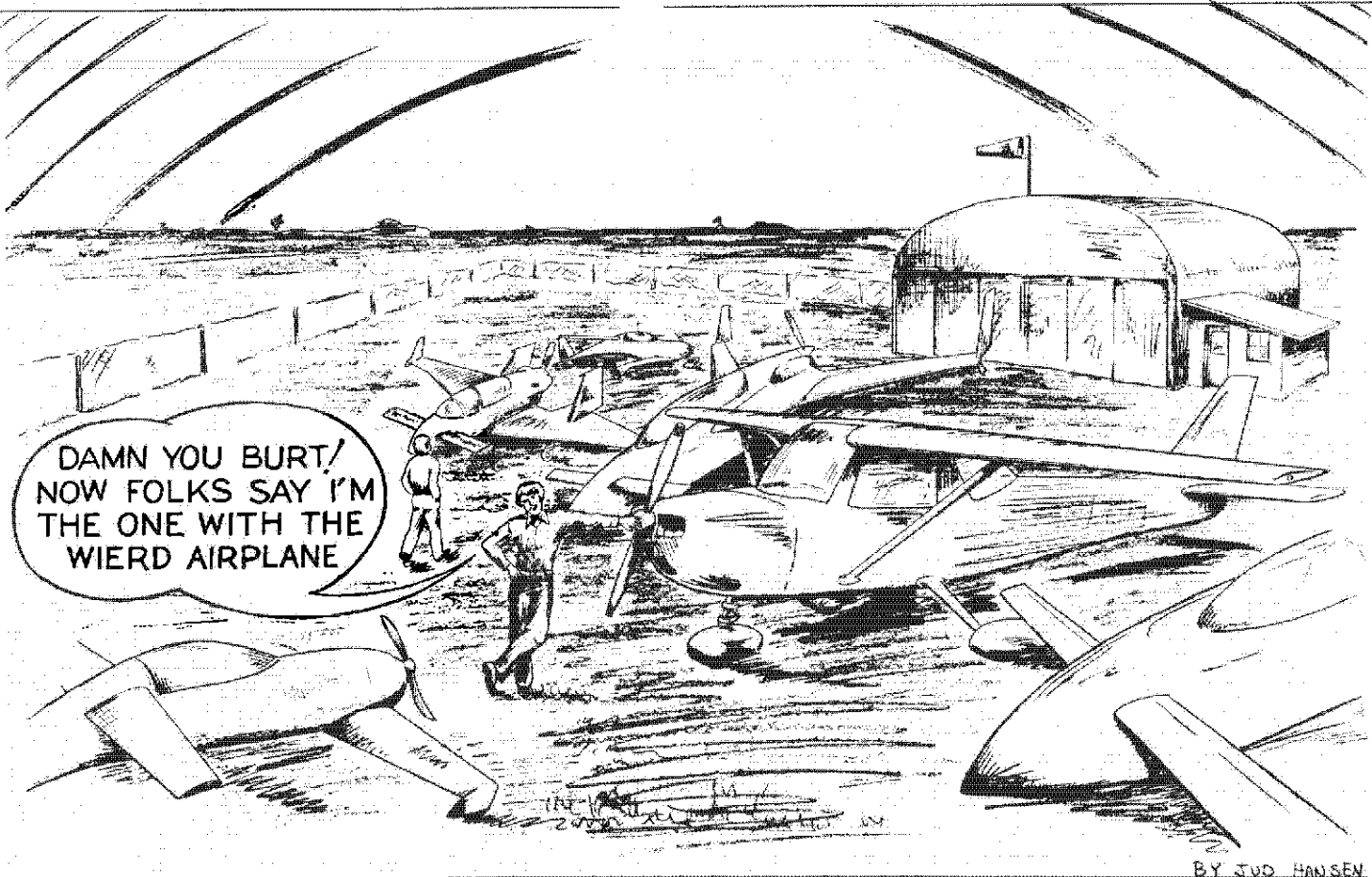
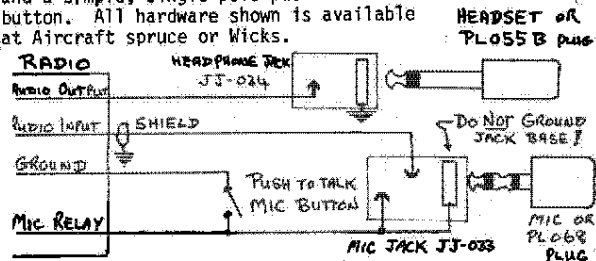
3,000
 2,000

5,000
 4,000

People sending names must understand that we cannot guarantee that other respondents will accept you as overnight guests, but our experiences (76WN, 777EJ, 39EZ) have been very rewarding. Those who send names will receive all information on all respondents.

VARIVIGGEN OR VARIIZE

Wiring of com radio to allow a headset and a simple, single-pole push-to-talk button. All hardware shown is available at Aircraft spruce or Wicks.



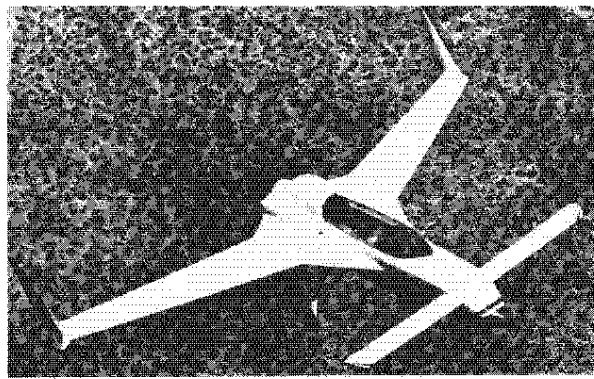
VariEze

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 Rutan 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.



VARIIZE 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 IIA - Continental A65, C85, C90, O-200
SECTION IIC - 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/priming/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 VARIIZE 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 W. Truslow Ave, Bx 424, Fullerton, Ca 92632 (714)870-7551 Catalog \$3	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.

FRED JIRAN GLIDER REPAIR, 6 Mojave Airport, Mojave Ca 93501, (805)824-4558: Prefabricated components - cowling, fuel tanks, wheel pants, maingear & nosegear struts, strut cover & nosegear box. Send \$12 SASE with 4-oz postage for brochure

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

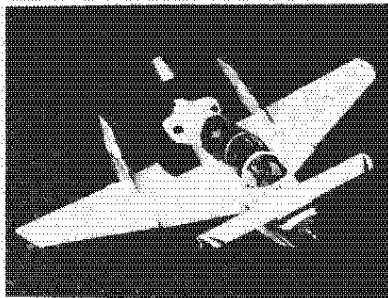
H.C. COMMUNICATIONS, Box 2047, Canoga Park, Ca 91306 (213)882-0422, Custom COM & NAV VHF antennae.

Week 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	\$6.00
"Canard Pusher" newsletter published quarterly. One-year subscription	\$4.75	\$6.50
Section I	\$139.00	\$153.00
Section IIA	\$ 19.00	\$ 21.00
Section IIC	\$ 21.50	\$ 23.50
Section III	\$ 8.00	\$ 9.50
Section IV	\$ 8.00	\$ 9.50
Section V	\$ 7.00	\$ 8.00
Section VI	\$ 10.00	\$ 11.00
3" tri-colored jacket patch	\$ 1.95	\$ 1.95
Add 6% if Calif resident - newsletter is not taxable.		
*U.S. FUNDS ONLY		

**Rutan
Aircraft
Factory**

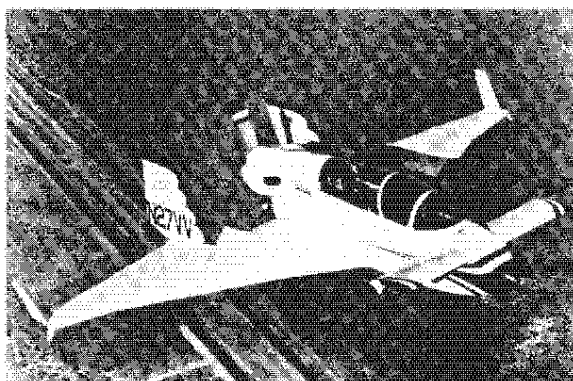
BUILDING 13, MOJAVE AIRPORT
P. O. BOX 656, MOJAVE, CA 93501
TELEPHONE (805) 824-2645

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	Cruise	150 mph		Wing Span/Area	19ft/119ft ²
	Full Aft Stick Landing	49 mph 500 ft		Empty Weight	950 lb
				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. Ozik trophy for design contribution, Oshkosh '72.

STALL/SPIN SAFETY

The VariViggen's safe flying qualities have been the subject of technical presentations for E, 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, al 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 Brandtville 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.

GOUGEN 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.

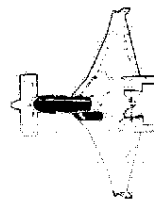
VARIVIGGEN TECHNICAL REPORT - Complete tech report describing the VariViggen two-place sportplane. Includes specifications, pilot report, dimensions, 3-view, stability and performance flight test data, construction cost, description of car-top wind tunnel, 8" x 10" glossy photo and current issue of newsletter.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

VARIVIGGEN OWNERS MANUAL - Complete operational handbook 1 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 under construction. Identifies new material sources as they become known. Published quarterly.
Price - \$4.75 per year first class mail.
\$6.50 per year air mail overseas. Back issues, \$1.00 ea.

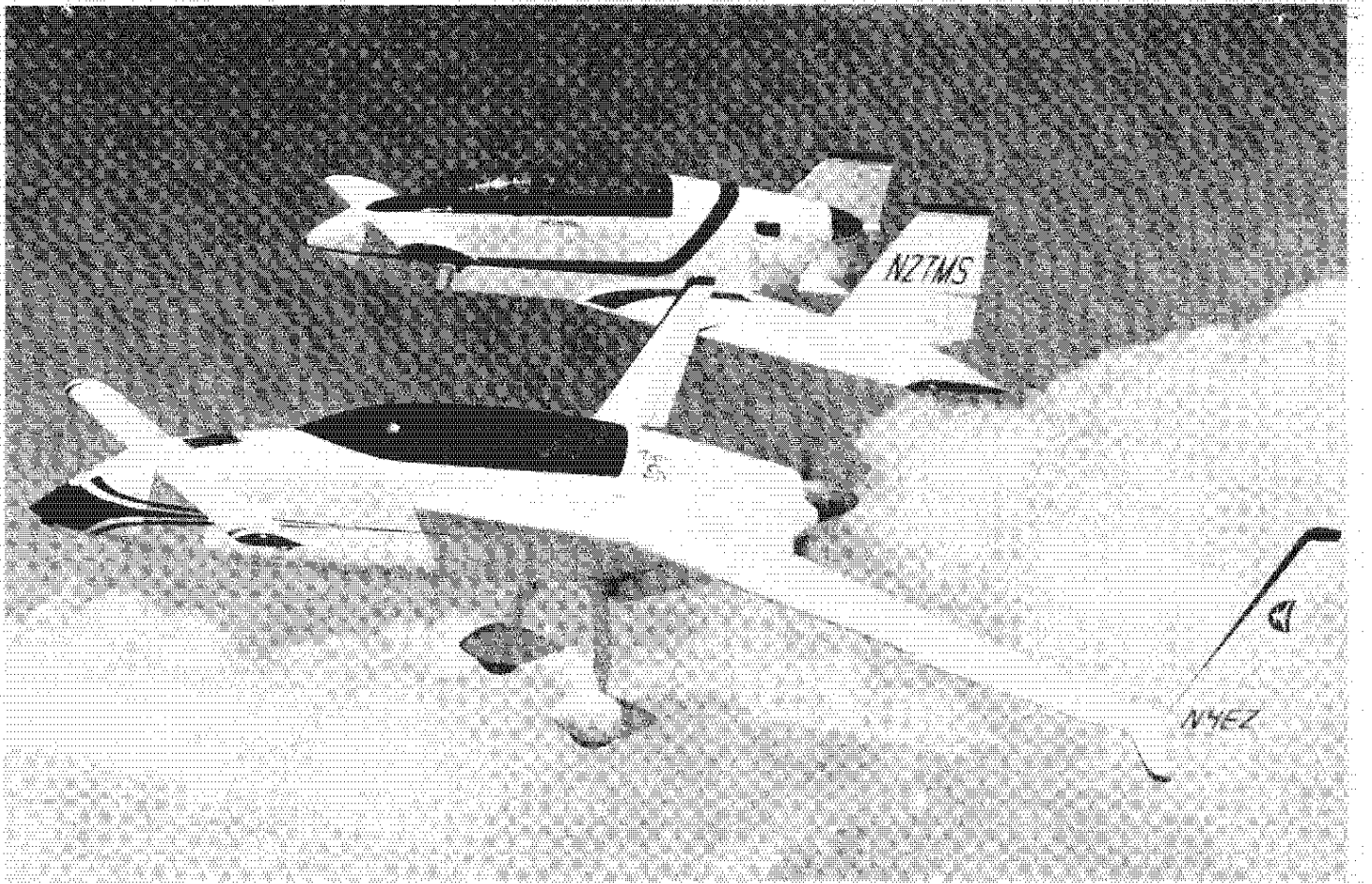
VARIVIGGEN PLANS - SECOND EDITION. This is an updated, revised set of very complete drawings and construction manual consisting of a bound 11" x 17" book, containing many photographs, hints and instructions based on actual builders experience over the past several years. It covers the entire airplane, 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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Building 13, Mojave Airport
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