Fall 2005

in this Issue

By Rick Mills...

FIRST FLIGHT for HB-YIY

Congratulations to Urs Villiger for his successful first flight August 27th, 2005. Doug Taylor made the first flight and has the complete story.

Lillard Christ

Lillard continues to work toward his first flight. He has made several engine starts with his Allison 250 and prepares for taxi tests.

Tom Hastings

Tom has over 500 hours on his VK-30. Thanks Tom for the update and the great flying pictures.

Glenn Elliott

Glenn completes installation of his new tailhousing and gives a summary of the process.

28. August 2005

A note from Erwin Mueller

Dear friends, dear flyer

Today the first flight with the VK – 30, HB – YIY, has successfully taken place. Flight time 28 minutes, altitude 6500 feet and speed up to 120 Kts. with gear down. Every thing performed well for the first flight, according the Test pilot Douglas Taylor. However there is still (a lot of) work ahead. We will continue with the test flights tomorrow after a few adjustments performed today. I myself have been watching the flight in a chase plane close by HB – YIY. It was just a beauty to see the project flying over the scenery area over Buochs
central Switzerland.
We were working hard to get the project ahead.

Thank you all for the good wishes and crossing fingers for the future.
Best regards

Erwin Mueller

Urs Villiger

First Flight August 27, 2005

Article by Doug Taylor

After 14 years of frustration, fiberglass itch, resin fumes, blood, impatience, obstacles, bureaucracy, even floods, and of course, money, the hard work, patience, dedication, inspiration, innovation, talent, and teamwork prevailed on August 27, 2005 and HB-YIY made its second flight! Yes, that's right, second flight. That's just one part of the story of the journey of Urs Villiger's Cirrus VK-30 from a hangar in Baraboo, Wisconsin to flying over the Swiss Alps.

Urs came to Baraboo in 1991 for builder's assistance. He was the second or third person I helped get started on their VK-30. A few months later, after waiting for various parts to arrive, we shipped what was probably the most complete VK-30 kit that Cirrus ever delivered. I visited Urs at his home in Switzerland a few times over the years and even helped work on his plane for about a month in 1993. He built the plane in his garage, which was custom made so a VK-30 could be built in it. The building code specified a maximum height for the garage ceiling but Urs built it with a small cavity in the ceiling. The vertical fin could fit into the cavity so the airplane could stand on its landing gear with only a few inches between the top of the fuselage and the ceiling!

That is one very small example of the many regulatory and bureaucratic obstacles that Urs had to overcome on the way to completing his plane and getting it into the air. People in the United States really have no idea how easy it is to build an airplane or anything else here compared to the rest of the world. Actually, everyone owes Urs a little thanks because we did a lot of documentation and testing much sooner than we otherwise would have done in order to create the information package for the Swiss authorities. There were many times where we at Cirrus did something for the Swiss documentation that we really didn't have time to do, but we said, "Well, we really need to do this sometime, so we might as well do it now." A good example is the structural testing of the horizontal tail. We found the tail needed some additional reinforcement because we finally

Doug Taylor

got around to testing one because the data was needed for the Swiss.

One advantage of having the close oversight of the civil aviation authority is that many of the things that weren't so nice about the VK-30 as it came from the factory were greatly improved. For example, all of the push-pull cables in the flight control systems were eliminated and replaced by either pushrods or conventional cables and pulleys. Also, the pushrods in the flap system had to be professionally welded and plated for corrosion protection. The electrical system was professionally designed and installed. There were also some additional structural reinforcements, particularly in the tail of the airplane. Part of this was to handle the extra power from the Allison 250-B17C turboprop engine. All of this, combined with Urs' excellent craftsmanship, resulted in a very nice VK-30 that should give many years of service.

Since it is very hard to find hangar space in Switzerland, Urs did as much of the work as possible in his garage. This meant that it was not very practical to take the wing out to transport the plane to the airport. Also, in Switzerland you don't just put it on a trailer and haul it to the airport in the middle of the night and hope the cops don't notice. Which brings us to the first flight. The solution was to sling it from a helicopter and FLY it to the airport. After quite an ordeal just to get the plane out of the garage, it was set up in an open area next to Urs' house and rigged up with netting over the wings so it wouldn't create any lift and then a Kamax helicopter came and picked it up and carried it to the airport about 30 miles away. Anyone who is interested in flying the VK-30 and has heard about some of the problems with low speed handling qualities would find the pictures of this flight very interesting. The VK-30 was completely stable under the helicopter but it was pointing 90 degrees to the flight path. The propeller and rudder were removed (they would have helped point it in the right direction) and the nose gear doors were open and which landing gear was down which are destabilizing, so it was a little worse than it normally would

be. However, this gives a very clear picture that the VK-30 has very “soft” lateral stability with the gear down.

I visited Urs in the summer of 2004 and was impressed with what he had to show me. There was clearly a lot of work left but it was also clear that it wouldn’t be long before it was ready for the first flight. We discussed the possibility of me doing the first flight. I had been involved in the project since its very beginning and was impressed with the workmanship and the professional manner in which everything was done so I was definitely interested in doing it. There were a few items that needed to be addressed before I would fly it however. The nose gear door sequencing was not done and as I mentioned in the description of the airplane under the helicopter, the lateral stability is soft so anything to improve it must be done. I have flown a VK-30 without the nose gear door sequenced and it is unstable laterally and if allowed to slip a little bit, the airplane will continue to yaw until quite a large side slip angle is achieved. I don’t even know for sure if it will stabilize because I never let it go that far. This was a contributing factor in the deaths of Craig and Steve Baldwin. They had a single fuel tank and the fuel would slosh away from the sump in a sideslip. With the instability caused by the nose gear doors being open with the gear down, the engine quit and they were unable to restart it. The other thing that needed to be done was to install some kind of temperature indications for the engine compartment and the engine compartment fire extinguisher. With the mid engine configuration, it is imperative that the pilot have something to indicate an engine fire because otherwise you will never know you have one and there must be some way of putting it out. Even with good fireproofing, I would not want to have a fire keep burning in a VK-30.

The structure can only take so much heat – about 160 degrees - before the strength starts dropping off. I mention these two items because of their importance to anyone else building a VK-30. They must be planned for from the very beginning.

Urs and I stayed in contact and it looked like the airplane would be ready to fly in the Spring of 2005, so I made plans to come to Switzerland in April. As is usually the case in homebuilding, things weren't quite ready. I did spend a couple of weeks working on the plane and checked the torque on all of the bolts in the plane and the rigging and anything else I could check. It was very good to spend the time and really get to know the plane. It was also good to spend time with Urs and his friend Erwin Mueller who has been helping on the plane since nearly the beginning. They are definitely a couple of really good guys.

Things were looking a lot closer by summer so I came back to Switzerland in August. When I arrived, Erwin picked me up and we went straight to the airport to look things over. The propeller had been removed for some maintenance on it and had not been reinstalled yet because they had also just received a new tailhousing from Rick Mills. We had to make a decision whether to use the original tailhousing or install the new one. Since nearly every VK-30 had problems with the tailhousing and I didn't think it would take very long to change it, we decided to put the new one in. As usual, there were also some other things that needed to be taken care of before we could fly, but things were looking good.

Naturally, there were some unforeseen difficulties with tailhousing installation, so it took about 3 times as long as I expected it would. You would think that since everything takes me 3 times as long as I expect it will, that I would be pretty good at estimating how long a project will take by now! Somehow it doesn't work out that way. We also had another unforeseen difficulty. I was staying in Urs' vacation cabin on a lake and woke up on August 22,2005 to find the lake was in the yard. It had been raining a bit for a few days and then it rained hard all night and most of that day. There was worse flooding than anyone had ever seen. The normal 30 minute trip to the airport to 4 hours due to detours around the flooding and then I couldn't get on the airport because there was a river running across the normal access road. I did find another way in, which was good because I was able to get all the miscellaneous stuff off the hangar floor and then I barely got out because the water was still rising. Urs and I came back later in his four wheel drive SUV and we got a little work done. We barely got out of there again because the water was still rising. The next day, we waited until we found out the water had gone down before heading to the airport. We found the hangar full of mud and the water line on the tires of the plane showed that there had been about 4 inches of water in the hangar. Things weren't looking quite as good now, and Urs had to go out of town in a few days.

A few days later we finally had things ready for high speed taxi tests to check the takeoff trim setting. This went well and I was happy to find that we had adequate ground cooling for extended running at low power settings and that temperatures cooled down while coasting down from the high speed taxi runs. Initial acceleration is moderate due to the propeller having a fair bit of pitch even though the low pitch stop is set so the prop is as flat as it will go. The blades are stalled a bit until there is some airspeed and then acceleration is good. We did have to make a small adjustment to the trim setting to get the airplane to rotate at little over 50 knots. There were now only a few more minor details and the airplane would be ready to fly. It looked like we might have a chance to fly before I had to return to the US and Urs said to fly even if he wasn't there.

One of those details was for me to get a familiarization flight around the local area. Urs keeps his airplane at Buochs, which is a few miles east of Luzern. It

was a military airport until very recently and is also home to the Pilatus aircraft factory. It has a nearly 7000' long east/west runway and a shorter parallel runway with quite a bit of space in between them, so the airport is very nice. However, it is in a beautiful valley. The mountain on the north side is about 3000' tall and is quite close to the airport. The normal traffic pattern for high performance aircraft goes around this mountain. On the south side, there is more room, but the mountains are about 6000' high. There is a large lake to the east and a narrow valley and town on the west end of the airport. I took a flight with a local pilot named Cari (sorry, I don't know how to spell it) who would also be our chase pilot. He works for a company on the airport that builds a small two seat aircraft that would fit in our new LSA category and we used one of them for our familiarization flight. I decided that the best plan for the first few flights in the Cirrus would be to take off to the east and circle up over the lake. There would be room to make a right hand down wind if there was any problem. The landing pattern would be a left hand pattern starting overhead the airport for a landing to the west. Again, this gave the most room and more options if anything went wrong. It really is extremely beautiful but is a challenging place to make a first flight. There would be about one minute after takeoff where there would be almost no option except to go in the lake if there was a complete loss of power.

One of the items that we were unable to finish was the sequencing of the nose gear doors. Urs had an arrangement to sequence the doors hydraulically, but due to leakage somewhere in the system, the pump had to cycle too often, so we decided to make the flight with the gear fixed down and the nose gear doors taped shut. This is the type of thing that one has to be a little flexible with in order to get a first flight done. There is one rule that applies to any interesting voyage: if you wait until everything is ready, you will never leave!

We were finally ready on the 26th of August. Cari had the Robin that is used as a glider towplane. It was capable of a little more speed than the airplane he and I flew in and it is a low wing with a full bubble canopy for excellent visibility. Erwin would ride along as an observer. This is a very important point for any first flight and especially for a rear-engined aircraft. There is no way the pilot can see if there is anything wrong. No oil will ever get on the windshield, so a chase plane is a very important safety item. We had discussed our plans with the control tower. There was a heavy airlift going on with large military helicopters. They were flying food and water to a town in the mountains that was completely cut off by landslides during the flooding. We would be able to stay out of their way (and vice versa) as long as we stayed east of the center of the airport. The only problem with this was that it meant a little more time that would likely result in a water landing in the event of problems on takeoff. We started engines and the chase plane taxied out and then – I had no radio! I tried both radios and couldn't hear anything. With the intercom off, I could hear but still couldn't transmit. So we had to abort the flight. Normally I would prefer not to need a radio to go flying, but it was essential to safety, plus we couldn't fly from this airport without communicating with the tower. We were able to determine that it was likely due to a problem with the intercom. Erwin made some phone calls and we had a new one coming so, hopefully we would have it installed the next morning.

August 27th and we got the new intercom in and the radios are working again. One more inspection and button things up and hopefully everything will keep working this time. We made the same arrangements with the tower and fire up the engines. So far, so good. The chase plane takes off and I go through the final checks while it climbs to about 1500 agl. We gave it a head start because I expect to have a better climb rate even though I will be using a power setting to give about 350 hp., instead of the full 420 hp. since I still don't think it is a good idea to use that much power

on this airframe, even though Urs has reinforced quite a few things. It is finally time to fly. Power is set, and release the brakes. Here we go. Urs went to a lot of effort (and expense!) to eliminate friction in the elevator system. This made to takeoff rotation very easy. There is much better feel of the subtle things going on and you don't have to push the yoke back to neutral after the nose starts coming up like on N33VK which had TONS of friction. There is no tendency to over rotate. The trim setting turns out to be way too nose up. I have to trim nose down a lot for climb speed. The intention is for the trim to be set for the initial climb speed so that no trimming is required immediately after takeoff. That way there will be less chance of a stall or settling back down if the pilot gets distracted. Everything seems okay, a little right roll trim is needed, temperatures look good, vibration levels are low – turbines are nice. Climb rate is less than expected, but I notice that prop rpm is a bit low. The prop control springs back and it loses about 100 rpm. I can hold it up by pushing on the lever, but I can't push on the lever all the time so climb rate suffers. 100 rpm is a lot of power. We climb to about 5000' agl (6500' msl). There are a few clouds around but the view is pretty spectacular. We check airspeeds with the chase plane and the indications seem reasonable. Some basic stability checks. Half ball side slips and release the rudder. It returns, but slowly and not all the way to center. Very normal for a VK-30. Pitch stability seems very soft. It feels like the c.g. is farther aft than we calculated. My initial feeling is that this is mostly due to the very low elevator friction. The higher friction will make the "stick free" stability behave more like the stick is fixed which is more stable. We will have to check this in more detail. The last thing to do is the idle power trim check. The objective is to see what the trim speed is in landing configuration with full nose up trim and idle power. The purpose of this is to make sure there isn't too much nose up trim to be a distraction to the pilot if there is a nose up trim runaway. If there is too much nose up trim, it would be easy to stall, which is a very bad thing in the VK-30. Since there was way too much nose up trim on take-off, I expect there will be too much nose up trim for this too. Sure enough, while pulling the power back to idle and briefly looking at the engine gauges, I get down to about 65 KIAS which is 15 knots less than I wanted and much much too slow. This happened in literally the blink of an eye. I was indicating 85 before I looked at the engine gauges. Part of this is due to the high drag of the windmilling prop – much higher than with a piston engine – and partly due to the low stability. This is a smaller part of the reason why you normally have a flight idle stop on the turbine engines. I make the rest of the approach with some power. I will try to fly power off approaches later. Surprisingly, my landing isn't too bad. The first one usually isn't though – the third one is the one to watch out for because you get to thinking you know what you're doing. All in all, it is a very successful first flight (under its own power!). As usual it took three tries before we actually made the first flight. I wouldn't expect anything less on this complex of an aircraft. None of the problems were very serious and mostly were the usual need to adjust a few things. We had a nice dinner to celebrate. It was especially nice because my girlfriend was able to come up to visit from her home in the southern part of Switzerland. I just wish Urs had been there to see it.

We made another flight the next day. Cari wasn't available, but we were able to find another chase pilot, Thomas Bettemann, who has a Rockwell 114 Commander that he keeps in the same hangar with Urs' VK-30. The flight was nearly a repeat of the first flight, except we readjusted the pitch trim and the prop governor cable. We also added a little ballast to move the c.g. forward a bit. The adjustments helped a lot but still need a little bit more. Stability was still weak and the additional ballast is not noticeable. We will try to find a spring scale to do some stick force measurements on the next flight. We did determine where to put a flight idle stop. The VK-30 normally has a slight nose up

pitch with power reductions. Since there is so much more drag from the prop with the engine at ground idle, there is more nose up pitch so it is still not possible to do the idle power trim check. It seems that with a flight idle stop and another adjustment to get more nose down trim, it will be possible.

The third and fourth flights were made the next day, August 29. On the third flight I took along a spring scale to measure the force required to hold airspeed different than what the airplane was trimmed for. This showed about what was expected. Pitch stability is okay if you are a little bit fast but degrades a lot as you slow down. I have some ideas that could improve things but we will have to investigate things quite a bit more before we do anything. I am now convinced that the difference to the other five VK-30's I have flown is the very low elevator friction. This is definitely not a bad thing though. I don't advocate adding any friction however, I also don't think it is a necessity to go to the length Urs did to reduce it below what there is if a careful job is done with the standard VK-30 control system. One last thing of interest from this flight is that the takeoff ground roll was a little bit less than 1300'.

I made the fourth flight with Erwin so he could get a little idea what the plane flies like and it would put the c.g. just a little bit further forward than where we had been flying. Unfortunately, we also had our first significant problem on this flight. It started out fine. The c.g. change was noticeable. The stability seemed better. However, I was also getting more used to the airplane, which can sometimes mask stability issues. Pilots tend to be very adaptable. I let Erwin fly shortly after takeoff and he climbed up and leveled off at about 2500' agl. About 8 minutes into the flight a moderate vibration suddenly started. It was a higher frequency than propeller rpm, but we couldn't tell what it was. We immediately returned for landing. The vibration didn't change until power was pulled completely to idle just before touchdown. The only thing we could find in the postflight inspection was that the propeller gearbox was hotter than normal. The next day we did some ground runs and the vibration still existed at high power settings so we decided that we shouldn't fly until a vibration survey had been done to check the internal condition of the engine. This was very disappointing because Urs didn't even get the chance to see the plane fly. I was really hoping to take him up and start checking him out in the plane.

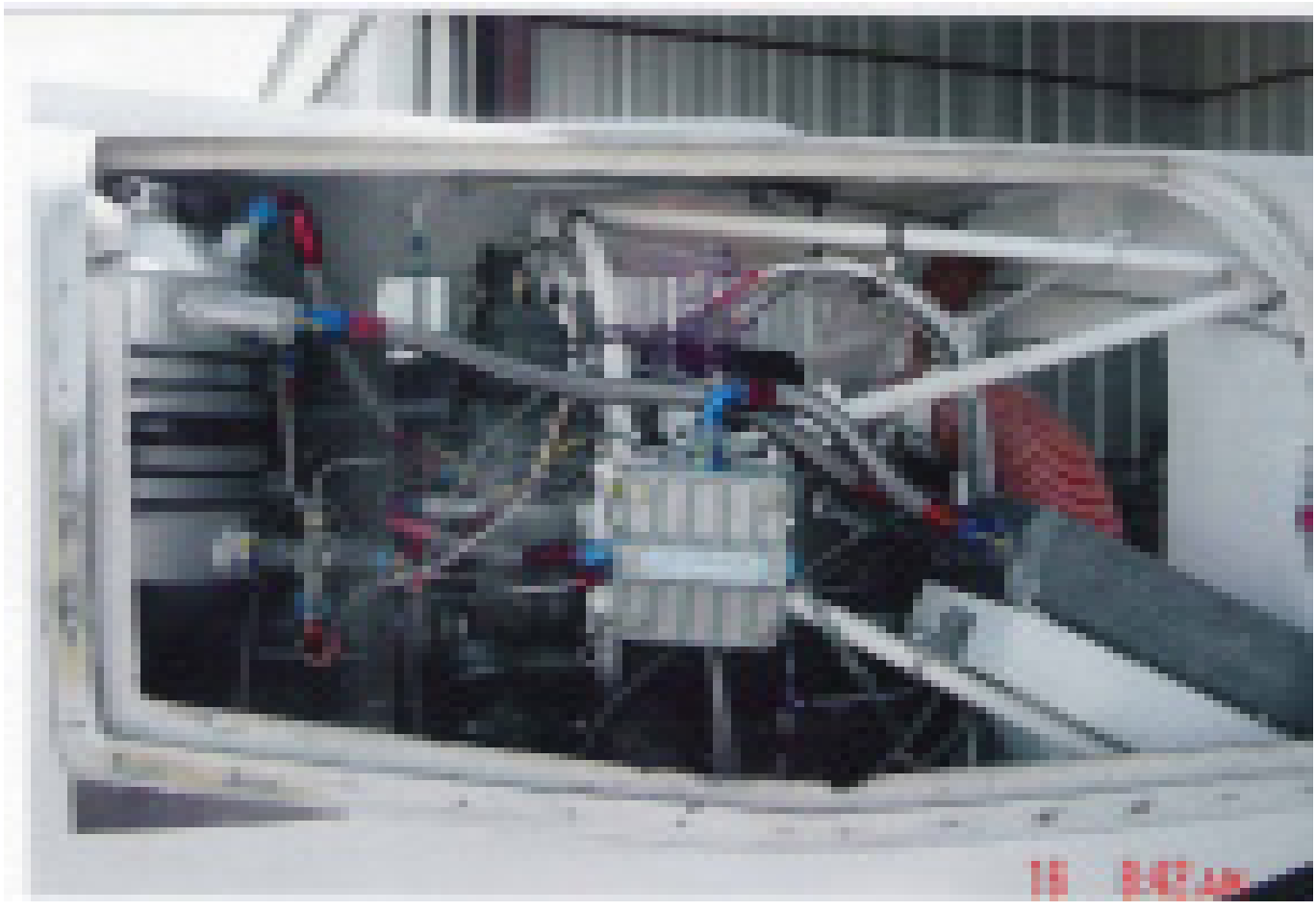
I had to return home the next day but I am really looking forward to going back to finish expanding the flight envelope and getting Urs checked out in the plane. The first part of the flight testing went very well. This is because of the excellent work done by Urs and Erwin and everyone else who helped build the plane. Many thanks to Erwin and his brother in law, Alois, and the two chase pilots, Cari and Thomas for all the help with the flight testing. Also to Mario Van Allemann who is something like a DAR for the Swiss Civil Aviation Authority. He was a big help during the flight testing. I would also like to offer a very special thank you to Cy and Jim Mehling for letting me fly their VK-30 down to Lakeland, FL where it is now on display in the Sun 'n Fun Museum. It was very helpful to have some recent experience in the plane. Hopefully, by the time everyone reads this, we will be back flying HB-YIY and enjoying the wonderful view from the cockpit of a VK-30 over the Swiss Alps.

A Progress Report on N301LC

By Lillard Christ

I started my project with an interest in a V8 auto engine. Cirrus' prototype 2 and Gerry Greth's project sparked my interest. Gerry was well into his endeavor when I first saw it at his hangar on Concord CA airport. He, as you may recall, was offering an engine and speed reduction package to other builders. Gerry built up his fuselage with 2 large NACA scoops in the belly as replacements for the side scoops designed by Cirrus. He made scoops available as part of his engine package. The NACA scoops tucked in on the lower part of the belly to make the aircraft look more aerodynamic.

I completed my project through running the V8 engine but was not satisfied with it's



performance. At that point in time, about 2 ½ years ago, I decided to switch to a turboprop engine. Cirrus, as you know, had the Allison 250 B17C engine in prototype 4. Rick Hagberg, our contact at Cirrus, supplied me with a great deal of information on the Allison 250 installation. Lanny Rundell, who was working on Bud Brady's VK-30 Allison 250, shared a lot of his experience, as well.

I already had two NACA scoops built into the belly of my fuselage so before switching to the Cirrus side scoops, I decided to try to use the NACA scoops. With some elaborate tunneling, I was able to get air from the left scoop to an air box located below the drive shaft, just aft of the engine. The engine compressor intake, which is facing aft in the VK-30, draws air from the air box. The right NACA scoop feeds air into the front of the engine compartment where it is diverted in three directions. Part of the air is fed into the oil cooler, a small amount is used for cabin vent air and the balance is dumped into the engine compartment for cooling around the engine.

Electrical System: The auto engine I originally planned on using operated on a 12 volt system. The Allison 250 engine is set up for 24 volt and uses a combination starter generator which is capable of putting out 150 AMPS. This engine does not have provisions for extra engine mounted accessories like a 12V alternator. I was hoping to somehow mount a 12V alternator which would be driven off of a V pulley that Rick Mills built into my slip spline. After trying several approaches, I gave up and went to a 24V to 12V converter.

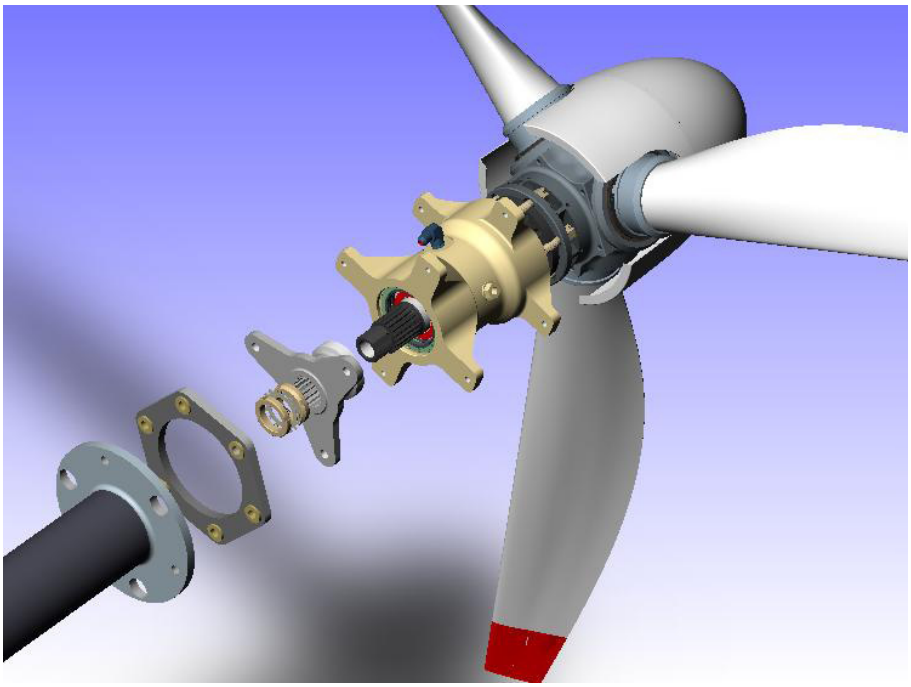
Glenn Elliott was very helpful in working out the electrical system needed for the Allison 250 engine as well as finding a source for the 24V to 12V converter. Without Glenn's help, I don't think I would have successfully completed my electrical system. The Allison engine requires different engine gauges than a V8. The turboprop engine requires a N1% gauge (gas producer speed), N2 Prop RPM, TOT (turbine out temp), Torque (in % or PSI) and oil temps and pressure. I

wanted to locate these gauges in front of the pilot but didn't have room for individual gauges. After checking out the multifunction engine monitors available, I decided to go with Grand Rapids Tec's EIS unit. They developed their system for the piston engine market but added a model for the turboprop engine. Most of the turboprop models were purchased by builders for use with the Walters engine.

Fuel System: The Allison 250 engine has a built in fuel pump but requires fuel to be delivered to it at not more than 25 PSI. I researched other projects using the Allison 250 engine (Beach A36, Cessna P210 and Maule Aircraft Corp.) and found that fuel pressure to the engine driven fuel pump varied from 5 PSI to 20 PSI. I selected a 24V Weldon fuel pump that is equipped with a pressure regulator and a fuel bypass. I backed up this pump with an automotive (diesel) 12V pump made by Carter. The bypass pressure is set at 17 PSI. The plumbing is arranged so both pumps use the bypass in the Weldon pump. All of the Allison 250 installations I was able to get information on use a header tank. Fuel is fed into the header tank from the main tanks and drawn from the header tank by the airframe furnished fuel pump which delivers it to the engine driven pump. My nine quart header tank fits under the main tanks and between the NACA scoop. The line from each tank to the header tank contains a one way valve which allows fuel to flow into the header tank but not back into the main tank. This could be a concern when the aircraft is in a slip or skid. The line out of the header tank is plumbed with a tee so one line serves each pump. In line in front of each pump is a large cylinder type fuel filter. With all the reports of a great deal of garbage coming out of the fuel tank early in the flight program it seemed prudent to have two filters.

N301LC does not have a finished coat of paint at this time, only a prime coat. After the 40 hours are flown off, I hope to find a quality paint shop at a reasonable price that I can fly to and have the job completed.

When I switched from the V8 to the Allison engine, it became necessary to replace my drive line because of the higher torque output of the Allison. Because the Allison is a turboprop engine, the concern dealing with piston pulse went away making a bigger selection of components available. Rick Mills engineered and produced the slip spline compatible with the torque output. An Addax disc pac coupler was selected for both ends of a new carbon filter drive shaft from TB Woods. Rick also provided a special hub on his new tail housing that matched the bolt pattern of the Addax disc pac coupler.



At the time of this writing, I have completed the engine installation and have engaged an A&P who works on the Allison 250 engine. We hope to be ready to start the engine in a few days.

Tom Hastings

Dear Cirrus Builders:

Rick has asked me to write a few words about my experience building and flying my VK-30. I will try to do this in a personal perspective rather than just reeling off numbers, hours and performance specifications. I will include with this a short article I wrote for Kit Planes at their request about my first flight. I still have the deepest respect for all the Cirrus Design people, for all their help over the years of construction and beyond and for designing such a fine aircraft.

Though I am a mechanical engineer by training, with few exceptions I built my plane exactly as Cirrus explained in the instruction manuals. No slight to Rick who has obviously made many improvements, I decided early on not to be too much an innovator on this project. This resulted in steady progress and quick answers from Cirrus to my many questions. Quality of my work and keeping the weight down were my highest concerns. My original guess was it would take me six years to build. It took eight and a half. We were all frustrated when the "Wing Crisis" hit. I figure it cost me at least a year of additional construction time since I had already installed the wing into the fuselage with completed flaps, ailerons and landing gear. It could have been much worse as far as time lost. Instead of just putting the project on hold until Cirrus resolved the problem, which took more than two years until I received my replacement parts (which was not a completed wing), I concentrated on the fuselage, instrument panel and electrical system. This did require a certain amount of faith that Cirrus would eventually come through with a fix. This was never a sure thing as many other kit manufactures went out of business under similar circumstances. When the new wing arrived at my doorstep, (only then did I cut up my old wing as Cirrus had demanded), I was ready for it. Construction progressed quickly as I had done all this before. Specific details of my construction highs and lows can best be done in another article though I am always available to answer questions if you have any. I did as much work as I possibly could at home before I took the project to the airport for final assembly. What I am saying is that the plane was completely assembled in my back yard (I am fortunate to have a back yard big enough for this) with all electrical, hydraulic, fuel, cooling, and vacuum systems installed and working. The engine / propeller were installed and many test runs completed. The landing gear was cycled dozens of times. The wing to fuselage fairings were built but not permanently installed. Most of the sanding / priming was complete. Only then did I disassemble / remove the wing, horizontal and prop (took a weekend) and put it on a trailer for transport to the airport. I say all that because it took me another whole year of work at the airport to get it ready for first flight. And that was still before final paint and interior work. Though first flight and subsequent testing were great experiences, the most memorable project day I had to that

point was the first time I taxied my plane under its own power.

Article as sent to Kit Planes in Jan. 2000
First flight in my Cirrus VK-30 was August 1st 1999 after 8 ½ years of construction. I've done the entire test flying myself after receiving a thorough checkout by fellow Cirrus pilot Glenn Elliot in his VK-30. He flew up from Albuquerque, NM to Camarillo CA where I have had the use of EAA Chapter 723's hanger, which they rent out primarily for the final assembly, and checkout of homebuilts. The first flight was an incredible experience with Glenn flying chase in his plane, though I did cut it short due to what I thought (incorrectly) was an oil temperature problem. I flew off my test hours just before Christmas which included ground time to have an interior installed (Grey leather seats with Blue carpet and trim) and final paint. These were the only tasks I farmed out to anyone else. The Plane flies great, is stable and easy to handle; the almost full span fowler flaps and trailing-link landing gear make landing a breeze. It trues out at 200kts indicated at 75% burning 15 gph through the Continental IO550G engine. My family and I have taken a few short trips so far but are really looking forward to some planned cross-country trips including Air-Venture in Oshkosh this summer. I could not have completed my project without the support of my wife Joyce and family. My son Jake (13) and my daughter Amber (10) have grown up with an airplane in the garage or back yard for as long as they can

remember. The key to success is persistence (as stated by the enclosure which I had posted on the garage wall over my workbench); do something, anything, on your project everyday and eventually you will finish.

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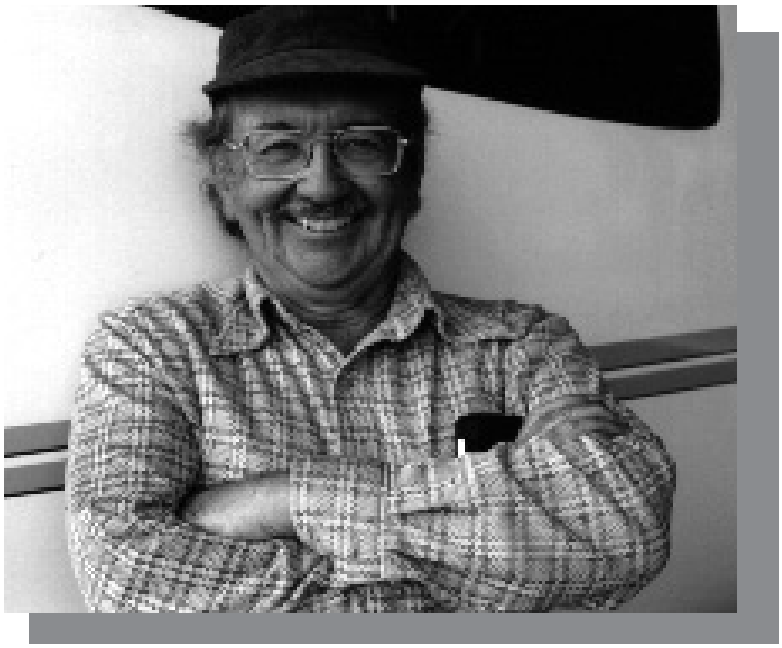
Flying My VK-30: What can I say, it flies great. Smooth, stable, & excellent visibility. Mine is a little pitch sensitive and a little heavy on the ailerons. I generally rotate for takeoff at 80 knots indicated with one notch of flaps (about 10 degrees), hold that and let it fly off the runway. Retract the gear and climb out at 90 –100 knots until 1000 ft agl where I retract flaps and continue the climb at 110 – 120 knots. This usually results in a 1000 – 1200 fpm rate, but to keep the engine cool, after a few minuets I lower the nose a little and accelerate to around 140 kts which will hold a 600 fpm climb rate, and I hold this all the way to cruise altitude. Cruise speed in calm air varies between 185 – 195 kts ground speed depending on load and ambient conditions. Coming down I like to convert some of that hard earned potential energy into kinetic by reducing power only a little and let the aircraft accelerate to around 220 kts or more as long as there is light to no turbulence. Keep reducing power slowly as I get closer, leveling off the speed bleeds off very slowly so the speed brakes come into play. At gear speed (140 kts) the gear comes out and the speed brakes are retracted. Stabilize the approach at 90 kts and put out a notch or two of flaps all the while feeding in up trim. Over the fence at 70 – 75 kts and hold a slight nose up attitude as I fly it on to the runway. No stall landings allowed and very little flare is needed or desired. Roll out with only light braking unless you have to as the wheels are small and the brake size is barely adequate with a full load.

Maintenance considerations; Keep the gear trunion nuts tight to prevent vibration on landing. Check the control surface counter weight arms often as I have found cracks in mine twice. On first flight after any maintenance to the tail housing assembly or even after an oil change, be prepared

for surging of the prop governor. This can be VERY alarming if you are not ready for it. High powered ground runs and many cycles of the propeller governor still will not prevent all surging during the first flight after maintenance to this system. Lubricate the shaft spline often. I have a Continental IO-550G engine in my plane, with 515 hours on my plane & engine as of this writing. So far I have replaced my alternator twice, vacuum pump twice. I am on my third set of tires and fourth set of brakes and too many other little things to mention here. But it is all good, because I get to fly one of the best looking and flying aircraft around. And still to this day a crowd gathers around wherever I land.



THE NEW TAIL HOUSING
Glenn Elliott

In August I installed the new tail housing, TH, (at times called “stub shaft”, “aft bearing assembly”, etc.) designed and fabricated by Rick Mills. This is a discussion of the problems with the original Cirrus-supplied part and an update on how the new one is working.

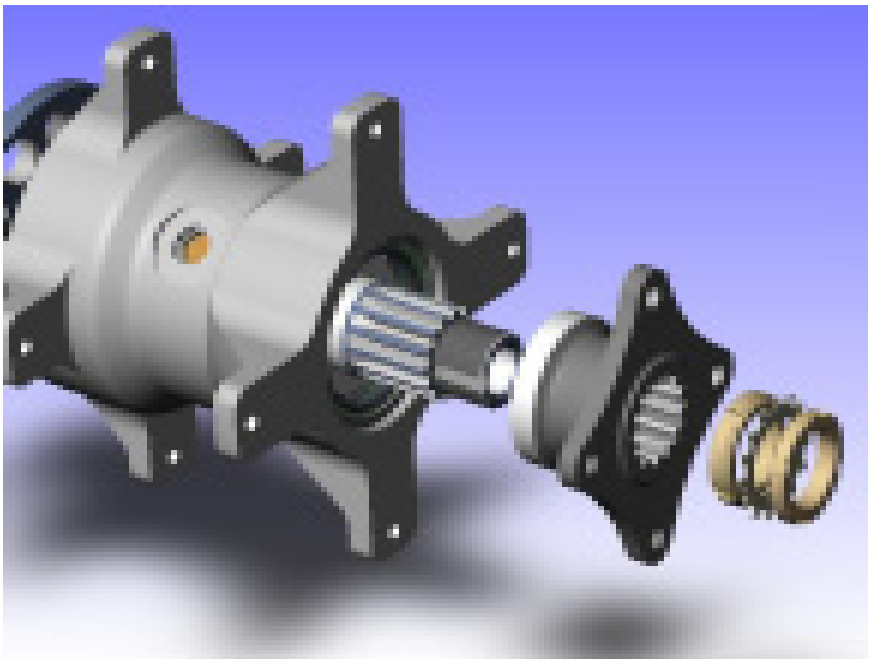
The TH contains a short shaft supported by two bearings encased in a housing which is securely fastened to the aft tail cone of the aircraft. It absorbs the thrust of the propeller and allows pitch control of the prop through a connection to the engine governor by a long oil line. This oil is transmitted to the prop dome through a hallow shaft/ slip ring arrangement.

The old, Cirrus-supplied assembly was manufactured and partially designed by a race car parts company in Silver City, NM. Most users have been plagued with a number of problems, most caused by poor design, parts selection, and fabrication. Most all builders suffered massive leaks in the bearing seals in the first few hours of use. In general, the seals were replaced by the manufacturer; however, the aircraft owner was charged for the replacement.

Some of the hallow shafts were over-hardened and cracked. In one case this led to a loss of propeller pitch control in flight, and an emergency landing. Bearings were poorly seated in the housing and in some cases the slip ring was fabricated from sewer pipe. One of my major concerns was the design of the flange that connected to the aft coupling which accepts the torque from the drive shaft. This flange had only two holes for bolts to attach to the coupling. This resulted in a high stress area and, as the parts wore, the coupling plate tended to wobble. I had to pull it out at 700 hours, re-machine the coupling surface, and insert a steel plate. The new TH has four bolts.

Most of these problems had been identified by1998 and Rick and I talked at length about a completely new TH that would correct all these problems and give a degree of reliability appropriate to an aircraft. A new design was started by RA Mills Corporation and assemblies subsequently delivered this year.

Installation was almost straight foreword. The eight mounting holes are precision machined and located on the new part as opposed to being a little sloppy on the old. Since my airframe brackets were individually fitted to the old I had to relocate two holes. The new part seems also to have a slightly different thrust line (shaft



center line vs. mounting holes). This difference in alignment in my installation is absorbed by the two couplings, at present. In all, I think that I spent about 10 hours in the installation.

The first start-up of the engine with the new TH installed went as expected. I made several run-ups in front of the hangar. Pitch cycling was effective, but slow. Rick and I were both concerned about temperatures. Surface temps of the TH in the bearing area rose quickly to around 140F; but, they seemed to stabilize there. I installed a temp probe with a temporary readout in the cabin. I also had the dynamic balance checked and found that it needed no corrections from the setup of a year ago. Vibration is less than 0.1 inch/sec.

A significant problem in opening up the governor oil lines is getting air into the system. This causes poor control until the system is thoroughly bled of all air. Unfortunately, the only way to get the air out is to fly, or at least, to move through the air at speeds above where the pitch control becomes effective, usually about 60 knts. No oil flows in the prop control until the prop passes through the air fast enough for it to come “off the stops”. I did make two high speed taxi runs, which might have helped.

The air in the system causes a surging in RPM, primarily on take off. RPM will go quickly to red line and above. Retarding the throttle is the only way to control this. After a few surges the prop will control in a rough way. And this was the case for the first few take offs. Fortunately, we have a 7000 ft runway. The surging didn’t completely stop until we had made a two hour cross country. A lot of oil flows through the control system at 2350 RPM in cruise, which purges the air. All of this was consistent with previous disassembly of the oil system.

I now have around 20 hours on the new TH. A multi-stop trip to the west coast and the Northwest, and a 6.5 hour round trip to South Dakota. Everything seems to be working well. Temperatures run about 40 F below oil temp. Control is good, and on run-up the cycling occurs quickly, just like a front-engine airplane. In conclusion, I feel a lot more confident in the reliability of my airplane with the new tail housing.

UPDATE ON N60GE

Glenn Elliott

In seems almost unbelievable that we are coming up on the twelfth anniversary of the first flight of N60GE. We now have 765 hours on the airframe and 60 hours on a new TSIO-550E engine. The old engine a TSIO-550A had developed a number of problems. Continental, TCM, made only 10 of the A models, making several improvements in subsequent models, hopefully, correcting problems. I had a top overhaul at 400 hours and at 700 it needed another. We removed the engine and shipped it to TCM, intending to do a rebuild; but there were so many problems (some in the original assembly) this proved impossible. TCM offered a new E model at a substantially reduced price.

During the installation and check out of the new engine I discovered problems with the

alternator drive system. There seems to be an incompatibility between our propeller drive system and the coupling used between the alternator and the drive shaft. I shredded three of the Lord isometric couplings in the first 10 hours. I found also that my old A model engine had an old-style steel spring coupling (not approved for certified engines since the mid 80s). I suspect that the incompatibility was discovered by Cirrus and they shipped all the 550 engines bought through them with the old coupling installed. So, here is something that the 550 series engine users should be aware of. Out of frustration, I converted my alternator drive system to an external belt/ pulley arrangement (like a Lycoming), using an after-market alternator. Works great.

N60GE now seems to be working fine. Most of the maintenance now is usually related to quality problems in assembly. The fuel tank/ gear trunion leakage problem has been time-consuming and a headache; but seems as if Tom Hastings may have found a material that seals and lasts. The right tank is now leaking again, so I'll get to try the new stuff soon. Maybe Rick Mill's gear mounting system won't have the leakage problem.

Now, for the pep talk: This VK-30 is a nice airplane. It goes fast and I've not discovered any bad handling characteristics. Over the summer we've been to 12 cities from IL to WA; and, aside from the leaking tanks, there have been no away-from-home problems. You know, the plane is so fast that it's hard to build up hours.

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Wow! I just got the bill for gas over August. ***OUCH!***

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Yes, it's worth spending a lot of time in building. I think all you builders who have devoted your project to quality work are going to be very pleased with the results.

Now, for the disclaimer: This is a very fast airplane. A descent and landing into a strange, busy airport can be stressful. One has to stay ahead of it. If you don't like to plan ahead and just like to sail around, go get a Cub. But, if you like to go places and can keep your flying skills together, this is a great plane. It's a blast to fly; and arrival at new airport is always a heady experience.

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Cirrus Builders Association

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