CIRRUS BUILDERS ASSOCIATION

A special Tribute to Al Corey

Open Letter to My Friend, Al

Hey Al,

I sit down to write this letter because you have gone now and I can't just drive up to Hadley any more and meet you at the shop, or come in early at 7:00AM and have coffee with you and your buddies at that little restaurant on Highway 24.

You left suddenly and none of us had a chance to say good-bye with a warm handshake and pat on the back; the way we used to part after spending several hours together in your shop mulling over the latest instruction changes from Cirrus or trading ideas on the best way to fit or bond a part.
You left suddenly, but I guess that is as good a way to go on the last trip as any. This is particularly true since we don't make the final decision ourselves.
I've been thinking that you are probably already flying around up there (no IFR, either) fixing angels' wings with your new found polymer bonding skills. We surely would like to know what material those wings are made of, could start another revolution in kit building. If you find out, I guess you would have to leave me a message by sky writing, or something, since the way the rules are we won't be speaking directly.

To finish, I'd normally say something like, "God bless ya, and have a good trip" but I see the Big Guy already blessed you while you were here on earth, what with you being married to a great lady, Marge, for thirty-eight years and having great kids and tons of friends in Hadley and Lapeer. I know you had lots of good people on your side because I saw them lining up at calling hours to say farewell.

In any case, Al, I just wanted you to know that I'll be thinking about you every now and again, and all good thoughts, too.

See ya.

Your friend,
Tom Logan

Al Corey

On June 3, 1996 we all lost a beloved friend and colleague, Al Corey. I spoke to Al three for four weeks ago on the telephone. He told me he'd like to come visit me and see how I was doing on my Cirrus. I looked forward to that visit which now will never happen.
I first met Al Corey at his home airport of Dupont/Lapeer in Michigan. After chatting with him for five minutes I realized that my biggest disappointment was that I had not known him for a much longer time. He was a gentle and humble man who made me feel welcome and important. He wanted to spend much more time encouraging me about my project than telling me about his project. Rick Mills and I wanted to feature his project for one of these newsletters but Al could barely pose for the camera because he didn't want to be the center of anyone's attention.

I would like to hear Al's voice telling me as he always would to keep working everyday. He would always tell me to do something on the Cirrus everyday. Don't let a day go by without working on your Cirrus, he would say. I would like to hear Al relate glimpses of his past which he did so with some reluctance. Maybe he would tell of his many homebuilt projects- his cement sailboat, his helicopter, or his many fixed wing flying projects. How many of us would drive a motorcycle to Sun-n-Fun from Michigan like he did this year? What an encouragement from a man more vital and alive at 76 years old than most people are who are many many years younger. How could I not finish my Cirrus at my age if Al could finish his at his age. He loved his Cirrus and he made me want to work all the more diligently on my Cirrus. He would want all of us to do the same.

If Al were here I would like to tell him how much of an inspiration he was to me and to others but he would never accept the credit. I would love to call Al and ask how he did something on his airplane. I usually didn't even care if he humbly said he didn't remember. His encouraging voice was enough for me. But most of all I miss saying good-bye to Al Corey and being able to tell him how much I would miss him.

Dave Doucette


N7033G


BP
CIRRUS
N94CM

My Friend Al Corey

Al would say "you should spend your time working on your airplane, not writing newsletter articles about me".
Al just didn't want to talk about himself very much, unless his article would help another builder. He was always interested in what other builders were doing.

I first met Al in late 1988 while visiting Cirrus. After several visits I discovered what a special guy he was. I always looked forward to my visit with Al in Hadley.

The first trip to Hadley, MI. was early March 1990. While driving to Al's shop we passed a beautiful lake, I asked the name, Lake Lapeer Al said proudly. The lake is surrounded by beautiful custom homes. Is the lake natural or man made, I asked?. Man made Al replied.
As it turns out, Al was the man who made the lake!
As I would discover over the years, that was just one of many large projects he had undertaken.
Al explain that he had retired from the road construction, heavy machinery business.
Building lakes, developing highways and heavy construction was just part of the business.

Al and his partner, Ralph Hartwig, started the construction business (Corey Hartwig) in 1951.
They owned a stone quarry and large earth moving equipment.
Al and his partner sold the business in 1990, about the time Al started the Cirrus.

During each visit I would uncover another restoration project Al had hidden away.
Al's restoration projects included everything from two 1939 Harley Davidson motorcycles, two 1949 Lincoln Continentals, 1949 MG, a huge turn of the century steam farm tractor driving a restored saw mill. Naturally he used the saw mill to build a beautiful covered bridge spanning a brook to the grist mill he restored. Al had a unique ability to transform a piece of equipment from the junk yard to better than new quality. Quality was the common thread in Al's personal and business dealings.

I will miss our frequent and lengthy telephone conversations. I always enjoyed sharing thoughts and ideas with Al.
Al, his encouragement and reassurance will be dearly missed.

Rick Mills

Roger Carter

Just as we were putting the final touches on the newsletter we sadly learned that CBA member, Roger Carter, was killed when he apparently lost control of a Riley conversion of a Cessna 340. Details of the mishap were not available as we went to press but we do know that the accident occurred somewhere in Maine. We will supply more details as they become available. As many of you know Roger was an A&P / IA who lived in Anchorage, Alaska. Roger's special interest was in aerial photography and he was planning on using his Cirrus for that activity. Life is filled with many tragedies and ironies. In what will surely be remembered as Black Monday for Cirrus builders is the fact that Roger was killed on the same day as Al Corey. Our deepest sympathy goes out to the friends and family of Roger Carter.

August 1996 Volume 3 No. 2

CIRRUS BUILDERS ASSOCIATION

Published by Rick Mills & Dave Doucette Circulation 50

Summer 1996

in this Issue

By Dave Doucette...

Letters to CBA

In this issue we received letters from Jim Patton and Doug Taylor. As many of you know Jim was Cirrus' test pilot for the original VK-30. His wealth of expertise in the area of test piloting and his extensive experience with the VK-30 make his contributions particularly valuable. Doug Taylor probably has more hours in the Cirrus than anyone else. He writes to us through E-mail as his current flying "job" takes him to far and distant places. Both of these gentlemen offer valuable comments and challenges all of us to strive for quality and safety.

N94CM Meets N60GE in DULUTH

Cy and Jim Mehling share an extensive article detailing some of their experiences in getting their new wing. Their very positive experience is an encouragement to the rest of us who are waiting for our wings. While there in Duluth they met up with Glenn Elliott who was also getting his new wing. The pictures of side by side Cirruses taking up the Duluth Factory floor space is just beautiful. Cy also has some questions in his article. We encourage anyone who can answer these questions to contact Cy. We also have more information on the evolving drive train. Both of these aircraft should be flying soon in their final configuration. Sure will be great to see some pictures of them once their done.

Bob Long Delivers

Last issue we put Bob Long on the spot. We hadn't heard much from Bob so we challenged him to send the newsletter an article about his project. In as much of a class act as one could expect Bob sent us an update on his project. Way to go Bob for coming through for all of us builders with the article and pictures.

Don Brosie- You're on the Spot

In keeping with a short standing tradition of one issue we now challenge Don Brosie to tell us about his Cirrus. I tried to visit Don once in the Monterey Bay area of California but could never connect up with him. He could probably take up a whole issue just telling us about how nice it is to be in that part of the country. But we really want to hear about his Cirrus project. So, Don, you're on the spot.

Counterweights 101

Ramon Pabalan takes counterweight building to a science in his contribution this month. Ramon has made several contributions in both written and video format. He has a flair for making complicated processes simple by breaking them down into a series of logical steps. Read about how he made his elevator counterweights. For those who complete the article and actual counterweights, there may be college credit available!!

Jim Patton

6 April 1996

Dear Cirrus Builders

General

The recent tragic accident at Cirrus Design convinced me that I need to be more explicit in imparting my experience with the VK-30 airplane to you builders. First, though, let me put this subject in context: Any airplane in the sky will be unsafe at some areas outside its design envelope; that's simply given. When I was a FAA test pilot, for instance, I encountered spins that were unrecoverable with normal controls while testing two airplanes for certification: The first metal-winged Mooney M-21, in 1961, and the Piper PA-235 in 1962. The Mooney spin was flat and the Piper spin, though steeper, was so stabilized that it was locked in. Both required use of a spin recovery 'chute after many turns with unsuccessful use of recovery controls. Both airplanes were subsequently certificated after they finally met the FAR 1-turn spin demonstration requirement, but the design remained the same; no aerodynamic changes were made, just some aft-loading restrictions; the unrecoverable spin modes are still there, outside the normal operating envelope. There are many other cases where larger changes were necessary to pull the design back into a safe operating condition. It's important to remember this: FAA Certification Testing is conducted under rigidly controlled conditions. The test airplan(s) must conform *exactly* to the Type Design and all airplanes produced thereafter must also meet that strict requirement. Such is not the case with homebuilts or kitbuilts, of course, which is bad news and good news, as we all know. It's wonderful that homebuilders can do their thing, but too many times individuals have changed plans or kit designs for self-expression without realizing what they were doing to the tested strength or flying qualities of the design. And this brings me to **YOU** and the Cirrus VK-30 design. It's an exciting design, a good design, a beautiful design... and a high-performance design. And it, too, has loss-of-control flight conditions which can occur if it is operated carelessly when outside of its design envelope. "Design envelope" means limits on C.G. and loading, flap design and deflection, control surface deflections, and the external aerodynamic shape of the airplane. Because of the high

performance qualities of the VK-30, it is more sensitive to small changes than many other homebuilts, changes which can and often do have large effects on the final result, maybe for the worse. Without expert advice, changes should never be undertaken. To get the optimum in performance and merely acceptable flight characteristics, a compromise that is delicate and easily screwed-up. I strongly discourage builder changes to the VK-30 design of the sort that affect aerodynamics or mass distribution.

MORE ON STALL TESTING.

As I've stated previously, we couldn't come up with an acceptable means of mounting a spin recovery 'chute, so I felt that we had to do a lot of abused stall testing: Wrestling the airplane around after the stall in trying to reach full aft stick and keep the wings level, to give assurance of sufficient safety margin between the stall and any bad post-stall characteristics., That meant using full aileron and full rudder as necessary to fight wing drop, meanwhile continuing to apply aft stick toward the stop. The results of these tests were somewhat colored by the assymetrical twist of the left and right wing sections: As I recall, it was discovered after I'd conducted most of the stall tests that the left wing was washed-in and the right wing washed-out. Later, in Protype II with the Chevrolet engine, this wing assymetry was not present and the clean configuration idle-power stall (just one test) was very docile, although no abused stall were conducted.

POST-STALL DEPARTURES.

Preliminary stalls, conducted soon after first flight in February 1988, were satisfactory enough to proceed, although an out-of -trim condition was present. Over 100 abused stalls were conducted in the fall of 1988 and early spring of 1989; the aft ventral fin was fitted in the first session and the dorsal fin in the second round of stall tests. Mid and aft C.G. loadings were investigated. Abused stalls in clean configuration sometimes resulted in left spins, since wing assymetry called for increasing left rudder and right aileron as stall was approached; spins only occurred after I had passed the stall and was using large rudder and aileron deflections to fight wing drop, while increasing aft stick movement. Recovery immediately following the stall was never a problem. Recovery from spins was normal with anti-spin controls. The ventral fin largely eliminated the wallowing, or dutch-rolling, that increased as stall was approached; the dorsal further aided by reducing wing-drop tendencies. However, uncontrollable departures to inverted flight occurred in abused landing configuration stalls at idle power with a flap setting of 40 deg. Increasing the rudder travel to 25 deg. also aggravated the departure tendencies. Changing the landing flap setting from 40 deg. to 32 deg. and reducing the rudder deflection to its original value (I forget what it was) eliminated the departure tendencies in abused stalls; I subsequently stated that the stall characteristics would probably meet FAR Part 23 requirements for idle power. 1"g" stalls, which call for wing drops of less than 15 deg. with unreversed use of controls, and a clear indication of stall in uncontrollable nosedown pitch or in reaching the aft stick stop. The term 1 "g" means the stall was approached at about 1 knot/second - it was not accelerated. The "clear indication of stall" would be marginal because the pitchdown is very slight. Also, artificial stall warning would be required to meet the FAR. The abused stall testing was not completed; I did not test accelerated stalls or power-on stalls. The FAA definition of "accelerated" means the approach to stall shall be at 3 to 5 knots/second; power on means 75% maximum continuous power.

Somewhere in this time period (early '89) or maybe a little later, Tom Logan called and asked me what I thought of the VK-30, that he was thinking of buying a kit. My response was that I felt it would be a safe, high-performance airplane. I still think so. I parted company with Cirrus Design before completing abused stall testing, but with common sense procedures and *strict adherence* to design parameters such as control surface deflections, landing flap settings, aft C.G limits, avoidance of icing conditions, etc. the airplane will be safe to operate. I hope all you builders realize that the Cirrus can deliver a lot, but it demands a lot in pilot skill, headwork, and proficiency. As in any high performance airplane, you have to stay well ahead of it. I encountered a good axiom in adapting to Navy jets, after years of prop flying: "Plan the Fight and Fly the Plan". Still good advice.

IN SUMMARY.

Not uncommonly, the Cirrus VK-30 design has unsafe features IF design limits are ignored. The main message:

(1) Don't change the design..,. if you insist on doing so, be aware of the risk and get the best professional help possible to minimize same.

(2) Be sure you keep your flap and control surface deflections within the specified limits.

(3) Be aware of C.G.... keep it forward of aft limits.

(4) If you're not experienced in high-performance airplanes, don't leap into the Cirrus without preparing yourself in an airplane such as the Beech Baron.

(5) Don't be afraid to stall the airplane; use 1"g" entries with idle power. You need to know the stall speed, as well as the warning and characteristics accompanying the stall. Also, I would recommend forward C.G. loading. Remember that with this type of entry, I really horsed the airplane around after stall, with no problems.

Jim Patton

Letters to CBA

Doug Taylor

Dear Cirrus Builders

First of all I'd like to thank all of you for including me in your association and keeping me informed with your excellent newsletter, and I think it's about time I did my part and contributed something. Hopefully, I'll be able to pass on something useful from my experience working for Cirrus.

I received the winter 96 edition about a month ago and I think the builder surveys are a great idea, because it gives everyone an organized way to describe their projects. The "Builders on the Spot" idea is great for the same reason. I know it's hard to write about something your very closely involved with because: 1. you don't think your own great ideas are all that great, 2. you spend a lot of time agonizing over what you think are probably trivial things to someone else, and don't want to admit you're an idiot, and 3. there's too much to break it down into a few short paragraphs, so what do you start on? Almost forgot my usual reason: procrastination. Everyone needs to contribute because everyone can benefit from the experience of the whole group. When I worked at Cirrus, I had the wonderful opportunity to visit most of you, and see your project in person. I think everyone of you has some great, innovative ideas, and we certainly benefited from them at the factory. I stole as many good ideas as I could get my hands (brains?) on! I'll try to pass some of them on here (and give credit to the genius responsible), and comment on things as they come up in the newsletter.

So to get started, a couple of builders had small comments about things they did that I think they should elaborate on. Roger Carter has a brief note about his flight control system. I haven't seen it but people I know that have seen it (Bill Freel for example) say it's really great. The push pull cables are quite easy to install, but have higher friction than they were supposed to have, partly because they are used in a closed loop system and need a bit of tension to take the slop out of the system. This was a big problem on Proto 3, and it's handling characteristics in pitch were such that it was decided that the elevator cables needed to be conventional to minimize friction. The ailerons were also quite heavy and friction built up noticeably when loads were applied. This was a problem in gusty conditions, when rapid corrections needed to be made for landing (I think my wrist still hurts from on occasion!) We added some travel to the system by increasing the size of the pulley in the transfer box, and we came up with a new profile for the aileron to further reduce the control forces, but they are still pretty high. They also come very close to the rated capacity of the cable, which is, fortunately, supposed to have its own safety factor. It was decided that the aileron cables would be left as is because it was too much trouble to route push rods out the wing as on

Proto 1. The rudder doesn't have too much trouble, except in slow speed situations, where there isn't enough airload to straighten it out when control force is released. This means that the aircraft would stay yawed after applying rudder and releasing it, unlike most airplanes where it "springs" back to straight and level. Something to get used to, but not a huge problem. In all cases reducing friction would be highly desirable. Since everyone is getting a new wing maybe you should all ask Roger how de did it so you can all have low friction ailerons. If you've already done the rudders, I wouldn't worry too much, but if you haven't, it might be a good idea. Urs Villiger also have conventional cables for his rudder, and it's a nice set up too.

Urs' survey also had a small note about his fireproofing. That is definitely one of the nastiest jobs there is in building a Cirrus. So I'd like to have everyone contact Urs Villiger and ask him about his fireproofing. It's and insulated silicone blanket that is approved fireproofing in Switzerland (That means a lot. We can get away with almost anything in the states.). It more or less just velcros in place. (metal hook-and -loop fasteners) (actually that might have been for the seams on the ST-50 fireproofing. Ask Urs, but I know it installs easily) Neat stuff, and as I recall reasonably light. The standard fireproofing is very heavy. The ST-50 had a neat fireproofing system, which consisted of an insulating material with a stainless steel face and the back encased in silicone. Unfortunately, it would be impractical in the VK-30 because it was manufactured on a mock-up of the engine compartment and there are too many different engine compartment configurations for the VK-30. It was also kind of heavy and expensive. There are probably other suitable blanket type materials out there. There are some neat looking things in racecars. Racecar Engineering is a cool magazine that has a great manufacturer index in the back. A couple of places to ask about fireproofing products that I've seen listed are: Thermo-Tec tel.: 1-216-243-9997
Earl's Performance Product's might not have anything but they have been very helpful on the few occasions I've called them.
Tel.:1-310-609-1602

One other little comment while I'm thinking of engine compartments. For anyone with engines other than the Continental's and the Allison's - have you considered putting the exhaust pipe through a hole in the engine door, rather than cutting yet another hole in the fuselage?

Another thing I noticed a lot of questions about was installing windows. I think I should keep that a secret and go into business installing them for all you guys! It is kind of tedious and I've done all the sanding I want to do for a while though. Start by making sure there is adequate flange on the fuselage overlapping the edge of the glass. There should be a bare minimum of 3/4". Especially around the windshield, it is often a little short. If it is, grind a little taper on the inside of the fuselage, clamp a piece of aluminum on the outside and lay up a flange big enough. The bond to this flange is what really does the work of holding the glass in. On Proto 3, had one of these bonds fail where there wasn't really enough area on the inside to hold it. (*This was during some rapid maneuvering while testing different aileron shapes, compounded by cold weather, which causes the acrylic to shrink much more than the fiberglass. Made quite a loud bang and I felt the armrest move under my elbow! Fortunately it was only one edge of the window, and it stayed attached.)* You then need to grind a taper on the outside of the window to minimize the bump where the glass gets laid up on the outside. The taper should extend about 1" from the edge of the glass and be about 1/16" deep at the edge of the glass. Then tough up the bond area on the inside. Since the windows are bonded in all the way around the perimeter, there doesn't seem to be much problem with scratches causing cracks if they are in the bond area. The hard part is actually bonding in the windows, especially the windshield. It is probably alright to drill a few holes for alignment pins and one could use

small bolts to help clamp, but there is definitely a risk of cracking the glass then. We just wrapped straps around the fuselage and use clamps at the edges where they can reach. Keep a syringe handy to squirt milled fiber in the inevitable voids where the flange and the glass won't fit real well. This brings up a question of what material to use when bonding in the windows. I've heard that styrene will attack the glass and therefore vinylester should not be used, but it seems to work OK on Proto 3. Just about any epoxy would be Much nicer to use, because when you make a cabosil / milled fiber paste, IT WILL NOT RUN!. I've heard some question about epoxy and styrene compatibility also, but some people say it's not something to worry about. I don't know the answer, but I would not hesitate to use epoxy anywhere I need to make a milled fiber pad to support the back side of something your bolting on. Some people have suggested using the same urethane that is used for bonding in car windshields. This would probably work great and would allow some flex when temperature changes, but I have no idea how you could finish off the outside. Which is the question that brought all this up!

Now the trick part. First mask off the edge of the glass on the outside. As there will be a number of steps of sanding and filling, use a number of layers of tape with the first a little less than 1" from the edge of the glass and each additional layer a little closer to the edge until the last layer is about 3/4" from the edge. This way when you complete a step, just peel off one layer of tape, and the next layer is already set back a bit so you can feather the joint till it's nice and smooth. Lay 2 layers of fiberglass to join the glass to the fuselage. You should have already ground the gelcoat off the bonding area, by the way. The first layer should extend up the glass, almost to the edge of the masking tape. The second should stop about 1/4" short of the tape. That way, when you sand, you won't go through the first layer, and it fills in the bevel you ground into the window. Then it's just a matter of filling and sanding until it's smooth. Keep stepping the masking tape back when priming and painting, so there is only paint on the glass at the last step. Nothing really magic, just a lot of work. One other important thing, it helps to put a layer of duct tape or other heavy tape over the masking, and quite close to the edge, so you don't scratch the glass by sanding through the tape. Also, bond the window into the door on the airplane. It's amazing how much that can distort the door frame, and that thing is enough of a pain in the ***! That's about all there is to it. Good luck and have fun.

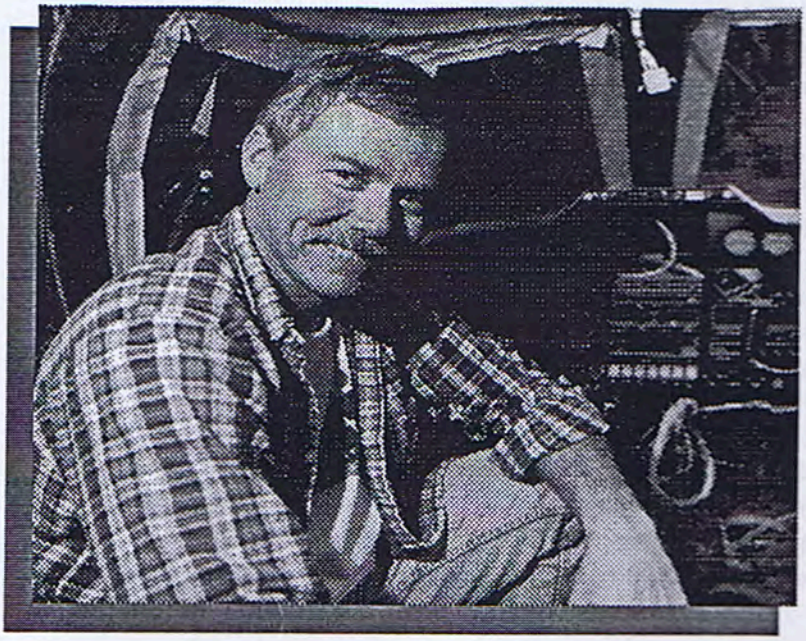
That's about all for now. I'll try to put something together for each newsletter. I hope you find this useful. I also want to apologize for putting a couple of you (Roger Carter and Urs Villiger("on the **spot**", but I think you've got some neat stuff that I'm not sure everyone is aware of. I'll probably have to say the same to different people every time because, like I said before, everyone has some neat stuff. I also know that most of you haven't seen all that many other projects, so I think I should help out by calling attention to some particularly good ideas.

If anyone has any particularly pressing problems, feel free to e-mail me at 103164.1044@compuserve.com

I won't guarantee I'll have an answer, and I don't have a copy of the plans, but I'll try to help out any way I can.

Best wishes to everyone and happy building.

Doug Taylor



Bob Long

Dear Fellow Builders,

I received my VK30 kit a little over 7 years ago. It was the third kit to be shipped. I was one of the "pre-production" builders. Though I had never built an airplane, I had built my own home, and so I felt ready to tackle this project. I expected it to take two years if everything went well — four years if it was more difficult than predicted by the factory.

Though the project is not "through" — I am working on the interior and paint — I could have flown months ago if I had had a wing. In fact, I had one of the early wings that was known to have a good spar, and I would have flown with that, but I took the pieces out of the wing and sent them back to the factory like they asked me to because they promised there would be no delay.

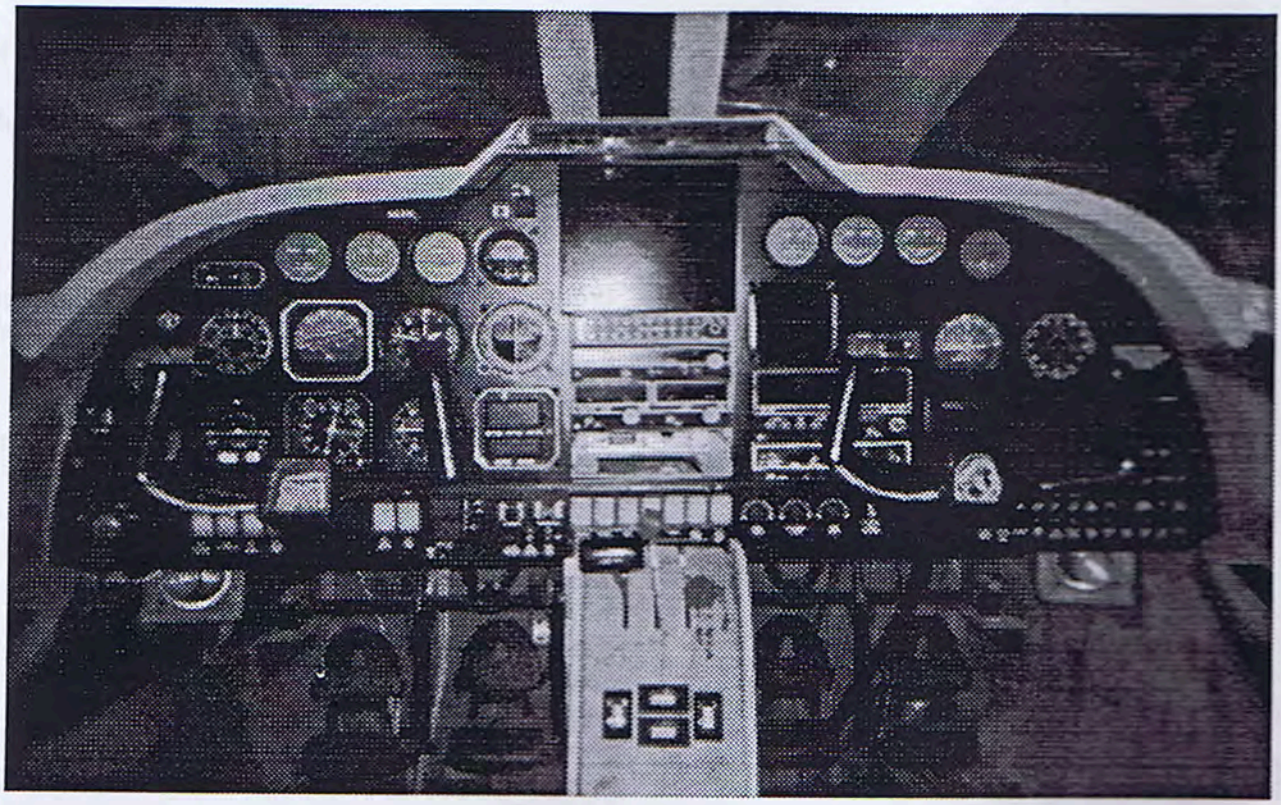
When I started this project, there was no manual. Rather, I received handwritten and drawn instructions — and then I spent a long time on the phone. There were no templates to use or markings as to where to install bulkheads, ribs and longerons. Sometimes after having installed bulkheads or attach points, the design changed, and then I had to go in and cut them

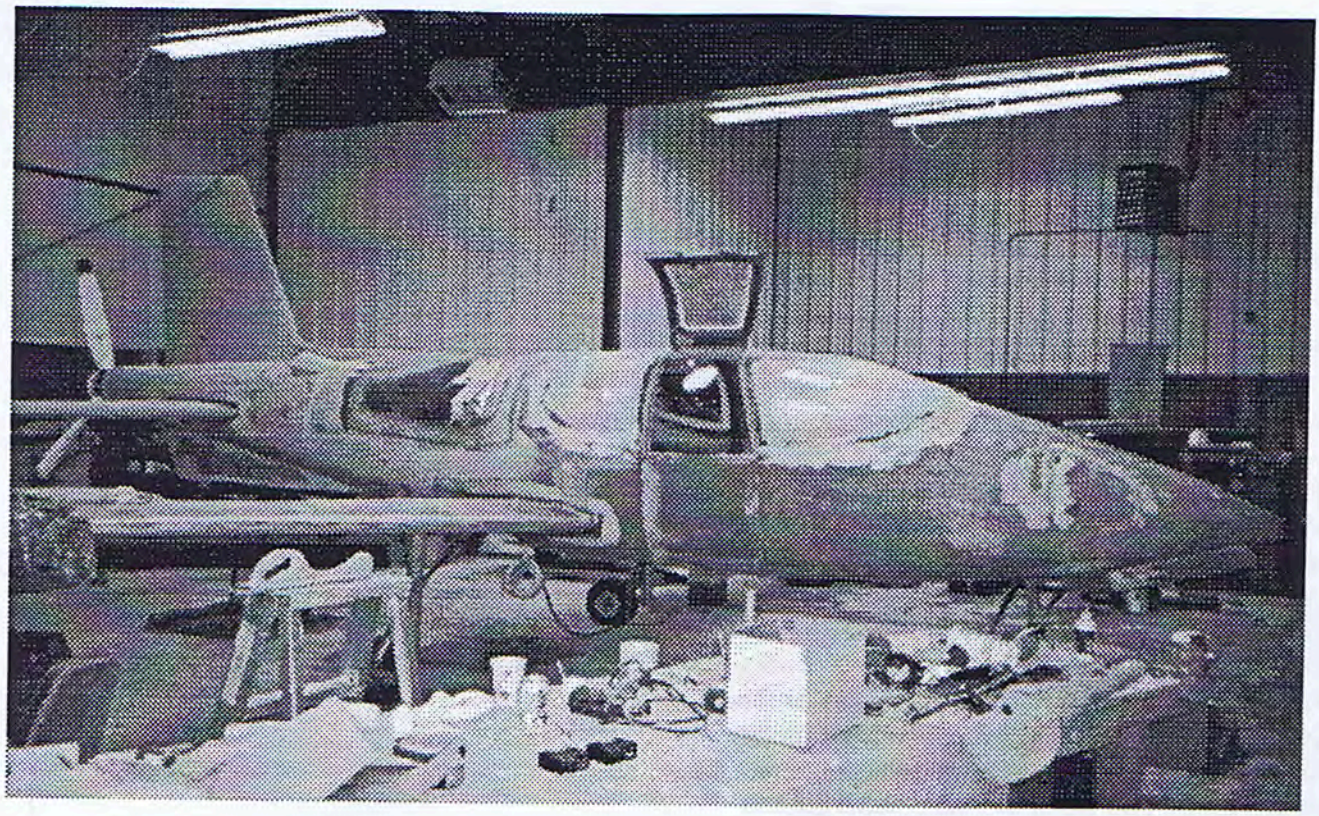
out and do it over.
When people ask me if it was worth it, I tell them I won't know until I fly it. But I have to admit, it really helps my spirits to talk to people

like Cy Mehling, Glenn Elliott, and Don Brosie. Cirrus ought to pay these guys for all they do to help all of us to fly.

I really enjoy reading our Cirrus Builders magazine, and it amazes me at some of the creative design changes that some of you are making. I don't have an engineering background — rather I have degrees in psychology and theology. So I tell people I will have the only Cirrus built by the instruction manual.

My engine is a little unique. I purchased it from Roy LoPresti. You may remember that Roy was president of Mooney and planned the Mooney 301 — a six-place airplane to go 300 miles per hour. He ordered a custom engine from Lycoming for the project that was guaranteed to produce 350 horsepower at 25,000 feet. The project was canceled when he left Mooney, but the prototype did fly. Roy liked the engine so much that while at Piper working on the Swiftfury, he planned a new project to modify the Comanche to fly 300 miles per hour and ordered another engine from Lycoming like the first. Before the project could begin, Piper went bankrupt, and they needed to liquidate their assets. The engine serial number starts with "X" for experimental, so the engine could not be sold for a standard aircraft. Legally, Lycoming could not take the engine back as a new engine even though it was still in the box. So I bought the engine for less than 50 cents on the dollar for a new zero time 360 horse power turbo charged engine. It has been challenging to make it fit in the engine compartment, but it is there!





I have also added a console between the front seats. Inside the console it houses one of three oxygen bottles and will be the base for the keypad for my RNAV moving map. I also installed a throttle quadrant since I learned to fly in Pipers, and that's what I'm comfortable with. I also installed an overhead console that is plumbed with the oxygen system, reading lights for all passengers, AC and heating vents, and a speaker for the radio.

The back seats are out of a Commander 114B and they recline both back and full forward for access to the baggage compartment. The man who is doing my interior used to install interiors for Commander aircraft (which is located on the airport where I am building my airplane).

I wish I could share some great ideas on how to build your kit, but I have been the number one student learning throughout the entire project. If I can be of encouragement to anyone, I am happy to talk with you. I have stuck with it for seven years, and soon (hopefully) it will fly and be worth it.

PANEL:
King KMA 24
King 197 Com
King 165 NAV/Com
King KNS 80 RNAV
King TRANSPONDER
STEC-60/2 Autopilot
STEC Flight Director
STEC-HSI
Vision Microsystem Engine Instruments
RNAV Moving Map
Encoding Altimeter
P.S. 2000 Stereo Intercom
RNAV-GPS
J.E.T.-Electric Artificial Horizon
RNAV-ELS
(ELT with Voice Location)
Sony Cassette/CD
Strike Finder

CO-PILOT INSTRUMENTS:
Artificial Horizon
D.G.

Cy & Jim Mehling

9 May '96

Dear Dave and Rick-

We had an appointment to show up in DLH for yesterday, but the wx along our route was loaded with thunderstorms so we are awaiting the movement of that stationary front from KA to the east coast which is forecast to move south over the weekend. Rick informs me that they have a car and motel reservations waiting for us.

He tells me Glenn Elliot's wing has the top skin done and the spars are in place with the ribs/ baffles being fitted. Seems to me more rapid progress is taking place at Cirrus. I believe our wings are going to be speeded up from what I hear from Rick.

I received all the parts for the new drive train a week ago and went right to work installing them. It wasn't as difficult as I had expected, it took about 12 hrs to do the job. I found the airplane was only out of service for less than a month. That is thanks to Glenn's efforts to do things promptly and push the vendors, machine shop etc.

I ran the engine this week and it seemed to be quite a bit smoother. Next day I flew and I was simply amazed at how much smoother and quieter it seems to be now. Will have to have Jim give his opinion when we make our trip to DLH this weekend.

Dear Rick and Dave- 19 MAY '96

Left Doylestown, PA (Jim and I) Mon. May 13th after waiting 5 days for the enroute wx to improve for our trip to DLH. Climbed to 8500' in the clear blue, but had to climb to 10,500' to top the clouds over Akron. Refueled in Fremont, OH after 2:20. Took off again and climbed to 8500, then later to 10,500(OAT -7øF) to stay on top until approaching Lake Mich. Near Gary finally had to descend ultimately to 2500 and dodge rain and snow showers and some lightning. From Joliet north to MSP had to settle for 4500' and light chop. Dropped Jim off so he could return to NY for business the next day and paid our $25 to Signature Avn for the privilege of passing thru MSP. Proceeded to DLH at 5500'. Total tach time for the trip was 6.6hr, 1040NM, 94.7 gal fuel burned. Probably had an average headwind of 20 kt.

Observed this big commotion at the Cirrus hangar as I arrived, both the SR-20's were being pushed outside and 35 boys and girls were waving to me. What a reception. While I completed my log entries, I was pushed in the hangar out of the rain, the other airplanes were brought in and the doors shut. I can't remember what went on after that, but it was near quitting time. I was given the keys to an old rusty bucket of a van for transportation. This van is used for parts running etc. John Hitchcock, the director of purch. gave me his home phone no. and said he was personally responsible for the operation of the van and I should call him 24hrs a day if any

problems and he would be there in 15 minutes. Now this just sets the tone of the personal consideration and helpfulness of every one you will meet at Cirrus. Cirrus made my reservations at the Econo Lodge, about 4 mi. away on the main highway. Nice location with lots of fast food and other restaurants close at hand. Eric and Dennis took me out to dinner and I retired to the motel to rethink all the things that took place that day we had looked fwd to for so many months.

I elected to stay for the week to help where I could and see everything of interest at the factory, or I would leave sooner if my welcome wore thin. I arr. at Cirrus about 10AM each day and left about 5PM. Tue morning I found them draining the fuel tanks. By noon they had the airplane on the scales for an initial wt and balance ck. After lunch, it was up on the fuselage dollies and wing jack. First it was necessary to remove the ex stacks and strip off the wing fairings as they were in the position of interfering with the rear dolly. Then the wing jacks raised the airplane and the dollies were in place and the airplane was once again airborne. I assisted a great guy named Rich who is the electrician in cutting and marking wires etc.. Rick and Steve (POO?) were busy with other things coming apart. There were so many other people on the job we were stumbling over each other. Some of them worked overtime until 11PM on the job.

Next morning I disconnected some of the engine controls and tried to stay out of the way. About 2PM, an impossible miracle took place before my very eyes when the wing was removed from the fuselage and placed in a stand. Within 15 minutes the new wing was inserted for fitting. Now all this took place within 48 hrs of my arrival with the airplane. When big parts need to be moved, a group of 12 or more show up to just lift and insert or move jacks or the fuselage, all of which are on castors. Meantime the crew that is building the flaps and ailerons who had been fitting them to the wing, moved their work station over the the airplane and continued their work. Nobody loses a minute on this operation.

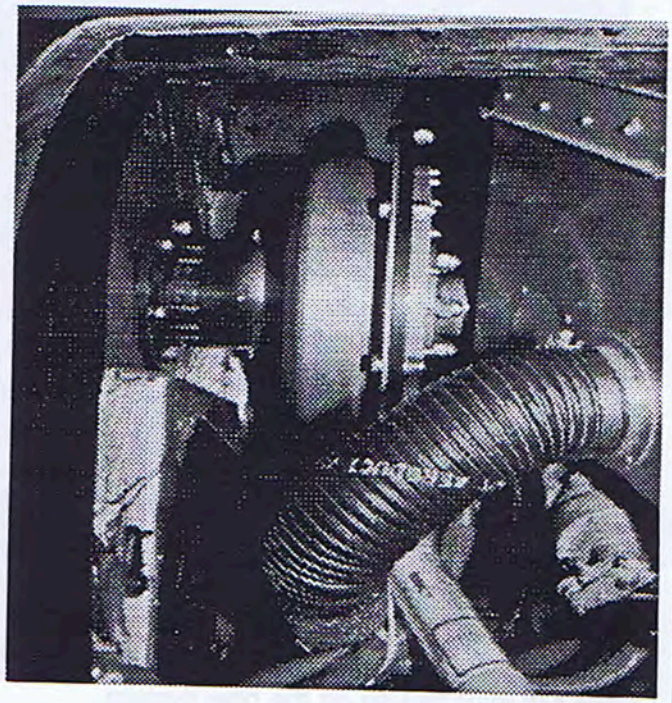
Thur. morning when I arrived the wing was in the proper location and I observed some head scratching over the mouting brackets. They knew the brackets were not going to align with the wing tangs, as the location of these tangs had been moved in the wing over the years, so a decision has to be made as what to move and what to shim to get the necessary alignment. My problem so far with these guys was their tolerances were too tight. When tramelling the distance from the nose to each wingtip, I didn't think an inch or two was that important when it might involve huge changes in the firewall area. What the heck is a couple inches in a 40' wingspan. Well, they are looking for more like a quarter inch. I told them, I probably wasn't that close when I built it and they agreed, they had measured before I arrived and said I had 2«". By the afternoon, all the decisions were made and shims measured and the wing was removed and returned to the body shop. It was inverted and sanding begun in preparation for finish. The tanks were tested with a very exotic pressure measuring device that plugged into a VOM and read very accurate low pressures. Leaks were found near the fwd attach plates and I threatened to write SCRAP on the wing, but the man who built it assured me he could fix that in an hour.

Fri, I found they were smoothing all the areas cut away in the fuselage for wing entry. I mostly spent my time looking at the the work stations producing the wing parts and getting acquainted with everyone I could. These Cirrus people are just the greatest folks you could ever meet. Rosie, Holts, Alan the fuel tank tester, Jerry, Mike, John, Robbie, Bernie, Rick, Steve, Cindy, Dennis, Lance, Rich, Eric, Dean, Pat, Gary, Dale I just can't remember everyone's name. I observed only a couple people working on the SR-20, everyone else was either building parts for wings or working on 94CM. It is so obvious that in spite of all the frustrations, the time is here to rewing the VK-30's and Rick is

planning a monthly turnover for us and the next two airplanes in flt status. That means we should be out of there early in June and Glenn Elliot will have to come up and pay off his cheeseburger bet to me at Grannie's. Now, then all you builders out there who have been sitting on your hands doubting the time would ever come, how about a show of hands on who is going to be at Sun 'N Fun in '98?
They made copies of my bottom fairings (wing-fuselage) and I think they intend to use them for others, not sure of this. Alum insp plates are fitted to the wing bottom, really neat. Cirrus has a nice lunch room with machine food available, (inexpensive and good). New MLG hyd rams will be installed. Wing angle of incidence being incr. from 1ø to 1.5ø perhaps as was done on 44VK. No decision on this when I left. There is a nice concave cusp on the bottom surface of the flaps which should sort of act like the cruise flaps for TO and Lndg which I liked.

I noted that Glenn's wing skin was complete. They laid the spars and ribs out on plastic in the top skin and fitted and bonded them as a unit, then checked the fit with the skin and finally that afternoon bonded them in with huge platforms upon which a thousand or more pounds of sandbags piled on top while curing took place. I observed them making huge jigs from the floor to the top of the wing mold to position the flap tracks. Every day, new ways are developed to make the work more accurate and do it faster.
When I arrived in DLH, the beacon came on shortly to indicate IFR conditions and it never went off the entire week I was there. Lake Superior was still ice covered. It was 41ø with 100'and 1/16th several mornings and never got over 46ø by mid day. The fog was so bad the harbor residents were yelling to turn off the diaphone foghorn which was on continuously for the week. Never mind, the work goes on at a fast pace in the hangar at Cirrus.

I know we have all had long faces for years because of lack of info, but the only solution is a visit to the factory, you'll be amazed and really surprised. NW flies commuter from MSP but is very expensive. I found a card for a rent a car at the MSP airport called ALL CAR RENTAL in St Paul for only $18.95/day with 100 miles free, then



.10 mile. Number is 612 644-3029 with pickup available at MSP.

As I was waiting in front of a quiet, desolate factory Sat. early morning for Rick to pick me up and generously take me to MSP, a lone employee drove up. I asked him what he was doing here and he said he was on overtime to close out my flaps. By now, you should have observed that I am one happy Cirrus owner. In the course of time, you will each join me, in the meantime, get busy, the time is now.

20 APR '96
Dear Rick and Dave-

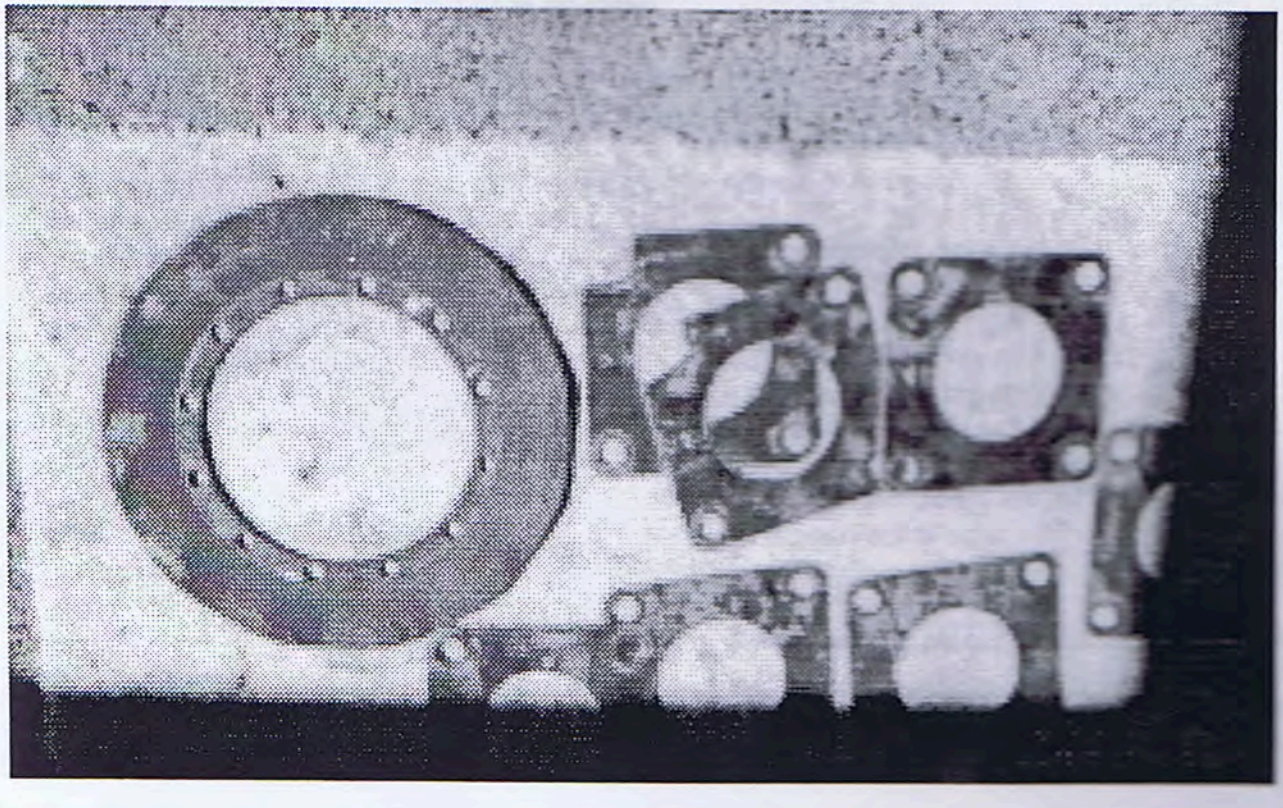
Last Newsletter was outstanding again as usual. Our sincere thanks to you two patient builders and thanks to everyone who contributed.

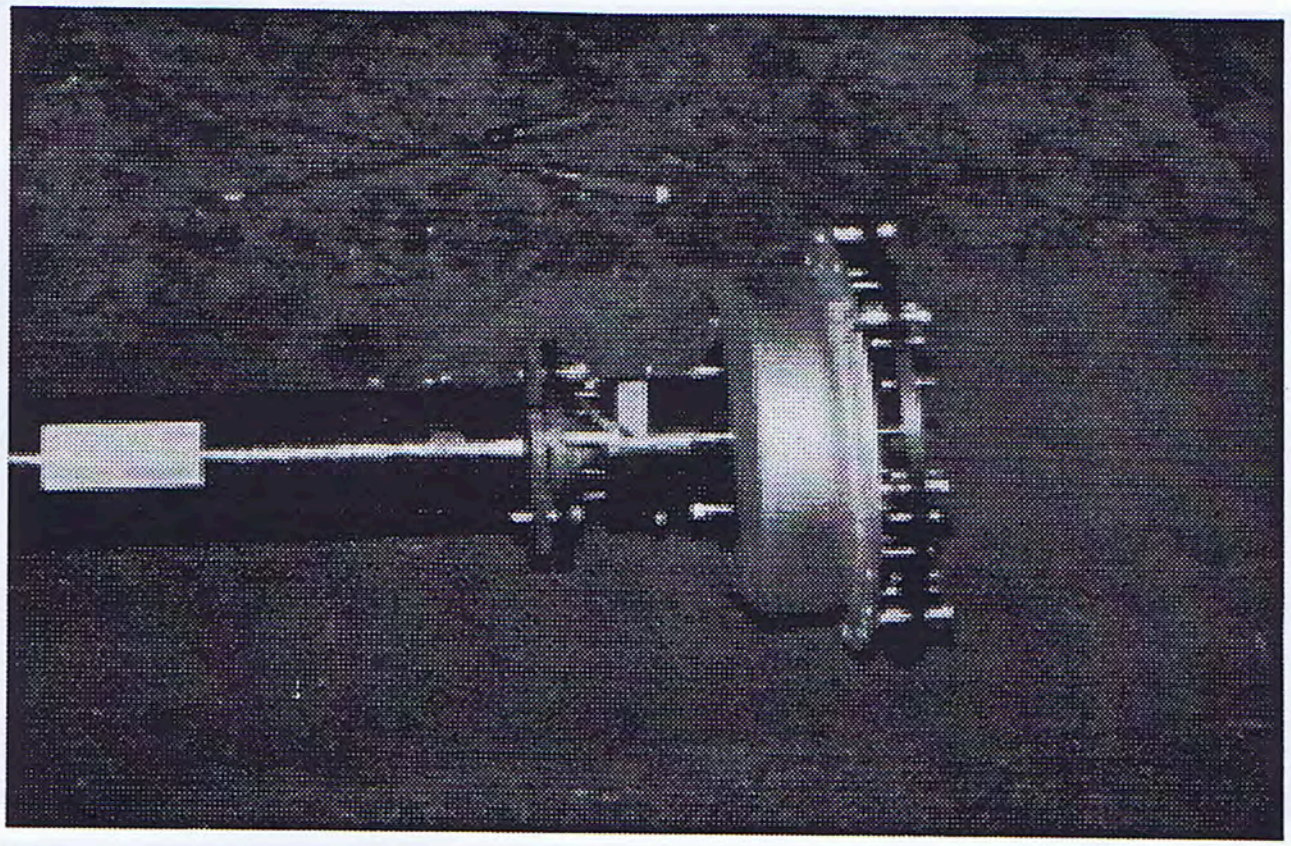
As we related recently, Jim and I were unable to get together on dates to go to Sun 'N Fun, so we cancelled our trip there a week before opening. In the meantime the fwd elastomeric coupling that we were not expecting until late May arrived the previous week. This was the item that was going to hold up our major work of changing the drive train. I decided to immediately remove the old drive train, as the next holdup would be the time it takes to rework the slip joint for use on the new system.

However, when I removed the bolts from the fwd assembly, I observed that some parts were falling out. All told, about 6 or 7 of the 18 plates were cracked or broken,

I had carefully inspected the flex pacs frequently and never found any reason to expect any distress. Of course I was only able to examine the edges visually and they appeared just as I had installed them nearly three yrs ago. However, when I removed the bolts from the fwd assembly, I observed that some parts were falling out. All told, about 6 or 7 of the 18 plates were cracked or broken, nothing like Glenn Elliot's, but nevertheless I was so happy that we decided not to make the 10 hr round trip to FL. The only indication I found of any evidence of a problem was the minor amt of rust colored dust on the bulkhead in the vicinity of the unit.

Next problem was found when I examined the clutch torque plate and found about 10% of the surface had collected the shot, what I would call welded to it. Finally I had noted that the carbon





fiber sleeve on the aluminum drive shaft had shifted somewhat, early on in the history of our operations, but this time I found it had shifted up against the rear flange, having moved about 5". Dennis at one time told me this was not to be worried about.

I am asking for help from anyone who reads this article. I am attempting to align the prop with the engine on our IO-550G. When we had the clutch in the system, it would engage at random, but since we are going to a solid connection now, I would like to align the prop as one would if the prop was installed directly to the engine. I have what I think is a Lyc. flange on the tail housing and a prop to match with an index that cannot be misaligned. However the Cont. crank flange has no markings, only two dowel pins 180 deg. apart. My best info is that there should be a "0" or punch mark by one of the mounting holes. Since I am unable to find this, can anyone tell my the relationship of this marked hole to the crank throw of #1 cyl, for example? I intend to align the engine to the prop and get it all balanced using the chadwick balance operation to get the smoothest running system we can get.

We hope to be back flying early in May if all goes well. Rick Hagberg tells me our wing is about done and we expect to proceed to DLH as soon as possible after that. I have had a conversation about the fuel vent system and the roll trim on the new wing with Dale and he informs me that although the roll trim on 44VK was not adequate, they will double the size of the trim tab in an effort to correct the problem. The fuel vent system will be as installed on our original wings, except that the backup tip to tip vent will be just that - tip to tip. The valves are being eliminated and we will go back to the cross vent, that is R tank vented at the L wing tip etc. All vent lines will be external and routed in the wing leading edge.

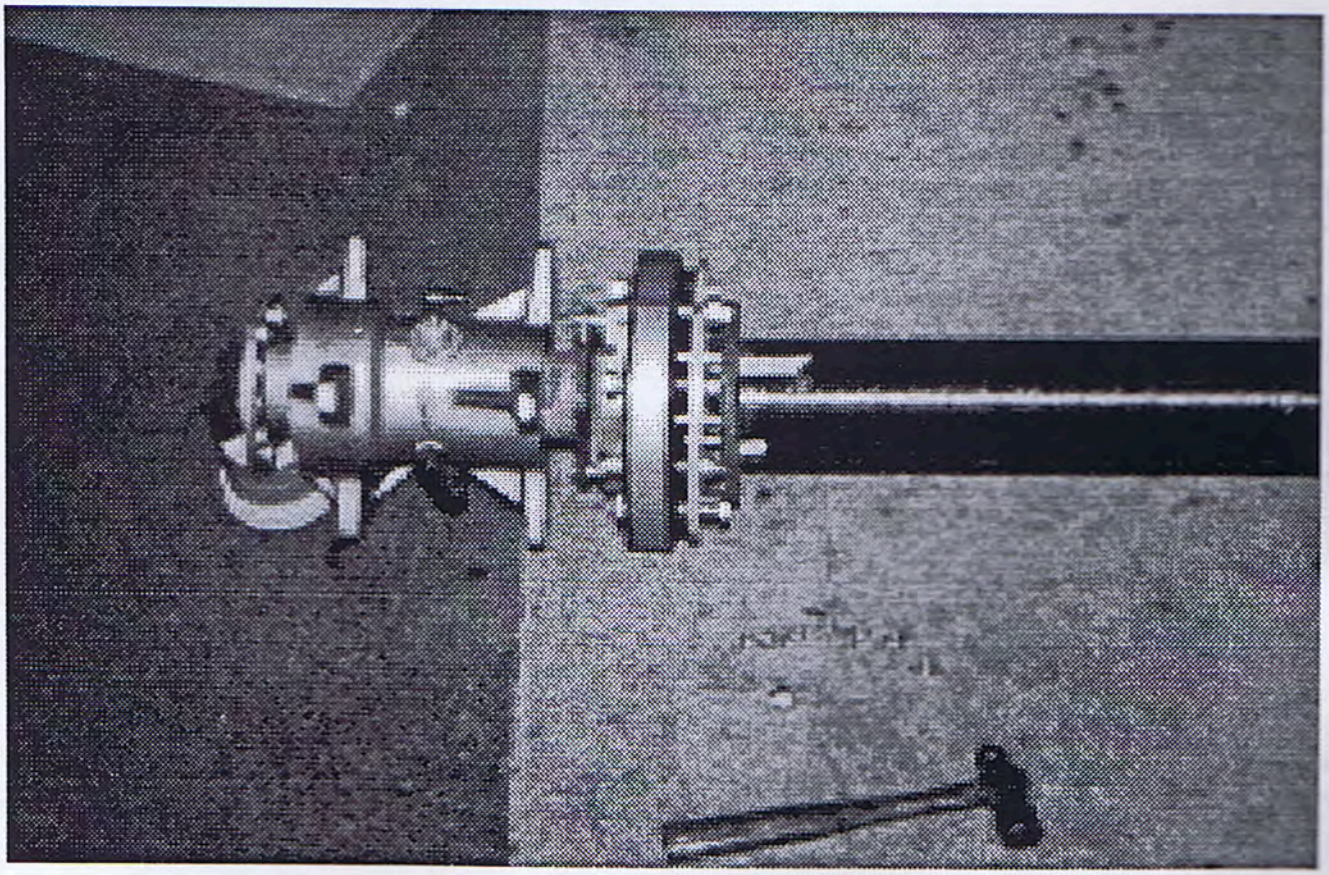
I have encl. photos of the broken fwd flex pac plates, the clutch torque plate and the drive shaft as removed from 94CM. I will take photos of the new drive train also when it arrives and attempt to update this article before we head to DLH.

If anyone can get their hands on the NTSB report of Craig Baldwin's or 44VK accidents, I would surely like to read them. As we all know, these reports are sometimes not worth much, but nevertheless, we must continue to gather all the info we can to improve our own flying.

Best Regards,

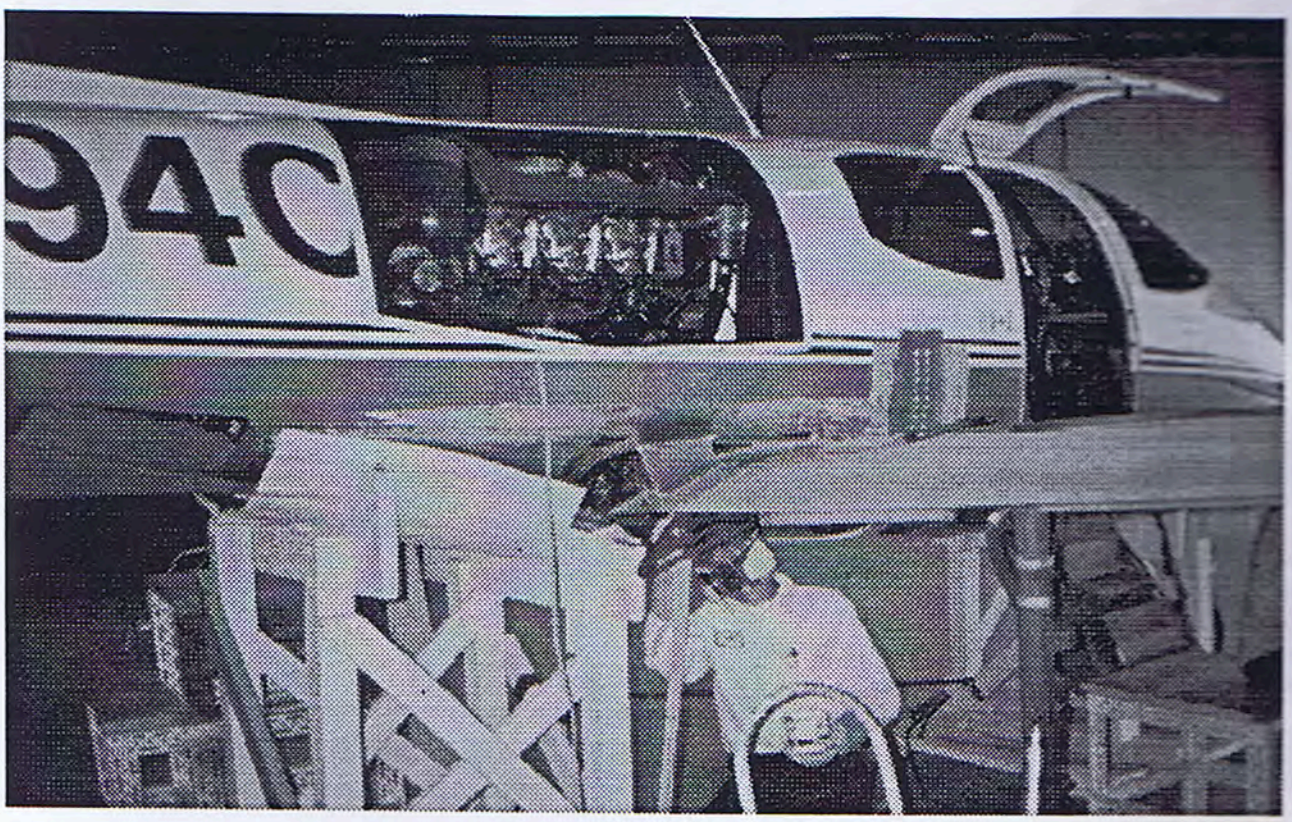
right top:
Cy and Jim Mehlings' VK-30 in Cirrus hanger, Duluth - **new wing installed!**.

right bottom:
Glenn Elliott and Cy Mehling VK-30 at Cirrus Design.

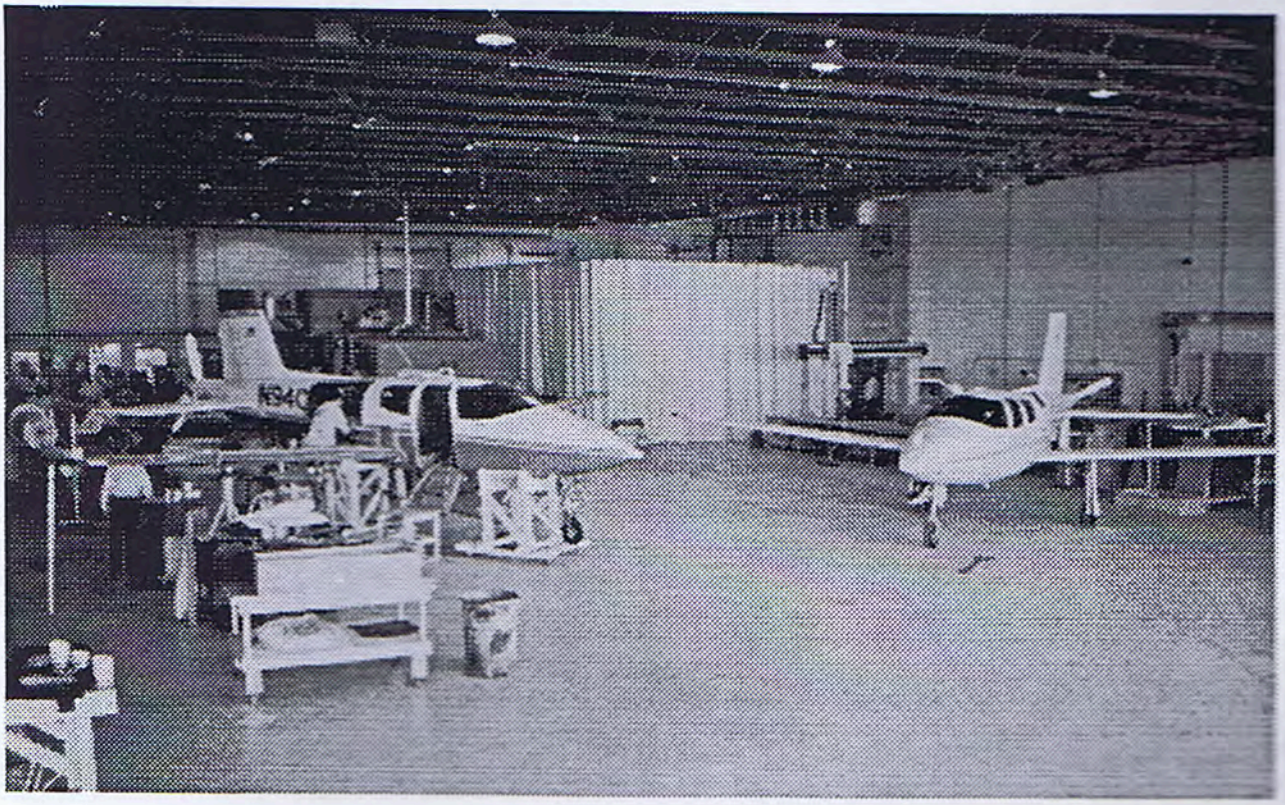



N94C
CIRRUS


N94C



Photo's taken on June 14, 1996 at Cirrus Design.



Glenn Elliott

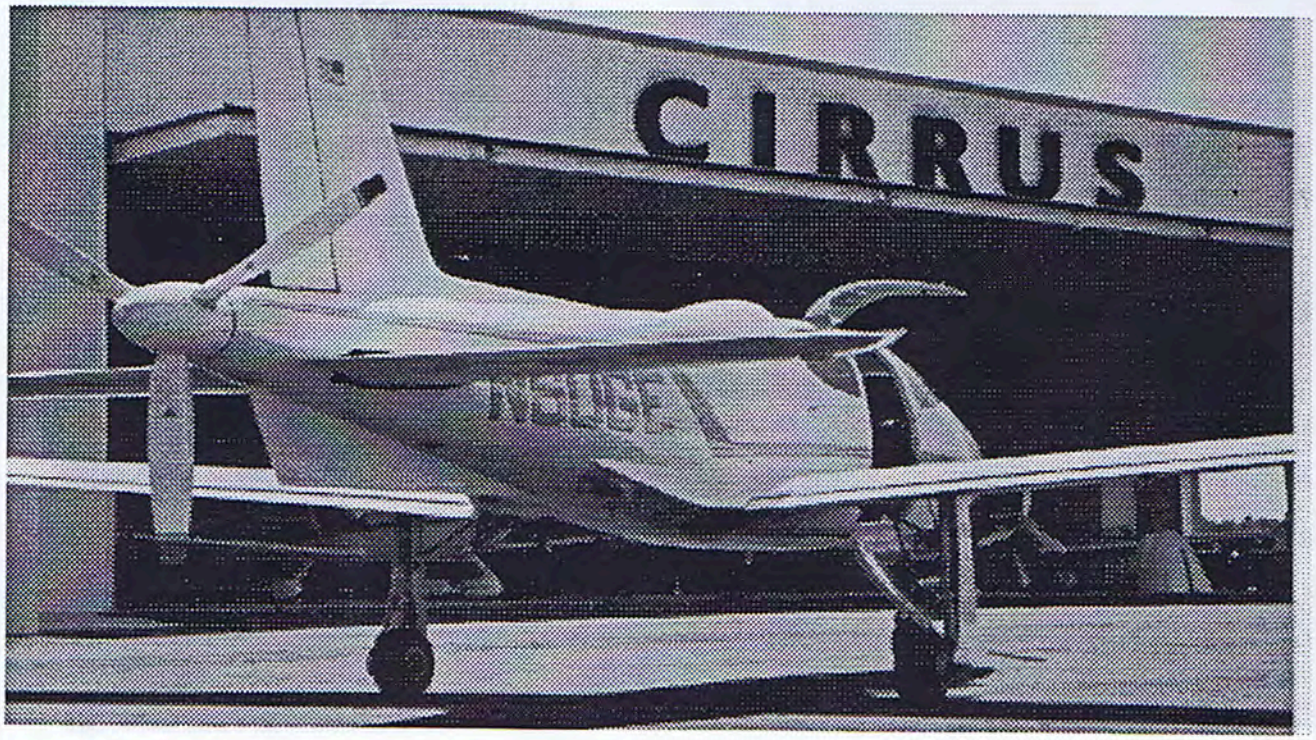
Dear Builders,

Now that all three of the flying builder's VK-30's have experienced some sort of drive line failure we can give a better estimate of Mean Time Between Failures, MTBF. It seems that an estimate of 100 hours would be about right based upon demonstrated failure rates. The use of the 300 vs 350 HP engine has a minor effect. The 100 hour MTBF is the exected rate of component failure and not what we would expect for drive system complete failure. Of course, none of us would knowingly fly with broken Flex Pac plates or with fused steel shot in the dry fluid clutch. Cy Mehling and I were both fortunate to discover the failures on the ground, and Al Corey was close to an airport when his clutch gave out and was able to make it home under reduced power.

Meanwhile, the new drive line in N60GE keeps humming along. No problems in approximately 80 hours of flight. We haven't flown as much recently as we would liked due to really lousy springtime weather here in the southwest.

Glenn Elliott

Glenn's VK-30 arrived in Duluth on June 10.

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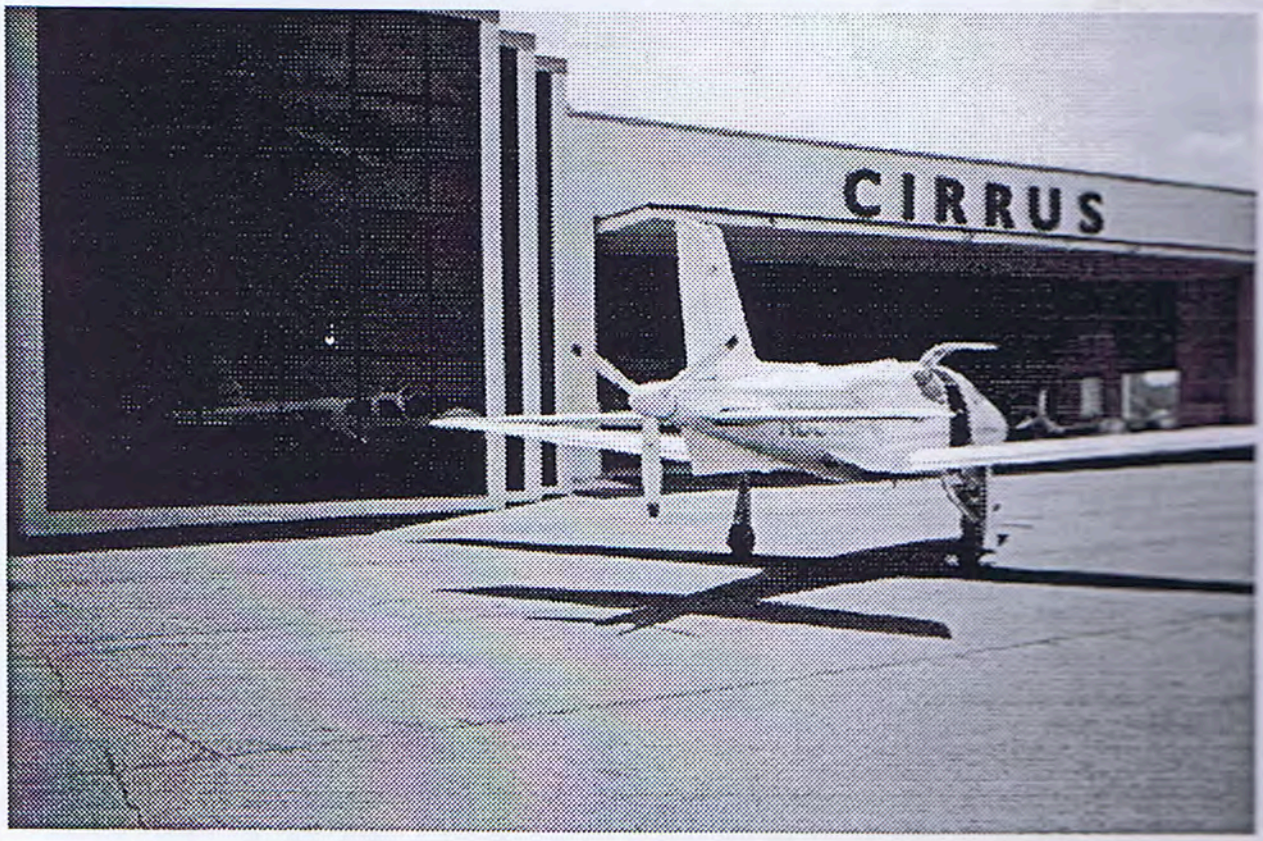

CIRRUS

Ramon Pabalan

End of May 1996

Fellow Builders,

It's been a few months since the Cirrus/ Overmeyer tragedy, taxes have been paid for 1995, another Sun 'N Fun has come and gone, and the hot summer has moved into Florida. It spite of it all I've managed to continue building the VK 30 although at a stuttering, snail's pace. The numbing effect of the losses of 44 VK and it's brilliant pilot caused a hiatus in construction but the disappointment is beginning to wear off. Hope abounds anew especially at the sight of Overmeyer's spouse at the Cirrus tent at Lakeland and the realization that life goes on. If I'm to reach a new height in personal aviation I either need to get rid of my Cirrus and buy a plane or take all that has happened in perspective and with a fresh breath, forge onward. Today I reaffirmed that choosing the latter is the much better choice, as it always has been whenever doubt about the entire project has begun to creep in.

One bright side at SNF (Sun'N Fun) this year was that four VK 30 builders sat down together and, over roasted corn and cold drinks, discussed many facets of the plane. It was enlightening as well as inspiring. Jeff Doddridge, Rick Mills, Dave Doucette and myself had an all-too-short two hour discussion of our plans and progress. As far as I know this is the first time that such a number of builders had actually met at one time for such a purpose. A few days later my wife and I were able to host Dean Vogel from Cirrus, Alan Shaw and Richard Tems for more of the same at a restaurant here in Bradenton, while later in the week Jeff Doddridge stopped by to give a farrier's opinion and see my project up close. Believe me, having the opportunity to participate in such encounters is one of the best ways to rapidly exchange ideas, successes and problem solve. If we only had such group meetings, say twice a year...

One of my missions at SNF this year was to continue investigating the new computer display panels from the various venders and see how they were maturing. In case you haven't had a chance to see them personally, you ought to make an effort to see them at Oshkosh because they seem to be coming of age. I can only expect that time and competition will cause prices to fall and products to improve. I believe that they're good enough right now to be my main display although I will have backup standard gauges on the right side. Most of the time however, if I'm not looking outside I'll be monitoring my flight from two LCD displays in front of me giving me everything from real time weather and moving map to complete engine monitoring.

My pick of the litter thus far is Archangel for its primary flight display, engine monitoring and moving map. Although a bit pricey it certainly is better than the Arnav rendition in the Cirrus SR 20 since that one costs twice as much and "isn't worth a darn" to quote the Cirrus pilot. Arnav did defend themselves saying that it isn't supposed to work, at least not yet. Keep your eyes peeled for the Silvaire and Avidyne products that even though are smaller in display than the aforementioned two. Given their flexibility and

architecture, it is highly doubtful these products will be obsolete in the near future.

The engine I'm banking on so far (at least through an escrow account) was also at SNF in a nearly finished Lancair IVP (see previous issues of the CBA Newsletter). However, they haven't flown yet so I'm waiting for them to fire it up and tune it for the Denver to Oshkosh race. They claim they'll win handily at a new speed record. They know I'm skeptical so their bragging doesn't mean much. Actually they don't brag at all. They're just working hard to prove that their engine is all they claim it to be. The proof of the pudding is in the eating; here it's in the reliability, endurance, and performance- areas in which they claim to set new standards. We'll see.

Other skeptics include Richard Tems, who in his inimitable Philadelphia style, gave his incisive comment on the engine and installation. His credible opinions are certainly worth listening to since he has expertise on engine installations, lightning protection and doing things right to FAR code. In reality I enjoy bantering ideas with Richard. If racing and competition improve the breed we'll go a long way safely with input like his. Richard does not like the EngineAir V8 and a few other V8's due to their lack of expertise in several areas. I won't elaborate here, but I encourage him to write his opinion in these pages for further discussion and elucidation.

One area that I think I've become an expert in is that of melting lead. For those who have tried to make elevator counterweights you know how difficult it is to make a weight properly sized and massed weight which gives the proper elevator travel. The following is the procedure that I used to make both my weights with a lot of time and effort.

First of all, throw away the section on making CW (counterweight, not country western) in the elevator construction. The dimensions they give are not big enough to give enough weight. Even Cirrus had to make their CW several times to get it right. Still, they wound up with a bigger weight and even digging out some of the inner skin to get the CW to travel up far enough i.e. enough elevator down travel.

Keep in mind that the manual calls for 30 degrees elevator trailing edge up travel and 26 degrees down travel although in the control system rigging section the final travel is 26 up and 21 degrees down. The limiting factor is the down travel since this is when the CW is up in the stabilizer and hitting the inner skin. I was able to achieve 25 degrees down travel after much trial and sweat, making no less than seven attempts at pouring hot lead.

A word of safety. LEAD VAPOR IS NOT GOOD FOR YOU! Lead can cause a lot of acute and chronic problems. Just look at the kinds of illnesses that lead smelters have been know to get and ask OSHA what kind of precautions should be taken when recycling batteries and you know that this should not be taken lightly. From photo 1 you can see that I

Insert at end of page 30

From photo 1 you can see that I melted my lead in our kitchen and I used a ventilating fan but this was not enough as I think I started developing some early signs of vapor inhalation. You cannot have enough ventilation when handling molten lead. Melt it outdoors if possible and stand upwind!

With that said I'll go through what I think is the best overall method for CW's. This is not a new technique but is the 'lost wax' method that artists have used to caste bronze or jewelry. It allows one to achieve a high degree of accuracy in metal by first working with a soft malleable material.

1. The first step calls for making the CW arm as described in the manual (don't throw that section away). The specified arm seems to be of correct length. Drill the three attach holes as specified in the square tube and set it aside. One problem I found here is bending the arm to the correct S-shape so that it fits inside the wing and allows enough travel without sticking below the horizontal in neutral position or hitting the upper inner skin on down travel. In fact that's the main problem with the CW. What I did was to use a piece of 1/2' copper pipe cut to the same length as the arm and drill it with the same three holes. I bolted this to the elevator and mounted the elevator to the stab. Using a tubing bender I gradually bent the copper tube until I got the right shape and proper elevator travel.

2. I made a bending jig for the steel arm by using the copper tube as a template. See photo 2. I used drywall nails closely screwed together in a piece of hard wood. Since both arms are mirror images I had to make only one jig, mentally inverting the pieces when it came time to bend the 4130 square tubing.

3. Heat the steel to a bright red so they bend easily and form them in the jig. If you do this carefully the wood won't catch fire too many times. Heating the steel can be a trick if you don't have a rosebud tip for an oxyacetylene welder since there's a tendency to burn through the steel with a standard tip. Once the arms are bent, compare the S-bend for accuracy with the copper tube.

Before the steel cools completely, heat the end that will hold the lead red hot and hammer the last inch of the end flat. This will do two things. It will first allow the arm to sit not too closely to the surface of the lead CW. Second, when pouring the molten lead, it will prevent the lead from flowing backwards down the tube and out of the arm.

I also welded two 3/16" steel crossrods to the ends of the arms to give more holding area for the lead.

4. Now attach the elevator and arms. Cut holes in the bottom of the stab to allow the CW and arm to move freely. This is sort of a guesstimate since you don't know the final shape of weight. From figure 1 you can see the dimensions of both my weights so this should give you an idea as to how big the hole should be. Move the elevator and see that it can travel the prerequisite distance.

5. Go to a craft store and get some modeling clay or putty. Apply the clay, putty or whatever molding substance to the end of the arm and shape it to the figure shown in figure 1. My weights are a shade over 5 pounds so they are that wide. I opted not to dig out some of the inner skin therefore my weight is wider but shorter than the manual specifies. Still I defy anyone to make a weight in dimensions the manual calls for and have if sufficiently heavy.

Put floor wax on the inner skin so the clay won't stick to it as you move the elevator CW in and out and establish the shape of upper surface of the CW, that is press the clay firmly onto the skin so it takes its shape. My stab has a beveled area of

foam right on top of the weight so to take advantage of maximizing the weight in the given space the top of the CW has a corresponding bevel in it too as shown in figure 1. Keep adding clay and sculpt it until you have the shape you want. Move the elevator to the neutral position and shave the bottom of the clay to match the slightly rounded bottom contour of the stab. Keep checking the elevator for travel and add or remove clay as necessary.

6. Once you have the shape you want, carefully remove the arm with the clay attached to the end of it. Put the whole device in a box that will allow you to pour plaster of Paris or some other heat resistant material that will give you 2" of plaster on all sides, surrounding the whole CW plus the arm, except for the top. Tip the CW in the plaster slightly so that when you pour the hot lead all the air can float freely to the top. Because you'll have to remove the clay after the mold has dried, make the mold in two pieces. Pour the bottom half of the mold up to the top of the CW and let it set. Then pour the top half of the mold and make it 1 and 1/2 inches thick with a 1" hole in the middle for you to pour the lead. This chimney will also allow for the shrinkage that occurs when lead cools.

What you should have now is a complete two piece mold surrounding your CW with plaster. OK so far?

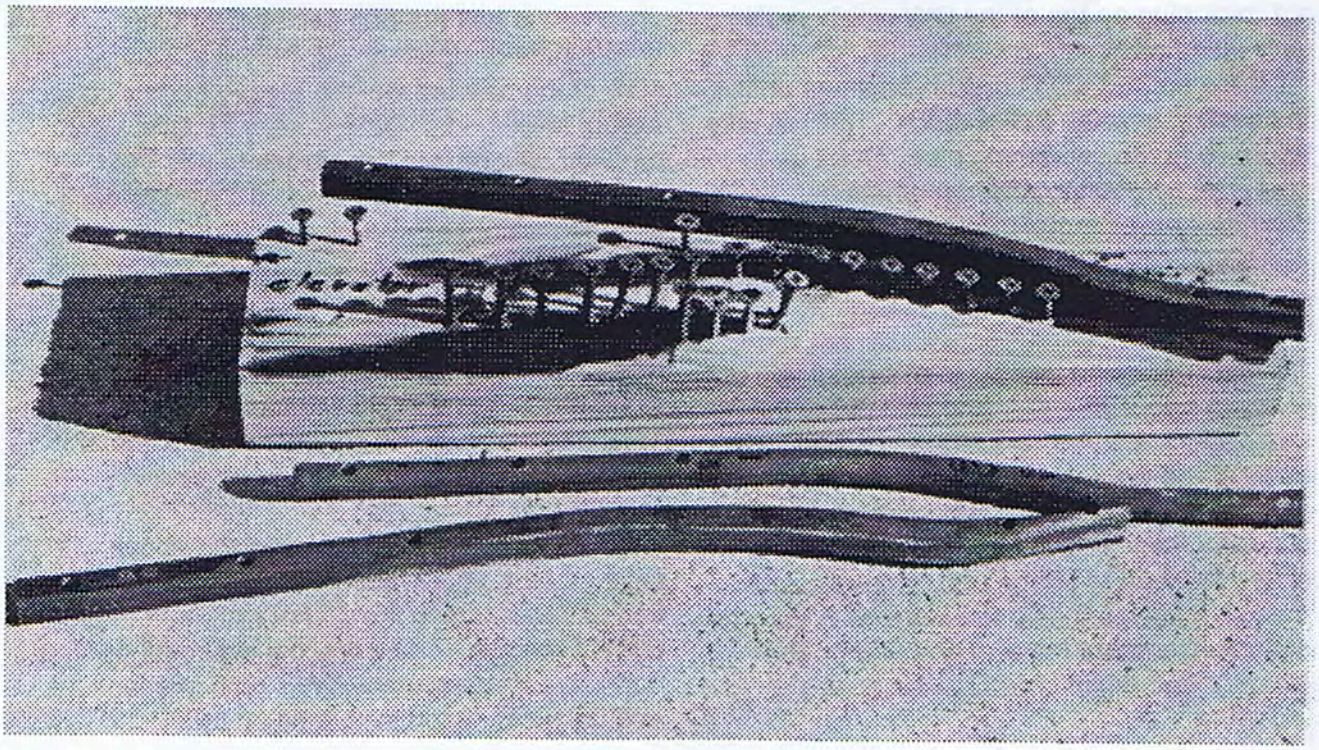
7. Separate the mold halves and carefully clean out all the clay since this is where the lead will be. The better you clean out the mold, the better your CW will look. You'll notice that the end of the arm and crossrods sit very close to the surface of the CW's. On mine there's barely an eighth of an inch of lead at the ends of the arm so the crossrods help to anchor the arm.

Be careful not to disturb the arm where it penetrates the mold. The arm should remain well anchored in the plaster so there is no movement when the lead is cast.

8. Bake the plaster mold with the arms attached. I used a moderately hot oven for three hours. I did this to remove ALL the moisture from the molds. Let me tell you what happens if you don't. On my first lead casting of the plaster- yes, I had to make the plaster mold more than once due to carelessness- there was some moisture still in the plaster. Since water boils at 212 degrees, you can imagine what happened when the 700 degree lead hit the slightly damp plaster. Steam came shooting out of the mold and so did a volcano of molten lead along with it. Not a pretty picture. Fortunately I was able to clean up the kitchen before my wife got home.

So bake your mold as long as you can to remove the water. By the way, I tested the plaster mold with a propane torch and it took a high temperature without cracking, flaking, chipping or any distortion. I suppose there are other materials you can use besides plaster but I chose it for its cheap cost and availability.

9. Now you're ready for the actual casting. Lead melts at 622 Fahrenheit but since most of us don't have thermometers in that range, you can go by color. Heat the lead to a slight golden color, about 700 degrees, and it will



pour like water. If you have friends in the bullet making business, borrow their cast iron pots and propane heaters. Otherwise you'll have to devise some type of pot. From photo 1 you can see I'm using the bottom 3" of a gallon metal can that I cut off and heating the lead over a gas range with supplemental heat from a propane torch from above. Melt more than you think you'll need because one caveat here is the CW should be cast in a single pour. This is very important since additions of hot lead will not stick to the original pour, not good unless you want to risk having your CW delaminate in flight.

Because the plaster top will float on the molten lead, clamp the two halves of your mold together firmly. Pour the molten lead through the 1" chimney right up to the top of the plaster giving you a 1 thick plug on top of the CW which you'll later plane off.

Once poured, don't disturb anything until the casting is warm to the touch. This will take hours so go do something else. Don't try to cool if off by pouring water or whatever. You'll risk having an internal fracture in the CW which you can't see but will nevertheless weaken it.

10. If all has gone well up to this point you're ready to break your CW and arm out of the mold. Unclamp the top half and carefully chip away at the lower half until the CW is free. After removal I used a cheese grater type of sander- I think it's a Stanley surform tool- to shave the lead to shape and remove casting marks. It leaves a nice surface and is easy to control. Remount the arm and CW on the elevator and again check for travel. It should be very close to the final fit which you can do with the grater.

You may have noticed that I haven't described the procedure to find the total weight needed for the CW. I used a different method than the manual's. Initially, I suspended the elevator on its own brackets and put the arm on- sans CW- and simply used a spring scale to determine the approximate weight needed. From there I used the known density of lead to come up with a close estimation for the CW. But hopefully with the CW made to the dimension in figure 1, you should have more than enough weight in the CW to give you a few ounces to shave off later to account for the weight of primer and paint, obviating the need for this weighing procedure. But if you think your elevator is heavier than mine- they weigh seven and a half pounds each without the torque tube or paint- or want to be absolutely sure of the needed weight, please go through a weight calculation. Otherwise, your CW will be too light. It's next to impossible to add lead weight. Believe me I've tried. It's always easier to shave weight off.

Counterweight Arm

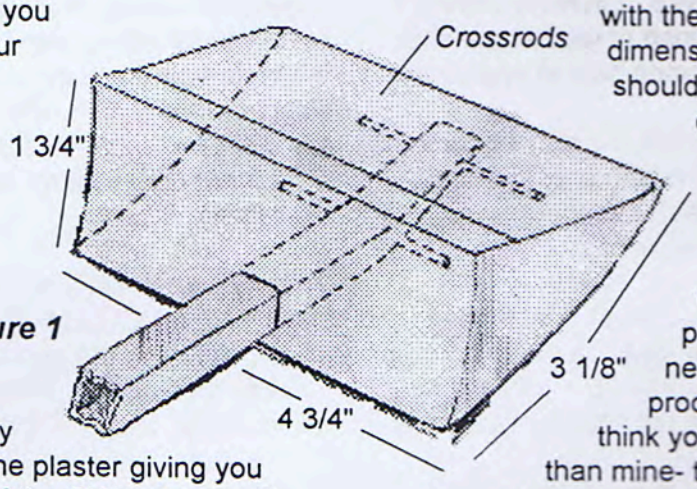


Figure 1

If you have a way to hold the horizontal stab in its flying position and allow the elevators and CW to swing freely then do so. This will accurately show you how heavy or light your CW is since this is a real world situation and when balanced correctly the elevators should be in their neutral or slightly TE edge up position.

Well, that's it for now. I hope the above will save you the aggravation and frustration that I encountered during the 35 hour attempt to get correct weights. Using the lost wax method, I now have very accurate CW's both in shape and balance. Good luck to all of you.

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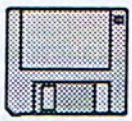

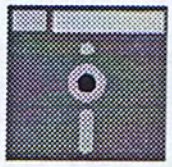

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