THE CANARD PUSHER

No. 81

July 1995

Published quarterly (Jan., April, July, Oct.) by
RUTAN AIRCRAFT FACTORY, INC.
Building 13 - Airport
1654 Flight Line
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 81.
VariViggen (2nd Edition), newsletters 18 to 81.
VariEze (1st Edition), newsletters 10 thru 81.
VariEze (2nd Edition), newsletters 16 thru 81.
Long-EZ, newsletters 24 through 81.
Solitaire, newsletters 37 through 81.
Defiant, newsletters 41 through 81.

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: RUTAN AIRCRAFT IS OPEN TUESDAY ONLY. When you call on Tuesdays, please make it between 8:00am and 11:00am and 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.

RAF is no longer accepting multi-year subscriptions. Please renew only after your current subscription has expired.

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.

1995 OSHKOSH SCHEDULE

FRIDAY, JULY 28
10:00AM, TENT #3 - *"LONG-EZ, VARIEZE & DEFIANT"* - BURT AND MIKE

SATURDAY, JULY 29 -
8:30AM, TENT #2, DESIGN COLLEGE *"FUTURE CONCEPTS FOR PERSONAL AIRCRAFT* BURT.
10:00AM, TENT #3, *"LIFE, UNIVERSE & EVERYTHING ELSE"* - BURT AND JOHN RONCZ
11:30AM, TENT #3, - JOHN RONCZ.

SUNDAY, JULY 30
8:30AM - DESIGN COLLEGE - JOHN.
10:00AM, TENT #3, *"TENT TALK SHOW"* BURT AND JOHN.

EDITOR'S LAMENT

Please accept my sincere apologies for not publishing the April CP written and for being late with the July CP. I have been extremely busy with some jobs at Scaled that have caused me to put in 12 hour days, seven days a week, for the several months. By the time I get home in the evening, I have been too tired to do anything but eat and sleep! My own Long-EZ is languishing in my hangar with the recently overhauled engine on the floor awaiting installation. I have, literally, not been able to find time to complete the installation.

I had Mattituck do a full up "red engine" major overhaul last March and I am looking forward to getting her back up and flying - hopefully in time for Oshkosh '95 but right now that seems questionable

Again, I am sorry about missing the April CP. I look forward to seeing many of you at Oshkosh. This year RAF will not have a booth so Burt and I should be able to spend more time at the airplanes just talking about operational problems and such. Burt will be flying his Defiant, N85R, to Oshkosh since the Boomerang is not yet ready to fly (it is close, though). ED.

OTHER OSHKOSH NEWS

FROM CENTRAL STATES NEWSLETTER BY WAY OF MOM RUTAN:

The Hot Dog Roast will be held this year on Friday, July 28th after the evening airshow to allow more people to attend.

For details, check the notice board at the Flightline Homebuilder Building. (Note: RAF will not have a booth at Oshkosh this year).

GLASS OVERCAST 1995

TO ALL RUTAN CANARD AND CANARD-TYPE PILOTS EVERYWHERE:

This is to update you on the progress of the Glass Overcast events that are happening at Oshkosh.

The **mass arrival** is an event anyone with a Rutan or similar design can participate in, as long as they have a cruise speed of 120 KIAS, or better, at 3000 feet MSL.

The mass arrival briefing will start at **1000 SHARP!!!** Thursday, July 27th, 1995 at the EAA Chapter 838 hangar at John H. Batten International Airport, Racine, Wisconsin. After the briefing, the aircraft will stage from Batten Airport, fly in trail (NOT IN FORMATION) to a special arrival procedure, be announced to the audience at Oshkosh, and taxi to a specially designated area on the grounds. We will be parked all together just north of the Theater in the Woods, and there will be a special "Glass Overcast/Central States/Rutan" tent right in our parking area for our use!!

There is a block of rooms reserved for the night of Wednesday, July 26th at the Holiday Inn of Racine, which is within walking distance of the airport. Even so, there will be shuttle vans available to take you back and forth between the airport and the hotel. Just call 1-414-637-9311 (ask for Sheila) and mention the Central States Association to get the special rate on rooms.

If you want, you may go on to the convention site before Thursday and fly down in the morning on Thursday and fly back in with the group. **Just don't be late to the brief! Remember, it's about 90nm from Racine to OSH.**

The **mass formation fly-by** will occur during the Saturday afternoon airshow, on July 29th. **This is an event not everyone may participate in.** You must have been signed off by a Glass Overcast regional coordinator and have practiced with your group at least three times. The Western Region has already established 16 aircraft which can pass muster. Remember, a small flyby that looks professional is far better than a gaggle of unorganized, unwashed wannabes. Sorry for being blunt, but we are blazing a trail into the Oshkosh afternoon airshows for homebuilts, and we must make a very good first impression. 'Nuff said.

The mass fly-by of Rutan Canards will take place at this year's EAA Oshkosh Convention during the Saturday airshow. There will be a MANDATORY full dress rehearsal the day prior.

For those of you coming to Racine to join in the mass arrival, here is some additional information: The EAA Chapter 838 hangar is located on the west side of the airport next to the airport terminal building. The EAA Chapter will have coffee and donuts available for the early arrivals. **Remember the brief time, it's 1000 sharp, Thursday, July 27th, 1995. DO NOT BE LATE!** Racine is just south of the Milwaukee Class C surface area, so call in or stay clear. Also, it is just north of the Chicago mode C veil so grab your Chicago sectional (a current one) and note the location of Racine on the shore of Lake Michigan between Chicago and Milwaukee. Or you can just punch KRAC into your GPS and follow the steering.

Remember...the **mass arrival** occurs on Thursday, July 27th. Anyone can participate. The **mass formation fly-by** (a separate event) occurs on Saturday, July 29th, during the afternoon airshow. Participation is by qualified individuals only. Everybody got that? Good.

For More Information, Contact:
Steve Sorenson, 11133 Glade Drive, Reston, VA 22091 (703-860-2321) - Glass Overcast Coordinator.

Terry Schubert, 9283 Lindbergh Blvd., Olmsted Falls, OH 44138 (216-826-3055) - Pres. and Newsletter Editor, Central States Assoc.

Norm Howell, 4400 Knox Ave, Rosamond, CA 93560 (805-256-1643) - Glass Overcast Western Region Coordinator.

Gene and Ann Zabler, 48 Robin Hill Dr, Racine, WI 53406 (414-886-8315) - Wisc. State Rep., Central States Assoc.

Tim Bass, 719 Orchard St, Racine, WI 53405-2353 (414-632-0270) - Pres. EAA Chapter 838, Racine, WI (hangar tel. # 414-634-7575).

LETTERS

"Dear RAF,

Greetings from Houston... I had come across some information recently that would probably be of interest to EZ drivers and builders for your next CP.

I noticed in CP 79 your comments about using TCP to counter the effects of lead in the fuel. I had been suffering from sticking exhaust valves over the years in my 0-200 and finally had decided best to do a complete overhauls and install new (millennium) cylinders. The engine work was done by Dick Demars Aero in Fort Collins, CO. - they do excellent work and I highly recommend them to anyone contemplating an overhaul. At their suggestion, I've started using "Av-Blend" an oil additive that is supposed to be a big help in preventing exhaust valve sticking. Although it is too soon to tell (I've only 100 hrs. SMOH), I have been using it at each oil change and subjectively, (sound, smoothness) it seems to be helping. I'm told that TCP will help in the lead fouling area, but ultimately won't solve the "caking" of oil that occurs on the valve stems. The Av-Blend folks sent me some technical data on their product which I'm forwarding to you. I get mine from Engine Additives, Inc. in Humble, TX (800-672-7262), but it is produced by TechniFlyte Corp. in Chicago (800-209-0083). They've got some fairly impressive test results to back up their claims.

There are two very interesting NASA reports available to the public that were written in '85 and '86 on the results of the wind tunnel te ts they did on the full scale VariEze and the 2 scale VariEze. One is about 80 pages, the oth 60, and they are full of interesting data on t basic aerodynamic characteristics as well as t aircraft's stability and control parameters. I m sure you at RAF have seen them - but it is t generally known that copies can be obtained anyone wanting to add to their "canard-push library". They are excellent reference mater for anyone flying an EZ. They are availal through the National Technical Informati Service by calling 1-800-553-6847. The fi report is entitled "Wind Tunnel Investigation the Flight Characteristics of a Canard Gene Aviation Airplane Configuration". The docum number is NTIS No. N-87-10039. (NAS Technical Paper 2623). The second is entitl "Wind Tunnel Investigation of a Full Scale Can Configured General Aviation Airplane (NASA TP 2382). The document number is NTIS No. N-8 19935. The only hitch is they aren't free - th are about $19.50 each, but they will take yo order by phone at the NTIS 800 number if you a credit card.

Deep Stall info update: I was perusing these wi tunnel reports recently when I noticed interesting piece of data about high angle attack characteristics of the EZ. I remember couple of years back when we had our discussio about the Long-EZ deep stall incident th someone had asked about the possibility th engine power could aid recovery. At the time think we concluded it would not since the thr line was basically through the cg. However, wind tunnel data does show a fairly signific restoring moment is added in the pitch axis going from idle to full power - about as mu nose-down moment as the elevator provides, at high angle of attach of a deep stall. A good pie of data to keep in your hip pocket should you e encounter a deep stall inadvertently. Applyi full power could aid in recovering an EZ - this a characteristic of pusher prop configuration.

Well that's about all for now in the airpla department - I'm fully engaged in training for next shuttle fight scheduled for this June. I been assigned as pilot on the Atlantis crew with mission to take two Russians up to the Russ MIR Space Station. We'll be making the first e docking of a space shuttle with another spa shuttle. Two 250,000 lb. vehicles will cor

together at little over 1/10th of one foot per second relative velocity. It's an interesting (and fun) flying task. This is also the first time we've docked with the Russians since Apollo-Soyez in 1975. We'll remain docked for 5 days and will leave the 2 Russian cosmonauts on board their MIR station and will bring home the 3 crew members who are up there now (2 Russians and an American - our first to fly on a Russian craft). They will have been there 90 days when we arrive so will probably be ready to come home. If all goes on time, I'll look forward to seeing you again at Oshkosh.

Fly Safe,
Charlie Precourt"

Ed. Note

We concur with Charlie on the use of engine power to aid in recovery from a deep stall in a canard pusher-type. In fact, we used this successfully on several occasions during high angle of attack testing of the Mercury aircraft, a development of the Microlite which was designed and built for Colin Chapman, Lotus Cars of England.

ACCIDENTS AND INCIDENTS

As always, the following reports are published for the sole purpose of helping others to avoid the same problems that caused the accidents.

BRUCE AND BONNIE TIFFT

Synopsis of Accident - N115EZ was a highly modified aircraft based on the Long-EZ.

Powerplant--although there was no data plate installed, this appeared to be a Lycoming IO-360-B series, angle valve, 200 HP engine.

The accident occurred on the morning of March 18, 1995 on the Tiller Trail Highway approximately 20 miles east of Myrtle Creek and 30 miles southeast of Roseburg, Oregon, only 55 miles from their departure point of Cottage Grove, Oregon.

Weather in the Roseburg area at the time was reported to be 3000 ft. overcast with good visibility. The overcast began to break up south of Roseburg and it was CAVU south of Myrtle Creek.

Based on all of the findings, it appears that the engine was not turning at the time of impact. Therefore, it is assumed that an engine related problem drove Bruce to attempt an emergency landing on this rather narrow mountain road near Tiller, OR. He appears to have approached from the south, made a left base to the west to line up on the road. The blacktop road bed is only 20 feet wide with approximately 6 foot wide shoulders on each side. There is a rocky hillside on the left side and a steep drop-off on the right, sloping down to Elk creek which roughly parallels the road. The airplane struck the tops of several pine trees which flexed and gave way but, unfortunately, the left wing then hit a large oak tree which tore this wing completely off the airplane. This caused the airplane to roll/yaw left where it impacted against some rocks in a nose low attitude, with at least 90° of left roll. It then bounced/slid down the slope into the rain swollen Elk creek where it came to rest. Forward of the firewall, the fuselage was submerged. The engine cowling, engine, right wing and right winglet/rudder were not under water. Both occupants were killed instantly by the impact and did not drown.

The prop was stopped in the horizontal position. The right prop blade was completely undamaged, while the only damage to the left blade was that the outboard 8" was bent/broken straight aft, not at an angle against the direction of rotation as it would have been if the engine was turning or developing any power. This damage to the tip was caused by the left wing root as it was torn aft by the oak tree. There is evidence of yellow paint on the prop tip as well as on the left exhaust stack which was dented by the left wing root as it departed the airplane. The cowling was essentially undamaged, as was the right fuel tank/strake, right wing and right winglet/rudder. The engine was undamaged and still attached to the engine mount and firewall. The main landing gear also suffered little damage. The left side of the fuselage, aft to the centersection spar, including the left fuel tank/strake, was destroyed. The right fuselage side was destroyed aft to the leading edge of the right stake. The canopy was also destroyed. The instrument panel was heavily damaged, making it impossible,

except for the radio, to determine the position of any of the switches. The control system was severely bent and even broken in several places, but all parts were recovered and all failures were due to massive overload. It is believed that the airplane was under control until impacting the oak tree and, it is the opinion of several of the accident investigation team that the pilot would probably have landed successfully, if he had not struck the oak tree.

Considerable damage was done to the airframe by the salvage crew while removing the aircraft from the creek and transporting it to the police impound area in Myrtle Creek. Although this was taken into account during the investigation, we may have been able to learn a great deal more had the salvage been supervised by someone intimately familiar with this type of aircraft. The NTSB would not allow any examination of the wreckage by us until a representative from Lycoming, Mr. Greg Erickson, had completed his inspection. He, together with a representative from the FAA, arrived several days later, removed the cowling, and discovered that the engine had "non standard" cylinders, ignition systems and carburetor. Also, the engine data plate was missing. At this point he concluded his investigation and left. He later called Fergus Fay, who had requested to be present at the investigation (but was not notified) and told him of the "non standard" nature of the engine. He said that with no data plate, non standard cylinders, a non standard ignition system and "other modifications", he considered that it was no longer a Lycoming product. NTSB lost interest immediately, and within 48 hours the FAA turned the wreckage over to the insurance company who released it to the family who, in turn, gave permission to Ferg Fay to conduct an inspection of the engine.

Ferg removed the engine from the aircraft and transported it to his home where he suspended the engine in level flight attitude and drained the oil. There were only 3.8 quarts in the crankcase. The engine was initially very tight and it took a measured 1200 inch pounds of torque to break it loose. A compression check was conducted with the following results:
Cylinder #1 - 40/80 - leaking from the exhaust valve.
Cylinder #2 - 50/80 - leaking from the exhaust valve and the rings.
Cylinder #3 - 75/80 - slight leak by the rings but OK.
Cylinder #4 - 20/80 leaking from the exhaust valve and the rings.
The valve clearances were checked with the lifters compressed and were found to be between .028 and .066 (the Lycoming standard spec. is .028-.080). The three worst cylinders were removed (cylinder base nuts were found torqued to 450-500 inch/lbs.) and carefully checked with a micrometer and a dial indicator. The bore diameter and choke were consistent with Lycoming standards. Definite, light scoring was found in the upper cylinders. The top compression rings were removed from the pistons and the ring gaps were checked. They were found to vary from .010 to .040. These rings were found to have unusually sharp edges, particularly for so little running time.

There were no magnetos on the engine. The left mag hole was covered by an aluminum plate. In its place, a Jeff Rose electronic ignition system module was used. Instead of the right mag, there was an automotive type electronic ignition system of unknown origin, complete with distributor cap, rotor and automotive high tension cables. On disassembly, the distributor cap was found to be cracked and the center carbon was broken and found lying loose under the distributor cap.

Ellison throttle body (carb) looked OK but the throttle linkage had been bent during the crash making it impossible to move the throttle slide. There was fuel in the right fuel strake and, although the linkage had been badly bent in the crash, the fuel shutoff valve was in the on position. When the fuel line was disconnected at the firewall, fuel ran out.

The crankshaft flange was checked, using a dial indicator, and the total indicated runout was only .002". The case was not disassembled because, at this point, the family sold the engine.

Analysis

Bruce had recently overhauled this engine using four new Superior millennium cylinders, pistons, valves, guides, etc. He had reported that the engine was running very hot but that it was using no oil! It is not normal for a newly overhauled engine to use no oil. The condition of the baffling verified the report of a hot engine. It was obvious

that he had been working hard on tightening up all baffle leaks. There was an extraordinary amount of RTV all over the baffling and cylinders. We have learned that Bruce had ordered a new digital scanning cylinder head temperature gauge just the day before the accident (further indication that he had high temperatures). There are no logs to verify the engine running time since the overhaul but it is believed that he had only flown it about 5.5 hours before departing for Mojave, CA around 7:30am on March 18.

The crash site is 55 miles south of the Cottage Grove airport suggesting that they probably were airborne for only about 20 minutes. Assuming Bruce topped off his oil, which was his usual habit, how could he have used 3 to 4 quarts of oil in only 20 minutes? There were none of the usual signs of heavy oil use, the tops of the pistons were not heavily carboned up, nor were the exhaust stacks excessively oily or sooty. The light, but definitely noticeable, scoring in the upper portion of the new cylinders is indicative of tight rings; the unusually sharp edges found on the compression rings indicates excessive wear caused by tight rings and/or overly expanded pistons, caused by excessively high cylinder head temperatures. Compression ring gaps were measured at .010-.040 (Lyoming spec. calls for a minimum gap of .030-.045 in a nitrided, choked cylinder barrel). There is, however, no evidence that the engine actually seized (at least, in the cylinders).

Compression reading as low as 20/80 in essentially new cylinders is indicative of possible ovalizing of the barrels due to extremely high cylinder head and cylinder barrel temperatures. This condition would cause unusually high pressure in the crankcase due to ring blow-by and could have blown a lot of oil out of the breather. Since Bruce's breather system dumps into the exhaust system, all evidence of this loss of oil would be eliminated by being burned in the exhaust stack.

It could not be determined if the cracked distributor cap or the broken carbon existed prior to impact, so it is not known if the experimental ignition systems contributed to the cause of the accident. It is a fact, however, that if Bruce had suffered a complete electrical failure, both of these ignition systems would have eventually cease to function. The battery was never found and it is assumed that it is at the bottom of the creek.

Summary

While weather was probably not a direct factor, the ceiling between Cottage Grove and Roseburg was reported to be around 3000 ft; we assume that he remained below these clouds. This would account for the fact that he did not have enough altitude to glide west to more favorable terrain. From 7500 ft, for example, he could have reached open, flat fields near Canyonville, east of Interstate 5. From 3000 ft, he was little more than a normal pattern altitude above the Tiller Trail, leaving him with no other choice. On reaching clear skies, southeast of Roseburg, he may have initiated a climb. Adding power at this point may have exacerbated the high cylinder temperatures problem and he may soon have felt compelled to reduce power to near idle. The engine might have stopped because of the internal friction evident by the upper cylinder scoring and ring wear. Had the engine been developing any power at all, it is certain that Bruce would have nursed it over to one of several airports that were less than 20 miles away., His radio was still on 122.8, the frequency used at Cottage Grove. He probably did not have time to switch to 121.5 and declare an emergency.

Bruce was the epitome of the experimenter and was always testing some new idea on his airplane. In this case, however, what with two different electronic ignitions systems, two different types of spark plugs, new design, relatively un-proven cylinders, a non standard crankcase breathing system, etc., maybe he was simply trying too many new things at one time. Bruce had a history of high oil temperatures with this engine, even before this latest overhaul, and he had installed a larger than normal oil cooler. This oil cooler was installed in an unusual position - just inside the engine cooling air inlet, in the cowling, where it looked as though it would impede the flow of cooling air to the cylinders. This is not a normal oil cooler installation and may have contributed to his high temperature problems.

Perhaps the lesson for those of us who fly these little airplanes is to try only one new idea at a time. We need to recognize the wisdom of FAA's requirement to test any "major alteration" in a

suitable test area prior to returning to "normal" operations. Completely evaluate each new idea, one at a time, accept or reject it, then go on to the next new experiment.

Mike Melvill

PS. I have recently been in touch with the person who bought Bruce's engine and he has a few interesting observations. First of all, he says the weather in Cottage Grove that morning was much worse than the weather reported at Roseburg. He believes that there was no more than an 800 foot ceiling with poor visibility. Furthermore, he says at least one other aircraft departing from Cottage Grove to fly to Roseburg that morning, was forced to return to Cottage Grove due to low ceilings and bad visibility.

While he has not torn down the engine, he did look at the mechanical fuel pump. He found that it contained only water, no fuel. This may, or may not, be significant. Since the aircraft ended up in a river, it is possible that the fuel system got water in it directly from the river. However, I can think of no way that water could get into a mechanical fuel pump if the pump is not operating, (The engine was not turning at impact) especially if the fuel lines between the mechanical fuel pump and the carburetor were intact. The same person, who has the hangar next to Bruce's on the Cottage Grove airport, says that Bruce fueled up his airplane the night before his planned flight to Mojave, by way of two Jerry cans. He had never seen Bruce do this before and it is possible that one, or both, cans may have had water in them. This scenario would require that only one fuel tank got contaminated by water and that they took off on the "clean" fuel tank, then switched to the tank with water close to the accident sight.

All of this is supposition, none of it is hard proof, and I am very sad to say that we may never know exactly what it was that caused us to loose our friends, Bruce and Bonnie. They were neat people and will be sorely missed by all of us in the sport aviation arena.

Mike M.

A Texas VariEze which was <u>not</u> built by this pilot but was purchased as a completed airplane, crash landed short of the runway due to a throttle control system anomaly that this pilot was unfamiliar with. This VariEze was equipped with an electrically operated nose gear system. Letter follows:

"On April 8th, my VariEze was force landed after the throttle stuck in the closed position while approaching Addison Field for a landing.

The pilot had been practicing formation flying with a Long-EZ flown by a friend. The pilot had been cleared for an approach, as a flight of two, into Addison. Approximately one mile from the runway, the tower requested that the flight reduce speed to the minimum possible to enable a twin on right base to land ahead of the flight. In complying with this request, power was reduced to a minimum. Shortly before this power reduction, the pilot noticed that the knob of the throttle control lever had dropped off. One part of the knob was retrieved and placed under the pilots thigh for safety.

When the time came to open the throttle to maintain altitude and continue the landing procedure, it was found the throttle would not open more than a half inch. A determined effort to force the throttle open was unsuccessful. The limited opening provided insufficient power to maintain altitude and it was not possible to stretch the glide to reach the runway. It was difficult to try and resolve the problem and fly the aircraft safely at the same time, so the decision was made to concentrate on landing safely. A field that seemed to have fewer wires and other nasties, became the option. The landing was made safely and the aircraft rolled three hundred and fifty feet before being launched back into the air by a sharp rise in the ground. The aircraft then flew over a road and landed on a bank on the other side of the road. The impact came with the plane level but descending almost vertically - what might be termed a genuine pancake. The distance between impact and final stopping place was about ten feet. Damage was extensive; nose gear, which did a great job in absorbing kinetic energy; main gear, folded back; and extensive damage to the fuselage in the attachment area. The landing gear fork, broken by the impact and then folded back under, came

through the fuselage floor, through the thigh support and the seat and cut into the pilots right thigh. Far more destructive was the remains of the electric landing gear which tore loose and destroyed the instrument panel bulkhead, both the radio and transponder, the turn and bank as well as severely bruising the pilot.

The cause of the throttle problem: The aircraft had had a plans built cable throttle originally. This was later changed to a push/pull, Morse cable which was different from the original in requiring a straight motion from the bottom attach point of the lever. This was achieved by making a second lever, longer from the fulcrum to the lower attach point than the original but using the same fulcrum and control knob pattern. Instead of removing the original lever, the second lever was placed alongside the original, such that both moved together, although the original was now no longer functioning or attached to a cable. When the knob which went through both levers came off, there was no longer any restraint to prevent the levers from moving independently. One fowled against the other and jammed.

With more altitude and thus more time to fiddle around, the problem might have been overcome, or if the pilot had been aware of the way the system had been installed, he might have come up with a way to overcome the jamming. On the other hand, given the circumstance, making the decision without delay and maintaining control probably was a contributing factor in the limited damage the pilot and aircraft sustained.

I am concerned that builders who have installed electric nose landing gear activation may be in for a rude shock if they ever have an off field landing. The operating mechanism is heavy, and potentially a lethal weapon if it comes loose in an accident. I would strongly recommend to those contemplating the use of this gear to have another think. The only thing that saved me from injury from the gear was the almost zero forward speed on impact. I do not want to think about what that bloody great torpedo shaped missile would do to one in a frontal impact situation. When this aircraft is rebuilt, it will definitely have a plans built nose gear."

A Southern California Long-EZ crashed shortly after departing from the Santa Monica airport. The pilot survived but was badly injured.

A careful post-crash investigation revealed that this airplane's fuel system had been extensively modified by removing the engine driven mechanical fuel pump as well as the electric boost pump. The fuel tanks had been plumbed together to form a gravity fuel system similar to a Cessna 150.

This pilot had also modified the front seat shoulder harness attach point and had installed a "Y" type shoulder harness, installed using a single bolt in the center of the seat bulkhead. There was no provision to carry the crash loads, no hardpoint and no beef-up of the bulkhead skins. The result was predictable. This single bolt pulled through the seat bulkhead and the should harness provided zero restraint. The seatbelts were installed per the plans and survived undamaged.

This is an absolute No-No! **RAF** Thoroughly explored the possibility of a gravity fuel system for the Long-EZ back in 1979 using the prototype, N79RA. Flight test results forced us to conclude that the margin of safety using a gravity fuel system was too slim and we opted to use a fuel system similar to a Grumman Tiger or Cherokee that includes two separately selectable fuel tanks, an electrically powered in-line fuel boost pump and an engine driven mechanical fuel pump. All of the above are mandatory in order to provide reliable fuel delivery to the carburetor on a typical Lycoming-powered Long-EZ,. This information was published in several *Canard Pushers* as well as in the plans and engine installation instructions. The following is taken from page 3 of the Section IIL of the Long-EZ plans:

"The most important item to consider is the mechanical fuel pump. The Long-Ez's fuel system is designed to require the use of an engine driven mechanical fuel pump, backed up by an in-line electric pump. This is a mandatory requirement and there is no acceptable way around it."

This important safety requirement was not just dreamed up, it was derived from a carefully conducted flight test program -- do not try to second-guess the designer's motives behind critical systems such as the fuel system. The plans built fuel system on the Long-EZ is an

excellent, trouble free system that is known to work on hundreds and hundreds of airplanes.

If you know of someone who may be contemplating a change to his or her airplane like this, get involved, help him or her out, don't let another unnecessary accident happen.

PLANS CHANGES AND OTHER IMPORTANT MAINTENANCE INFORMATION

NONE THIS ISSUE

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 manufacturer:

Ted Hendrickson
600 Superior St.
Concrete, WA 98237
206-853-8947

SHOPPING

MOLDED VORTEX GENERATORS

CCI is pleased to announce the availability of pre-molded generators. Specially engineered for aircraft application, the 1" long by 0.40 high device is injection molded from U/V resistant polycarbonate material.

The design has been engineered so the "sail" is stiff enough to impart the desired energy into the boundary layer but flexible enough to resist breakage from "hangar rash" and the curious. Because they are molded from light weight polycarbonates rather than cut from extruded aluminum, these pieces are less likely to cause injury, chip paint or cause propeller ingestion damage on pusher aircraft. Available in white, they can also be custom molded in quantity to match specific paint colors for aircraft manufacturers and OEM suppliers. Coloring does not compromise their ability to withstand harmful ultra-violet radiation.

The gluing surface of each generator is flexible and slightly concave to facilitate adhesion to either cambered or flat surfaces. The perimeter of each base is feathered to blend seamlessly onto the surface to which it is attached. After installation, the sail appears to be molded an integral part, rather than and "add-on". The final result not only looks better, it performs better than typical hand-made aluminum fences. Molded vortex generators adhere better, do not corrode, require no painting and are easy to install: one Long-EZ canard can be equipped with a full span of generators in less than 90 minutes.

Effective may 15, 1994, a kit containing fifty generators is available for a price of $25.00 plus $2.00 shipping and handling per kit. Two kits are sufficient to equip the full span of a typical canard (i.e. Long-EZ, Dragon-Fly, et al) or both ailerons on either canard or conventional planforms. Documentation is included. Please send check or money order to:

CCI
PO Box 607
Plainfield, NJ 07061-2318

Please allow 2-3 weeks for delivery, Sorry, no COD's. For more information 6:00-10:00pm EST, Mon.-Fri. 908-757-9573
908-755-9639 FAX

Note: These vortex generators are not TSO'd for use on type-certificated aircraft.

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

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

FEATHER LITE HAS BOUGHT BRUCE'S EQUIPMENT FROM B&T PROPS AND WILL MAKE AN ANNOUNCEMENT SOON AS TO WHEN THEY EXPECT TO START PRODUCING PROPS. HOPEFULLY VERY SOON.

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	25.00
Go-A-Long-EZ	25.00

TITANIUM ACCESSORIES AVAILABLE!

Custom anodized in 15 different colors,
Rudder and aileron gust locks - $20.00-30.00.
GU canard full span vortex generators with layout template - $170.00. These are hot looking !
Contact: Mike Rhodes
PO Box 1052
Grover Beach, CA 93483-1052
805-489-8155

F-16 DEEP STALL INCIDENT VIDEO
Gives a pilot's-eye view of a deep stall which almost doesn't recover. Includes a letter describing what the important learning points are from the video, especially as they apply to EZ pilots who are unfamiliar with deep stall, as well as a transcript of the audio portion (for clarity).
Price - $13.00.
Contact: Charlie Precourt
7015 Little Redwood Dr.
Pasadena, TX 77505-4433

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. $35.00 per set.

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

NOSE WHEEL SHIMMY DAMPER

Bob Davenport tells us that he can still supply this excellent damper. Unfortunately he gets very few orders nowadays but can sell them even if he gets only <u>one</u> order. Including the set up charge, the cost is $236.00 delivered in the USA.

Contact: Bob Davenport
PO Box 650581
Vero Beach FL 32965-0581
407-567-1844

NEW STARTER FOR 0-200 CONTINENTALS

B&C Specialty introduced a beautifully made, 12 volt starter specifically designed to be installed into the accessory housing on a Continental 0-200 engine, or on an 0-240. This starter has been thoroughly tested at Teledyne Continental (more than 5000 start cycles without a single problem!).

Bill Bainbridge has these starters available for immediate delivery and they can be had STC'd or for homebuilts.

Contact: B&C Specialty Products, Inc.
123 East 4th Street
Newton, KS 67114
316-283-8662

PS If you did not see this jewel at Oshkosh 1994, you should try to see one soon. They are really objects 'd art! ED.

0-235-C1 w/accessory case. Slick mags, starter, alt., fuel pump, vac. pump, carb AD'd, no prop strike, 1800 TT logs. Light rust found in cylinders. Needs TOH. $2200.00

62x66 B&T prop (60 hrs.).
3" extension.
Brock exhaust.
Air valve and intake elbow.
Call for prices on above items.

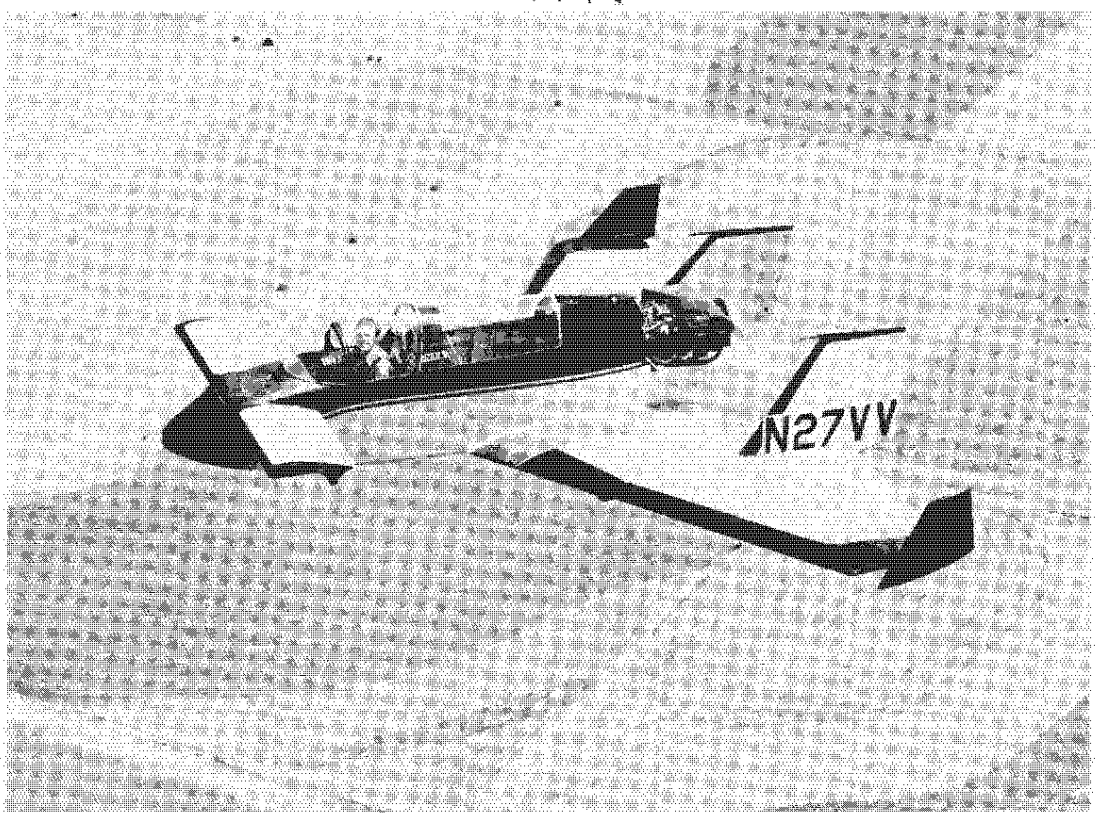
Contact: Francois Choquette
187 W Plumtree Ln. #61
Midvale, UT 84047
801-566-6102 (H)
801-565-4674 (W)

<u>FOR SALE</u>

Removed from Long-EZ, N26MS, in order to install a new Allegro CHT/EGT engine analyzer:
2-1/4" digital EGT/CHT gauge by Electronics International. Includes a 4-way switch and all necessary wires and CHT and EGT thermocouples (bayonet-type CHT probes) -- $150.00

Also, 2-1/4" Electronis International digital volt/amp meter. Includes shunt and installation manual. Original cost, $148.00 - only $60.00.

Contact: Mike Melvill
24120 Jacaranda Dr.
Tehachapi, CA 93561
805-821-1805 (H)
805-824-4541 (W)



How about this for something from the past! Circa 1974 (?) A young Burt- first flight - up and away - of his original VariViggen prototype. Note wingtip end plates and lack of cowling

RUTAN AIRCRAFT FACTORY
1654 Flight Line
Mojave, CA 93501

TO:

APR. & JULY: 95

The line which appears above your name lets you know through which *Canard Pusher* you are paid. If your label says **LAST ISSUE CP81**, then this is your last issue, and you need to renew.

CP 81