

# CIRRUS BUILDERS ASSOCIATION

Published by Rick Mills &amp; Dave Doucette

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## CBA

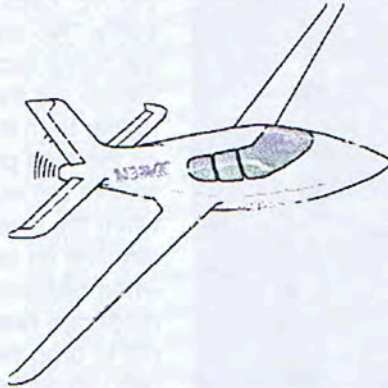
### Late Summer 95

## WHAT'S INSIDE

By Dave Doucette.....

### CBA Video

Rick and I finally made it to Duluth in mid May to shoot the factory video. In marked contrast to the April weather, we found clear skies and hot temperatures getting to Duluth. It was quite an experience at one point leaving the airport with the temperature at 85 degrees and going to the port of Duluth on Lake Superior and finding it cold enough to want a jacket. Reminds me of when we lived in the San Francisco Bay area. The video should have three parts. The parts include an interview with Dale and Alan Klapmeier, a discussion with Eric Hartwig about the quality control process for the wing, and Pat Waddick answering some of the builder submitted questions. Thanks in advance to



Jim Blair for his video expertise in producing the final product.

### Report from Cy and Jim Mehling

Cy and Jim continue to provide valuable tidbits as they continue to fly their Cirrus. Many of us will not be flying for awhile but the Mehlings' valuable troubleshooting will save most of us many hours of frustration. Thanks to them for their regular input to the newsletter.

### Glenn Elliott on Flex Pac Alternative

In the last newsletter Glenn Elliott reported on his experience with the Flex Pacs in the Cirrus drive train. In this issue he summarizes his experience and possible solution now in a testing phase. We look forward to a complete report in the next newsletter.

### Oshkosh 1995

Rick, my wife Diane, and I had the opportunity to fly to Oshkosh and spend a few days at the show. It was good to see Al Corey, Richard Tems, Ramon Pabalan, And Tom Westonberger at the show. The Cirrus display was quite impressive occupying space both inside and outside one of the new exhibit buildings. All of the Cirrus Design folks were upbeat, enthusiastic and optimistic about production of the Cirrus wing. Dale remarked that the Proto IV wing actually looked like a wing now, not just a spar box. As will be explained in the video, there is no firm production timetable established because attempts to estimate production schedules in the past have only led to disappointment at unanticipated delays. We're all waiting patiently and Cirrus is working to deliver our markedly improved wings as soon as possible.

### Richard Tems

Richard is negotiating with an Allison Maintenance facility to purchase 420 SHP Allison zero time turbine engines. Delivery in 1996. Cost is approximately \$50,000.00 per engine. If interested call Richard at 215 345-8228.



**Cy & Jim Mehling**

6 APR '95

Dear Rick and Dave-

Jim reported to me that he was unable to extend the RT Main L/G on a recent flight. I made a minor adjustment on the rod from the uplock to the "J" hook and test flew it, only to find it would not release. On each occasion we released it with the cable we installed. About this cable, we had heard some reports that it took one heck of a pull on the cable to release the locks. We thought we could improve on the plans and put two pulleys at the rear of the wing with the two cables joined up the line and going to another pulley fwd of the Capt seat so you can pull the cable straight up, get more force, less drag and the system works very nicely.

I discovered I adjusted the rod in the wrong direction, so made a new adjustment and went flying again. This time it worked fine, but on the postflight I discovered the gear had struck the "J" hook and nearly tore it off the spar. With the plane on jacks, I referred to the original plans and found them to be wanting, so proceeded to try to solve the problem by myself. I ordered some resin and went about repositioning the location of the "J" hook bracket. It worked fine on the jacks, but refused to release in flight. I thought about it overnight and went up again next day, this time I used the hand pump and one stroke released it. This told me, my down hyd pressure (which is not available on

the gage) was inadequate.

I jury rigged the system to read the pressure on the ship's gage and found it to be 500 psi. I called Cirrus for help and got none, so I went about looking for the pressure valve in the pump. I found one on each side, the 7/8" caps, under which is a spring and a needle valve. No adjustment was available there, so I called the pump factory and got all the help I needed. Those valves are the temp relief valves and are set 1000 psi higher than the up and down press valves. This valve on the high pressure side would relieve at 2400 psi, to relieve the high pressures we have complained about when the system heats up. I experimented with the airplane on jacks and discovered the free fall valve, when opened carefully drops the pressure at a very moderate rate of perhaps 100 psi / second, allowing me to drop the pressure without lowering the LG. The real valves I wanted are in the bottom, visible after you remove the reservoir. A 3/8" wrench removes one bolt in the middle of the bottom of the reservoir, it has an O ring on it and the reservoir has a big O ring where it seats against the pump. There are 4 extrusions as the factory calls them protruding from the pump into the reservoir. I call them towers. The two inbd ones have jam nuts on them to lock the adjustments for hi and low pressure. The towers are associated with the hi and lo press. ports adjacent. The towers are 7/16" hex and the jam nuts are 11/16". Each turn of the lo press tower gives 400 psi inc. CW. The hi press adj is 600 psi per turn - inc CW. You can remove the tower and find a heavy spring, a rivet in the end of the spring and a steel ball against it's seat. I once found a sliver of aluminum on the ball-seat of the low press on a Glasair III which limited the down press to about 200 psi. That airplane used about 800-1000 psi in the down position. Anyway I cranked mine up a turn and now have 1000 psi and it works just fine.

Experimental airplanes are all about education, you remember. Looking back, you might recall we had trouble with the nose gear doors. I stated that any pressure whatever on the doors in the down position would prevent the green light from coming on. I believe that increasing the down hyd pressure at that time would have solved this problem. Again, my recollection tells me that a stroke of the hand pump would lock the nose gear down after the pump failed to do so.

The last aggravating problem remaining was the inaccurate fuel quantity gages of the Sports type furnished in the kit. We use two tanks and gages and once these were initially calibrated, we soon found them to be inaccurate. One read too high, the other

full all the time. I blamed Cirrus for vent system problems, assuming the transmitter towers were either not properly vented or the vent lines were full of fuel. In any event, I figured the towers were full of fuel. It is such a pain to drain or fill 110 gal. of fuel, I elected to wait for the new wing to solve the problem.

Last week I observed a homebuilder calibrating his system using a 5 gal. bucket of gas and decided to try that myself. To my amazement I did not find the tower full of fuel, so I went about making the leads on the probe a couple feet longer so I could remove the 18" probes while still connected to the system. (suggest you do this when wiring them initially, the wires can be tie wrapped to the towers) I was able to calibrate each of them with no trouble at all empty as well as full. Obviously, the problem was the potentiometers had moved to their limits from vibration. After I did the calibrations, I put a piece of masking tape over the screws to prevent their future movement, if this works OK, I will put a drop of silicone caulk on each one. Bear in mind that these readings go up a bit when the alternator comes on line and raises the volts from 24 to 28. I have since found that the probe would make the system read correctly only for a short period after powering up, then it would slowly advance to a full reading. Sports has agreed to send me a new probe.

I have phoned and written to Cirrus requesting further info on the Flex Pac problems encountered by Glen Elliot and rumored to have been encountered by Cirrus on their prototypes. I have received no response to date.

Keep building,

24 APR '95

Dear Rick and Dave-

In trouble shooting my L/G HYD system, I examined the new free fall valve that Cirrus sent and was surprised to see that there was a difference looking into the ends, and there was an arrow on the valve. Printed on the valve was the statement - 2000psi. This puzzled me, we had cracked this valve open with an indication in excess of 2200psi, and thereafter it leaked. Since I had no manual to work with at the time of construction, I took a look at the new manual I have. Page 11 and 12 of the Fuselage Hyd's shows that the valve should be installed with the arrow pointing to the reservoir line, the direction of flow when the valve is opened with the L/G "UP".

Mine had been installed just the opposite, so I reversed it and found that it leaked off the "UP"

pressure so badly that it would not retract the gear with the elec. motor. I then installed the new valve with the arrow pointing toward the "UP" line as I had done originally and the leak disappeared and the system now operates fine. I suggest you make this correction in your manuals.

I also lost the use of the hand pump, there was no pumping action. I reasoned the system out and figured I had a faulty check valve at the hand pump. I replaced it with a new one and that also now works properly. Remember it takes about 40 strokes to get the gear down and locked using the hand pump.

I installed the free fall valve under the copilot's heels at the insp hole just fwd of the console. I put the hand pump ck valves under the copilot seat at the rear insp hole. I ran my uplock release cable to the Capt side so the pilot can get a nice upward pull and all these items worked out better than the manual positions suggested. I installed a pulley for the fwd end of the cable so you can pull vertically. I also installed two pulleys in the center back by the trailing edge of the wing to reduce the friction there and it is fine. However, Al Cory says he ran teflon tubing in a nice gentle arc in place of the rear pulleys and it works great too.

A little discussion of this hyd system might help. The motor does not allow fluid to flow between the "UP", "DN", or reservoir when it is not running. When the gear is up and the free fall valve is opened, the fluid flows from the "UP" lines to the reservoir. Since the actuators require a supply of fluid (to the down side of the actuators) as the gear free falls, it is supplied from the reservoir thru the hand pump ck valves. Therefore make sure you install these two valves so the free flow is toward the down line. You can ascertain which end is which by visually inspecting the valves. One end appears to be closed, using a small probe, you can depress the valve in that end against its spring. That end needs to be toward the reservoir in both cases. Since the hand pump is single acting, it is ported between the ck valves and alternately draws in fluid from the reservoir on the down stroke and expels it to the down line on the upstroke, the ck valves directing the flow as you pump.

Of course only the nose gear will free fall when you open the free fall valve. You may now pull the cable to release the main gears, or you may operate the hand pump. Using the hand pump will initially turn on the Nose green light, then will

unlock one of the main gears. When the pressure is built up on that gear, the green light may come on/or the other main gear may unlock. When all gears are down and locked the pump handle becomes extremely hard to move.

My observations are that no amount of yawing, g loading + or - is going to lock that landing gear system down unless you have either the motor or the hand pump and the down lines are all intact. Fortunately, a pinhole or very small size leak in the down lines might be compensated for by the fact that the fluid in the "UP" sides of the actuators exceeds that needed for the "DN" side, so even if you emptied the reservoir retracting the gear, you would still have fluid available to lower the gear.

We wired an amber "UP" light to the pressure switch and by observing this light coming on and the pressure steady at 1500 to 1700psi, that tells us the gear is up (at least it has pressure in the system) and the motor has shut off. This is a MUST ck item after takeoff to avoid emptying the reservoir in case of a leak in the "UP" system.

Cy Mehling

18 MAY '95

What a great newsletter! Congrats to all who contributed and especially to you, Rick and Dave for the work you do to get this to us builders.

I had previously told you that we had problems with the SKYSPORTS fuel gages. I have solved that problem and want to tell you a few things. Skysports gave us a new probe at about 1/3 retail price after tracking their sale to Cirrus. I find it is not necessary to fill and drain the tanks to set the calibration on the probes. Just remove them from the tank while connected to set "MT". Then measure the fuel height and set the full reading to the portion of the total inches in the tank. For example with 60 gal. on board the height was 9" and since the probe is 18" long, I set the full calibrator to read 1/2 tank on the gage.

Also be advised if you have a 24V elec. system you may or may not have a 24V probe and gage. When I got my kit, they only sold 12V gage systems, so they sent me a resistor to put with ea. gage to reduce the sys voltage from 24 to 12v. Since then, they now make 24V probes and gages. If you have trouble with the sys, you have to tell them what components you have. The probes are marked for which voltage they use.

Also note that their recent paperwork with their products shows a wiring diag. that does not have the "S" lead connected to the probe, this is an error, it should be connected. There is another problem that Al Corey reported to me and we had already solved that involves the lighted gages that come with these units. The 12v units we had, had 12v bulbs in them. We tried connecting the bulbs to the same resistor used for the gage, but it threw the gage reading off. We then tried putting the two bulbs from the two gages in series to operate them on 24v, that did not work either. We wanted them to be on the instrument rheostat system, so scouted up (with much difficulty) some 24v bulbs and they now work fine.

Jim had previously reported that the VK-30 wing did not want to fly at 100kts on downwind without some wing flaps. On a recent photo mission with 94CM, I found I could easily fly at 100 kts "without the gear down" and no flaps.

Since we told you we always needed the fuel pump on lo in cruise above 8000', I am wondering if that was only because of our clogged gascolator screen. I will report on this when I get a chance to try it next. I have encl a photo of the fiber and junk we removed from the gascolator.

I really got a chuckle out of Glen Elliot's description of the fuel tank divider that looked like it was installed by high school kids having a mill fiber fight. I examined mine too and would like to amend that statement to indicate they were only grade school kids.

I was shocked when I completed my airplane and found no wing tiedown provisions. I intend to suggest to Eric Hartwig to install some steel plates with plain nuts welded on (as per Glasair) outside the fuel tank area at the tip bent 90° to allow some hardware store 5/16" eyes to be inserted for tiedown ropes. They can be bolted to the wing spar.

Cy,

25 MAY '95

Rick and Dave-

Just completed a nice weeknd of flying to VA to the Winchester EAA chapter flyin. Found that the fuel boost pump was not required in cruise. A complete stranger informed me the Cirrus ST-50 crashed in Israel after the PT-6 engine failed. I confirmed this with an anonymous source at Cirrus and they reported it was a gear up landing and was repairable.

I completed a 25 hr insp and service to 94CM this week in preparation for Jim's trip to Canada to open his cottage for the season. I found the flex packs still OK, and found some fiber contamination on the gascolator screen. Believe it to be about 5-10% clogged. Our fuel quantity indicator system is much better, we can now "sort of" tell where the fuel is. With the extensive trunion leaks, we have only a vague idea of the fuel on board as the computer can't tell how much is leaked overboard. The only sure way to ascertain the adequate fuel supply is to fill it before flight or carry a whole bunch extra. Of course this will all be taken care of by Cirrus.

Rick Hagberg said last night that the new wing for the VK-44, the turbine powered proto was not yet complete and he had no idea when the kit wings production would begin. He said that he and Pat Waddick and some others had prepared a video for you answering builders questions.

I was appalled to hear that few builders have responded to our request for annual funding for this newsletter. Those not contributing obviously have no interest in completing their airplanes and don't want to waste money or take the time to show their appreciation. Many years ago, EAA noted that only 15% of homebuilt planes started, ever were finished and flown. I would assume that in this day of kits and especially of the prices of today's kits, engines, avionics etc that that percentage would be much higher. Judging by the response for support of our newsletter, it appears that Cirrus kits will fall short of that average. If you think you can finish this airplane on your own, take a look at your construction manual and find the section on engine installation, alignment of the drive shaft, installation of the tail housing and a few other minor things. If you find the pages, give me a call so I can ask you

to copy them for me. My last revision is over 18 months old I think. Think again about selling your uncompleted kit. What price do you think it might bring without instructions to complete it?

CY



**Glenn Elliott**

Dear Builders,

As reported in the last news letter I had a near total failure of the forward Flex Pac in N60GE. 17 of the 19 plates were fractured and the entire Flex Pac would have certainly disintegrated in the next few minutes of flight. An analysis of the loading, using data supplied by T. B. Woods, the current manufacturer, showed clearly that the part was not suitable for use in my application. Service (safety) factor is around 1.2, assuming that the dry fluid clutch (DFC) does a perfect job of smoothing out the power pulses from the engine. This is far below the 4-5 service factor generally acceptable for non fail-safe parts in an aircraft system critical to flight. Although an angular misalignment of about 0.5 degrees probably contributed to the early failure in my airplane, the 1.2 service factor is for perfect alignment, and is, without any doubt too low.

I also became very interested in verifying the design service factors of the rest of the drive train system. In general, no data were available to use for a dynamic/static load analysis. For this and many other reasons I decided to do a complete

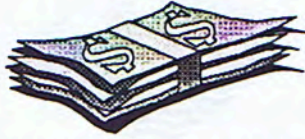
redesign of the drive train. My objectives were to do a better job of damping power pulses from the engine, to avoid torsional resonance throughout the operating range, to reduce operational and maintenance complexity, to reduce weight, avoid major changes in empty aircraft CG, and to have acceptable fail/safe and service factor levels.

The new design eliminates the DFC, Flex Pacs, the carbon fiber-wrapped aluminum shaft, and the inertial rings. There are two elastomeric couplings, fore and aft; a carbon fiber epoxy drive shaft; and a slip joint made by modifying the original from the DFC. Flight test began on June 18 and to date (July 5) no problems have been discovered. We have made six flights, about 3 hours, into a ten hour test program, the last was a short cross country (100 nm) for lunch in Gallup, NM. I'm planning a complete engineering report for distribution to any builder. And, of course, I'll keep everybody informed through the news letter.

I am still very concerned about the design of drive train systems for pusher airplanes like the VK30. Especially worrisome are reports of installations using large engines driving props at low speed. This can develop torque levels and vibration problems that one would not expect from an airplane. To do the job right and arrive at generally accepted safety levels requires very careful analysis by someone familiar with the design of power transmission equipment normally associated with industrial equipment such as busses, trucks, and earth moving equipment. I urge a careful and conservative approach.

*Glenn*

## Newsletter Financial Statement



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Please include a photo of yourself with your article. A closeup black & white glossy works best.