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# RECREATIONAL RELYER

Recreational Aircraft Association Canada www.raa.ca


RAA
RECREATIONAL AIRCRAFT ASSOCIATION
RÉSEAU AÉRONEFS AMATEUR CANADA

# From The President's Desk

*Gary Wolf RAA 7379*

**Chapter Status Reports and your Events**

Thank you to the chapters that have sent in their 2014 status reports. You events are now covered under the RAA Chapter Liability Policy to the limit of $5 million. The rest of you are paying for the insurance with your dues, but your chapter events will not be covered until someone sends in the report. Hint – get someone to send in the status report naming your president, treasurer, secretary, and two other named members. Also send in the chapter membership list with contact information. This may be done by mail or by email to garywolf@rogers.com . Please place "status report" in the subject line.

**Registration Marks**

Size and location of marks is a common telephone question these days.

222.01 (1)(g) explains that there must be marks on each side of the aircraft, between the cabin and tail, or on each side of the vertical tail, while 221.01 (1)(h) states that having marks under the wing is optional.

222.01 (2) spends a lot of space to discuss the style and proportion of letters, even the hyphen, but cutting to the chase:

If the fuselage side will accept a 12 inch letter, allowing for a 2 inch border top and bottom, you must then use 12 inches. If 12 inches will not fit, within a 2 inch border, you must then use 6 inches. And if the fuselage side is so small (as in the case of a pod and boom ultralight) you must use no smaller than 3 inches.

Alternatively you may place the marks on each side of the vertical tail, but 221.01 (2) (p) prevents you from cherry picking and deciding to use the smallest marks on the smallest surface if a larger surface is available elsewhere.

Military aircraft and military replicas may deviate from the above requirements, and 222.05 gives the procedure. Submit in writing to your Transport Canada office a request for authorization to permit an alternate size, location, colour. Include evidence that the aircraft retains it original colours and markings. A photograph of the paint would be helpful if the plane is at that point. Suggest an alternative size, location, colour which would still clearly identify the aircraft.

Typically these aircraft end up with 3 inch letters under the tail area.

**Flying Without a License?**

Strangely, there is nothing that Transport Canada can do to someone who flies an aircraft but has never applied for a license. This surprising bit of news came to light at a recent Nav Canada meeting attended by RAA Canada. The topic was powered parachute pilots, a group that unfortunately has vendors who tell their customers that there is no requirement to have a license or register their aircraft. The CARs apply to pilots and student pilots, and even to persons who have made application to gain a permit or license. However if someone has never even applied for a permit or license the CARs have no power to deal with that situation.

The CARs do deal with the powered parachutes themselves. These are legally basic Ultralights, and they must be registered, marked, and insured. From the definition in the CARs, "powered parachute aircraft" means a power-driven heavier-than-air aircraft that derives its lift in flight from aerodynamic reactions on surfaces of a flexible parachute-type aerofoil" The regs do not clearly state whether TC considers the wing or the metal structure to be the aircraft, but somewhere there must be a means of readily identifying the aircraft.


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# features




# columns




***Sun n Fun, 2014. Shawn Connelly Photo.***
***On the cover: Dan Oldridge's Just Highlander "Flyer Chief".***


# For Aviana

## The Story of a Zodiac / By Chad Scriver


**BACK IN 2008/2009** I had been happily married for almost 4 years, together for almost ten years total by the time things began to change. I had aviation in my heart, and in my blood. I had been an Air Cadet as a kid, and my first ride in a Cessna 152 at Trent Air Aviation on my 13th birthday had me hooked. As time went on, and life became more complex, I took another leap of faith: money in hand, I tried my hand at the Ultralight scene up in Barrie. I flew throughout the summer, but always felt that I didn't know enough to be shooting around the skies in a plane. So, that kind of put a damper on all things aviation. I didn't have the money to do a Private license, so it was put on the back burner.

In 2009 my daughter was born. She became my focus of everything in this world and beyond; we used to make airplane noises together. I would fly her around the house, and take her to airshows. We had a bond that was different, unexplainable, and very deep.

I decided one day to try and approach the license issue again, and went to a flight school at the local airport. I had the support of my then wife, and money in hand, so off I go. I get signed up and get my first flight. I never had another flight again... Blame it all on instructor shortages! There I was, dream crushed again. So, again, every night, I would sing a rendition of "Hush little Baby" to my little girl before she went to sleep: "Hush little baby don't say a word, daddy's gonna buy you a mocking bird / and if that mocking bird don't sing, daddy's gonna buy you an aeroplane /and



you and daddy will fly so high, high up in that big blue sky"! It put her to sleep every time, and made my heart ache that much harder to do this for her. I mean, who could? A VERY small population of the world would have these two items, one, an airplane, and two, a license - right?

Well, life throws curveballs. In February of 2010, my marriage ended, and life changed as I knew it. The intense pain of that time was an important motivator in my decision to fly: maybe it was time to chase some dreams. I collected myself, stood up out of my chair and said to myself "I *am* making this happen!". I called the Canadian Flight Academy with such enthusiasm that I think they were concerned with possible ulterior motives (this came out later as I became very close with my instructor, and consider him one of my good friends). Off I go! I flew almost every single day, sometimes two times a day, sometimes three. I went at it with passion in my heart, and I did well. From the very first, to the very last flight, I took off and landed, and my instructor never once had to take control from me. After all, it was in my DNA right!?

I started in August 2011, soloed October 18 of the same year, and was fully licensed August 8 2012. *I made it!* It wasn't easy, and I darn near quit many, many times, but I did it. My written test I scored a 98% overall, and my flight test I scored a 97%. I managed to take Aviana flying a few months after, but she was still pretty small. She looked nervous, yet knew that as she looked at me, that she trusted me... and we were off.

*GYXQ's panel is nicely equipped with conventional instrumentation; below, part of Chad's overhaul included a new interior courtesy of Flightcrafters.*


So, time passes, and I want my own plane. I hunted for months, but to no avail. Do I want certified, or home-built? Both have benefits. So one day, as I'm losing hope on finding an airplane, I come across an ad on Barnstormers. Zenair Zodiac 601XL, Bravo mod done! Bravo mod? What's that? So, I researched and researched. It had a Rotax 912S in it, and I know that motor from my ultralight flying. Could this be the airplane? The price is affordable. No paint, but I can live with that. Well, off my Dad and I go to Ottawa, deposit in hand to look at it. Keep in mind, there was no one with Zodiac experience that would look at it for me. I talked to Gary Wolf for hours, and he gave me countless numbers of members that might know a thing or two. No one had any experience with the Zodiac. So, another leap of faith.... I didn't know airplanes well, but I'm pretty mechanical and I know what safe and built proper looks like. Dad and I drove up there, and I was happy with what I saw. I gave him a deposit on the condition that he fly it to me as soon as he could (if it made it from Ottawa to Oshawa, then it will be safe, someone said to me. We chuckled about that). We were getting late in the year (September) and the weather wasn't cooperating. Finally a window opened up, and the airplane arrived, complete with radio problems.

Great... here we go. He barely got into Oshawa because of the radio issue. I began to feel that discouragement. And what crossed my mind *next* was.... who the heck is going to teach me how to fly this thing? Luckily there was a man I befriended through the RAA Oshawa chapter named Ed. He had the same exact airplane, only with a Jabiru and paint... (Can you feel the jealousy about the paint?) Ha! He was gracious enough to let me fly for three hours with him. It was a tricky little plane compared to a 152, but not scary - just different. I wasn't sure I'd love it. I'm not big on change.

Well, C-GYXQ, my very own airplane with help from my Dad, sat there at Oshawa at the Canadian Flight Academy for almost a year. I found a lot of little issues that needed to be repaired, so I tinkered from October to the next spring, May 20th to be exact. See, COPA and MAGNES is a great organization, except in order to insure this bird under the gold policy (I owed money on it, so I needed hull coverage as well). MAGNES demanded 5 hours with a licensed flight instructor to be covered, and the instructor had to be experienced on this airplane. Guess what... there is no such thing in this part of Canada! So after many phone calls, they allowed George Nelson from the Canadian Flight Academy to do it. He's got somewhere close to 25,000 hours single engine, so this man is a legend. On May 20, 2013 we went flying.

On our first flight, something was wrong: the prop (we hoped) was causing a bad vibration, and so we landed immediately. It was a GSC wooden prop, and it had just endured a winter outdoors, so that *had* to be it. We changed the prop (beginning of airplane ownership) and off we went again: problem solved. We flew that five hours off like it wasn't even a chore. It was done and signed off before we knew it. I remember my first solo in it, and cannot describe the feeling of flying your *own airplane!* I didn't have to sign out, or brief, or anything, just go. I flew and flew and flew, every morning before work, fixing problems that popped up here and there. The airplane had sat for many years, so things began to break down; seals, hoses etc. I also noticed a lack of proper paperwork like a Pilots' Operating Handbook, sloppy maintenance and journey log organization. So I created and cleaned up the paperwork. I realized it never had a pitot static test, or any of the requisite mandatory items. I'm a stickler, so I spent some more money, and got it legal completely. After last summer, I had accrued close to 100 hours, but wasn't happy with all the little things that kept breaking, so I decided to cut her loose, bring her home for the winter and fix these items.

I really wanted paint, but the cheapest I could get a quote for was $10,000 and that seemed ridiculous. Overhearing me talk about this paint thing one day, my stepdad pipes up and says, *you get a painter, I'll get you the paint*. Turned out, he owns his own company and it is tied in with

*Zenith's 601-XLB is a comfortable, capable cross country aircraft.*



*Above, a few of "before" pictures of GYXQ.*

DuPont! I asked how much the paint would cost, and he kept telling me not to worry. In the end, "the boys" over at DuPont took a special interest in my project, and formulated the best paint money could buy. 40 year guarantee with this system! Three stages. Single stage paint. The paint's value alone had to be between $7,000 and $9,000, but I could never get the truth out of him. Word spread, and before I knew it, I was meeting with Blair Decker, a superb painter, and whom I now consider a friend. I told him the story, and that money was an issue. I'm not rich, I'm just trying to make something happen, a dream on a budget. And he took the job! I will feel forever indebted to him.

So we get the plane painted, and what a mess. Acid etching for days, then sprayed a Metalok (Like Alodine) primer that eats into the metal, followed by DuPont DTM Epoxy Primer. Then the beauty comes next: DuPont Imron elite series single stage. I was always a skeptic of single stage, but... *wow*. Months later the Zodiac still looks wet. What a shine!

Getting the plane to and from all these locations was a challenge too, as the landing gear was too wide for any trailer out there. I ended up using a flatbed tow truck; a friend of my cousin's helped make this happen. A lot of trips. So, airplane painted, home bound it goes, into a single car garage. It was tight, but all of the airplane fit, wings and all. I ordered a custom interior from Flightcrafters in Florida, new tires, brakes, bearings... if it could be changed, I changed it. I spent about $8,000 in parts alone. (the good folks at Aircraft Spruce actually recognize my voice now when I call). New sending units, new sensors, new everything. I wanted this to be perfect when it went back to the airport in the spring.

I could bore you with details that would drive everyone insane, but one thing I have to mention is the unbelievable support, encouragement and help that I received from Zenair. They helped me every which way, and fielded literally hundreds of phone calls from me. Michael Heintz had patience with me, as I'm sure I would have cursed me if I was him. Cleo who helped with the technical stuff, and a very warm thanks to a man in Mexico, Missouri who custom fabricated me a complete new exhaust system practically blind that fit like a glove. Thank you Travis of Kobush welding, and Zenith Aircraft! Both Zenair and Zenith were extremely helpful, and I'm proud to say it originated as a Canadian company, and I am flying a Canadian designed airplane. I would say, I have over 300 hours of work in this little bird since just the beginning of winter, working almost around the clock sometimes.

So, the day comes where I'm at the airport one day, and the Canadian Flight Academy mechanics that took her apart tell me, you better hurry and get her back here, we are really slow right now, and if you miss this window, you might be waiting a month or more. "But I'm not ready I say"! They laughed, no one is ever ready, and there is always something missed. But you are there, get her here! So I do.... And the journey begins again. I still had a bunch of vinyl graphics that needed to be done to finish off the paint job too. Another great connection I made. Rob TenWesteneind of 10West Graphics showed up the day of assembly and worked around all of us reassembling her. His job was meticulous, and in my opinion made it pop in a way I'd never imagined! It took us two full days to get her back together, running into issues here and there. Flap motor problems showed up, but I believe is now fixed.

Here is where the luck hits an all time high. We did the weight and balance, and the airplane gained a whopping 12lbs. That's it! How is this possible you say? I took out 37 pounds of interior that was made out of ultra heavy memory foam. I also went to a lighter battery, and removed a few small useless items. It's amazing what little changes like that can do! 783lbs, to 795lbs. Talk about lucky duck! We all know that paint alone has got to be close to 40 pounds there's so much of it on there!

So now we come to the end, where I must say, this is a new airplane. It now requires a full test flight. A lot has changed, but a lot has remained the same, but none the less, the first flight will be a test flight. I've talked to the tower staff already, and they are expecting me any day now. I will overhead the airport, remaining in the control zone for several flights until I know I don't have any leaks, or any other more serious issues. I want to thank all those that helped make this dream a reality. It took a team of people from start to finish, including the RAA, because without them, I wouldn't have half the contacts I've made.

## Thanks...

**- Aviana-Juliet, my daughter, for her inspiration!**
**- Michael Sitayeb, a great flight instructor and friend, thank you for teaching me what you know!**
**- My Wife Amanda for her patience throughout the entire process of both the airplane and the license. I love you, and couldn't have done it without you. Thank you from the bottom of my heart!**
**- Ed McDiarmid for the support, expertise and the time in his airplane**
**- My Dad for supporting me and helping financially.**
**- George Nelson (Flight instructor extraordinaire) for the dual time.**
**- All the staff at the Canadian Flight Academy - (905) 404-9252**
**- All the Zenair Canada staff, thank you so much!! - (705) 526-2871**
**- Blair Decker, the greatest airplane painter yet! (289) 355-8541**
**- Rob TenWesteneind for your enthusiasm and stellar vision of vinyl! Thank you!**
**- 10West (905) 391-4100**
**- Gord Werry, a fellow Zenair pilot/builder, my friend and a great help along the way!**
**- John Alford, my friend, plane watcher, updater and supporter. Thanks, John!**
**- April, my sister and partner in our family business. Thank you for your patience, and your unbelievable support. Thank you so much!**

**And finally,**

**- To the RAA, who has allowed me to tell my story, support me, and encourage newcomers to aviation. I will remain a lifetime member, and to all the pilots that have inspired me through the RAA, the warmest, sincerest thank you. I will pass along what I have learned, and hope that one day I can be part of someone's dream!—**

**Thank you Aviana-Juliet, this is all for you. I love you!**

**Daddy**

# SMOKE AND MIRRORS

### *FLYING FOR HOLLYWOOD IN THE WORLD'S SMALLEST JET / BY BARRY MEEK*

Most of the articles you read every month in this column contain all factual material. But some of what I write requires a lot of imagination, like flying under the Lions Gate Bridge in Vancouver. It's something I've wanted to do for many years, probably since seeing the 1983 James Bond movie, Octopussy. No doubt every pilot can recall the opening scene where Bond flies the tiny jet through a hangar door and out the other end while being chased by a surface-to-air missile. The missile follows him into the hangar but detonates inside, killing the soldiers who were trying to kill or capture the hero. *(To view that scene: http://www.youtube.com/watch?v=I5SV1wuemhM&feature=related )*

Was the stunt real or a Hollywood trick done with blue-screen backgrounds and special effects? Both methods were used. The aircraft was indeed a real plane, a BD-5J micro jet. Most pilots are familiar with the tiny jet, built as a kit back in the '70's by engineer/designer Jim Bede. This particular jet was owned by aviator/stunt-pilot J.W. "Corkey" Fornof, a man with quite a history of flying and for his work in the movie stunt business.

When I saw the movie and was told it was a real plane with a real pilot that flew through that hangar, I wondered what kind of crazy person would, or could, do such a stunt. I looked up Fornof's resume, and it is indeed impressive. Here's the kind of pilot every movie director would like to have working on his set.

John William "Corkey" Fornof has flown over 15,000 hours in close to 300 different types of airplanes. His career has taken him around the world doing airshows and working in the movie production field. He's developed the skill, imagination and talent to design workable flying stunts. In other words, when a producer and/or director needs a special flying stunt to fit a scene, they call on Fornof to come up with the ideas and make them work.

Another part of his experience is having flown stunts for every major air show in the United States, Canada, the Bahamas, Mexico and South Africa. Among other credits, he's a stunt pilot, aviation technical advisor, script consultant and writer. Just a few of the movies he has been involved with in one way or another include Six Days Seven Nights, Face Off, Congo, Heavens Prisoners, Jurassic Park and several James Bond flicks. He's been the stand-in pilot for Tom Cruise, Harrison Ford and John Travolta to name a few.

***So it's particularly amazing that back in the day, Corkey Fornof actually did the deed. He flew the little jet right through the hangar at close to 180 miles per hour.***

The Octopussy scene where the jet flies through the hangar is a clever combination of special effects and actually flying through it. The scene when watched now, in 2012 appears somewhat fake and a little rudimentary. But remember, it was done in 1982 or 1983, and I would think the special effects industry in the movies has come a long way in the past thirty years. However, it was a thriller even back then. Movies shot today are a bit overdone in my opinion. When I see a movie with flying scenes, I can't help but think of Star Wars, where everything is moving so fast, it is simply impossible to avoid smashing into oncoming airplanes, space ships or space debris. Not too convincing or realistic. So it's particularly amazing that back in the day, Corkey Fornof actually did the deed. He flew the little jet right through the hangar at close to 180 miles per hour. Incidentally, that was the fastest he thought he could get away with, given the compressing of the air inside the building and the possibility of blowing out doors and windows, perhaps even collapsing the structure. He had just six feet of space above and below the little jet, which would have appeared to be a tiny space to be putting an aircraft into at that kind of speed.

Meantime, the Lions Gate Bridge, for those readers who have not been to Vancouver and seen it, has a ship's clearance of about 200 feet. The entire structure is over a mile long, with two giant suspension towers supporting the bridge deck. Those towers offer a span of fifteen hundred feet between them. So the area available to fly through is 200 by 1,500 feet. Not much of a challenge. But not even the float planes that come and go through the area are allowed to fly under the bridge. The day I flew through the massive hole, it was in a simulator, and just for the fun of it. But as I said, it's something I've always wanted to do. Now I'll look for a little barn or hangar somewhere on the simulator and try what Corkey Fornof does for real. For me, it will take a lot of practice. Better on the sim, than for real. This should be good.

***Barry Meek*** *is a retired ambulance paramedic, former broadcaster, mountain bike tour guide and commercial pilot. His articles have appeared in the COPA newsletter, the Aviation News Journal, and (of course) the Recreational Flyer. He resides on Gabriola Island in British Columbia.*

# Cutting Holes

## Modifications to Wing Tank Access Panels in a Zenith 601 HDS

**by Peter Whittaker**

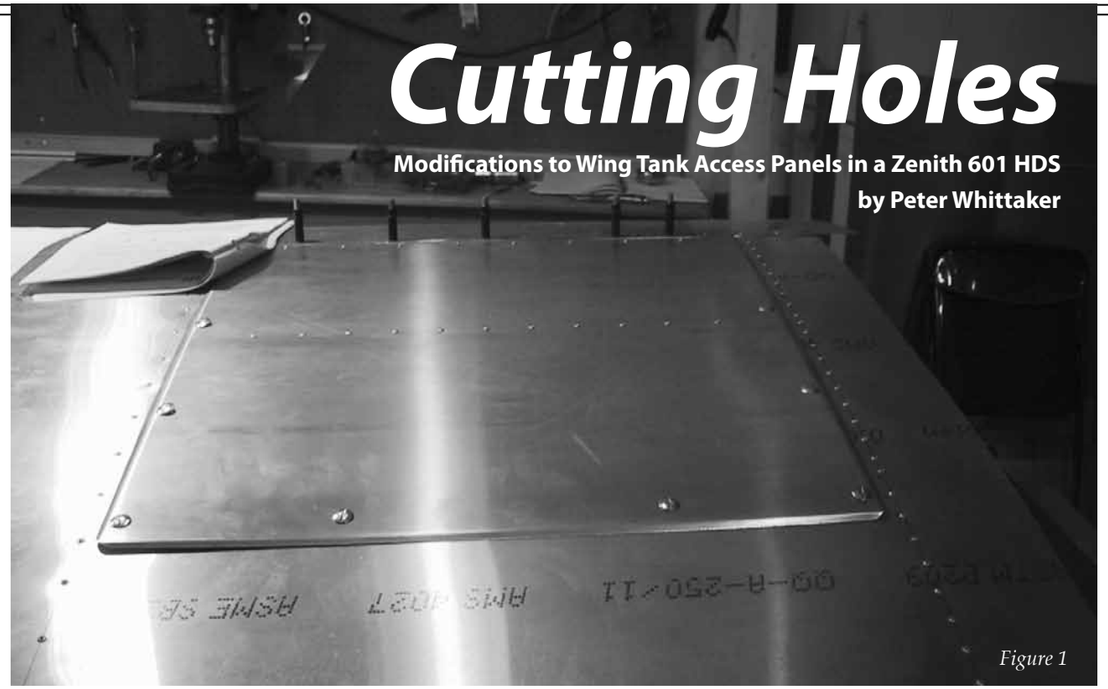


*Figure 1*

**I COMPLETED** my plans built Zenith 601 HDS (C-GKWI) in 2013 and began test flights in April of that year. I built in the option for wing lockers and installed a fuel tank in each wing locker. These are used in conjunction with a header tank mounted on the cockpit side of the firewall and together the three tanks give a capacity of 23 US gallons. Each wing tank holds 7.5 US gallons and all tanks are welded aluminum with a twist lock type fuel cap. Electric fuel pumps (Facet) transfer fuel from the wing tanks to top up the header tank in flight. The Jabiru 3300 engine in the 601 receives sufficient fuel by gravity from the header tank, although an additional Facet fuel pump is plumbed in line for added boost as a backup. After the first few flights and associated refuelling, it became readily apparent that the novelty of opening the entire wing locker cover to get to the tanks would rapidly wear off.

The wing locker covers are held closed by Dzus fasteners of which eight were originally used (Fig.1). After a few initial test flights, I deemed it necessary to add two Dzus fasteners at the front corners of the covers to keep them tight against the wing skin in flight. This gives 10 fasteners that need to be removed to gain access to the fuel filler cap at each wing tank. The Dzus fasteners are relatively quick and easy to remove and re-install after each fill, but the process becomes tedious. Reviews of other 601 builder accounts showed that a common solution was to install a dedicated fuel filler cap access panel set within the main wing locker cover. These were designed to use only two Dzus fasteners which allows for faster and more convenient access to the filler caps. The rest of this article gives the steps that were used to design, fabricate and install the smaller access panels.

*Figure 1*. Wing locker cover for the left wing; eight Dzus fasteners were initially used to hold it closed. In flight, the cover would lift at the leading edge so additional fasteners were added at the front corners.

The tools used for this project include; a unibit or stepbit for an electric drill, left and right handed aviation snips, a flat file, a rat tail file for rounding out corners, a flexible steel ruler and fine point felt tip marker, an Olfa knife with a hooked draw knife blade for scoring and cutting sheet aluminum, drill bits for drilling out rivets, A4 Avex rivets and hand rivet puller, crimping pliers for putting a bend in reinforcing L-angle and a Dremel tool with an abrasive cutting disc *(Fig.2)*. A small wood block is also handy for backing up underneath the locker cover as rivets are drilled out and new holes are drilled.

*Figure 2*. The tools used for the project are laid out ready for use. An old towel protects the wing skin and another towel was used to cover each wing locker tank during the procedure.

The design criteria for the size and location of the filler cap inset panels were based on the need for an opening that was big enough to insert a gloved hand (winter operations) and give free access to the filler cap. The access panel also had to have a tight seal and be flush with the main wing cover skin. The dimensions were determined by laying out a plan around my hand in fine point black marker directly onto the wing locker cover skin *(Fig.3)*. The centre position of the filler cap was measured and reference lines were transferred to the cover skin to locate the filler cap centre. The design is such that the existing piano hinge for the wing locker cover could be used as the hinge for the filler cap panel. In addition to the main cut-out lines, lines for inside

*Figure 2*

*The entire operation was accomplished with the standard-issue sheet metal tools.*

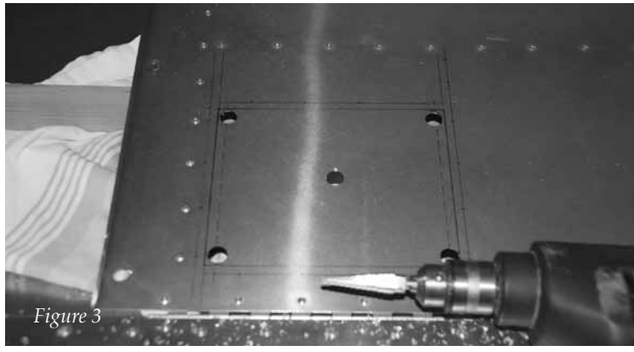


*Figure 3*

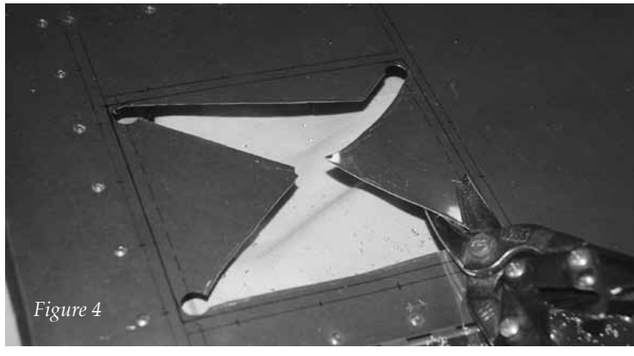


*Figure 4*

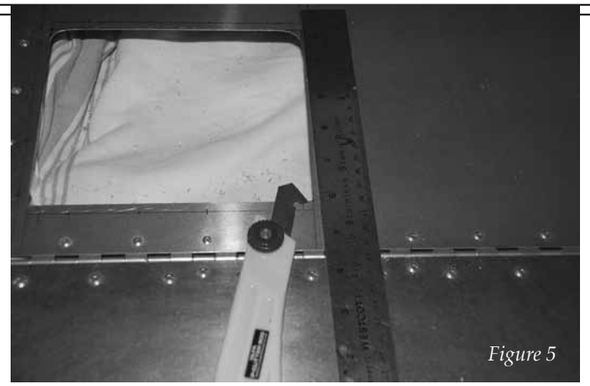
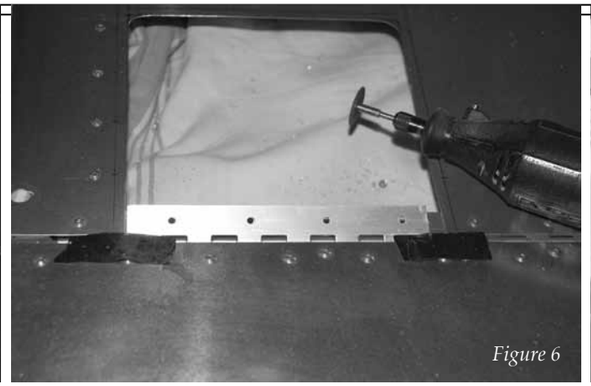


Figure 5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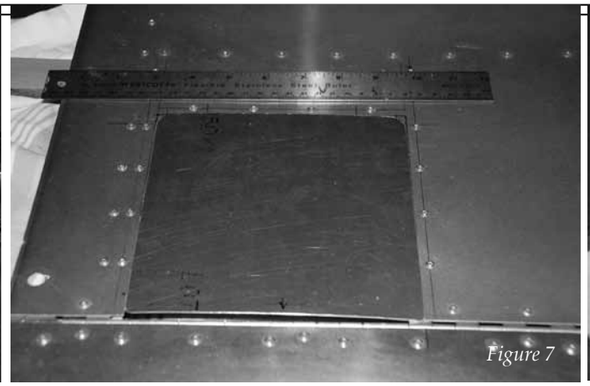
Figure 7

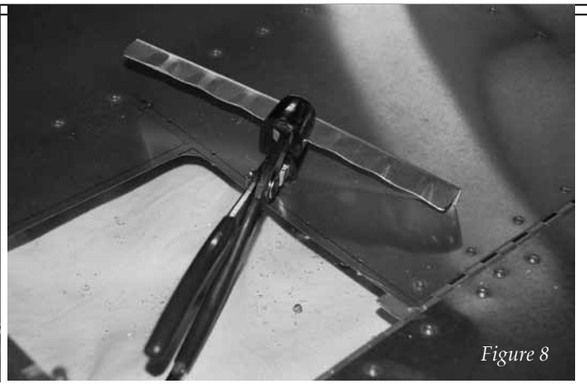
Figure 8

**The hardest part in the process was making the first hole in an otherwise perfectly good wing locker cover**

flanges and rivet lines were drawn. All of the parts, which include flat flanges (for the panel to sit on), L-angle crimped to the curvature of the wing surface and the panel cover itself, were made from 0.025" 6061-T6 sheet aluminum.

After deciding on dimensions and drawing out the plan on the skin, the first step was to remove sheet metal to create the rough opening. Starter holes were made (Fig.3) using a unibit or stepbit and then tin snips were used to cut back close to the lines (Fig.4). The hardest part in the process was making the first hole in an otherwise perfectly good wing locker cover!

*Figure 3*. Dimensions of the final opening, overlap for the side and rear flanges, rivet lines and positions for the starter holes were laid out using a fine felt marker. Dashed lines are the inside edges of the flanges, solid lines mark the full opening and the lines with tick marks are the rivet lines for the flanges.

*Figure 4*. The initial cut with the snips joins starter holes, sheet metal was then trimmed back to square up the opening. Files were used to finish the edges precisely at the lines.

Four starter holes were positioned to give round corners for the finished opening and a fifth hole was made at the centre to facilitate easier cutting. Once all of the trimming was finished with tin snips, a rat tail file was used to even out the round corners and flat files were used to straighten and dress the four sides back to the marked lines of the full opening. The sides of the opening were extended forward to cross the piano hinge and the rivets holding the wing locker skin to the hinge were drilled out between the two side lines.

A fine cut in the locker cover skin has to be made at each side line so that the skin can be removed and the hinge exposed *(Fig.5)*. The skin was cut using an Olfa knife with repeated light weight scoring slices and using a flexible steel ruler as a cutting guide. With the rivets removed and both side cuts made, the remaining skin can be removed (Fig.5). The last part to be cut is the piano hinge itself, but just the flat hinge plate – not the hinge pin! A Dremel tool with an abrasive cutting disc made easy work of cutting the exposed hinge plate to give a freely moving short section of hinge to which the new cover will be attached *(Fig.6)*.

*Figure 5*. The sides were cut with an Olfa knife to allow removal of the forward piece of locker cover skin and to expose the hinge. The rivets were drilled out and these holes were reused to attach the new access panel.

*Figure 6*. A Dremel tool was used to make the final cuts and isolate a short section of freely moving hinge plate. Fours layers of electrical tape were used to protect the wing nose skin edge from the cutting disc. Rivet holes from the original rivets are also visible.

Once all of the cutting, trimming and dressing of cut edges was completed, a piece of sheet metal was placed under the opening and a new panel shape was traced using a fine tip marker. The panel was cut, trimmed and filed to produce a final fit *(Fig.7)*. Parts were then cut from 0.025" sheet aluminum for flat flanges which would make seating surfaces for the new panel. An additional L-angle was bent from 0.025" metal and then crimped into a gentle curve to match the curvature of the wing surface (Fig.8). This curved L-angle was used to provide structural reinforcement to the locker cover skin alongside the new opening. The rear flange was made wide enough for two Dzus fasteners, one at each corner (Fig.9).

*Figure 7*. The new panel was cut and trimmed to get a final fit for the opening. The edges were trimmed to give about a 1mm gap all around to avoid binding.

*Figure 8*. An L-angle stiffener was bent from 0.025" aluminum and then crimped with pliers to give a gentle curve to match the wing surface curvature.

*Figure 9*. The rear seating flange for the new panel has a Dzus fastener at each corner. This provides a secure closure and holds the panel flush with the locker cover skin. The rivets were pulled using a flat plate over the rivets to force flattened rivet heads. The flat rivet heads allow the panel to sit flush.

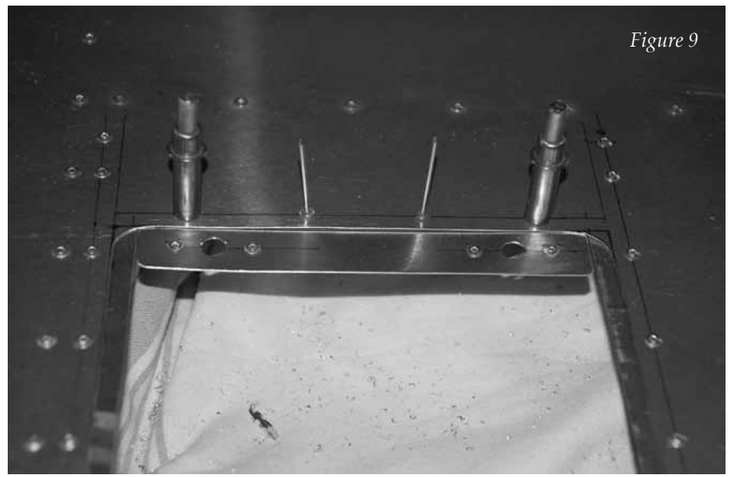
Figure 9

The final step after all of the flanges, L-angle stiffener and Dzus fasteners were installed was to rivet the new panel to the hinge plate. The new panel was taped into place, the wing locker was opened, the hinge plate was held up against the new panel and the rivet hole positions were marked onto the underside of the new panel. After drilling and deburring the rivet holes, the new panel was riveted into place and closed down with the Dzus fasteners to check the final fit. A bit more filing

and trimming of the panel was needed to get a good fit after the drilling and riveting, but this was minor tweaking (Fig.10). The completed structure, viewed from underneath shows the flanges, L-angle stiffener and Dzus fasteners in place (Fig.11). The fuel filler cap, although not centred under the opening, is still fully accessible when the panel is opened. The positioning was dictated by the width of the main wing locker opening and the location of the filler cap on the tank.

*Figure 10.* The completed fuel filler cap access panel is shown within the main wing locker cover of the right wing. Only two fasteners now need to be opened instead of ten for refueling.

*Figure 11.* The completed structure, viewed from underneath, shows the filler cap relative to the flanges, L-angle stiffener and Dzus fasteners for the new access panel.

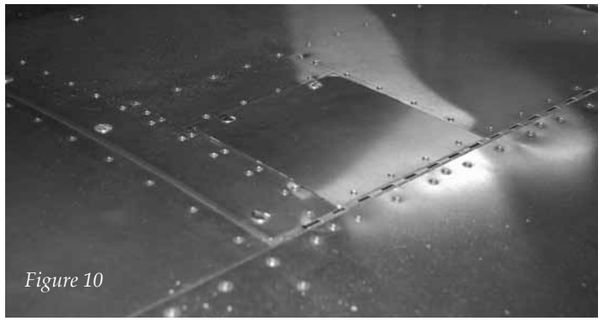
*Figure 10*

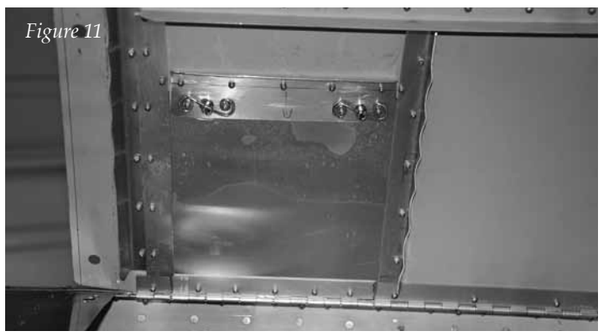
*Figure 11*

**Peter Whittaker** *is Vice President of Chapter 85 (Vancouver). He scratch built his Zenith over a 14 year period and continues to improve his aircraft.*

# Airtrikes AT 160 gearbox conversion kit

**Vassili Tarakanov is a Russian aerospace engineer based in the Montreal area, and for many years he has been supplying gearbox conversion parts for automotive and motorcycle engines. In the past he has used the SPG gearboxes, fitted with a driveshaft, a Mercedes rubber damper, and a bellhousing appropriate to the chosen engine. Vassili has recently begun importing his own gearboxes with improved gearsets to provide a wider range of ratios up to 3.2 : 1. Bolt circles available are Rotax 75mm and Rotax 4". Other circles are available on special order, and gearboxes may be run as tractor or pusher. Weight for the Suzuki/Geo conversion is 25.5 pounds, which is 1.5 pounds lighter than the SPG unit. Bellhousings are available for Suzuki/Geo 3 and 4 cylinder engines, Honda Fit 1500, various Subarus, and BMW motorcycle engines.**

**AT-160 gearbox alone, suitable for up to 165 hp $1795**

**AT-160 gearbox with bellhousing, Mercedes coupler, driveshaft $2195**

**AT-280 gearbox for up to 280 hp, price on application**

**www.airtrikes.net, info@airtrikes.net 450-202-7772**



# Mercury Outboard Conversion

*Ted Kiebke*


A friend of mine has been in the boat racing scene for years and is very knowledgeable about the two stroke V-6 outboard Mercury engine. After seeing his work and gaining more knowledge about the engine I saw that an aircraft conversion was possible. I borrowed a damaged engine block from my friend and began the long process of inventing a Mercury outboard conversion to an aircraft engine.

The first thing I had to consider was the performance of a stock engine. A fishing motor turns at 5500 rpm to develop the rated 200 hp, so a reduction gear box was needed to bring the propeller rpm down. An Eggenfellner gear box popped up on Barnstormers and through a quick search about the gear box, I found it had a gear ratio of 2.1 to 1. A phone call to the seller and the gear box was on its way. Next big problem was how to couple the engine and gear box together. I wanted some kind of cushion been the two units so I went back to the web and did some more searching. There are many rubber couplers out there and I chose a coupler from a Toyota driveshaft. Now the machining began. The Mercury and Eggenfellner driveshafts were cut down and both shafts were welded to plates and machined to fit the Toyota rubber cushioned coupler. Next job was to create the engine to gear box adapter plates. Not much of a challenge here, flat plates were cut out and machined to close the engine water system. I made the surface large enough to mate the gear box to the engine. Spacers were machined to get the necessary distance between the two units for the coupler. Only one more problem to solve and that was the cooling system. A 12 volt electric water pump was purchased from Jegs to provide the water flow and a Honda Civic radiator for the cooling.

The rest of the conversion is pretty straight forward. I just need to put everything together, build the necessary pieces and mount the unit to the aircraft.

My engine was completely rebuilt and modified to develop 230 hp at 5500 rpm. The unit weighs 240 lbs dry . It's a little on the heavy side because of material choices and the exhaust system. Am sure I could get one to weigh around 220 lbs real easy. My propeller is a Ivo Magum 3 blade with electric adjustable control and the airplane is a Acro Sport I. Feel free to contact me if there are more questions.

Have fun with your projects!

Ted Kiebke (218) 234-1172 cell

Why should you read this article?

Because if you follow the explanation that until now appeared in Wiki and several other places, you might rip the wings off your airplane. Or perhaps land at some inconvenient angle, like nearly straight down.

# MYTHS ABOUT SPIRAL DIVES

FRANK GUE

Got your attention?

For decades, reasons for and recovery from the spiral dive have been laden with dangerous myths, such as that you recover from a spiral dive by hauling back on the stick (Oops, there goes that wing. Gotta beef up the main spar.).

Studying accident reports one finds that people are killed in spiral dive episodes (not accidents; the industrial safety people will tell us there is no such thing as an accident. Accidents are caused, and we merely must identify the cause).

This article will explain the causes of a spiral dive that are intuitively satisfactory and technically accurate, and provable in your own aircraft without much excitement or any risk to persons or property.

Spiraling is inherent

All aircraft trimmed for straight-and-level flight, if flown stick-fixed under full throttle, will spiral. Some types will spiral-dive. The design of the aircraft makes the difference. If a spiral dive is entered unintentionally, the result can be fatal as explained below.

Detection

A spiral dive is not a spin. It starts not with a stall, but with steadily increasing roll and speed. Without prompt intervention by the pilot, this can lead to structural failure of the airframe, either as a result of excess aerodynamic loading or flight into terrain. The aircraft initially gives little indication that anything has changed. The pilot's "down" sensation continues to be with respect to the bottom of the airplane, although the aircraft actually has increasingly rolled off the true vertical. Under VFR conditions, the pilot corrects for this deviation from level automatically, while it is very small; but under poor VFR or dark conditions, in a susceptible airplane, it can go unnoticed if the pilot's horizon has been lost. The roll will increase and the lift, no longer vertical, is insufficient to support the airplane. The nose drops and speed increases: the spiral dive has begun.

This sequence is more likely with some configurations, such as low wing. With other configurations, such as high wing and relatively low power, the spiral does not become a dive.

The probability of a spiral dive increases when a pilot complies with one of his ground-school instructions, which is: "If disoriented or unexpectedly flying into IFR conditions, do the three Cs; Climb, Communicate, and Confess." That is all very well, but unfortunately climbing requires high power, which sets up the very conditions that promote spiral diving in susceptible aircraft: high power, stick fixed.

The VFR pilot who loses horizon may be confused or panicked by the rising wind noises and noticeable increase in rpm and airspeed, and not know what to do in the remaining two minutes of his life. There is little doubt, for instance, that JFK Jr. killed himself and some of his family in a spiral dive when, having had no spiral dive training, he foolishly took off in conditions that were visually marginal and deteriorating.

The forces involved

Say that the roll is to the right. A sideslip starts, resulting in a right-to-left slip-flow. Now examine the resulting forces one at a time, calling rightward influences yaw-in, leftward yaw-out, or roll-in or -out, whichever applies. The slip-flow will: push the fin, rudder,

**A SPIRAL DIVE IS A SUBTLE MENACE; MANY FLIERS HAVE LOST THEIR LIVES BY EITHER FAILING TO RECOGNIZE IT OR BY RECOVERING DANGEROUSLY**

and other side areas aft of c.g. to the left, causing a right yaw-in, push side areas ahead of the c.g. to the left, causing a left yaw-out, push the prop-normal effect to the left (in a tractor aircraft), causing a yaw-out,(1) push the right wingtip up, the left down, a roll-out owing to the dihedral angle, cause the left wing to go faster, the right wing slower, a roll-in, cause the left wing to fly at a lower angle of attack with less drag than the right, a yaw-in(2) and simultaneous roll-in, push the side areas of the aircraft above the c.g. to the left, a roll-out, push the side areas of the aircraft below the c.g. to the left, a roll-in.

Also, a non-aerodynamic force is from the relative vertical positions of the c.g. and the lift, creating a roll-in leverage if the c.g. is above the centre of lift, as in a low wing configuration; or roll-out if below, as in a high-wing configuration (a pendulum effect).

Thus, a spiral dive results from a complex netting-out of many forces depending partly on the design of the aircraft, partly on its attitude, and partly on its throttle setting (a susceptible design will spiral dive under power but probably not in the glide).

Examples
Flown stick-fixed under climb rpm a low-wing Cherokee will be in a spiral dive in less than a minute, but a high-wing Cessna 150 will climb while spiraling, like a big free-flight model airplane. Builders of contest models know this; all such models have high wings, some very high on pylons. Success in contests depends upon their models' ability to climb fast in a tight spiral under very high power and no pilot input, without spiral diving.

Excess energy in and recovery from a spiral dive
A diving aircraft has more kinetic energy (which varies as the square of speed) than when straight-and-level. To get back to straight-and-level, the recovery must get rid of this excess energy safely. The sequence is: Power all off; level the wings to the horizon or, if horizon has been lost, to the instruments; kill the zoom resulting from the excess speed (which will result in the same high forces as those encountered at the bottom of a loop).

"Kill the zoom", the man says. Here is where the temptation arises to haul back hard on the stick, because you are nose-down at high speed. Instead, see what the airplane does, since it also wants to recover (by zooming) because of its natural longitudinal stability. "g" forces will increase at once. Too much "g"? Gentle forward, not back, stick. Watch your VSI, which will rise out of the negative. IAS will drop off as the nose rises above that horizon you can't see. Maintain a nose-up attitude and climb (to bleed off the excess kinetic energy by exchanging it for potential energy of height) until a desired speed is reached; level off and restore power.

What is "too much 'g'"? Sorry, can't answer. This depends on your airplane, how much altitude you have lost, and what you are feeling in the seat of your pants. Perhaps your pilot's operating handbook will have some hints. For the experiment below, you might try hanging somewhere in your cabin a fisherman's spring scale with a one-pound weight on it to give you a direct reading, i.e. 2 on the spring scale equals 2g; although the experiment will take you nowhere near the "g" specified for most recreational aircraft.

What about your own aircraft?
It is worth your while to check your own aircraft and your own habits. On a good VFR day at altitude, trim for straight and level at full rpm, fix the stick and pedals and wait to see what happens. Your aircraft will spiral; perhaps it will spiral-dive. Recover, using instruments not the horizon, when your good judgment tells you to do so, and file away the results of the experiment in your head for life-saving use some time in the future.

Remember that, as always, Pilot in Command has full, exclusive, personal responsibility for safe flight as she uses this, and any other, instructions or advice.

Summary
All aircraft will spiral and some will spiral dive. A spiral dive is a subtle menace; many fliers have lost their lives by either failing to recognize it or by recovering dangerously. It is wise to check your own airplane to understand its habits in spiral and recovery.

Notes:
1. Re prop normal: A tractor prop rotating under power is an invisible fin at the nose which is, in effect, a surface at right angles to any airflow arriving from any angle. It is called "normal" because it is at right angles (normal) to the longitudinal axis of the aircraft and also to any side flow. Its effect depends on throttle setting (high at high rpm, low at low) and the attitude of the aircraft. A pusher prop is the reverse and causes a yaw-in, not a yaw-out, force: and in fact, one certain tailless R/C model, where such a drastic change as re-rigging from tractor to pusher was feasible, went from susceptible to spiral-diving (pusher configuration) to non-spiral-diving (tractor configuration).

2. Re angle of attack: A climbing aircraft meets a slow downward airflow and a fast forward airflow. The vector sum of these, plus the angle of incidence rigged into the aircraft, make up the angle of attack of the wings. Also, because the aircraft is yawing, the outer wing is flying faster than the inner, even though both are connected to the same aircraft. The resulting outer wing vector flattens and lengthens, while the inner vector does the reverse. Thus the outer wing is flying faster at a lower angle of attack than the inner wing, creating a roll-in couple. This effect reverses when the aircraft is descending in a glide, acting to prevent rather than promote a spiral dive.

**Frank Gue** *is a Registered Professional Engineer living in Burlington. He is a published author on factory management, education, politics, and economics. He flies a C150, which he uses better to understand the theoretical basics of flight. He uses R/C models to test outrageous designs that would be too expensive for a human to test. One result is a patented hydrofoil landing gear for waterplanes.*

# Omega Propellers

**Thompson Propellors of new Zealand has been sold and the new company is Omega Propellors, owned by Bill Izard of Waikato NZ. Bill has been a pilot for forty years, a builder for the past fifteen, and for awhile he lived in Canada**

**Omega propellers are laminated from ash and mahogany, finished with a composite skin and a urethane leading edge. The alternating laminations give Omega propellers a classic old-time appearance that compliments the lines of many aircraft such as a Tiger Moth. It is not all nostalgia though at Omega – the range includes high speed 60 x 70 props for the O-200 Cassutt and several for the Lycoming powered Tailwind. The range of applications includes VW, Jabiru, Rotax, Continental, Lycoming, and an array of specials. Pricing is in NZ dollars which currently trades at a slight discount to Canadian, and ranges from $900 to $1250 for off the rack props.**

**The website is well worth cruising - it has videos on prop repair methods, prop storage, prop balancing, and prop tracking.**

**FMI: www.thompson-aero.com phone 64 21 423 853**

# FLYER CHIEF

**WHILE WORKING AS DEPUTY FIRE CHIEF**

in London, Ontario a few years ago, I already knew that I would not be content with a quiet retirement. By the time I retired, London was a city of almost 370,000 people and London Fire Department had over 400 personnel and 14 fire stations. Although I had started my Firefighting career in Cambridge, Ontario and worked my way up through the ranks there, it wasn't until I became a senior manager in London that I truly realized the scope of work required behind the scenes to keep an organization like that functioning and growing. With long hours and dedication to the job, it was often difficult to make time at home for personal projects, but I always seemed to have a project or two on the go at home anyway and was soon going to start my next big project. To the surprise of friends and relatives, I was going to build an airplane!


**WITH RETIREMENT PLANNED** for 2012, I built a 24'x36' garage in my backyard in 2011 to accommodate my project and provide enough room for a nice woodworking shop when the plane was done. I have built several pieces of furniture throughout the last 20 or more years and my wife understood my need to continue building furniture and other wood projects once I retired and once the plane was done, of course. With 12' ceilings and 11' x 11' door, it made a very nice workspace to build a plane in and easily allows the plane to be moved in and out with its wings folded. It's sparsely outfitted so far, but my wife calls my large workshop the "Garage Mahal"!

I am an avid fisherman and canoeist, but I was finding that the portages were getting longer and the canoe was getting heavier every year... or so it felt. As I sat on some remote lake that took several hours to get to through dense bush and rough portage trails, I thought to myself how much easier it would be if I could just fly in, fish for the day, and fly home that same day. Hmmm ... if only I had a float plane.

I always had a mild interest in aircraft, having built and flown several .049ci-powered models on control lines when I was much younger, but the interest was renewed when I realized that building a full-scale plane from a kit could now be a reality. My wife was very understanding and supported my efforts to get my pilot's licence first and then later in my decision to buy and build a kit plane. Not one to jump in without analysis, I surveyed the field of aircraft manufacturers and kits. I wanted a plane that would satisfy a wide range of requirements, and would be challenging to build without having to jump through too many hoops or require a lot of specialized tools. Among the kit planes I considered were various models of Kitfoxes, Zeniths, and Cubcrafters, but throughout the process I even considered just buying a good used certified plane like a Maule, Piper or Cessna on floats. One of the earliest contenders on my list of kit planes was the Just Aircraft Highlander, which is manufactured in Walhalla, South Carolina. It quickly became the standard by which I gauged all other planes and in the end, won out as my STOL aircraft kit of choice.

The Highlander is a back country version of the Just Aircraft Escapade, which is still their base model. Longer wings and larger tail feathers make the Highlander a better STOL aircraft with the performance that I was looking for. Additionally, a few Highlanders had already been put on floats in the USA and the results were quite impressive, with awards and accolade at all the major airshows throughout the USA. As an avid fisherman and now a pilot too, I believed this was the STOL aircraft with the most items on my list and once equipped with amphibious floats would get me in and out of more secluded lakes where the fishing would be better, while providing the versatility for back country adventures and a 100 mph cruise speed for cross country trips.

Technically, the Highlander is a modern development of Dean Wilson's Avid Flyer. The actual path followed leads through Dan Denny's Kitfoxes, through the Skyraider and the Easy Raider to the Escapade, which was jointly developed in the UK and US. Troy Woodland used many of the ideas from the redesign of the Skyraider into the Easy Raider in developing the US version of the Escapade. Feedback from customers lead to further refinements and requests for additional features and options lead to the design currently known as the Highlander.

The Avids and Kitfoxes have been built in all sizes to take anything from a 503 Rotax to a 912 or 914, and the latest Kitfoxes even accept a Continental or Lycoming engine. There is worldwide industry of kit aircraft that owes its heritage to the genius of Dean Wilson, among them the Eurofox from England, the Aeropup from Australia, and the Ridge Runner from the USA. There are even plans available, reverse engineered from early Avid models, including the Raven and the Montana Coyote. Just Aircraft is one of the latest on this path, but their changes and refinements have produced what is undeniably their own unique aircraft line and they have followed up with an excellent reputation among their customers for outstanding support. Builders are even encouraged to call the factory or dealer to work out any issues they are experiencing. Potential builders often travel down to Walhalla to tour the factory and fly with Troy or his partner Gary for an hour or so to experience flying their unique line of aircraft before buying one.

Like all of the derivatives of Dean Wilson's Avid Flyer, the Highlander shares his wing construction method. Two tubular spars of 2.5" OD are set on 27.5" centres, with routed plywood ribs glued in place at fairly close stations. The Highlander wings fold easily with only the removal of the front clevis pins and retainer clips, allowing them to swing backward on the vertical rear pivot bolts. The V-type lift struts converge at the rear of the cabin with the attach bolt on axis with the pivot bolt of the rear spar while cabane or jury struts provide additional support to the wings. The slim under-cambered airfoil originally designed by Dean Wilson, is a bit draggy but it has the advantage of providing a very soft stall and enhances the planes slow flight capabilities. Just Aircraft gets good speed from this airfoil by eliminating the draggy Junkers flaperons used on Avids and Kitfoxes. Additionally, the Just Aircraft Highlander has cable-actuated conventional flaps and ailerons, allowing the wing fold to be performed quickly without undoing any flight controls. The folded struc-

*Below: Current panel is MGL, with an Airsoob-type angle of attack. Dan hopes to upgrade to a large screen EFIS at a future date. Right, Seats slide on plastic strips and lock with a spring loaded pin. I made aluminum floor trays and control covers to keep clutter contained.*


*Opposite: Engine was moved ahead 2" to provide more firewall clearance and for weight and balance. Opposite, below, tail surfaces are aerodynamically counterbalanced, stab has VG's on the underside. Above: paddles and fishing rods are stowed in tubes, and the emergency cabinet is on the right hand wall.*

**As an avid fisherman and now a pilot too, I believed this was the STOL aircraft with the most items on my list and once equipped with amphibious floats would get me in and out of more secluded lakes**

ture is strong enough to handle movement around the shop or hangar, but for travel on a trailer there are travel struts available to reduce torsional stress on the rear pivot points of the wings and hold them in place laterally during transportation. When the wings are folded, they fit inside an 8 ft. enclosed trailer, so the plane may legally be taken from home to airport and back, or on road trips behind your vehicle.

The Highlander has a 31.5 ft. wingspan and a 45.75 in. chord, which gives 120 sq ft of wing surface area. The quarter chord slotted flaps extend almost half way down the length of the wing with the slightly larger ailerons taking up the rest. The flaps lower in 15 degree increments to 45 degrees via a cable and spring system from a centrally-located handle between the seats. To get useful lift right out to the tips it also has Hoerner wingtips, a simple and clean method of minimizing wingtip vortices. The wings have 13 USG fiberglass fuel tanks bonded in at the root. These are made with a resin that can handle ethanol-bearing

fuel, and because they are part of the wing structure they provide part of the drag-anti-drag assembly; the rest being handled by diagonal brace tubes down the length of the wing. The wing is available as a quick build, with most builders opting for this option.

**THE FUSELAGE** of the Highlander, the gear legs and the empennage parts are factory-welded, which saves a significant amount of time and assures a uniform high quality product as all of their frames are done on the same jigs. The fuselage of the Highlander, like the Avid and Kitfox, is made from 4130 chrome moly tubing, with a hexagonal cabin to give elbow room, but Just Aircraft has made the Highlander a lot roomier. Two pilots in an Avid or Kitfox 4 had better be on good terms, and most passengers will have to keep the left elbow pulled in. The Highlander has a cabin that is long and wide, with 44" of lateral space, courtesy of doors that bow out at shoulder level. Besides the doors being top hinged and held open by gas spring shocks, each door has a top hinged window section, and either the full door or only the window may be left open in flight. The Highlander seats are easily adjusted fore and aft without the use of tools. The individual seats slide on two rails topped with Teflon glide strips, and spring loaded catches keep the seats positioned. They are adjustable in 1" increments to comfortably accommodate pilots up to 6' 5" tall. The seating is upright and quite comfortable for long flights.

The tail of the Highlander is Dacron-covered welded 4130 tubing; braced to the lower longerons and vertical stabilizer with flying wires, and the elevators and rudder are aerodynamically balanced. The landing gear of the Highlander is Cub-type, with a lower cabane and bungee pulling on a tension rod for each leg. The axles are rugged and are fitted with Matco wheels and brakes, and optional 21 inch tundra tires. These are tall enough to give good prop clearance while rolling over rough terrain and provide a nice stool in the shade under the wing while stopped. Also available are larger landing struts and tires in the 26 and 29 inch size for bush operations, or just to look cool. Since I am putting mine on amphibious floats the larger struts and tires seemed like an unnecessary option in my case, but for most Highlander owners, these are "must have" items.


*Wing fold begins with removal of the rear window, remove the safeties and remove the front pins and the wings fold back, within only a few minutes*

Two other popular options for the Highlander are flap gap seals and vortex generators (VG's), which deliver a combined decrease in stall speed of up to 7 mph. Generally, the upper surface of the wing gets a line of vortex generators, as does the underside of the horizontal stabilizers just ahead of the elevators. In my case, I even installed them on top of the cabin skylight, as it too is a lifting surface. The result of reattaching the airflow over the wing with VG's is that the conventional ailerons provide good control right down to the stall speed, overall stall speed is reduced as smooth air flow is maintained over the flaps longer, and by installing them under the tail feathers, pitch control is also maintained at higher angles of attack. Some aircraft benefit from the addition of VG's on the vertical stabilizer just ahead of the rudder, but the Highlander's large rudder maintains good yaw control even at very low speeds without them.

Just Aircraft has developed an even more capable STOL airplane known as the SuperSTOL. With Fowler flaps, self-deploying leading edge slats and beefed up landing gear, the SuperSTOL can absorb the impact from an 800 fpm descent with ease, allowing it to land and take off in a few lengths of the plane. However, with its high AOA landings, heavier weight and modified undercarriage, the SuperSTOL was not designed as a float plane and lacks the required attachment points. The Highlander still remains one of the best kit aircraft available for float operations in the LSA weight class.

**IN THE SUMMER OF 2011**, my "airplane in a box" arrived and I did my parts inventory. Building a plane looked like a monumental task at the time, but like any other project I have worked on, it just required a little planning and the courage to proceed one step at a time, keeping the end goal in mind. The manual leaves a little to be desired, but the factory staff and other builders were always available to provide photos, descriptions and any information required to build the Highlander. The manual is not specific about what order to follow when building the Highlander, but Jak, one of the guys at the factory, sent a short list of basic components to work on and outlined the order that they prefer to do them at the factory. This list provided a significant amount of motivation as I completed each component and stroked them off the list over the next two and a half years. The Highlander kit can be finished in as little as 500 to 600 hours if the plane is kept simple and the builder has some previous experience.

The pre-welded fuselage, empennage components, doors and other frames make for a fairly easy assembly job with just basic hand tools and a few inexpensive specialized tools that are readily available. Although there are some small and relatively easy-to-make components that the builder has to fashion, most of the building process is a trimming, fitting and fastening assembly job. Just Aircraft does a very good job of ensuring you get everything that is supposed to be in the kit and provides great follow-up if anything is missing when you receive and inventory the kit. Just Aircraft also supplies firewall forward kits as an option for most of the popular engines available today.

After a couple hundred hours of drilling, reaming, filing and assembling, the basic structure was finally together. Next, I had to dismantle it for covering.

I began the fabric work using the factory supplied adhesive and had completed about 10 hours of covering work wearing VOC respiratory protection, goggles and rubber gloves. Realizing that I was less than 10% of the way done, I questioned whether there was an easier and more comfortable way to do this job. With a little research and some assistance from other builders on the wings forum, I decided to look seriously at the Stewart Systems products. After a review of their numerous product installation videos on youtube, I decided to give it a try. So, after a quick trip to Aircraft Spruce to pick up some Ekobond, I began covering parts using this system. I was quite impressed with not having to wear the VOC mask and found that some light duty eye protection (reading glasses) were adequate for me and with the latex base in the glue, gloves were also optional. I was so impressed with this system,

**The design I used is a mix of modern and antique styles, to pay homage to today's fire service and to those that came before.**

I ripped the fabric off the empennage pieces I had already completed and re-covered them using Ekobond. Clean up of the water-based glue was easy, but what really surprised me was that I was actually enjoying the covering process thanks to Stewarts.

With the fuselage, empennage, wings and wheel struts covered, it was time to seal and prime the fabric. Stewarts recommends two coats of sealer brushed on and two coats sprayed on just before you apply the primer. Again, the water-based system made clean-up a breeze and the minimal personal protective equipment required made the job more enjoyable than working with high VOC

products. Once I had the assemblies sealed, I ordered my paint and primer. The Stewarts paints are mixed to order and have a shorter shelf life, so it's a good idea not to order it too soon before it will be used.

## DESIGNING THE PAINT SCHEME

When I started planning for this project, I thought about how I wanted the finished plane to look. I had considered a number of traditional paint schemes, but wanted my plane to reflect my personal and professional life. What better scheme than to design a plane that would stand out from the crowd and say, "That must be Dan's plane!" Scanning the available registration marks, a number of suitable choices were available, but none as definitive as C-FDEP, given that it works for both Fire Department and Fire Deputy. I reserved the mark and waited for the day I could place it on my "fire plane".

With its full-size gull wing doors and windows covered in Lexan, and a full cabin skylight, no other kit plane that I considered had the great visibility that a Highlander does. In my mind it combined the best features of a trike, a low wing and a high wing all into one aircraft. Some builders have opted to install small triangular windows in the fuselage behind the main windows, thereby offering a slightly enhanced over-the-shoulder view, but I preferred the option of making the removable turtle deck into a rear window. This provided me with another opportunity to make my Highlander unique. I hand cut a large firefighter's Maltese cross into the turtle deck and added a sheet of Lexan inside to complete the window.

*Dan made fairings with lexan windows for easy visual checks of the cables*

Most builders mount the communications antennas on the removable turtle deck, but because of the Lexan window I had added, I decided a permanent antenna deck would be good, so I bent up and added an aluminum plate just behind the removable turtle deck and mounted the antennas to that.

To get the basic fire truck look, I painted the plane with Firethorn Red and added 3M reflective striping and graphics to resemble the colours used on antique fire apparatus, which were often adorned with hand-laid gold leaf designs. The design I used is a mix of modern and antique styles, to pay homage to today's fire service and to those that came before. Stewart Systems paint is fairly easy to use, but it's important to follow the instructions to the letter and do not skimp on air volume from the compressor. I had a few items I did using a compressor that did not deliver enough air and the results were not as good as I would have liked. A conversation with the dealer revealed that air volume was most likely to blame.

With 32 cubic feet, the Highlander has one of the largest cargo areas of any plane in its category and comes complete with numerous factory-welded tie-down points. But I wanted a custom fire truck-style interior, so I sourced some .045 aluminum diamond checker plate, which I installed on the floors and rear wall of the baggage area, as well as the floor in the cabin area. Several parts I had made for the cargo area including the header tank made from .040 – 5052 aluminum and a matching ELT / Emergency supplies cabinet made from .030 - 2024 aluminum had a smooth look and did not coordinate well with the rest of the fire truck theme. I sourced some peel and stick Mylar coating and found that without a close inspection, they look just like real checker plate aluminum. To complete the look, I added full-size graphic of a fire axe on one side of the baggage area and a pike pole (used to pull down ceilings to locate hidden fires) on the other. In addition, I mounted my H3R Halon fire extinguisher on diamond checker plate in open view behind the passenger seat, beside the pike pole graphic. On the exterior of the doors I have a generic Fire Dept. decal that I downloaded from Stock Photos on the internet and had made by Fleet Image in Ayr, Ontario. They do the graphics on a lot of the emergency service vehicles in our area and customized my graphic to have a clear background. Although it looks great from the outside, you can look right through it from inside.

Much of the interior, I covered with black marine grade vinyl to replicate the look of a fire truck interior. I tested a number of materials for fire spread, and found the marine grade vinyl upholstery to be one of the most retardant materials, self-extinguishing in just one second after the open flame was removed. To my surprise, it performed better than the fire retardant insulation used in aircraft. However, before anyone else uses a similar material, I recommend performing a fire spread test on it, or ask your local fire department if they will do it for you. Fire Prevention Officers will generally test small samples of fabric for free and provide an opinion on its suitability.

The larger header tank was an idea I had considered early in the build process. The supplied tank, although considered adequate by most builders does not provide as much of a safety factor as I would have liked for long descents on low fuel when the tank outlets could unport because of their location near the rear of the wing tanks. The added safety factor of having a 3.5 USG header is that it gives me 45 minutes flying time even if the wing tanks are empty and extends my possible cruise distance to about 600 miles because of a combined 27 USG of usable fuel for the Rotax 912 uls. On the flip side of the equation is the move rearward in the C of G of the aircraft by moving an extra 20 pounds of fuel into the baggage area. To counter the shift, I moved the battery from behind the baggage area to the firewall, which has a slightly forward moment arm, replaced it with a Lithium Polymer battery to save 10 pounds, and moved the AmeriKing 3-band ELT from the tail to my emergency supplies cabinet in the baggage area. Based on my calculations, the C of G would remain relatively unchanged and the extra weight I was adding was useful load… in my opinion anyway.

**...no other kit plane that I considered had the great visibility that a Highlander does. In my mind it combined the best features of a trike, a low wing and a high wing all into one aircraft**

In the back of the baggage area, I added a couple of 2 inch diameter tubes (central vacuum tubing is strong and light) to act as fishing rod holders. The exposed ends stick out about an inch into the cabin, but the remainder extends for five feet into the tail of the plane, allowing full length fishing rods up to nine feet long to be stowed inside the plane behind the cabin. Additionally, I added a five by seven inch aluminum box that extends into the tail at the base of the baggage area that allows me to stow paddles, tent poles, or other light items up to six feet long on the floor of the baggage area.

**AFTER CONSIDERING** most of the engine options available, I decided to get the Rotax 912uls, primarily because of its reliability track record and proven design. The engine uses a built in reduction gearbox with a 2.43:1 ratio, which gives the little 100 hp. dual-carburetor engine a great boost in torque from 94 ft-lb to 228 ft-lb… enough to spin up to a 74" propeller. Given my mission profile, I asked Lonnie Prince for a quote on a carbon fibre P-tip propeller that would suit my needs. My Highlander now sports a beautiful semi-scimitar shaped 74 inch propeller with a 51 inch pitch designed to get my plane off the ground or water quickly and still provide a respectable 100 mph. cruise speed.

My decision to install a Rotax 912 required a bit of planning regarding firewall forward configuration. Although the 912 is relatively small as 100 hp. power plants go, the accessories required often look like they have been crammed into too small of a space and leave little room for maintenance and add-ons later. To counter this problem, I contacted Just Aircraft and inquired about moving the engine forward two inches. After a short discussion, they agreed to a

*continued on page 40*

# Oratex Covering Systems

*Product review by Bill Wojcik*


ORATEX IS A PRODUCT of Lanitz-Prena, a manufacturer located in Leipzig Germany. You may view the complete Lanitz catalogue in English online by typing into your internet browser "oracover.de".

Although they produce different aviation related SKU's; everything from model aircraft to full size ultralights, the covering material we would consider for our builds is the object of this review.

Simply put, Oratex fabric comes in two varieties. The difference is the weight and the strength. They both, according to the description provided, are made from modified polyester and use the same application process.

Oratex600 is for aircraft with a gross weight up to 600kg (1323 lbs) while the Oratex6000 can be used on aircraft weight as much as 6000kg (13228 lbs).

Material weight is always a factor and from published numbers based on what colour the builder chooses, Oratex600 varies from 2.92 oz/sq yard to 3.24 oz/sq yard.

The big brother Oratex6000 tips the scales a bit heavier from 4.05 ozs to 4.72 ozs a square yard; once again, based on the builders choice of colours.

A few words about colours is of some importance here as the colour choices are sufficient for the average builder to produce a scheme worthy of his creation.

White, yellow, red, blue, olive, silver and antique are available with a few subtle variations in both varieties of covering.

The literature makes mention of UV protection being part of the colour and manufacturing technique, as well as fuel protection. Although painting is optional, the material is compatible with topcoats with their recommended paint, Oracolour.

Graphics including line or strips and vinyl also work with the fabric. Naturally the manufacturer would suggest you use their line of graphic products but this would be no different on any covering solution a builder would consider.

Covering your bird with this product requires the same attention to surface prep one would exercise with the more traditional covering material.

Metal aircraft require the surfaces to be free of any grease, oil, silicone remnants, dirt, or other contaminants. With glossy surfaces such as powder coating or gloss paint, the surface must be scuffed to provide tooth for the adhesive to adhere.


*Oratex comes in weights to accommodate large aircraft like the Antonov Colt (top) or your typical advanced ultralight / light sport aircraft (above)*

Aluminum surfaces can be painted with a good quality two-part primer, or simply scuffed with a suitable aftermarket product. However, the builder must do one or the other but not both.

Zinc-Phosphate primers must not be used with Oratex. You must use quality, multi-component wash primers or self-etching primers. Zinc Chromate primers have been suggested.

When working with a wooden airframe, all surfaces should be painted or varnished (per aircraft designer's recommendation) and then scuffed or lightly sanded. Failure to properly paint or varnish can cause problems. Unvarnished wood will soak up the adhesive, making multiple applications necessary. Failure to properly scuff the painted surface could result in inadequate adhesion.

Adhesive is a two-part epoxy mixture in either pre-mixed ready-to-use, or self mixed in a two-component offering. Manufacturer's literature claims a shelf life of 6 months for the pre-mixed adhesive, however the builder may be better served to mix his own when required.

Both the Oratex600 and 6000 are applied after the adhesive is painted on, allowed to dry thoroughly, and then the glue properties are activated by using a heat gun or iron. No dope, chemicals, respirators, or the like are required as a builder would normally use during traditional covering work.

Tape (also sold for the Oratex system) is recommended for covering all seams. The difference the manufacturer writes is that there is no difference if the covering tape is pinked or straight. The properties and strength remain the same. \

Fabric is delivered to the customer in 34.5 inch by 71 inch wide strips.

Price is calculated to current US exchange rates, adjusted daily as conditions dictate. The example I was given by the Canadian distributor was $5.67 US (or $6.34 Cdn) per square foot for the Oratex600 ultralight covering. The numbers for the Oratex6000 come in at $7.92 US (or $8.85 Cdn). Once again, this is for the fabric alone. A Kitfox covered by the Canadian Distributor was costed out at $4600 Canadian.

Oratex is not certified in Canada or the United States at the time of this writing, but it is apparently certified in Europe. Information related to a guaranty is written as 10 years for this covering system. As with any new product, it would be in the best interests to the purchaser to fully investigate and understand all documentation related to the product that would also obviously entail complying with manufacturer's instructions.

For further information contact:
Jean- Marc Auge
(President of Datumair Inc.)
9805 Route des Ormes
Becancour, QC, Canada G9H 3R4
Phone: (819) 297-2426 voice or Fax (819) 297-2425.
Email: datumair@datumair.com
Website www.datumair.com

# New Belgian Engine

**Rapid prototyping and CNC manufacturing have changed the engine manufacturing business, and D-Motor is one of the latest to hit the market. This direct drive 4 cylinder dry sump Boxer engine has dual ignition, electronic fuel injection, and a built-in flywheel alternator and integrated electric starter, with a claimed dry weight of 112.2 pounds including exhaust, rad, and oil tank. Add something for coolant and lubricating oil, depending on the length and weight of the hoses, and this is still a very light engine package.**

**This 2.5 litre engine is very oversquare (4.1" bore x 2.91 stroke), resulting in a package that is very narrow at 21", allowing a good cowl shape. In a world of overhead valve and overhead cam engines the D-Motor is a throwback, being a sidevalve engine. The designer feels that at 2900 rpms there is no need for extra complexity and weight, so a sidevalve makes good sense. All ports are on the bottom so custom exhaust systems will be easy to fabricate. The engine mounting points are identical with the Jabiru 2200 engine.**
**The factory brochure claims an output of 80 hp (58.8 KW) at 2900 rpms. Fuel requirement is 95 octane. Strangely the US distributor claims 2700cc and 95 hp peak with 88 continuous. Claimed TBO is 1500 hours with the intent to raise this to 2000.**
**D-Motor is also working on a flat six engine that is expected to produce 135 hp and have a 176 pound wet weight.**
**D-Motor USA, Deland Airfield, Florida**
**314-322-5660, doc@renegadelightsport.com**
**Factory www.d-motor.eu , info@d-motor.eu**

# Across Canada

## RAA Chapters In Action

**London - St. Thomas**

Roland Kreiling reported that today is a banner day as today is the day he received the CofA for his Murphy Rebel. This aircraft has been six and a half years in building with its 32,000 rivets. It has a Honda based Viking engine and at this time there are 5 hours on the engine. This is the only Viking in Canada and it has responded poorly to the cold weather but Jan Engenfellner, who developed the engine, has come up from Florida to Michigan to experience serious cold weather and this has le to all Viking owners returning their ECUs to be reprogrammed. The Rebel is presently hangared at Mark Matthys' Warren Field.

Bob Buchanan informed the Chapter that Ross Summer's one-third scale Hercules that has been at Stratford airport is being dismantled. [This remarkable aircraft was featured in the 2012 Nov-Dec issue of Recreational Flyer].Bob went on to tell of a recent inspection at which he looked at a different aircraft. This aircraft is being built to supply missionaries in remote places. The wing is an oval shaped semi rigid inflated ( to about 2" to 3" WG ) 62' X 25' with trailing edge elevator/aileron and rudders. It has an aluminium tube tail-dragger fuselage with large wheels to be fabric covered. Power is by two electric motors/3 blade props from a battery pack. Solar panels may be added to top of wing.

**RAA Chapter 247 – Flamborough**

While we have recently lost a few members like Phil Stubley, who has moved to Port Elgin, it's nice to see his lovely Murphy Rebel has now passed into the capable hands of Mike Bellinger. Other sad departures include losing Peter Creer in his battle with Huntingtons Disease and our oldest member Ernie Weeks. Ernie was one of the old-time bush pilots who worked for years completing the first aerial maps of northern Quebec and Ontario.

On a brighter note, we welcome new member Greg Loten who is lucky enough to be flying a lovely RV-9A. Other members have been busy completing repairs or modifications to their machines in anticipation of flying them again soon, in the weeks ahead. These include Buzz Steeves and his Belwood Special 150, Jezzabel, and Jim Anderson who has put some finishing touches to his pretty Glastar with its glass panel and fully redundant systems. George Flosman is still flying his C-150, but he is also modifying a Zenair 705 on the side.

President Karl Wettlaufer is accumulating his own fleet, one by one. As well as his Stinson 108 he is part owner in an Aeronca Champ and a Falconar AMF-S14 Super Maranda. Never one to pass up an obvious bargain, Karl recently acquired a Wittman Tailwind that needs some attention and TLC from him.

**Scarborough - Markham**

In March, we watched a further part of the 3- disc DVD series entitled The Ultimate Dambuster Collection which was begun at the February meeting. This series is really a study of the Lancaster bomber. In this episode, we went along on an actual bomber raid which put 600 Lancasters in a target area over Berlin. With an airspeed of 260 MPH, the danger of collision must have been immense. We accompanied Flight Lieutenant Harris and his crew through the whole day up to, and including, the mission. Repairs to aircraft were made in the morning; in particular, one of the aircraft required a Merlin engine change which was completed in five hours. The aircraft were "bombed up" with one canister bomb of 2,000 lbs and six of 500-lbs. Fueling in the afternoon involved taking on 2,500 imperial gallons of gasoline. This was followed by briefing of the navigators and flight crews. British radar could only extend about 100 miles out from the coast into Germany; after that, they were on their own. The pathfinders marked the target with a particular combination of red and green flares; this foiled German attempts to plant false flares in out-of-the-way and harmless locations. F/L Harris's Lancaster developed engine trouble. The crew members had to survive a fuel endurance of 7 hours in an unheated aircraft at - 40 degrees Celsius. Almost given up as lost, they nevertheless returned to an airfield blanketed in fog. They managed to land after the fog was dissipated somewhat by burning huge quantities of gasoline along the sides of the runway. Following the raid, the crews returned to mugs of hot tea with rum and cookies. After an elaborate debriefing, they partook of the traditional breakfast of bacon and eggs. After a sleep into the morning, the airmen started the whole routine again for the next night. A tour of duty consisted of 30 missions. The average life of a Lancaster bomber was 40 hours. This episode was very well done - one of the only operational films to be photographed in colour.

**RAA Chapter 85 (Vancouver)**

At the March meeting, Paul Harris, Manager of Flight Operations at Pacific Flying Club and a Transport Canada flight examiner, provides tips on flight safety. John thanked Paul for his presentation and great ideas on promoting safety within the Chapter.
Dave Rose confirmed that a deposit of $390.00 has now been received toward the purchase of the Turbi. The deposit was made by an RAA chapter member in Brandon, Manitoba. The purchaser has rebuilt similar aircraft in the past and is looking rebuild the Turbi for personal use. At present time, the plan is for the Turbi to be taken apart and trailered back to Brandon, when the weather improves. Chapter 85 members are encouraged to help the new purchaser in the dismantling of the aircraft, when the time come.

Dave Rose distributed a survey to determine whether the chapter Members want to have another aircraft. The survey was completed at the meeting. The results of the survey will be reviewed by the executive members and given to the chapter next month.

Custodian: John Macready suggested a revamping and restoration of the current trophy collection. Bruce Prior noted that previous Chapter award winners should still be recognized and we should not have the previous names from the trophies removed. John also suggested that a trophy display be created at the front of the clubhouse.

Vice-President Peter Whittaker reported on the awards banquet. The Chapter was two attendees short from what was anticipated for the cost of the dinner. The majority of members had paid for tickets at the door. Peter suggested that future purchases be made by presale. A big thank you to the speaker at the event who kept the members engaged in the presentation. John thanked Peter and Terri for all their hard work in organizing the event.

Tom Boulanger reported several maintenance items that are on the agenda for the Chapter this year; including building repairs for the coffee shop, repairs on hangar three, and the removal of the trees near the threshold of runway 07.

Gary Peare announced "The Sky is no Limit – Girls Can Fly Too" event that is being held at the Langley airport on March 8th and 9th. The event is designed primarily to promote careers in aviation to young women. 800 fam flights have been booked for the event so far; there will also be tower tours provided.

Heidi Bekker announced the speaker for the next meeting in April. Ray Maxwell, previously the president of the Vancouver Soaring Association, currently a power pilot and an aerobatic glider instructor, will provide a presentation on gliding.



# Patty Wagstaff Opens Aerobatic School

**Kramer Upchurch, President of Southeast Aero, and Patty Wagstaff announced March 26 that they have teamed up in creating Patty Wagstaff Aerobatic School in St. Augustine, Florida.**

**Southeast Aero, the U.S. distributor for the Extra aircraft is located at the St. Augustine Airport (KSGJ) in St. Augustine, Florida, has long been a magnet for sport aviation, attracting top aerobatic pilots from around the world. St. Augustine, known for its beauty, location, and great weather, allows visitors to combine flying aerobatics with a great vacation destination.**

**The Patty Wagstaff Aerobatic School will focus on precision aerobatics in classic competition style for people who want to fly for recreation, airshows, or competition, and will offer tailwheel training and upset training to individuals and corporate flight departments, using both the Extra 300L and the Super Decathalon airplanes.**

**For information: email patty@pattywagstaff.com or check out www.pattywagstaff.com and www.southeastaero.com**

# RAA Chapters and Meetings Across Canada

*The following is a list of active RAA Chapters. New members and other interested people are encouraged to contact chapter presidents to confirm meetings as places and times may vary.*

**ATLANTIC REGION**

*HAVELOCK NB: Weekly Sunday morning get together year round, all aviation enthusiasts welcome. Havelock Flying Club - 25 mi west of Moncton. Contact Sterling Goddard 506-856-2211 sterling_goddard@hotmail.com*

**QUEBEC REGION**

*COTE NORD (BAIE COMEAU): Meeting times to be advised. Contact Pres.Gabriel Chouinard, 418-296-6180.*

*LES AILES FERMONTOISES (FERMONT): First Sunday 7:30 pm at 24 Iberville, Fermont. Contact Pres. Serge Mihelic, 418-287-3340.*

*MONTREAL (LONGUEUIL): Chapter 415, Meeting in French second Wednesday at 8 pm, at CEGEP Edouard Montpetit 5555 Place de la Savane, St. Hubert, PQ. Contact president Normand Rioux at NRIOUX@lapresse.ca*

*OUATOUAIS/GATINEAU: Every Saturday 9:00 am to noon at the restaurant l9Aileron in the airport terminal. Contact Ms N.C. Kroft, Gatineau Airport, 819-669-0164.*

*ASSOC DES CONSTRUCTUERS D'AVIONS EXPERIMENTAUX DE QUEBEC (QUEBEC): Third Monday 7:30 pm at Les Ailes Quebecoises, Quebec City Airport.*

*ASSOC AEROSPORTIVE DE RIMOUSKI: First Saturday at 9:00 am, La Cage aux Sports, Rimouski. Contact Pres. Bruno Albert, 418-735-5324.*

*ASSOC DES PILOTES ET CONSTRUCTEURS DU SAGUENAY-LAC ST JEAN: Third Wednesday 7:00 pm at Exact Air, St Honore Airport, CYRC. Contact Marc Tremblay, 418-548-3660*

*SHERBROOKE LES FAUCHEURS de MARGUERITES. Contact Real Paquette 819-878-3998 lesfaucheurs@hotmail.com*

**ONTARIO**

*BARRIE/ORILLIA CHAPTER 4th Monday of the month at 6:00 PM at the Lake Simcoe Regional Airport for the months of June, July & August (BBQ nights) For other months contact Dave Evans at david.evans2@sympatico.ca or 705 728 8742*

*COBDEN: Third Thursday of the month at the Cobden airfield clubhouse 20:00 hrs. President - Grantley Este 613 432 0797 este@compmore.net*

*COLLINGWOOD AND DISTRICT; The Collingwood and District RAA, Chapter 4904, meets every first Thursday of every. month, at 7:30 PM except July and August, at the Collingwood Airport or at off-site locations as projects dictate. The January meeting is a club banquet held at a local establishment. For more information contact Pres. George Elliott gaelliott@sympatico.ca 705-445-7054*

*EXETER: Second Monday 7:30 pm at Summers-Sexsmith Airfield, Winters-Exeter Legion. Contact Pres. Ron Helm, ron.helm@sympatico.ca 519 235-2644*

*FLAMBOROUGH: Second Thursday 8:00 pm at Flamborough Airpark. Contact Pres. Karl Wettlaufer 905 876-2551 or lazykfarm@sympatico.ca*

*KENT FLYING MACHINES: First Tuesday 7:00 pm at various locations. Contact President Paul Perry 519-351-6251 pkperry@teksavvy.com*

*KITCHENER-WATERLOO: Kitchener-Waterloo: New Meeting Time. We now meet the Second Monday of each month at 7:30pm in the upstairs meeting room of the Air Cadet building at CYKF, except during the summer months when we have fly-ins instead.Please contact Clare Snyder clare@snyder.on.ca*

*LONDON/ST. THOMAS: First Tuesday 7:30 p.m. At the Air Force Association building at the London Airport. Contact President Phil Hicks p.hicks@tvdsb.on.ca 519-452-0986*

*MIDLAND/HURONIA*

*Meeting: First Tuesday, 7:30 pm at Midland/Huronia airport (CYEE) terminal building. Contacts: President Ian Reed – 705-549-0572, Secretary Ray McNally – 705-533-4998, E-mail – raa.midland@gmail.com .*

*NIAGARA REGION: Second Monday 7:30 pm at Niagara District Airport, CARES Building. Contact Pres. Elizabeth Murphy at murphage@cogeco.ca, http://www.raaniagara.ca/*

*OSHAWA DISTRICT: Last Monday at 7:30 PM at the Oshawa Airport, South side, 420 Wing RCAF Assoc. Contact President: Jim Morrison ,905 434 5638 jamesmorrison190@msn.com*

*OWEN SOUND Contact President Roger Foster 519-923-5183 rpfoster@bmts.com*

*OTTAWA/RIDEAU: Kars, Ont. 1st Tuesday. Contact: Secretary, Bill Reed 613-858-7333 bill@ncf.ca*

*SAUGEEN: Third Saturday for breakfast at Hanover Airport. President: Barry Tschirhart P.O. Box 1238 27 Ridout Street Walkerton, Ontario. Home: 519-881-0305 Cell: 519-881-6020. Meetings are held every second Tuesday evening, at 7:30pm. Location(s) Saugeen Municipal Airport, Kincardine or Port Elgin. All interested pilots are welcome. Email: barry.tschirhart@bell.net*

*YQG AMATEUR AVIATION GROUP (WINDSOR): Forth Monday, 7:30 pm Windsor Flying Club, Airport Road, Contact: Kris Browne e_kris_browne@hotmail.com*

*SCARBOROUGH/MARKHAM: Third Thursday 7:30 pm Buttonville Airport, Buttonville Flying Clubhouse. Contact Bob Stobie 416-497-2808 bstobie@pathcom.com*

*TORONTO: First Monday 7:30 pm at Hangar 41 on north end of Brampton Airport. Contact: President Fred Grootarz - Tel: (905) 212-9333, Cell: (647) 290-9170; e-mail: fred@acronav.com*

*TORONTO ROTORCRAFT CLUB: Meets 3rd. Friday except July, August, December and holiday weekends at 7:30 pm Etobicoke Civic Centre, 399 The West Mall (at Burnhamthorpe), Toronto. Contact Jerry Forest, Pres. 416 244-4122 or gyro_jerry@hotmail.com.*

*WIARTON: Bruce Peninsula Chapter #51 breakfast meetings start at 8:30am on the second Saturday of each month in the Gallery of Early CanadianFlight/Roof Top Cafe at Wiarton-Keppel Airport. As there are sometime changes, contact Brian Reis at 519-534-4090 or earlycanflight@symptico.ca*

**MANITOBA**

*BRANDON: Brandon Chapter RAA meets on the second Monday of each month at the Commonwealth Air Training Plan Museum at 7:30 PM except in the months of July and August. Contact Pres. John Robinson 204-728-1240.*

*WINNIPEG: Winnipeg Area Chapter: Third Thursday, 7:30 pm RAA Hangar, Lyncrest Airport or other location as arranged. Contact President Ben Toenders at 204-895-8779 or email raa@mts.net. No meetings June, July & Aug. RAA Winnipeg info also available at Springfield Flying Center website at http://www.lyncrest.org/sfcraac.html.*

**SASKATCHEWAN**

*Chapter 4901 North Saskatchewan. Meetings: Second Tuesday of the month 7:30pm Prairie Partners Aero Club Martensville, Sk. info at www.raa4901.com. Brian Caithcart is the chapter president. Contact email: president@raa4901.com.*

**ALBERTA**

*CALGARY chapter meets every 4th Monday each month with exception of holiday Mondays and July & August. Meetings from 19:00-22:00 are held at the Southern Alberta Institute of Technologies (SAIT) Training Hangar at the Calgary Airport. Join us for builder discussions, site visits, tech. tips, fly out weekends and more. Contact President Bob White 403-472-1035 pittsflyer111b@gmail.com*

*EDMONTON HOMEBUILT AIRCRAFT ASSOC: First Tuesday 7:30 pm EAHS boardroom. Contact President Bill Boyes 780-485-7088*

*GRANDE PRAIRIE: Third Tuesday, (September to April), 7:30, 2nd floor boardroom of the Grande Prairie Terminal Building. Summer events on an informal schedule. For more information contact Lee Merlo at 780-518-4254 or e-mail arniesusanmeyer@gmail.com*

**BRITISH COLUMBIA**

*ABBOTSFORD: Third Wednesday 7:30 pm Abbotsford Flying Club, Abbotsford Airport. Contact President, John Vlake 604-820-9088 email javlakeca@yahoo.ca*

*DUNCAN: Second Tuesday 7 pm members homes (rotating basis). Contact Pres. Howard Rolston, 250-246-3756.*

*OKANAGAN VALLEY: First Thursday of every month except July and August (no meetings) at the Mekong Restaurant.1030 Harvey Ave. Dinner at 6:00pm, meeting at 7:30pm Contact President, Cameron Bottrill 250-558-5551 moneypit@uniserve.net*

*QUESNEL: First Monday/Month 7:00 p.m. at Old Terminal Building, CYQZ Airport. Contact President Jerry Van Halderen 250-249-5151 email: jjwvanhalderen@shaw.ca*

*SUNCOAST RAA CHAPTER 580: Second Sunday 13:30 pm Sechelt Airport Clubhouse, sometimes members homes. Contact Pres. Gene Hogan, 604-886-7645*

*CHAPTER 85 RAA (DELTA): First Tuesday 7:30pm, Delta Heritage Airpark RAA Clubhouse. 4103-104th Street, Delta. Contact President President: John Macready jmacready@shaw.ca. Website www.raa85.ca.*

*VANCOUVER ISLAND AVIATION SOCIETY (VICTORIA): Third Monday 7:30 pm Victoria Flying Club Lounge. Contact Pres. Roger Damico, 250-744-7472.*

*THOMPSON VALLEY SPORT AIRCRAFT CLUB: Second Thursday of the month 7:30 pm Knutsford Club, contact President - zzALASKA HIGHWAY: meetings held every third Thursday of every month (except July & August) at the Taylor Fire Hall at 7:30 p.m. For more information call Gerry at 250-782-4707 or Heath at 250-785-4758.*

*Chapter executives, please advise of changes as they occur. For further information regarding chapter activities contact RAA Canada, Waterloo Airport, Breslau ON N0B 1M0 Telephone:* 519-648-3030 *Member's Toll Free line: 1-800-387-1028*

*Emails can be sent to President Gary Wolf at:* **garywolf@rogers.com** *and George Gregory at* **gregdesign@telus.net.**

# Classified Ads

*To submit or delete a classified ad, please send to raa@raa.ca and place "RAA ad" in the subject line.*

*The Recreational Flyer is pleased to offer you colour advertising within the magazine. Previously limited to the back cover, we have added 4 new colour pages which will be available with limited space for your advertising needs. Our rates for both black and white and colour ads remain very competitive and you reach a captive and qualified audience. Emails can be sent to President Gary Wolf at:* **garywolf@rogers.com** *and George Gregory at* **gregdesign@telus.net**

**Deadline for submissions** *is the first of the month preceding date of issue.*
*Artwork: Rates apply to camera ready artwork. Digital files are preferred and should be sent as email and in .txt format, PDF, JPEG, MS WORD, Photoshop or other common file types. Advertising is payable prior to printing of magazine unless other arrangements have been made. Payment is in Canadian funds. 10% Discount applies to one year (6 issues) insertion paid in advance. Commercial Classified ad rates 1/8 page minimum.*
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*Please note: Ads running more than 3 issues must be renewed to guarantee continued display in the magazine.*

*Recreational Aircraft Association Canada*
*President: Gary Wolf / Treasurer: Wayne Hadath*

**Recreational Flyer Magazine**

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## For Sale

1960 BELLANCA CRUISEMASTER 2555 TT 260 HP IO-470F A fast aircraft with good short field performance and triple tail style. Full size nosewheel suitable for grass fields.1000 mile range. Gami injectors, engine analyser,white polyurethane paint . Otherwise stock. Have paperwork to turn it into an amateur built.
$65,000.00 Richard 705-652-6307

ACEY DEUCY 2 seat open cockpit project. Fabric covering completed and painted. Engine Continental 0200A rebuilt with logs. New Warp Drive 3 blade ground adjustable prop. B and C Light weight starter and alternator. Full instruments and guages in rear cockpit basic flight instruments in front cockpit. Full electrics. Aluminum fuel tank. Radio included. ELT included. Gross weight 1230lbs. Estimated 50hours to final inspection. Asking $18000. Will sell only as a package. Many extras. 905-786-2482.

STINSON 108-3, a classic aircraft for sale. Airframe 2365TT. Franklin 165 hp engine 998 TT, 82 hours since top overhaul. Fabric in 2005, float kit, wheel pants, spare engine parts, 2 metal props - seaplane and cruise. 26K OBO. Medical forces sale, can qualify for OM 250-991-7958 Quesnel BC.

CAVALIER 102.5, "Aero Sport Power" O-320-B2B; 182 TTSN. Sensenich metal prop. Airframe was totally rebuilt in 1997; 1750# GW, 622 lb useful load; VFR instruments + Garman GTX 327 TXP Mode C & Val Radio; Trutrak Turn & Bank; Kept in heated hangar; 8/10 inside and out. $29,000 OBO. cavalier102@uniserve.com or 250-558-5551. Ask for Cameron.

WANTED: CONTINENTAL A65 PARTS: Pistons, cylinders, carb, magnetos, rocker covers, spyder, cams, etc. Also interested in complete engines up to C90. Email Chris at

cphorsten@yahoo.ca or call 416-918-6569.
1974 WITTMAN TAILWIND W8, for sale because Transport does not want old pilots flying. C-FSNY has a C-90-14F Continental with compressions 80-70-74-76. Prop is a 3 blade IVO (great prop - easy to change pitch) This plane will fly at 150 mph at 5000 ft at 75% power (measured with a GPS 4 leg measure) Uses 4 imperial gallons per hour (18.24 litres) Capacity 20 imperial gallons.Fuselage was recovered in 2012. with Ceconite. Com transceiver and 1 transponder (not working at the moment). You must have tailwheel time. I will check you out but will NOT teach you to fly. $12,000. Jack Steele, Brockville ON 613-865-8107 jsteele@cogeco.ca

TAILWIND W-10 $49,000 One of the best metal wing Tailwinds around. Time since new – 150 hours. Lycoming 0320 Engine, 160 HP, SMOH 650 hrs. Warnke prop. IFR, 2 King 170B, 2VOR, GS, King
Transponder, 3 strobes, Leather seats, 36 US Gal. Fuel in wet wings, 3 hrs + 1 hr reserve at about 160 kts. Great cross country. Pilot, passenger and fuel over CG, no constant retrimming. Always hangared at Brampton Airport NC3 in Ontario. Much more on my Tailwind website <earltrimble.com> or e-mail me at earltrimble@gmail.com or call 416-802-5324.

HANGAR FOR RENT at YKF (Kitchener-Waterloo) Available immediately 40 x 40 feet, concrete floor, Bi-fold door, unheated, with hydro for engine pre-heating and extra lighting. Good access to taxiway, close to RWY 32 The hangar is large enough to accommodate two small aircraft. Rent is $400.- per month plus HST For more info contact Rudy Hane at 519 648-3006 519 648-3006 FREE

Hangar For Sale at Sundridge Ontario, beside CPE6 airpark. Hangar is a wood framed building with steel siding, roof, and doors, with a gravel floor. 40x40x10 on 7.5 acres. Taxes this year were $352. Asking

$50,000. Phone 705-386-9080.
KR 2 TRIGEAR, 2180 cc Great Planes VW, 3.5 gph @ 130mph cruise, TTAE/TTAF 54 int/ext 10/10 $15000 call Ray Larson {905}892-6389 (SEE PIC)

RV6 for sale $72,000, 410 hrs TT, Lycoming A1A 180 hp, Sensenich Fixed Pitch Propeller, JPI Fuel Flow Gauge, Dynon D10A and autopilot servos, Dynon Heated Pitot, Kannad 406 ELT, GPS Garmin Aera 560, Transponder KT76A, Odessey Battery, Bell Tailwheel Yoke, Stereo Intercom PM3000, Garmin SL30, ADF KR87, Certified for IFR, Call George at 647 588 8544

1995 Sirocco MJ5, all wood with 248 hrs., for sale. Has 3.8 liter Ford V6 engine with Blanton reduction drive and three blade Warp Drive propeller and retractable gear. VFR including Val Com radio and Mode C transponder. Engine needs overhaul (or replacement) $15,000 or best offer. Alknud@shaw.ca or 780-476-5348

FOR SALE: Amateur-Built Stits SA-11 Playmate Registration # C-FFEO
Two place folding-wing sport plane Wing Span: 27 Ft., 5-3/4 In. Length: 18 Ft., 4-1/2 In. Gross Weight: 1500 Lbs. Cruising Speed: 110 MPH Three Bladed Warp Drive Prop AVCO Lycoming 0-290-D Engine Includes Trailer, 12 Volt Winch and Wing-Folding Hardware Asking Price $14,900 (or best offer) Can be viewed at Lyncrest Airport: 514 Murdock Road, Winnipeg, MB, Hangar No. 8 Home Phone: 613-424-6080 Cell Phone: 613-884-3022

CNC3 BRAMPTON, HANGAR SPACE FOR RENT. Suitable for high wing. Heating, electricity and bi-fold door. $335 monthly. 905-861-9535 Paul Horsten.

FOR SALE MINI MAX. TTSN220 TSEO40. In wing tank. New ICOM radio. Always hangared. Aluminum skis. 447 Rotax.
Very good condition. $8900.00 OBO. Contact by phone only at 780-460-6841 (Alberta)

FOR SALE C-85 complete exhaust system. $250.00 plus shipping.Contact by phone only at 780-460-6841 (Alberta)

Sump for O-360, complete and in good shape, includes heater and rear mounted carb. This was removed from a Sundowner. Asking $500 OBO. Located at my hangar in Hanover Ontario, will ship, postage or UPS extra. Please call 519-881-6019 between 9 am and 8 pm EST or email to fleetair@wightman.com

FOR SALE Glasair Super II (can be FT or RG your choice). Fuselage complete with professional interior. Control cables to engine and to flaps, ailerons and empenage installed Panel complete with instruments. FWF complete and ready for engine. Lyc IO-360-B1E TTSN 250hrs TTSOH 0hrs, Hartzell c/s prop TTSN 26hrs TTSOH 0hrs . Needs wings (either FT or RG), landing gear and lower cowl. Call Dan 519 371 4673 for pics and specs.$55,000 OBO, located in Owen Sound Ont.

*Ads run for a maximum three issues depending on space available and then must be renewed for continued display. Please direct all classified inquiries and ad cancellations to: garywolf@rogers.com and place "RAA ad" in the subject line.*

*Flyer Chief / continued from page 31*

move of no more than two inches, which placed the engine in the same position a 914 would go on a ring mount in the Highlander. So, I had a couple of new mounts made on a CNC machine from the same material as those supplied with the kit to move the engine forward on the bed-style frame two inches. The move also helped me to compensate on the C of G a bit for the weight I had added in the rear of the plane with my diamond plate and insulation in the cabin and baggage area.

Considering the length of the cowls supplied with the kit, two inches was the most I could have gone anyway without doing a lot of fiberglass work to extend them.

The exhaust system was ordered from the factory after considerable research into Rotax systems and after-market solutions, most of which required a considerable amount of TIG welding by the builder. The factory system is manufactured by Sonic Headers and uses slip joints rather than ball and spring joints, so I added a bit of anti-seize compound to them during assembly. With the engine moved 2" forward one of the pipes had to be extended to clear the frame, but I was able to get that done at a local machine shop. The muffler has a heat muff welded in position with a forward facing pickup that pressurizes the cabin heat air so no fan is required. I fitted a diverter on the firewall to dump excess cabin heat forward of the firewall. Carb heat is supplied via 12 volt 40 watt heating elements mounted on the side of each of the carburetors opposite the butterfly valve. I have a set of 12 volt thermostats that control carb temperature and an override switch that feeds the elements directly from 12 volts if the thermostats stop functioning.

The engine move required that I make new mounts for the oil cooler radiator, so I fashioned some from aluminum to determine the position and later replaced them with stainless steel versions. The cowling did not have an air flow opening for the oil cooler radiator, so I cut an opening and glassed in a small rounded lip to match the other openings. The Rotax engine uses a combination of air and water cooling, but no mods were required to the water-cooling radiator mounts. The radiator hoses do come fairly close to the exhaust pipes, so I added adhesive wrap around shields to the rad hoses. This adhesive shield material is designed to reflect 95% of the heat that reaches it, but time will tell if it is sufficient without adding additional shielding on the exhaust pipes too.

Just Aircraft supplies a basic bent sheet of aluminum in the kit for the panel and it provides sufficient space for almost any configuration of instruments. I opted for a basic array of multi-function MGL gauges (Flight 2 and E1), and MGL V6 radio, with integrated intercom and put a hole in the panel for a transponder, but will likely wait until the 25 hours are flown off before installing one. In addition, I added an AOA/LRI gauge made from a differential water pressure gauge using plans available on the RAA website (Airsoob) and associated probe mounted on the right wing. The static port is always a challenge with fabric aircraft, but the fiberglass engine cowling provides a nice solid surface to mount the port. The radio is keyed by push buttons mounted on the top of the sticks and the headsets hang neatly on hooks that Just Aircraft welded into the head rack as part of the design, when not in use. I also opted for the Ray Allen electric trim with the controls mounted within easy finger reach while holding onto the throttle. I used separate switches for the starter and magnetos as recommended by Rotax, not a standard rotary key switch. I left room either side of the center cluster for a future IEFIS, likely the MGL unit, but for now I have installed a couple of brackets to mount my iPads on, providing me with some basic flight information and maps. While planning the panel layout, I found it very helpful to print full size images of the avionics and tape them onto the panel to get an idea of how it would look when it was finished.

Throughout the build process, I ran into times where I was waiting to get a part or waiting for epoxy to cure, or just wanting to work on something different, so I filled that time by working on the 90% items (70% done and 90% to go). There were a lot of small items to do like fabric backing plates that had to be made early on in the process and numerous fairings and trim pieces to be made as the end got closer. One of the more interesting items I made is the fairings for the aileron and flap pulleys. Rather than an opaque fiberglass bubble, I made aerodynamic aluminum covers that have Lexan end plates. The pulleys, cables and attachment hardware can be inspected by looking through the end of each cover without having to remove it.

*Dan shows what*

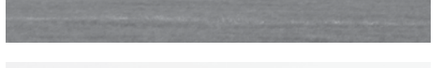
I had been saying for months now that I would be happy if my plane came in at 720 pounds or maybe a little less and like some self-fulfilling prophesy, it weighed exactly 720 with oil and minimum fuel. With a registered gross weight of 1320, that leaves exactly 600 pounds for pilot, passenger, fuel and baggage. The C of G is well within the 9 to 15.5 inches aft range specified by Just Aircraft, at 11.4 inches, and remains within the C of G envelope in every normal flight configuration. The fuel flow test showed a gravity feed flow of 11 USG/hr. and 33 USG/hr. using the fuel pump, well beyond the requirements of the Rotax 912uls.

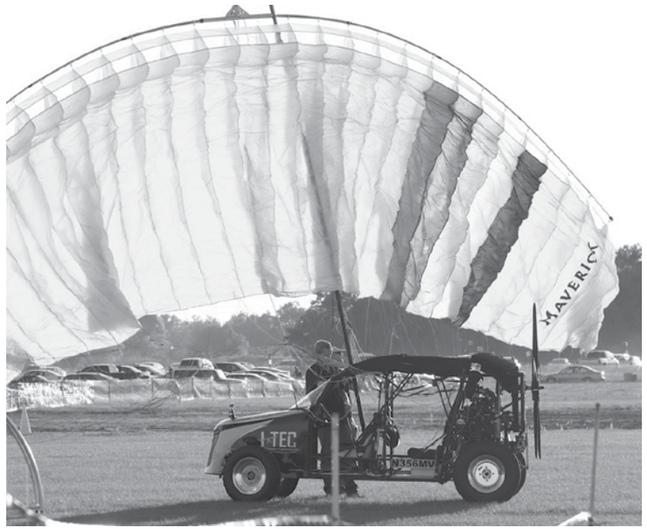
One thing I will recommend to anyone taking on an aircraft building project is to first build a good network of other builders you can draw on for ideas and advice. This can come in the form of other RAA members, builder's forums on the internet like the Wings Forum, which is popular with the Just Aircraft crowd, and especially other builders who are working on the same aircraft model or have completed one recently. I was lucky enough to be able to work closely with Jack Leroux, another Highlander builder I met on the Wings Forum, who was at almost the same stages throughout the build process. Although we are located about 300 km. apart, we exchanged volumes of information with each other via telephone and e-mail and with another Highlander builder, Bob Dimond in Saskatchewan. I cannot say enough about having someone to bounce ideas off. The local RAA chapter has also been a great help with ideas and suggestions. They even formed a committee to review projects before they head off for the final inspection by MD-RA. The local RAA team came out to my place, looked over my project and provided me with a number of useful comments and suggestions to consider before the final.

"Build a good network of other builders you can draw on for ideas and advice. This can come in the form of other RAA members, builder's forums on the internet... and especially other builders who are working on the same aircraft model or have completed one recently"

Just Aircraft has designed an incredible airplane in the Highlander and I'm sure the performance of mine will be everything I expected and more. In the next few weeks I will be taking some tail wheel transition training and C-FDEP will undergo the final inspection and flight testing. Once I have some performance results, I will report back with more details on the progress the Highlander I call "Aerial One"… my *flying* fire truck.

***Dan Oldridge** is a retired firefighter who began his career in Cambridge, ON before eventually rising to the postion of senior manager in London. He is a member of RAA National and two local RAA chapters.*






*Some pictures of ITEC's Maverick LSA at Sun 'n Fun last April. Photos courtesy Shawn Connelly, Chapter 85*



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