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CIRRUS BUILDERS ASSOCIATION

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CBA

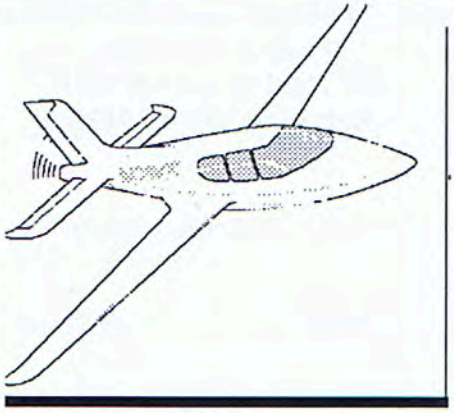
Winter 1994

WHAT'S INSIDE

By Dave Doucette.....

New Co-editor

Beginning with this issue, Dave Doucette, will be Co— editor along with Rick Mills. Dave remembers Rick Mills' airplane at its' very early stages when Dave was at Builder's assistance in December of 1990. Rick is probably one of the few people who has a vacuum bagged firewall along with other nifty attentions to detail like stainless steel hydraulic lines in his wing (which, of course, is now in Duluth in the Cirrus wing bone yard). Dave has become good friends with Rick as Rick's machine shop is very near Dave's home and his Cirrus project. Dave only slows Rick down by a factor of five or ten when he visits Rick and "helps" him on a project.



Help me please . . .

I need a schematic of someone's heating and ventilation ducting. I am in the process of laying out things under the floor and know I will need heating ventilation lines, hydraulic lines, brake lines, and electrical bus bars (1" x 1/8" aluminum bar stock). How did you do it? How do you plan to do it? Send us your ideas, pictures, explanations for inclusion in a future newsletter.

News From Alaska

In this issue we hear from Cirrus builder Roger Carter in an article written by Richard Luthas, my brother-in-law. Richard is a former bicycle frame builder, painter, and bicycle consultant. He is currently espousing the starving artist life-styles as he develops his skills as a writer. Richard has been a constant encouragement and helper in my Cirrus project. Rich attended builder's assistance with me and helped build my first construction hangar. Enjoy his style as he presents his interpretation of an interview with Roger Carter complete with an array of photos presented by Roger himself. We also have a schematic of Roger Carter's hydraulic system which is modified from what Cirrus designed. Take a look at it and send us your comments.

From Florida . . .

We move from Alaska to the sunshine state for an update from Ramon Pabalan. I'm still amazed at how comfortable Ramon looked on the builder's video while squatting in the tail section of his VK-30.

More from Cy and Jim

We have over seven pages of more valuable information from the Mehlings. As one of the only flying VK-30's their input is valuable reference information for those of us in earlier stages. They're an inspiration to all of us to get building so we'll be ready for the new wings. We also have a letter from Jim Mehling that you'll want to check out.

Thank you Jim Blair..
by Rick Mills....

The fall CBA video was a fun and interesting view of several builders projects. Shooting the video was only part of the production. On behalf of all association members I would like to thank Jim Blair for his time and financial contribution in producing and distributing the video. Jim volunteered his time and professional studio for the production of the CBA video.

Grob versus Cirrus

I have enclosed a copy of a letter I sent to Private Pilot editor Peter Underhill outlining my objections to his article on the Grob GF200. I really don't expect anyone to agree with me but thought it would be of interest to some of you.

Letters to CBA

Dear Rick,

This is a copy of the letter I sent. Thought it would be of interest for the Cirrus builders newsletter.

David J. Doucette
457 Rolling Timber Trail
Kettering, Ohio 45429

Mr. Peter Underhill
Senior Editor
Private Pilot
P. O. Box 6050
Mission Viejo, CA 92718

Dear Mr. Underhill:

I have read and reread your article, "Plane of the Future", in the December 1994 issue of Private Pilot. In many ways I enjoyed the descriptions of systems and flight characteristics. Perhaps it is because I am a Cirrus VK-30 builder that I have some mild feelings of resent for the way in which you seem to have built up the Grob GF-200 as such a unique aircraft. While it certainly has advanced design features it is by no means as unique as you suggest.

First, consider that the basic shape is remarkably similar to the Cirrus Design Corporation's VK-30 and its larger ST-50 currently being built. Second, consider that the landing gear which you describe as "tall and elegant" (I agree) looks amazingly like and in fact probably is the exact same gear that is on my Cirrus VK-30. Third, you mention that pusher aircraft are not new. You mention that the original Wright Flyer was a pusher. You again fail to mention the Cirrus airplanes. You might have mentioned, for example, that because of the proven experience of Cirrus Design and its VK-30 combined with Grob's extensive resources and aircraft design and production experience one could expect this to be an airplane with a remarkable demonstration of advanced form combined with advanced function. Fourth, you paint a picture of the benefits of composite construction as one without any disadvantages in *this* aircraft. I would agree with the concept that composites have many advantages but in production tooling and manufacturing it is no easy task to cheaply produce consistently stable molds and parts. And composites are not totally impervious to heat, humidity, and material fatigue. Fifth and finally, you describe a carbon fiber drive shaft resonance problem. I would guess that the Grob drive system is remarkably similar to the Cirrus system and there has no doubt been some corroboration and interaction of ideas between the two companies.

My objections extend beyond your simple failure to mention Cirrus Design, a company to which I am obviously biased and perhaps overly loyal. My additional objection is how you describe the Grob aircraft as though it were developed in a vacuum. There are many in this country apart from the metal manufacturers of the past who are just as innovative and just as poised to revitalize general aviation with exciting new designs. You passed up on a unique opportunity to point out that almost every aspect of the Grob aircraft from materials, design, and systems have counterparts and indeed copies in aircraft being produced by Cirrus Design and others in our country. You rightly pointed out that many of the Grob's features like powerplant, power to weight, and ability to exceed the current Vne are indeed not well

received or not quite where they should be in the production aircraft. These challenges are remarkably similar to what Cirrus and other composite manufacturers in this country have discovered. You passed up the chance to see that there are those in this country that are doing something to revitalize the general aviation market beyond just considering the resumption of production of outdated overpriced metal designs. And if there has been corroboration between Cirrus Design and Grob you passed up the opportunity to validate that this type of aircraft has support on two continents and is as viable as traditional designs.

In summary, your article objectively reports on the features and flying characteristics of the Grob GF-200. It fails to put the Grob aircraft in perspective with other similar designs, most notably the Cirrus VK-30 and Cirrus ST-50. It describes uniqueness, innovation, and advanced features which in many cases are not unique, not innovative, and in fact, steps down from similar but corrected problems found in early Cirrus VK-30 designs. The article ignores or at least avoids any mention of corroboration between Grob and any other similar company. The article implies a level of aviation achievement that is not available here in America which I believe is largely untrue. In fact, given that the Grob GF-200 described is a proof of concept aircraft it is not currently available either.

Sincerely,

David J. Doucette

P.O. Box 1
Buckingham, PA 18912
November 14, 1994

Mr. Tom Logan
9276 Youngstown Salem Rd.
Canfield, OH 44406

Dear Tom,

Thanks for the latest edition of the Cirrus newsletter and the video tape. We would like to do a video for you of a pre-flight and flight, but we have to get the video camera fixed first. Our oldest son did a video of sorts for a school project using the airport as the basis for a story and the video camera has not worked since.

We have accumulated a number of data points for our performance spreadsheet. I will save the spreadsheet in a "WK1" format the next time so you can read it into your spreadsheet program. In addition I am using Microsoft Word 6.0, so anything else we have can be sent to you on floppy. I am using an older version of Generic CADD (version 5.0) for our wiring diagrams. If you cannot convert this type of file to your state-of-the -art CADD program i could send you a file of these diagrams in digitized form. I now have access to a flat-bed scanner at the office.

We are still having engine noise problems on the VOR. If one of the builders has some experience with this I could use some help. I am thinking that the next step is to install a pair of blade antennas near the top of the vertical fin. Dad installed the copper strips in the horizontal stabilizer. He said the same installation worked fine in the GlassAir. I am wondering if the antenna in the horizontal stabilizer is being affected by the proximity and sine of sight of the propeller. Nothing seems to have made a significant difference.

The autopilot is an absolute dream with the automatic pitch synchronization system installed. In smooth air you can now play with the cruise flaps and see how they affect cruise flight. In a few words, they can only detract from cruise. It looks like they might add 3-5 knots if they are set at the right position, otherwise they only change the deck angle of the airplane and reduce the true airspeed a bit.

Best regards

Jim

Jim Mehling

Ramon Pabalan

October 25

Dear Rick, Tom and Fellow Builders,

Having just returned from AOPA Expo where I was able to present the seminar on high altitude flying, I can say that there is progress in general aviation, a lot of which is in the experimental category. I saw Slick's new LASAR magneto which they tell me will be certified by next year but they will soon make it available to homebuilders. The Cirrus display was well done and very well attended which is good to see because their success I believe is closely linked to our success.

One question I've had for a while regarding my VK 30 is the possibility of installing deicing equipment. It seems Richard Tems has already spoken with the TKS 'weeping wing' people and they told him (and me at Oshkosh) that they would develop a program for the VK 30 if they could get enough builders to commit, as he said in Vol. 1 No. 4 issue.

My positive opinions on the TKS is that it does seem to work. It deices and anti-ices well and probably better than standard leading edge boots since the fluid coats the entire wing back from the leading edge. My criticism about this system is: 1. It requires a steel leading edge on the horizontal which will probably interfere with the built in nav antennas that I have already installed. 2. Windshield deice capability is, to me, an unknown. 3. The EPA may soon give TKS users grief about spilling propylene glycol over the countryside although this stuff is relatively benign. They may in the future try to limit the distribution and use of this liquid. 4. I'm not keen on having this wet, gooey stuff dripping all over the hangar floor after I land nor does it do my clothing any good if I get in contact with it which I'm sure I will. 5. This is one more liquid I'll have to check and replenish in the plane, with the attendant maintenance to the entire plumbing system.

As we know, Cirrus introduced their SR20 at Oshkosh and I've learned that they intend to deice this plane. I was able to speak with the inventor of a deice system that Cirrus is investigating for use in their projects. Mr. Joseph Gerardi hails from Ithaca, NY and he had a display booth at Expo for his Innovative Dynamics, Inc. which has been partly funded for its research over the past years by NASA. Joe's system uses electric coils embedded in the leading edges of the wing which are jolted by a large but very short adjustable outburst of electrical power that produces an audible and palpable 'thunk' each time it discharges. To me it feels like someone had landed a solid hammer blow on the leading edge of the wing but from inside. He tells me this produces a small- on the order of several thousandths of an inch- excursion of the specially designed composite leading edge, enough to crack the ice off. Moreover, this shock coil system is automatic in that there are leading edge sensors that trigger the system whenever they detect ice over a small fraction of an inch. There is no need to monitor for ice as you have to with pneumatic boots.

Advantages here are that it is electronic and automatic. There is nothing to replenish. The power consumption is relatively small, somewhere around 300 watts continuous power I'm told. It is environmentally friendly (catch phrase of the 90's) and needs no monitoring except that it is on. The coils are installed on the leading edge in sections and is ideal for a composite installation on the wing, horizontal and vertical stabilizers.

Drawbacks are the price- somewhere around 12 kilobucks- and weight which on the VK 30 would be around 70 pounds. Most of this would be from the power supplies that generate and store the electrical energy until discharge but ongoing research may reduce this weight by a dozen pounds. I don't know if it would interfere with antenna function which obviously is of great import on the horizontal stabilizer.

Anyway, I told Mr. Gerardi that I was interested and would forward this info to the other builders. From what I saw the installation might be tedious but not difficult as it requires generating a leading edge groove to accommodate the hardware. Since they will probably be engineering the ST 50 system for Cirrus before they sell to VK 30 people, one further drawback may be that they won't have a system available for a few months. For more information you can call him at Innovative Dynamics, Inc. (607) 257-0533 or FAX 257-0516.

My next question to you all is what are you doing about the design, fabrication, and installation of the electric system in you plane? This can like all other systems in the plane, be a source of great satisfaction once the whole system is in place and debugged. The construction manual is appropriately very sketchy on this matter

since individuality would preclude anything more than the basic subsystem wiring. I did take their advice and get the publication from Aero Connection and have read most of the manual. It certainly makes for fascinating reading and gives me a lot of ideas as to how to design a state of the art electric system without state of the art dollars. The author seems to have a lot of experience in this realm especially as to what works and what does not. I had the opportunity to speak with the author, Mr. Bob Nuckolls, whose several articles in Sport Aviation you've undoubtedly read. He offers a very unique service in that he can help design a custom electric systems and put it in a "wirebook" format just like the folks at Vero Beach and Wichita do, making it all look very official and easy to use for future trouble-shooting. He also knows where to procure the hardware at reasonable prices. I intend to use his expertise in implementing a dual electric system airplane with no vacuum instruments. I'd like to hear what others have planned in this area.

Although I know there are a handful of V8 builders (I don't have the bucks for a turbine), I haven't seen or read much in the CBA Newsletter as to what's going on in the powerplant arena . I also hope to use a V8 of Chevy or similar design, put it through a gear reduction unit and then power a 3 or 5 blade electrically controlled prop, probably an MT. I'd like to hear others' experiences or plans on engines, speed reduction units, vibration analysis and damping (I hear that the V8 engine can have some significant torsional resonance) and propellers.

I recently had a discussion with Dan Denney, former owner of Kitfox and now leader of the Papa 51 group that is using a Falconer V-12 in a 3/4 scale P-51 Mustang. They went high tech and looked very carefully at all the issues just mentioned before making the PSRU (prop speed reduction unit, an acronym that I'll use hereon) and finding customized gears and so on. His concerns about the use of V8's in aircraft is the engineering or lack of that many people don't use before selecting a drive unit. His main concern was that of vibration and resonance, a problem that he feels wouldn't surface for possibly several hundred hours. The engine itself wasn't too much of a problem, it's the engine-gearbox-driveshaft-prop as a unit that have to be considered. If three hundred hours could be put on a said unit without any failures, unexpected wear or problems then that should be a fair indication that it should go a few more hundred hours without much worry. Sport Aviation had an article on Papa 51 this past summer.

I have been collecting articles on several V8 makers and also some PSRU makers. The latest one I've come up with is a company called Blackhawk Lightning Corporation in Tennessee. Mr. Owen Bell claims to have a PSRU that has gone over 500 hours in simulated flight and has 100 flying hours using a Cheyenne propeller. His unit uses three spur gears riding on tapered roller bearings and are pressure fed by an internal oil pump. Rather heavy in both the weight and the wallet at around ninety pounds and ten thousand dollars, it's at least a consideration especially if you can have an engine custom made for ten to fifteen grand. The total price is still far less than a Continental or Lycoming six cylinder. For more information you can write Blackhawk Lightnig Corp. at 4099 Brick Church Pike;Whites Creek, TN 37189 or call them at 615 865-1802.

Keep those articles, information, and videos rolling. I enjoy seeing what everyone else is doing and my phone and FAX lines are always open.

Ramon Pabalan

Bradenton, FL

CIRRUS BUILDERS ASSOCIATION

BUILDERS NEWS

Cy & Jim Mehling

1 DEC '94

Dear Rick and Tom-

Since discussing the severe fuel tank contamination with Al Cory and Glen Elliot, I have found a new improved, larger in line fuel filter.
We installed it between the gascolator and the aux fuel pump. It has nipples for hose connections and clamps 3/8". We are installing the Hastings GF-112 filter. Other vendors are AC GF-482, FRAM G-3870, and WIX 33482. These units are about 4" long and 2" dia (filter body), stainlesss and have about 4X the capacity of the original filter we had been using.

Glen reported he changed the filter every 6-8 hrs. Al had used a ceramic filter which caused fuel starvation on one flight and was very exciting before he got it back on the ground. Dale said he thought that their airplane had two filters right out of the tanks. At any rate, we ran our first, smaller filter for 50 hrs and upon opening it up, we found no contamination. We feel the new larger one is just more insurance against clogging as Al experienced.

Jim Blair's video of Al Cory, Ramon and Dave were really appreciated. Wish I could contribute something and will strive to find someone to do this in the future.

Dale assured me that anyone who wants it will receive a two tank new wing and a vent system to my specs to eliminate our severe unbalance and inability to control that fuel balance. My son, Jim departed Wed before Thanksgiving for FL. He reports that in spite of severe turbulance reported along the way, he had glass smooth flying at 8500' with a 20° wind correction angle until reaching ST. SIMON'S ISLAND, GA. after which he found the 42KT wind on the tail the rest of the way to Winterhaven, FL, total flt time with a fuel stop of 5.1 hrs. Fuel load was limited by runway conditions here.

All builders, please send in some interesting tidbits to this newsletter and don't forget a **contribution** to keep it alive. If you appreciate the letter, show it by helping. Everyone can do a little.

Happy HOLIDAYS,
Cy Mehling

From Jim Mehling - Some random notes on a recent trip from Doylestown, PA to Winter Haven, FL and return:

Unless the other builders know something that I don't about balancing the fuel load in a 39' wingspan I suggest that the only way to build the new Cirrus wings is to have 2 completely separate tanks and a venting system that will allow each tank to be filled without overflow through the vents. We filled the tanks to a total of 80 gallons for our departure from N88 (Doylestown) to FLO (Florence, SC), our planned fuel stop on the way to Florida for Thanksgiving. The airplane had been parked in the hangar (level) prior to fuelling. As we pulled the airplane out of the hangar with the tow-motor and pulled it around the corner of our T-hangar to position it on the taxiway the fuel was pouring out of the right vent (left turn out of the hangar). This vent is supposed to be connected to the left fuel tank, which at 40 gallons on each side was not full. There was no fuel visible in the tank cap after adding the fuel. In addition the fuel gauges (Sky-Port solid state indicating system) showed a substantial imbalance between tanks. We took off into a 60 degree crosswind gusting to about 15 knots and then had to do a quick dance on the rudder pedals, ailerons and cruise flaps to get the airplane to fly straight after takeoff.

We set a countdown timer for 30 minutes and changed tanks each time it went off. The air was smooth at 9500' and it was clear all of the way to Florida the day before Thanksgiving. The S-Tec autopilot held a 20 degree wind correction while tracking the GPS and the altitude never moved as we

headed south towards warmer weather. The 122.0 FSS frequency was full of airplanes screaming about the turbulence at lower altitudes, but it was perfect at our altitude. We decided before it was time to begin descent into FLO to continue on further south in order to overfly the lower-level turbulence as much as possible. By this time we were down to 35 gallons of fuel and even though we had switched tanks every 30 minutes it now appeared from the fuel gauges that the right tank was manufacturing fuel and the left tank was dropping very fast (the vapor return line is to the left tank!). Even though we calculated that we could make it non-stop to GIF (Winter Haven) in 5 hours total time we would only have 30 minutes reserve plus our ultimate reserve. (Our fuel computer only goes up to 99 gallons, but our Cirrus holds 109 gallons of fuel, so we run the computer up to 99 when filling the tanks and then ignore the other 10 gallons in our planning). Not fully understanding the vent system nor the apparent uneven fuel load we decided to stop at SSI (St. Simon's Island, GA) for fuel. Upon parking the airplane on the ramp it seemed as if the right tank did indeed have more fuel than the left tank. We added 15 gallons to each tank for the 1 hour flight remaining to GIF and departed. We have noticed this uneven fuel load before when running below 30 gallons and cannot really say if it is correct or something is wrong with the gauging system. Since on the Cirrus we are not really measuring the fuel in the tank, but rather the fuel in a standpipe wich is vented to the main vent system, we do not know what is going on here. We have pretty much decided that the minimum fuel load will be 35 gallons until the new wing is installed (25 gallons plus the 10 gallons hidden reserve.)

We also received further confirmation of the exquisite sensitivity of the S-Tec altitude sensing devicepon this flight. As we got far enough south into warmer air (19 degrees F. at 9500' in PA) we discovered that upon turning off the heater the airplane would momentarily descend, which in perfectly smooth air can be alarming. We have vented the altitude hold static pressure line to the cockpit since we discovered that the static port on the pitot tube did not have sufficiently stable pressures for the autopilot. This is probably due to the fact that we installed the pitot tube out near the right wingtip (per Cirrus instructions) and there is enough yawing, even in smoothe air, to affect the autopilot.

Another problem all Cirrus builders will have to contend with is the inability to achieve a quick turnaround on any fuel stops. All we wanted to do was pick up 30 gallons of fuel, a quick relief stop for the crew and passengers and then back up into smooth air for the leg down to GIF and Thanksgiving dinner. At SSI we were surrounded by pilots who wanted to look at the airplane and talk about the kit. As soon as we landed at GIF Jim "Zoom" Campbell of U.S. Aviator magazine came across the ramp to say hello.

Total flight time from N88 to GIF was 5.0 hours with an average fuel consumption of 14.1 gallons per hour for the entire trip. You can see the details of power settings and fuel consumption on the enclosed spreadsheet. The flight down was on 11/23/94 and the return was 11/29/94. The automatic pitch trim that we installed is an absolute must for cross-country flying. The autopilot covers up all of the problems with the Cirrus stabilizer trim actuator running too fast and creeping in cruise. Flying the airplane in cruise consists of switching fuel tanks every 30 minutes, changing the HSI course selector at each GPS waypoint and switching the FM stereo stations as we rocketed south. As we mentionned in the last newsletter, the cruise flaps do nothing when in the proper range other than balance out the fuel load. We retract them after reaching 1500' and 120 knots and then leave them alone until extending them fully on the pre-landing checklist - about 5 miles from the traffic pattern.

Our trip home was almost the same as the trip down, except the winds were on our quartering tail. Would you believe GIF to N88 nonstop in 4:16? We filled the tanks to the max in GIF and took off at 3850 pounds with a forecasted tailwind component of 40 knots all the way home. We were running at times above 220 knots groundspeed (true airspeed was 174 knots initially and increased to about 179 knots after 3 hours of fuel burn). We encountered forecasted rain showers around FLO north to about LVL (Lawrenceville, VA), but otherwise had a nice easy VFR trip. We had filed IFR so we had no problem with the weather. We can confirm that in any kind of precipitation the Cirrus immediately loses 12 knots of airspeed. On N94CM water sits on top of the ailerons at 145 knots IAS - which I presume will not occur with the new wing/aileron installation. Even after we were out of the rain showers the airspeed does not immediately recover. It seems that even heavy mist (small water droplets blowing up the windshield) will reduce the airspeed 5-10 knots. Eventually we recovered the normal IAS (and the fantastic ground speeds) for the rest of the trip. Fuel consumption from Florida to Penna. was 58.3 gallons for an

average of 13.6 GPH. Not bad for 175-180 knots TAS and enough cabin room to serve lunch. Now if we could only find a way to transform several hundred pounds of empty weight into useful load! In our normally aspirated IO-550 I don't like taking off at 3800 pounds on a warm day on anything shorter than 3500', and with no obstacles. The airplane uses a lot of runway (about 2000') and is very reluctanct to climb until the airspeed is 80+ knots. As you accelerate above 80 knots the climb performance is fine (leaving the wing flaps at takeoff and cruise flaps full down). I do not retract the wing flaps until above 1000' AGL and the airspeed is up to 100 knots, and even then only half way to full up. The airplane will stop climbing at this point. After letting the airspeed build to 110 knots and resuming the climb I retract the wing flaps fully and let the speed build to 120 knots before rectracting the cruise flaps to the neutral position.

The only outstanding problems with the airplane (other than wing replacement items such as the fuel leaks around the gear trunions, etc) is the VOR, which is still unuseable beyond 10-15 miles. I have a new theory that there is something wrong with our antenna installation which I would like to solve by installing a blade or towel-bar VOR antenna high up on the vertical fin. I think that either our copper wire antenna has worn out the toroid beads attached to the point of the "V" or the propeller is affecting the reception of the VOR signal. In any event the other partner - who would have to install the antenna on the fin so I could run a coax cable (I solder - he drills holes). I have also installed a power line filter on the KX-165 power leads but that did not seem to help the problem. I have since talked with someone who said that if the interference we hear on the audio side of the VOR is not controlled with the VOR volume control then the noise is coming in through the antenna and not the front end of the radio itself.

1 NOV '94

Dear Tom and Rick-

Your OCT Newsletter was outstanding again and all us builders thank you for the time and effort you so tirelessly put into this publication. More builder's input improves the publication as well as stimulates our thinking. In this regard I would like to offer the following thinking on the Cirrus Landing Gear system.

Some time ago Glen Elliot reported finding his LG unlocked in the morning in the hangar. Al Cory reported to me that he stepped into his airplane one morning and experienced a nose gear collapse, damaging the nose gear doors and the cabin lower door. This week, Al reported a second nose gear collapse, this time on the power towmotor doing much more damage. I find that when I lower the LG in flight I frequently find 200 psi on the hyd. gage, in the up line, with the motor stopped and three green lights. My pressure gage reads "UP" PRESSURE AND THIS DISTURBS ME. I recall similar findings on Glasairs I have built, and they had very similar systems and components. As previously reported I have a button on my panel which activates the LG DN solenoid. Depressing this button after LG extension momentarily will make this "UP" pressure disappear from the gage.

I suggest that the retraction test show that all the "DN" locks be inspected for FULL engagement when the micro switches open the circuits. Beyond that, it is necessary to understand the system, for which I don't recall much in the builder's instructions. This system is a closed fluid system and temperature changes can only inc. or dec. thepressure, there is no place for the fluid to be displaced such as an accululator normally found in any hyd. system. It's also to be remembered that when the LG is retracted, there is no way to tell the position of the gear on the Cirrus, once the pressure builds up and the pressure switch turns the pump off, any malfunction or physical interference with the retracted components will be masked by the LG motorpump shutting off without telling the pilot that something is wrong.

Again when the LG is down the micro switches turn the motor off and show three green lights, however the DN pressure can bleed off (which you are unaware of without a DN pressure gage), leaving you with only the spring operated DN latches. I suggest that if you know you have a problem with the LG down, that you not attempt to turn off the active runway. Shut down and procure some hose clamps to physically clamp those down locks in place right at the micro switch operating tabs.
I believe the reason for this residual pressure in the UP system with the LG DN is caused by the check valves in the pump or the design of the Cirrus system, anybody else have any ideas on these items?

Jim Patton's story of the no flap landing was so timely. On a trip from NY, I found our simple three way flap switch in the UP position with the Flap c/b popped when I went to lower the flaps for landing.
This has happened before, when resetting the C/B solved the problem, however this time it would not stay in when the switch was moved to DN. We have the old style actuators which continue to run when their limit is reached, with no limit switches on the system. I recalled Doug Taylor's instruction for this procedure of landing without wing flaps and the first order of business is to raise your seat as high as possible for the needed visibility over the nose with the nose high attitude to be encountered. He had me flying final at 110 mph and it was a thrilling landing on a 4500' runway. Jim and I had this very experience on our first flt, when we unknowingly had the same situation and it was even more exciting on our 3000' runway. I felt the airplane out on final and was able to use 80-85 kts on final. After the attitude is established (full DN cruise flaps), the position on glide path is maintained by use of power, little elevator motion is needed. I was able to stop with light to moderate braking on the 3000' runway with no appreciable wind. I wonder if we might suffer some in this situation with the new wing and no cruise flaps. I hope that Cirrus will discuss this after flt testing the new flaps. Menwhile I installed a new three way switch which is spring loaded to off to protect the motor in our system.

We were able to get a new motor from stock at Cirrus and were back in service shortly. I called Dukes in Northridge, CA about repairing the shorted motor and they wanted $300-$600 as a starting point when Cirrus only charged $350 for a new one, so we shall try a local shop to see if they can put new brushes in and dress the armature or some such for a reasonable cost.

MORE S TEC AUTOPILOT NEWS

On a trip I make often to visit a son in NY on LI, I almost always have the problem of the controllers keeping me high,(too high), upon reaching my destination on both ends of the trip, because of the TCA and ARSA. I decided to experiment with the autopilot during the descent. From cruise altitude with ALT HOLD on, I reduced pwr to 15"
and 2100 rpm. Then I selected VS (Vertical speed)and selected 500 ft/min. DN. This configuration gave me about 160 KIAS, our self imposed limit until wing replacement. Next I deployed the speed brakes, which simply slowed us down while maintaining 500 ft/min descent. Then I lowered the Landing Gear and Cruise flaps. I continued onto downwind with this situation and the speed bleeding off to flap operating speed, whereupon I retracted the speed brakes and lowered the flaps to 15° T/O position. I punched in altitude hold at 1000' above the field and moved the bug to the downwind heading. Abeam the runway I disconnected the autopilot to find the trim set just right for my desired speed of 85 kts. All the time being able to keep my eyeballs out for traffic. Let's all get busy on those Cirrus airplanes, you just cannot imagine how much fun it is to fly this autopilot.

CIRRUS BUILDERS ASSOCIATION

BUILDERS NEWS

OCT 1 '94

FINAL REPORT ON S-TEC 60-2 INSTALLATION ON CIRRUS 94CM

As of this date Jim and I feel that we have optimized our installation to perfection and this final report will be a review of the things we did to make our autopilot fly the airplane as it was intended.
First a few caveats about our installation:

1. It may apply only to aircraft equipped with IO-550G equipped Cirrus. More powerful engines would produce higher indicated airspeeds and thus require further modifications. The limiting factor is the torque output of the servo's. We are using the maximum torque allowed by S-TEC to overcome the considerable power required to move the controls.

2. There is the danger of the servo's driving overcenter. Since there are no stops on the servo, and the Cirrus control system has so much give, if you allow the system to drive to it's limit during ground test, the servo will drive overcenter and must be driven the opposite way overcenter again. We have not encountered any inflight condition that would cause this to happen. The ground prefIt test should be performed with all controls in neutral and discontinued when proper control deflection is observed.

3. We did not install a pitch trim disconnect button on the conrolwheel.

4. We connected our Cirrus pitch trim motor to the system and did not install an S -TEC pitch trim servo.

5. Our system used push rod type servo capstans. If you have cable operated servo's, you would have to contact S-TEC for further instructions.

6. We have the 60-2 autopilot, other systems would have to contact S-TEC for variations on this installation.

7. This system is not in compliance with FAA requirements for installations on certified a/c, nor does it meet S-TEC's high standards for engineering. We have simply adapted their very sophisticated autopilot with our amateur engineering to an experimental airplane to make it perform to our satisfaction.

8. After having completed the modifications to make the autopilot perform as intended, we found the pitch trim system on the Cirrus was overshooting the desired position in cruise flight. We were constantly trimming UP or DN with ALT HOLD on to keep the trim light out. Therefore, with a lot of help from S-TEC, again we installed an automatic pitch trim system on our autopilot using our existing Cirrus pitch trim motor. This is an optional, additional effort, you may elect not to install this option. Having previously installed two S-TEC controlwheel (CW) switches on the yokes and two relays to operate the system in CW position and also incorporating a manual (MAN) switching configuration, we further modified it to handle the autopilot pitch trim signal (A/P). S-TEC can supply an alternate circuit that was designed for the LANCAIR which might be better, if you are starting from scratch, however we felt ours was superior in that we have a manual switching arrangement in case of relay failure.

9. During test flying, we found that we were unable to get the pitch to settle down with the altitude module connected to the normal static system. Among other things, we switched to alternate static sys. and the system settled down very nicely. We disconnedected the autopilot from the static system and just ported it to cabin static pressure to solve the problem.

First thing you need to do is have a ROLL servo with a part # ending in R-10 and a PITCH servo # ending in P-5. These nos. are on the ID placard on the base of the servo. You have to remove them from the a/c to see them. The clutches must be set for 60 in lbs, you can ask S-TEC to do this or make a jig as we described in a previous newsletter
to set them yourself.

The Flight Guidance computers need to have a gain resistor for the roll set to 15K ohms, and for the pitch set to 100K ohms. We arrived at these settings thru trial and error and suggest you check with S-TEC for advice on this matter.

The mechanical connections from the servo on the Cirrus were modified as shown in previous newsletters as follows. Pitch - extend the length

of the T Bar to gain about 1 3/8" for the push rod from the servo. Do not disturb the cable connecting point. Drill a new hole in the servo bracket about 7/16" closer to the center of the capstan. ROLL - Use the existing hole (one of two) that mounts the bracket to the capstan for the servo rod. Discard the bracket.

When this work is completed and all plugs on the harness are installed, you are ready for the Preflt test as shown in the manual. Make sure that all surfaces move when commanded to do so, in the proper direction and further, that you can overpower the system with the control yoke.

AUTOMATIC PITCH TRIM

You need to purchase a new amplifier for this function which is installed as a new circuit board in the PITCH computer. Two pins, Red and Black wires, already a part of the harness in a Molex plug which originally had no connections are connected to 28V thru a SPDT switch (in our airplane) to power the trim sys. in A/P mode. Two pins are added (17 & 18) to the PFGC plug. These pin locations are vacant and S-TEC supplied us with the pins with a short wire attached. We simply disassembled the 80 pin plug, found the proper locations and inserted the new pins. In our airplane we connected them to a DPDT switch. All these switches need to have their polarity verified during wiring to assure proper NOSE UP or NOSE DOWN operation.

The wiring diagram for our airplane is enclosed showing the complete circuit and all switches and relays for the pitch trim circuit, with provisions for operation in manual (MAN), Control Wheel (CW), and Autopilot (AP). For further info call S-TEC, Scott Howard 800-872- 7832 or the author, Cy Mehling 215 348-8134.

Roger Carter

By Richard Luthas....

For someone who was given flying lessons for a High School graduation present in hopes that he would find the straight and narrow, Roger has hardly flown the high, fast, straight line. Of course, you couldn't be much of an Alaskan bush pilot if you didn't know how to fly slow and crooked up and down those mountainous canyons, along that rugged coastline and out on the tundra of the North Slope oil fields.

Roger brings all the experience he has gained as an A & P IA (rebuilding and servicing some of the slowest SuperCubs around, amongst other varied repair work) and ATP rated pilot (Skyvans and Twin Otters) to his first kit plane. He chose a VK-30 because it was one of the few singles that could fly in the high altitude, long range high speed envelope he envisioned. After seeing it in that first magazine article, looking at the mockup at Oshkosh '90 he visited Baraboo and bought kit #12, one of the last to include the free autopilot.

But what you really need to know most about Roger is his skill as a school bus driver.

If you were anchored up in Anchorage in October of 1990 and the best bid for transporting your VK-30 kit from Baraboo was $6,000, would you; a) Pay the freight or b) Buy a used bus from the school district for $1,400, drive down the famed Alcan highway, pick up your plane and drive back? Did I mention that you'd also have to cut off the back end of the bus, make a slot in the roof for the vertical stabilizer, build wooden forms on the roof to shape the foam that the wing would ride on, affix numerous anchors on the outside and inside in order to keep everything tied down, and weld the back of the bus back on after inserting the fuselage and kit parts? Maybe the best part of this 6000 mile odyssey is that Roger is still using the bus for storage and the occasional hauling of large objects.

You wouldn't think that someone who would be creative enough to choose the b) scenario would just build his plane exactly by the Cirrus book, and you'd be right. Although Roger estimates that his plane is 80% finished and it will be done on Tuesday (SOME Tuesday) these are the major modifications that he has already incorporated.

1) Cable and Pulley Controls. Having seen Push-pull cables freeze up and fail in the typical harsh conditions of Alaska, Roger decided to go through the extra effort to install cable and pulleys for all his flight controls. Using a system of strings and mirrors, he carefully installed the pulleys in perfect alignment to allow the 1/8" 7-19 stainless cable to operate with less break-free force than the typical push-pull cable. Roger surmises that this decrease in friction will allow the autopilot to exert more fine control over the control surfaces causing less hunting from over-controlling. He estimates the overall weight of his system to be equivalent.

2)Driveshaft Collars. Roger has used Delrin as cable guides in much of his control system as you would expect, but one use of this material is quite unique. Thinking that a flailing propshaft might result from any failure of a joint at either the engine end or the propeller end which might tend to carve the inside of the tail up if not off, he has installed control collars at both ends of the shaft. These split collars are installed in the #6 bulkhead and in an extra bulkhead installed in the tailcone. The minimum clearance around the circumference of the shaft is 1/8" on the aft collar and slightly

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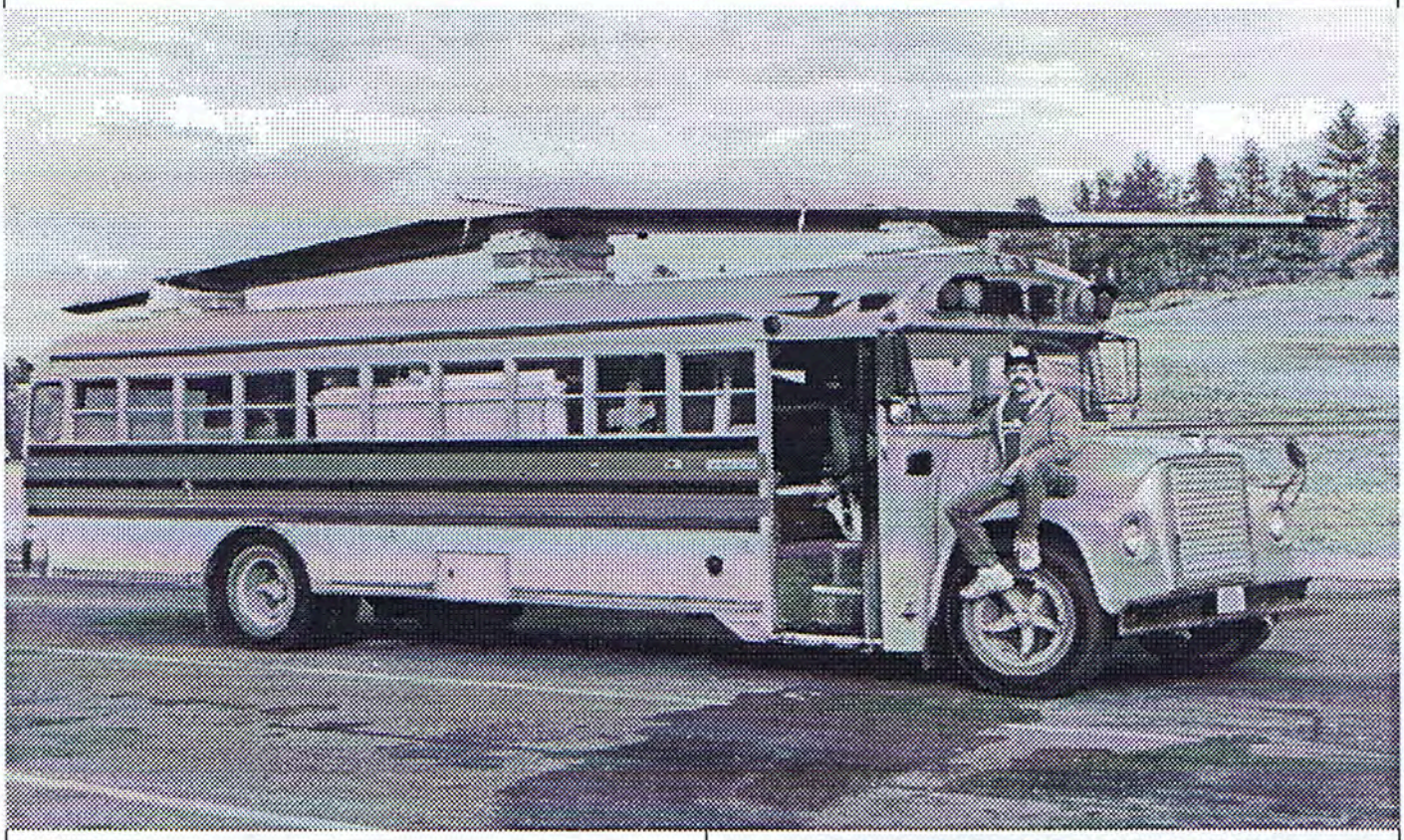

greater on bulkhead #6 to allow for engine movement.

3)Augmenter Exhaust. Speaking of that #6 bulkhead, Roger has slanted the bottom half of the bulkhead forward at the bottom as part of his cooling air control system. The biggest feature of that system is the exhaust augmenter that he has engineered. His testing has shown that a minimum of a 5:1 ratio, length to diameter, should work best. The augmenter tube runs straight from the #6 bulkhead to an exit in the underside of the tailcone and is built up of a layer of phenolic sheet surrounded by insul-wool incased in a fiberglass/ foam/2-ply fiberglass sandwich. It is positioned to be directly in line with the direction of travel in level cruise. When the exhaust pipe is inserted a few inches into the mouth of this tube the flow of the gasses will draw enough air through the engine bay to cool the engine in most of the flight envelope without the auxiliary fan or much cowl flap opening. The 14" fan is installed in the slanted bulkhead pointed directly at the repositioned cowl flap. Roger moved it down onto the bottom of the plane and into an aerodynamically dirty area that would also not tend to pick up any detritus while sitting on the ground. The fan is turned on by a switch that is activated in the last 1/4" of the vernier cowl flap control. He believes that this fan will only see use on the hottest days during taxiing.

4)Engine Mounting and Accessories. Roger bought a Cessna 210 that had a low-time Continental TSIO-520-R engine but after closer inspection he decided to rebuild it anyway. The two major changes he made on reassembly were to use a Spearco intercooler and use the larger oil cooler that is used on this engine in the Piper Navajo. Both of these changes were made because of the airflow requirements of his augmenter system. The oil cooler is mounted horizontally instead of vertically, as it would

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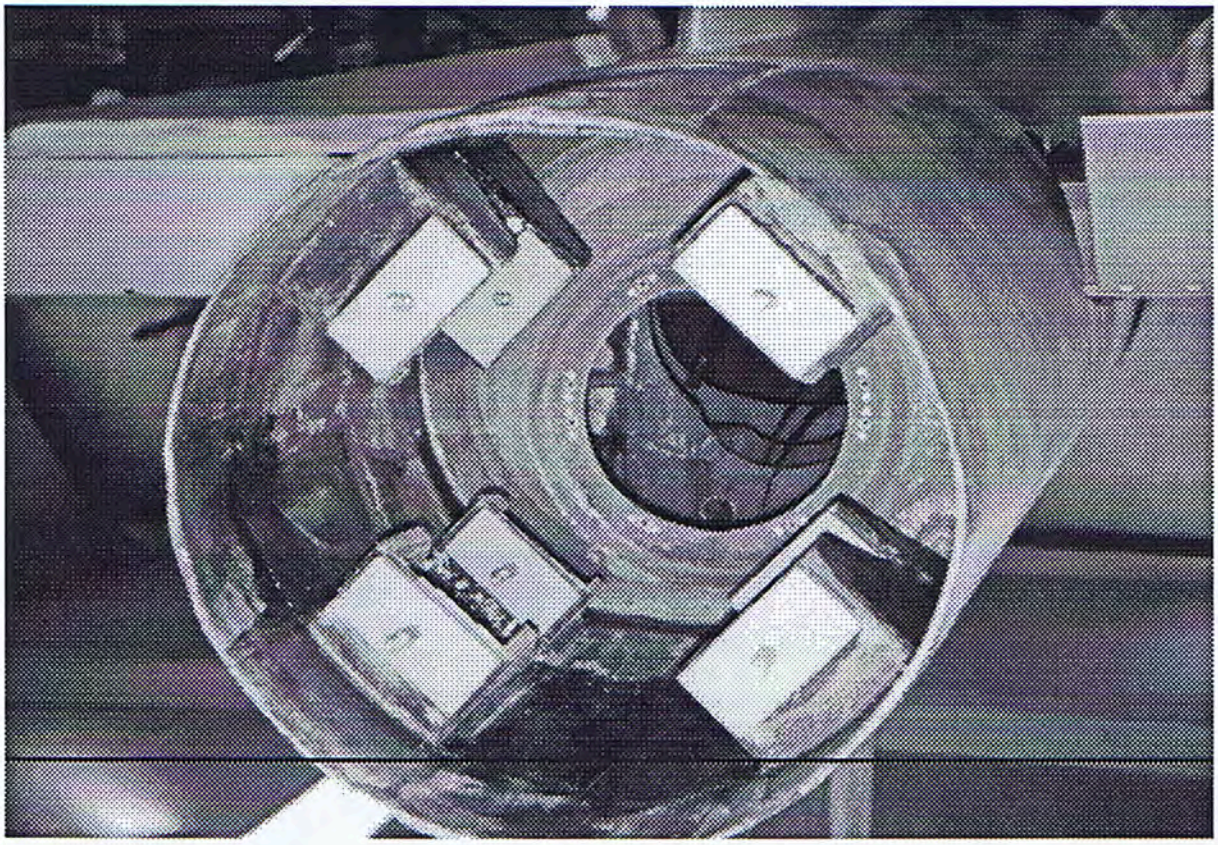
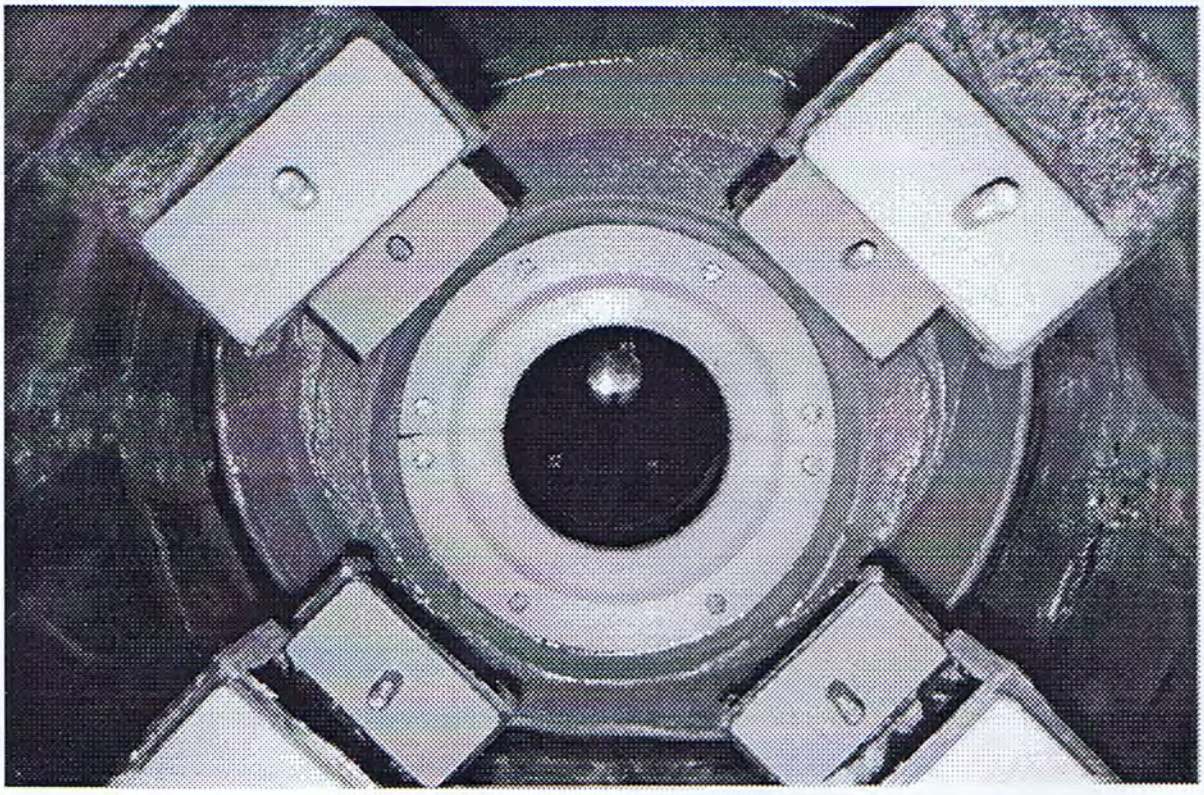
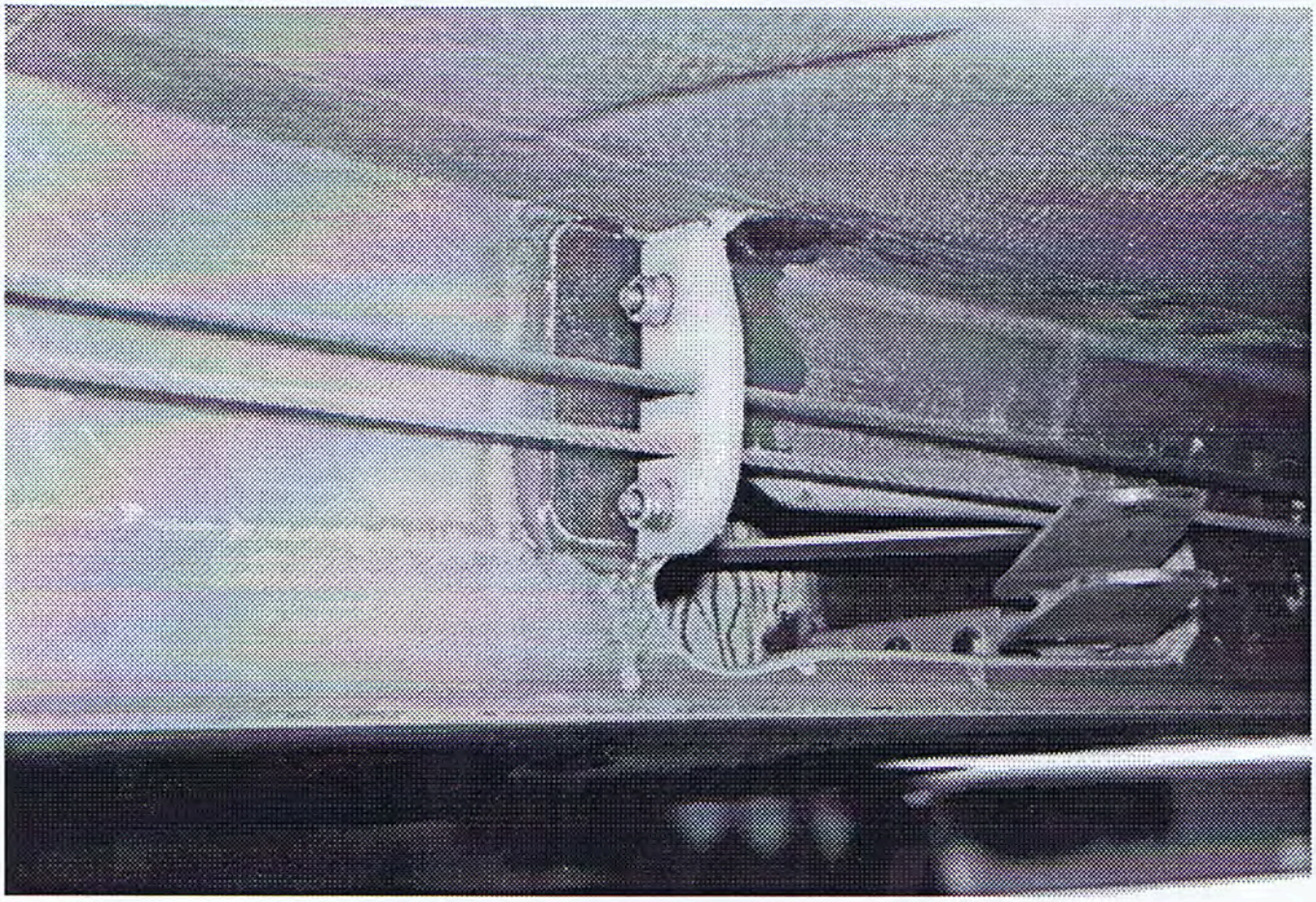


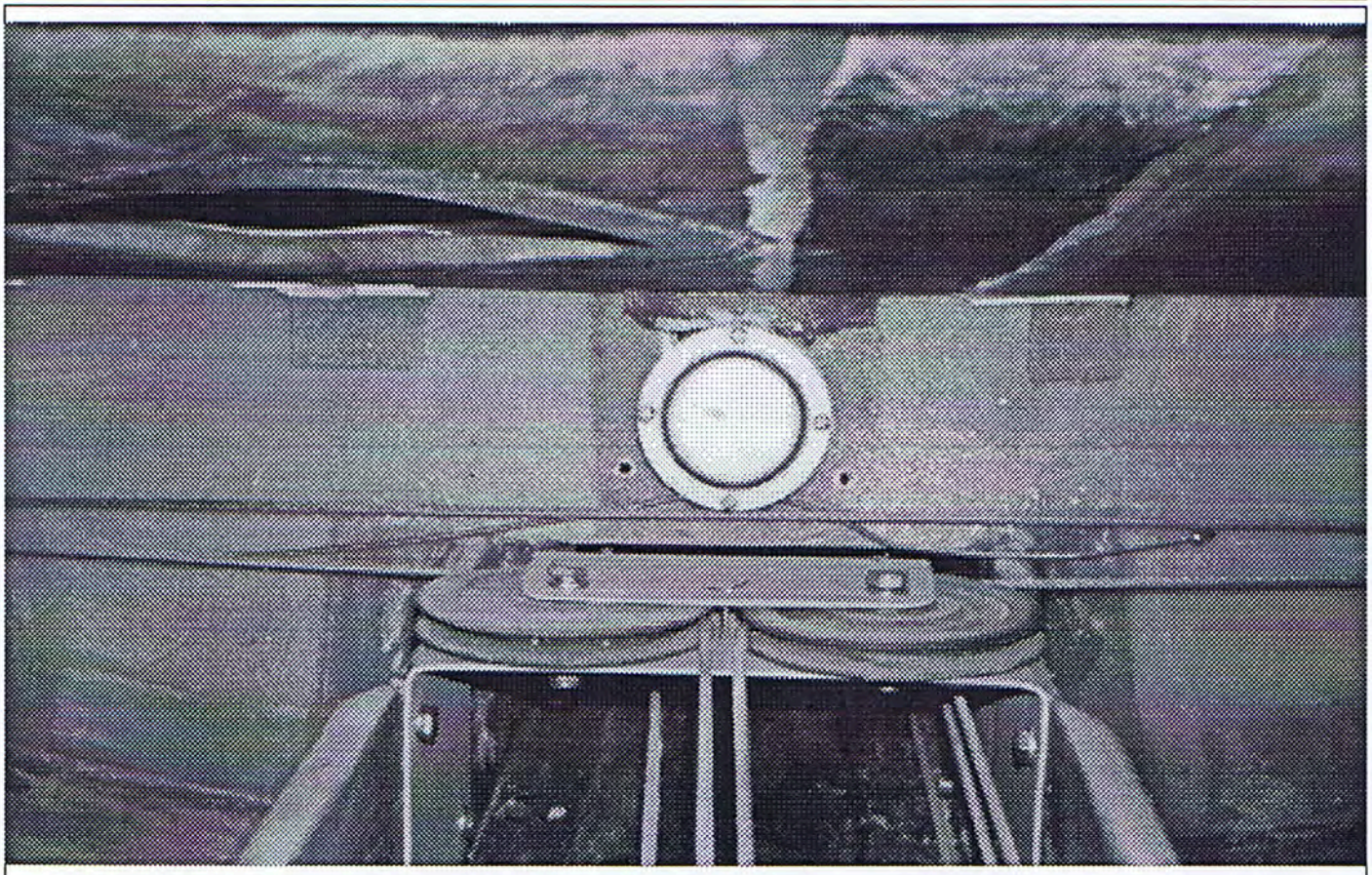


have been in the Piper. One interesting and very time consuming affect of using this particular engine with its turbo underneath is that Roger had to build the turbo mount to split around the engine mount. It took him several tries but now he has an engine that is tilted up just enough to settle into perfect propshaft alignment with a little break-in running.

5)Hydraulics. Roger decided that he wanted the extra security of constantly maintained hydraulic pressure to hold the non-overcentering landing gear extended during all ground phases. Instead of using the landing gear micro-switches to indicate gear extension and shut off the Oildyne motor, he only uses them as indicators. By using a four port hydraulic pressure switch Roger can maintain 2000 psi in the system at all times. Even if there are small leaks in the system the Oildyne will be switched on before the gear can begin to retract.

6)Tie down hard points. Having been through more than his fair share of big blows that whip through Alaska, Roger decided that his VK-30 would have bombproof tiedowns. He welded two pieces of 4130 steel strap to a short length of steel barstock that he had drilled and tapped to receive a 5/16" coarse thread bolt. This is screwed and fiberglassed to the main spar with the screw hole flush with the underwing surface. The separate ring-on-a-bolt is screwed into the hole to allow attachment of a standard tiedown strap.





7)Fuel system. Do you remember the early VW Beetle reserve fuel switch? I remember eagerly waiting for my dad to let me reach down to the front of the floorboard of his '61 Bug and flip that bar over after that first chuffaw from the engine running out of gas. Roger has installed such a device under the pilot's seat that allows him to know exactly when he has one hour of fuel left, no guessing, no gauges, find a field now! Instead of running fuel lines into the cockpit the fuel selector valve is between the tanks and the engine and is actuated by cable. Roger hopes to be able to fly non-stop for up to ten hours. In order to accomplish this he has constructed a removeable 40 gallon tank that sits in the baggage area. Now if he could just find enough room for a sky toilet.

Here are a few other tips and changes that Roger has made, so far.

-extra inspection panels that allow for full access to all fittings and systems.
-no cam-locks because he has seen too many that loosen and allow fretting of the panel until they fail. They were not designed for composites but the problem exists on aluminum panels also.
-extensive use of chromated epoxy on metal surfaces for corrosion protection.

So if you're ever driving your bus up the Alcan...No, better yet, flying your Cirrus North and West...Stop in at Merrill Field...on a Tuesday. Maybe Roger will be putting the final polish on his VK-30 and be willing to take you on a 10 hour cruise.

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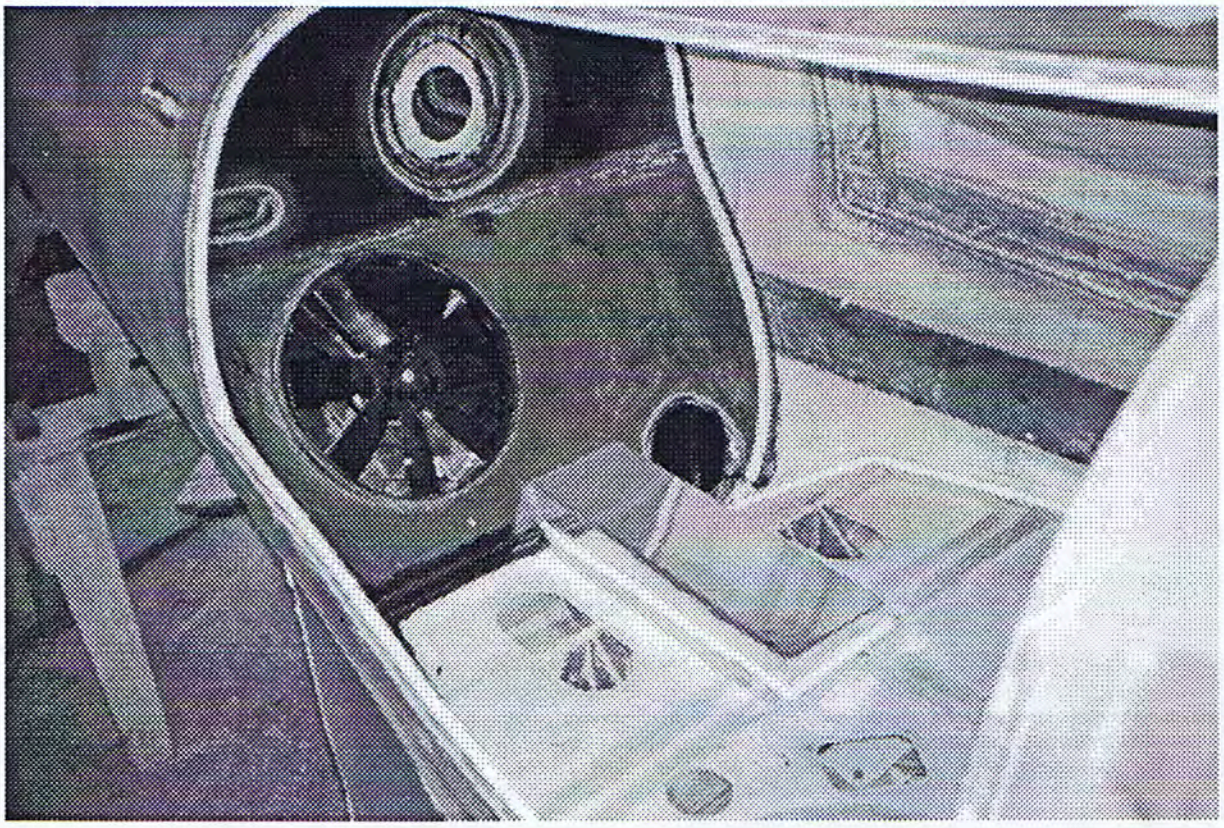

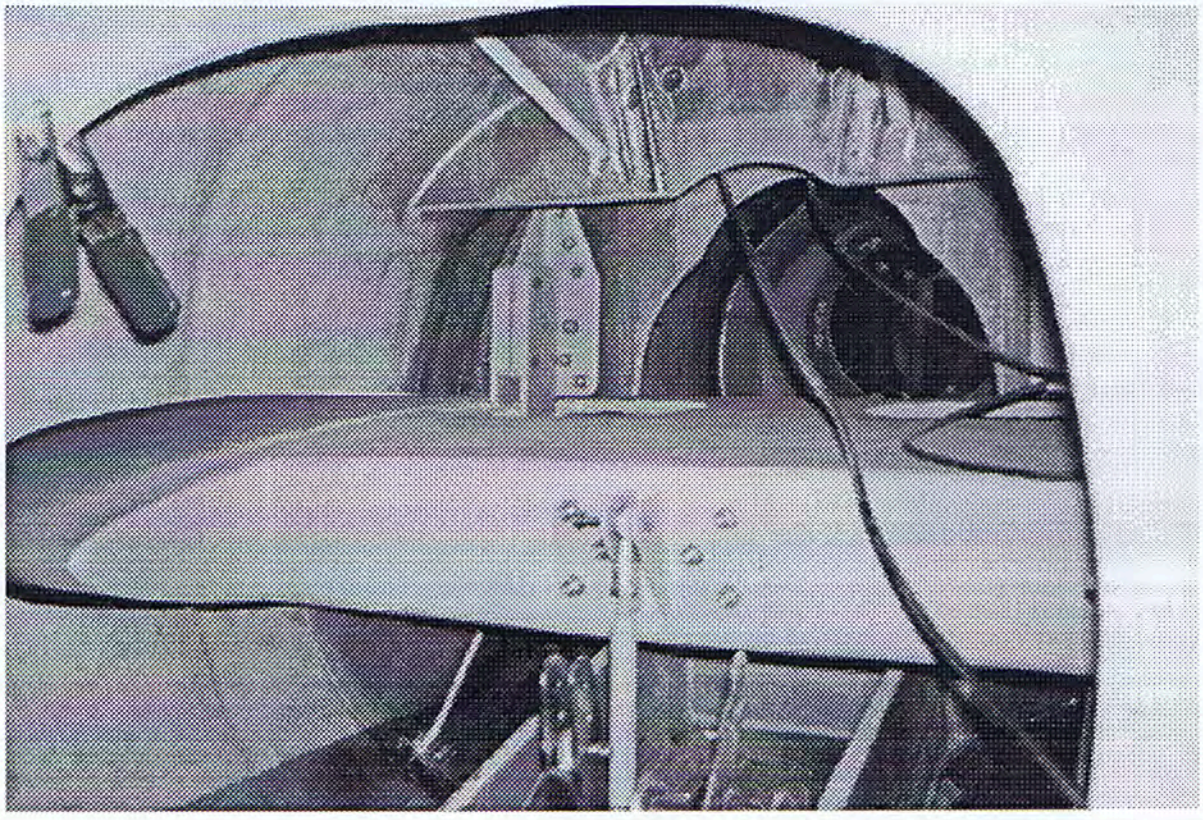

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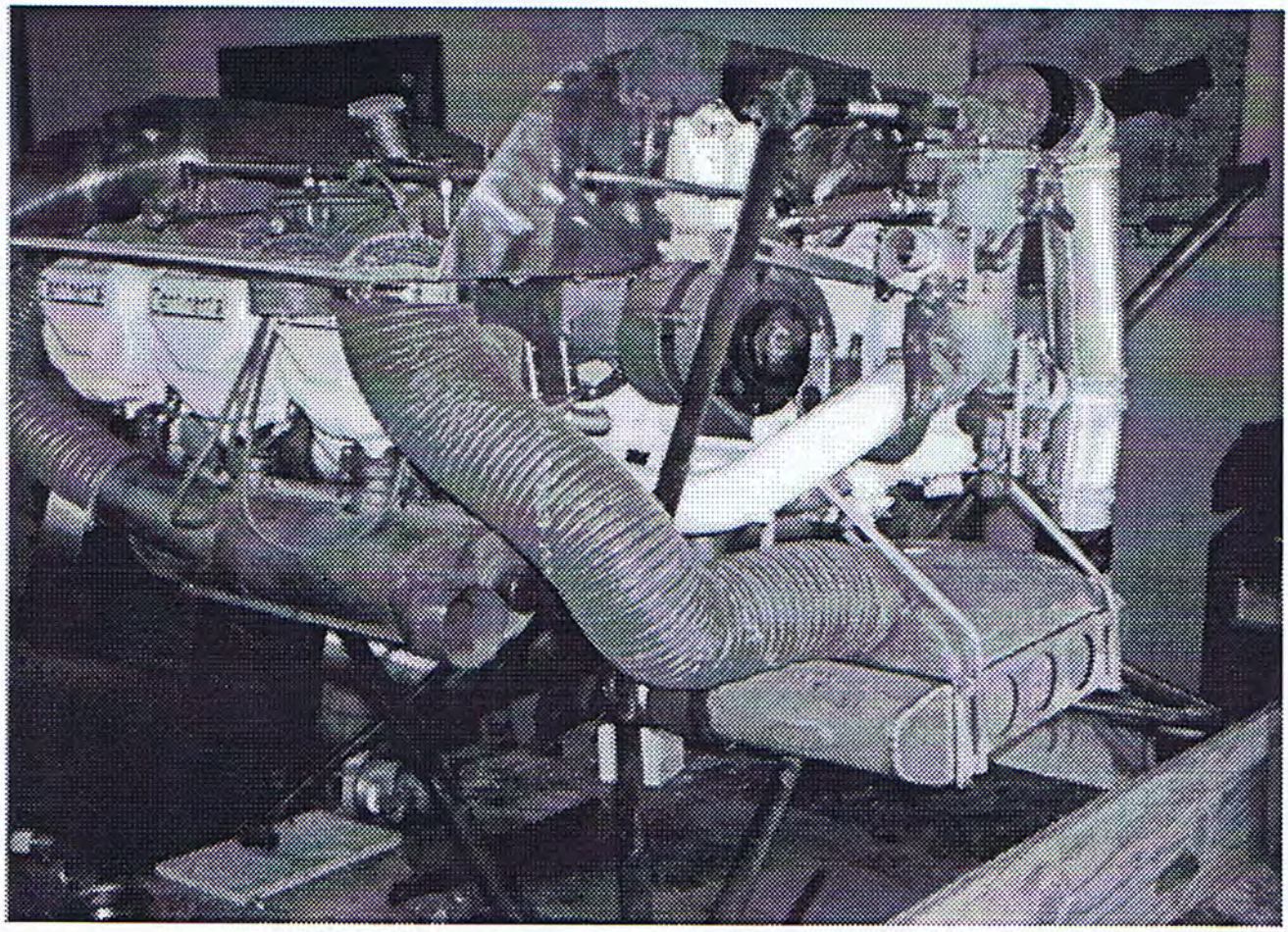

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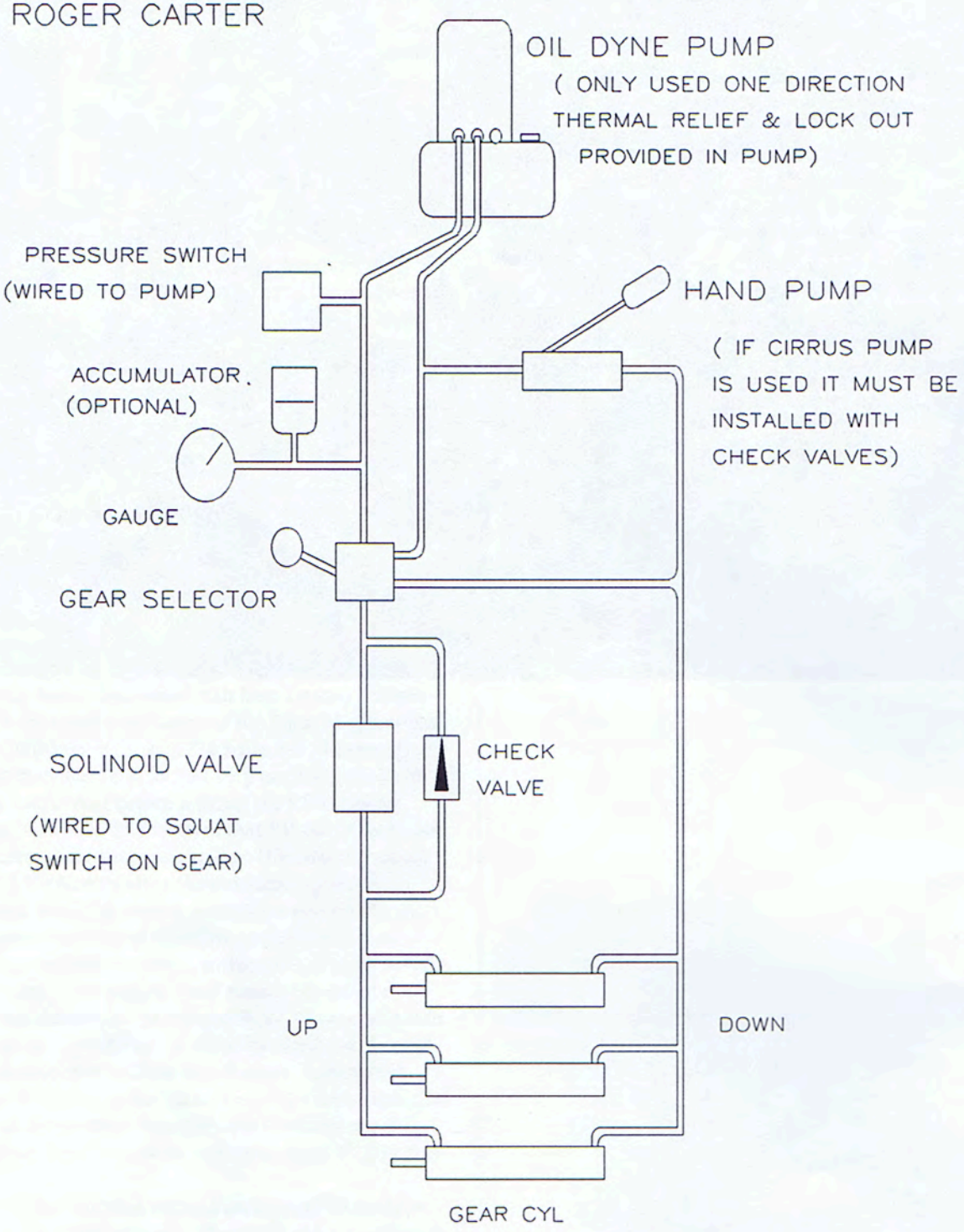
HYDRAULIC SYSTEM VK-30

ROGER CARTER



ROGER CARTER HYD. SYSTEM VK-30

PARTS LIST

1	PUMP	OILDYNE
2	PRESSURE SWITCH	- VEP 490A44 (CIRRUS)
3	ACCUMULATOR	ROCKWELL 5790214 OR SIMILAR
4	GAUGE	CENTURY N-7000
5	GEAR SLECTOR	CESSNA 210 (LATE MODEL PN?)
6	SOLINOID	COMPACT CONTROLS P-510 B-3P 24DL
7	CHECK VALVE	DELTROL EC-10-B (CIRRUS)
8	HAND PUMP	CESSNA 210) LATE MODEL PN?)

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Welcome new CBA member: Bud Brady
Greenwood Village CO.

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