

THE CANARD PUSHER

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

VariViggen (1st Edition), newsletters 1 to 75.

VariViggen (2nd Edition), newsletters 18 to 75.

VariEze (1st Edition), newsletters 10 thru 75.

VariEze (2nd Edition), newsletters 16 thru 75.

Long-EZ, newsletters 24 through 75.

Solitaire, newsletters 37 through 75.

Defiant, newsletters 41 through 75.

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.

SOMETHING NEW HAS BEEN ADDED

The post office has decreed that a change be made to our address. The flight line number must appear above the city name or they will not deliver our mail beginning March 1, 1993. Please read and heed.

OSHKOSH 1993 TALKS

July 30 - Friday - 10:00am - Tent #3 - *Life, the Universe and Everything Else - Part III.*

July 31- Saturday - 8:30am - Design College -
10:00am - Tent #3 - *Tent Talk Show - Part III.*
11.30am - NASA Tent - *Talk on General Aviation.*

August 1 - Sunday - 10:00am - Tent #3 - *RAF Airplane Builder Support.*

WANTED

PARTICIPANTS

THIRD NATIONAL GATHERING FOR CANARD TYPE AIRPLANES

June 11, 12, 13, 1993
Johnson County Industrial Airport (KIXD)
Olathe, Kansas

Social events, seminars, prizes

Guest speaker - Astronaut - Long-EZ builder,
Jim Voss

Contact: Terry Yake
8904 W. 116th Terrace
Overland, KS 66210-1963
913-451-8904

CORRECTION

The telephone number given in Canard Pusher 74 for OSHA in Washington, DC was incorrect. The OSHA operator phone number is 202-219-8148. However, callers can save time (and money) by calling the publications office, direct, at 202-219-4667.

FROZEN CRANKCASE BREATHER

The following experience is reiterated in the hope that reading about it may prevent a similar problem, or at least allow someone unfortunate enough to run into this, to come through it undamaged.

Sally and I flew our Long-EZ to Telluride, Colorado this past February. We had planned five days of skiing in the San Juan mountains. We landed at Telluride airport which is at 9100 feet elevation. There was lots of snow and it was cold, especially at night. There was no hangar or tiedown available so we parked nose down, into the wind.

While we were there, it snowed four to six inches each night. The last night, we had 27 inches of snow. We had to dig the Long-EZ out of the snow before we could leave.

A careful preflight was conducted, followed by pulling the prop through enough times to show oil pressure on our mechanical gauge. The engine started easily and I warmed it up at low power. I did not taxi out for take-off until I had 120°F oil temperature. We took off and headed directly toward Page, Arizona at 14500 feet.

One hour out of Telluride, I suddenly noticed the oil pressure gauge fluctuating. The oil pressure slowly fell from 85 to 60psi. At this point, I hit the Loran "nearest airport" button and headed for the brand new Black Memorial airport near the northeast end of Lake Powell.

We removed the cowl and found that the engine had only 1-1/2 quarts of oil left in the sump. We had left Telluride an hour earlier with 7-1/2 quarts! There was evidence of oil near the push rod tube seals, the rocker cover oil drains, but no oil in the vicinity of the main bearing/prop seal. The prop had some oil on it, but not nearly as much as I would have expected considering we had lost 6 quarts of oil!

We topped off the oil, ran the engine for 10 minutes with no sign of an oil leak. We replaced the cowling and headed toward Mojave. One hour later, we had an exact repeat of the problem! This time, we landed at Boulder City, Nevada. It was much warmer there. We went through essentially

the same steps again; filled up the oil, replaced the cowl and headed for home. One hour and 10 minutes later, we landed at Mojave and found that we had not used a perceptible amount of oil!!!

Here is my theory but, I hasten to add that I have no conclusive proof of anything at all. We have one of Wes Gardner's breather systems installed and we have run this system for more than 1500 hours without a problem. For those who may not be familiar with this system, it consists of a 5/8" I.D. hose that runs from the crankcase breather elbow to an anti-backfire valve welded into the exhaust system. There is a "T" fitting in this hose from which a 3/8" I.D. hose runs to an automotive PCV valve, and then to the intake manifold (in my case, a fitting is screwed into the Ellison throttle body in the venturi). At low power, the anti-backfire valve does not open and the crankcase breathes through the PCV valve and into the carburetor, then into the cylinders where the crankcase gases are burned in the cylinders and go out the exhaust. At higher power, the PCV valve closes and the anti-backfire valve opens. The breather gases flow directly into the exhaust system, are burned and expelled through the prop.

I later found that the anti-backfire valve had carboned up to about 80% blocked. I believe that the moisture, normally expelled from the breather, froze in the partially carboned and blocked anti-backfire valve. With the very low temperatures at Telluride, particularly at night, this moisture froze hard. Even though I warmed the engine until the oil temperature read 120°F, this did not help because the breather system is located entirely on the "cold" side of the engine baffles. This means the cold air being pulled through the cowling during the engine warm-up kept the frozen breather frozen. The flight at 14500 feet (minus 20°C) continued to keep the breather frozen.

With the normal crankcase vent (the anti-backfire valve) plugged, crankcase pressure built up and began to force oil out of the seals, as well as through the PCV valve, into the carburetor, up through the manifold and into the cylinders where it was burned and expelled out of the exhaust. I believe this continued at a rate of 6 quarts per hour, or 0.1 quarts per minute. In other words, the engine burned most of the oil

while some of it leaked out of the seals. The small amount of oil found on the prop, on the engine and in the cowling supports this theory although, to be honest, not everyone agrees with this hypothesis.

The temperature at Black Memorial airport was cold enough so that the frozen blockage did not melt. The temperature at Boulder City was in the low 80's - this finally melted the frozen breather ice and so we did not use any oil from Boulder City to Mojave.

I replaced every part of the breather system, new hoses, new PCV valve, new anti-backfire valve. I did not find anything wrong with the original parts, for what that is worth. I ran a 3/8" drill through the carboned up anti-backfire valve mounting and was surprised at the amount of carbon that came out. In the 40 hours flown since this incident, oil consumption has been normal (about 1 quart per 14 hours).

I intend to keep on using Wes Gardner's breather system. It has given excellent service for hundreds of hours. I will, however, do two things differently from now on. I will check the carbon build-up and clean it out every 100 hours and, I will pre-heat the engine compartment before starting it if it has been left out, overnight, in sub-zero weather. I would recommend that anyone using this breather system do the same thing.

I would value any and all opinions about this incident. Has anyone else out there has anything like this happen to them?

Mike Melvill

LEAKY MA-3 CARBURETOR?

Once upon a time, I believed that OEM (original equipment manufacturer) made parts were the only reliable way to go. After all, if they made it originally, they should be the best equipped to make the replacement parts and have their good name, and day in court, to gamble if the parts are defective. This fairy tale usually ends with "and they all lived happily ever after". Reality is a bit different, I found recently.

My 0-235-C powered Long-EZ has over 1000 hours on it with the same badly worn MA-3 carburetor which was on it at first flight. I decided it would be a good time to comply with all the service bulletins and replace the throttle shaft, 2 piece venturi, and finally, change from the composite float.

Two hundred and seventy-five dollars later, I replaced the freshly overhauled carburetor and turned on the fuel pump to leak check the installation. I was amazed to see fuel pour out the overflow hole at the bottom of the venturi. I returned the unit to the overhaul facility where the mechanic disassembled it and declared it was OK and to try it again. I installed the carburetor and the mechanic decided the needle and seat must be leaking. Sixty dollars later, I put the carburetor back on again. (I'm getting better at carburetor R&R.) Once again, the unit leaked like a sieve. I returned the unit and told the mechanic to lower the float level below what the OEM specified.

The lower float level helped. It passed the pressure test in the hangar. I took the airplane outside and started it up with great difficulty. After a 5 minute run, I shut the engine down and watched fuel run out of the carburetor again. By then, I was assured that Mr. Marvel and Mr. Schebler didn't know who their fathers were.

The mechanic said he had no idea what was wrong and left me to thoughts of getting my glider raring dusted off.

A chance encounter with Bob Wilson of the Ayling & Reichert Company, which manufactured the floats for Precision Airmotive, revealed the reason for my problems. It seems that Marvel-Schebler-Facet-Precision Airmotive are not manufacturers of anything. They just assemble parts that are produced by other manufacturers. I discovered the float I bought for \$125.00 from Precision had been sold to them by Ayling & Reichert for \$6.00. Who says there is no money in aviation?

I was told that Precision told Ayling & Reichert to manufacture a batch of floats and supplied original drawings. The newly manufactured floats did not fit in the carburetors and, consequently, stuck. Careful dimensional checking by Ayling & Reichert assured that their

floats did agree with the Precision Airmotive supplied drawings. The only variable left was the carburetor bowl casting. Ayling & Reichert measured an assortment of MA-3 castings and discovered they varied widely. It was discovered that the original castings were made using badly worn tooling and that each carb casting was slightly different from the previous one. The end effect was that each newer carburetor had a slightly smaller fuel volume and less clearance between the float and the casing walls. I was told Precision Airmotive was informed of the wide dimensional variation problem but insisted on producing the floats to the original plan. Because of this, some MA-3 carburetor floats stick, thereby, causing leaks and very rich mixture settings.

The mixture can be so rich that the engine will not develop full power and runs very roughly. I've heard of cases where pilots have made precautionary landings because the engine was running so roughly that stoppage was predicted. I wonder how many "Engine lost power" accidents can be attributed to sticking floats in these FAA approved carburetors.

Now that the cause is apparently known - what is the fix? Bill Smith of Consolidated Fuel Systems had Ayling & Reichert make a batch of floats that supposedly do fit and work in the MA-3 carburetors with the undersize float chambers. Call him at 205-286-8551 or information.

To fix your existing Precision Airmotive float system, you might try Bob Wilson's suggestion. First, you need to determine where the float is sticking and then increase the clearance so it does not touch in the future.

To do this, you must remove the carburetor and drain it completely. Paint the float with Prussian blue toolmakers ink then reassemble and shake like crazy in all direction. Remove the carburetor top and look to see where the ink has been applied to the casting wall. Those spots are where the float has been touching. Clearance in those areas needs to be increased. I elected to Dremel the inside of the casting and then polish with succeeding finer abrasive papers. Repeat the blue ink procedure until no more float contact is observed.

I suppose one might also alter the float but that is pretty risky business as leaks are easy to get and hard to fix.

I tried the trick of grinding out the inside of my float bowl and reinstalled the carb, knowing I'd finally solved the problem. Guess what? It still leaked.

I then screwed a fitting into the float bowl drain and rigged a clear tube sight gage to it so I could monitor fuel level while the carb was under pressure. I found the fuel level was moving swiftly up to the desired level and then SLOWLY moving higher and higher until it overflowed out the float chamber vent.

That indicated the brand new Precision Airmotive needle and seat assembly must be leaking. I replace it with an STC'd Consolidated Fuel Systems part and, PRESTO, the fuel level stayed right where it should have stayed. Ahh, so much for OEM high priced parts. Or so I thought.

I took the airplane out to run it up and it worked fine. I cowed it up and tried to start it. It acted too rich - and then I saw the puddle of fuel again!

I then sent it away to one of those high dollar repair places and for \$158.60, I found the \$3.00 clip that holds the needle to the float assembly was at fault. It no longer provided proper alignment between the needle and seat. I reinstalled the carb and it seemed to work properly. I now have two flights on it and nothing is running out the bottom of the cowl. Could it be the problem is solved?

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SUCKER HOLE

For several years, when two or more clouds are in the sky, we have heard the Flight Service Station weather briefer say "VFR not recommended". And since this started, I have shouted that they are crying "Wolf". Any experienced pilot knows the briefer is practicing CYA and most briefers are not pilots. So for years, we hear and ignore. Eventually, someone is going to get into trouble,

maybe killed and "pilot error" will be the cause as "VFR not recommended" will be on the tape.

Thursday, July 30, 1992

My flight is from Tallahassee to Oshkosh with a lunch stop at Huntingburg, Indiana. The Tallahassee Flight Service weather briefer warns of two frontal areas, one over Chattanooga, TN and one extending from Champaign, IL to Ohio across my route. "VFR not recommended" is read like a Miranda notice. Haze and two miles visibility at TLH means a special VFR departure; no problem. I climb quickly to 6500 feet and head north. Cloud cover below soon becomes solid. At Chattanooga, I am VFR on top. Flight watch informs of the frontal activity from Champaign, IL to Ohio with many thunder storms across my route. "VFR not recommended" results in a "Roger" acknowledgement. The Flight Watch briefer adds, "You are not going ahead, are you?". Another "Roger your information, thanks" ends the discussion. Soon the solid cover breaks and I land at Huntingburg after four hours, thirty minutes flying from Tallahassee.

A microwaved sandwich, some fuel, and I climb to 8500 feet, anticipating the need soon to reach 10500 feet to pass over the Chicago TCA. From west to east, as far as I can see ahead are towering cumulonimbus formations, perhaps ten miles apart. As I approach Terre Haute, IN, I see no breaks in the line. Where a CB ends, solid clouds with light to moderate rain fill the gaps. Turning westward, I head sixty or seventy miles toward Champaign, which is reported to be the end of the easterly moving frontal activity. However, I see blue sky through a gap in the line of CBs at my altitude and I turn into my personal "sucker hole".

Light turbulence and light rain cause me to glance down to pull on carburetor heat, reduce throttle setting, stabilize the aircraft, and slow the Long-EZ to the maneuvering speed of less than 120 knots. The I glance at the altimeter. Instead of 8500 feet, it indicates 13400 feet. Up a mile in seconds! Suddenly, I see lightning off my left wing. The VSI is pegged at 2000 feet per minute, worthless! Now I move the throttle to idle and the nose down ten degrees for an airspeed of 110 knots. The light rain becomes heavy rain, then hail. The turbulence is minor; the altimeter slows at 15600 feet. An ascent of a mile and a

half in seconds means the updraft is over 100 miles per hour! There is no sensation of the vertical speed. The plane seems to be flying at 110 miles per hour straight and level. Yet, what goes up . . .!

As the plane passes from the 100-plus mile per hour updraft into the compensating down draft, the sharp shear force is tremendous. The plane shudders, as if it has hit a solid wall. Negative G-forces cause everything in my shirt pocket to fly out; the ELT pops out of the clamps holding it in place. In spite of a tight seat belt, my head hits the canopy. During a flight from Bogota to Panama on AVIANCE Air Line, I experienced CAT. Passengers and hand luggage flew through the cabin but this hammering shock of the sharp wind shear is far, far worse. The shuddering of the aircraft is the heaviest shock I have ever felt in a plane, so bad I do not expect to see the wings still attached. My first thought is "If this is it, so be it". This is interesting, as I never use this expression. My second thought is "Thanks, Burt Rutan for designing a strong aircraft, and thanks Tom Caywood for building to specifications". The rest is anti-climatic as the down draft takes back the free ride up and I enter clear air at 9000 feet.

Using Rich Domke's hand held VOR, I find Mattoon, IL and stop for the night.

After climbing out of the Long-EZ, I was shocked when I saw the hail damage to the leading edges of the canard and wings and the amount of paint removed from the landing struts and winglets. Immediately, I walked to the rear to inspect the prop. By the time I entered the hail, I had pulled the throttle back to idle. With little or no thrust or drag, there was no wood damage. The urethane leading edge of the wood prop eroded slightly along the outer ten inches. Close visual inspection of the EZ revealed no signs of cracks or stressed structural areas from the outside.

Early Friday, July 31, I flew out of Mattoon to Oshkosh. The damaged canard destroyed almost all the laminar flow, requiring full aft trim and some positive stick pressure to maintain straight and level flight. At Oshkosh, I talked to Burt Rutan about the hail damage.

Burt, Mike, Bruce Tift and I were all parked together. Mike held an informal discussion and information exchange session for Rutan builders

and flyers at the Defiant every day at 1:30PM. After the Saturday meeting, he examined the aircraft and reassured me concerning structural damage. Then, he advised me to flex the holes where the hail cut through to the foam and apply micro to reform the leading edges of the canard and wings.

Bruce Tiffit showed everyone how great his prop resisted the forces that destroyed the leading edges of the wings and canard. He also advised me to sand lightly with a fine grit paper to restore the polish to the urethane leading edge.

CONCLUSIONS:

The hole revealing the blue sky had ample room for the plane to fly through. The surrounding rain and clouds were very light in color, not the dark mass normally associated with cumulonimbus and severe thunderstorms. No lightning was visible from outside the clouds. The thunderstorm was imbedded. Yes, I was suckered.

Once the hole closed, I should have made an immediate 180 degree turn to exit. Then I could have continued VFR westward to pass the end of the line or find an airport and land until the weather improved.

Never let the urgency or desire to arrive at the destination interfere with flying judgment and decisions. Respect the the power of nature. Do not let the attraction of a light, thin area of clouds and light rain prevent thinking rationally. There may be a "sucker hole".

Due to the tremendous sharp wind shear between the strong updraft and down draft, I do not believe an aluminum light aircraft could have withstood the abrupt shock of the shear force encountered. The impact was incredibly severe.

AL Hodges
9850 SW 15 Street
Miami, FL 33174
305-551-0384

HURRICANE ANDREW - (Before dawn, Monday,
August 24, 1992)

On Sunday, August 23, 1992 several of us gathered at Tamiami Airport (Miami, FL) to store our planes in a hangar to avoid damage from the impending storm.

"Why did Florida Power and Light fly out instead of storing their jet in their hangar?", I asked Bob Hitchcock, manager for the FBO, Jet Center.

"Would you leave a \$10 million jet in a hangar built by the lowest bidder?". I laughed. By Tuesday, it was not funny.

Sunday, we carefully eased the planes into the Jet Center hangar. All the way back against the wall was a beautiful SNJ. My Long-EZ and a Swift filled the back row, nestled but not touching. Each plane was chocked. A Cessna 180, a 172 and a Twin Comanche filled the next row. Then another 172 was eased into safety and steel doors closed to protect our planes. By Tuesday morning, Tamiami was a total disaster. Every hangar except three were destroyed. Approximately 500 airplanes were totaled, later to be piled up in a scrap heap. Driving around the airport caused a big knot in the pit of my stomach. Perhaps 20 to 30 airplanes were flyable, an equal number repairable. Approximately 0.5% of America's total air fleet was wiped out, including the hangars and aircraft in Kermit Weeks' museum. His B-17 came to rest about a mile from the museum hangar. A C-46 ended upside down about a third of a mile from its parking place.

The Jet Center hangar, facing the hurricane, had the steel doors blown away and panels in the rear forced open, letting the full power of the storm flow through the hangar. All planes were pushed back to less than half the hangar floor space. The SNJ was pushed up the back wall, stopping when the tail went through the roof and the propeller was resting on the floor. Blue paint covers part of the Long-EZ upper wing surface, left by the SNJ as it scraped across the top of the EZ wing. The 180 was totally destroyed and the pressure of moving and compacting of scrap aluminum forced the 180's crushed wing under the EZ. This lifted one EZ wheel off the floor and delaminated a few square feet of the lower wing surface, but there seems to be no spar damage. Both rudders and winglets took a beating from flying debris and the bashing from the remains of crushed aircraft. The right wheel was doubled under at about a 30

degree angle. The remains of the Swift scraped the paint off one strut and one layer of glass on the strut is delaminated. No canard damage, no prop damage, no cowling or engine damage, and only cosmetic damage to the fuselage except for a broken canopy.

After removing the aluminum scrap blocking access to the EZ, I was able to walk the plane from under and behind the SNJ wing. When the pieces of the 180 were dragged from under the EZ, the wheel snapped back to its normal angle. Unbelievable! EAA Chapter 620 members, Mike Chenoweth and John Taylor, helped remove the canard and wings. Then, we loaded the bruised bird on a trailer and hauled it to my house for repair. Perhaps by Christmas, I will be flying again. Bruce Tifft can show everyone how his propeller stood up to Andrew and hail.

As a supplement to the "Sucker Hole" storm incident going to Oshkosh, I quickly checked for any crushing or cracking around the wing bolts after removing the wings. What a relief to find no signs of any damage or stress cracks. Again, thanks, Burt Rutan, for designing a strong aircraft. During 30 days, this Long-EZ suffered extreme stress and strain.

Now, let's continue to plan for the flight around the world next May through July.

Al Hodges

DAVENPORT SHIMMY DAMPER UPDATE

I'd like to report on a letter which was received from Mark Buxbaum of Richland WA. It seems, after making a series of "not so good landings" last summer, he experienced catastrophic shimmy on landing at Dubois, WY. This occurred with the Super Shimmy Damper installed!! After replacing the nose gear assembly with another complete assembly, including a Super Shimmy Damper, Mark continued on his way to Oshkosh with no further problems.

On returning home and checking over the failed nose gear assembly, Mark discovered he had bent the wheel disc on one of those "not so good landings". Run-out was found to be .020" which

he believes drove the nose wheel to oscillate beyond the capacity of the shimmy damper.

If that is correct, then we should all check our nose wheels for run-out regardless of the type of shimmy damper installed.

Mark did not indicated which type of wheel was installed, but my guess is his unit was of the single center disc type with the overhung wheel bearings. This wheel is very prone to bending and failing under a side load and could possibly provide a little excitement in your life similar to Marks' experience.

A far better choice would be a Gerdes nosewheel (part # NWA 1230 from Wicks). This wheel is made just like the main wheels and has proven to be very reliable in Mike's Long-EZ for more than 1000 hours.

I occasionally get requests for the Super Shimmy Damper from people who are near first flight. I feel I need to clarify the supply situation. I do not have a machine shop and, therefore, subcontract all parts to a high quality shop. I keep no inventory of parts or complete assemblies. I hold all orders until a total of 25 accumulate. That quantity is required to keep the delivered sale price to \$71.48. All checks are kept until two weeks prior to shipping. Save yourself a disappointment by ordering the unit when you can afford a waiting period that won't disrupt your schedule.

Bob Davenport

ANOTHER REPORT OF A CRACKED ENGINE MOUNT

W. A. Theeringer, Long-EZ builder/flyer, discovered several cracks in, or adjacent to, the welds on his engine mount. After 650 hours of flight, per the CP73 recommendation for inspection, hair line cracks were discovered. The engine mount was returned to Ken Brock where it was repaired. So far, with 10 hours on the repaired engine mount, he feels less low frequency vibration and the mount is holding up fine.

Do not neglect to inspect for cracks in your engine mount. This is very important. If you find any cracks, do not fly until they have been repaired by a qualified welder. Also, please send a report in to RAF.

CRACKING EXHAUST SYSTEMS

Tom Caughlin reports that there have been several examples of his own exhaust system, as well as Hal Hunt's exhaust systems, that have cracked. If you own one of these exhaust systems, please check it for cracks before your next flight.

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

Editor's comment: Seven years ago, I designed and built a four pipe exhaust system for my own EZ. It was essentially the same as what Tom Caughlin and Hal Hunt subsequently marketed. I had numerous failures, cracked pipes, cracked supports, all kinds of problems, some of which caused severe damage to my prop! My own solution was to weld a Brock ball joint into each of the four pipes which allowed some movement in the exhaust system. The pipes were connected in pairs with a slip-type connection. (Not welded together). This system has been in service for over 1000 hours with only a couple of minor cracks and no loss of pieces - and no damage to the prop.

Any four pipe exhaust system would have slip joints or Brock ball joints in each pipe. If not, they will crack. Check yours before next flight and get it fixed.

SHOPPING

FLUSH, INTERNALLY MOUNTED ANTENNAS

A complete line of antennas, specifically designed for, and flight tested on, composite aircraft. The antennas are tuned for maximum performance and, in general those who have used them so far, report reception is doubled over standard external antennas.

VariEze builder/flyer, Bill Butters, has started a company to develop a full range of buried antennas. These are normally supplied with a BNC connector built into the actual antenna, but can be supplied without connectors to include enough length of co-ax cable to facilitate easy installation with minimum weight and bulk.
Contact: Bill Butters
Advanced Aircraft Electronics
PO Box 4111
Florissant, MO 63032
1-800-758-8632

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 for 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 CPs 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 CPs 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) for \$24.00. Specify which you would want. 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

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 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 or Long-EZ)	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
Videos - Building the Rutan Composite	39.00
Go-A-Long-EZ	39.00

NEW FOUR PIPE EXHAUST SYSTEM

Nat Puffer has designed and tested a new exhaust system for his Cozy. He tells us it will fit any pusher, including a VariEze or Long-EZ. There are slip joints at the flanges to prevent cracking and stainless springs are included to retain the exhaust headers into the short slip joints. These exhaust systems can be ordered directly from the manufacturer: Custom Aircraft Supply

1318 Gertrude Street
San Diego, CA 92110
619-276-6954

\$500.00 includes shipping, handling and packaging.

Nat has had good luck with a heat muff wrapped around both #2 and #4 exhaust headers. There may, or may not, be enough room in an EZ cowl to do this.

FOR SALE

NOSE GEAR RATCHET

Dr. Curtis Smith's nose gear crank ratchet is still available at \$38.00 which includes postage and packaging. No need to call, just send check or

money order. 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

If you have ever tried to remove a tire from a 500x5 wheel you will understand what a neat tool this is. (Mike purchased one of these tools and wonders how he ever got along without it!) 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 - \$75.00.

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

AIRCRAFT COVERS

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

PLANS CHANGES AND OTHER IMPORTANT
MAINTENANCE INFORMATION

NO PLANS CHANGES THIS CP..

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.

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

FeatherLite
PO Box 781
Boonville, CA 95415
707-895-2718

Brock Mfg.
11852 Western Ave.
Stanton, CA 90680
714-898-4366

These suppliers are still the only authorized RAF dealers for all your various aircraft materials and components.

RAF recommends the following prop manufacturers:

Bruce Tiff
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

AIRCRAFT SPRUCE has opened a distribution center and order desk in England. They will handle the full line of homebuilt supplies and materials.

Contact: Aircraft Spruce
Unit 8, Cam Centre
Hitchin
Hertfordshire SG4 OTW
462-441-995

SOME OBSERVATIONS ON THE PTM&W
EPOXY SYSTEM

RAF has already received a few complaints about the newly recommended replacement for Hexcel's Safety-Poxy. Now hear this, People: When RAF learned that Safety-Poxy contained an unacceptable level of MDA, a known carcinogen, we immediately began testing various epoxy systems. The goals were as follows: 1) Must contain no known carcinogen. 2) Must have as good, or better, performance characteristics. 3) Should contain no styrene (causes allergies).

Close to 100 different epoxies have been looked at and, at this pint in time, the only system meeting all goals is PTM&W. In some ways, PTM&W is a little less desirable. It is more viscous and it takes more effort to wet out the glass. We have found that it works well when using a squeegee, but not quite as well when stippling with a brush. However, the PTM&W epoxy is as strong and slightly exceeds the "TG" or heat distortion point of Safety-Poxy.

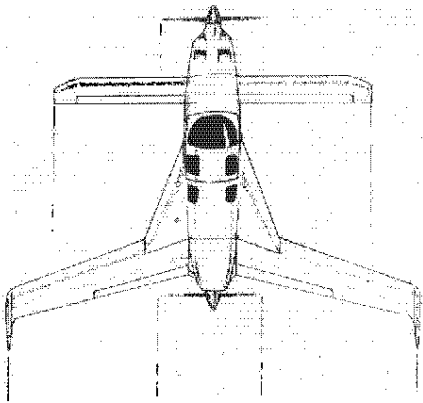
It is not perfect. Unfortunately, we live in an imperfect world but, the facts are that you do have a choice. Safety-Poxy will be available for the foreseeable future and no one is holding a gun to your head. If you prefer to use Safety-Poxy, that is your prerogative. RAF does not recommend using Safety-Poxy. If, for your own reasons, you must use Safety-Poxy, protect yourself from skin contact (wear protective clothing, gloves, etc.). Also, wear a respirator.

In spite of the workability of PTM&W being a little different, we are using it and getting used to it. We strongly recommend that you use it, too.



AHHH, THE GOOD OLD DAYS!!!

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



TO:

April '93

The line which appears above your name lets you know through which Canard Pusher you are paid. If your label says **LAST ISSUE CP 75**, then this is your last Issue, and you need to renew.

CP 75