

THE CANARD PUSHER

No. 73

October 1992

Published quarterly (Jan., April, July, Oct.) by

RUTAN AIRCRAFT FACTORY, INC.

Building 13 - Airport

Mojave, CA 93501

805-824-2645

U.S. & Canadian subscriptions	\$14.00
Back issues	\$ 3.50
Overseas (Airmail)	\$16.00
Back issues	\$ 4.00

If you are building a RAF design, you must have the following newsletters:

- VariViggen (1st Edition), newsletters 1 to 73.
- VariViggen (2nd Edition), newsletters 18 to 73.
- VariEze (1st Edition), newsletters 10 thru 73.
- VariEze (2nd Edition), newsletters 16 thru 73.
- Long-EZ, newsletters 24 through 73.
- Solitaire, newsletters 37 through 73.
- Defiant, newsletters 41 through 73.

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.

PLEASE NOTE: BUILDER SUPPORT IS ON TUESDAY ONLY FROM 8:00 TO 5:00. When you call on Tuesdays for builder assistance, please give your name, serial number, and nature of the problem. If you are not in an emergency situation, we ask that you write to Mike. However, if you require immediate assistance, Mike will make every effort to return your call between 2:30pm and 4:00pm (our time).

When writing to RAF, send along a stamped, self addressed envelope if you have builder's questions to be answered. Please put your name and address on the back of any photos you send.

OSHKOSH 1992

Burt flew the Catbird non-stop from Mojave to Eau Claire, Wisconsin in 6-1/2 hours where he had a business meeting the day before the airshow opened. He had more than enough fuel remaining to have gone on to Oshkosh.

Many builders and flyers noticed that the right canard was missing on the Catbird. This was done to provide more static margin (distance that the center of gravity is from the neutral point) or to improve the longitudinal stability so that the S-TEC auto pilot's "altitude hold" feature would work. The test flight a few weeks before Oshkosh was a complete success. The altitude-hold worked great, so Burt elected to fly it to Oshkosh that way.

Mike and Sally flew N78RA, Burt's Defiant, and transported Burt's friend and attorney, Lee Horton from Mojave to Oshkosh via Chadron, Nebraska. The old Defiant does not get much use these days but it performed flawlessly, there and back. Mike and Sally's Long-EZ, N26MS, which first flew almost 12 years ago in 1980, had been to Oshkosh every year since then. Not wanting to break that string, friends and fellow Scaled employees, Beth and Jeff Holle, flew her to Oshkosh and back to make 1992 the twelfth consecutive Oshkosh. N26MS now has 1980 hours of flight time and still flies great.

During the bull sessions held near the Catbird each afternoon, many interesting subjects were discussed. One subject was brought up that was disturbing. At least three Long-EZ pilots have had their engine mounts crack. Since this is not just an isolated case, all Long-EZ flyers should remove their cowlings and closely examine the engine mounts using a bright light. Pay particular attention to each tube near where it is welded. Anyone finding a cracked or broken engine mount is requested to send a full report covering number of flight hours, total time in service, nature of the failure and exactly where the failure is located. RAF will keep a file on this subject and will report our findings in future newsletters. If you feel any unusual vibration or hear a different noise, land immediately and carefully check the engine mount.

It is most gratifying to note that even though RAF has essentially been out of business for the past seven years, there were still more RAF designs at Oshkosh this year than any other, just as there has been for the past 10 years.

FIRST VARIEZE BUILDER/FLYER TO MAKE IT ABOARD THE SPACE SHUTTLE

Charlie Precourt, builder and pilot of N81CP, reports that he has over 400 hours on his VariEze with several trips coast-to-coast travelling to speaking engagements for NASA.

Charlie has been picked as a Mission Specialist for the crew of space shuttle, Columbia, when it lifts off the pad at Cape Canaveral in February 1993.

Congratulations, Charlie! How about an article on the shuttle flight for the CP?

RUTAN AND COMPOSITE ENTHUSIASTS 1992 EVENTS SCHEDULE

EVENT: HIGH POINTS AWARDS BANQUET AND KILO TRIALS.

LOCATION: Montezuma Airpark, Camp Verde, AZ

DATES: NOVEMBER 28 & 29, 1992

ACCOMMODATIONS: Contact: Shirl Dickey
PO Box 4022
Sedona, AZ 86336
602-567-6333

APPROACHING 2000 HOURS

N26MS, MIKE AND SALLY'S LONG-EZ

The kit was picked up in July, first flight was December of 1980.

1980 hours of flight time and almost 12 years later, our Long-EZ is showing remarkably little signs of wear and tear. Just recently, I decided to install a new pitch and roll control system. Over

the years, some play had developed in the phenolic bearings in the roll control system in the cockpits as well as in the wing roots. I have now installed ball bearings in place of all four phenolic bearings and, also, have replaced the three universal joints in the control system. I have also installed a ball bearing pivot in the forward control stick. There is now essentially zero play or slop in the pitch and roll flight control system. Part of the reason for doing this was to try to improve the performance of my Navaid wing leveller (auto pilot). Doug Spears, designer of this unit, had called me and explained that the biggest problem he had seen with his autopilot was in EZ's. He says that any play at all in the linkage from the autopilot servo to the actual control surface (aileron) will greatly degrade the authority of the autopilot and ruin its ability to track accurately. The other factor that really hurts autopilot capability is friction in the control system. The ball bearings have essentially eliminated any friction. I am looking forward to testing the Navaid 1 in the near future. While at it, I replaced all rod ends in the entire control system. There was noticeable play in all of these rod ends but none had excessive play. Now there is essentially no play.

I have carefully examined the entire airplane for signs of wear, fretting, etc. and I must say, I am surprised how little evidence there is of this. Over the past 12 years, we have made several improvements to our Long-EZ, some of which I will try to cover here.

One of the most useful things we have is a vinyl bag which fits closely into the area above the centersection spar behind the passenger's head. This bag, which has a strong zipper, was custom made for us and has been in continuous use since 1981. In it we store our tiedowns and ropes, control locks, cleaning rags, Zero Static polish (for paint and Plexiglass) as well as the waterproof canopy cover which we bought years ago from, Herb Sanders in Memphis. This bag, when full, fits snugly in the cavity over the spar and, I believe, contributes to reducing the noise level in the cockpit. I would highly recommend having a bag such as this made for your Long-EZ.

For several years now, we have had a gas strut installed in place of the throw-over strut on our canopy. At first, I did not like it much, but once

I got used to it, I think it makes a lot of sense. I installed it so that when the canopy is closed, the gas strut actually applies a small amount of pressure, holding it closed. This means it takes several pounds of force to open the canopy the first several inches. The force goes to zero for a few more inches then gradually pushes the canopy with increasing force to the fully opened position. The gas strut firmly holds the canopy open allowing taxiing in the strongest crosswinds, with no problems. As my friend, Ralph Gaither, has pointed out several times, the gas strut is also probably safer than the throw-over strut since you can close the canopy simply by pulling it with one hand (in the event of an inadvertent canopy opening in flight, for example) whereas the throw-over stay requires two hands to close. The gas strut makes a nice, clean installation but it does require a heavy beef-up of the cross brace in the center of the canopy. The plans call out arrow shaft must be replaced by a heavier aluminum or steel tube which must be securely bonded into each canopy rail. (I had this cross brace fail 3 times before I finally got it strong enough.) The gas strut puts a lot more stress into the canopy frame just in normal use of the canopy.

Another item of interest on 26MS is the use of stainless flathead allen screws in the cowling, on all the aileron and rudder hinges and on the wheel pants. Many builders have asked about these and I have told them on an individual basis. After nearly 6 years of using these screws, I feel confident in recommending them. These are not "aircraft" screws - they have the standard 82° countersunk head and are installed using a chrome plated, brass countersunk washer (similar to a Tinnerman washer). The fiberglass cowl, or wing skin, is countersunk using an 82° countersunk (not a 100° aircraft countersink) just enough so that this chrome washer fits into the countersunk hole flush with the top skin and no more. These screws are available from Garrett Industrial Supply which has stores all over the USA. I used the store in the LA area.

Contact: Garrett Industrial Supply
6015 Randolph Street
Los Angeles, CA 90040
213-723-6777

The screws are stainless steel, flat head, socket cap screws, 10-32x5/8", part #30477. The

washers are available from Aircraft Spruce or Wicks, part #NAS 390B10P. I bought 100 of each and found that I used almost all of them. I always install these screws in the cowling using Loctite. First, it prevents the screws from vibrating out into and damaging the prop. Second, it provides some lubrication which prevents galling during installation into the K-1000 steel locking nutplates. If you do not use Loctite, you will have these screws galling and ruining themselves. (Believe me, after 6 years using them, I should know!). I use the removable Blue #242 Threadlocker by Loctite.

For more than 1100 hours and six years, we have been flying with a bigger engine (a subject I can't cover!) but, more importantly, with an Ellison throttle body instead of the Marvel Shebler carburetor. To be absolutely honest, I went with the Ellison initially because it was physically shorter, more compact and would fit inside the cowling contour more easily. I had flown an Ellison on my O-235 some years before and had not had much success. Ben Ellison had changed the design a little and made a couple of improvements since then so I decided to give it another try. I am very glad I did. With 6 years of experience in all kinds of conditions, I have been completely satisfied. The Ellison Throttle body works extremely well, a dramatic improvement over the carburetor. I get at least one gallon per hour across the board better fuel economy and much, much better mixture control fidelity. On top of that, the unit is lighter weight, much simpler design (far fewer parts) and has proven to be extremely reliable. Best of all, though, I have had extremely good support from the factory. There have been two "AD recalls" where I received a letter from the factory explaining a problem that had occurred on a few throttle bodies and that, if I sent mine in, it would be modified free of charge. In addition, I have had excellent response when I have had questions on installation and tuning.

On the negative side, I have had the o-ring seals on the mixture tube leak slightly which required replacement, and I have heard from several other owners that they had had similar problems. A few owners have complained about the Ellison to me, but I have noticed that they have not gone back to a carburetor! Nor would I - ever! What with all the fuss over the past several years about

composite versus metal floats in carburetors, the Ellison does not even have a float bowl! One other thing, I have never experienced any sign whatsoever of induction icing with my Ellison. I cannot say the same about my O-235 with a carburetor!

Another interesting improvement, especially in fuel efficiency, has been an electronic ignition system which I purchased from Klaus Savier over three years ago. I removed my left magneto and installed an aluminum plate over the hole. This provides a surprising amount of room between the engine and firewall for easier access. The installation of the triggers and magnetic coil pickups is fairly straightforward. Klaus provides an excellent installation and operations manual which should be followed closely to the best of your ability. You cannot afford sloppy workmanship here. My installation has required essentially no maintenance, I have never had to adjust the timing, it just simply keeps on running with incredible reliability. I am very please with the improvements, among them; considerably less fuel flow for the same power, much better and smoother idle, and a noticeably quieter running engine, particularly at altitude when it advances the timing to approximately 44° before top center! The engine has been generally much easier to start also, Klaus' electronic ignition system is a capacitive discharge system (not an inductive system) and as such draws very low current. Sally and I were returning to Mojave from New York a year or two ago when our alternator quit charging. We stopped to see if it was just a loose wire (it was not, it was a voltage regulator which had got water in it during a two hour flight in heavy rain). We elected to fly over 400 nautical miles to Newton, KS, where we were repaired by Bill Bainbridge. The important thing here is that we were able to run, without any problem, for 2-1/2 hours, depleting the battery (no charge), and the electronic ignition ran flawlessly all the way.

Our airplane was the first Long-EZ to use the "heavy duty" Cleveland brakes, the 3/8" thick discs and the large diameter brake pad actuator. In fact, we flew for several years with these brakes before George Varga did the research through Cleveland's data sheets to come up with the current so called "heavy duty" brakes. The brakes we had came off Peter Garrison's

"Melmoth" after it was destroyed in a bizarre accident at Orange County airport back in 1981 or '82. Recently, I installed some new brakes. These are designed by a VariEze builder/flyer, Phil Mattingly, who bought the business from Fred Rosenhaan. These brakes are quite different from the Cleveland design in that the 3/8" heavy duty disc is simply a flat disc that bolts to the wheel rim in 3 places. The brake assembly is a double puck arrangement, that is, each brake uses 4 brake pads and these are actuated by two hydraulic piston assemblies. The brakes are very powerful, smooth and, best of all, they seem to last a long time. I installed them 15 months ago, have over 250 hours of flight time on them and I still have not had to replace the brake linings! For me, that is remarkable. It seems I was always replacing the linings on my Clevelands. I have been extremely pleased with these Matco wheels and brakes (the wheels are slightly narrower than Cleveland 500x5 wheels and fit the Lamb tires better). You will have to purchase the whole set, including wheels, brakes and axles. Phil tells me this brake is standard equipment on some Glassair models and on the Venture.

The linear voltage regulator together with Bill Bainbridge's (B&C) lightweight starter pretty much caps it off. These have both been excellent value and I would go the same route again. The starter has been a gem - never misses a beat and cranks my engine in any amount of cold weather without fail. Other than getting water in the voltage regulator (my fault), it has been flawless as well.

We have an excellent instrument panel now, King KX-155 Nav/Com, King transponder, and King KLN-88 loran, together with a full gyro panel. This enables us to fly "California" IFR and, more importantly, to maintain IFR proficiency. We have an Alcor fuel flow meter (the simplest and the best in my opinion but, sadly, no longer available). Knowing your fuel state with complete accuracy increases dramatically the utility of an already very versatile airplane.

This airplane is in constant, at least weekly, use and has given Sally and me untold joy. It has carried us faithfully for probably over 300,000 miles through every state except Hawaii. I cannot imagine how we would manage without it.

Mike Melvill

LETTERS

"Dear RAF:

This letter finds my aircraft N84GR VariEze up and ready to go anywhere. My years of enjoyment with this fine design are pleasant memories which nothing can replace.

I use my aircraft mostly for cross country flights. I rarely get into weather, but have the quads and gages if necessary. I find that 11,500 ft. is max when wet. Rain during takeoff always means an extra 500' roll before lift off. My stall when wet is 10 knots faster than dry....so I advise everyone to watch the wet stuff. Here in Florida we get our share of liquid sunshine. Always watch out for puddles on the runway....can pull you off runway and ruin your whole day (like my friend Byron McKean's previous report).

My only hangertale concerns a flight I took this last summer. I normally fly from Pensacola to Stuart, Florida to visit my family several times per year. It is such a routine flight now, I know the route by memory. I usually fly the VFR corridor just south of Eglin AFB along the beautiful white beaches to Panama City then direct to an intersection just west of Cross City and direct to Orlando...direct Stuart. The flight normally takes 3+00. I was at 9,500' just south of Orlando and waiting for a few more miles closer before beginning my enroute descent (35km) into Stuart when my trusty O-200 seemed to change pitch and lose some power. I began checking into things not worried too much since I had over 750 hours on that engine and had only 100 plus hours before done a cermichrome overhaul on the top end. Mags checked okay....tank change did not help....(I have the Long-EZ fuel system with separate main tanks plus the emergency)....the emergency tank did not help....(I knew of one guy that had a clogging fuel filter and the higher point of the emergency tank gave more head pressure through the filter....plus RAF reports say the same)....boost pump was okay....oil pressure fine....so I backed the throttle a bit....then she began getting rougher....NO GOOD! I hit emergency search on the loran....(A nice feature to have even if you know your way) figured I best be getting on the ground asap....(I really wanted to go that next 80 miles to Stuart, but knew better....ole Navy flight training and

common sense said..."Get it on the ground while she is still running") so....I landed at Sebastian (home of Danny Mayer and Velocity). A nice twin allowed me to have his place in the pattern after I said I had a rough runner. I landed a bit hot (lots of runway) with plenty of altitude in case of failure, but she was running fine at idle...no oil to be seen, so I taxied in to give her a good look-see. After a lot of looking and plenty of advice from Danny and other local folks the problem could not be immediately found. New fuel, plugs, etc...did not help. The next day with the help of my cousin Tim and friend George of Aviation Propellers, Miami we found a loose exhaust valve guide on number two cylinder. The keepers were still in and springs working fine. This allowed the engine to run fairly well at idle, but at high rpm the valve was floating some and causing loss of power. (2200 rpm static) Lucky for me the keepers stayed in and no significant damage was done. A new cylinder was shipped out (complete warranty replacement by cermichrome folks and my mechanic Don Freeman, Aviation Engines of Hueytown, Ala..thanks!). My cousin and friend drove up from Miami again and helped me put her together...I mostly watched...then after a short test flight returned to Pensacola....nonstop. This once again reminds us to believe what we have and don't push it. With only one engine back there and God only issuing each one of us one sweet life it is the prudent man/lady who is careful while hurling themselves through the air at tremendous velocities.

That's about it for now. Ken Forrest's old VariEze N84ST is well over 1000 hours now and still flying fine in the hands of my hangermate. Just a thought, I and many others are still awaiting a new 3-4 place bird from Burt which will run the pants off the competition....please.

Together for a GREAT AMERICA
Ralph Gaither"

"Dear RAF,

I'm writing this letter in the interest of safety for all canard-pusher type designs. Please feel free to edit or paraphrase it at will; I just want to help others avoid the scare that I had.

As a little background, I bought my Long-EZ about two and a half years ago with 400 hours on the airframe. Since then, I have put almost 300 more hours on it, including a trip around the borders of the US last summer. I love my plane, but my only regret is that I did not have the honor of building her myself.

Last week, after doing an oil change, I took off into a quiet Friday evening sky at my home field for a test flight. I climbed to 8,000 feet, where I spent about 15 minutes watching the sun set, after which I started my descent.

Suddenly, there was a loud bang, followed by violent vibrations. I immediately pulled the throttle to idle and shut off the mags as I pulled the nose up. The prop stopped quickly, and I was able to see in my rear-view mirror (a small convex mirror inside the canopy for looking at my passenger) that something had hit my B&T prop and that it was badly broken.

I decided to keep the engine off and glide back to my home field. Fortunately, I was at about 5,000 feet and only 10 miles from my airstrip, a mile-long asphalt runway. This would have been possible in any plane, but was an easy task in the Long-EZ with its great engine-out performance. I announced my problem on unicom and the FBO operator monitored my descent.

As I touched down on the runway, I was amazed as to how dark it was, for I'd forgotten that sunset at 8,000 feet occurs quite a while after it had on the ground at sea level. I rolled out without any problems and got out to inspect the damage and determine the cause.

It was immediately obvious that my right exhaust stack had broken inside the heat muff box and that was what had damaged my propeller. The damage to the prop consisted of complete loss of the plastic rain edge, a gouge out of the leading edge of the blade measuring about 1 inch by six long, and a 5 inch longitudinal crack propagating from the impact point towards the hub.

After pulling the cowlings and exhaust stack, I was able to determine that the cause of the problem had been entirely the result of the builder NOT FOLLOWING THE PLANS and my A&P mechanic and I missing a problem in the recent annual inspection (5.5 flight hours prior).

The heat muff had been built as per the plans except that it had not been welded directly to the exhaust stack. Instead, it had been built to be a snug fit. The problem with this was that this design allowed it to vibrate, albeit in very small movements, and this slowly ground away at the wall of the exhaust stack. The groove was deepest on the inside wall of the muff. After almost 700 hours of use, the walls of the stack were paper thin and finally gave way, allowing a half-foot long section of the exhaust stack to separate and hit my prop.

Believe it nor not, this failure may have saved me from an even greater danger - that posed by carbon monoxide poisoning from exhaust gases leaking into my cabin air system.

Lessons learned:

1. With the engine off, I'm glad I have a Long-EZ, as she has a great glide ratio and handles like a dream.
2. I was glad that I had practiced simulated engine failures just the flight before; the practice really helps out.
3. Build your planes as per the plans. If you do buy a used RAF design, go over each and every step in the plans (which should be included as a condition of sale) to find where an error or oversight might have occurred.
4. Pay special attention to the dangers of very small vibrations; small movements over long periods of time can grind through very strong metals.

I hope that this information is of help. If there are any of you out there thinking of buying a used EZ, please call me. The designs are great, but, as experience has taught me, used homebuilts have an unusual number and kinds of pitfalls.

Have a great day flying, and thanks to the folks at RAF for their continuing support.

Sincerely,
Tom Staggs"

"Dear Mike:

Several weeks ago, I had a right brake failure on landing. Please re-alert others as to the serious nature of a brake failure, and suggest they frequently inspect their brakes. Finally, I

suggest there may be a problem with Silicone brake fluid (DOT 5 motor vehicle standard #116).

In the last 2 months, I have flown around 200 hours, and the brakes had been working fine. (Yes, the brakes were inspected twice during this period). The takeoff at MEI, prior to the problem landing, the right brake was nearly gone. Previous flight, only 1 hour before, indicated no problem. I aborted the takeoff to bleed the brake. This seemed to fix the problem and I left with excellent brakes. However, two hours later I landed at RKW with NO right brake.

Assuming I might still have a problem, I landed with the wind on the right side. This worked great down to about 30 knots when it was obvious the nose had to be lowered to stop (I should have cut the engine on landing!). The damage was minor (retract gear and a few scratches) but could have been very serious. For example, had I landed the other direction, I would have left the runway at a much higher speed and went into the trees. The pilot has little control of a Long-EZ without brakes. It's a very sobering, dangerous situation -- best avoided!

I inspected the brakes after the accident, and found three confusing things. The calipers and pads had retracted about 1/4" from the disk. Why? The pads, disk and wheel pant were covered with silicone brake fluid. A leak (but small??) was found in the tube where it connected to the caliper. I believe the leak was initiated by 7 years of age and a "hot" landing several weeks before at a high altitude airport. Finally, there was a "gummy" gray deposit on the O-rings within the tubing and elsewhere. This indicates stability/compatibility/moisture problem with Silicone Fluid. I have changed back to standard good old red aviation fluid. Its thicker, lubricates better, works and leaks are apparent! I had changed to silicon fluid about three years ago after reading about it in a CP.

Mike, I have over 1300 hours in Long-EZ's and I have never had as serious a problem as this. I spend more time inspecting/working on my airplane than flying it! For example, in the last 7 years, I have replaced both master cylinders, upgraded to 50-106 disks and completely disassembled, cleaned and inspected the brake system 3 times. Yet, it got me! I will be even more attentive to the brake system!

Tim Crawford"

Editor's note: We have used silicon brake fluid (Dot 5) in all RAF airplanes for many years, the main reason was aircraft red brake fluid is highly flammable, Dot 5 is not. This is the first problem we have had reported. Mike did replace the o-rings in his master cylinders about 6 months ago and found a "grey" deposit in each cylinder. This was cleaned out and the brakes have functioned perfectly ever since. Has anyone else seen any problems using Dot 5 silicone brake fluid?

Keep those letters coming! Remember, anything that was a problem, or of interest to you, will also be appreciated by other EZ people.

**FROM "GENERAL AVIATION
AIRWORTHINESS ALERT" FAA AC 43-16**

LONG/VARI-EZ - LANDING LIGHTS

Some owners/builders of the Long/Vari-EZ are relocating the landing lights from under the fuselage to a position outboard in an attempt to

improve lighting for night landings. Several instances have shown where the builders have created a separate cell in the fuel strake for the landing light.

The submitter of the Malfunction or Defect Report stated that this is a poor choice for a device that generates so much heat. Even without a fuel leak, the amount of heat generated by these lights in such close proximity to 26 gallons of fuel is very risky. If a short circuit should develop and the fuse or circuit breaker fails to trip, the short could cause sufficient heat to melt the resin and dissolve the foam that seals the tank causing a fuel leak into the light housing. A fuel leak from a simple bulkhead seam flaw could also cause ignition simply from the heat of the light.

High amperage circuits and heavy amperage consumers should never be placed in or around fuel lines or storage cells.

CAUTION

Corrosion in the gascolator sediment bowl and even in the aluminum fuel lines is not only possible but has occurred more than once. Check you gascolator bowl often and, if ever you smell gasoline in the cockpit, do a thorough inspection of all aluminum fuel lines for leaks at the "B" nut fittings as well as leaks in the lines themselves due to corrosion.

OVER-VOLTAGE PROTECTION

Most modern homebuilts today have very expensive avionics in the panel, yet few have protection from a run-away alternator. Don't think this never happens - we have reports from two builders since last CP! The cause can be as simple as a loose or badly corroded connection on the "field" nut on the alternator. The result can be the total loss of such items as radios, transponders, lorans, intercoms, even Bose headsets!

A simple fix is to use one of Bill Bainbridge's linear voltage regulators with built-in over-voltage protection. Don't risk your expensive avionics - install some form of over-voltage protection before you fly again. A truly

excellent source of information on things electrical is Bob Nuckoll's AeroElectric Connection.

Contact at: 6936 Bainbridge Road
Wichita, Kansas 67226-1008
316-685-8617

The service is offered by subscription; back issues are available and strongly recommended. The major effort now is to write and illustrate a book. Work in print right now totals about 200 pages with lots of illustrations. Chapters presently cover:

- 1 D.C. Fundamentals
 - 2 Batteries
 - 3 Engine Driven Power Sources
 - 4 Voltage Regulators
 - 5 Grounding
 - 6 Over Voltage Protection
 - 7 Electrical System Instrumentation
 - 8 Wire Selection & Installation
 - 9 Wire Termination & Connectors
 - 10 Circuit Protection
 - 11 Switches, Relays & Contactors
 - 12 Lighting & Lighting Controls
 - 13 Antennas and Feedlines
- Appendix A List of Supplies for New & Surplus Parts
- Appendix H Collection of Hot Flash Newsletters
- Appendix K Collection of Do-it-yourself Avionics projects
- Appendix Z Power Distribution Diagrams (Big Foldouts)

Future chapters will cover noise and interference, motors and controls, audio/intercom systems, ignition systems, system reliability, pilot workload reducers, electrical load analysis, failure mode effects analysis, and how to develop a customized wire-book for your airplane. Appendix K will continue to grow. Planned projects include an audio/intercom system, hall effect battery ammeter, an accurate, used calibrated fuel gaging system, expanded scale voltmeter, and many more. Appendix D is being planned to carry excerpts from various manufacturers' catalogs with detailed information on components and supplies. Appendix S will outline custom design, fabrication and documentation services to be available soon. Issues consisting of chapters to the book are supplemented by Hot Flashes from the

AeroElectric Connection: a newsletter which addresses timely topics and carries errata information for the book.

The service will shift to quarterly newsletter when the book is finished. Newsletters will carry regular features in addition to timely topics and error corrections. A planned feature is a "Catalog Watch" column where items for sale and of interest to readers will be listed. We'll carry articles from readers on discoveries or ideas they wish to share. The newsletters will provide a vehicle for periodic updates, sometimes complete replacement of chapters in the book as new technology or information dictates.

Subscriptions are \$10.00 per issue. Back issues should be ordered and they are always available. Issues #1 through #4 may be purchased as a group for \$32.00. Subscriptions for other than USA or Canada should include \$4.00 per issue for first class, air mail postage. Book material has been planned for at least 7 issues. The Connection is published in three-ring, loose leaf binder format; a "living" work that will be updated as technology advances and/or new information is found. From time to time, Hot Flashes will be mailed to subscribers when an important subject must be addressed between regular issues of the Connection

ACCIDENTS AND INCIDENTS

"Dear Mike,

On May 20, while doing touch-and-go's at Clark Co. airport in southern Indiana, my VariEze (N64SJ) was extensively damaged. I had elected to go around because of a slower aircraft ahead (C-150). While traveling along the right side of the active about half throttle in a very shallow climb, just past the take-off end of the runway, I moved the throttle to full power. The engine (0-200) started to respond then tailed off to nothing. I turned back toward the airport but came up about 50 yards short of the intersecting runway. It had rained quite heavily for several days previously and the sod was very soft.

The aircraft rolled several yards before the nose gear failed causing the plane to flip forward landing inverted and traveling another few yards

before finally coming to rest, tail first, upside down.

Damage included -- Right wing broken just o/b of the wing attach fitting, left wing broken at mid span, Canard separated from aircraft taking a small part of F-22 bulkhead, the elevator control pushrod did considerable damage to the right side of forward fuselage before it finally broke, the canard has a small tension tear in the top skin at mid span, the main gear has some torsional damage, both winglets were broken near mid span, the taper pin holes in the top sides of both inboard sections of the wing attach fitting were slightly elongated from tension, other damage to canopy and cowling that I won't go into here.

After removing the cowling, the cause of the engine stoppage was obvious. The aeroduct between the carb heat valve and the carb had collapsed. A further check confirmed that both ends of the coiled wire were held tightly under the worm clamps. The wire coil had become completely disorganized and, in fact, parts of it looked somewhat like a Slinky that had been mistreated.

On a subsequent engine run, the engine repeated the in-flight shutdown. After removing the aeroduct, the engine ran normally.

I feel the shoulder harness and seatbelt and rollover structure worked very well as I was uninjured.

I can't say how much I enjoyed and miss my EZ. I would appreciate any advice you might have about possibly rebuilding.

Please pass on my experience with the aeroduct,

Best regards,
James Bierly"

**PLANS CHANGES AND OTHER IMPORTANT
MAINTENANCE INFORMATION**

MANDATORY GROUND

VARIEZE AND LONG-EZ Engine mount weldment inspection before next flight is required. Using a bright light, carefully examine the tubing close to each weld in the entire weldment. Look for hairline fractures or cracks. See page 1, this CP. Please report any cracking or failures found to RAF. If at any time during flight you should feel any unusual vibration, land and check the engine mount for cracks.

ALL RAF DESIGNS - See Accidents and Incidents this CP, page 9 - aeroduct collapse.

Carefully check any aeroduct hose in inlet systems for security and condition. Suspect hose must be replaced before next flight

Since RAF is no longer active in the development of homebuilts, we are not likely to discover many new errors or omissions in the plans. For this reason, we need your help. Please submit any significant plans changes that you may come across as you go through the building process.

FOR SALE

FLUSH RUDDER BELHORN SPRINGS.

Many builders have had difficulty locating the correct springs called out to be installed in the rudder cables when installing the flush rudder belhorn modification. The springs called out in the plans are available from Century Spring Corp. but this company has a \$25.00 minimum charge! Fortunately, John York, a Long-EZ builder who experienced the same problem, has informed us that he has a supply of these springs and is willing to keep them in stock for a year or two. He will sell the springs for \$1.50 each plus \$1.00

shipping. So send John a check or money order for \$4.00 and he will send you a pair of springs!

Contact: John York
903 W. 24th Street
Lawrence, KS 66046
913-832-2049

NOSE GEAR RATCHET

Dr. Curtis Smith's nose gear crank ratchet is still available at \$38.00 pp. This little device should be considered a "must" by all Long-EZ and VariEze builder/flyers. Once you have flown with it you will wonder how you ever did without it. Contact: Curtis Smith
1846 Sextant Dr.
Worden, IL 62097
618-656-5120

SIGHT GAUGES

New, improved fuel sight gauges. Use with auto fuel or Avgas. Clear bubble with white background. Retrofit for Long-EZ and VariEze. \$30.00 per set.

Contact: Vance Atkinson
3604 Willomet Court
Bedford, TX 76021-2431
817-354-8064

The "Bead Buster" TM - \$75.00.

If you have ever tried to remove a tire from a 500x5 wheel you will understand what a neat tool this is. Designed by a Long-EZ builder who became frustrated by this problem, the kit consists of a canvas pouch, a vulcanizing patch kit, cadmium plated fulcrum lever and base, and the heat treated aluminum "Bead Busting" shoe.

Contact: Tom Caughlin
10958 National Blvd. #1
Los Angeles, CA 90064

Custom cover for you Long-EZ. This neat design completely covers your prop, canopy and nose and only uses two straps. Made from space-age Evolution 3 material. Reasonable price.

Contact: Tony Brazier
PO Box 6478
Ocala, FL 32678
904-237-1811

AIRWOLF FILTER CORP.

After 4 years of design and testing, Airwolf Filter Corp. is proud to release to the homebuilt market their Lycoming remote mount oil filter. This remote mount filter was designed to replace the 4-bolt Lycoming P/N 69510, 68974, or 62815 oil screen housing at the rear of most Lycoming 0-235, 290, 320, 340, 360, 540, and 720 series engines. This adapter allows the user to locate the oil filter to the firewall and is a welcome relief since many Lycoming engine applications are unable to use the current spin-on adapters due to space restrictions. In addition this kit, including the oil filter, adds less than 4 pounds to the aircraft empty weight.

The AFC remote mount oil filter kit is available in three versions. 1) The basic kit includes only the oil filter adapter and remote oil filter mounting plate and retails for \$495.00. 2) The deluxe kit includes the oil filter adapter, remote oil filter mounting plate, spin-on oil filter, Aeroquip steel braided hose and fittings, AN-8 fitting and bulkhead nuts, Vitron O-rings, Teflon washers and is priced at \$695.00. 3) Remote filter adapter (allowing the homebuilder to use his own oil filter mounting base) for \$395.00.

The entire remote mount filter installation should take only 1 to 2 hours to install in most applications.

The public release of this product will be at Oshkosh 1992 and our booth is 368E in the Fly Market.

Contact: Airwolf Filter Corp.
15401 Madison Road
Middlefield, OH 44062
216-632-5136

Kevlar Long-EZ cowling (new) \$380.00
Wheel pants for 500x5 (new) 140.00
Carb heat box (new) 50.00
Carburetor MA4SPA 400.00

Contact: John Perry
619-721-5937

Lycoming 0-235-L2C - 2000 hrs... TTSN.
Removed from a flying Long-EZ, mags, ignition
harness and carb included. \$5500.00.

Contact: Steve Bowser
707-629-3445

King KX-145, 720 channel Nav-Com \$550.00
EZE nose gear ratchet assembly 25.00

Contact: Dan Worley
818-366-8803

Edo Aire Rt-553 Com/VOR radio with integral CDI
in a single panel unit 6.5" (wide) by 3.25" (high)
by 12" (deep). Excellent condition, replaced by a
Loran. Complete with all documentation for
installation. \$475.00

Contact: Sam V. Shelton
145 15th Street #1221
Atlanta, GA
404-894-3289

1 Long-EZ main gear strut \$280.00
1 Long-EZ nose gear strut 45.00

5 pieces blue foam for wings 7' long
(you pick up)

Contact: Jess DeLaCueva
818-918-8047

WANTED

Great American multi-laminate prop for 0-235-
L2C powered Long-EZ. 62x62. Must be in good
condition.

Contact: Frank Nowak
Searle Road
Huntington, MA 01050
413-667-5595

Antenna Dynamics ADL-3 or ADL-4 hidden
Loran-C antenna.

Contact: William J. Norton
9197 Lime Ave.
California City, CA 93505
619-373-1323

SHOPPING

CANARD PUSHER DIGEST, 2ND EDITION

Stet Elliott's "Canard Pusher Digest for the Long-EZ" is now in its 2nd Edition. (For a complete description, see CP57). Includes all builder related information from CPs 24-72. The 2nd edition of the Digest has now grown to over 700 pages, and is professionally printed on double sided 8 1/2 x 11" paper from a laser printed master.

Quarterly updates to the Digest are also available. The updates provide additional information from newly published CPs to bring the Digest current. The updates are compatible with either Digest edition.

Note that the Digest is builders and flyers of the Long-EZ only. It does not support other RAF designs.

CP Digest for the Long-EZ (2nd Edition)

\$75.00

(Overseas orders add \$20.00 for airmail)

Annual Update Subscription (4 updates)

\$25.00

Overseas orders add \$5.00 for airmail

CANARD PUSHER NEWSLETTERS "ON DISK"

Stet Elliott has also compiled the text of all the Canard Pusher newsletters in electronic format. The set includes all of the Canard Pusher Newsletters, from the very first one published in May of 1974, to the present. The set of CP's is provided in a text only format which should be 100% compatible with any computer word processor you presently use. It is available for either the IBM or Macintosh platforms. A hard disk is strongly recommended since the set contains over five megabytes of textual information!

This product is ideal for anyone interested in reading about the evolutionary development of RAF's canard designs through the years, or for those builders still plagued with the "I know I read it here somewhere!!" syndrome. With one of the inexpensive text search and retrieval programs, text string searches across the entire set of files are a snap.

CPs on disk costs \$65.00. Specify disk size, (3 1/2" or 5 1/4"), platform (IBM or Mac), and disk capacity.

For either the CP Digest for the Long-EZ, or the CP's on disk, contact:

Stet Elliott
5322 W. Melric Dr.
Santa Ana, CA 92704
(714) 839-4156

VARIEZE INDEX

Lists all plans changes from CP10 through CP68 as well as all suggestions, problems, etc. For any VariEze builder, this is a must. Bill sells it a couple of different ways. You can buy just the printed book for \$20.00 or you can get the book plus a 5-1/4" IBM compatible floppy disc with a delimited ASCII listing of the data base (or optional PFS professional file data file). Specify which you would want, for \$24.00. This index will be updated annually.

Contact: Bill Greer
8827 Larchwood Dr.
Dallas, TX 75238
214-348-0215

PLEASE NOTE: Those of you who have the first edition, Bill has improved the indexing of several topics and added more cross-indexing. You may find it helpful to get an up-grade.

DEFIANT FLYER

If you are building a Defiant and you are not currently receiving John Steichen's Defiant Flyer, you are missing a bet. This publication is exactly what is required by both builders and flyers. It contains all kinds of helpful information and great articles. Bayard DuPont's letter on his Ford-powered Defiant in the December issue is a case in point. See CP67, page 2 for information on subscribing to the Defiant Flyer.

Seen at Oshkosh. Beautiful leather seat cushions (also available in various fabrics) for Long-EZ, VariEze and Defiant.

Contact: Diana Davidson
Alexander Aeroplane Co.
900 S. Pine Hill Road
PO Box 909
Griffin, GA 30224
404-228-3901

LONG-EZ PARTS PRICE LIST FROM FEATHER LITE

Main gear strut	\$ 349.00
Nose gear strut	58.00
Engine cowls, pr. (glass)	329.00
Engine cowls, pr. (Kevlar)	480.00
Cowl inlet	48.00
Wheel pants (3.5x5)	150.00
Wheel pants (500x5)	180.00
Above item in Kevlar	215.00
NG 30 cover	21.00
Pre-cut canard cores	160.00
Pre-cut wing & winglets	1199.00
Leading edge fuel strakes w/ bulkheads	524.00
Strut cover SC	19.50
Nose wheel cover NB	19.50
Sump blister	19.50
NACA inlet	47.00
3" extended nose gear	70.00

Contact Michael Dilley or Larry Lombard (both ex-RAF employees and EZ builders and flyers) at:

Feather Lite, Inc.
PO Box 781
Boonville, CA 95415
707-895-2718

RAF "GOODIES" AVAILABLE

Charms-Long-EZ/VariEze (gold or silver)	6.50
Name patch	1.50
Silhouette patch (no Defiant)	3.50
3-ship poster (17"x22")	3.75
2 Long-EZs in trail (11"x17")	3.00
Defiant on water (11"x17")	8.00
RAF Chronological poster	15.00
Long-EZ lithograph	10.00
Color photos (EZs, Solitaire, Defiant)	1.25
Night photo by Jim Sugar	5.00

FEATHER LITE PRODUCTS

Feather Lite, Inc. is proud to announce another product to re-introduce to EZ builders: The original Space Saver Panel by the late Rusty Foster. This is a bare fiberglass panel with a molded recess for builder installation of an aluminum flat stock electrical panel. \$40.00

Contact: Larry Lombard or
Mike Dilley at
Feather Lite, Inc.
PO Box 781
Boonville, CA 95415
707-895-2718

RAF RECOMMENDED SUPPLIERS

Aircraft Spruce PO Box 424 Fullerton, CA 92632 714-870-7551	Wicks Aircraft 410 Pine Street Highland, IL 62249 618-654-7447
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FeatherLite PO Box 781 Boonville, CA 95415 707-895-2718	Brock Mfg. 11852 Western Ave. Stanton, CA 90680 714-898-4366
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These suppliers are still the only authorized RAF dealers for all your various aircraft materials and components.

PROPS FOR EZ'S AND DEFIANTS

RAF recommends the following prop manufacturers:

Bruce Tift
B&T Props
75872 Mosby Creek Rd.
Cottage Grove, OR 97424
503-942-7068

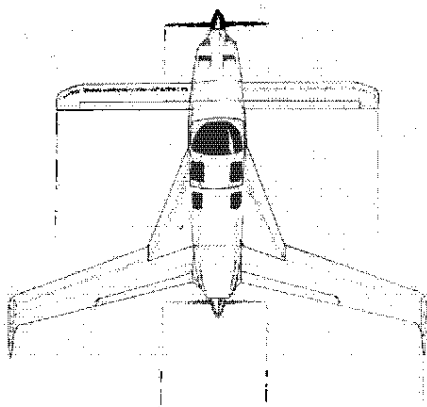
Ted Hendrickson
PO Box 824
Concrete, WA 98237
206-853-8947

While we still have not had an opportunity to try one of Performance Propellers (Nogales, Arizona) props, we have now had a chance to see and touch several of them, and to talk with pilots who fly them. We have also received several enthusiastic letters of recommendation for these props. See their ad in *Sport Aviation*.



Charlie Precourt, builder and flyer of VariEze, N81CP, has been chosen to fly in the space shuttle next February. The first EZ builder/pilot to achieve this honor. Congratulations, Charlie!

**Rutan Aircraft Factory
Building 13, Mojave Airport
Mojave, CA 93501**



TO:

October '92

The line which appears above your name lets you know through which Canard Pusher you are paid. If your label says **LAST ISSUE CP 73** then this is your last issue, and you need to renew.

GP 73