

# THE CANARD PUSHER

No. 60

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by

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

VariViggen (1st Edition), newsletters 1 to 60.  
VariViggen (2nd Edition), newsletter 18 to 60.  
VariEze (1st Edition), newsletters 10 thru 60.  
VariEze (2nd Edition), newsletters 16 thru 60.  
Long-EZ, newsletters 24 through 60.  
Solitaire, newsletters 37 through 60.  
Defiant, newsletters 41 through 60.

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 AND FRIDAY FROM 8:00 AM TO 5:00 PM ONLY. If you have parts that you would like us to see and/or would like to drop in, please make it Tuesdays and Fridays if you can. If you need to come other than those days, please call so we will be sure to be here. When you call on Tuesdays and Fridays for builder assistance, please give you name and serial number. It is required before you can be put through to Mike. This is a company policy and we must adhere to it.

When writing to RAF, send along a stamped, self addressed envelope if you have builder's questions to be answered. If you are placing an order, it's best to keep it separate from a request for an answer.

## OSHKOSH 1989

Burt will be speaking four times at Oshkosh this year. Each forum will be held in Tent #3 on the day and at the times listed below.

Friday, July 28 - 1:00-2:15pm - Topic: General Aircraft, Scaled Composites' Development Projects.

Saturday, July 29 - 2:30-3:45pm - Topic: Builder Support (with Mike Melvill).

Sunday, July 30 - 11:30am-12:45pm - Topic: Darwin-Our Aviation Designer.

Monday, July 31 - 1:00-2:15 -Topic: Pond Racer (with Dick Rutan).

## CAFE 400 - 1989

Klaus Savier won overall at Santa Rosa in his remarkable VariEze. He averaged 158.5 MPH getting an unbelievable 47.73 MPG while carrying the equivalent of two 200 lb. people! Outstanding, Klaus, keep up the good work.

Gene Sheehan, in his phenomenal Q-200, narrowly beat Gary Hertzler in his 85 HP VariEze for the second and third places. All three got scores well over 2 million, considerably higher than any of the competition.

It is quite amazing how much performance and efficiency is being squeezed out of these little glass airplanes. Competition like this is what improves the breed. Who would have thought, a few years ago, that a VariEze powered by a Continental O-200 would ever turn in a speed of 222 MPH over a measured course? Klaus Savier did at Sun-and-Fun in the Sun 60 Race, only 2 MPH behind a 180 HP retractable gear Glasair!

## SOLITAIRE NEWS

Don Wemple tells us he has been flying his new Solitaire and self-launching, using his KFM engine. His latest letter tells us he has 8

hours on the self-launching sailplane and he promises a complete flight report which we hope to bring you in a future CP.

Herb Abrams is ready to fly his Solitaire. He hopes to have accomplished his first flight before Oshkosh. He also intends to have his Solitaire at Oshkosh. Be sure and see this one if possible - he has the most ingenious engine installation with an amazing retraction/extension system that flips the engine over as it retracts, allowing a much larger diameter geared prop. Should really do something for rate-of-climb.

### SUN 60 RACE RESULTS

The Questair Venture blew the doors off everybody, including a 420 HP turbo-prop powered Glasair III and three other Glassair III's with an incredible 293 MPH lap. Klaus Savier was the fastest EZ followed by the Long-EZ's of Verne Simon, Tom Coughlin, Stan Sniderman and Dave Ronneberg, all of whom turned in speeds in the 214 to 216 MPH range - pretty impressive.

KANAB HONK OUT '89. (A Shirl Dickey race similar to the Jackpot and Wendover races, and new for '89)

Again it was Klaus Savier in his speedy VariEze winning over the 96 mile course at 218 MPH. Dave Ronneberg turned in a 215 MPH lap in his Long-EZ followed by John Hayes (Long-EZ) at 211.8 MPH, Tom Coughlin (Long-EZ) at 208.4 MPH, Vance Atkinson (Cozy) at 208.1 MPH and Bruce Tift (VariLong) at 207 MPH.

This "new for 1989 race" was lots of fun. Kanab, Utah is a beautiful place and the people of Kanab were very friendly and want the race back next year. Put this one on your calendar.

### JACKPOT 125 PROFICIENCY RACE

This was the 7th annual running of this race and it was fantastic. Shirl Dickey outdid himself this year. Glen Campbell was the entertainer on Saturday night and there were over 70 glass airplanes on the ramp. Five

classes of races were all flown safely over the "now familiar to most EZ drivers" 125 mile course. The terrain forces pilots to fly this race at 6500 MSL or above. Even so, there were some pretty amazing speeds turned in.

Dick Rutan won the Ribbon Cutting Contest as well as the Spot Landing Contest. The ribbon cut is fun. A Cessna 172 releases a roll of toilet paper 3000 feet above the ground. It unrolls to make a long streamer. The contestant attempts to cut the paper streamer as many times as possible before reaching 1000 feet above the ground. Dick hit it 8 times! Second place, with 6 cuts each, was shared by Dave Ronneberg, Vance Atkinson and Mike Melvill.

All told, there were 75 aircraft which flew in for the Jackpot weekend, 2 Spam Cans and 73 glass birds - a marvelous get-together, enjoyed by one and all. Don't miss it next year!

Remember, Wendover race is over the Labor Day weekend in September at Wendover, Utah.

### VARIIZE CLASS (Per Plans)

1) Shirl Dickey	Cont.0-200	201.43mph
2) John Lambert	Lyc. 0-235	200.58mph
3) Bob Pauson	Lyc. 0-235	199.09mph

Wow, a close race and a first for VariEze's to break 200mph.

### STOCK LONG-EZ (Per Plans)

1) Bob Campbell	Lyc. 0-235	194.70mph
2) Mike Marker	Lyc. 0-235	179.29mph
3) Gary Spencer	Lyc. 0-235	179.18mph

### SUPER STOCK LONG-EZ (0-320 Eng., Per Plans Airframe)

1) Dave Ronneberg	Lyc.0-320	222.45mph
2) Dick Kreidel	Lyc 0-320	220.60mph
3) Doug Shane	Lyc 0-320	219.22mph

### SUPER MODIFIED (Mod. Eng., Mod. Airframe)

1) John Chambers	Lyc. 0-235/VE	222.45
2) Klaus Savier	Cont. 0-200/VE	217.96
3) Howard Drolling	Lyc. 0-235Lanair	194.02

### UNLIMITED EZ (Non-Turbo, Anything Goes)

- |                 |                      |        |
|-----------------|----------------------|--------|
| 1) Mike Melvill | Lyc.0-360/LE         | 225.55 |
| 2) Wes Gardner  | Lyc. 0-320/VE        | 214.05 |
| 3) Bruce Tift   | Lyc. IO-360/VariLong | 211.97 |

### EXHIBITION CLASS (Anything Goes!)

- |                |                      |        |
|----------------|----------------------|--------|
| 1) Burt Rutan  | Lyc. TIO-360/Catbird | 242.09 |
| 2) Dave Goetz  | Lyc. 0-360/Lancair   | 225.21 |
| 3) R. Rodewald | Lyc 0-360x2/Defiant  | 191.84 |

B&C SPECIALTY PRODUCTS will be at OSHKOSH '89 in Booth C-11. Their lightweight starter is now STC - PMA'd for all Lycoming engines (O-235 through IO-360, 12 & 24 volt). The price is still the same for homebuilders while the STC'd version is priced a little higher. The Linear Voltage Regulator (low noise LR-2) and sealed immobilized electrolite batteries continue to give good service. Bob Nuckolls from the Aero Electric Connection will be giving forums on electrical systems (3:30am Sunday & Tuesday; 10:00am Thursday). These will be very educational open forums so bring your questions. If you can't make the forums, Bob will be at B&C's booth, C-11 to talk to you during OSHKOSH '89.

### THE AERO-ELECTRICAL CONNECTION.

Specifically, a very smart electrical engineer named Bob Nuckles, is alive and well. Bob can help with wiring and electrical problems and his newsletter is well worth subscribing to. Bob will be at Oshkosh and will be conducting a couple of seminars consisting mainly of question and answer sessions. If you have any electrical questions, wiring, radios, loran, etc., don't miss the opportunity to get help in person from Bob. His forums will be at 3:30 pm Sunday and Tuesday, and 10:00 am Thursday.

### FLYIN AT FOX FIELD, LANCASTER, CA

Sponsored by the Rotary Club, George "Pop" Rutan is helping to organize this show which will feature Bob Hoover and many other well know acts. "Pop" says he will have a protected tiedown area for homebuilts, display aircraft

and other aviation related objects. All are invited to fly or drive in on Sunday, September 24, 1989.

### ACCIDENTS AND INCIDENTS

LOSS OF POWER ON TAKE-OFF. (PIREP from Bill Perry).

"I am sorry to have to report an off airport landing with my Long-EZ due to loss of power on take off. The result was damage to the landing gear, canard and left wing.

The Long-EZ, serial no. 132, is powered with a Continental O-200 and has been a joy to fly for the past two years and 200 hours flight time. Recently, I flew the Long-EZ to a nearby airport in Alabama for an "Aviation Day" event. About an hour after landing, I was to participate in a flyby. It was about 12 minutes after I started the engine, with outside temperatures near 90 degrees, before getting into takeoff position. The oil temperature was up to 200 degrees and I was considering cancelling the flight when we were cleared to go. Even though the engine was very warm, the temps were in the green and a crowd was watching, so I decided to takeoff. The takeoff roll was normal although an observer later told me that he saw what appeared to be smoke coming from the engine. The climb seemed a little sluggish and, at approximately 60 feet, the engine lost power.

I verified that the booster pump was on and, pumping the throttle, got a couple of very brief surges of power. The flight was so short and I was so busy looking for a place to land that I did not look at the fuel pressure and did not attempt to switch fuel tanks. The aircraft was put down in virtually the only field available. It was about 1000 feet long with the always present powerline on the approach end and was ringed with trees. Touch down was 1800 feet beyond the end of the 4300 foot runway and was 300 feet into the field beyond the powerline. The aircraft slid 240 feet in a straight line. It remained upright with the engine still running at a rough idle. The ELT was activated. The engine was shut off with the mixture control. I was not bruised or scratched.

The aircraft touched down nose low because the canard was stalled and apparently the left wing was slightly low. The nose gear shock strut broke and the lower NG-15A casting cracked and came off the gear strut. The gear strut appears to be undamaged. The left main gear leg twisted with some damage to the gear attach point. The prop did not make contact. The left tip of the canard touched, breaking the canard with some damage to the F-22 bulkhead. The left wing made contact with slight damage to the lower winglet and buckling the skin aft of the outboard attach fitting.

I fully expected to go through the trees at the end of the the field and was surprised that the aircraft stopped just beyond midfield. If the plane had not been stalled in, it would have touched down much further down field and would surely have gone into the trees with probable injuries to me and major damage to the aircraft. I feel very fortunate to have avoided injury and to be left with a repairable aircraft. I am impressed that the Long-EZ could be put down in so small a field with so little damage.

I have not been able to identify a probable cause for the power loss. The engine was restarted about an hour after the landing. It ran and accelerated smoothly and both mags checked ok. There was an unusual sooty deposit in both exhaust pipes. After the aircraft was brought home, the engine was run and checked again. The throttle, mixture and carb heat controls have been checked. The fuel tank vents (two per tank) are clear. The fuel flow rate with booster pump on is 25.8 gal./hr. for both tanks. The booster pump was replaced in Nov. 1988 as recommended by newsletter CP 57, pg 7. The engine driven fuel pump has a cooling shroud as per CP 48, pg 4.

It seems likely that there was a partial vapor lock due to the heat soak from the warm engine and minimal cooling air flow. It is also possible that the engine driven pump over heated and caused a loss of pressure. When I look at the carburetor mounted behind, and very close to, the oil tank on the Continental, I suspect the possibility of fuel boiling in the carburetor. This however will not be easy to prove since I don't plan to try another takeoff with an overly warm engine."

William R. Perry

Editors comment: We have talked at length with Bill Perry about what may have caused his loss of power and we suggested carb ice as a possibility. Certainly, as a student pilot flying a C-150 (Cont. 0-200) in the humidity of the midwest, we saw carb ice on take-off at least once when it required full application of carb heat just to make it back to the runway. This would also explain why the engine ran fine an hour later - the ice melted. Whatever it may have been, we have asked Bill to keep us apprised of anything he may come up with during his rebuild and, of course, we will pass it on via the CP.

PROP BOLT TORQUE. (Letter from John Bridges to Arnie Ash passed on to RAF)

"How many times have we been cautioned about checking the torque on wooden props, especially when climates change? Here's the new wrinkle that happened to me.

My Long-EZ, N642JB, has been flying since July, 1987, and has accumulated 283 hours. I have made several trips from Michigan to Phoenix, been to Sun-&Fun twice, and many more short hops like Rough River and Oshkosh. It has been a great joy to fly and share with others. While in Phoenix, about a year ago, I talked to Great American about the poor climb performance with my 62x62 prop and 0-235C1 engine. They recommended a change to a 60" pitch would solve the problem. I flew to San Luis Obispo on the next day and Fred Griffith met me at the airport where we installed the new prop. I must add that Fred is a super guy and really helped to solve my problem.

The new prop did the job - better climb performance and I could see 2800 RPM at full throttle.

Returning to Phoenix, I removed the spinner and re-torqued the bolts. After returning to Michigan, I checked torque again at 10, 25 and every 50 hours.

Last November, I flew the airplane back to Phoenix for the winter. The airplane stayed in Phoenix until I headed for Sun-&Fun on April 6th. I checked the prop torque on April 5th to make sure the dry climate wouldn't

come back to haunt me. Prop torque was perfect and had remained unchanged all winter.

I arrived at Sun-&Fun on April 6th and stayed until April 13th, and then flew home to Michigan. During the next week, I changed oil, cleaned the airplane and checked prop torque - no change.

On April 23rd, I flew over to visit a friend at another airport. Upon departing that airport, I could not fully retract the nosewheel. It was rotated 90 degrees from normal. I tried twice to coax it back into position without success. Since I only had 20 miles to go, I decided to leave it partially retracted. This was the first time this had happened. About 10 miles later (about 1000 AGL), I started to make a climbing turn to the left and reduced RPM to 2000, and all hell broke loose. I thought I had been hit by another airplane.

These were my thoughts as the airplane began shaking violently. I looked out - both wings still on - something's wrong with the engine - shut everything off - slow so vibration stops - look for a place to land. The City of Rochester was in front of me so I did a 180 degree looking for a place with no houses, people, cars, wires or trees. There it is, green grass - looks flat - plenty of open field - set up for landing - gear down - slow it down - trees at the other end of field - set it down. Snap, the nosewheel assembly departed the the strut - canopy shattered - nosewheel collapsed, mains folded - wheel pants (Sport Flight) stuck into wings - now I was totally a sled - started turning to the right - left tip of the canard dug in, cut into the fuselage and broke - left wing tip dug in - wing broke at corner of wing spar to inboard aileron cutout - went a few more feet and stopped.

FAA came out to investigate and stated I had picked the best place around but, if I had kept it up another 30 feet I would have missed the tire ruts that I couldn't see, and probably saved the aircraft.

What caused the sudden vibration? One prop blade broke off at the hub. Why? The threads on the prop bolts had bottomed out. Why? Apparently, the prop hub was a little thinner. The prop dried out during the Phoenix winter

and the bolts could have been about 1/8" shorter. I was reading torques, but there was no clamping pressure on the prop. I also feel the nosewheel hit something on take-off and threw it into the prop, causing damage to the blade and when I retarded the throttle, it was all over.

Let this be a lesson to all of us, not only to check prop torque, but to also recheck bolt length to ensure any slight variation in hub thickness will not result in running out of threads.

PS I suffered a minor cut on the forehead (no stitches) and a very sore shoulder - it cracked the left side of the fuselage."

John E. Bridges.

Editor's comment. Many of you will recall a similar incident that happened to Dick Rutan while flying the prototype Long-EZ, N79RA, (See CP 32, page 5). Due to the spinner backplate interfering with a radius on the prop extension, the prop bolts did not provide any squeeze up or crush between the crush plate and the prop extension. Neither the drive lugs nor the prop bolts have anything to do with driving a wood prop. Only the friction between the flange on the prop extension and the forward face of the prop, plus the friction between the crush plate and the aft face of the prop, drives the prop. Once you lose the friction grip on the prop by bottoming the bolt threads, as John did, the prop is free to oscillate slightly with each piston firing stroke. This begins to elongate the drive lug holes in the prop and causes vibration. If the pilot allows this to continue for more than 30 seconds or so, the bolts will break at the base of the threads and the prop will depart the airplane (which is what happened to Dick!). The damage to the prop is usually quite graphic, huge elongation of the drive lug holes which causes the bolts to bend back and forth and ultimately break, but also usually the prop face will have evidence of charring. - Yes, lots of heat is generated by the oscillation and it burns the wood! We believe John's problem was bolts bottomed on the threads. Therefore, little or no gripping pressure between the crushplate and the extension flange, therefore prop oscillates, elongates drive lug holes, perhaps chars the wood, vibration sets in and John shuts the

engine down. Prop stopped near vertical and when the gear folded the lower blade broke off when it struck the ground. The loss of one prop blade almost certainly did not occur in flight. We would be most interested to examine John's prop, but the above is our opinion here at RAF based on many accident investigations as well as some personal experiences.

A FLORIDA VARIEZE crashed during an attempted forced landing and the pilot, the only occupant of the aircraft was fatally injured. An eye witness reported that the engine cut out and that the pilot subsequently attempted to land on a road. A local EZ builder/flyer reported to RAF that he believed the pilot may have accidentally turned the mag switches off. The mag switches in this airplane were small toggle-type switches mounted high in the center of the instrument panel close to the air vent. The theory is that perhaps because it was hot, the pilot may have attempted to adjust the air vent and accidentally knocked the toggle mag switches off. Of course, no one will ever know for certain, but this theory is plausible and we have certainly seen mag switches mounted like this that could easily be inadvertently switched off.

Use only the "locking" type switches, the ones you have to pull out to move up or down. Or place the switches where they could not possibly be accidentally turned off or on without the pilot's knowing about it.

A TEXAS LONG-EZ experienced an unintentional landing on the dirt foundation of a future runway, causing some minor damage to the airplane but no injuries. During a fly-in, while flying in a high speed/low speed competition, this pilot was slowing to his minimum flying speed and was indicating 65 knots, very nose high, when he noticed he was sinking. At what he judged to be about 20 feet, the nose pitched down. He immediately applied power which he said had no effect, so he pulled the power to idle and held the stick full back. The nose continued dropping and he hit the soft dirt in a 3 point attitude. The Long-EZ slid to a stop in about 300 feet. Damage was minor and he had it flying again the next day.

The weather conditions were good, no rain,

light winds and the airplane was being flown very light. What caused this problem? We experienced a situation very similar to this once ourselves, but at the time we were flying with an experimental canard airfoil and it was raining. This test airfoil was retired and not put into production!!

It is not normal for an EZ to behave in this way. There have been rumors over the years that EZ's were prone to this behavior, but that is simply not true. At least of a plans built, correctly rigged EZ. A Long-EZ using the original GU canard, with the elevator rigged so that the full aft stick (FAS) mechanical stop is at a point beyond maximum lift coefficient, approx.  $22^{\circ}$  trailing edge down, would possibly exhibit the same characteristics described by this Texas Long-EZ pilot.

It is critically important that the maximum attainable lift on the canard occur at full aft stick. A perfectly built canard/elevator will reach maximum lift at  $22^{\circ}$  of elevator deflection, however beyond  $22^{\circ}$ , the lift available will decrease. When you do your initial flight testing check that you are, indeed, getting maximum lift at full aft stick.

We believe it is possible that the above incident may have been caused, at least in part, by the elevator having been deflected beyond the point at which it allows the canard to generate maximum lift. Another contributing factor may have been an incorrect airspeed indication. At 65 KIAS, a light weight Long-EZ certainly should not be at such a nose high condition that the pilot cannot see forward, nor should it stall at 65 KIAS. This pilot may have been much slower than he thought, and had actually reach the stall condition - normally a pitch bucking as the canard stalls and unstalls. If this were the case, this condition might have been aggravated by the main wing getting into ground effect which would cause a small nose down pitching moment due to the long moment arm of the swept main wing and the "cushion" between the wing tips and the ground.

It must be pointed out, however, that it would be a problem to land an EZ if this were a normal characteristic of all EZ's! After all, we have all probably landed at 65 KIAS or slower

many times without having the nose pitch down prior to touch down or even after touchdown. When the prototype Long-EZ was in flight test back in 1979, we landed it many times at full aft stick. This is not a good method of landing but it can be done with some practice. It does not produce the shortest landing distance, however, and is not recommended. It is only brought up here to make the point that a Long-EZ should not do what this Texas Long-EZ did.

As always, we publish reports on accidents and incidents like these above purely in the hope that by reading them, other pilots will perhaps avoid getting into similar situations. If only one pilot is saved from an accident because of RAF publishing these reports, it is well worth it.

### PLANS CHANGES

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

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

### Category      Definition

MAN-GRD      Mandatory - ground the aircraft.  
Do not fly until the change has been accomplished.

MAN-XXHR      Mandatory - accomplish the change at next convenient maintenance interval or within XX flight hours, whichever comes first.

DES              Desired - strongly recommended but not requiring grounding of the aircraft.

OPT              Optional - does not affect flight safety.

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### THERE ARE NO PLANS CHANGES FOR ANY RAF DESIGNS THIS TIME.

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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

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

### FOR SALE

One pair of Cleveland 500x5 wheels, brake calipers and discs. Never used - \$225.00.  
Contact: Dave Lind  
15114 Paso Del Sol  
Del Mar, CA 92014  
619-755-6117

Composite prop by Klaus Savier for 0-235 powered Long-EZ. Like new - \$650.00.  
Contact: Gus Sabo

2842 Brockington Dr.  
Las Vegas, NV 89120  
702-454-0078

Lycoming 0-235-C1, modified for mechanical fuel pump. 400 hrs. since major with chrome cylinders - \$4000.00. Contact:  
Art Lazzarini  
208-726-9103 (leave message)

### INSTALLING THE RECOMMENDED NEW FUEL BOOST PUMP

The Facet fuel pumps, part #40108 and #40154 which have the 37° flares, have caused some builders to feel that the old pump with the 1/8" female pipe thread was easier to install. We have always preferred the 37° dash 6 fitting and do feel it offers the advantage of a large passage for the fuel (less restriction in the line. We had new flex hoses (Stratoflex) made up with 90° gooseneck fittings on one end to make the installation easy, however, there is a simple alternative. Aeroquip makes a steel elbow with a swivel nut that fits 37° flares that really make this installation straight forward and economical. The part number is 2071-6-6S. They are hydraulic, steel fittings made Aeroquip and marketed by hydraulic dealers who handle Aeroquip parts. Bill says he will have a few of these swivel fittings with him at Oshkosh and would be happy to get them for anyone who wants them.

We would like to thank Bill Bainbridge for this gem of information.

### THE NEW FUEL VALVE

Unbelievably, after all the effort to finally find the perfect fuel valve, we still apparently have problems. We have received reports from both Wicks and Aircraft Spruce that some builders have returned the new fuel valve as unusable, won't fit, not as represented in the CP, etc.!! Even the Cozy newsletter condemned the valve without even looking at it!

WOW!! What can we say? The new fuel valve is all we said it was. It is a direct

replacement for the original brass valve. Several EZ owners at Mojave, including Mike and Sally, have installed the new valve and have reported that it is great. It turns so easily, and the strong spring/ball detents are very positive. In fact, the valve can be turned to either tank by feel, without ever looking at it!

There may be some confusion about the left-right orientation of the new valve. Keep in mind that the original valve is identical. If you installed your original valve exactly per plans (i.e., left tank goes to right side of valve and right tank goes to left side of valve, see plans page 21-5), your new valve will fit and work exactly as your old one does. You may have to file an additional flat on the valve shank (there are only 3, whereas the original had 4 flats) depending on how you oriented your fuel valve handle. Other than that, the new valve bolts on to the same bracket, same bolt location, uses the same elbows and fittings and, also, uses your original handle. Remember, this valve was manufactured specifically to replace the brass valve in Piper Cherokees. Since this was the same brass valve, it must fit your Long-EZ! If you have any problems, call Mike here at RAF.

The new valve is available at both Aircraft Spruce and Wicks. It uses "O" ring seals, all of which are replaceable. It turns so freely it has to be used to be appreciated. It has the most positive position detents we have ever seen. Don't let yourself be caught with a stuck fuel valve - get one on order today - even though they are expensive, they will prove to be worth it in the long run.

RAF has received many complimentary letters and phone calls on this valve. We appreciate the feedback on this and anything else you feel might be useful

### LONG-EZ AILERON BELCRANK VIBRATION UPDATE

We have had only three reported incidents of aileron vibration in flight in the Long-EZ. Since our original CP article on this subject, only a few builders have found their rod ends badly worn. All of these had steel push rods installed (heavier than the original aluminum



pushrods). One builder had no problem with rod ends but the rivets holding the inserts into the steel pushrods were loose!

Be sure and check these rivets next time you remove the cowling. Obviously, the heavier weight of the steel pushrods has moved the natural frequency of these parts into a frequency range that can be driven by the engine at certain RPM's. If you have steel push rods installed, check the rivets and the rod ends often, and be sure to replace the original aileron belhorns (CS-132L) with the new double arm belhorns (CS-132L-R) available from Ken Brock.

### EXHAUST SYSTEM CRACKS

Since we mentioned a crack in a Brock exhaust system in the last CP, we have had four letters from EZ flyers who have had similar cracks. All report that they are hard to see and generally occur around the weld at the flanges.

Next time you remove your cowling, take a bright light and carefully examine the exhaust system, paying close attention to the flanges. Look for a light grey deposit on the pipes or flanges. Any cracks should be welded up before next flight. TIG welding is required for Stainless steel exhaust systems. Do not ignore a crack in any exhaust system. It may cause carbon monoxide to seep into the cockpit, or a piece of the exhaust pipe may depart the airplane and tear up your prop!

Keep in mind that exhaust systems do not last forever, not on homebuilts, not on factory builts, not even on cars! The constant hot gasses, heating to red hot, than cooling, all the vibration, etc., makes for a hard life. Check you exhaust system often and fix it if it is bad.

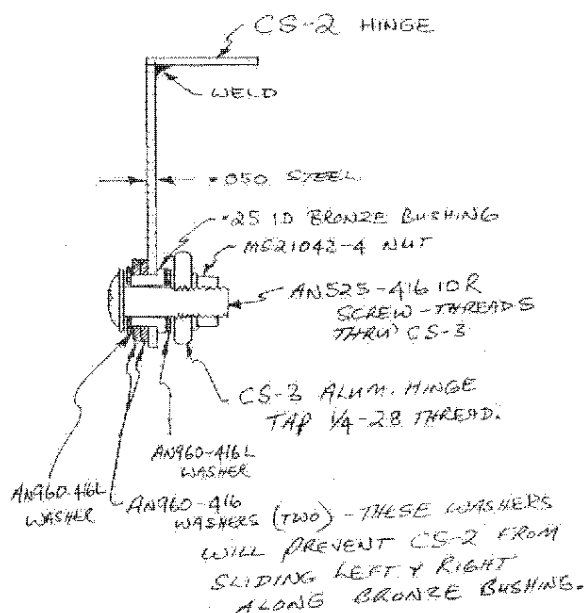
### DEFIANT ELEVATOR HINGE PROBLEM

Rodie Rodewald just called to tell us that after the trip home to Petaluma, CA from Jackpot, NV, he discovered that his Defiant had suffered some damage to the hinges on the elevators. Apparently, an engine related vibration drove the elevators to vibrate left and right (inboard/outboard, not trailing edge

up or down) which put a big load on the hinge to the elevators' attach point and caused the steel hinges, CS-2, to loosen on the bronze bushings and slip along the bronze bushings. Rodie has suggested the addition of a couple of washers. These should be installed over the bronze bushings to prevent the CS-2 steel hinge from sliding along the bronze bushings - see sketch. Another method might be to cut the bronze bushing down to be almost flush with the steel hinge (CS-2) and use a shorter AN525 screw.

The most important lesson here is that if you detect any left/right movement in the elevators in flight, you should realize that it is probably caused by a resonant vibration from the engine/prop and the first thing you need to do is change the engine RPM. Either decrease or increase the RPM and you will almost certainly get away from the harmful harmonic vibration.

Have any other Defiant flyers noted anything like Rodie has reported? We have looked closely at Burt's N78RA, the prototype Defiant, and there is no sign of anything having moved in the elevator hinge system. Please let us know if you come across any vibration induced wear and tear.



### STATIC RELATED RADIO "BLACKOUT"

"Some time ago, I read a report of a Long-Ez

pilot who experienced static while in flight from New Orleans to somewhere in Texas. I thought I read it in the Canard Pusher, but I have been unable to locate it. (ED - see CP 53). Twice I have experienced both comm and nav "blackout" while flying in light and moderate rain during overcast conditions. The first time during a landing at Liberal, Kansas, in light rain, I thought that Unicom just was not attended at the time. After landing and sending my wife inside to monitor the frequency, I was able to transmit and receive while standing on the ground beside the Long-EZ.

Later that day after departing Liberal, rain was encountered and a 180 executed when all nav and comm was lost. After landing at Liberal, again sending my wife inside to monitor the frequency, I was able to transmit and receive while standing on the ground. A phone call to the FSS at Garden City revealed they had heard none of my transmissions.

I have discussed this "blackout" with several radio repairmen and other composite airplane flyers. All agree that it is likely that a static charge built up on the composite structure and effectively blocked the radio signal until the charge was bled off.

Just this week, I experienced a similar "blackout" at Garden City, Kansas. After talking to Garden City FSS about 15 miles out and deciding to land because of the rain in my intended path of flight, I went a few minutes toward the airport in light rain before calling for a landing advisory. I was unable to contact the FSS until after about a half dozen tries. By then, I was within 2 miles. A visit to the FSS revealed that they could tell someone was transmitting, but there was no intelligible message.

In discussing this problem with the FSS manager, he told me of his experience in the army when operating helicopters using FM communications. The helicopters had a large amount of composite materials in them and built up quite a static charge. To discharge this static charge before making a pick-up of a fuel cell, they simply keyed the mike for 20 or 30 seconds. After a few minutes of discussion, we surmised that the "blackout" might possibly be broken by simply keying

the mike for a long period of time, that is 20 to 30 seconds versus the 2 to 5 seconds that might be used to make the initial callup. Perhaps that was how I finally got through just before landing, making repeated calls in a short period of time.

It is not easy to deliberately set up this condition, especially when I do not like to intentionally fly in the rain knowing that I may experience a "blackout". Perhaps others could report on their experiences in rain, and maybe have occasion to try discharging the static build-up by an extended keying of the mike. Wouldn't it be great if the system could be discharged this simply?

I have 280 hours and over 300 landings on N86PD. What a fine machine! We plan to be at Oshkosh this year."  
D.W. Smith

Editor's comment. We don't get much rain flying being based in Mojave, CA, however, we have flown in the rain many times over the past 11 years in Long-EZ's, VariEze's and a Defiant, including an IFR flight from Mojave to San Francisco (Defiant). We were in some of the heaviest rain we have seen for about 30 minutes but never had any problems communicating with ATC or with any nav equipment. At no time can we recall a radio blackout such as Dave has reported. Has any other builder ever had such an experience?

### SAFE FLYING IS AN ATTITUDE

This safety suggestion was sent in by former Navy Safety Officer and VariEze pilot, Ralph Gaither.

"I am one of those guys who does more flying than writing, with little input for your newsletter. I modify as recommended and have little trouble with my VariEze. I use my aircraft to support my business as a professional speaker. With reasonable weather - any city within a thousand miles is fair game. My EZ is like many of those heavy ones with full gages, nav package plus loran. I have made my share of mistakes (as noted in my previous comments to you) but have always flown the aircraft first and came out ahead.

One suggestion for consideration. I have a few hours around gliders and one thing these birds teach you is to always have a place to land... I believe we should all keep that in the back of our minds as we travel. I find myself constantly on the lookout for the nearest airport, major highway or just a good looking farmer's field to put down in case of an emergency. It becomes a part of my flying and keeps me alert too. Nice to have when that surprise comes along. Make it a part of your flying too.

Hope to see you all at Oshkosh."  
Ralph Gaither

Editor's comment. An excellent suggestion. Thanks, Ralph. We have practiced Ralph's system for many years now and can attest to its success from a couple of actual forced landings.

#### NEW BOSE ELECTRONIC NOISE ATTENUATING HEADSETS.

Bose is planning on introducing their long awaited electronic headsets at Oshkosh 1989. The first time we saw these headsets was during the Voyager program when Bose provided Dick and Jeana with the most comfortable headsets we had ever seen. In spite of the fact that they had a couple of minor problems, Dick has said the fact that he experienced little or no hearing loss during the grueling 9 day flight was due to the Bose headsets.

Mike and Sally have been evaluating a couple of pre-production Bose headsets for the past several weeks and will be flying to Oshkosh using them. So far, the verdict is that they are excellent. The comfort on a long trip is so superior to any other headset as to make it "no contest". The noise attenuation, with the electronics turned on, is superb. Significantly better even than the highest passive noise attenuating headsets available (27 DB reduction). They are impressive looking too! The easiest way to sell a set is to let a pilot put one on, power off. Let him feel the comfort, notice the good noise reduction, then turn on the power and watch his face! It is fun because the facial expressions vary from puzzlement to plain disbelief. Be sure to look up Mike or Sally on the flight line at

Oshkosh and ask for their "demo". Then go and talk with the Bose people at their booth.

#### **!!! WE AT RAF NEED HELP !!!**

We appreciate all the help you've given over the years by sending news and articles that concern builders. As you see by this newsletter, we have relied on you quite heavily. Now - we need pictures! If you have pictures you feel will be of interest to the readers who are builders and flyers, please sent them in. Interesting topics: pictures of you next to your airplane, vacations in your EZ, good building pictures, exceptional instrument installations, fly-ins you've attended, - the list goes on! **AND WE NEED THEM FOR FUTURE NEWSLETTERS.** So dig thru those pictures you've stuck aside and let us take a look.

They need not be black and white. Nice, sharp, clear color pictures are fine. One request - PLEASE - put your name address and identifying information on EACH photo as they get shuffled while we're working with them. Thanks for the years of help.

RAF

#### HOW TO CHECK IF YOUR AIRPLANE IS STRAIGHT.

So you have a few hours on your new EZ/Long/Defiant/etc., and you are buzzing around within your limited 25 mile radius of home base - why not spend the required hours you have left to take a close look at your airplane. Specifically, checking the rigging, the "straightness", if you will, of your brand new creation.

Assume you have built a "perfect" airplane, both wings are mounted to the fuselage at the correct incidence with zero relative difference, the canard is straight and at the correct incidence, and the two winglets are correct and exactly symmetrical relative to each other. This airplane should fly at cruise power, level flight, with the ball centered and both ailerons even and faired with the wing trailing edges. Depending on the CG and the speed, the elevator may also be perfectly faired with the canard tips. Since elevator

position is a function of speed and, to a lesser degree, to CG position, I will limit this discussion primarily to rudder and ailerons.

How many of you have reached this goal? Not many I would bet. I know my own Long-EZ certainly is short of this state of perfection. How important is it to have a perfectly straight airplane? Difficult to say. Obviously, the straighter it is, the less control surface deflection there will be in high speed flight and the lower the drag and the greater the efficiency will be.

How do you check for a straight airplane? First of all, you will have to have a slip indicator, accurately installed. This can be a short length of yarn stuck to the canopy on the aircraft centerline with a small piece of masking tape (this will only work on gliders and pushers!). Place it about 12" up from the leading edge of the plexiglass canopy. If you have a needle and ball, a turn coordinator and ball, or just a ball, it must be mounted in the panel, ball centered with the wings exactly level. Be sure this is correct before attempting to evaluate the airplane.

Now, before you conduct the following flight test, check to see that the two elevators are rigged perfectly, relative to each other. You will have to remove the canard to check this out. Simply eyeball along the elevator trailing edges. They should be in a straight line. If they are not, you must correct this before doing the flight testing. Elevators rigged incorrectly will roll the airplane.

Also, stand behind your airplane looking at the center of the spinner. Raise or lower your head until your eyes can see along the top skin forward of the trailing edges of the wings. You don't want to be looking down on top of the wings or up at the bottom skins. You must be able to see the trailing edges and the top skins as a line. Now, without tilting your head, look from the right wing to the left. Any differences? Shouldn't be. If you can see more of the top of one wing, you have a relative incidence problem. Make a note as to which way it should roll and verify this in flight.

Take off and establish a high cruise in level flight, feet off the rudder pedals and ailerons perfectly centered (if you can't see your

ailerons, take a passenger along to help you get them centered. Remember, your limitations allow you to carry a passenger if they are essential to the mission)! Now, look at the ball. Is it centered? Are the wings level? Probably not! Bummer, oh well, take comfort in knowing that almost everyone else is in the same boat! Keep the ailerons centered (visually verify this), and "step on the ball", that is, step on the rudder to center the ball. Step on the rudder opposite the direction of the yarn slip indicator. Lock your feet, ball centered (yarn centered), keep ailerons centered, and carefully observe the horizon and your DG (if you have one) to see if the airplane is flying a straight course over the ground or if it is slowly turning. If you have no turning rate and your wings are level with the horizon, you have one or both winglets attached to the wings slightly crooked. Even though you have a small error in your airplane, at least you know what is wrong and it can be corrected.

What if you are turning? Carefully null out the turn. Use just enough aileron in the proper direction to zero the turn. Verify this by watching for zero heading change on your DG or by observing a distant peak or other prominent object on the ground at the horizon. This takes a little time and patience but you can get it perfect if you try. With zero turn rate and the ball centered, check how much aileron and rudder deflection you have and in which direction. An assistant can be a great help here. Have them write down, for example, "right aileron up 3/16", left aileron down 3/16" and left rudder outboard 1/4", right rudder at zero." These dimensions can be quite accurately "eyeballed" with a little practice. If you doubt your passenger's ability to judge this, before you fly, have him or her sit in the passenger seat and you move the ailerons and rudders, using a scale and have them call out what they see. Now you know you have a relative wing incidence problem, as well as a relative winglet incidence problem.

Block the rudder out to whatever the eyeball estimate was by taping a small wood block to the inboard trailing edge of the winglet. When the rudder is released, it should close on this block and remain deflected outboard the estimated amount. Repeat the flight test and

verify that the ball is centered with zero turn rate.

Now, in the case of a Long-EZ or Defiant, you will have to install shim washers on one of the outboard wing attach bolts such that the wing incidence is altered in the proper direction, i.e., in the example above of the right aileron trailing edge up, this wing would need to be shimmed by perhaps one thin washer (AN960-816L) on the bottom outboard bolt. The left wing probably should be left alone until you look at the results of this change in flight.

Fly it and see if this was enough and if it was in the correct direction. Remember, do this kind of adjusting only in small increments. Use thin washers or thin shim stock, one piece at a time, starting with the wing that appeared to be off when you eyeballed the airplane from behind, whichever wing needs to be shimmed to raise the trailing edge. If one washer on one wing does not do it, add one on the other bolt on the opposite wing. Keep both wings even by eyeballing from behind - do not get one wing much different than the other. Continue using small increments until the airplane flies wings level, ball centered with zero turn rate.

You now have a straight but ugly airplane! Unfortunately, if you have already painted it, you will have some work to do. If it is still in primer, fair the fuel strakes to match the wing roots with dry micro (West System). To fair the rudder with the upper and lower winglet (on a Long-EZ), use a hacksaw blade to cut through the outboard skin along the rudder hinge line to the top and bottom of the winglet. If necessary, widened this saw cut as required and cut through the foam core to the inside of the inboard skins above the rudder and below the rudder. Check that you can now flex the trailing edges of the top and bottom of the winglet til it lines up with the rudder (still in its blocked outboard position). Now, reduce the amount the rudder is blocked out by approximately 10%, fill the saw cuts with micro and force the top and bottom outboard to exactly match to the rudder. Clamp them in this position and allow to cure. Layup a 2-ply BID repair over the saw cuts and fill, sand and finish. Install a permanent block, full span along the inboard trailing edge of the winglet to block the rudder in its proper faired position. You can use wood or a piece of pre-

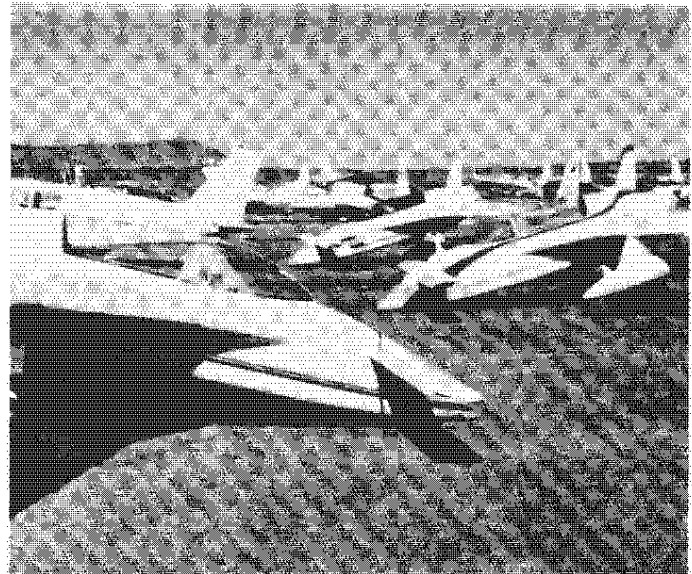
cured glass here.

Your airplane should now fly straight and the winglet repair will not be detectable.

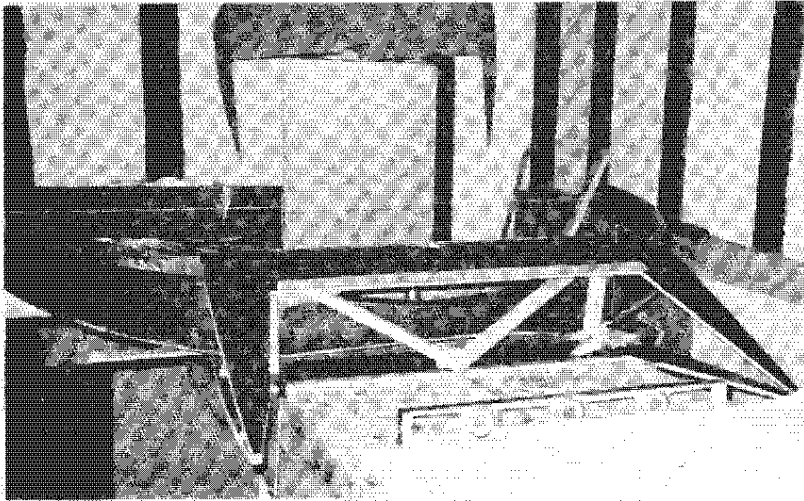
This works great on a Long-EZ, but what about a VariEze? Since it is not possible to adjust the incidence of the wings of a completed VariEze, you will have to do surgery to the TOP of whichever wing it takes to correct the tendency to roll. If it rolls left (ailerons centered), you will have to slit the top skin of the right wing, outboard of the aileron along the aileron hinge line and bend this trailing edge up as described for Long-EZ winglets/rudders. If you have to do this to your VariEze, call me at RAF and let's discuss it before you do it.

Well, I hope this is helpful and not too confusing. I'd be happy to discuss this with any builders or flyers who may find themselves have to make this kind of correction.

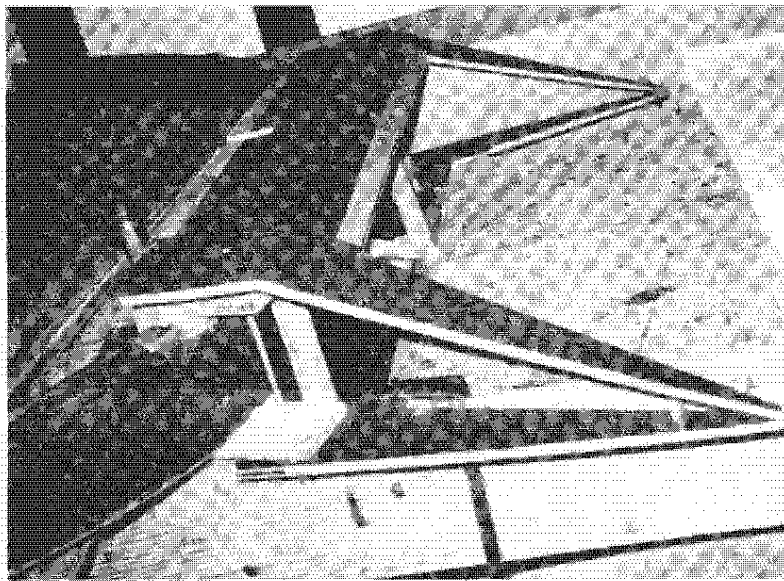
Mike Melvill



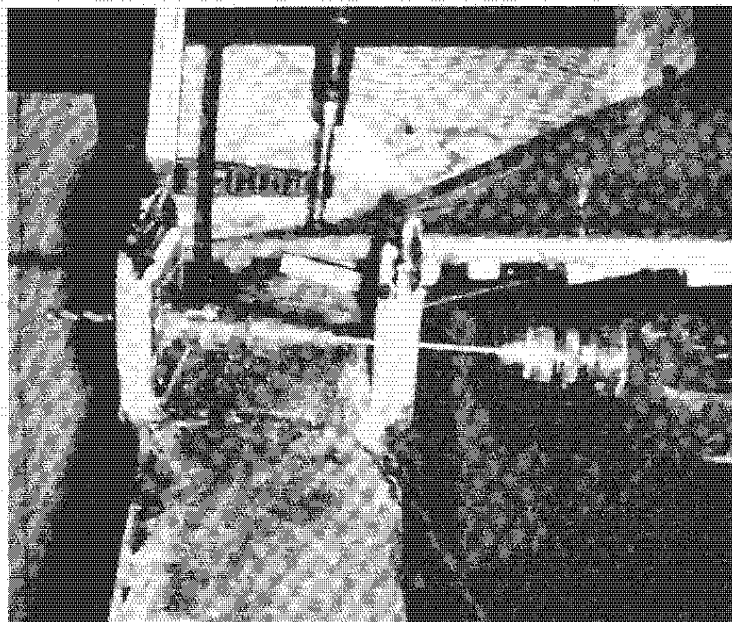
A few of the planes at the Kanab Honk Out



ER GROOTERS sent in these shorts of his method of installing the gear in his Defiant. Jigging for installation of the main gear attach tabs.



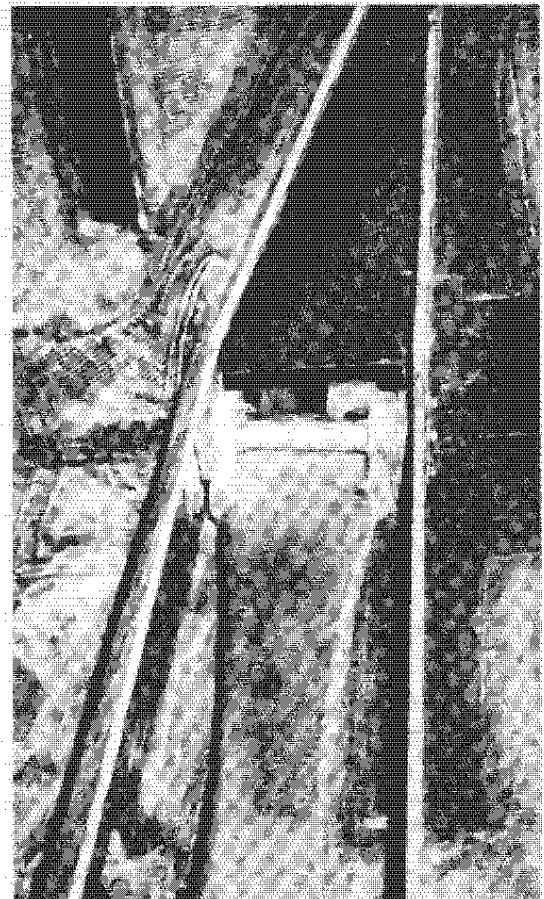
MAIN GEAR bulkheads remain jugged together through installation in the fuselage. A great idea!



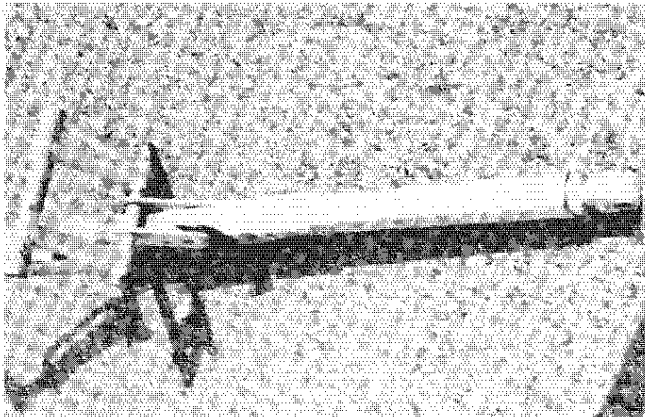
Using a hole saw to open the pilot holes in the attach tabs.



Our leader, BURT, flight planning his trip home from Jackpot while Bonnie Tiff and Sally Melvill observe.



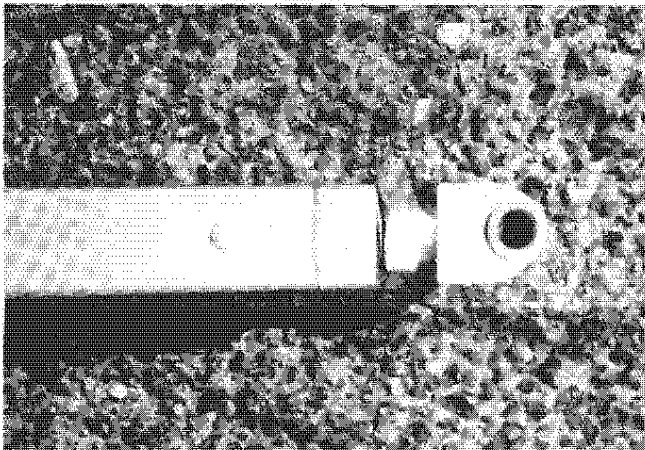
The entire main gear/bulkhead assembly is taped into the fuselage.



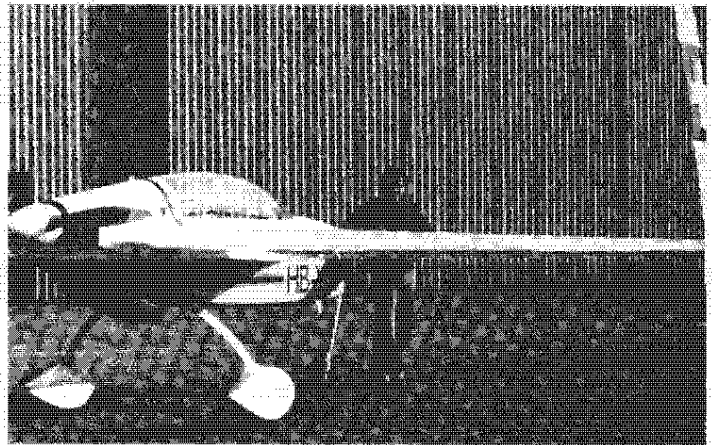
Don Foreman's new NG-1/NG-2 nose gear strut.



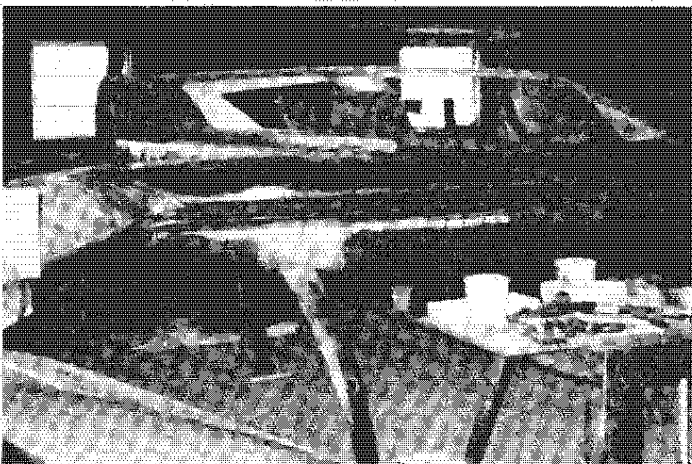
Donald Douglas' plans-built Long-EZ ready to paint. Don's Long-EZ has made its first flight now - Congratulations!



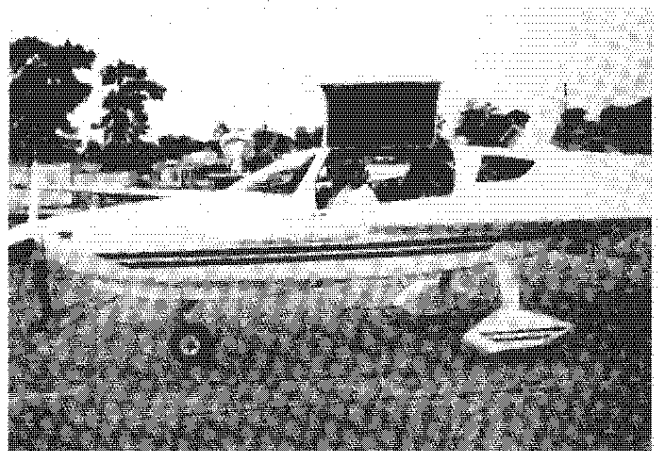
Detail of the end of Don Foreman's NG-1. Note: Heavy duty adjustable pivot end. Don's own design and a good idea - makes it much easier to install.



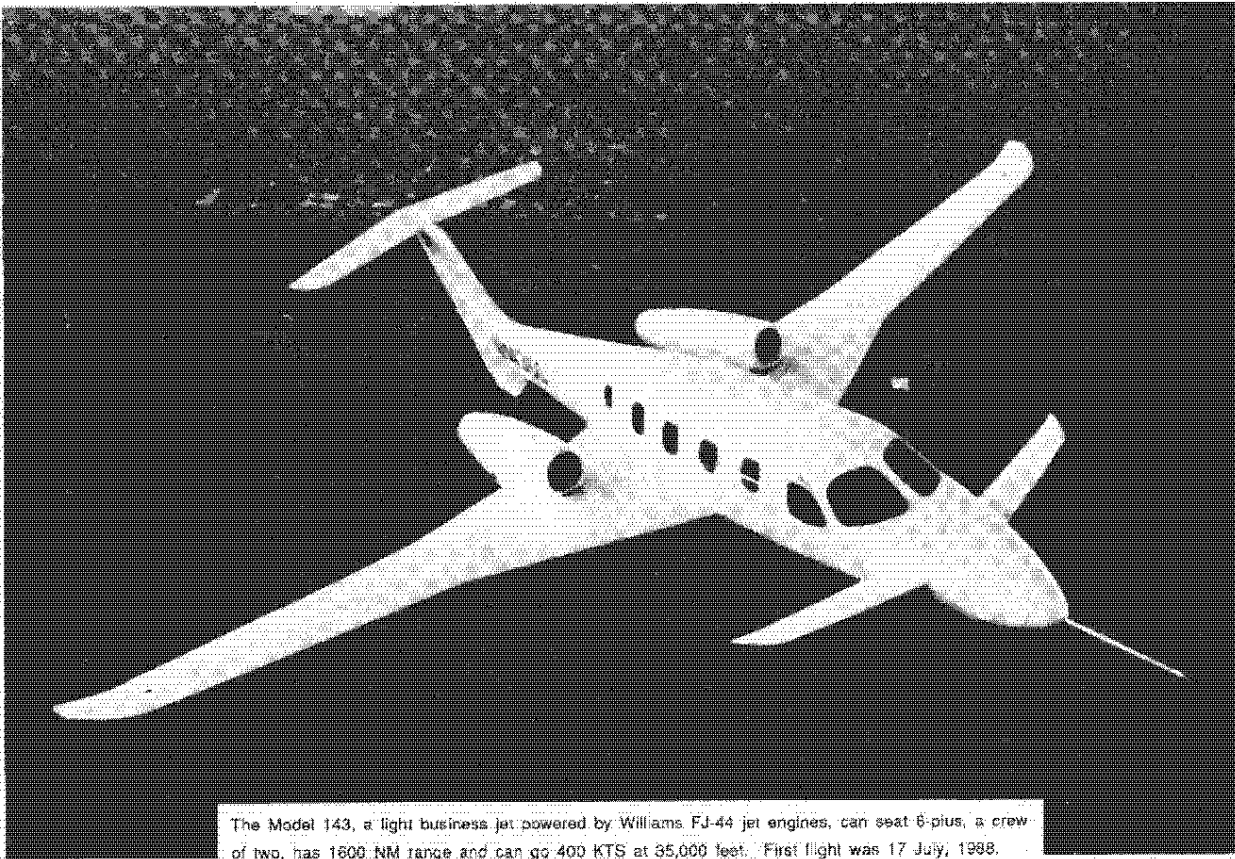
Peter Frodevaux with his beautiful Swiss registered Long-EZ.



Charlie Gray's second Defiant going together in his shop. Rakish roof line, Charlie!



Charlie Gray with his second Defiant! Charlie has completed two Long-EZs and two Defiants.



The Model 143, a light business jet powered by Williams FJ-44 jet engines, can seat 6-plus, a crew of two, has 1800 NM range and can go 400 KTS at 35,000 feet. First flight was 17 July, 1988.

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

**first class mail**



**TO:**

**July '89**

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**CP 60**