

THE CANARD PUSHER

NO.18

OCT. 1978

Published quarterly (Jan, Apr, Jly, Oct) by

RUTAN AIRCRAFT FACTORY
BLDG. 13, MOJAVE AIRPORT
MOJAVE, CA. 93501
(805) 824-2645

NEWSLETTER SUBSCRIPTION - \$4.75 per year
OVERSEAS (AIRMAIL) - \$6.50 per year
BACK ISSUES - \$1.00 each

If you are building a VariViggen you must have newsletter 1 through 18. If you are building a VariEze from the first edition plans you must have newsletters 10 through 18. If you are building a VariEze from the second edition plans you must have newsletters 16, 17 and 18. 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, Calif., approximately 80 miles north of Los Angeles. You are welcome to come by and see our aircraft or to bring in any part 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 question." This will speed our reply.

RAF ACTIVITY since the July newsletter has included the Oshkosh EAA convention, completion of the basic flight tests on the Defiant twin, work on updating the VariEze section IIA and VariViggen plans, and builder support.

We are very happy to report that Mike and Sally Melvill (builders of N27MS, the beautiful VariViggen seen at Sun-N-Fun and Oshkosh) have moved to California and joined us here at RAF. Mike is now responsible for builder support on the VariViggen and is helping Burt by assisting VariEze builders. He is busy preparing the 2nd edition of the VariViggen plans, and will soon start building a VariEze. VariViggen builders are invited to RAF to inspect Mike and Sally's VariViggen. It has immaculate workmanship. It has composite glass/foam standard wings with wing tanks, full IFR panel, and is powered by a 180-hp Lycoming. Mike and Sally have used N27MS extensively for travel, logging 230 hours in the first year.

OSHKOSH 78 - Twenty-four VariEzes, one Quickie, and one VariViggen flew to Oshkosh, WI., in July for the annual EAA flyin. It was quite a sight to see them together, particularly in the fly-bys. Mike's VariViggen and thirteen EZ's were airborne in the fly-by pattern at one time. The Quickie, EZ, and Viggen joined up in formation for airborne photos to be used in "Poplar Mechanics" magazine. Fred Keller flew in from Anchorage, Alaska in his beautiful EZ that won our "Best VariEze" trophy and also the convention's

"Best workmanship" award - this is the first time the workmanship trophy has gone to a composite aircraft. Fred's finish is flawless, yet his empty weight (no generator) is only 590 lb using the C-85-12 Continental. He attributes this to very careful and accurate foam core assembly with a minimum amount of micro used in core assembly and finishing. Maybe we can talk him into writing some words on his techniques for a future newsletter. Fred built most of the prefab parts, himself, keeping his total cost (including engine and shipping to Alaska) under \$6000. Congratulations, Fred, for a well done project, and thanks for sharing it with all of us at Oshkosh.

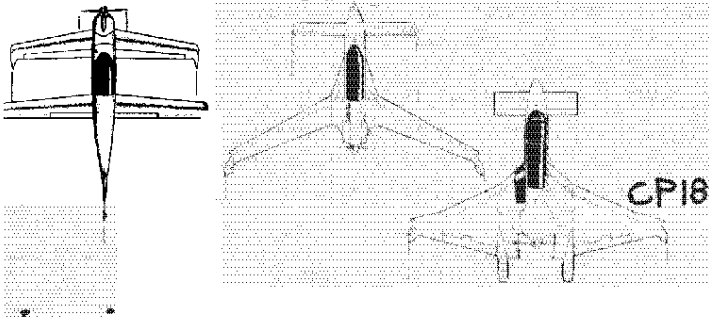
Daily VariEze bull sessions were held at the EZ's on the flight line the first five days of the convention. Builders would ask questions and each of the EZ pilots would answer giving his experience. These were very educational for all. Subjects ranged from stall characteristics to UFO reports. A summary of the bull session information is shown later in this newsletter.

The first running of the Lowers-Baker-Falck race was during Oshkosh 78. This is actually an efficiency contest much like the Indianapolis 500. At Indy the cars are given 280 gallons of fuel for 500 miles. For the LBF race, the airplanes must finish 500 miles on less than 18 gallons of fuel. Four airplanes were entered: Steve Wittman with his Bonzo formula racer, Ken Rand with his Turbo KR2, Ken Swain, with his Lycoming-powered VariEze, and Dick Rutan with N4EZ, RAF's Continental 0-200-powered VariEze. None of the racers could run wide open, since they would burn more than 18 gallons and thus be disqualified, thus, the pilots had to carefully plan and adjust their speed. Any fuel left over (less than 18 gal) could be added to the speed at 1 mph-per-lb fuel. The '01 master' Steve Wittman won easily at an adjusted speed of 199.8 mph (fuel remaining 19.5 lb). Dick Rutan was second with an adjusted speed of 168.5 mph (fuel remaining 6 lb). Ken Swain was third with an adjusted speed of 157 mph (fuel remaining only 0.5 lb!). Ken Rand was disqualified for using too much fuel (10 lb over the 18 gal), his adjusted speed was 147 mph. Next year there is a four-gallon (24 mph) advantage given for two-place airplanes, so we can compete more favorably with the racers.

We want to thank the eager and able volunteers from the Minnesota VariEze club (see "CP" 14 for a list of clubs), who helped us throughout the Oshkosh week in our booth: George Wilson, Vic Berggren, Jim Tome, Cliff Johnson, John Novy, Earl Freeman, John Benjamin, Dennis Mitchell, Nat Puffer, and Ed Wieland. Jim Tome was the one who occasionally sported the "Darth Vader" costume. Nat Puffer's VariEze was the first to arrive and last to leave.

COMPOSITE WORKSHOP - VARIEZE, VARIVIGGEN, & QUICKIE

We are planning one more composite construction seminar. This will be done jointly with Quickie Aircraft, Inc., since the VariEze, VariViggen, and Quickie construction methods are similar. The seminar will be held at RAF, hangar 13, Mojave Airport on Saturday the 25th of November. There will be flight demonstrations of the Quickie, EZ, VariViggen, and Defiant between 10 and 11 AM. The workshop will run from 1 PM till 6 PM. Sandwiches prepared by the local Rainbow girls will be available for lunch. Builders are encouraged to bring parts of their airplanes. If you have a part in which you are unsure of its workmanship or acceptability, bring it so it can be inspected or used to educate others. Mojave Airport is a two-hour drive north from Los Angeles on Highway 14, 25 miles on a 335 radial from Palmdale Vortac. Bring folding chairs if you can.



A letter from Nat Puffer.

Dear Burt and Carolyn,

This is a special "thank you" letter. The VariEze has really changed our lives. Much has been written about how easy and satisfying it is to build a VariEze, and much has been written about how delightful it is to fly a VariEze. With all of this we concur. But not enough has been said about how owning and flying a VariEze can change your personal lives.

When you are building an airplane, you live in relative obscurity, except for other builders. You tend to shun social obligations, to get the plane done, and tend to drop out of things going on around you. But once the airplane is completed, especially a VariEze, it is an instant passport to fame. You become an instant celebrity! It is very ego building and in stark contrast to what has gone before.

It starts with offers of free use of airplane trailers, free hangaring and/or reduced rates. Very prompt attention from the FAA, etc. Every time we open the hangar doors, an instant crowd of admirers gathers. People come back time and time again, and just stand and look. Special recognition by the control tower. All kinds of people anxious to help in anyway possible.

Being reported as a UFO, and being interviewed on the radio. Being the subject of a sound movie, and being interviewed on the local TV station.

At Oshkosh, receiving a very warm and friendly reception by the control tower, and being personally escorted to a parking space right in front of the main gate. Being asked to participate in a fly by. Being asked to participate in photo flights in formation for Popular Mechanics, National Geographic, and Sport Aviation. Being asked to announce on the Oshkosh PA system for the VariEze fly by just before the airshow.

On the return home from Oshkosh, having Mpls Flight watch carry on a running conversation for 90 miles asking if I would land at Mpls. International so they could see my VariEze.

At Voyageur Village being swarmed with kids. At a local fly in at Osceola, drawing the crowd away from all the other airplanes. Not being allowed to pay for my gasoline. Having the 3M employee Magazine editor asking for an interview, and having to fly a special photo flight for the company photographer.

Having everyone who flies in the other plane on a photo flight ecstatic over how much the VariEze excels any other plane in the sky. (I make gunnery runs and fly circles around the chase planes). Being very proud to be a part of the VariEze program.

Best of all, how ecstatic my wife is about being a part of it all, and how she simply eats it up! She delights in explaining all the intimate technical details to people, and how wonderful it flies. (she has never even had her hands on the stick and would be terrified if I asked her to fly)

There is no indication that any of this will ever let up. It has truly been one of the nicest things that has happened to us in our life time, and we owe it all to you, Burt and Carolyn.

Very truly yours,
Nat Puffer.

THE DEFIANT PROTOTYPE has now completed its basic flight test program, including high angle-of-attack tests. It has been equipped with a full IFR panel of King equipment, including their new integrated VOR/LOC/GS/DME/RNAV KNS80 NAV system. It has logged 120 hours in its first three months, including trips to St. Louis and Las Vegas for the NBAA and AOPA conventions. Its longest leg was 1032 nm (1188 miles), flown at 12,500 ft at an average speed of 184 kt (212 mph), using 84 gal of fuel. It has been flown to 28,350 ft altitude. It can fly at 174 kt (200 mph) at 20,000 ft, with an economy of 13.2 nm (15.6 miles) per gallon! Rather than use the "CP" space to describe the Defiant we refer you to several articles and pilot reports to be printed within the December issues of "Flying" and "Air Progress" magazines. Defiant will also appear in "National Geographic" within the next year. We are presently gathering information to assist us in deciding how to proceed with the Defiant. Should we decide to do the type certification program ourselves, we may be soliciting investors to assist in financing the certification effort. If you, or someone you know may be interested in this as an investment, please write to Rutan Defiant, Building 13 Airport, Mojave, Ca. 93501. We will supply an introductory bulletin and contact you, should we require investors.

VARIVIGGEN NEWS - by Mike Melvill

The big news for potential 'Viggen' builders, at least, is that the plans for the VariViggen are being updated, corrected, improved and reprinted in a second edition. These plans will be more like the VariEze plans, in that there will be more "how to" instructions covering each chapter with photographs, wherever possible. Engine baffles will be shown full size in most cases with photos to clarify where each part goes. We will be incorporating all valid parts from Parts I and II of the VariViggen Construction Manuals. Photos and words from both parts will be included in the appropriate chapters.

All corrections and revisions from newsletter #1 through #17 will be included. The foam-fiberglass composite S.P. wing, composite standard wing, rudders, ailerons, will be in the new edition. Also, since so many people have had problems with the cable system on the main gear, we will be incorporating the worm gear drive as used on my Viggen N27MS. This system has worked flawlessly for over a year now, the aircraft has 230 hours and 260 landings on it, with absolutely no problems. We will have the bearings, gears and machine parts available at our normal distributors. The new edition of the VariViggen plans should be available by late November, 1978 and will consist of approximately 120 pages and will cost \$165.00

Now that we have a VariViggen on permanent display here at R.A.F. it is available to all builders to inspect and compare. Hopefully we will be able to get the Viggen builders to start contributing to the newsletter again. We know there are a lot of active builders out there so how about it guys? Send in something for the newsletter. That is the only way we can get feedback and so help others who are building. We have had only 20 replies as a result of the requested survey in CP #16 so far. (Please send them in guys, it only takes a few minutes of your time, and it really is a big help to us). Even such a small number is still interesting and shows quite a wide distribution of Viggens through 14 states and three different countries. There are at least three Viggens flying now with several close to flying. The majority of those who sent in their survey replies appear to be between a year and two years away from flying. Wally Warners Viggen N455WV is once again airworthy after a main gear up landing sometime ago. Jim

Edgar of Columbus, Ohio, has begun his flight tests. John Poehner of Flushing Michigan, has his Viggen N29X, painted white and ready for first flights. He is awaiting hangar space.

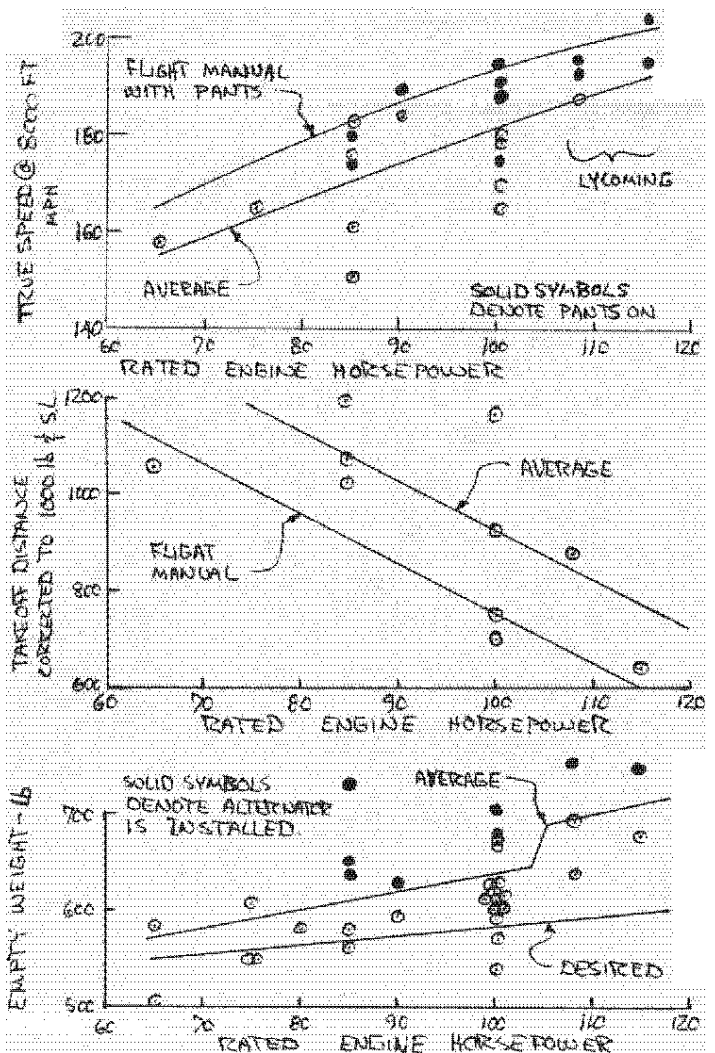
My own Viggen, N27MS, has flown coast-to-coast and been to many states, as well as Florida's Sun 'n Fun and Oshkosh, where I had the opportunity to meet and talk with many of you Viggen builders. Both myself and my wife Sally are working full time here at R.A.F. and we are both looking forward to meeting more of you. Feel free to call or write either of us with your questions and or problems. Some of you have sent in suggestions and been disappointed when it was not printed in the newsletter. We have to decide what will be of help to the average builder and we have to avoid printing anything that may be confusing. Anyway, take heart and keep in touch with us, contrary to what some of you think, Burt has not abandoned the Viggen builders, quite the reverse, viz: new Viggen plans, Mike and Sally and N27MS hired on etc. We need to get the Viggen builders fired up again, it is a fine aircraft and you will love it when you start flying yours! I just recently learned to roll mine, and it is really quick and so easy to roll I wish I had learned earlier. I had not rolled it prior to coming to Mojave, as I had had no aerobatic training, but with instruction from Burt's brother Dick, I have been finding out just what a super handling aircraft the Viggen is. Dick's comment after his first flight in N27MS was, "That is the most responsive airplane I have flown since I quit the Airforce, I love it!"

Viggen builders should note the drawings for Mike's three-light angle of attack system shown later in this newsletter. This indexing system gives precise approach information without requiring the hard-to-find low-friction potentiometer.

VARI-EZE SECTION IIA is now in its second edition after extensive modification to incorporate the three-tank fuel system ("CP" 11), revised exhaust systems, and some recent improvements to improve fire resistance and water removal. This involves moving the fuel valve forward of the firewall, adding a gascolator (better water removal and removal of contamination-replaces the filter), and using a fire resistant line ("CP" 16) to the carb. There have been no VariEze fires, but we still think it's best to have the system meet FAR part 23 fire resistance requirements. These improvements are shown later in this newsletter, so those building from first edition IIA plans can update your drawings. Note that the valve is now a Weatherhead Delrin-spool type, to eliminate the valve sticking problems that occurred with the earlier Imperial valves. Our thanks to EZ builder Gordon Wright of Fort Jones, Ca., for suggesting the Delrin valve. Our tests show it to be compatible with avgas and to have excellent operating forces. Note that the improved fuselage tank now has its outlet in the front allowing positive water removal in the nosedown parking position.

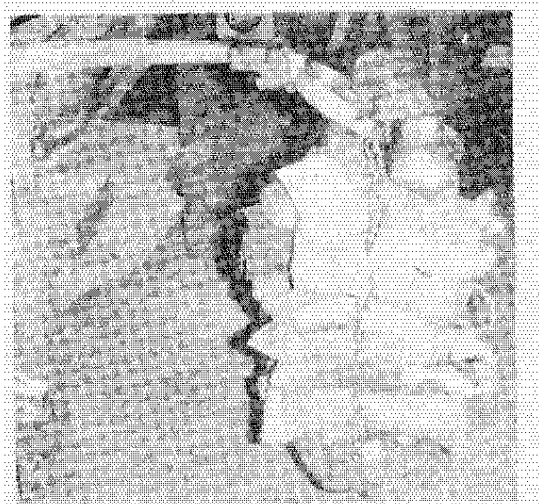
SURVEY OF EZ'S FLYING - "CP" 16 included a data sheet. Enough of these have now been received to show some average results. Most of the approximately 100 owners that are flying have not supplied the information. Please do so, so we can get a better statistical average. The data is plotted below vs. engine horsepower. It shows that the average VariEze with a Continental is 30 to 50 lb overweight, 100 lb overweight for the Lycoming. Most of the airplanes over 650 lb are either loaded with equipment or are built with excess material than that shown on the plans. Remember, excess equipment or excess structure actually weakens the airplane. It can pull less g' and will fail more easily on a hard landing. The strongest airplane all around, is one

built with all materials like the plans, with good workmanship, and kept as light as possible. Note that 25% of the airplanes (16% of the Continentals and 100% of the Lycomings) are over 650 lb empty. These are either single place airplanes or, at best, marginal with two people. The biggest surprise here is that all the Lycoming airplanes are overweight. The O-235 weighs only about 15 lb more than a similar equipped Continental O-200, and it is mounted closer to the cg, so we had expected similar empty weight. One possible reason is that some Lycomings are using mechanical and electric fuel pumps, but even this does not explain the large differences. So, those builders using O235's have a goal - - who's going to be first to build a 600 lb. Lyc. EZ? It would be a performer, no doubt. Note that the lighter O-200 airplanes will out-perform the average O-235 airplanes. We do prefer the Continental if you can find one. The other plots show that, while some airplanes are meeting the performance shown in the Owners Manual, the average EZ is 12 mph slower, requires 170 ft more takeoff distance, and climbs slightly less. All responding commented that the owners manual adequately prepared them for first flights. While two owners reported they could beat the published landing distances, many listed long runway requirements under "dislikes", along with small baggage space, inability to use gravel and grass runways, low useful load, and forward visibility during landing. The owners listed the following under "what do you like most?" speed, fun machine, range, safety, economy, climb, appearance, everything, visibility, comfort and EZ to fly. All response under "problems or failures" were items that have been covered in previous newsletters.



WEIGHT AND BALANCE - There have been several instances where builders have flown airplanes in a dangerous tail heavy condition because of erroneous weight and balance data. This has occurred generally when using bathroom-type scales. Because of this we are now recommending that the measurements be done on a good platform scale. Only one is required, as long as two other stands are used under the other wheels so that the aircraft is level for all three weighings. One of the problems in weighing an EZ is that the main gear spreads out when the airplane is lowered onto the scales. This binds the scale sideways. To avoid this, align the scale so its wheels are pointed to the side or use two aluminum or steel plates under one wheel. Apply a generous glob of grease between the plates. This allows them to move sideways without binding the scales.

NEW DESIGN NG15 TESTED - The lower nose gear strut attach casting on the VariEze has been a problem for many builders. Last March it was solved with the addition of the NG25 plate and elimination of the bolts through the strut (CP16). Recently Brock ran out of the NG 15 castings so we made new tooling for it to improve its fit to the strut and to eliminate NG25. This new part (NG15A) fits over the strut and has a full length bottom plate that bolts on with four bolts (see photo). The entire strut and fork assembly was tested to more than 80% over the FAR Part 23 requirement without failure. The new NG15A is available now from Brock for new construction. Retrofit is not required provided your old NG15 is installed per "CP" 16 using NG25. Strength is equivalent.



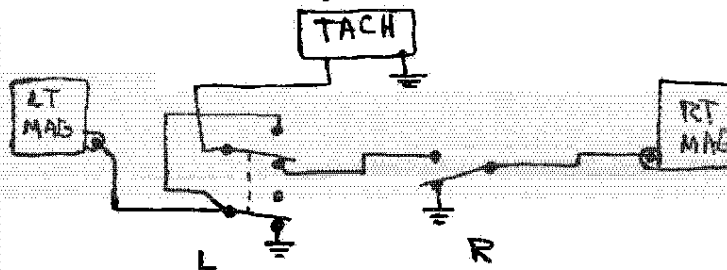
VARIIZE PROPELLORS - John Benjamin, 973 Nissley Rd, Lancaster Pa 17601, is now producing and marketing the Sensenich Propellor for the VariEze (model W58LKL67). We have tested this prop extensively on N4EZ. Its performance is very similar to The Ted's prop and it appears to be quieter. Quality is excellent with 15 laminations and a plastic leading edge.

BUILDER HINTS:

Engine Instruments - The Westach Cylinder temp system is not temperature compensating. This fact is not clear in their supplied information. This system measures temperature differences between the probe and the wire junctions, with zero difference referenced to 70 degrees F. Thus, on a hot day with the wire junction temp of 100 degrees, the gage will read 30 degrees too low. At 40 degrees it reads 30 degrees high. Many, including us, have found the Westline oil pressure system to be unsatisfactory. We recommend a direct-type system for oil pressure.

3M makes a "white cap system" that may provide sufficient protection for those people who are sensitized to epoxy fumes. This is a helmet with a fresh air pump and filter. For details write, Occupational Health and Safety Products, 3M Company, P.O.Box 8327, Dept F3, St.Paul, Minnesota 55113

Tach wiring - Plans show the electric tach wired to only one magneto, such that mag drop is only indicated on one mag - the other is done by 'ear', comparing it to the other mag. If you want to measure the drop on both mags do not hook the tach to both mags. Nat Puffer flew his first ten hours with a missing engine due to this. He came up with an excellent solution, which substitutes a double pole switch for one of the single pole mag switches. Wired as shown it switches the tach to the mag being checked during the runup, with no "crosstalk" between mags.



Tires - We have seen several instances where the two ply VariEze tires have broken down before wearing out. Be sure to keep proper inflation - 55 psi on two ply and 65 psi on four ply. Replace the two ply tires after 60 landings even if not worn out. Better yet, use only the four ply rated tires.

Rod Ends - Reminder from "CP15" Page 4: we recently observed an airplane with a rod end that had been bent when installing the canard. Be extremely careful when the pushrods are loose that the rod ends are not stressed (bent). If you even suspect that a rod end has been slightly bent, ground your airplane until it is replaced.

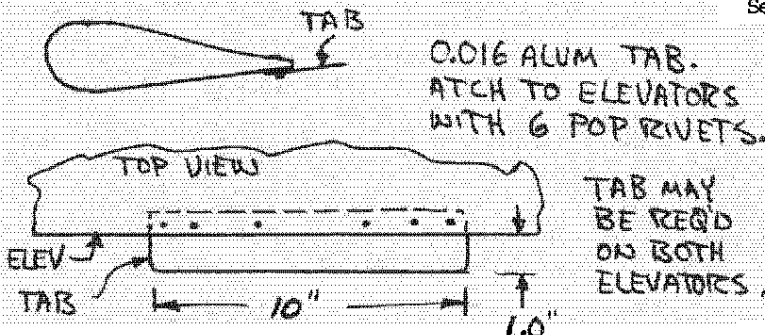
Nylon Control Conduit - we have an indication that incorrect material was shipped to some customers during the spring of '77. This was .039 wall nylaseal rather than the correct .025 wall nylaflo. Check yours, the 3/32 cable will not fit the incorrect tubing.

Epoxy Pump - when changing from fast to slow hardener merely hold the resin lid on while you tip the pump to pour out the hardener. Refill with correct hardener. The mixture of fast and slow obtained by residual material is good - no problem.

- Fiber Orientation - at least two builders have built wings with all the UND plies parrallel to the T.E. rather than one parrallel to the L.E.. Be careful to do this correctly, as we have no acceptable repair for this error, short of redoing the entire wing.

Dry Micro Fill - Bill Talutis suggests filling the T.E. depressions with gobbled up dry micro, cover with a peel ply strip, then using a putty knife at 45° angle to smooth it down flat. The peel ply keeps the micro from building up and sticking to the knife. Remove peel ply after cure.

Elevator Trim Authority - some EZ owners have had insufficient high speed or low speed trim authority. If, after checking your trim spring rigging (CP 14 Page 5), you still require trim to fly hands off, install a trim tab on the elevator as shown. Bend the tab up for more up trim or down if you need more down trim.



VARIEZE PLANS CHANGES - Incorporate these NOW

Section V Page 6 After "sand the surfaces lightly by hand" add "using 36-grit (featherfil requires a mechanical bond so do not use fine sand paper)"
Add " do not wet sand featherfil, it absorbs moisture. Featherfil cannot be used over primer. 3M sanding screen type 18N FABRICUT WETORDRY silicone carbide 180 works excellent on feather-fill. It is available at lumber yards.

Section IIA & IIC 1st edition only Install the gascolator, fire resistant fuel lines and valve as shown in this newsletter.

Owners Manual Page 31 Strike reference to bathroom scales. Add " align the scales or use grease plates to avoid side loading scales."

Newsletter 17 Page 5 Clarification - the wide chord elevator must be balanced to the same criteria as the original one. This may require additional lead weight. The additional weight should be added to both the inboard and outboard arms. This may require enlarging the slot in the canard at the outboard arm. Do not fly a new airplane without the wide chord elevators installed. Bruce Muirhead has flown his EZ with both the original and the wide chord elevator configurations. His comments "I flew my VariEze first with the original chord length and had the anticipated difficulty bobbing up and down on take-off and landing. After a couple rather hectic hours (and the realization that the elevator bottoms were not flat) I decided to extend the chord.

The most important improvement I see is at take off. Now I can pretty well establish a good solid nose-off attitude at about 55 mph and hold it there while take-off speed is gained. Then the take off is positive and "up and away."

Section I Chap. 15 Add "Check to see if the seat belt brackets are radiused where the nylon belt loops through. Radius any sharp edges to avoid cuts in the strap"

Section I Page 12-3 CP 12, pg 7 Change toe-in angle to 1/4 to 1/2 degree. Excess toe-in causes excessive tire wear and increases the speed for nose rotation.

Owners Manual Page 17 under " Tie Down" add " normal care of the main landing gear should always include lifting one wing tip to allow the gear to spring inward when parking, especially in hot weather. This reduces the possibility of gear creep and loss of alignment. Gear creep should not occur unless the airplane is overweight"

Section IIA Change tygothane part numbers from 0505-107 to 0585-107

SHOPPING - Engines for sale: C85-8FJ call Pastor Jenkins (517) 626-2145. O-200 modified for 100 LL, call Dave at (305) 425-2850
Wanted: Used epoxy pump - Ralph Freshour (213) 673-2819
Custom aircraft parts, 1318 Gertrude, San Diego, Ca 92110 is now making a muffler system similar to the flight research mufflers.
Aircraft Spruce's new catalog has been expanded to 230 pages, including 17 pages on composites (materials, tools etc).

OSHKOSH BULL SESSION RESULTS

Stall Characteristics - all but two reported that stalls were as described in the owners manual. One noted that his would roll off after about three cycles of wing rock. One reported that at aft cg, his airplane would roll abruptly when he approached full aft stick and result in large altitude losses.

Trim change in rain - Based on the Bull session and on the test several owners made returning from Oshkosh, VariEze s all have a nose up trim change when in mist or light rain - this occurs even before the mist is seen on the wind shield. In moderate to heavy rain some VariEzes trim nose down.

Antennae Performance - while most have satisfactory reception, many have had poor results. The H & C antennae are working well with most of the lower cost radios, but the higher output units have had interference and some have had to mount the antennae farther from the radio, or use an external antennae. Nat Puffer reports good results using homebuilt antennae shown in EAA "Sport Aviation," October '76 issue.

UFO Reports - Three of the EZ's had been reported as UFOs in serparate incidences.

Exhaust Systems - Two at Oshkosh had the mufflers, most had combinations of either straight stacks or the short double-bend tubes. Herb Sander's airplane had a system with flex joints and exits at the cowl T.E. near the prop tips. This simplified cowl removal. We asked Herb to keep us informed on how it held up after 100 hours since if it is durable we would like to get someone to produce it. How about it Herb? Let us know. By the way Herb's trip to Oshkosh from Memphis with his wife was the first time his airplane had flown two-place. His first flight was only seven days earlier.

Pitch Sensitivity - Nearly half the owners reported their airplanes were initially difficult to control in pitch until they got used to the sensitive forces. None at Oshkosh had the wide-chord elevator.

VARIIZE STALL CHARACTERISTICS AND FLIGHT TESTING

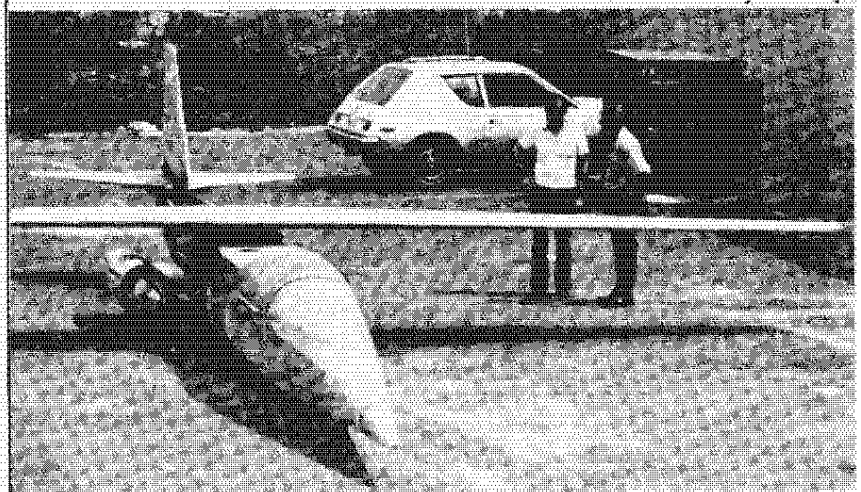
As discussed in the owners manual, "CP14,15 & 17" not all VariEzes have the safe stall-proof characteristics interceded. While the exact reasons for this are unknown, we have traced it primarily to cg position. For example, Lowell Ridge of Reno experienced a spin while doing stall tests on his first flight. He later found his weight and balance was incorrect and he was operating aft of the cg limit. He now reports standard stall characteristics at normal cg positions. Two EZs have reported bad stalls with large altitude loss, even at normal cg positions. As we have said before, a new homebuilt can be full of surprises in many ways: systems operation, flying qualities, performance, spin characteristics. This is to be expected from airplanes built individually without tooling and with a near infinite variety of things that can be slightly different.

The important thing that you must do as an individual is to realize that there is an enormous difference between flying a new untested homebuilt and flying a rented Cessna. You have the responsibility for conducting a safe test program, and envelope expansion. Any time you expand the parameters (stalls, cg range, dive speed, load factor, gross weight, etc) you should do it with a parachute and at least 8000 ft altitude AGL.

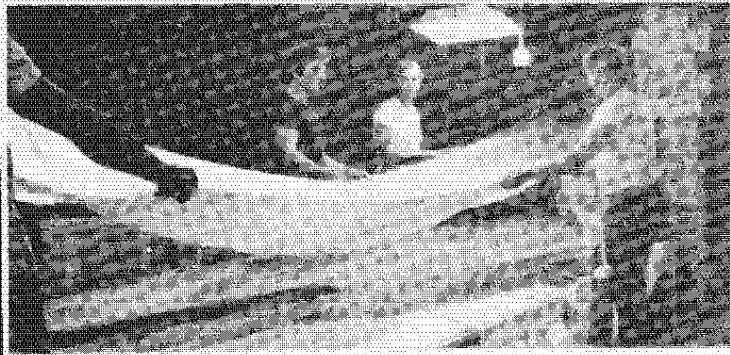
I have flown first flights on eight different canard homebuilt airplanes and have found the correct, docile stall characteristics on all of them. But, this does not mean that I would test the next one, opening the envelope of operation, without a parachute or without expecting to find something different. Never fly a new aircraft slow and low until you know its slow speed characteristics as tested at an altitude that allows a safe recovery.

ACCIDENTS There have been two fatal VariEze accidents since August. We presently have very little information on these, as FAA has yet to release its findings. The following information is listed here not to infer that we know the causes, but in the hopes that knowledge of the circumstances may in some way prevent reoccurrence. The first was one of the airplanes that was Oshkosh. It had a total of about 60 hours flying time. It was sold to two people. One of the new owners had no problem flying it and made several flights without incident. The other partner had considerable difficulty flying the aircraft but landed safely. On his second flight he was observed to be flying erratically on takeoff and during climb. He apparently approached much too slow, as the airplane was observed in wing rock at about 50 ft. height (+ 45 degrees bank angle). The aircraft fell at a high sink rate from about ten feet height, possibly damaging a wing tip or rudder at initial impact. At initial impact, power was applied, presumably for a go-around. The aircraft bounced nose high and abruptly turned left, then rolled left, striking the ground in an inverted attitude.

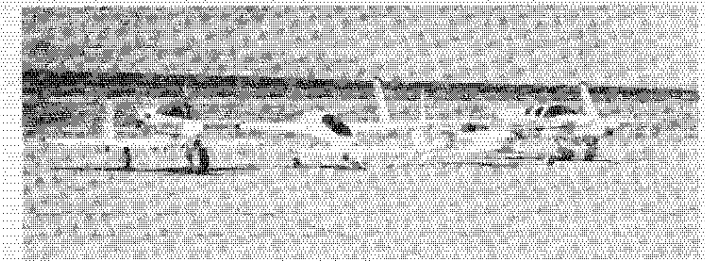
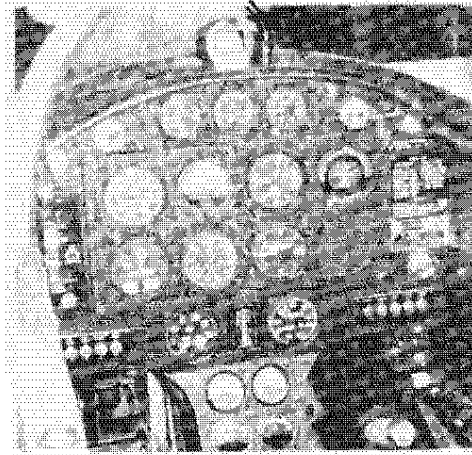
The second accident occurred on the third flight of a new airplane. The pilot had noted on the first flights an inability to trim the airplane, having to push on the stick to hold it level. The owner had neglected to trim the canard length, even though the airplane was tail heavy. He had not installed the wide chord elevator and did not correct the elevator shape even though it was similar to the "dangerous" one shown on "Page {} of CP 17. On his third flight he was observed to be lowering the nosegear on final about 400 feet altitude when the airplane pitched up abruptly and rolled until striking trees in a near vertical attitude.



AD-1 ↗ ↘ 17 PLYS OF UND & BID ON A 32-FT WING TAKES 12 HOURS!



ACA INDICATOR ON MIKES VIGGEN SEE PAGE 13.



VIGGEN EZ QUICKIE DEFIANT

FUEL SYSTEM

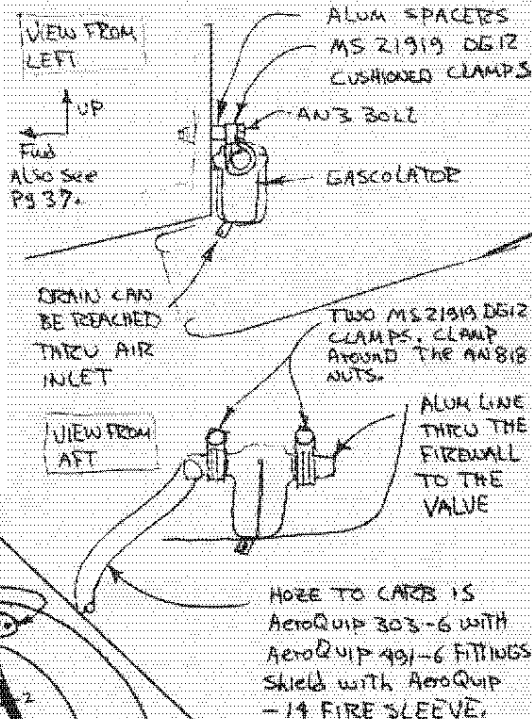
The fuel system consists of two wing tanks and a small fuselage tank, all equipped with visual sight gauges. A three-way selector is located on the pilot's right console. The selector is positioned left to select wing fuel, up to select fuselage fuel, and right to off.

The wings hold about twenty-four gallons total, all is usable for climb or level flight. One to two gallons per tank are not usable for steep descents. The fuselage tank holds about 2.8 gallons, all is usable in all normal attitudes.

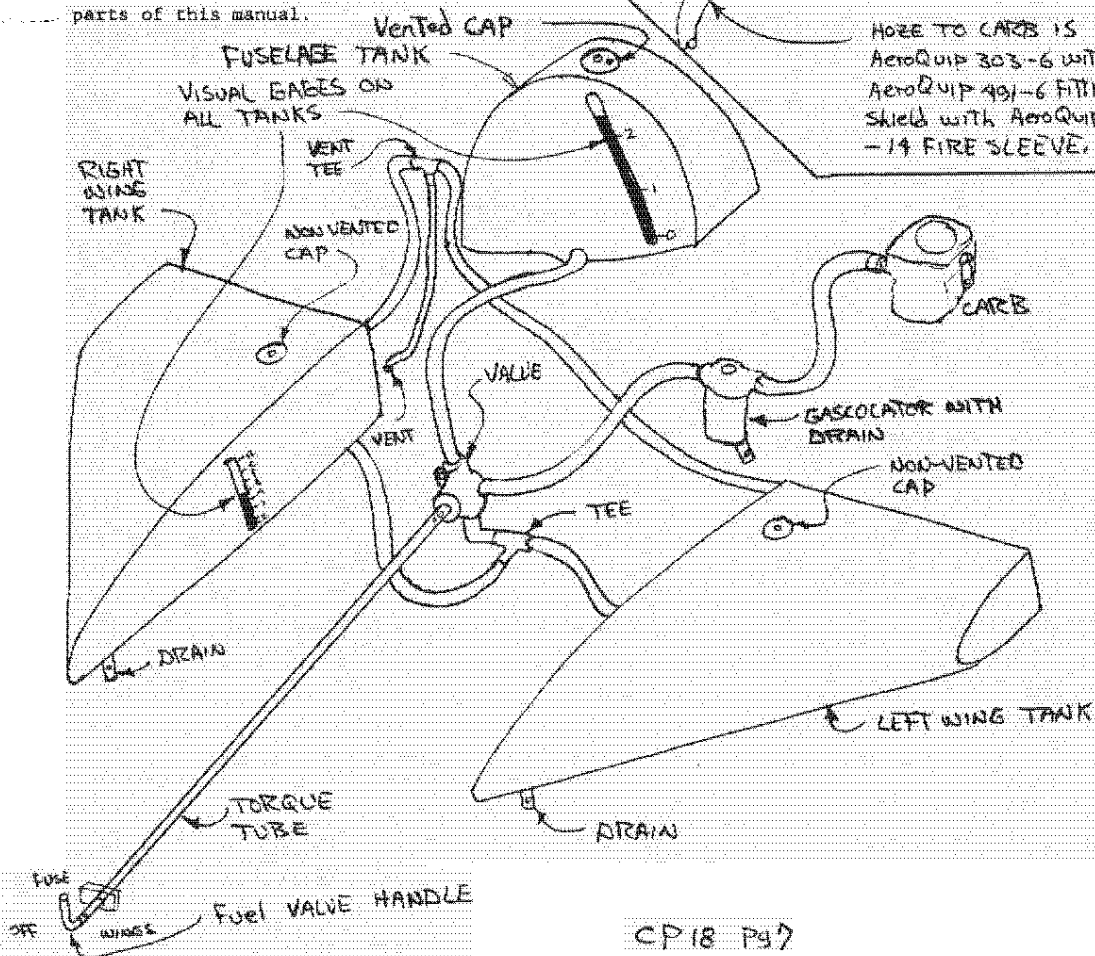
Drains are provided at the wing tanks and at the gascolator. The wing tanks are vented together to maintain equal tank fuel levels. The fuselage tank has a separate vent to provide redundancy from a clogged vent. The fuel selector handle is designed to interfere with the pilot's wrist when the fuselage tank is selected, as a reminder to not takeoff on fuselage fuel. Fuselage fuel is only used as the last fuel on a long trip. This allows complete use of the wing fuel and a very accurate indication of the last 1/2-hour fuel supply.

Do not delete the fuselage tank. Without it, the unusable fuel for descents of about three gallons becomes just "dead weight." Thus, by adding the 2.5 gallons, you are adding about 5.5 gallons of usable fuel (over 150 miles range) and providing very accurate gauging of the last 2.5 gallons. Note that all the wing fuel can be used in level flight. It is not unusual to completely run the wings out during cruise, select fuselage to restart and continue on fuselage fuel. See "Owner's Manual" (2nd edition) for operation of the fuel system.

GASCOLATOR MOUNTING



The schematic shown below shows the general arrangement of the entire fuel system. Details of each area are covered in other parts of this manual.

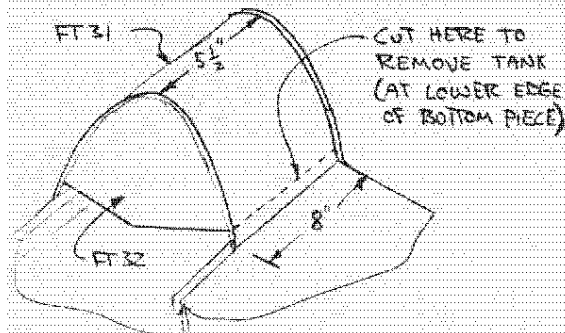
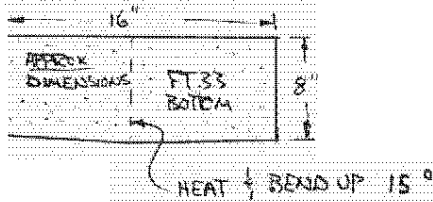


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SECOND EDITION

FUSELAGE TANK

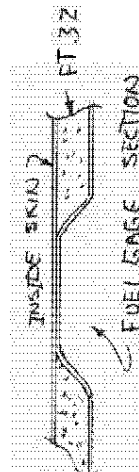
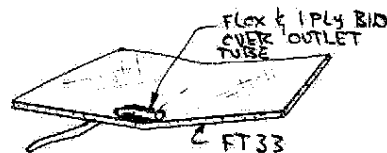
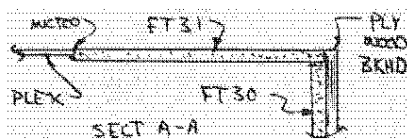
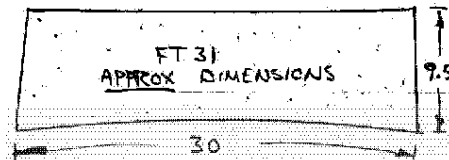
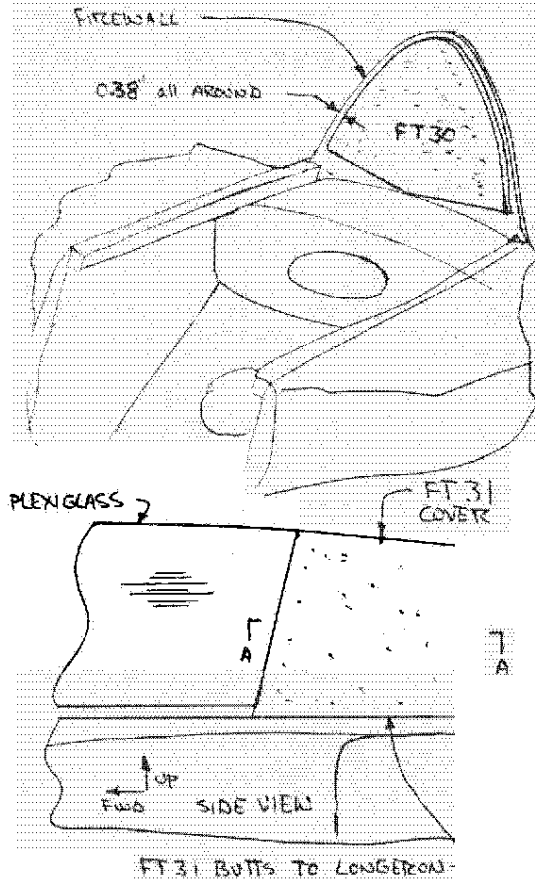
Refer to "Section I," chapter 22, step 3. Do not install the urethane foam along the rear of the plexiglass. Cut the FT30 bulkhead from 9 mm, 6-lb PVC to fit as shown to the firewall. Attach it temporarily with a couple dabs of 5-MIN. Cut out FT31 from 9 mm PVC foam, heat-form it (in an oven at 300°F or with a high-watt hair dryer or heat gun) to fit around the top between the plexiglass and the firewall. Trim as required. Mount it with micro to the plexiglass and with 5-MIN dabs to the firewall. Now, complete step 4 and 5 of chapter 22. When cutting off the canopy (page 22-4) change the 4" and 5½" dimensions at the back to 5½" and 8" respectively. Fabricate FT32 bulkhead and FT33 bottom pieces to fit as shown, leaving room at the bottom sides for the shoulder harness attach points and main wing vent tubes. These parts are not dimensioned. They have to be custom-fit due to variances in canopy size.

Cut the tank away from the fuselage, leaving the small side pieces in place. Bond the FT30 and FT32 to FT31 with wet micro holding in place to cure with nails. Place a strip of Vinyl tape or shiny-surface duct tape on the inside of FT32 where the visible fuel gauge is located. Layup one ply BID at 45° on the entire inside and on the inside surface of FT33. This layup should be wet to avoid pin holes.



Mount the fuel outlet in the forward center of FT33. The outlet is a 6-inch length of 3/8-inch soft aluminum tube. Sand its surface dull for bonding. Mount it at an angle as shown to bond along about 2 inches of the tank inside bottom. Flow in a liberal amount of wet floc and cover with 1 ply BID. This gives the outlet extra durability so it will not break loose. Before bonding, form the outlet so it will eventually lie along the front face of the center-

Now, bond FT33 to the tank with floc. When cured, remove the foam from the face of FT32 over the vinyl. Tape and remove the tape. Be sure the outlet is open to relieve any pressure during cure. Round all edges of the tank and glass it with two plies BID, lapping 1" onto the existing glass on the outside surface of FT31. Use peel ply to transition the exposed edges. Be careful to get no traces of micro on the visible fuel gauge. The gauge gives a good visible indication only if it is not contaminated with micro foam or air.



section spar and not interfere with the hole in the spar or shoulder harness attachment. The outlet should not be bent after it is cured, as this can induce cracks or leaks. Fabricate a screen and install as shown in "Section I," page 21-4.

When cured, test for leaks using an altimeter with 1500-ft pressure. Identify any leaks with soap bubbles applied with a brush. Rinse and repair per "CP" 14. Cut a 2-1/8" hole in the top using a hole saw. Clean out contamination with a vacuum cleaner (tape a 1-inch tube to the hose to reach in). Bond in the Brock VariEze fuel cap (FT18). Drill a #40 hole in the cap to provide a vent. Mount the tank to the fuselage with a 1-ply BID strip all around its edges. This will allow it to be removed if later required. Drill a ½" hole in the aft seat bulkhead for the 3/8" ID x 1/16 wall Tygothane tubing.

FUEL VALVE INSTALLATION

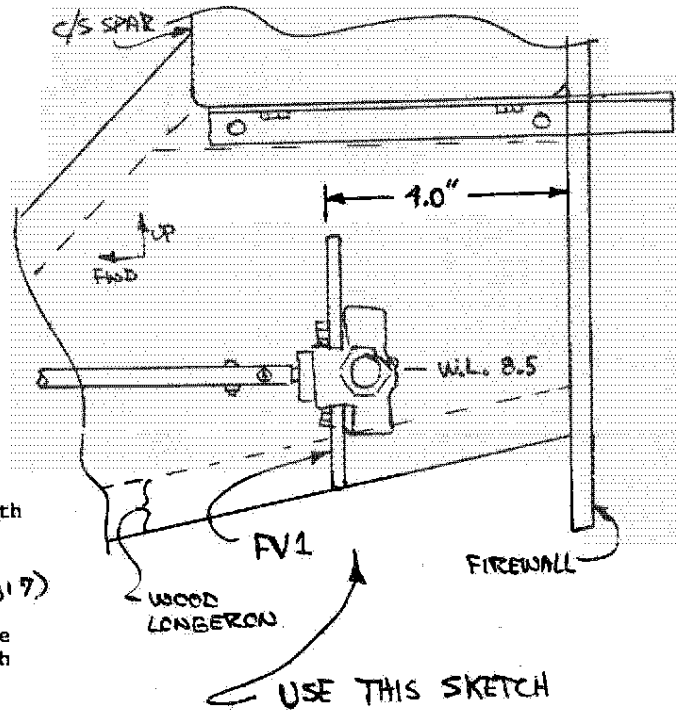
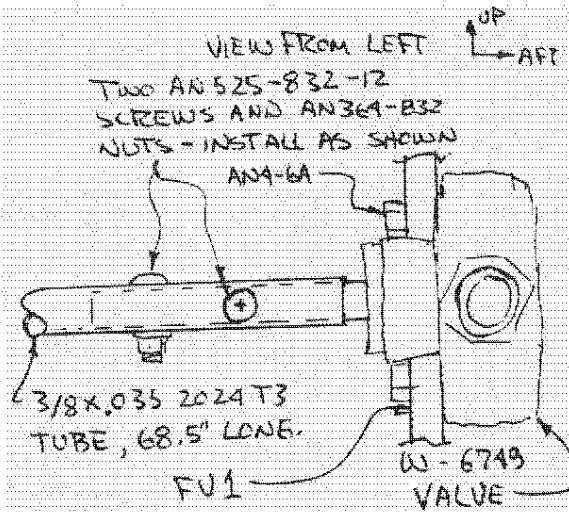
Locate your Weatherhead #6749 valve. Remove its handle and disassemble the valve. Carefully remove any burrs in the valve ports that can scratch its Delrin plastic spool. Chuck the handle stem in your drill and using emery paper remove enough of its diameter so it will slip inside the valve torque tube. When about .007" is removed it will slip inside the 3/8 x .035 2024T3 tube. Reassemble valve.

Cut the alum tube to 68.5 inches long. Mount the tube to the valve with two #8-32 screws as shown. Fabricate the FV1 plywood piece and bolt it to the valve with two AN4-6A bolts.

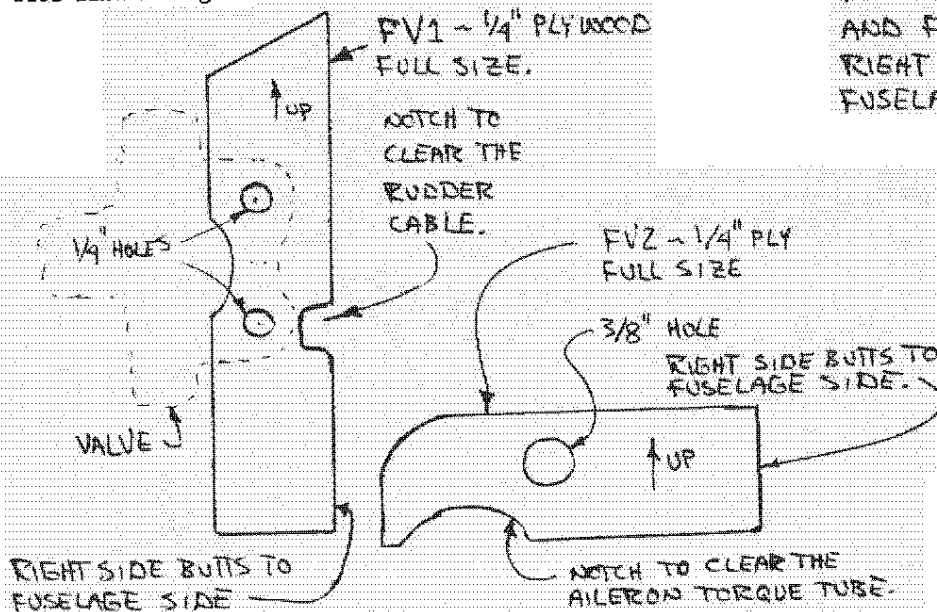
Fabricate the FV2 plywood piece and mount to the right forward armrest as shown in the upper right of page 19-5 of "Section I" (2nd edition). Fabricate the handle and drill it into the tube, clocking so it will be outboard for "off," up for "fuselage" and inboard for "wings." Do not mount it until final installation.

Now, grab the tube/valve/FV1 assembly and thread it into the fuselage passing through the CS118 hole in the backseat area and through FV2. The tube will have a gentle bend and should not bind on the seat bulkheads. When you are satisfied it fits well and clears all controls, bond FV1 to the fuselage side and let cure. Then remove the two AN4-6A bolts, remove the valve and layup 1 ply BID on each side of FV1 lapping onto the fuselage side.

Round up the plumbing parts shown and install them on the three valve ports using Teflon tape. Install the Tygothane tubing with the hardware shown. Do not substitute vinyl, polyethylene, polypropylene or Tygon tubing. They are not near as tough, are not fuel compatible, and get brittle at low temperatures. Tygothane has a tensile strength of 5900 psi and avoids brittleness down to -100°F. Mount the gascolator on the firewall and plumb the aluminum line as shown (pg 19). An alternate (better) method is to use the gascolator installation bracket shown on page 100 of the 1978 Aircraft Spruce Catalog which mounts the gascolator with one port facing the firewall to allow direct routing of the fuel line through the firewall.

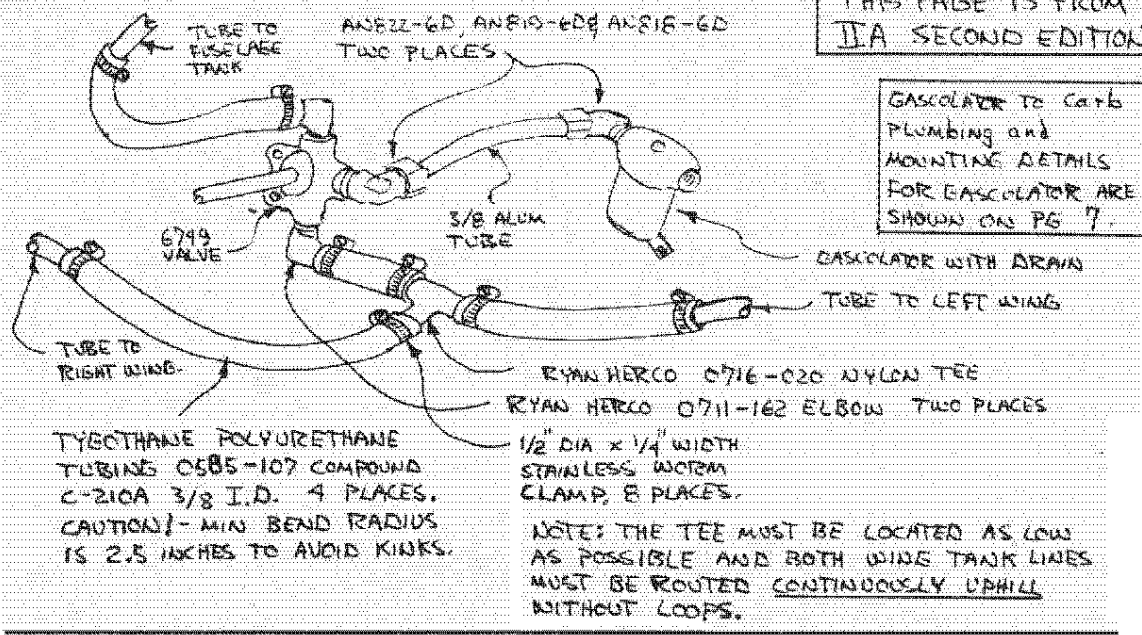


USE THIS SKETCH TO LOCATE VALVE AND FV1 ON RIGHT INSIDE FUSELAGE SIDE.



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THIS PAGE IS FROM
IIA SECOND EDITION



GASCOLATOR TO Carb
PLUMBING and
MOUNTING DETAILS
FOR GASCOLATOR ARE
SHOWN ON PG 7.

TYCOTHANE POLYURETHANE
TUBING 0585-107 COMPOUND
C-210A 3/8 I.D. 4 PLACES.
CAUTION! - MIN BEND RADIUS
IS 2.5 INCHES TO AVOID KINKS.

1/2" DIA x 1/4" WIDTH
STAINLESS WORM
CLAMP, 8 PLACES.

NOTE: THE TEE MUST BE LOCATED AS LOW
AS POSSIBLE AND BOTH WING TANK LINES
MUST BE ROUTED CONTINUOUSLY UPHILL
WITHOUT LOOPS.

EXHAUST SYSTEM

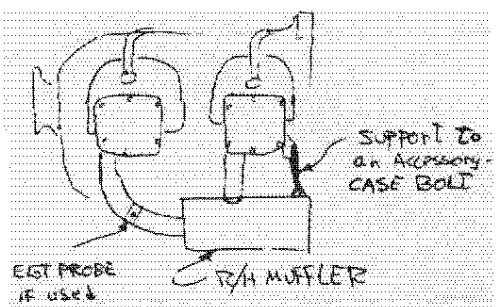
The preferred exhaust system for the VariEze is the system consisting of two mufflers, one on each side, directly below the exhaust ports. This is similar to the system on Cessna 150's. The mufflers reduce the noise level and provide excellent heat for carb heat and cabin heat.

Use Continental exhaust gaskets (part no. 21493) on final installation. For initial fit-up purposes, don't use your gaskets. The initial "set" taken by the gaskets when the flange is torqued down provides a custom seal for that exhaust pipe and several cycles of installation and removal reduces the effectiveness and life of the gasket. Use 5/16 x 24 brass exhaust manifold nuts with AN960-516 washers (8 ea) for final installation. Be sure to install the support on the right muffler.

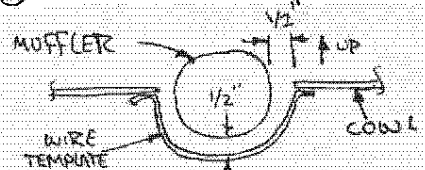
The mufflers require a homebuilder-fabricated blister to fair them in to the cowl. This job is not as difficult as it appears. When fitting the cowl, cut a hole to clear the mufflers by 1/4-inch all around, plus clearance to hookup the heat muff hose. Put the mufflers and cowl on. Using some soft wire (coat hangers) make three or four "templates" to define the shape of the blister to clear the mufflers by about 1/4 inch all around. Remove cowl and place on a table upside down. Tack a large block of foam (green or blue) on the cowl and carve to a pleasing shape that clears the mufflers. Line the edges with grey tape to provide a release then glass with four plies BID. Remove the blister, and dig out the foam. Sand the cowl surface and attach the blister with flox and pop rivets with 3-inch spacing. Leave about 1/4" space around the muffler outlet pipe so the excess muffler heat can escape.

You will be surprised at how little cabin heat is required for a VariEze. In general, the natural solar collection of the canopy and insulation of the cockpit will provide sufficient heat for day/VFR flying, as long as the canopy is well sealed. N4EZ's cockpit temperature can be maintained at 65°F with an OAI of 25°F. In the summer heat, the cockpit is well cooled by opening the vent.

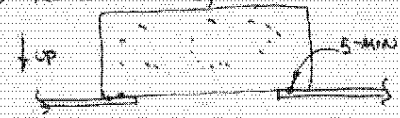
We recommend that you do not install cabin heat, to save weight & complexity. If your flying experience indicates you need it, it is easily added later by adding a tee in the carb heat hose and plumbing a 2" dia (1 1/2" may be enough) hose to the feet area of both cockpits. Install an adjustable valve in the line to control the amount of heat.



① MAKE TEMPLATE



② REMOVE COWL, INSTALL BLOCK



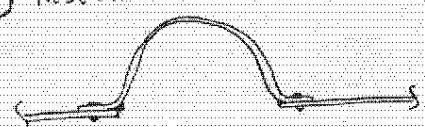
③ CARVE SHAPE & LAY TAPE



④ GLASS & REMOVE FOAM



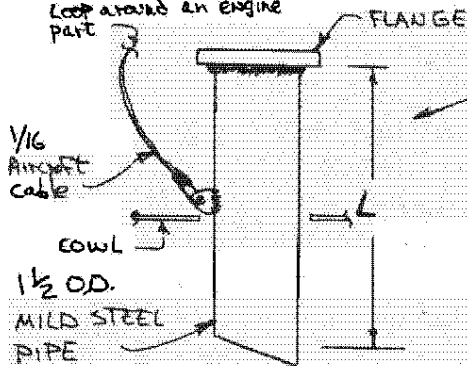
⑤ INSTALL WITH RIVETS & FLOX



A less expensive, lighter, and louder system can be made as shown with three straight stacks and one double elbow. The double elbow is used on the left forward cylinder to provide sufficient pipe length for a carburetor heat muff. The heat muff consists of an over-stretched screen door spring wrapped around the pipe to transfer heat and a sheet metal shroud wrapped around the area to collect heat. Note that this pipe must be supported to the cylinder by the tube shown, to prevent vibration failure. The three straight stacks are equipped with safety cables to retain them, should they fail at the flange. This keeps them out of the prop. **DO NOT OMIT THIS!**

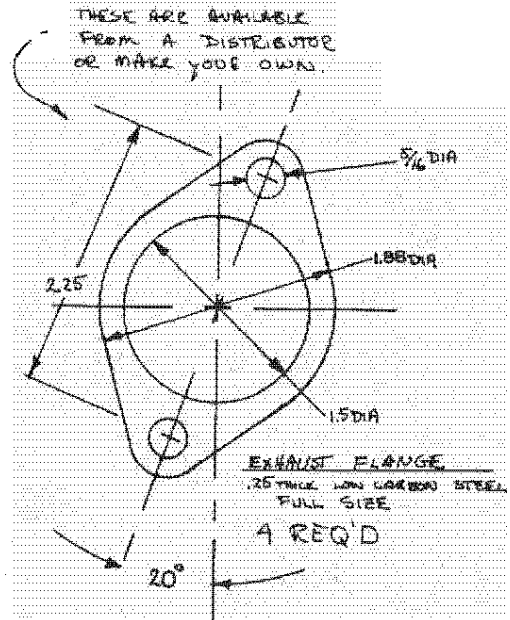
Various other exhaust systems are presently being developed and tested. As they prove successful they will be defined in the "Canard Pusher" newsletter.

Loop around an engine part

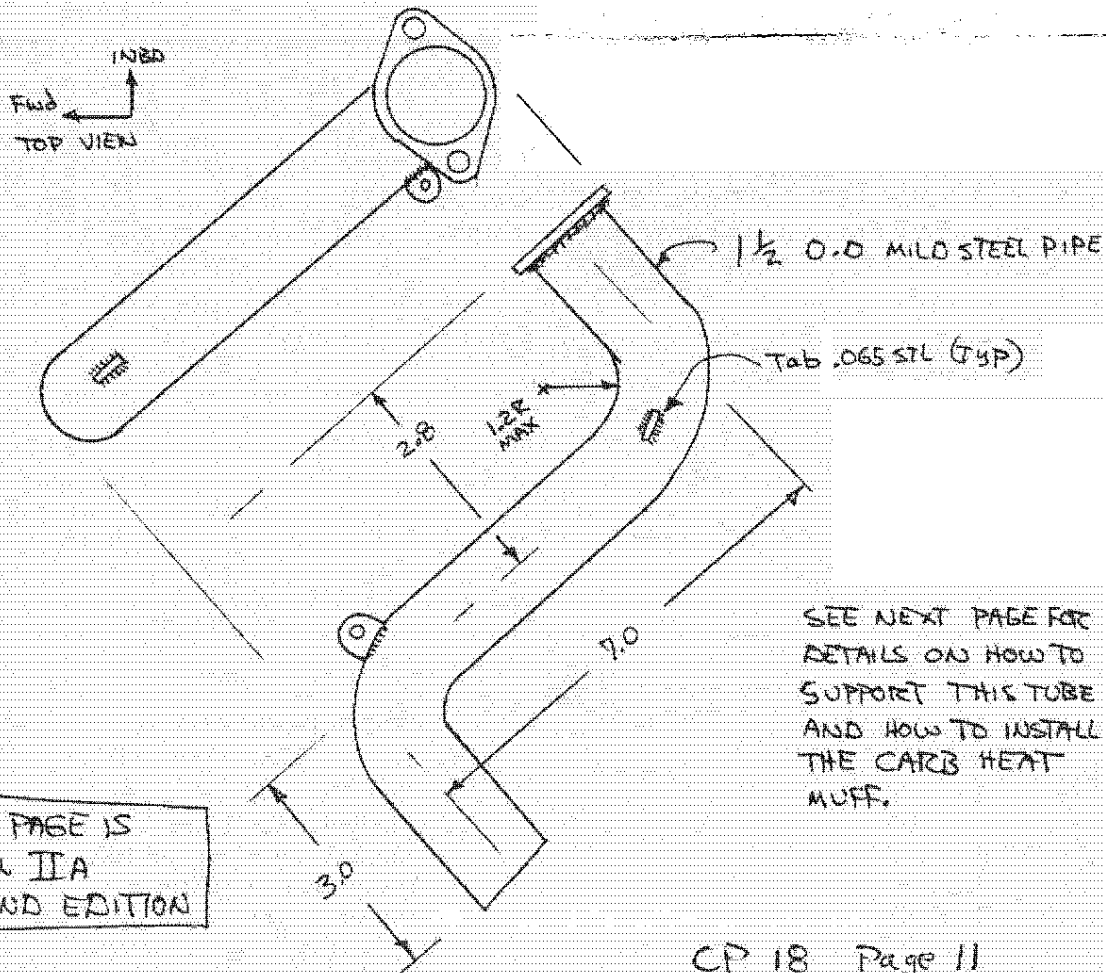


FLANGE
STRAIGHT STACK
MAKE 3.

L must be at least 7 inches to avoid valve cooling problems.



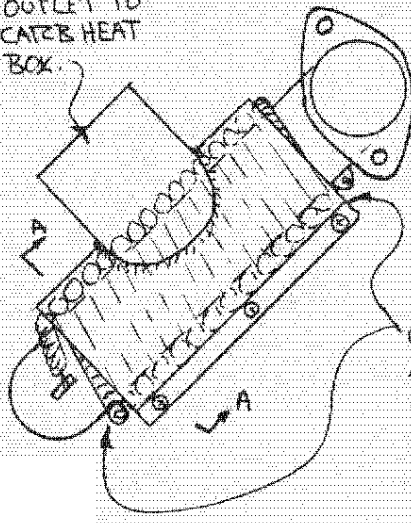
DOUBLE ELBOW - MAKE ONE FOR LH FRONT CYL.



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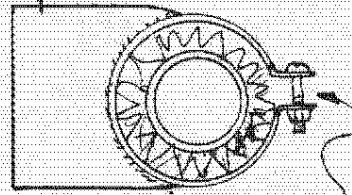
HEAT MUFF

2 1/2" TUBE -
OUTLET TO
CATER HEAT
BOX.



2 1/2" DIA OUTLET TUBE

VIEW A-A



COLD AIR ENTERS AT THE ENDS
AND AT THE RIGHT SIDE AND IS
WARMED BY THE HOT PIPE AND
HOT SPRING, BEFORE BEING
DRAWN OFF AT THE 2 1/2"
TUBE AT LEFT CENTER.

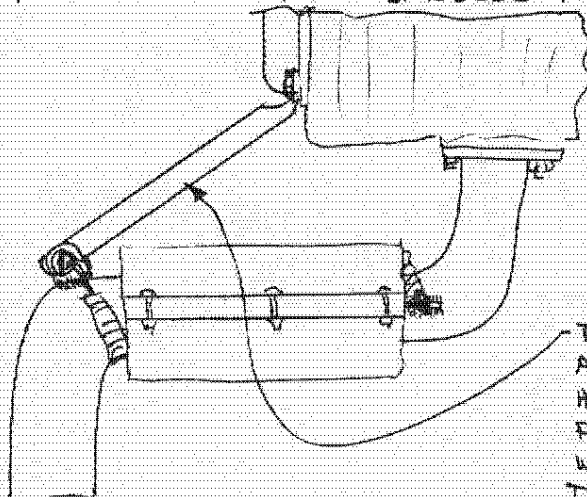
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IS FROM
IIA SECOND
EDITION

TO FABRICATE THE SPRING, TAKE A 1/2" DIA SCREEN
DOOR SPRING AND OVER-STRETCH IT SO THE GAPS
IN THE WIRE OPEN TO ABOUT 1/10". ATTACH IT
TO ONE OF THE TABS WITH 3 LOOPS OF .041" DIA
STAINLESS SAFETY WIRE. WIND IT TIGHTLY AROUND
THE TUBE AND ATTACH TO THE OTHER TAB.

THE MUFF SHROUD CAN BE BUILT BY FORMING
A FLAT SHEET OF .025 6061-T6 ALUM TO FIT OVER
THE SPRING WRAP AS SHOWN. CUT THE OUTLET HOLE
& WELD ON A 3-INCH LENGTH OF 2 1/2" DIA 6061-T6
TUBE. FASTEN AS SHOWN WITH THREE #8-32
SCREENS AND LOCKNUTS.

Install a 2-1/2 diameter SCAR-10 (RED)
Induction hose from the air valve to the
muff. Follow the clamping details shown on
page 17. This hose should be retained against
the engine mount with a nylon "tie wrap" so
that it doesn't chafe against the cowl.

SUPPORT - THIS TUBE MUST BE SUPPORTED
TO PREVENT VIBRATION-INDUCED FAILURES.

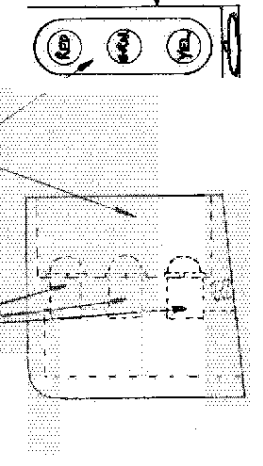
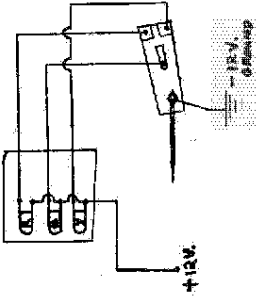
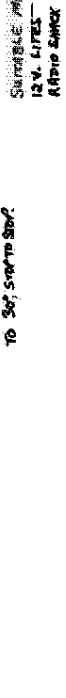
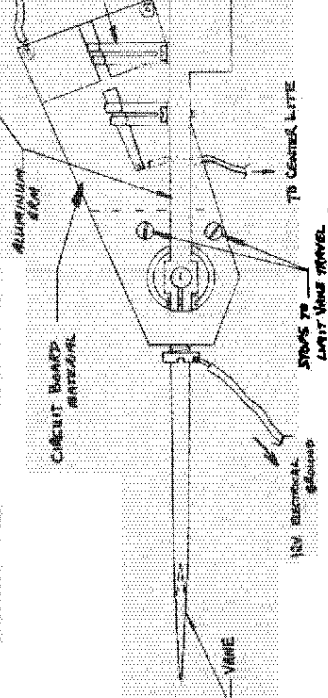
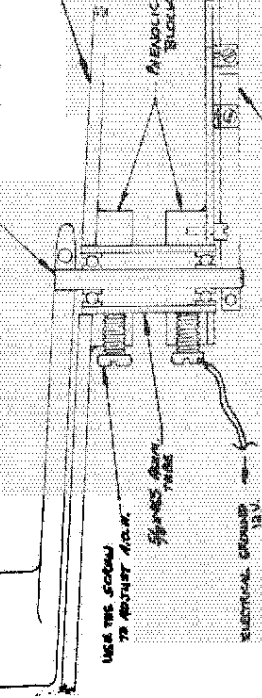
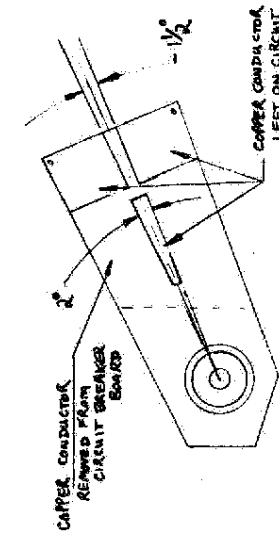
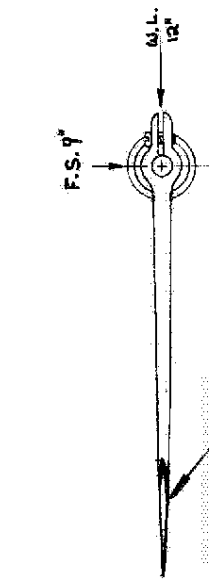


THE SUPPORT CAN BE
A 1/2 X .035 STEEL TUBE.
HEAT THE ENDS RED-HOT &
FLATTEN. BOLT TO THE
WELDED TAB ON EXHAUST
TUBE AND BOLT TO A
VALVE COVER BOLT ON
THE ENGINE.

ANGLE OF ATTACK VANE AND SWITCHING GEAR.
 The pivot is made up of a 1 1/4" length of 5/8" .062 aluminum tube, with an MC R 322 bearing (or equivalent) pressed into each end. The spindle is a .187 dia. stainless steel rod, 1 3/4 long. This is pressed into both bearings as per drawing. If it or the bearings are loose, use Loctite to be sure the spindle and bearings are firmly located, but free to spin. An aluminum vane is attached per drawings to the outboard end of the spindle. This vane can be carved from solid aluminum, or fabricated. An aluminum arm is cut from 3/16 stock with a balance weight as shown. Install the vane and balance arm on the spindle and balance them by grinding the balance weight down. The brass brushes are cut from .005" brass shim stock. These are split back from the contact end to the mounting area, as shown in the enlarged detail (no scale). The switching board is a piece of copper clad circuit board, obtainable from Radio Shack. Lay it out as shown. The detail is full size, and may be scaled. Remove all the copper cladding except in the areas shown. Drill three small holes where indicated, and push #22 wires through from the back side and solder to each copper area. These wires go to the light bulbs in the three light A.O.A. indicator mounted on top of the glare shield or high in the panel. The circuit board is epoxied to a piece of 3/8" thick phenolic. A 5/8" hole is drilled through the circuit board and phenolic block. A #10-32 set screw is installed as shown to lock the circuit board and phenolic block to the 5/8" spindle housing, and to serve as a ground wire attach point. A similar phenolic block is epoxied to the inside of the nose cone. A 5/8" hole is drilled through the phenolic and the nose cone skin. A #10-32 set screw is installed in this block, is used to fine tune the A.O.A. vane.

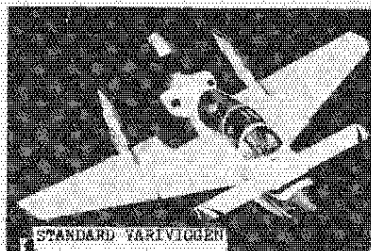
When flying the A.O.A. indicator, only the green light should be on when the airplane is "on speed" on the approach. If you increase the airspeed by about three knots indicated, you will have the green and yellow (lower) lights on. Further increasing the airspeed by three knots will leave only the yellow light on. Slowing the airplane down three knots (increasing angle of attack) from a green light (on speed) will switch green and red (top) lights on. Reducing speed three more knots leaves only the red light on, indicating too high of an angle of attack (too slow). This is a simple yet very effective way to achieve consistently good landings. The A.O.A. indicator is wired through the gear down and locked, and therefore is an excellent gear up warning.

For first flight in a VairViggen, set the vane at 11° - 12° up with the bottom of the airplane level. The vane pivot must be set at F.S. 9" and W.L. 12". Then adjust as req'd to obtain the correct speeds.

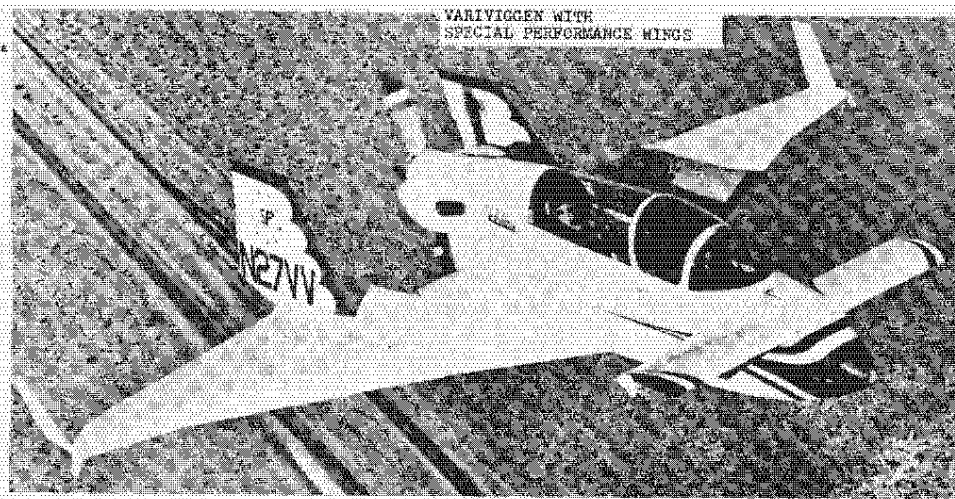


CAN BE FABRICATED FROM ALUM. OR FIBERGLASS.

THANK YOU
FOR YOUR INTEREST IN THE
VARIVIGGEN
TWO + TWO SPORTPLANE



STANDARD VARIVIGGEN



VARIVIGGEN WITH
SPECIAL PERFORMANCE WINGS

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

PROVEN DESIGN

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

STALL/SPIN SAFETY

The VariViggen's safe flying qualities have been the subject of technical presentations for FAA, SAE, AOPA, & AIAA. It will not stall or "wash in" like the common delta. At full aft stick (43 kts) 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 SUPPLY & 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 Brandevista Ave., Dayton, Ohio 45424
VariViggen plexiglass canopy. (513) 645 9872

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

GOUGEON BROTHERS, 706 Martin, Bay City MI 48706
VariViggen 105/206 epoxy and 403 fibers for wood construction.

GEORGE EVANS, 4102 Twining, Riverside, Ca 92509
VariViggen welded nose & 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 \$04 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 VariViggens under construction. Identifies new material sources as they become known. Published quarterly.
Price - \$4.75 per year first class mail, \$6.50 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 and 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 Air mail overseas.

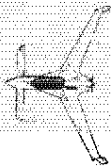
VARIVIGGEN R/C MODEL PLANS - Complete construction plans for the 18" - size radio-controlled model airplane built and flown to evaluate VariViggen spin characteristics. Designed for 4-channel proportional radio equipment and engine in the .35 to .65-cu-inch size. 535-sq inch wing area.

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 line, .19to .45 -cu inch engines)
Price - \$4.75 first class mail, \$5.50 air mail overseas.

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VariEze

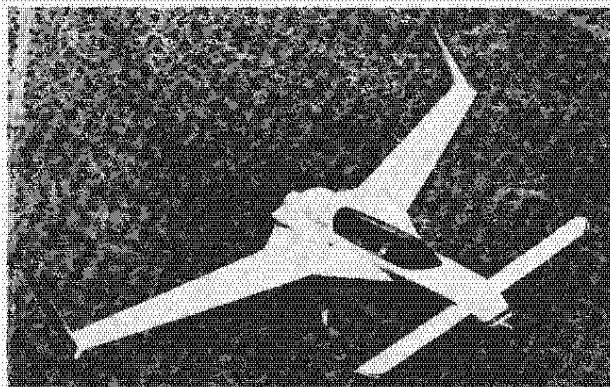


TODAY'S HOMEBUILT WITH TOMORROW'S TECHNOLOGY

THE AIRPLANE The VariEze is a small, high-performance home-built sportplane. It can be built from raw materials costing approximately \$2600 (less engine) in about 1000 man-hours, or from prefab parts and materials, costing approximately \$4000 in about 600 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 aircraft engines. The O-235 Lycoming, stripped of starter and alternator, is now being tested and should be available soon. The airplane has exceptional climb and cruise performance. It can carry two people 700 miles at 185 mph on less than 20 gallons of fuel. Frontseat passengers up to 6', 170/250 lbs and backseat passengers up to 6', 5'11"/220 lbs can be accommodated plus a modest amount of baggage in two custom suitcases. 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 (60 kt/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 90 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 systems 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 tests 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"x17" 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. *NASAD 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, A75, C85, C90, G-200

SECTION IIC - LYCOMING G235 - 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 operational handbook and checklists, including normal and emergency operation, detailed flying qualities and performance charts, maintenance, maiden flight procedures, 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 & 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	Min Speed (full aft stick)	55 mph
Econ Cruise	165 mph	Landing Distance	900 ft
Empty Weight	560 lb	Wing Span/Area	22.2' / 53.6sqft ²
Gross Weight	1050 lb	Canard Span/Area	12.5' / 13.8sqft ²

SPECS & PERFORMANCE WITH 75-HP CONTINENTAL:

Take Off	1050 ft	Econ Cruise	145 mph
Climb	900 fpm	Empty Weight	530 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.

AIRCRAFT SPRUCE & SPECIALTY CO. or WICKS AIRCRAFT SUPPLY
201 W. Truistow Ave, Bx 424 410 Pine
Fullerton, Ca. 92632 (ALL RAW MATERIALS) Highland, 11. 62249
(714) 870-7551 (CATALOGS COSTS \$2.) (618) 654-7447

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 SASE with 3-oz postage for brochure.

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

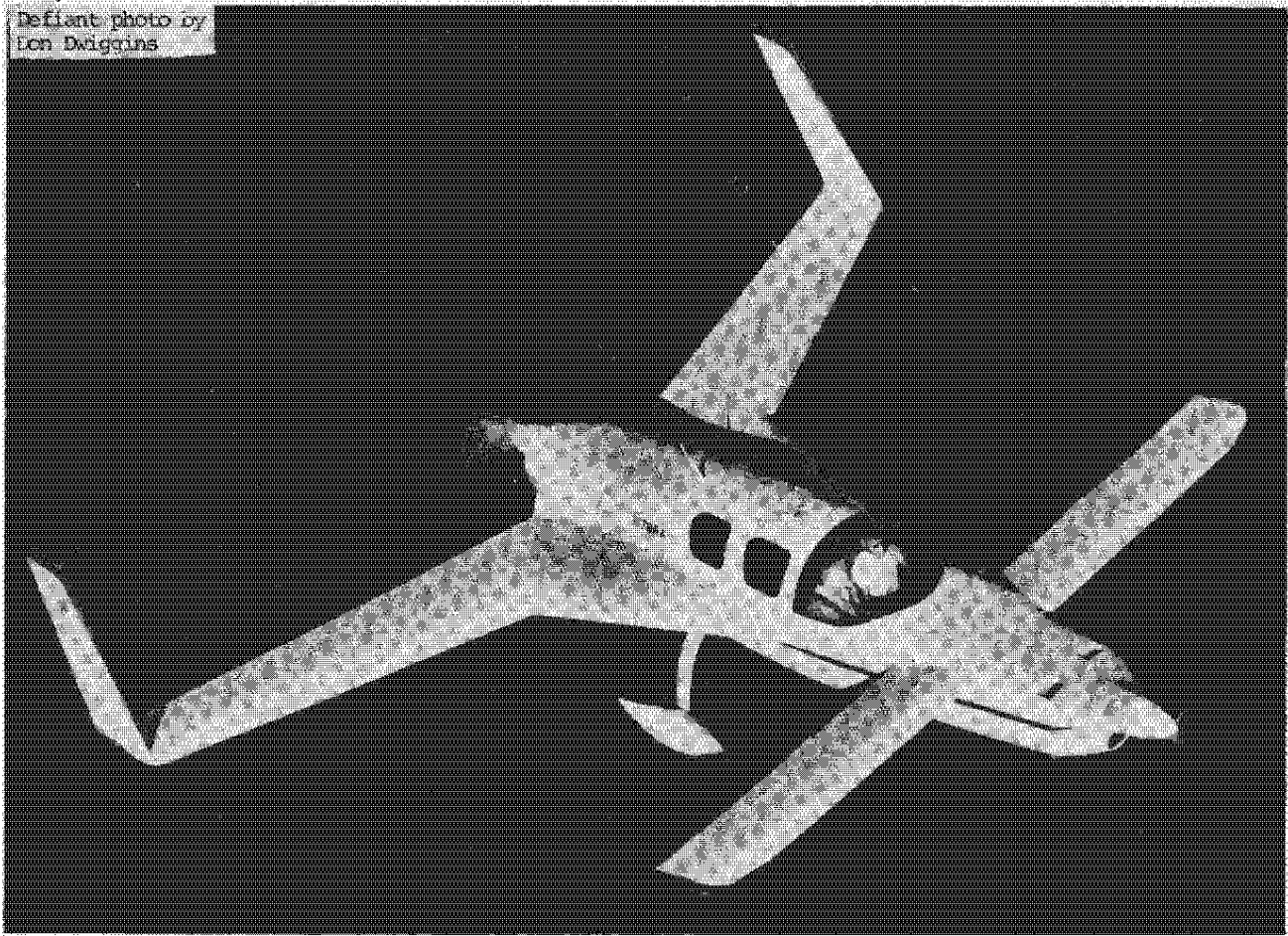
H.C. COMMUNICATIONS, Bx 2047, Canoga Park, Ca 91306, (213) 882-0422. Custom COM & NAV VHF antennas.

Check items desired	Price, including first-class mail U.S. and Canada	Air Mail Overseas*
<input type="checkbox"/> VariEze info kit, includes current issue of "Canard Pusher" newsletter	\$5.00	\$6.00
<input type="checkbox"/> "Canard Pusher" newsletter, published quarterly. One-year subscription	\$4.75	\$6.50
<input type="checkbox"/> Section I	\$139.00	\$153.00
<input type="checkbox"/> Section IIA	\$19.00	\$21.00
<input type="checkbox"/> Section IIC	\$21.50	\$23.50
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<input type="checkbox"/> Section IV	\$8.00	\$9.50
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