

THE CANARD PUSHER

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

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

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

The RAF hangar is located on the west end of the flight line at the Mojave Airport, Mojave Ca., approximately 80 miles north of Los Angeles. You are welcome to come by and see our aircraft or to bring in any parts for our comments. We are normally open from 8:00 to 12:00 and 1:00 to 5:00 on Monday through Friday and 9:00 to 4:00 Saturday. Closed Sunday.

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

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

SATURDAY DEMOS RESUMED

In 1975 and 1976 our offices were located remote from our prototype aircraft making it difficult to show them to visitors on an individual basis. Therefore, at that time we had a formal display of the airplanes, including a flight demo each Saturday at noon. After we had our new building on the flight line in 1977, our airplanes were available for public inspection daily, and due to our being gone on occasional weekends, we discontinued the Saturday demos.

Lately, during the last few months, we have had a large number of Saturday visitors, and we have been rolling all the airplanes out for flight demos, including our airshow practice with formation flying etc. These have been well recieved and thus, we now plan to resume our policy of a scheduled flight demo and composite construction discussion period every Saturday that is not reserved for an out-of-town EAA flyin. We will start the presentation/discussion at 10am each Saturday with flight demos of our experimental aircraft at approximately noon (weather permitting). This will be done each Saturday except when we will be gone to the following airshows:

26 April 80	Chino, Ca.	Flyin
24 May 80	Watsonville, Ca	Flyin
31 May 80	Lake Isabella, Ca	Hospitality Club
2 Aug 80	Oshkosh, Wisc.	EAA Convention
9 Aug 80	Oshkosh, Wisc.	EAA Convention

Bring any of your parts for inspection. We are located near the west end of the flight line at the Mojave Airport about 2 hours drive north of Los Angeles on Highway 14. When arriving at Mojave by car turn east at the Carls Jr restaurant to find the airport.

LONG-EZ AT SUN-'N-FUN, by Dick Rutan

I just returned from a very successful two week trip to the 1980 Sun-'n-Fun flyin at Lakeland, Florida, with the Long-EZ. We originally planned to go non-stop from Mojave to Lakeland at a economy cruise speed. However, before departure we modified the wing strake fuel tank into a baggage compartment, reducing the volume of fuel. With only 50 gallons, non-stop is possible only with a moderate tailwind. Note that with the strake baggage compartment the prototype has about the same fuel volume as the plan-built Long-EZ.

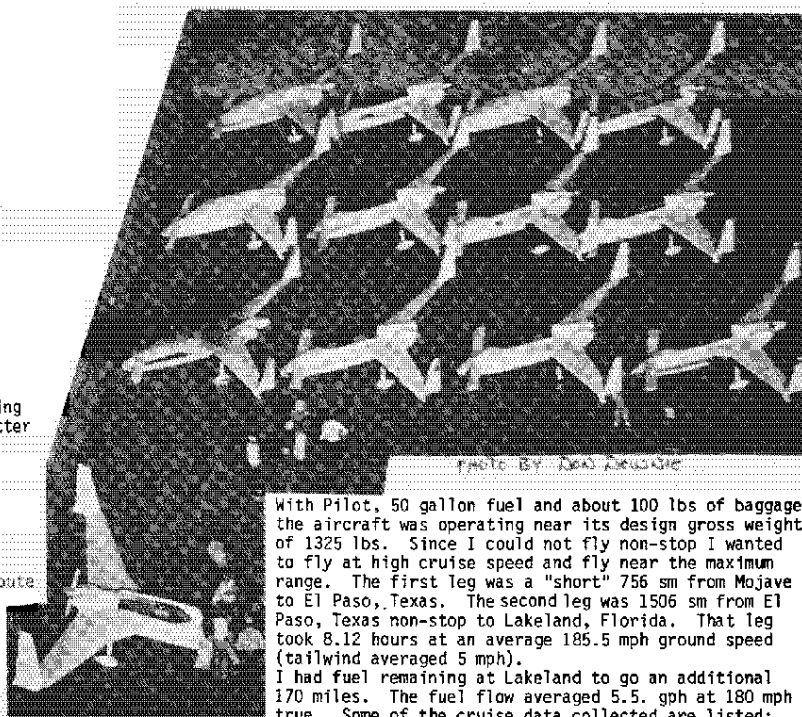


PHOTO BY NOAS LANGRISH

With Pilot, 50 gallon fuel and about 100 lbs of baggage the aircraft was operating near its design gross weight of 1325 lbs. Since I could not fly non-stop I wanted to fly at high cruise speed and fly near the maximum range. The first leg was a "short" 756 sm from Mojave to El Paso, Texas. The second leg was 1506 sm from El Paso, Texas non-stop to Lakeland, Florida. That leg took 8.12 hours at an average 185.5 mph ground speed (tailwind averaged 5 mph). I had fuel remaining at Lakeland to go an additional 170 miles. The fuel flow averaged 5.5. gph at 180 mph true. Some of the cruise data collected are listed:

Alt.	Throttle	MP	TAS	GPH	Mi/GAL	RPM
9500	Yes	19.2"	182	5.65	32.2	2780
11,500	No	18.0"	175	4.80	36.4	2756
13,500	Yes	18.1"	176	4.75	37.05	2740

On my arrival in the Lakeland area I found myself surrounded by VariEzes escorting me in. We did a formation fly-by and landed. The participation by the "galactic wonders" at Lakeland was excellent - 16 total, by for the most popular homebuilt in attendance. There were 15 VariEzes and one Long-EZ. Some of the VariEze activities included a designers' award for the best EZ, a VariEze race, a daily bull sessions and an awards banquet. The award for the best EZ went to Steve Darlington from Anderson, Indiana, immaculate N36SD. Congratulations Steve on a job well done.

The race was flown on Friday just before a mild weather front went through. Bringing 3 hours of the only rain we had all week. We wanted to fly the race out of Lakeland and back to finish in front of the crowd but the air traffic was such that this was not feasible. So we ran the race out of an airfield 15 miles east of Lakeland. We set up a triangular course of 46 total miles. I did not want to get involved in complicated timing or handicapping and wanted the first one across the finish line to be the winner. But 9 VariEzes are tough to start all at once so we staggered the start based on engine size. This put the C-90 out front, the O-200 next and the Lycomings last. The whole gaggle got off in less than 40 seconds and they were all really close at the first turn. Some sight to see all those weird birds so close going around the first pylon. Rounding the last pylon before the finish we had Steve Wood with his boat tail NACA air scoop Continental O-200 Eze in the lead, or so we thought, but much to my surprise Ed Rockwell in his C-90 N7ER was turning the pylon a good mile out front. Steve Woods was gaining, it looked like a horse race finish right to the wire. The rule was that you must fly down the runway and the first one to cross the intersection at midfield was the winner. Since the approach was about 90° to the runway it meant a turn around the numbers then down the runway. Well, unfortunately Ed made this turn a little wide and Steve, an old race pilot, cut him off and finished just 5 seconds ahead to win. Results follow. Note that even though the Long-EZ has 41% more wing area than a VariEze, it was faster than 4 of the VariEzes. The speeds listed are not corrected for the start interval or losses in the turns. For example, based on actual start times, Steve Wood turned 196.3 mph and the Long-EZ turned 185.7 mph. Two of the EZs were running TAS over 200 mph in the straightways.

SUN-'N-FUN EZ RACE RESULTS

Placing	Aircraft	Engine	Pilot	Speed-not corrected for start handicap.
1	VariEze	N56EZ	0-200 Steve Wood	186.8 mph
2	VariEze	N7ER	C-90 Ed Rockwell	185.8 mph
3	VariEze	N2UM	118 Lyc Lance Uhley	183.5 mph
4	Long-EZ	N79RA	108 Lyc Dick Rutan	180.8 mph
5	VariEze	N57EZ	0-200 Byron McKean	180.6 mph
6	VariEze	N36SD	0-200 Steve Darlington	171.9 mph
7	VariEze	N70VE	0-200 Herb Sanders	170.8 mph
8	VariEze	N2286A	0-200 Mule Ferguson	169.7 mph
9	VariEze	N301RW	0-200 Bob Woodall	163.6 mph

The demonstration flown by the Long-EZ at airshow time was intended to show its excellent glide ratio, good maneuverability and a wide stall margin. To demonstrate this and to dispell the doubts about canard stability and control we worked up a low altitude, simple aerobatic routine. We want to make it clear that the Long-EZ is not designed for aerobatics and, while we don't recommend it for aerobatics, in the hands of a competent aerobatic pilot the basic positive "g" aerobatics can be easily performed. The 4 1/2 minute routine flown at Lakeland went like this: Take off at minimum speed, enter a steep bank, full aft stick "corkscrew" climb 720° turn to about 500 feet then descend to gain speed and do the same thing starting at 120 knots 4 "g" full aft stick 70° bank topping out at 1200 feet, then split "S" to 200 feet at 150 knots for a loop, a roll, then a split "S" reversal for a Cuban "8". Then, another split "S" reversal to attain 180 knots. At 200 feet, show line center, kill the engine and do a loop, a roll, a 180° climbing turn back to show line center. Now at 500 feet and at final approach speed, 65 knots do two 360° spiral turns landing show line center all dead stick. Impressive ??? You bet - - - We recieved numerous letters, calls, and personal comments at the flyin - - - " I had no idea that that could be done etc etc - - -". We have even recieved a formal request to perform at the 1980 World Aerobatic Championships to show the foreign countries what is available here.

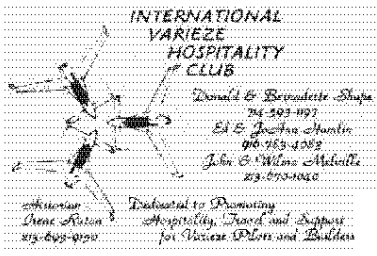
During the return from Lakeland, I stopped off to visit some local EAA chapters at Dallas, Austin and Phoenix. Total flight time 52.2 hours, two weeks on the road, used 279.0 gallon fuel for an average of 5.34 gallon per hour. Much of the flying was spent giving back seat rides and checking out six new pilots in the front seat.

BURT'S TRIP DOWNUNDER

At the invitation of the Sport Aviation enthusiasts of New Zealand and Australia, Burt traveled to those countries in March/April. Purpose of the trip was to conduct composite structure workshops and to discuss composite inspection with homebuilt inspection agencies. The hospitality was great Burt stayed with ten different EAA families. In addition to some sight seeing, Burt was able to inspect several VariViggen and VariEze projects under construction and fly two VariEzes. At the Latrobe Valley flyin near Melbourne there were 4 VariEzes flown in to join the 54 other homebuilts in the Australia National Flyin. Two of them flew more than 2400 miles from Western Australia. Congratulations Noel Bramish, Geoff Danes, Ian Clubb and Bob Keeher on four beautiful EZs. Thanks also to Tony Stinton, Ian Williams and the other EAA'ers who sorked so hard to arrange the trip. Some observations of interest to us American homebuilders:

Even though New Zealand only has 3 1/2 million population, they had 53 homebuilts at their January flyin! Their acitivity is high despite tight government control: All materials purchases must be accompanied by a release note. Workshop must be approved before you can start building. Only specific designs maybe built. Any modifications must be approved and documented with drawings and engineering. Stage inspection is intensive - even the book ends must be approved! No material substitute is allowed. Test pilot must be approved.

Both Australia and New Zealand Governments provide a composite aircraft construction school to teach methods and inspection. Some of the class projects include building a VariEze, our confidence samples and bookends.



Applications for New Members should include the following information.

Name	Address
City	State
Zip	Phone
# number	Hours or percent complete
Home airport	Runway condition
Number of persons can accommodate	
Hanger space available	
Transportation	
Personal inf. of interest	Latest trips etc.
Mail to: 2531 College Lane La Verne, CA. 91750	

CP 21 752

HOSPITALITY CLUB FLYIN at Bullhead City, Az. by Mike Melvill With Burt still on a trip to Australia, Dick in Long-EZ and myself and my Mother in the VariViggen, took off from Mojave and headed east. Perfect weather with unlimited visability made for a very pleasant flight. Dick occupied himself with fuel flow checks at various power settings and altitudes. We started out on the deck and ended up at 11,000. One hour and thirty minutes later we made a two ship formation flyby at Bull Head, and counted 11 VariEze's on the ramp.

We all crossed the river on the ferry boat and had an early lunch in the casino restaurant. We lost a couple of dollars very quickly, then crossed back to the airport where we spent the rest of the day chatting with all the EZ pilots, potential pilots and general public. Both Dick and I gave short demonstration flybys, later in the day, and Dick treated everyone to most of his "Sun-'n-Fun" aerobatic show.

As it got dark, there were 16 VariEzes, 1 Long-EZ and 1 VariViggen on the field. We all crossed to the casino where we had an excellent buffet dinner for only \$4.00. After dinner, Dick showed some breath-taking slides of the Long-EZ doing aerobatics shot from an aft-looking camera, mounted on the nose.

Don Shupe gave out several awards, and Dick awarded a VariEze belt buckle to Gary Hertzler of Tempe, Az, for having the most outstanding VariEze. A real jewel, powered by a Continental A80. After dinner we checked out the various gambling spots along the Nevada shore of the Colorado river. It was a lot of fun, but could cost you money if you were not careful!

Early next morning 5 VariEzes were out in a dawn patrol flight, while the rest of us were trying to sleep! After a hearty breakfast at the casino, we spent an enjoyable morning looking inside cowlings, and answering questions, and generally having a good time. I must say the feeling of being with a bunch of VariEze pilots, their wives and girlfriends like that, is great.

I took Bruce Evans for a ride in my Viggen, then Dick did his aerobatic show, and we all started heading for home. A total of 18 EZ's 1 Long-EZ and 1 Viggen actually flew in. EZ's came in from as far away as Redding, Ca, and Las Cruces, New Mexico.

We did a couple of close formation flyby's then headed back to Mojave. Time enroute 1:20. We really had a great time and vowed to try to get to any future Hospitality Club flyins. Congratulations to the organizers of a really fun flyin, lets do it again, soon.

LAKE ISABELLA HOSPITALITY FLY-IN

The Hospitality Club is planning their next fly-in for May 31st and June 1st. This will be at California's Lake Isabella in the Kern Valley. There are plenty of camping areas, the lake is within walking distance as well as the river. A really beautiful area for a fly-in. For more details call either of the following - Bruce and Bonnie Tift (805)649-2721 Don and Bernadette Shupe (714)593-1197

HOSPITALITY CLUB PROPOSED TRIP to the Bahamas.

Plans are still very tentative but at this point we are planning to depart California on December 20th, spend one week in transit, and plan to be in the Bahamas from 27th on. We are planning to take 3 weeks. However there are many of you out there with only 2 weeks, and of course you could get over there easily in a couple of days, depending on weather.

If anyone would like more information on this trip contact Bruce and Bonnie Tift, 8746 Ventura Ave, Ventura, Ca 93001 (805)649-2721 (evenings)

We hope to have firm plans and dates within the next few weeks so we can proceed with reservations and deposits.

SAFETY MODIFICATIONS by Dick.

During my travels I am dismayed at the number of VariEzes flying that have not accomplished the safety modifications. Check CP # 21, pg 4-5, CP # 22 pg 8, CP # 23 pg 7. Things like rudder travel, Continental 0-200 starter bearings plug, 1" rod ends, canopy safety latch, EON-8000 seat belt buckle, etc, etc, are extremely important and should be accomplished immediately. Do not procrastinate with safety.

LONG-EZ UPDATE

(See also Long-EZ flyer, "Which one?" and "Sun-'n-Fun" in this issue, and CP #23.

Long-EZ plans are now available!!

The major benefits of the Long-EZ over the VariEze are listed below:

- (1) Lower (65kts) landing approach speed, can touch down at 50 kts with full aft stick.
- (2) Better visibility for takeoff, approach and landing.
- (3) Higher roll rate, lighter and more responsive ailerons.
- (4) Stiffer elevator forces, more solid feel in pitch.
- (5) Increased useful load, cabin size and instrument panel space.
- (6) More baggage area. Cabin-accessable area in wing strakes.
- (7) 60% more range and less runway required.
- (8) Better high-altitude performance.
- (9) Better maneuverability, yet more docile for low proficiency pilots.
- (10) Greater stall margin.
- (11) Ability to use 100 to 118 hp engines without nose ballast.
- (12) Ability to use lighting, alternator and starter
- (13) Ability to use 500 x 5 tires.
- (14) Improved structural materials.
- (15) Improved structural methods and easier jiggling.
- (16) Overlap, incidence - adjustable wing attach (no wing fittings).
- (17) Improved trim, electrical, and fuel systems.

The major benefits of the VariEze over the Long-EZ are listed below:

- (1) Lower cost - materials are approximately \$500 less due to smaller size and cheaper type foam.
- (2) Ability to use the A75, A80 and C85 engines.
- (3) Easier to trailer (Long-EZ must be tilted to meet the 8ft width requirement).
- (4) Faster to build (Long-EZ requires about 15% more work).

Note that there is only a minor difference in speed. Our Long-EZ outran half the VariEzes in the Sun-'n-Fun race.

The adjacent photos show Johnny Murphy of Cape Canaveral with his Long-EZ. This is the #2 ship, started last year. Johnny's project was built from the plans before they went to the printer, thus he provided assistance in debugging the plans. The Long-EZ plans are laid-out and detailed very clearly and completely. They are drawn based on our experience providing support for over 2000 VariEze builders. Thus, we expect far fewer changes and building problems than with the VariEze.

The Long-EZ design has taken advantage of the numerous improvements noted based on over 250 EZ first flights. Testing has been more extensive. When the VariEze plans first went to print in 1976 the prototype had 100 hours flying in 4 months and had been flown by about 6 pilots. Long-EZ prototype has over 250 hours flying in 10 months and has been flown by 25 pilots (front seat).

Our original plan of an addendum rather than a new set of plans was foolish, since even the unchanged canard and elevators were redrawn to improve their clarity and to eliminate common builder errors. The Long-EZ plans Section I include finishing instructions and complete electrical system drawings. Section VI is required and IIA or IIC are needed for engine installation. The Long-EZ Section I includes all updates for these Sections. Thus, Long-EZ builders do not need newsletters previous to CP #24.

The fact that the Long-EZ plans are completely new rather than an addendum eliminates the confusion of plans editing. However, some of you have purchased VariEze plans with the intent to build a Long-EZ when the addendum was published. Thus, we are providing a plans trade-in program so those people can get credit toward the Long-EZ plans. If you bought a VariEze Section I from RAF after July 15, 1979 with the intent to build a Long-EZ, contact RAF for terms for trading them for the Long-EZ plans.

We are just now finishing the Long-EZ Owners Manual. It should be printed and available by the end of May.

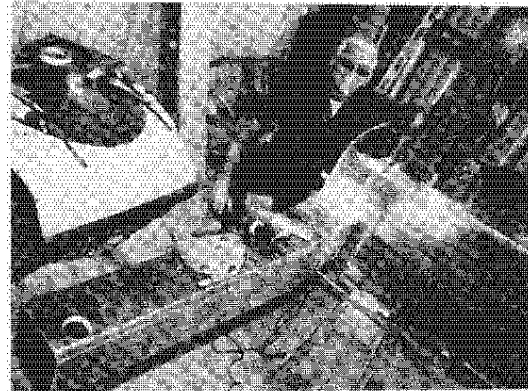
LBF RACE - OSHKOSH 1980 - We are still active in planning a VariEze/Long-EZ class race in the LBF race this year at Oshkosh. Since a VariEze is not competitive with the best formula racers for the major purse, we have established a class within the race for the fastest VariEze in each

of the three categories. We have been successful in getting \$1200 so far for prize money and this could double by race time. The race is a timed speed/efficiency contest. You get 18 gallons to go 500 sm and the fastest using no more than 18 gallons wins. You get credit (speed adjustment) for fuel not used under 18 gallons. Use more than 18 gallons and you're disqualified. I just learned from the LBF organizer Nick Jones that he is now giving prize money to more than just the 1st place winner - \$500 for 2nd, \$250 for 3rd, \$150 for 4th and \$100 for 5th. We may have some EZs in this money or maybe the \$7000 overall purse!! You never can tell what will happen in a race so start planning now.

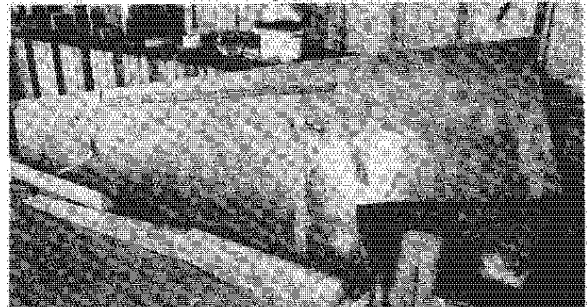
For rules, see the December 1978 Sport Aviation, C.P. #22 or an upcoming Sport Aviation. You can write to the race director -

Aaron King,
1893 Greystone Road,
Atlanta, Ga 30318

for an application, race number and official rules. There is a \$10 registration fee and you can request your race number at that time. (List 3 choices for race number). Get your applications in now before the good numbers are taken. You must be registered prior to the July cut off to race. See you on Race Day.



JOHNNY MURPHY - LONG-EZ # 2,
WILL FLY TO OSHKOSH, 1980.
JOHNNY'S RIGHT WING - 7



FLASH - At the down-under fuel efficiency race held 6 April 1980 in Australia (same rules as LBF), Geoff Danes VariEze easily won over 4 other types. Placing and fuel-corrected speeds are listed below.

1st	VariEze	174.5 mph
2nd	Mustang II	160.2 mph
3rd	Cassett	160.0 mph
4th	Tailwind	154.2 mph
5th	T-18	disq - used too much fuel.

LONG-EZ/VARIEZE MIX

We have had many requests concerning the possibility of converting partially completed and even complete VariEzes into Long-EZs. This may work, and may fly ok. However, since we have not done it ourselves, and have not flight tested it, we can not recommend it, and neither can we provide builder support for those who elect to do it. Anyone who elects to try to do this is entirely on his or her own, and it will be your responsibility to handle all modifications, to foresee any interference problems and to fit parts that may not go together. We would also request that you do not call your airplane a VariEze or Long-EZ. Please call it something else like "Smith Special" etc. Remember, you will be doing exploratory flight tests where all characteristics are in question until you have flown and tested them. We are supporting over 2,000 builders now, and there would not be enough hours in the day for us to be able to work out problems with individual builders of a "hybrid". Please don't ask us, because we will have to say no.

WEIGHT CONTROL - Too many builders are loading their airplanes down with extra equipment and heavy finish jobs. They are going to miss the real thrill of flying their EZ at a light weight, and they will find their useful load disappearing. Here is the trap - if you address each item as, "Oh, that's only one-half pound, it's a small percent of the empty weight", you will find that the sum of all the extras will add up, and when you weigh your ready-to-fly airplane you will be scratching your head and saying, "where is it all?". Believe me, it happens every time.

We have a strong recommendation for all of you, and that is to delay installation of any equipment not absolutely required for flight, until after you have flown your airplane a few hours. Then, you will have a much better chance of a successful flight test program - the airplane is easier to fly light and uses less runway. Also, if you make a real bad landing during your transit it will put a lot less stress on your landing gear. Then if you must, load on the equipment, at least you will get to see first-hand the effect it has on performance and runway requirements.

This philosophy also goes for modifications, too. Don't try something new on your unflown new airplane. Build to the plans first, where you know from our experience that it will work. Fly it that way, then try your modifications.

EON E-8000 SEAT BELT UPDATE

In CP #22 we reported the EON E-8000 seat belt was unairworthy and that Dr. Cross, President of EON Corp would replace the belts with one that was acceptable. Unfortunately Dr. Cross reneged on his commitment. Long delays were reported and the ones he did replace were still the same type (dash 4) and in our opinion still unsatisfactory. We recommend the EON E-8000 be removed from your aircraft and replaced with another approved style. We have been very active with the FAA to have the cap-over buckle recalled. Now, over 5 months since we recalled the buckle and pointed it out to the FAA and EON, Airworthiness Directive dated 4 March 1980 80-05-04 amendment 39-3706 has also recalled them.

PROPS FOR VARIEZE AND LONG-EZ

We have approved and recommended the following prop manufacturers.

Larry Weishaar 1924 no. 6th Springfield, IL 62702 (217)544-6086 (Homebuilt prop)	Ted's Custom Props, Ted Hendrickson 9917 Airport Way Snohomish, Wa 98290 (206) 568-6792
B & T Props, 5746 Ventura Ave Ventura, Ca 93001 (805)649-2721	Bill Cassidy 4652 Montview Blvd, Denver, Co 80207 (303) 322-3423
Ray Hegy Marfa, Texas, 79843 (915) 729-4249	

Most of our testing has been done using Ted's props, and therefore we tend to compare everyone elses to Ted's. Ted reports that he has finally caught up his VariEze prop production to where he can offer much better delivery than he has been able to over the past year or so. He also reports that, lately he has been supplying steeper pitch props to O-235 Lycoming powered VariEzes in the form of a 58 x 74 and in some cases 58 x 76 prop. A couple of builders using these props have reported good results. We are presently using a Ted's 58 x 72 on the Long-EZ.

Any potential prop makers who would like us to recommend their props on either the VariEze or the Long-EZ or both, should send us a representative prop, which we will test on our prototypes, and if it comes up to our standards, we will keep the prop for further testing and approve and recommend it in the Canard Pusher. If it does not meet our standards it will be returned freight collect.

PREFAB WING FOR VARIEZE

In CP #20 we promised an update as to whether RAF would approve and recommend them. The testing we did manage to do last summer and fall proved unsatisfactory. The amount of work necessary to finish them through paint is not significantly less than a good plans-built wing, and the weight savings is negligible if any. Also, we experienced structural cracks requiring repair. The attach system was inadequate, resulting in our having to destroy structure to remove the wings. It is possible that these problems could be solved but we have no current plans for further testing, thus, we cannot recommend their use.

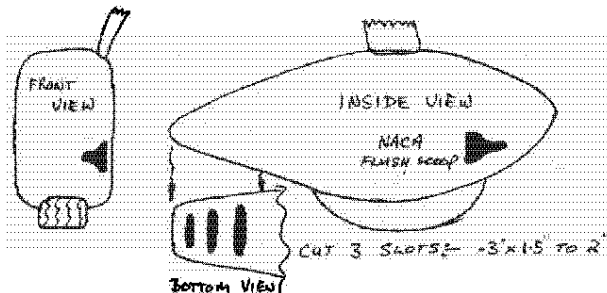
ROTOWAY RW-100 UPDATE

You may have noticed that Rotoway has, once again, started their advertising blitz alluding that the RW-100 is now approved for the new Long-EZ. We understand there have been some changes in the engine and some further testing. However, we have not seen, nor do we have any first hand information on the engine as it is now. The advertising mentioning the Long-EZ/VariEze was done without our knowledge or consent and until we have had the opportunity to evaluate/test the engine first-hand we cannot recommend its use in any of our aircraft. We encourage new engine development and wish Rotoway success in their efforts. The RW-100 is approved for Long-EZ/VariEze use it will be reported in this newsletter.

In our attempt to gather information on the acceptability of the Rotoway engines, we have been trying to access the reliability and maintainability of the helicopter version of the engine. If you know of a Scorpion owner willing to discuss his engine service record, please let us know his address so we can contact him. All information will be in confidence, we merely want to compile data on the engine's reliability.

BUILDER HINTS

Brake Cooling - The "Real" George Scott reports brake overheating with his tight-fitting wheel pants. He has solved this by installing cooling ducts in his wheel pants to cool the brakes. He has detected no change in cruise airspeed, and has not experienced any brake fade since installing per sketch below.

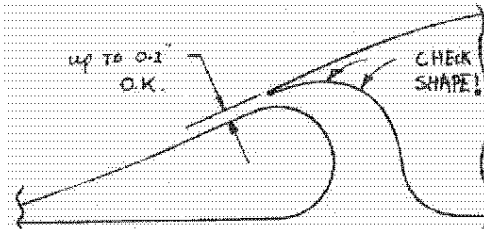


Hotwire Templates

An excellent way to make hot wire templates, is to glue the paper template to a clean piece of 1/16" thick aircraft plywood, available from Spruce or Wicks or hobby stores, using RAE or Safe-T-Poxy. Squeeze the paper onto the plywood and allow to cure overnight. Band saw or saber saw as close to the line as you can, finish to the line with a smooth metal file and/or sanding block. Lubricate the edge with pencil lead. This makes a really fine template with zero shrink. Do not use water base glue, it will shrink the paper.

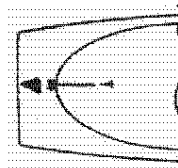
Elevator Positioning

VariEze Section I, page 5-5 (or Long-EZ page 11-5) shows a smooth transition from the trailing edge of the canard onto the top of the elevator. This is not easy to attain, and still get full and easy elevator travel. It is acceptable to have up to 0.1" of "step-down" as shown below. However, be sure the slot shape and elevator shape are precise.



Yaw String

We have always flown our VariEze with a yaw string glued to the front edge of the canopy. This is used in sailplanes and is an excellent heads up yaw reference. Glue or tape a 3" long piece of yarn or string to your canopy leading edge, and be sure it is on the aircraft centerline. Mark the canopy where the string should lie in coordinated flight.



VariEzes can use the lighter Long-EZ canopy layup. Save weight with an approved new layup schedule on your canopy. On the original VariEze the canopy layup is actually stronger and heavier than it really needs to be. New layup schedule is as follows for both the inside and outside layups: front and back areas - 3 plies BID at 45°. Side rails 2 plies BID at 45° + 2 UND length wise.

Prefab brackets available for VariEze.

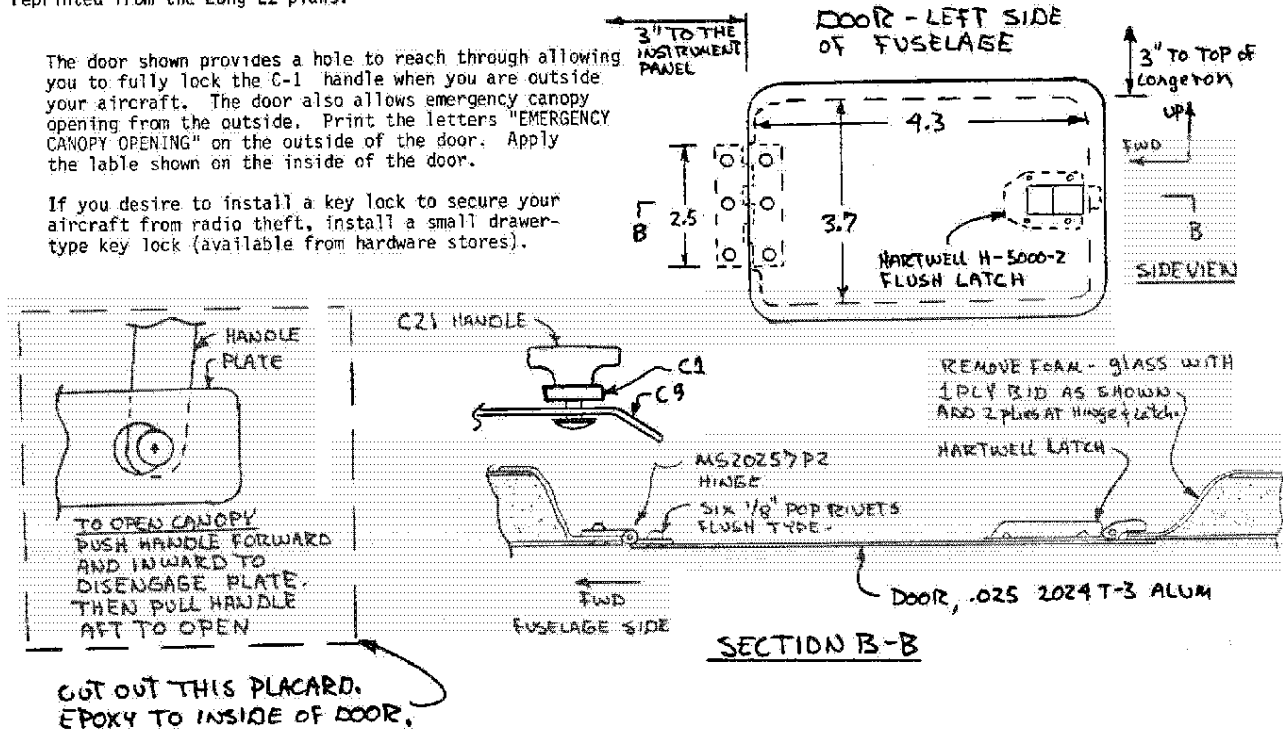
The VariEze rudder bellcrank brackets, Section I page 16-1 and 16-2 and A-4, have been slightly redesigned for Long-EZ and are available from Ken Brock and are applicable to a standard VariEze. Order 4 each part # CS71. Brock also has the rudder pulley brackets, Section I, page 16-1, order 2 each #CS72

Long-EZ fuselage door

can be installed on VariEze, if you wish. See the detail reprinted from the Long-EZ plans.

The door shown provides a hole to reach through allowing you to fully lock the C-1 handle when you are outside your aircraft. The door also allows emergency canopy opening from the outside. Print the letters "EMERGENCY CANOPY OPENING" on the outside of the door. Apply the table shown on the inside of the door.

If you desire to install a key lock to secure your aircraft from radio theft, install a small drawer-type key lock (available from hardware stores).



STROMBERG CARBURATOR

Last CP we reported a problem with a Stromberg carb in a VariEze. We have no experience with the Stromberg and had asked if any out there had used it successfully. We found 4 using the Stromberg carb ok but they reported that the float level is critical. Also the float valve opening is different for psrreure and gravity systems. Be sure yours had the gravity valve. If you are anticipating using a Stromberg, we suggest you contact those using them in VariEzes.

Steve Stuff,
517 Roberts Street,
Monroe, Wa 98272

Gary Hertzler
2507 E. Balboa
Tempe, Az 85282

Fred Keller
SRA Box 2385 Q
Anchorage, Ak 99507

Bruce Tuttle
4471 S 1625 W.
Roy, Ut. 84067

Float needle valve seat part # 384585 has a .113 dia. seat to accomodate 2-4psi pressure at the carb. Part # 383911 has a .187 dia. seat for the half psi or gravity pressure at carb. (VariEze) float level 13/32. For a C85-12 engine carb should be a NA-S3A1 Stromberg part # 380167, venturi 1-3/8, main discharge jet #22, main air bleed #66, main meter jet #45. But be sure the float needle valve seat is for the gravity system.

SOLUTION TO STIFF FUEL VALVES

One homebuilder reported his stiff fuel valve problems were solved by using a fuel valve lubricant called "parker fuel lub" available in most aircraft supply stores. Cost \$10 or \$12 for a small can. The lubricant is not soluble in fuel. This small can could lub dozens of EZs.

FUEL GAUGE VISABILITY

- Micro or traces of air in-trapped in the fiberglass layup at the visual fuel gauge area will result in poor gauge readability. This is a very common problem, existing in at least half the airplanes we have seen lately. The gauge will read with excellent contrast only if the layups are perfectly clear. If you have not yet installed the fuel tank top, inspect your gauge area carefully. Without touching the surface you should be able to see your fingers clearly enough to count them when looking through the gauge. If it is not perfectly clear and translucent, cut out the gauge area, about 0.7" wide. Sand adjacent skin inside fuselage and out. Then layup two plies BID at 45° onto two pieces of "Saran Wrap" (or glad-wrap) thin plastic kitchen plastic. Apply to inside and outside using your fingers on inside and outside to expell all air. The plastic wrap keeps the layup from drawing in air. After cure, remove the plastic. The result will be a gauge clear enough to see your hand through and will give a good contrast with fuel.

VARIIZE RUDDER TRIM

The rudder trim as called out in the VariEze plans, is to enable you to correct any tolerance buildup that may cause your VariEze to yaw one way or the other. This system is intended to allow the pilot to set the neutral position of the left rudder at the position required for "ball-centered" flight. Most EZs trim with the rudder deflected left about 1/4" to 1/2". The rudder position for "ball centered" flight does not change with airspeed. However, due to airloads and stretch in the system from rudder to yaw trim system, the rudder blows toward the right at high speeds and slacks out to the left at low speeds. Thus, because of our trim system, trimming is needed when airspeed is changed. If we block the rudder itself, hard at the correct neutral position, we do not need inflight trim adjustment and we can seal the gap in the left rudder. Thus, inflight adjustment of trim when speed is changed is not necessary.

Proceed as follows: Visually note the position of the left rudder at cruise flight with the ball centered. Land, then block the rudder position there, with a balsa block epoxied to the winglet, closing the gap full span. Then fly with the yaw trim knob full in (inactive) to confirm position of the block. From now on use the knob only for parking brake function, not yaw trim. Or, completely remove the system if parking brake is not desired. Some EZ flyers use a small wheel chock instead of the parking brake. A nylon parachute riser attached to the chock allows you to haul it aboard when ready to taxi.

PLANS CHANGES

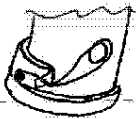
We at RAF, of course, cannot enforce a mandatory change, as FAA can on a type-certified aircraft. The regulations allowing amateur-built experimental aircraft recognize that the homebuilder is the aircraft manufacturer and, that the aircraft does not need to conform to certification requirements. This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

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

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

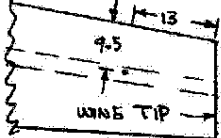
LONG-EZ PLANS CHANGES

LCP #1
MAN-GRD pg 21-8



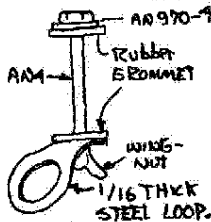
The Bendix fuel pump called out does not have a means of safetying the bottom cap. This is done on certified aircraft as follows:
Bend the small tab shown 90° drill a #50 hole in it, safety with .032 stainless safety wire, tied to the fitting.

LCP #2
MEO pg 19-10



Oops! We forgot to include the tie downs in the Long-EZ plans.

Drill a 3/8" hole through the wings, 13" inboard along the leading edge, and 9.5" aft of the leading edge. This will assure that you do not drill through the shear web, but will be just aft of the shear web.



Now floc a piece of aluminum tube into each wing, so that the tube is flush with the skin top and bottom. 3/8 O.D. x .049W 2024 T3. Obtain two AN4 bolts and make up a couple of removeable tie down as shown, these can be stored in the centersection spar when not in use.

LCP#3
MEO

Sect VI See landing brake bushing revision below under VariEze plans change

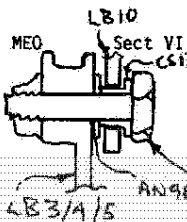
LCP #4

DES chap 7&21 See Safe-T-Poxy recommendation below for fuel areas.

VARIEZE PLANS CHANGES

MEO pg 18-3
Sect I & 19-11

Change "Nyloseal .050 wall" to "Nylaflo with .025 wall".



Landing Brake. Brock part #LB10 has been supplied with #10 hole. It should be drilled out with a 17/64 drill and a CS13 bushing should be inserted and clamped with the AN3-7A bolt as shown.

DES Sect I chap 12 821 New construction only. The interior fuel tank layup and fuselage side layup should be done using only Safe-T-Poxy. Laboratory tests have shown Safe-T-Poxy to be more resistant to fuel than either Lambert or RAE epoxy systems. Our survey of possible fuel contamination (see CP # 22 pg 7) did not reveal anything of major concern, although several of the 64 responding, reported a gummy substance on the float valve seat. Be sure to follow the CP #22 pg 8 Owners Manual carberator inspection requirement.

MEO Sect III Radio Shack buzzer for warning is part # 273-051

MEO Sect IV Under taxi testing add "Remove wheel pants for taxi tests to avoid overheating brakes".

VariEze Owners Manual 2nd Edition pg 24 3rd Edition pg 23 Add the following to pilot checkout criteria:
5. Weight and balance must be in the first flight box (pg 26/27)
6. Briefing must emphasize that the aircraft should never be rotated past the angle that places the canard on the horizon for takeoff or landing.

7. Pilot being checked out must have minimum of 10 hours each in at least two type aircraft in the last 4 months (5 in the last 30 days) & feel competent and comfortable in them during marginal conditions such as crosswind landings near demonstrated limits, etc".

VariEze Owners Manual 2nd Edition pg 34 3rd Edition pg 33 Add the following to aircraft first flight procedures:
"It is strongly recommended, if at all possible, that the test pilot have at least 10 hours VariEze experience or, at minimum, 10 hours in a small aircraft with a fast approach speed like a formula-one racer or other relatively 'hot' homebuilt".

FOCAL POINT - FIRST FLIGHT ASSISTANCE

The following VariEze builder/pilots have volunteered to give first flight assistance to any VariEze builder in their respective local areas. Many others have also done several first-flights on EZ's in their areas.

Steve Stuff 517 Roberts Street Monroe, Wa 98272
Ray Cullen, 1116 6th Street Tillamook, Or 97141

John Steicher, 960 86th Street, Downers Grove, Ill. (312)985-6671
Bob Woodall 8302 26th Ave, Adelphi, Md 20783 (301)422-6027

Thanks very much for offering your help, this is a much needed service and anyone else wanting to offer this kind of help should let us know, and we can publish names and addresses. With well over 200 VariEzes flying now, there is really no valid reason why a builder with no VariEze experience should have to make his first flight. We strongly recommend that any first flight of any new airplane be made by a pilot with at least 10 hours in type. Do take advantage of this from the many pilots who offer their skills and experience. A back-seat ride is not adequate checkout. Get the 10 hour front seat time or locate someone who has this experience.

"EZCALC" Electronic Instrumentation

The Long-EZ has such an impressive long range cruise capability that to fully utilize this unique efficiency we are developing an electronic unit that will give instantaneous fuel flow (gph) and average for the trip. This will also save panel space by displaying other engine data. Also displayed are: total fuel used/fuel remaining, fuel/distance/time remaining (pilot in-puts ground speed), battery voltage, OAT, CHT, RPM, EGT, fuel low warning, clock local/Zulu, and approach timer. We installed a prototype in the Long-EZ for the trip to Sun-'n-Fun. We found it to be an invaluable aid in long range cruise control. For any given air speed and altitude we found we could lean for optimum and found my normal leaning technique was wasting fuel. An example, using my old technique at 180 mph true, I was using 6.2 gph, but using the "EZcalc" I could refine the mixture back to 5.56 gph for the same speed. Therefore we could easily exceed the advertized range for the aircraft. We learned a lot about leaning on the record flight using the Sears fuel counter and stop watch. But this unit gives a direct read out on fuel flow and you see it change as you move the mixture control. It's interesting to see the difference, with full rich at cruise power its 7+ gph and to be able to cut it back to 5.56 gph for the same speed is quite gratifying.

The "EZCALC" micro processor chip is now being designed and programmed for our special needs. There is a 15 week lead time on these new chips. We can expect availability of this unit by late summer.

ACCIDENTS

Since CP #23 there have been two off-field forced landings in VariEzes due to engine failure. No injuries, but both aircraft recieved major damage. The one in Southern California landed in the desert after the engine failed (reason yet unknown) taking the gears off and buckling the forward fuselage. The other in central California engine failed just after take off when the pilot selected a tank with water in the fuel. (non-standard fuel system). The field was undulating soft grass. When the aircraft touched down it took the main gear off and damaged the under fuselage and wings. The nose gear was not extended. Rain water got into the tank due to a very badly deteriorated "O" ring in the fuel cap. The aircraft had no gasculator or tank drains.

What is learned from the above? First, we don't recommend the nose be retracted for any landing no matter what the terrain is, even water. The nose gear provides extra cushion and keeps the nose from slapping down and digging in after the mains hit. The one possible exception could be brake failure after landing to retract the nose to keep from running off into unfavorable terrain or obstacles.

Water in the fuel system - - be sure the cap "O" rings are in good shape. Be sure all three drains are installed and used. If you suspect water, drain at least two quarts. Drain first while the nose is down from the wing tanks then from the gasculator with nose up. Some times it takes a lot of doing to get to the water. Run your engine at high power for awhile before take-off (nose up) to purge the water. Better to have it quit on the ground than just after take-off.

Don't be in a big rush to switch tanks. Have a safe landing area in sight before switching tanks if you can. Especially the first time you take fuel from the tank. In the case of water, even if you switch back to the "good" tank, you may not get it going in time. It takes a long time to purge water out of the carb. Also don't take short cuts on your systems, it takes a lot less time to do it right the first time than rebuild it.

Reference the Australian fatal VariEze accident reported in CP #23 page 7. We have learned that the pilot's total flight experience in the last 2 years had consisted of 1 hour solo and about 3 to 4 hour dual. He grossly over-controlled the aircraft in pitch on his first take off, flying at a relatively heavy weight at a relatively aft cg. Based on this and analysis of a previous accident with similar statistics, we are recommending additional limitations for the VariEze operators manual. These are listed in the VariEze plans changes section of this newsletter (Pg 6).

SHOPPING

NOTE! RAF cannot advertize complete or partially complete VariEze's, due to the inference that we have approved the quality. Our policy is that we will advertize your engines and propellers only.

TIRES: Both Aircraft Spruce and Wicks now stock Goodyear 6 ply ribbed tires. This has been the most satisfactory tire we have tested so far. We recommend them for both VariEze and Long-EZ. These tires should be inflated to 80 psi. Long-EZ does has over 240 HR on a set of THESE - they may be 300 HR. Toe-in is 1/4 degree. HOUR METER: Both Aircraft Spruce and Wicks stock a VDO hour meter slightly different than the VDO 331-011 we recommended in CP #22. It is the same size and has the part # 1763-002-016.

Construction drawings for a VariEze trailer. We mentioned these in the Canard Pusher previously, and have recieved notice of a change of address. For more information contact: C.A. Gross
6761 Crestview Dr,
Yucca Valley, Ca 92284

Lloyd G. Eash, 541 Utah, NE, Albuquerque, NM 87108 has a disassembled Continental A-75 plus all kinds of parts for these engines. However, he does not want to piece-meal it, and would prefer to sell the whole lot to a VariEze builder. Contact Lloyd for prices.

For Sale - Brand new Ted's prop. 58" x 70" for C-90 \$185.00 Alan McPherson (402)258-4212

RAF NOW SELLS AND STOCKS EZ CANOPIES

RAF now has in stock at Mojave both new and slightly blemished canopies. These canopies are for both Long-EZ and VariEze. If you order one to be shipped to you it will be shipped FOB Dayton, Ohio. Or, save all shipping costs and pick one up at Mojave.

Prices are as follows:	Clear	\$199.00
	Green	229.00
	Smoke	239.00
	Bronze	239.00

Blemished - Price varies with extent of defect.

Note: Canopies are 94" x 25" x 13". If your car is not big enough a canopy can be mounted to the top of the car with duct tape.

LANDING GEAR - RAF has both nose gears and main gears in stock for immediate shipment, or save yourself shipping costs and pick them up here at Mojave.

Prices are as follows:	Nose Gear	\$ 49.75
	Main Gear	277.95

These prices are FOB Mojave and these will be shipped freight collect. Generally we ship by Greyhound Bus, since the main gear is too large to go UPS. Shipping varies from approx. \$10.00 to \$26.00 on the east coast. Those of you ordering from foreign countries, please add \$20.00 for shipping and handling. They will be shipped Air Freight collect from Los Angeles.

3-SHIP POSTER - The 18" x 23" poster we have for sale for \$2.75 each or 2 for \$5.00 plus \$1.00 for postage is in color and is as shown on the cover of CP #22, consisting of Burt flying N78RA - the Defiant, Dick flying N4EZ - VariEze and Mike flying N27MS - VariViggen. This is a really excellent poster, printed from a beautiful photograph taken by Budd Davison, and may be obtained autographed by the three pilots, or plain.

SANTA PAULA AVIONICS Santa Paula Airport, Santa Paula, Ca, 93060 can take an Escort 110 and change it to an intercom and adjust it to draw only 0.6 amps very reasonably. Bruce Tiff recommends it, he has not had to charge his battery since.

OVERSEAS FOCAL POINTS

The purpose of this section is to list anyone willing to help other builders in their areas overseas.

Builders in France, contact -
Jaques Lesschaeve
218 rue de la Rianderje,
- 59700 Marcq en Bardeoul
FRANCE

Builders in Switzerland, contact -
Rudi Kurth
Langgasse 51,
CH-3292 Buswil
Switzerland

For any builder wishing to share shipping cost to Germany as mentioned in CP #23 contact -
Lt. Peter Magnuson
Post Fach 499
6541 Hatin Flug Platz,
West Germany.

When shipping the Main Gear to overseas customers, we have found that they ship better and take up far less space if wrapped individually rather than being boxed in quantity. To box the gear takes a great deal of time on our part and we do not have the facility to do so.

VARIVIGGEN NEWS

N27MS has been flown on several cross countries since the last newsletter, and has been trouble free. Ground speeds consistently are 160-165 mph with fuel flows of 7.5 to 7.9 gph. Sally and I have been very satisfied with our Viggen so far and would not trade it for any airplane flying.

Arthur Schwartz will be coming to Mojave in May to get checked out in the Viggen prior to flying his own. Once again, I encourage those of you Viggen builders who are ready to fly or close to it, to take advantage of our offer of a check ride before flying your own. I did it with Burt's Viggen and heartily recommend it. The difference of knowing what to expect and not having any idea, can really make the difference between having a totally uneventful and satisfactory first flight, and possibly damaging not only your airplane but your pride.

Lou Cislo in Hawaii reports good progress on his Viggen, although being so far from the "big island" means much delay in obtaining needed materials. B.W.Rottschaefer of Wyomissing, Pa, reports that he lacks only installation of his cowling and paint and hopes to fly this summer. Frank Saunders from Miami, FL reports having repaired his beautiful Viggen after a gear up landing and should be flying again soon. Both Jack Rosen and Frank Stites report excellent progress and expect to fly this summer.

So much has been said in previous newsletter about the handling characteristics of the VariViggen, particularly the pitch trim change, with power changes, that I hesitate to go over it yet again, but since it apparently has been a problem for several Viggen pilots, we are more aware of it than most people. During some of my demo flights in the Viggen I have taken off at minimum flying speed, then immediately forced it into a full-aft-stick climbing turn. From the pilots seat this maneuver is not difficult, neither does it seem dangerous, however several observers from the ground have expressed concern over what would happen should the engine fail abruptly. Dick Rutan and I decided to find out.

I flew level at 5000 ft. at 60-70 knots, then went to full power to simulate a take-off, 5000 ft. being the simulated field altitude. I 'rotated' as soon as possible and immediately began a steep climbing turn. Dick abruptly pulled the power to idle with no prior warning. We were 70 - 100 ft above our 5000 feet "runway", I countered the pitch up, rolled wings level, pushed over to pick up some airspeed, then flared to land at 5000 feet. Frankly I was surprised that this was easily accomplished. I had absolutely no difficulty in arriving at 5000 feet (ground level), wings level and with an acceptable sink rate. Of course in an actual situation such as we simulated, you would not be able to fly back to the runway, nor would you have time to lower the gear, so you would tear the airplane up, however it is a very survivable situation. Dick tried a few of the same maneuvers with approximately the same result.

My opinion is that a proficient VariViggen pilot will have no problem at all in handling a situation like this, which is, lets face it, the worst case you could encounter. However a low time, or low proficiency pilot flying a Viggen for the first time, probably would not be quick enough to counter the pitch up with less than acceptable results. One thing the test did prove, conclusively to me at least, was that the Viggen has more than enough nose down elevator authority. At no time during the tests did Dick or I ever require full forward stick.

Hopefully this will be the last word on the pitch trim change with power change. It is important to know about it. It is very easy to get used to, in fact after an hour or two in a Viggen I don't believe you would even be conscious of making adjustment to counter it. I certainly do it with out conscious thought, and have never considered it to be a problem. Rather it is unusual, and therefore could catch an unprepared pilot. The main thing for a beginning Viggen pilot to remember is that if the engine fails or if power is abruptly retarded he must move the stick noticeably forward to maintain the same flight path.

FOR SALE - Lycoming O-360-A3A, 3hours SMOH. Stainless exhausts, King radios, various instruments, and Viggen equipment. Send S.A.S.A. for list and prices to John Poehner
409 Hillwood Court
Flushing, Mi 48433.

VARIVIGGEN PLANS CHANGE

The forward aileron cable attached to AB4, as shown in both first and second editions of the VariViggen plans interferes with the main gear when it is in the up and locked position. The best solution to this problem is to install the main gear before installing AB2's, AB3's and AB4's. Then install the belcrank assembly at an angle, such that the aft aileron cable attach point on AB4 remains at W.L. 4.6, but the forward point is raised up 0.9. Check this on installation to clear your main gear when it is up and locked. The turn buckle called out to mount directly into the forward end of AB4 assembly, should be moved inboard into the next bay (between WR25 and WR36.54), to ensure no interference between the turn buckle and the top of the main gear.

Bill Campbell is working on his outboard wings and reports the following mistakes in the second Edition of the Plans.

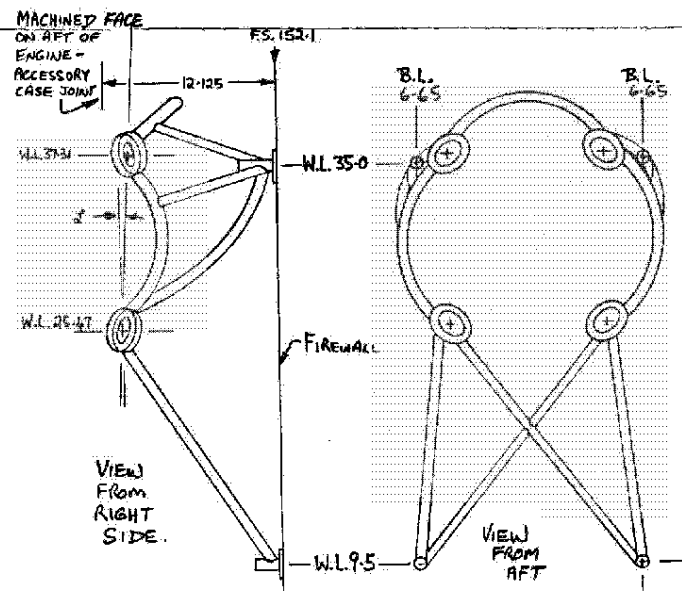
Chapter 8, page 29, part # WA1, B.L. 46.8 should be 47.3 and dimension 1.9 should be 2.4.

Composite Standard Wing chapter, Page A23, full size template at B.L. 114 (wing tip). F.S. of leading edge of template should be at 173.1 and therefore all fuselage stations from F.S. 175 through F.S. 185 must be changed by one inch. Thus, F.S. 175 becomes F.S. 174, F.S.176 becomes F.S.175 etc. to F.S. 185 which should be F.S.184. F.S. 188 through F.S. 199.75 are correct.

Thanks for pointing these two problems out to us Bill.

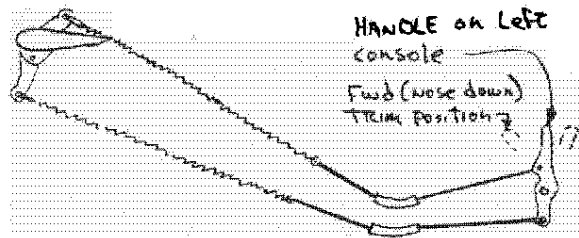
Viggen Builders add to your Owners Manual -
Demonstrated crosswind component = 25 knots.

Several Viggen builders have wanted information to build and install a dynafocal engine mount. Since N27MS does have a dynafocal mounted O-360 Lycoming, I have taken some pertinent dimensions off it, which should help you to duplicate it.



LONG-EZ PITCH TRIM SYSTEM, can be installed on a VariEze as an optional retrofit. Also, we are recommending it as standard for new construction VariEzes. The new system is a lever on the left armrest that actuates two springs driving the elevator tube on the left side of the fuselage. It has twice the authority of the previous system. Now you can trim hands off from the stall to over 160 knots. It is totally redundant from the normal pitch control system. If there were a failure of the pushrods or other pitch linkage parts, you could still fly home with the pitch trim. We have done approaches and landings without touching the stick, using throttle rudders and pitch trim only. Install per the drawings shown. Retrofit requires removal of a portion of the left side console. Saw it out with a hacksaw blade, and patch with one ply BID tape. PTH and PTB are available from Brock. The springs are available from Aircraft Spruce and Wicks.

PITCH TRIM SCHEMATIC



STEP 1

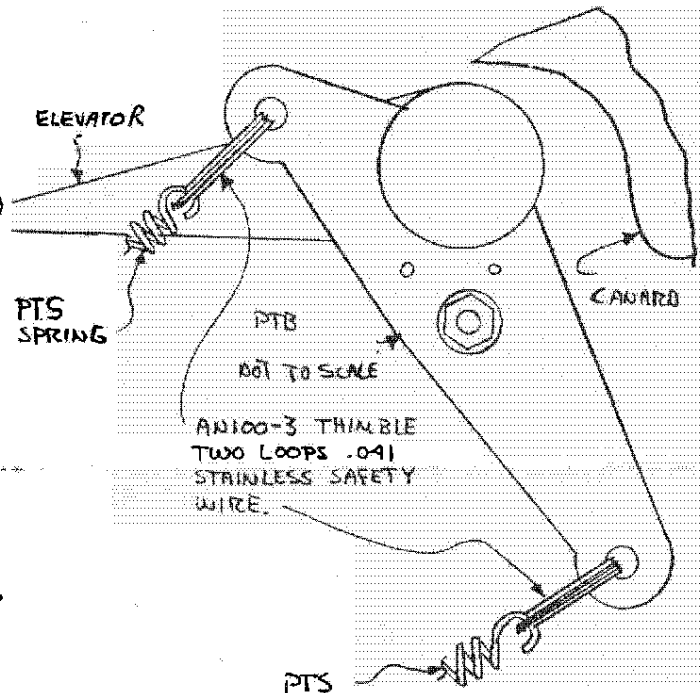
Mounting block - PT 1. Fabricate from 1/4" 5 ply birch plywood, see full size pattern. Locate PT 1, dremmel away the skin to clear the AN 3 bolts (section A-A). Install the bolts, then bond PT 1 to the fuselage side with flox. Cover with 1 ply of BID that laps 1/2" onto the fuselage side, cure.

STEP 2

Fabricate PTH, PTB, and two PW's or purchase them pre-fabricated from the distributors. PTS (pitch trim springs) should be .350" outside dia, x .050 wire dia, cut to 6" (unstretched) and installed stretched to 9" long.

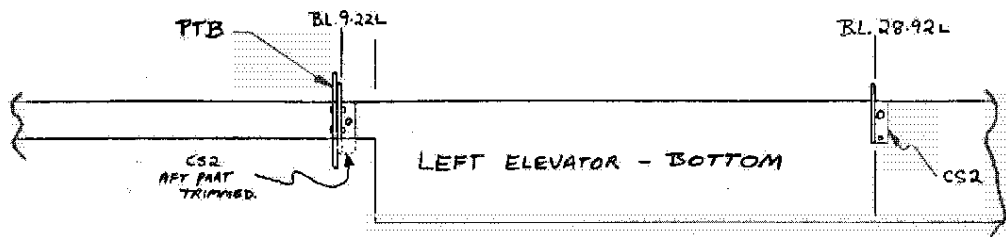
STEP 3

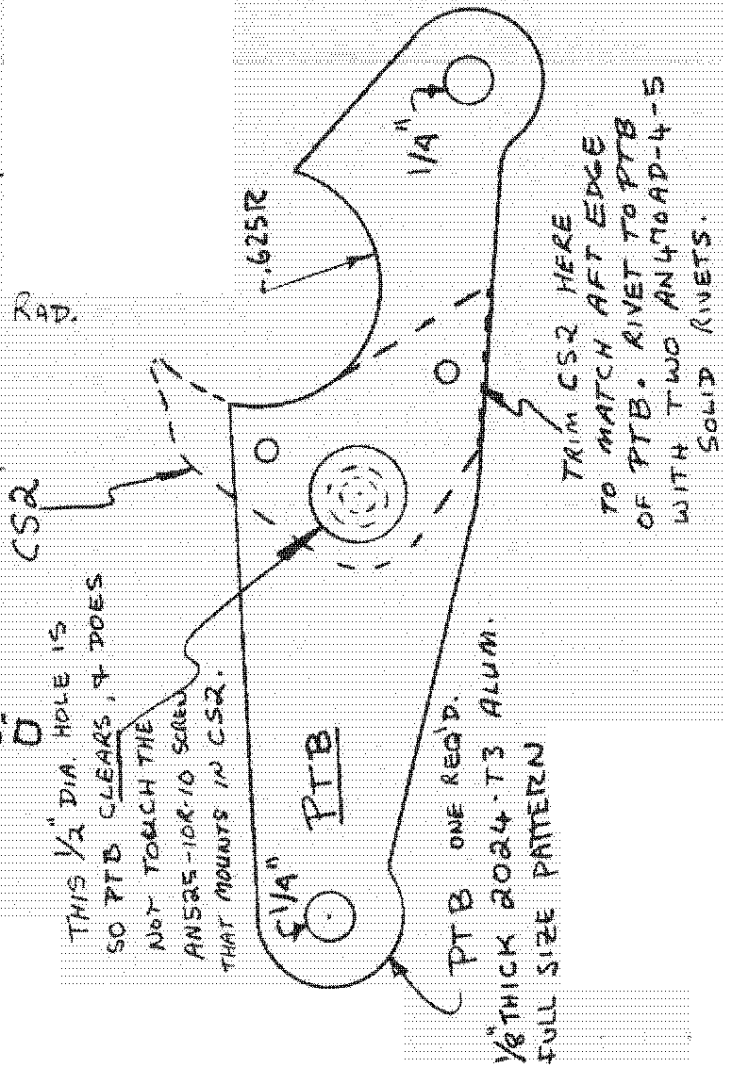
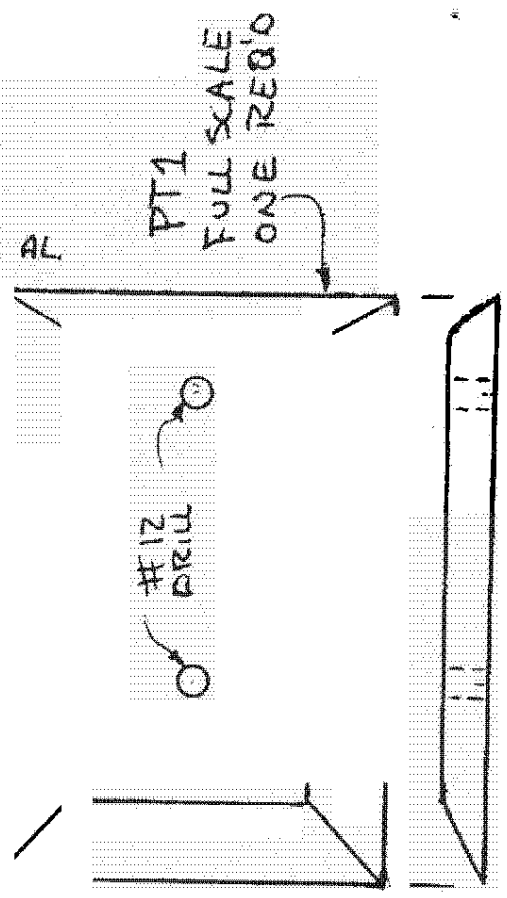
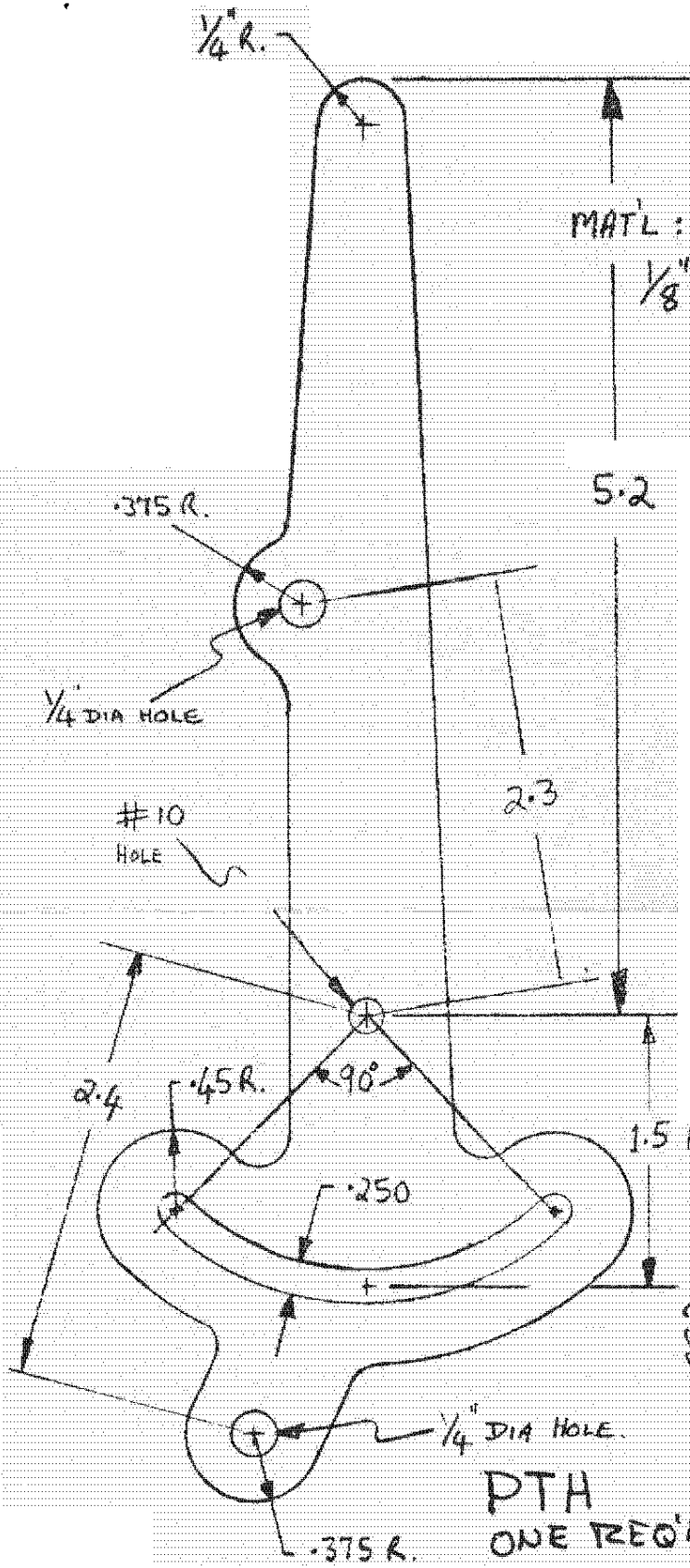
Cut two 20" lengths of 7 x 7 x 1/16" dia. aircraft cable. Using two AN100-3 and two 18-1-C sleeves, swage one end of each cable to PTH. Install PTH as shown using all the hardware shown in section A-A. Cut two 2" lengths of nylaflo nylon conduit and flox into instrument panel holes. Thread the cables through and swage the ends at the 5.6" and 6.2" dimensions with the PTH handle at the neutral trim position.



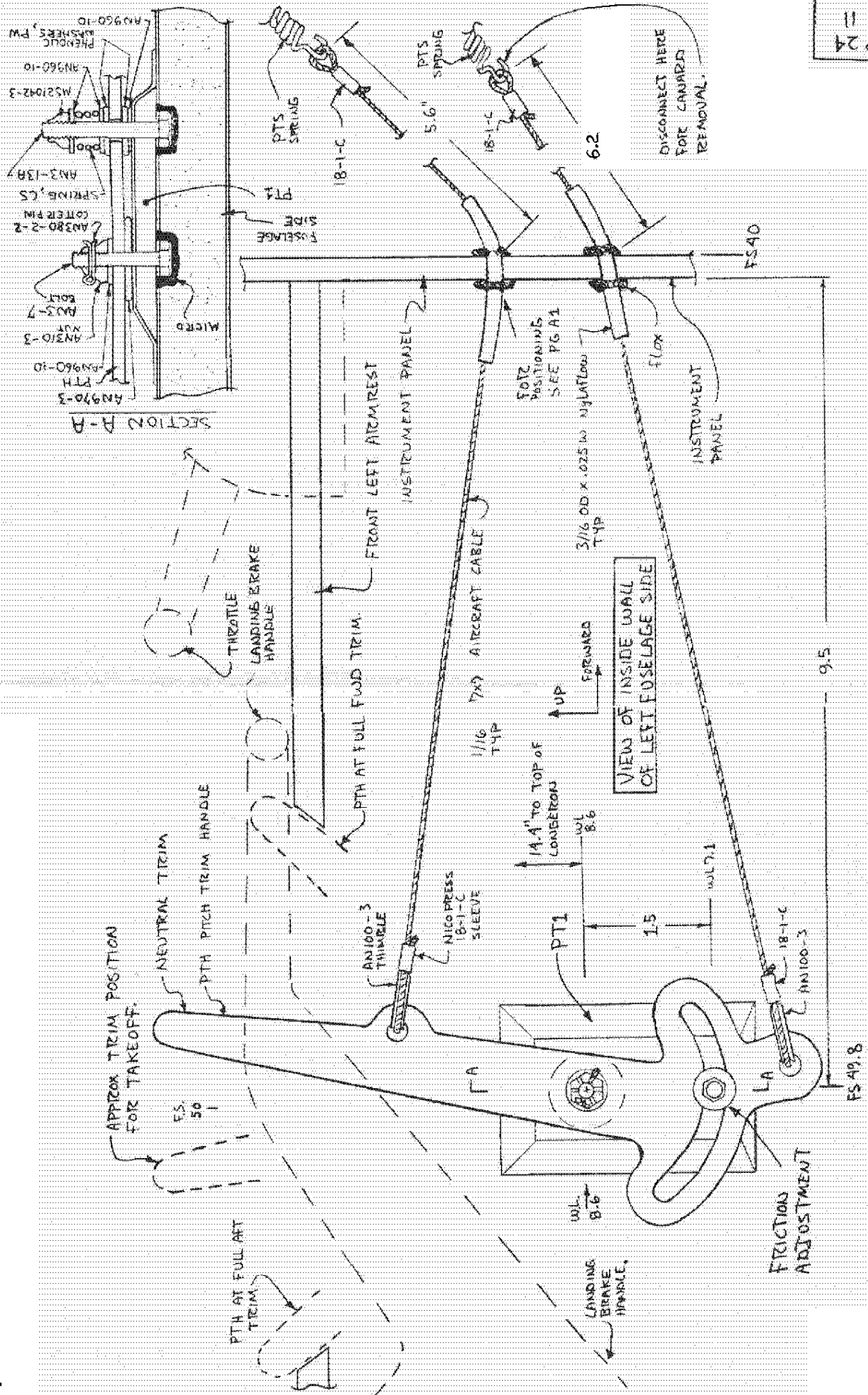
Rivet PTB to the VECS2 as shown using two AN470 AD-4-5 solid rivets. For new construction, be sure to do this before attaching this trimmed VECS2 to the left elevator tube. For retrofit, you can carefully squeeze these solid rivets using a vise grip. Do it progressively, a little at a time. Do not use pop rivets. Be sure to check for adequate longeron clearance.

Install AN100-3 thimbles in the PTB elevator bracket. Sew the PTS springs on as shown with two loops of .041 stainless safety wire. Now install the canard and hook up the springs. The elevator should sit at zero degrees with the PTH handle at neutral trim. Cut the required slot to allow full travel and mark the "take off" position. Leave a 1" dia hole in the console to allow adjustment of the lower bolt to change friction. Adjust friction to just hold PTH at full aft trim with full forward stick. Springs should never be slack. If your trim is insufficient at either end of the range, you can make a minor adjustment by shortening one of the PTS springs, up to a maximum of 1 1/2" shorter. If this is still insufficient, your elevator contour is incorrect. Further trim authority must be done either by correcting elevator contour, or by adding a fixed trim tab to the elevators.





PTH
 ONE REQ'D
 FULL SCALE.



WHICH ONE?

Rutan Aircraft Factory Inc., markets homebuilt plans for three different aircraft - The VariViggen, VariEze and Long-EZ. All three are two-place. The following information is intended to help you decide which is best for you.

PERFORMANCE AND UTILITY

The Long-EZ is the best in this category with range, altitude capability and performance way above the other two. Operation from high density-altitude airports at heavy weights is also best with the Long. The Long-EZ has the highest ceiling - a demonstrated 26,900 at light weights! Takeoff and landing distance of the Long is better than the VariEze and roughly similar to the VariViggen. Neither of the three are suited to unprepared fields, soft surfaces, gravel or small airports (less than 2000 ft, or 2400 ft with obstacles). Only the Long and Viggen are capable of night or IFR flying and only when properly equipped and flown by pilots with appropriate competence.

EFFICIENCY

The VariEze has the best miles per gallon, the Long coming in a close second and the VariViggen last. MPG at 75% power for the three are 35, 29, and 15 respectively.

CABIN/BAGGAGE

All three airplanes are soloed from front seat only. The VariViggen has two, similar, large, spacious cockpits with relatively upright seating. Large enough for 6 ft-5 in pilots. Two or three average-size normal suitcases fit the large baggage area aft of the rear seat. The cabin size and baggage room is much larger than the VariEze or the Long.

The VariEze and Long have two cockpits that are not similar. The front seat allows stretch-out comfort for pilots up to 6 ft-5 in, with carefully engineered thigh, lumbar, armrest and head support. The VariEze and the Long-EZ front seats are better suited to long-range comfort than the VariViggen seats. However, the VariEze and Long-EZ rear seats are smaller and less comfortable than the VariViggen. They can fit a 6 ft-4 in person, but comfort is compromised above 5 ft-10 in.

The Long-EZ baggage areas include two special suitcases, two cabin-accessible wing strake areas and additional room over the rear seat and in the wing spar. Total volume is nearly 10 cubic feet, however soft-type luggage must be used. Normal, hard suitcases do not fit. The VariEze has baggage room limited to the two special suitcases, approximately 3 cubic feet.

The VariViggen has center control sticks, rudder pedals and throttle in both cockpits, arranged much like a modern fighter. Conventional toe brakes are used. The VariEze and Long-EZ have side-stick controllers in both cockpits, but rudder pedals and engine controls only in front. Their rudder pedals work the two rudders independently and actuate the wheel brakes after full rudder is reached, ie, one simple pedal for rudder and wheel brake.

CONSTRUCTION

None of the three require special skills or elaborate tools, since prefab parts are available for complex components. The VariViggen is by far the most demanding to build for several reasons: retractable landing gear, electric aileron reflex controls, full dual cockpit controls add a considerable number of parts to build. The mix of wood and composite structure requires different skills and tools. Control system includes many parts. Total building time can run from 3000 to 4000 hours, approximately 3 to 5 years of spare time effort.

The VariEze has been built by homebuilders in as little as 550 man hours and 4 months. However, projects on the average run closer to 900 to 1200 man-hours and 1 to 1.5 years spare time. The Long-EZ requires about 10 to 20 percent more work than a VariEze.

Any of the composite work (complete Long-EZ, VariEze and VariViggen outer wings) requires a clean shop that is controlled to a temperature range of 70 to 90 degrees and that allows work without direct sunlight on the part being built. Minimum shop size for Viggen, Long and VariEze is 400, 300, and 250 sq. ft. respectively.

ENGINE SIZE

The VariViggen, designed for the 273 lb 150 hp Lycoming is limited to the 150, 160, and 180 hp Lycoming engines. The lightweight, fatigue-free fixed pitch wooden props must be used. Heavy metal props make it (and the VariEze and Long) tailheavy, and increase risk of prop failure. Use of the 180 hp or injected 160 hp Lycomings on a VariViggen will result in a requirement to carry nose-ballast.

The Long-EZ is limited to the Lycoming O-235 (108 to 125 hp) and Continental O-200 (100 hp) with any accessories. The Lycoming is preferred, since it has a fuel pump and longer over-haul life.

The VariEze is intended for the lightweight Continental A75 and A80 engines. The C-85, C90 and O-200 can be adapted, but they must be stripped of accessories to avoid an overweight, tailheavy airplane.

STALL CHARACTERISTICS

All three aircraft are designed to be "stall proof", ie, they can safely maneuver up to, and including, full-aft-stick without experiencing a stall break, departure, or loss of altitude. They can all climb at the full-aft-stick speed, Long-EZ being the best (900 ft/mn at gross), Viggen the least at about 400 ft/mn. Homebuilder experience has shown that most VariEzes have excellent stall characteristics but a few experience wing rocking and roll-off at the stall. This is not expected with any of the Long-EZs, since they were designed with a greater margin of stall for the rear wing. Our prototype Long has proved to have exceptionally docile high angle attack characteristics, resisting departure for any maneuvers including tailslide stall entries, and application of all combinations of rudder and aileron. The VariViggen also has a good stall margin, with its standard wing configuration, however, with its special performance-wing its stall margin is low, resulting in more conventional characteristics, ie, at minimum speed the S.P. wing will drop if the pilot sideslips.

MANEUVERABILITY

The VariViggen excels here, with its high roll rate and tight turning capability. However, due to its low aspect ratio, The Viggen loses speed in maneuvering. Thus, for sustained maneuvering, the Long is the best - it can climb over 400 ft per minute while maintaining 2-g at gross weight! The VariEze has the lowest roll rate. All three types are noted for their good maneuverability, as compared to conventional aircraft.

PILOT SKILL REQUIRED

The VariEze's high approach and landing speeds and responsive controls put more demands on pilot proficiency than the Viggen or Long-EZ. The Viggen has a relatively large trim change with power application. (nose up when power is reduced), requiring pilots attention. The VariEze and Long-EZ have very small trim changes for power, gear extension and landing brake extension. A VariEze or Long-EZ can fly for extended periods with "hands-off" controls. A Viggen must be continually flown. For those reasons the Long is the most docile, easiest to fly, and safest for the low-proficiency pilot.

Crosswinds - due to its responsive roll rate, high available sideslip and wide landing gear, the Viggen can handle the most crosswind. Takeoff and landing in wind components well above the capabilities of conventional airplanes are relatively easy. The Long-EZ is next, capable of handling a 20-knot component. Due to lower roll rate and lower wing tip clearance, the VariEze is last for crosswinds.

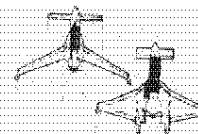
VISIBILITY

In order of preference - Viggen, Long and VariEze

COST

Refer to the respective sheets for a breakdown of costs to build each airplane.

Rutan
Aircraft
Factory Inc.
BUILDING 13, MOJAVE AIRPORT
MOJAVE, CALIFORNIA 93501



CP 24 p9 12

LONG-EZ

FAST - EFFICIENT - HIGH UTILITY - LONG RANGE

THE AIRPLANE

The Long-EZ is a small, high-performance, high-utility homebuilt sportplane. While recommended mainly for Day-VFR operation, competent pilots can also equip it for night and IFR flying. Power plant is either the O-235 Lycoming or the O-200 Continental. It has an alternator-powered electrical system and can be equipped with electric engine starter. It's cockpit layout is designed to compliment pilot work load, with throttle, mixture, carb heat, pitch trim and landing brake controls on the left console and side-stick controller on the right console. Seating provides correct armrest, lumbar, thigh, and headrest support allowing "recliner-chair" comfort not found in conventional aircraft seats. This allows long, fatigue-free flights. The inboard portion of the large wing strakes are used as baggage areas, accessible from the front and rear cockpit. These, combined with special suitcases and three other storage areas, provide nearly 10 cubic feet of baggage room.

The airframe structure is a sandwich of high-strength fiberglass facings with a core of rigid closed cell foam. Extensive use is made of the new type R45 P.V. core foam. (poly vinyl). The facings are laid up directly over the shaped core, thus expensive tooling is not required. Flying surfaces are full-core reducing complexity, increasing contour stability, and improving corrosion resistance. As compared to conventional metal or wood, composite sandwich structure offers less construction time, more uniform stresses, improved fatigue life, better environmental resistance, and increased surface durability.

TRAVELING MACHINE

At last, an airplane that is specifically developed for efficient, high speed, long-range traveling with room for two adults and plenty of baggage. Fuel allowance with two adults is 38 gallons. Single-place, you can carry 52 gallons! If you're in a hurry, you can cruise at 75% power at 8000 ft at 185 mph (161kts), burning 6.51 gallons per hour. This will take two of you from Los Angeles to Seattle or Chicago to Daytona Beach non-stop (965 miles), in 5.2 hours with a 40 minute fuel reserve. If you're not in a hurry, you can cruise "economy" at 12000 feet at 144 mph (125 kts), burning only 3.52 gallons per hour. This will take two of you from New York to Dallas non-stop (1430 miles) in 10 hours with a 40-minute fuel reserve. Single place, using the entire 52-gallon fuel capacity, stretches the maximum range and endurance to over 2000 miles and 16 hours!

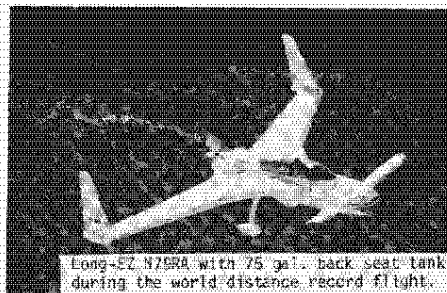
The high efficiency, long-range capability increases a pilots options for fuel availability and weather detours. The fact that the Long-EZ can carry the same load and fly as fast as other 160-180 horsepower aircraft, means large fuel savings- 29 mpg at fast cruise, 41 mpg at economy cruise.

UNUSUAL EFFICIENCY

The Long-EZ uses the very latest aerodynamic technology, combining winglets, a high aspect-ratio wing with Eppler airfoils optimized for efficient cruise, and a configuration with far less wetted area than conventional airplanes. As a demonstration of its efficiency, our prototype with a large rear-seat fuel tank flew over 4800 miles, setting a worlds distance record, and landing with enough fuel to surpass 5000 miles. At that, it's capability was not taxed - it's initial climb rate was over 600 ft/mn! At light weight, it climbed to 27000 ft in still air - an altitude unheard of for a fixed-pitch, non-turbocharged airplane. Our Long-EZ is so efficient, the engine can be shut down while at 5-ft altitude over the numbers at only 120 knots, then it can pull up, fly at 360° pattern and land on the same runway - completely without power! It's power-off glide angle is only 3.7 degrees - thus a belly-mounted drag devise (landing brake) is used for landings.

SUPERB FLYING QUALITIES

Development of the Long-Ez included flight testing of many refinements to optimize flying qualities. It is a very solid, stable airplane that has responsive ailerons, good turbulence response, excellent "hands-off" stability and safe stall characteristics. It can be maneuvered sharply, even to full aft stick, without fear of stall or spin. Flight tests show the prototype to be free from stall departures and spins for all types of entries, including tailslides. Climb is excellent, even at the full-aft-stick speed.



Long-EZ N759A with 75 gal. back seat tank during the world distance record flight.

Trim changes due to power, gear retraction or landing brake are all very small. It's wide cg range allows a large range of pilots or passengers weighing up to 240 lbs.

The Long-EZ's approach and landing speeds are 75 mph (65 kts) and 60 mph (52 kts) at normal landing weights. The approach and landing are docile and conventional. Forward visibility is excellent even during a "full stall" touchdown - a considerable improvement over our earlier VariEze.

THE HOMEBUILDER SUPPORT

The Homebuilder support. The plans are 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.

THE TEST PROGRAM

The 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.

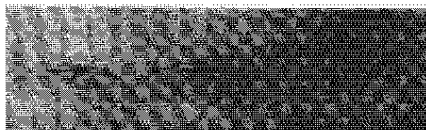
COST AND BUILDING TIME

The complete package of raw materials available from the two distributors listed, including all fiberglass, epoxies, foams, fillers, sheet metal, tubing, hardware, control system materials, VFR instruments, plumbing, tools, tires, wheels, brakes and upholstery (cushions and special suitcases) costs about \$2,900. Any of these items can be purchased separately. We strongly recommend that you get the distributor's catalogs to familiarize yourself with the materials. A complete bill-of-materials is in the plans.

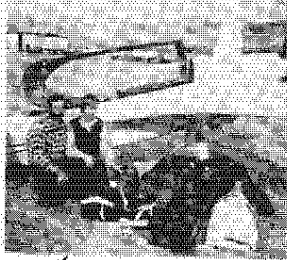
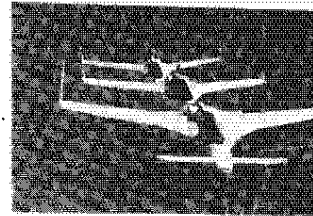
The S-glass roving molded structural fiberglass main gear and nose gear are available from RAF, at \$277.95 and \$49.75 respectively. Many other prefab parts ranging from propellers, cowlings, canopies and welded engine mounts to small aluminum brackets and bushings can be purchased from the listed manufactures. All those prefab parts cost approximately \$1,600 - and using them, the competent builder can build a Long-EZ in as little as 800 man-hours. The budget-minded builder may elect to build most of these prefab parts himself, using the drawings in the plans. His building time would exceed 1500 hours and he would save most of the above cost of the prefab items. Contact the manufactures for their catalogs showing available prefab parts. These are also listed in the plans bill-of-materials.

Engine costs vary widely. Our prototype has an O-235 Lycoming that had 1400 hours, when purchased for \$1500. It has 600 hours to overhaul and will be worth then, about what we paid, thus this is a very economical way to go. Newly over hauled or new engines can cost from \$3000 to \$6000. Engine accessories, such as instruments, prop extensions etc cost about \$300 to \$500.

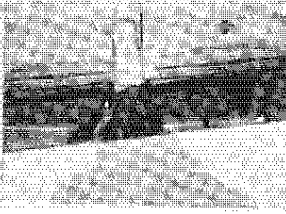
In summary then, total cost can run from \$5300 for a basic airplane with a 3/4 runout engine and owner-built prefab parts, to \$9900 for everything available purchased and a zero-time engine. IFR avionics can add from \$2000 to \$15,000 to those numbers, with many options available.



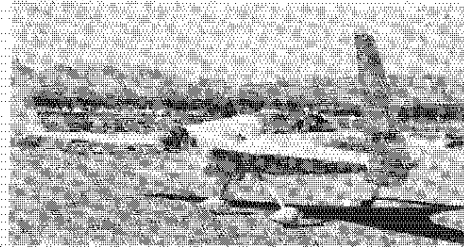
Brief Long-Ez specifications/Performance			
Engine Lycoming O-235 108 hp.			
Span	25.3ft	Takeoff (solo/gross)	550/830 ft
Area	94.1sq.ft.	Climb (solo/gross)	1750/1350 fpm
Empty Basic	710 lb.	Cruise 75% 8000 ft	183 mph
Empty Equipped	750 lb.	Cruise 40% 12000 ft	144 mph
Solo Weight	960 lb	Max range * 75% (solo/2 place)	1370/965 mi
Gross Weight	1325 lb	Max range * 40% (solo/2 place)	2010/1430 mi
Max Fuel	52 gal.	Ceiling (solo/gross)	27000/22000 ft
Cabin L/W/H	100/23/37 in.	Landing dist. (solo/gross)	450/680 ft.
*40-minute reserve			



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



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



Long-EZ parked nose-down with two VariEzes



LONG-EZ DOCUMENTATION

SECTION I - MANUFACTURING MANUAL - This is the complete education manual for composite materials and methods, also, the complete plans and construction manual for the entire Long-EZ except engine installation and landing-brake. The manual consists of a 180-page, bound 11" x 17" book plus 14 larger full size drawings. It includes many photos, over 800 drawings and illustrations, and over 65,000 words. The builder is led, step-by-step through the entire construction of the airplane, including electrical system, fuel system and finishing procedures. The manual identifies sources for all materials and all prefabricated components.

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

SECTION IIIA - Continental O-200
SECTION IIC - Lycoming O-235

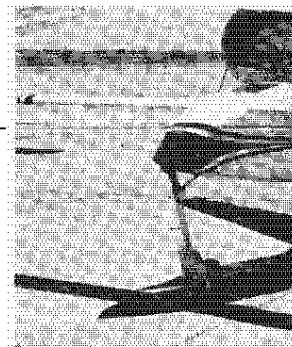
OWNERS MANUAL - This is the required operations handbook and checklists, including normal and emergency operation, detailed flying qualities and performance charts, maintenance, maiden flight procedure, and pilot checkout, etc.

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

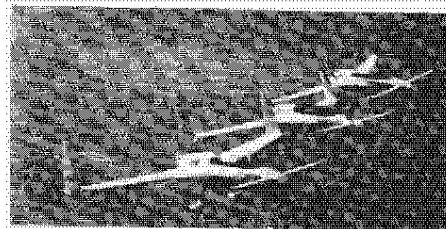
Rutan Aircraft Factory Inc.
 BUILDING 13, MOJAVE AIRPORT
 MOJAVE, CALIFORNIA 93501
 TELEPHONE (805) 824-2645

Check items desired	Price, includes first class mail to U.S. & Canada	Overseas, Airmail - U.S. Funds only
<input type="radio"/> Rutan Aircraft information package-complete data and photos of all Rutan Aircraft designs.	\$ 5.00	\$ 6.00
<input type="radio"/> "Canard Pusher" newsletter. Published quarterly. One year subscription. Approx 10,000 words per issue.	6.75	8.75
<input type="radio"/> Long-EZ plans. Section I	198.50	212.50
<input type="radio"/> Section IIA Continental	19.00	21.00
<input type="radio"/> Section IIC Lycoming	21.50	23.50
<input type="radio"/> Long-EZ Owners Manual	9.00	10.50
<input type="radio"/> Long-EZ Landing Brake	10.00	11.00
6% tax, if Calif. order, Newsletter not taxable.		
TOTAL		

The nose gear retracts for parking and in flight



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



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

ALL RAW MATERIALS & COWLINGS

Near Los Angeles. Near St. Louis
AIRCRAFT SPRUCE WICKS AIRCRAFT SUPPLY
 201 W. Truslow Ave, Bx 424, 410 Pine
 Fullerton, Ca 92632 Highland, IL 62249
 (714)870-7551 (618)654-7447
 Catalog \$3 Catalog \$2

KEN BROCK MANUFACTURING, 11852 Western Ave., Stanton Ca 90680 (714)898-4366: Control system parts and all machined or welded parts, fuel caps, engine mount rudder pedals and exhaust system. Catalog \$2

PLEXIGLASS CANOPY BUBBLE, NOSE & MAIN GEAR STRUT
RUTAN AIRCRAFT FACTORY INC.
 BUILDING 13 airport
 Mojave Calif 93501

VariEze

FAST - EFFICIENT - FUN

THE AIRPLANE

The VariEze is a small, high-performance homebuilt sportplane. It is recommended for day VFR operation only. The powerplant is the A-75 or A-80 Continental. The airplane is not alternator equipped. A basic electrical system can be installed to run a NavCom and standby gyro instrument. This electrical system is powered by a solar panel and/or ground-charged. Additional electrical instrumentation, electrical engine starter, and night lighting are not recommended.

Larger Continental engines, up to 100 hp (C-85, C90 and O-200) can also be used, but their accessories must be removed (starter, alternator and vacuum pump) to provide adequate useful load and proper aircraft balance.

Cockpit layout is a sidestick on the right console, rudder pedals/brakes and throttle and optional landing brake on the left console. A backup sidestick is located in the rear cockpit. A small amount of baggage can be carried in two special suitcases.

The airframe structure is a sandwich of high-strength fiberglass facings with a core of rigid closed cell foam. The facings are laid up directly over the shaped core, thus expensive tooling is not required. Flying surfaces are full-core, reducing complexity, increasing contour stability, and improving corrosion resistance. As compared to conventional metal or wood, composite-sandwich structure offers less construction time, more uniform stresses, improved fatigue life, better environmental resistance, and increased surface durability.

EFFICIENT DAY-VFR UTILITY

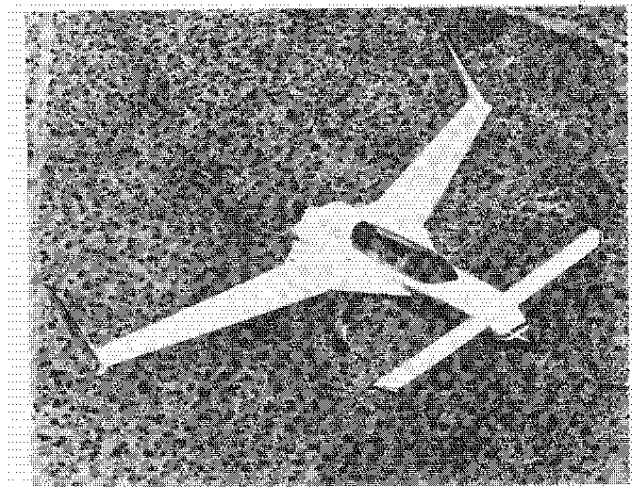
In addition to fun recreational flying, the VariEze can be used for VFR cross-country flying. Its range, single place, using the full 26-gallon fuel supply is 750 miles plus 45 minute reserve. Two place, with 15 gallons fuel, the range is 430 miles plus 45 minute reserve. Economy is excellent - 35 mpg at 177 miles per hour and 42 mpg at 140 miles per hour. Complete range and performance data is shown in the Owners Manual.

UNUSUAL EFFICIENCY

The VariEze uses the very latest aerodynamic technology, combining winglets, a high aspect-ratio wing with airfoils optimized for efficient cruise, and a configuration with far less wetted area than conventional airplanes. At light weight, a VariEze powered by an O-200 has climbed to over 25,000 ft in still air - an altitude unheard of for a fixed-pitch, non-turbocharged airplane.

GOOD FLYING QUALITIES

Development of the VariEze included flight testing of many refinements to optimize flying qualities. It is a solid, stable airplane that has responsive elevators and ailerons, good turbulence response, excellent "hands off" stability and safe stall characteristics. It can be maneuvered sharply, even to full aft stick, without fear of stall or spin. Flight tests show the prototype to



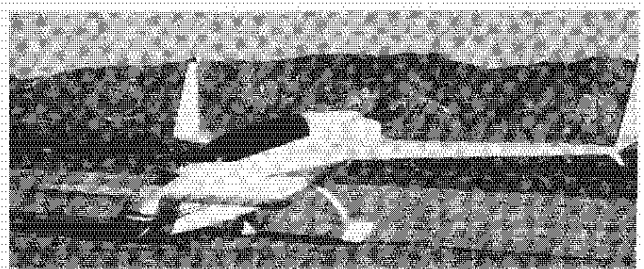
be free from stall departures and spins for all types of entries. Climb is excellent, even at the full-aft-stick speed. Trim changes due to power, gear retraction or landing brake are all very small. It's cg range allows a range of pilots or passengers weighing from 150 lb to 220 lb. Lighter pilots generally require the addition of ballast. The VariEze's approach and landing speeds are 85 mph (75 kts) and 70 mph (60 kts) at normal landing weights. The approach and landing are at a faster speed than average light planes. Forward visibility is inadequate, thus, the airplane is landed at about 10 knots above its stall speed. Pilots should be competent and proficient in several types before VariEze check out.

THE HOMEBUILDER SUPPORT

The plans are 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.

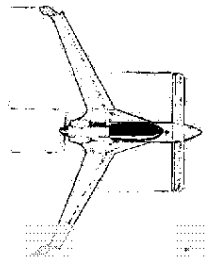
THE TEST PROGRAM

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



**Rutan
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INC**

BUILDING 13, MOJAVE AIRPORT
MOJAVE, CALIFORNIA 93501



CP 24 Pg 15

COST AND BUILDING TIME

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The S-glass roving molded structural fiberglass main gear and nose gear are available from RAF, at \$277.95 and \$49.75 respectively. Many other prefab parts ranging from propellers, cowlings, canopies and welded engine mount to small aluminum brackets and bushings can be purchased from the listed manufactures. All those prefab parts cost approximately \$1,600 - and using them, the competent builder can build a VariEze in as little as 700 man-hours. The budget minded builder may elect to build most of these prefab parts himself, using the drawings in the plans. His building time would exceed 1500 hours and he would save most of the above cost of the prefab items. Contact the manufactures for their catalogs showing available prefab parts. These are also listed in the plans bill-of-materials.

Engine costs vary widely. A partially runout A-75 can cost as little as \$1500. Newly overhauled engines can cost from \$2000 to \$3500. Engine accessories, such as instruments, prop extensions etc cost about \$300 to \$500.

In summary, the total cost can run from \$4300 for a basic airplane with a 3/4 runout engine and owner-built prefab parts, to \$8500 for everything available purchased and a zero-time engine.

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 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. NASAD approved.

SECTION IIA --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 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 can be used with appropriate pilot proficiency.

Brief VariEze Specifications/Performance.

Engine A-80 Continental (complete data in Owners Manual).

Span	22.2 ft	Takeoff (solo gross)	900/1200 ft
Area	66 sq. ft	Climb (solo gross)	1200/900 ft
Empty Basic	570 lb.	Cruise 75% 8000ft	177 mph
Gross Weight	1000lb.*	Cruise 40% 12000ft	135 mph
Max Fuel	26 gal.	Max range *75% (solo/2 place)	750/430 mi.
Cabin L/W/H	100/22/36 in.	Max range *40%	900/540 mi.
		Ceiling (solo/gross)	17000/14000
		Landing dist. (solo/gross)	700/900 ft

* 1050 with 0-200 Continental

* 45-minute reserve

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

ALL RAW MATERIALS AND COWLINGS.

Near Los Angeles

AIRCRAFT SPRUCE,
201 W. Truxlow Ave.
Fullerton, Ca 92632
(714)870-7551
Catalog \$3

Near St. Louis

WICKS AIRCRAFT SUPPLY
410 Pine Street,
Highland, Ill 62249
(618)654-7447
Catalog \$2

KEN BROCK MANUFACTURING, 11852 Western Ave, Stanton Ca. 90680 (714-898-4366 - Control system parts and all machined or welded parts, fuel caps, engine mount, rudder pedals and exhaust system. Catalog \$2

THE AIRPLANE FACTORY, 7111A Brandtvista, Dayton, Ohio 45424 (513)845-9872. Plexiglass canopy bubble. Send SASE

Check items desired	Price, includes first-class mail U.S. & Canada	Air Mail Overseas*
<input checked="" type="checkbox"/> Rutan Aircraft info kit includes current issue of "Canard Pusher" newsletter.	\$ 5.00	\$ 6.00
<input checked="" type="checkbox"/> "Canard Pusher" newsletter published quarterly. One-year subscription.	6.75	8.75
<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
<input type="checkbox"/> Section III	8.00	9.50
<input type="checkbox"/> Section IV	8.00	9.50
<input type="checkbox"/> Section V	7.00	8.00
<input type="checkbox"/> Section VI	10.00	11.00
<input type="checkbox"/> 3" tri-color jacket patch.	1.95	1.95
ADD 6% if California resident. Newsletter is not taxable.		

VARIVIGGEN

FULLY RETRACTABLE, FIGHTERLIKE, HIGHLY MANEUVERABLE.

EXCELLENT UTILITY.

Comfortable tandem cockpits, three-suitcase baggage area, and an adequate cruise speed provide unusual utility for a homebuilt airplane. It's road-towable with outer panels removed.

PROVEN DESIGN

Complete flight test program completed; 600 hours on prototype with very little maintenance. Won the Stan Dzik trophy for design contribution, Oshkosh '72, the Omni Aviation Safety trophy at Oshkosh '73 and the outstanding new design award at Oshkosh '74.

STALL/SPIN SAFETY

The VariViggen's safe flying qualities have been the subject of technical presentations for EAA, SAE, AOPA, and AIAA. It will not stall or "mush 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 standard-wing VariViggen is highly stall/spin resistant. The Special-performance VariViggen can be stalled if sideslipped at low speed.

FLYING QUALITIES

The Viggen flies similar to conventional aircraft, with the following exceptions: higher roll rate, ability to tightly maneuver without stall, and trim change due to power change (nose rises unless checked when power is reduced). The Viggen can handle crosswinds that exceed the capability of conventional light planes.

UNCOMPLICATED DESIGN

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 and welded parts are available. Due to the many systems and wood structure, building time is not short. Allow 3000 to 4000 man hours.

COST TO BUILD

Raw materials - approximately \$3000. Prefab parts - approximately \$2800. Engine - \$500 to \$3500. Instruments - approximately \$500. Total cost can run from \$6000 (owner built prefab parts and half runout engine) to about \$9500, plus avionics.

THE FOLLOWING DISTRIBUTORS MARKET VARIVIGGEN PARTS.

AIRCRAFT SPRUCE AND SPECIALTY CO.
Box 424, Fullerton, Ca 92632
(714)870-7551

VariViggen Spruce kit, plywood kit, hardware, aluminum and fiberglass. Catalog - \$3

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

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

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

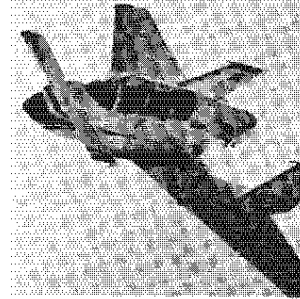
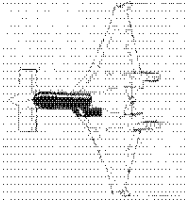
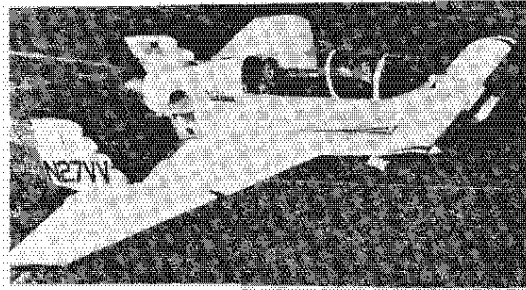
GEORGE EVANS, 4102 Twining, Riverside, Ca 92509
VariViggen welded nose and main landing gear, 1 1/2" sq. steel tube.

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

Rutan
Aircraft
Factory

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

CP24-1917



Performance with 150-hp, fixed pitch prop, gross weight	Takeoff	850 ft
	Climb	800 fpm
	Cruise	150 mph
	Full Aft stick	49 mph
<u>Standard Wing</u>	Landing	500 ft

Performance with 150-hp <u>Special Performance Wings</u>	Climb	1000 fpm
	Cruise	158 mph

Specifications <u>Standard VariViggen</u>	Canard Span/Area	8ft/18.3 ft ²
	Wing Span/Area	19 ft/119 ft ²
	Empty Weight	1050 lb
	Gross Weight	1700 lb

Specifications <u>Special Performance Wing</u>	Wing/Span Area	23.7ft/125 ft ²
	Gross Weight	1700 lb.

The following documentation is available:

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. Description of car-top wind tunnel. 8" x 10" glossy photo and current issue of newsletter.
Price - \$10.00 first class mail, \$11.50 Airmail overseas.

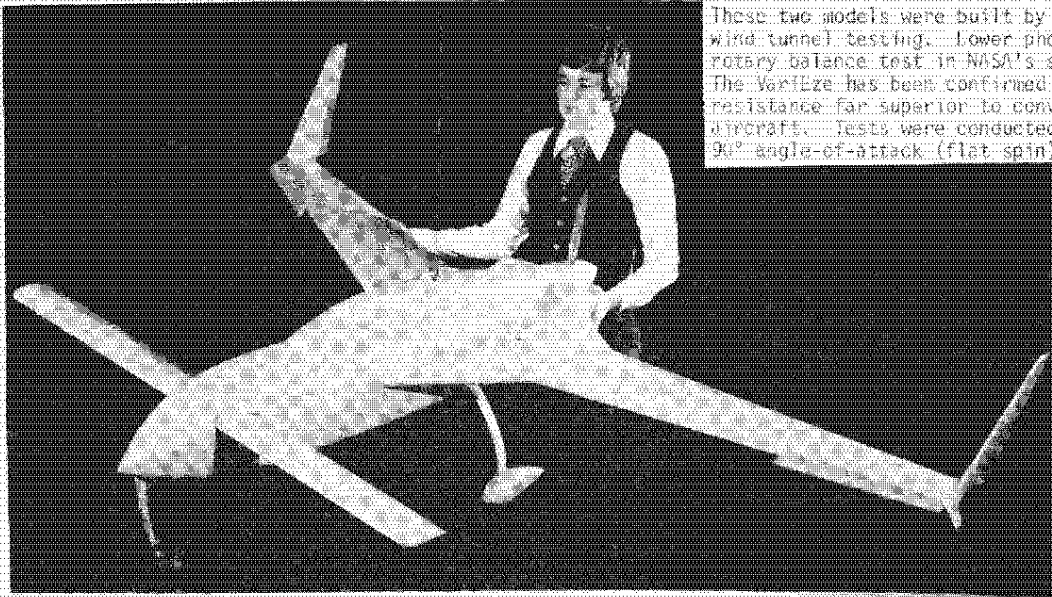
VARIVIGGEN OWNERS MANUAL. Complete operational handbook including normal and emergency procedures, loading, operational record keeping.
Price - \$6.00 first class mail, \$7.50 Airmail overseas.

"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 is mandatory for those with VariViggen's under construction. Published quarterly.
Price - \$6.75 first class mail, \$8.75 Airmail overseas. Back issues, \$1.50 each.

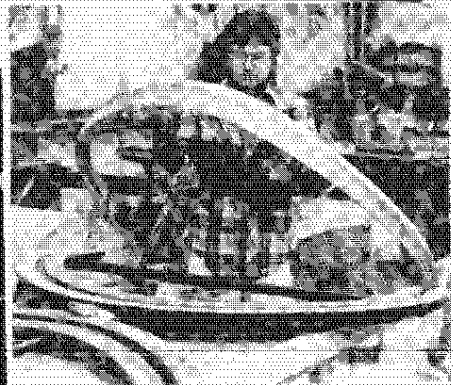
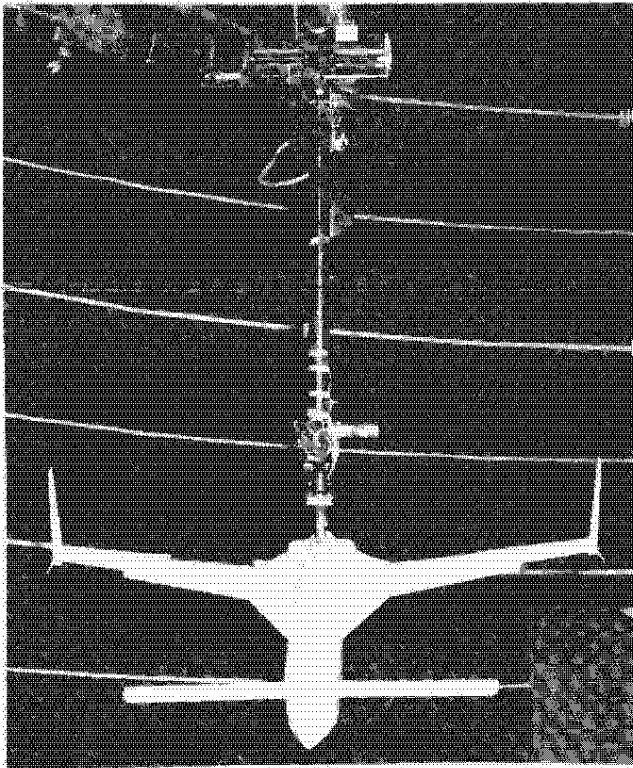
VARIVIGGEN PLANS - SECOND EDITION. This is an updated, revised set of very complete drawings and construction manual consisting of a bound 11" x 17" book, containing many photographs, hints and instructions based on actual builders experience over the past several years. It covers the entire airplane, including the engine installation, fuel system, and not only covers the original standard wing in both aluminum and foam 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 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 cubic inch size. 555-sq inch wing area.
Price - \$4.75 first class mail, \$5.50 Airmail overseas.

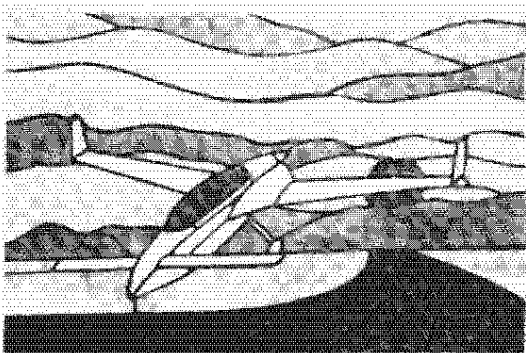
Note - Add 6% tax for California orders.



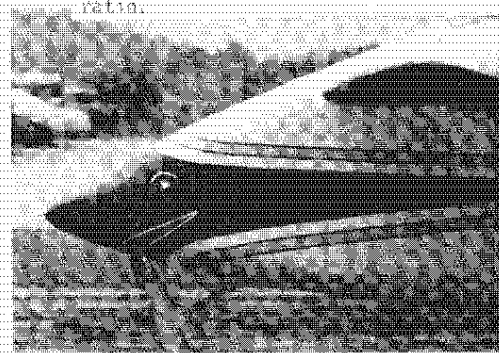
These two models were built by NASA for wind tunnel testing. Lower photo is a rotary balance test in NASA's spin tunnel. The Vortez has been confirmed to have spin resistance far superior to conventional aircraft. Tests were conducted up through 90° angle-of-attack (flat spin).



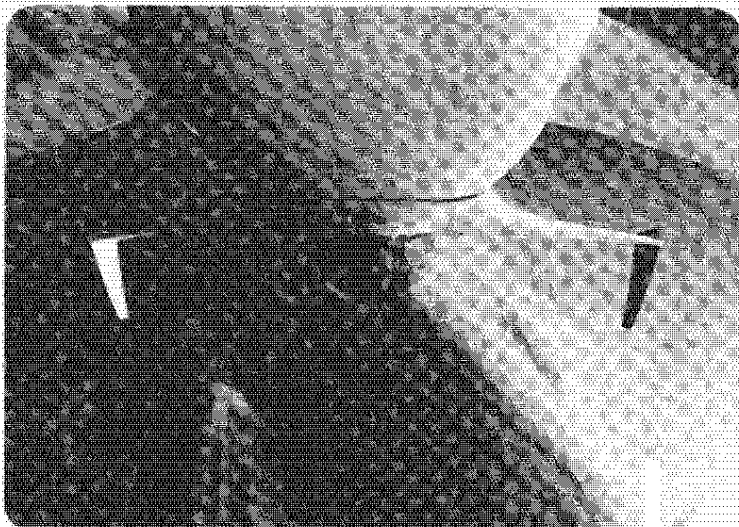
Roger Houghton at RAF. Roger produces the S-glass main and nose gear struts for Long-EZ and Vortez. New method accurately proportions the epoxy for a perfect resin-to-glass ratio.



GLASS EZ BY MARY REITHE



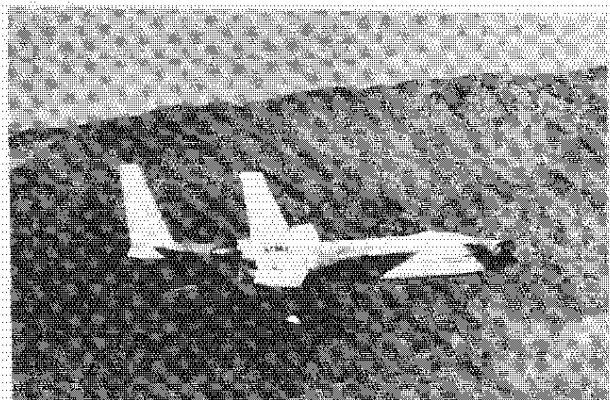
MULE FIRROSON'S E Z



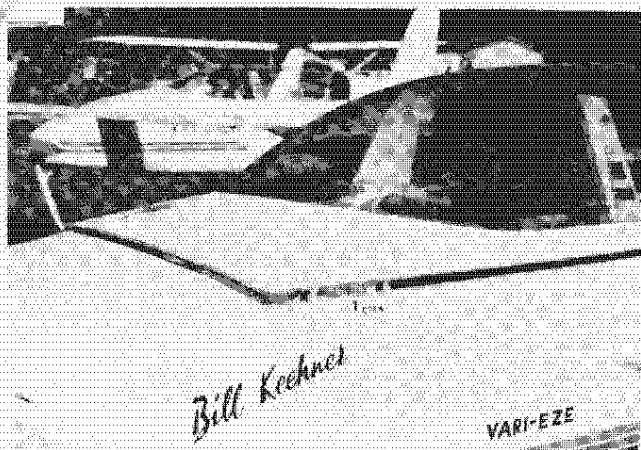
DICK IN LONG-EZ DOING HIS THING



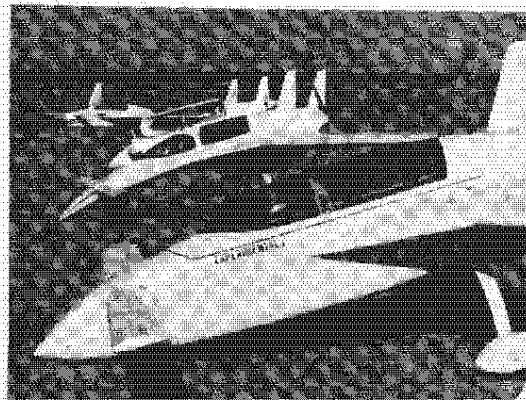
LES FAWCETT - LONG-EZ CHECK-OUT.



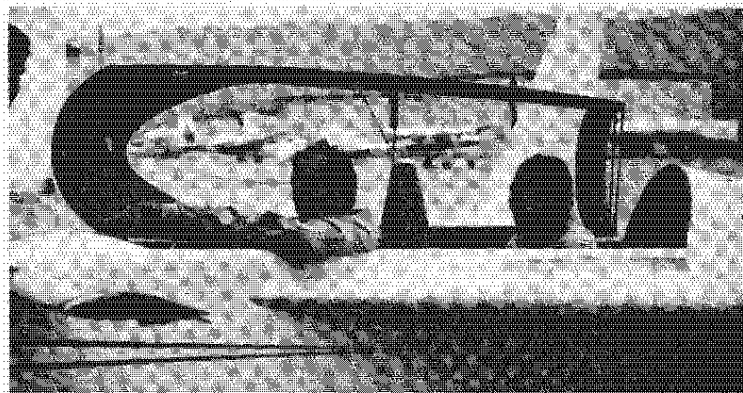
SALLY MELVILL - FIRST SOLO - LONG-EZ



Bill Kechnel
BURT - DOWN UNDER - JEFF DAVIES
VARI-EZE



A TYPICAL SATURDAY AT RAF.



BARRY + MARY SCHIFF, AFTER FIRST LONG-EZ FLIGHT.



DICK CHECKING OUT DON DOWNIE



DALLAS - TEXAS 2

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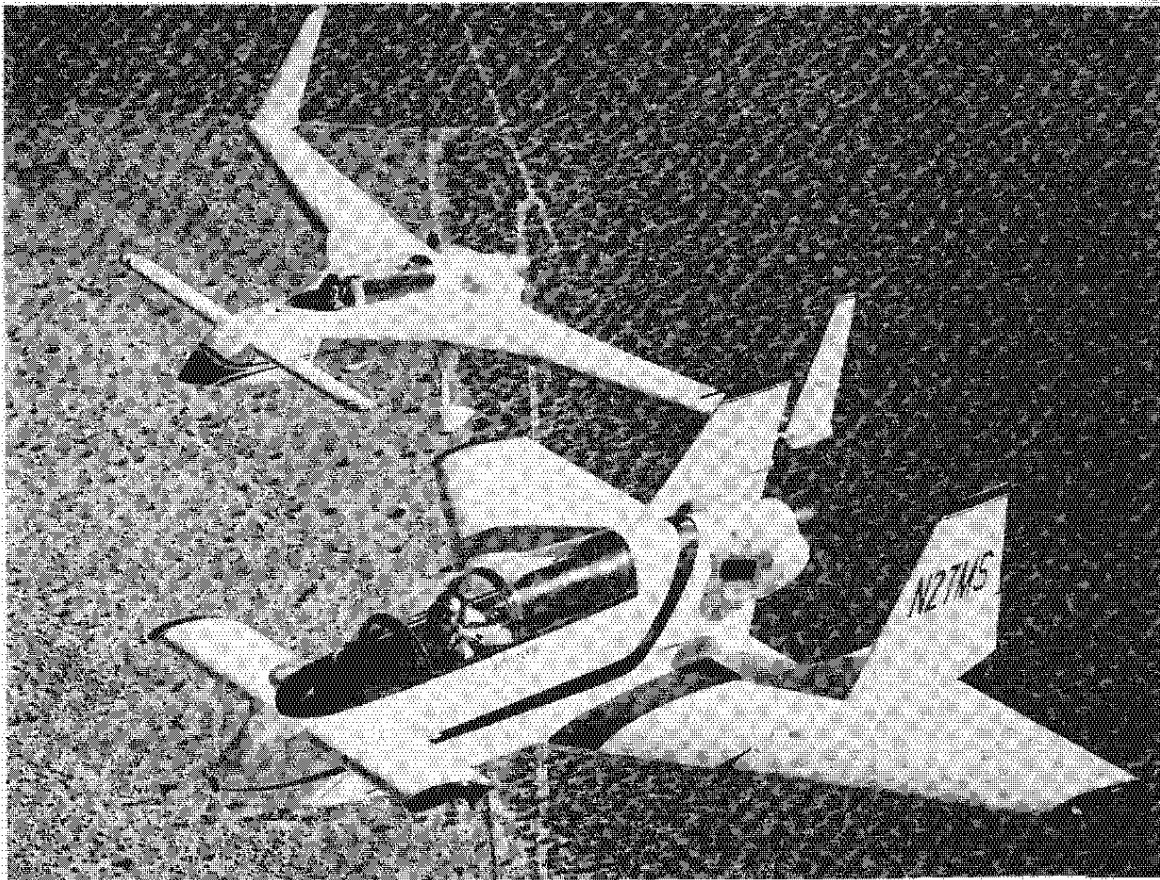


Photo BY Don Downie