May - June 2013

Recreational Flyer

Recreational Aircraft Association Canada www.raa.ca
The Voice of Canadian Amateur Aircraft Builders $6.95

Speed For the Common Man: The McHugh

Tailwind

RAA
RECREATIONAL AIRCRAFT ASSOCIATION
RÉSEAU AÉRONEFS AMATEUR CANADA

From The President's Desk

Gary Wolf

Online Charts and Flight Planning

Member Ivan Kristensen now uses an online service to obtain his Canadian charts and flight planning information. www.fltplan.com is a free US-based website that pays a fee for access to Canadian flight charts and pays the bills by having ads along the side of the page. Ivan uses a centrally mounted tablet that displays his route on the chart and he flies his RV-10 all over Canada and the US, frequently IFR. Look it up.

Smartphone Application

There are many applications available for a smartphone, among them to use a phone as a digital level. Some of these applications are only 99 cents or even free. My son was using one when aligning the suspension of his race car, and it struck me that this would work for leveling an aircraft for W&B, checking squareness of tail surfaces, checking control surface deflections, and setting the pitch of a ground adjustable prop. For iPhones there are inexpensive aftermarket machined cases that make it even easier to use a phone as a level.

Nav Canada and Class C

NavCanada seems to be determined to raise the level of airspace these days. A few years ago when London CYXU had a brief flurry of increased flight training, Nav Canada used this as the opportunity to raise the zone from Class D to Class C, chasing out many of our members who had been based there. Never mind that the real problem was that the student pilots spoke little English and that their training planes already had Mode C. Changing the airspace shut out a lot of GA traffic and made the job of controlling easier.

There is always the empty promise that if the traffic declines the airspace can be changed back to Class D... downgrading airspace has rarely happened. It is your airspace but if you are not vigilant you will lose it.

Nav Canada had promised a consultation meeting beforehand but when the chapter met with Nav Canada's reps their first statement was that the decision had already been made.

Flight training at London has now dwindled to a low number but the Class C remains as a convenience to controllers and commercial traffic, and a deterrent to private owners of small aircraft.

A year ago Nav Canada started making noises about raising Kitchener-Waterloo CYKF airspace from Class D to Class C, claiming that the increased number of scheduled flights justified the safety benefit. The real problem is that radar provided to CYKF is a matrix from London, Toronto, and Hamilton and has a big hole in the Northwest sector. Instead of correcting this deficiency the decision was made to change to Class C, which requires a Mode C transponder for all traffic. This allows the airliners' TCAS to alert them to the presence of aircraft in the zone. Essentially the 70% single piston engine traffic is paying to make up for the sketchy radar, to the benefit of the airliners that comprise 6% of the traffic. This

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The Recreational Aircraft Association Canada
Waterloo Airport, Breslau ON
N0B 1M0
Telephone: 519-648-3030
Member's Toll Free line: 1-800-387-1028
email: raa@raa.ca **web:** *www.raa.ca*

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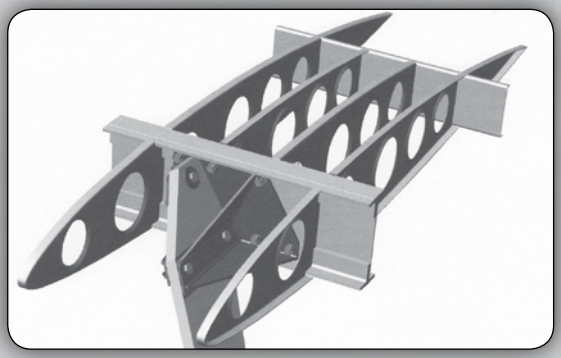
features



columns

George Gregory

Steve Searle's Mustang II, Goderich, 2005
On the cover: The McHugh Tailwind

Jim Stunden

Into The

(Editor's note: This article is excerpted from a longer piece dealing mainly with the Osprey II aircraft but much is applicable to water flying in general. Take note that speeds and other aircraft-specifc data are referencing the Osprey II only and not your Cessna or Stinson or Dehavilland.)

LOOK FOR IDEAL CONDITIONS to start. You are now testing a new airplane again, the other half. The easiest way to get into the water is to fly to an airport with a ramp and taxi in. If you are lucky enough to have a ramp, scout it out. How steep is it? Is it slippery? Are there poles in the water? Is there a current? Is there wind? Is there shelter? If the ramp is steep, your brakes may not hold. The tires may slide because of slime. The tail may rub on the ramp forcing the nose into the water. Entering at an angle may stop a tail rub, but you may also slide sideways on a slippery ramp. Adjust your engine to idle slowly. Use one mag to idle as slow as possible. They say a good reason for electronic ignition is that the engine will idle slower and smoother. When the aircraft is static, the nose is quite high, it lies on the tail. When the engine is started, the nose lowers. That is the reason why you want the low idle. The Osprey is low in the water under power. If you raise the power too fast without hull speed, the nose will plough with water coming up the window. It gets your attention.

Water Leaks:
You may have some small leaks from the nose gear push rod and on the nose wheel steering cables. Light grease will seal it. I carry a sponge and I have a bilge pump. At slow speeds, it is very easy to push the nose into the water and the water runs in around the canopy. Install a weather strip to seal the canopy.

Get your fuel balanced in the wing tanks. Extra weight in a wing

Water

will force a wing float into the water creating drag which causes turning moments. I found that in calm conditions 180 degree turns at idle could be done left and right in 60 ft. It will pivot around a wing tip. I noticed no difference in turn radius with the water rudder and gear up or down; however, response is slower with gear down. The nose wheel door on one side does not seem to affect turning. Some people think the airplane turns tighter in the water with the gear down. I have not found that to be the case. Step on the rudder to circle and hold a position for pre-flight checks and engine warm up. Run up at 1800 RPM will not make step. Around 1500 RPM, the Osprey pushes a lot of water and has a sizable wake. With full power, it will quickly get on step and accelerate.

Step Taxi
This is where the porpoise will show up. You need to test it for porpoise. With no wedge, at step speed of about 15 MPH, the plane will start to porpoise. As you accelerate, it will continue to oscillate and you will not be able to stop it. By 45 you will not want to go any faster. Add the wedge as per plans and it will become docile. To try and give you a feel for it, at 45, I can let go of my stick and nothing happens. In the water, it is a hydroplane. From a hydro point of view, the farther in front of the step the CG is, the more stabilized the hull. In order to be able to rotate and get off the water, the CG must be close to the step to allow the plane to get of the water in shorter distances. You may be familiar with vented steps. It is a theory to break surface tension and get of it too. Coots have it.

As a general rule, on the step, power on, stick back! Power off, stick forward! As you accelerate, reduce power to approximately 1500 RPM and hold slight back pressure. You will be scooting along at 40. If you have the hull trim just right, it will not porpoise or at least, it will not be obvious. The view in the water will be the same as what you can see when you float on a inner tube. You are in a very fast boat. 45 mph is nothing in an Osprey and only the fastest boats on your lake are capable of that speed. The real estate goes by fast. Debris in the water is very hard to see and there are no brakes, so be careful. Try some runs in a straight line. Add power and pull back. Reduce power and push forward. Keep the hull on the sweet spot. Start the runs at up to 30 then 40 and 50. You have to get used to co-ordinating power and elevator. You are trying to maintain a level planing attitude. The stick pressure required will change with different speeds and power settings.

Step Turns
Step turns can be completed at any speeds from just on the step. They are easiest at 45 (1500 RPM) becoming more difficult as you depart from this speed. At 45, steering with rudder is good for small turns to start. Ailerons will also start a turn. You do not need a lot. Remember that engine I talked about, it will push a wing down. At first, you may not go where you want or where you think. If the water is very calm, wing floats will stick to the water or be pressed in by that engine, and keep you turning. If the nose is too high, the tail will dig and the turn will stop. You can feel the

Jim Stunden's Osprey II.

plane buck when the tail digs. At slow speeds in a turn, the plane will want to porpoise. You are off the sweet spot! At high speeds, the turn may tighten and control inputs may not be what you think to control it (wing floats in the water). Give yourself lots of room! The planing attitude must be maintained. You may require the full range of controls depending on the circumstances. I make the smoothest turns with the wing floats out of the water adding a little power. As you get more proficient, the turns will become smoother and you will find the plane will turn very hard. You may start to slide sideways. Depending on your power applications and engine baffles, the engine will heat up after time cylinders first, and oil temp next. The only way to cool it is to go flying or shut down. If over rotated, the plane will lift off in ground effect before it is ready to fly. This is a place you do not want to be. With slight elevator back pressure the plane will just fly off, the take-off will occur around 60 mph. 0 to 60 about (15 seconds). There is a surging sensation at lift off as the water drag is left behind

Landing on Water

Do not land on water until you water test your hull. I like to set up for landing in water prior to arriving in the area when the work load is low, gear up, fuel pump, carb heat, etc so that then I can focus on the water. Where are the cabins (West Coast), cottages (East Coast), built up areas, people on beaches, boats and swells, water conditions, debris in water, power lines, wind and distances? There are a lot more risks to landing on water because it is an uncontrolled environment, not like a defined runway. Use a standard circuit. Do your routine checks. This will be more familiar and keep you from turning low over the water. In addition, this gives a reasonable final to establish descent. There are generally three descriptions of water landing techniques: glassy water, stall and step.

Glassy water: the water is very calm like a mirror. You have no depth perception. Not for your first landings. Come back another day! For now! Note: Very smooth water can have a well developed swell from wind and boats. Your osprey will not like it. Be careful

Stall landing: are for rough water and not what you want either. The Osprey was not envisioned as a rough water plane. The hull has a dead rise of 13.5 degrees (the V) that caters to about 6- 9 inch waves. Stall Landings are uncomfortable and the Osprey

is too fast (landing speed lowered 30% reduces bottom loading 50%). Commercial operators do them, but they have to. They also have a maintenance department and the cost is built into the tickets. You have wheels! Go somewhere else and put them down. When the water is white, it does not matter what kind of white, its time to do something else.

So the landing you want is a STEP LANDING .

Approach at 80 MPH, descend at 500 ft/min with a light wind and a ripple on the water. The Osprey 2 will level out in ground effect. With 1800 RPM, the aircraft may not land because of ground effect. When you touch down, you can hear the water as the ripples slap the hull. You will lose about 5 knots fairly quickly. Apply power and fly away. Repeat this, allowing the hull to go slower and slower. This is really a glassy water technique. It requires the least elevator control. The more power used to land, the less requirement there will be to check forward. Step landing with 1500 RPM will require checking forward as you touch, and will become your normal water landing. You can land on water power off but it requires good nose down elevator inputs as you touch down. It will seem very foreign at first. Not for the beginner.

Beaching

The reality is that you have to ask yourself where you put your aircraft once you have landed on a lake. Do you beach it and walk out? You need local knowledge about the shoreline. Is it mud, is it rocks, and how deep is the water? Is there shelter? What can you tie to? How wet do you want to get? In a fast flowing river, you get eddies at shore. The water flows one way, and then in ten feet the exact opposite happens. The nose goes one way, the tail the opposite, and you cannot stop it without a lot of power. You may taxi onto a beach however you may not leave. The ground is often soft underneath and small wheels sink in.

There are a lot more risks to landing on water because it is an uncontrolled environment, not like a defined runway.

One big disadvantage to flying boats is you cannot get out and fend them off like a float plane. I will not go near a dock. Ramps are great. That is where it shines. Gear down, taxi up. That is neat and everyone is envious but what is the wind doing? I am very leery without local knowledge. Remember your field of view in the water is the same as if you were sitting within an inner tube. Even if the water is clear, you cannot see down into it. Lowering the gear in the water requires minimum speed. A dead stop is best. I do not know why, it just is. Often in advance, I lower my tire pressure from 32lbs to 24lbs as well. Squeeze the gear down slowly do not force it.

How it all goes wrong

I once flew to a lake that I had scouted. The earthlings drove to meet us. We landed and taxied to a beach with a cabin. There was no wind and the lake was calm. It was sheltered and the beach had soft sand. I left the gear up. Some aluminum boats dotted the beach. There was a lot of room! I was moving really slowly, one mag, 20 feet out I pulled the mixture. I did not want to scratch the hull bottom, you know! The prop stopped and the airplane turned right. I hit an aluminum boat square on the nose of the plane, right on the back right transom corner at 45 degrees. It could not have been a harder point. I wrecked my paint job! I could not stop the puff of wind on that big fin back there! The Osprey rests easy on anchor and can stay anywhere that small boats can. Waves of one and half feet are not a problem on anchor. It does not rock and has little pull on the anchor. Windage is what determines the size of a boat anchor and an Osprey has very little windage. Boaters also use at least ½ their length in chain for an anchor. Now how do I get that rubber boat?

Pulling the nose up on a beach leaves the tail exposed. It is okay when the water is calm, but then the wind picks up or boats come by leaving their waves! The lap at the control surfaces slaps the rudder and ailerons around. Oh why not just heal it up, you dough head! Lifting the tail in the water is impossible "so I discovered." It cannot be healed up to face nose out so the gear needs to be lowered and then there are the sand issues, etc. **R**

Jim Stunden *is a member of Chapter 85. He learned to fly in 1974 at the age of 16, has most endorsements and has flown Douglas, Lockheed, Airbus and Boeing aircraft. A professional pilot since 1976, he has accumulated 20,000 hours in his logbook, including 600 hours in a Fly Baby.*

Lithium Batteries

Chris Horsten

ON JANUARY 7 2013, a Japan Airways 787 Dreamliner experienced a fire in the Lithium battery pack in an empty aircraft at Boston's Logan airport. A couple more incidents involving the batteries of these new super jets prompted the FAA to launch a probe to investigate the technology.

Lithium batteries have been around for a while, and have been used extensively in corporate jets along side nickel cadmium. They offer extreme light weight and small size with comparable cranking power and a decent life span compared to lead acid batteries. Every battery system has its own weaknesses and Lithium batteries are no exception. They require their own special handling and maintenance. Specifically they are far more sensitive to vibration and heat, than other battery types. Because of this sensitivity they generally should not be mounted under the cowl. Heat can be created a number of ways such as from the engine, from overcharging or from a short. Any of these conditions can eventually trigger a VWF (venting with flame) condition. There are plenty of videos on YouTube of idiots hammering their discarded lithium batteries and forcing a VWF situation. The danger is that once a VWF situation occurs, it will cascade over to adjoining cells until the entire battery is in flames. For the most part this does not occur without severe abuse and provocation.

When it comes to amateur built aircraft we are allowed much freedom with our aircraft. We must use this freedom carefully and manage the risks of our experiments vs the gains. In my case, I have an aircraft with a 623 lb empty weight and a 1060 lb gross weight. Fuel takes up about 132 lbs of the 437 lb useful load, leaving a whopping 305 lbs for pilot and passenger. My current lead acid battery weighs 20lbs. The aircraft is made of fibreglass so there are two heavy copper cables running all the way back behind the seat to the battery. I estimate about 4 lbs for the extra wire. Shaving 20 pounds off my empty weight is great motivation to try the new Ballistic EVO2 12 cell Lithium battery. It weighs 2.5 lbs, and I can move its position forward and cut about half the copper wire away as well. The 12 cell version of the EVO2 has more than adequate power to turn over the Rotax 912UL under the hood. Shedding 20 lbs means I don't have to diet as hard, or I can take my wife with me, and all of the fuel.

The Ballistic EVO2 battery is available at many motorcycle stores and online retailers. I got mine in the USA for $169 and had it shipped free to a warehouse in Buffalo. I also bought the $69 Balance Charger; a smart charger that balances out the individual cells

of the battery extending it's life. The charger doesn't go in the plane; rather it is used periodically to "adjust" things in a controlled way. The EVO2 battery comes in a few different sizes and is so light that one could easily be mounted behind the panel as a back up battery. The battery is marketed by a company called Aerovoltz and sold through Aircraft Spruce. I am not aware of any difference between this model and the batteries sold for motor cycles except the label and the price. I asked my uncle who is a retired electronics engineer and designer. His experience is military and extends to power systems in jet aircraft and guidance systems in missiles. He reminded me that there currently is no way to manage the high cranking power needed to start an engine (other than a fuse) and protect the battery from the much lower demands of avionics and lighting at the same time. This was confirmed by Steve Johnson at Aerovoltz who let me know that a battery with a BMS "Battery Management System" was in development and would be released at Oshkosh 2013. However it won't work as a start battery. Here's an except from his email to me about the EVO2 battery.

The EVO2 battery has some built in safeguards. They are not vented on the main case but the cells themselves are internally and have designed in an air gap inside the case to allow for any pressure that may be caused by overheating the battery by overcharging it to the point of failure of the cells or a dead short that will cause heat. EVO2 batteries have all undergone UN-DOT testing for all types of failures and passed with ease. This is a stringent test that fails the battery due to vibration, heat, dead short, and overcharging. The actual chemistry in the lithium Iron Phosphate battery cell is a nonflammable compound unlike other forms of lithium.

To further enhance safety my aircraft now sports an "Aircraft Extra's" enunciator in the panel. This little device is capable of monitoring anything you can wire up to it, with a little programming. I've set it up to monitor battery temperature, voltage, and amperage. It will also interface with my EIS but that is another article. An alarm would allow me to disconnect the battery and proceed on steam gauges and battery backups built into my EFIS, to the nearest airport.

I'll be flying tests on my airplane over the summer and look forward to writing again about the results in the fall.

For more information:
http://www.ballisticparts.com/index.php
http://www.aerovoltz.com/

SAM Aircraft Taking Orders

SAM Aircraft has received formal recognition from Transport Canada: the SAM LS is approved in the Advanced Ultralight class. Flying at a slightly lower weight in Canada than the US-spec SLSA (the aircraft is the same; only the gross weight differs), flight characteristics for both weights have now been determined by months of flight test. "We worked very hard to be sure that everything was done in conformance with both the LSA and Transport Canada rules and quality standards. We are happy to see that the SAM LS flies to our expectations," said President Thierry Zibi, whose idea of a retro-look airplane with modern reliability, comfort, components, systems, materials, and build techniques is now reality. Those expectations were high: edge-of-class performance, responsive handling with linear stick forces, and great real utility are all available in an LSA with more shoulder room than found in the cabin of a King Air, and visibility to rival a helicopter's.

Thierry Zibi is now offering and scheduling demo flight for the press and potential buyers at the SAM's home airport in Lachute, Quebec, and has set up a funding system through Indiegogo.com.

SAM Aircraft is now taking orders for kits, with delivery dates available in 2013. This follows a comprehensive review of the approved design, which resulted in some kit price reductions (see attached brochure for final pricing). Firewall-aft kits start at $29,000USD.

The SAM LS is to be featured in several high-profile publications in coming months, and will of course be seen at Oshkosh; but the order book is open now, for kits and the ready-to-fly SAM LS. For more info: www.sam-aircraft.com/

About the SAM LS:

Designed to bring a retro look and modern flying manners to the LSA class, the SAM LS first flew in late winter. Acceptance by Transport Canada as an AULA (Advanced Ultralight Aircraft) was granted in April.

The SAM LS is also LSA-eligible in the USA, with finished, ready-to-fly aircraft available mid-summer, at an introductory price of $131,800USD, fully equipped with a 10" Dynon panel and the 100hp Rotax 912S. The standard LS and two additional models (one, a shorter-wing cross-country machine; the other a long-wing STOL bird) are all to be available as kits. The two kit variants qualify as Experimental aircraft and are thus not limited to LSA speeds. All models are also available as quick-build kits that qualify under the "51% rule."

-Thanks to Tim Kern for this information.

Obtaining an American Airman's Certificate

Fred Grootarz

MANY CANADIAN pilots have asked about how the holder of a Canadian PPL can get an American Airman's Certificate so they can rent N-registered airplanes.
I have spent some more time looking into the regulations involved, and I also e-mailed the local FSDO office in Rochester, NY asking for clarification. Within a short while I received an unexpected conference call from two FAA officials in Rochester. Amy Malcolm (who issued my temporary 90 day FAA licence), and one of her superiors, Ralph Einwoodie, who identified himself as a senior FAA specialist with respect to Canadian to US License conversions and related matters.

Ralph confirmed that the FAA will issue you a US license (Private License specifically), once the FAA Oklahoma has verified the validity of your existing Canadian license. Note that the FAA fax confirming this tells you that you can go to the FSDO Rochester office to get your 90 temporary license followed by the receipt of the official credit card type license in the mail, has a second page attached (standard procedure for all applicants), which refers to a number of specific requirements in 14 CFR part 61 and 14 CFR Part 91. Most pilots (myself included), who have received such approval fax have not paid any attention to the requirements mentioned on the second page, and went straight to make the appointment with the respective FSDO office. The FSDO office did not make any reference to the second page when I was there.

In that fax it clearly mentions 61.56 flight review requirements, recency of experience requirements, 61.58 PIC proficiency check, 61.51 required logbook entries, etc. It goes to say that Airmen Certification has verified the authenticity of the applicant's foreign license, but the applicant MUST still provide documentation that the rating(s) held on the foreign license parallel U.S. rating(s) in accordance with 14 CFR 61.5(b) or 63.33(a).

Ralph explained that he thinks the FAA Rules are quite clear with respect to the Private Pilot Licence conversion. While your US licence (PPL) is only valid in conjunction with the flying privileges shown in your valid Canadian Licence; however, in addition, if you fly as PIC in a U.S. registered airplane:

61.56 – states that a flight review consists of a minimum of 1 hours of flight training and 1 hour of ground training. The review must include:
1.) a review of the current general operating and flight rules of part 91 of this chapter, and
2.) A review of those maneuvers and procedures that, at the discretion of the person giving the review, are necessary for the pilot to demonstrate the safe practise of the privileges of the pilot certificate.

A logbook endorsed from an authorized instructor who gave the review, certifying that the person has satisfactorily completed the review.

The fact that the FOB or Flight School Rental place will ask you to take a proficiency flight with one of their qualified instructors to satisfy the rental company and their insurance, *does not automatically replace the FAA* required 24 month flight review. However, in reality, since this instructor is likely a qualified FAA approved instructor anyways, he can use this flight including some verbal talk about appropriate FAA rules and regulations to satisfy the requirements under 61.56, *as long as he endorses the same remark also in your logbook*. Note the FAA flight review is not a flight test. The review does not consist of a pass/fail nature.

The recency requirement under 61.57 (min 3 takeoffs and landings within 90 days) can usually be verified from previous entries in your own logbook, and could be done in your own airplane prior to the rental day. So that's generally not a problem for an active Canadian pilot.

A separate U.S. medical is not required for PPL conversion under 61.75. It states that a current U.S. medical is required under part 67 *or*

a current medical certificate issued by the country that issued the person's foreign pilot license.

It should be noted that the FAA Advisory Circular # 61-135 is dated back 12/5/06 and various other subsequent notices and/or advisories since have been revised by the FAA. If you pull up the 61.56 now on the FAA web site, you see at the bottom an amend dated 10/20/09.

So there you have it. Flight review and currency are two important items a PIC in the U.S. needs to be aware of. You obviously had figured all this out already in your research. Ralph pointed out that the rental place would probably not ask for the FAA flight review currency. They most likely see your U.S. pilot license in conjunction with your valid Canadian licence as valid enough, as long as you pass their check ride. Possible problems with the 24 months flight review entry in your log book may not be of concern to them, but it sure is a serious concern for you as the PIC, should you ever get involved in an incident or accident stateside involving the FAA authorities.

If you want to rent an American Aircraft next time you're Stateside, an American Airman's Certificate is a must-have.

I don't know how long you may wait for the official answer/ clarification from the FAA headquarters in Washington, but bureaucracy in high places make take considerable time. I guess I am lucky that I know some efficient people at the FSDO in Rochester. It is most unfortunate that an article on this topic was edited internally before going to eFlight, and also the article on the front page in the July COPA Flight newspaper. It has and will scare a lot of Canadian pilots away from getting the Canadian to US license conversion. I will let my findings and conclusions be known to my local COPA Flight 28 in Burlington (our next meeting is this Friday June 28) and also to my local RAA chapter in Brampton as well as RAA National in Canada. R

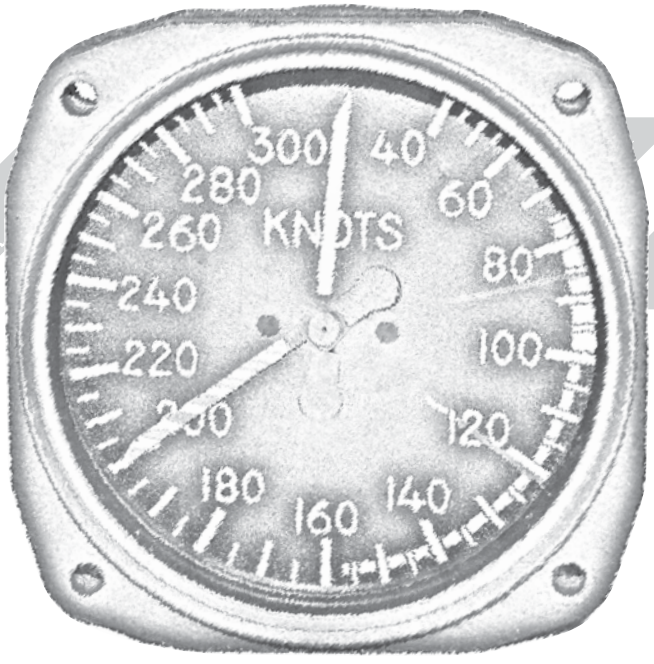
Fred Grootarz *is President of RAA Chapter 41 in Brampton.*

The Procedure:

Go to the FAA web site: http://www.faa.gov and click on "Licenses & Certificates"
(http://www.faa.gov/licenses_certificates)
- then click on "Airmen Certification" then 2/3 down under Certificate click on "Verify the Authenticity of a Foreign Licence".
- That brings you to the page "Verifying the Authenticity of a Foreign License, Rating, or Medical Certification. It explains the process. Scroll down; there are several pages. You can print those pages in PDF format.
- Click on the lower part under Send Us your Information "Verifying the Authenticity of a Foreign License, Rating, or Medical Certification"
- That gives you a line by line description how to fill out the form (scroll down) to get to the blank form. On page 3 there is even a filled out form sample.
- Then *fax* the filled out form to the FAA Airman Certification Branch in Oklahoma. *They won't accept e-mail.* Attach relevant copies from your Canadian Aviation Booklet including the pages of any endorsements, ratings, and medical validity. They will then check with Transport Canada to confirm its authenticity and send a fax back to confirming that all info you gave them is correct and on the up and up. This takes about 3 weeks. A copy of that fax is also sent to the FSDO (Flight Standard District Office) you have picked from a list shown in the instruction sheet. The closest one is in Rochester, NY, right in a building next to the airport.

Once you have received the fax from Oklahoma, contact the local FSDO office you have selected in your application form and make an appointment. They want you to show up in person to verify that you are really "you". You must bring along your Canadian Passport, your blue Aviation Document (Pilot Licence with all the endorsements and ratings and medical validation in it), fill out another form, and they will give you your Temporary Airman Certificate. Amazingly, there is no fee payable for this! It's free! Go figure. The FSDO office will issue you the TEMPORARY AIRMAN CERTIFICATE on the spot, valid for max 120 days. During this period you will receive your official Airman Certificate (credit card type) directly by mail; usually in about 2 months. Meanwhile you can already legally rent N-registered airplanes in the US, provided a PIC also complies with two additional FAA requirements. else in the world where they rent out N-registered airplanes (like in most European countries etc).

The contact person at the FSDO Rochester office is Amy Malcolm. Her telephone number is (585) 436-3880, Ext. 232. She is extremely helpful and will walk you through it.



Understanding Maneuvering Speed

Frank Gue

WHY WAS THIS article written? There is uncertainty and confusion about maneuvering speed. Ground school students are puzzled when taught that a lightly loaded aircraft needs a lower maneuvering speed than the same aircraft when heavily loaded, which seems counter-intuitive. The internet is full of puzzled questions around this seemingly illogical situation. The confusion arises because a the main reason for a reduced speed for maneuvers or in turbulence is to protect the airframe from over-stress; whereas a still lower maneuvering speed is recommended for lightly loaded aircraft to spare the personnel and/or cargo and/or components from discomfort or displacement. This second reason for a still lower maneuvering speed is not often explained. Some "explanations" are questionable, probably including this one. This article was written to be a fresh and hopefully helpful view of the subject.

But first -

Explanations of maneuvering speed usually deal with the dangers of abrupt full-travel control movements. These can overstress and even destroy flying surfaces; but we in our smaller aircraft, seldom if ever requiring abrupt full-travel control inputs, will seldom be in such a situation. However we certainly will encounter turbulence, sometimes very severe. Your author has had the door of his Cessna spring unlatched in heavy turbulence, giving witness to the high structural and aerodynamic stresses that can arise even in recreational airplanes. Therefore this article hopefully improves the ability of the recreational pilot to understand and cope with low-speed, low-altitude, relatively low-frequency encounters with turbulence.

We're dealing with impulses (impacts), not steady-state aerody-

namics. Newton's laws of motion assume that we are in a steady state. But we aren't: a gust or a rapid sequence of gusts (turbulence) is the opposite; that is, we are coping with impulses, or impacts, or as some say, collisions. Textbooks either are silent on the subject of forces in an impulse or, as one text flatly states, "In such situations, the force laws are never known". Wow, says the careful pilot to herself, that means that, even flying well below maneuvering speed, with an abrupt control movement I could develop big, unknown forces someplace on my airplane ..... rudder, elevators, ailerons ....

Terrifying thought. Let's follow it up.

So there is no math for impulse situations. But this does not prevent our using the concepts embedded in the math. For instance, force is still equal to mass times acceleration, even though we cannot calculate, numerically, what the forces and accelerations are.

Enter knowledge, experience, logic, metaphor, and intuition.

Why do we have a maneuvering speed, and how does it do what for whom? The answer we will explain below is: We have a maneuvering speed to protect the airframe from damage, the cargo and attachments from displacement or damage, the people from discomfort or injury, or all three.

The maneuvering speed does this by reducing the response of the aircraft to each individual "bump" in the series of bumps we call turbulence. Cutting speed stretches out the time over which the bump acts. The slowed-down aircraft needs more time to enter and leave the column of rising (or descending) air than when it is going fast. The slower aircraft feels less of a jolt entering the riser than does the faster aircraft. Air transport pilots will confirm that turbulence feels worse at high speed than at low speed.

Weight enters the picture because of inertia and Newton's first law, which says that a body continues in uniform motion in a straight line until some external force is applied to it. Straight and level, the wings are supplying an up-force exactly equal to the weight of the aircraft. We fly into an updraft. Thinking vectors, we realize that the oncoming, relative wind now has an upward slope; therefore the wings have abruptly assumed a higher angle of attack. They will suddenly deliver more lift. This surplus lift causes an acceleration upward. This is the "bump". It will continue until, for a stable airplane, the nose has dropped far enough to restore the wing and tail attack angles to what they were trimmed to before the disturbance, or we fly out of the updraft. That needs a little thinking time: we have an aircraft flying nose-down but gaining altitude.

Hence the apparent contradiction that bothers students: the airplane when lightly loaded deserves an even lower maneuvering speed than when it is heavily loaded

Your wing struts accept flight loads from the wings and transfer them to the fuselage, motor, people, etc., plus "g" loads imposed by maneuvering in pitch. It follows that, if there is surplus lift as explained above, there will be increased tension (in the case of an updraft) on those struts; further, the faster the aircraft flies the higher will be the surplus lift. A speed reduction will reduce those stresses, since lift depends upon speed squared. And so, we use a maneuvering speed lower than cruise; it reduces stresses on the airframe imposed by turbulence. But it isn't a pilot's number, it's a designer's number, called in more than one reference "an arbitrary number used in designing the empennage". However pilots can and do

...to a considerable extent, stable airplanes will fly themselves and do not need instantaneous correction of very temporary disturbances.

use it as a guide in coping with turbulence.

Ah, but there's a fly in the ointment: " ... 'g' loads imposed by maneuvering in pitch." Many pilots have misinterpreted the regs to say (which they don't) that, if they are at or below the maneuvering speed, they can do anything they like with the flight controls, as abruptly as they like. It is there that the textbook's flat statement, "In such situations, the force laws

are never known", catches up with them, with results that can be tragic. In one case, 275 lives were lost: the entire fin and rudder of an airliner were ripped off when the co-pilot unwisely applied repeated max right-left rudder to cope with turbulence.

Every year recreational aircraft more closely approach small bizjets in ability, speed, and range, thereby making it more probable that such a situation will arise. As a matter of good airmanship, we should all be aware of the important fact that under-maneuvering-speed does not make us immune from the bad results of excessive control inputs.

All he above said, wouldn't it be handy to have a cockpit readout of "g" forces, with red-lines and all? Even if we can't calculate them, surely, Mrs. Designer, could you not measure them real-time and give us a readout??

Now to the other question addressed by this article: Why should a lightly loaded aircraft demand a lower maneuvering speed than the same aircraft when heavily loaded?

It's because the lighter the aircraft the more it responds to the forces that arise in turbulence; hence the more it (and its passengers, attachments, and cargo) is thrown around. Think of a dry leaf fluttering down in a strong breeze; the "load" on its "wings" is nearly zero, so there is no threat to its "airframe"; it will arrive at the ground intact. But any mite or dew droplet on the leaf is getting a very rough ride! Requiring reduced speed for a lightly loaded airplane protects freight, or passengers, or anything else connected to the airframe from undue discomfort or displacement.

For example, a big single weight "connected to the airframe" is the engine. It is intuitively obvious that, if the buffeting of the aircraft is increased, the stress on the engine mounts will be increased. The AUW of the aircraft as a whole may have fallen, but the weight of the engine has not.

Similarly, the occupants are "connected to the airframe" (via their shoulder harnesses) and will be shaken-up more in the aircraft when it is lightly loaded than when it is heavily loaded.

Hence the apparent contradiction that bothers students: the airplane when lightly loaded deserves an even lower maneuvering speed than

when it is heavily loaded, to protect its contents and attachments, not its airframe.

You can take a look at the math for this adjusted maneuvering speed if you like:

A glance at the math - http://en.wikipedia.org/wiki/Maneuvering_speed.

We find (abridged and edited) that:

V_A, the designer's maneuvering speed, cannot be lower than $V_S\sqrt{n}$, where Vs is the stalling speed and *n* is the positive load factor, typically 3.8 for light aircraft.

For weights less than the published POH maximum, the formula used to calculate the adjusted maneuvering speed Vo is

$$Vo = V_A \sqrt{\frac{W_2}{W_1}}$$

-where V_A is maneuvering speed (as defined above), W_2 is actual weight being flown, and W_1 is maximum published weight. Clearly, since we almost always operate with W_2 less than W_1, this formula will usually call for a maneuvering speed lower than V_A.

To summarize: maneuvering speed must not be considered a speed that guarantees safe structural stresses on the airframe when maneuvering or coping with turbulence. Since such stresses are unknown and cannot be calculated or displayed on any cockpit instrument, good judgment and intimate knowledge of the performance and feel of the aircraft are demanded of the pilot.

A lightly loaded aircraft requires an even lower maneuvering speed than when it is heavily loaded to protect its contents from displacement, damage, or discomfort, be they people or freight or components such as the engine: this is because the lighter the aircraft, the more it is buffeted by turbulence or abrupt control inputs, hence the higher the stresses on people, cargo, or components.

Sadly, the accident costing 275 lives must be attributed to the fact that (a) the co-pilot used excessively abrupt, full-throw, reversing rudder deflections in a misguided effort to counteract turbulence, not knowing that (b) to a considerable extent, stable airplanes will fly themselves and do not need instantaneous correction of very temporary disturbances.

Whether it's a Pietenpol or a fighter, every aircraft has its limitations. Even hotrods like this Spitfire have to keep maneuvering speed in mind (flown by member Trevor Skillen on a recent visit to England. Lucky guy).

Landing Gear Redux

Saving weight while taming your bronco
by Ray McNally

IN THE MID-EIGHTIES while I was progressing with the construction of my plans-built Bushby Mustang II, an issue with the design of the cantilever landing gear came to light through feedback in the Builder/Owner group news-letters. Several hard landings had resulted in either bending or complete failure of the so- called torque tubes which attach the gear legs to the wing spars. These tubes pick up the torsional forces generated by the side motion of the wheels and transfer them to the main spar. They also carry some of the bending loads, due to the location of the wheel in front of the main spar, from the front spar to the rear spar. After reviewing the existing Bushby design (see Dwg 1), I concluded that his use of steel tubing was not the most efficient method to transmit bending loads. Given the same bending loads, a structure having a depth equal to the wing thickness would have a much higher section-modulus and hence lower stresses than would the relatively small diameter steel tubing specified on the drawings. Extra ribs attached to the 0.040" wing-walk doublers under the top skin proved to be effective and efficient transmitters of these loads from the main spar to the rear spar.

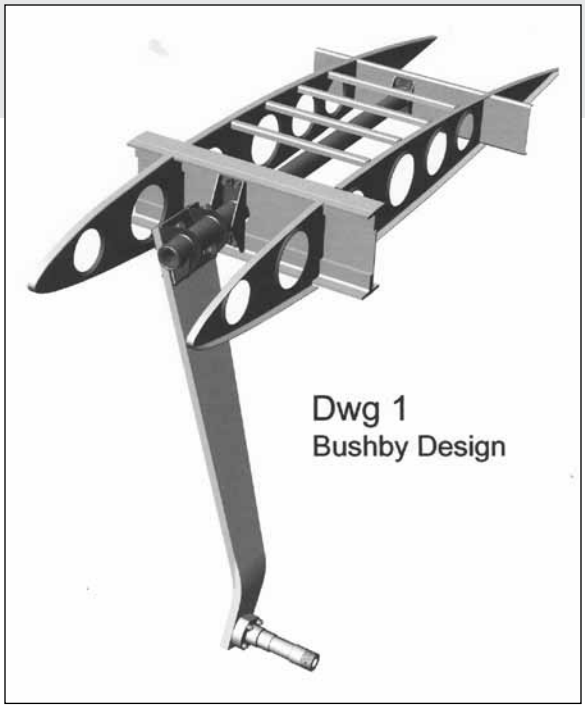
At about this time American Aviation introduced their Yankee and Traveler series, two and four place aircraft, both of which sported cantilever main-landing-gear incorporating factory made 3M ScotchPly, unidirectional glass-epoxy composite spring material. (3M has since sold this product line to Cytec Engineered Materials and it is now called CyPly.) A review of the material specifications for this product indicated that it would indeed be a good candidate to replace the heavy steel plates called out in the Mustang II plans (see Dwg 2). A redesign of the gear attach brackets would be required (see Dwg 3 and Image 1), not only to pick up the planned additional ribs, but also to increase the distance between the leg attach points, needed to accommodate the lower compression strength of the 3M material. These brackets would be made from pieces cut from 0.190" 4130 steel plate and stick-welded in jigs. While still bolted firmly in the jigs, they would be heat treated to a "normalized" state, making use of an electric furnace available at my place of employment. (Normalization of 4130 steel consists of raising the internal temperature to 1600 F and holding it there for one hour, followed by a slow cooling in warm still air. This process removes welding and other stresses and improves toughness.) The attach bolts size would be increased from 3/8" to 7/16", also to lower the local compressive stress in the fibreglass. Since the ScotchPly was available only as pre-cured flat slabs, the option of bending the legs at the lower end to attach the axles was out. Therefore additional brackets, machined from solid blocks of 6061 T6 aluminum, would be required at the axle end (see Dwg 4 and Image 2).

One of the certification require-

ments for aircraft in the USA specifies that the combined main gear legs must be capable of withstanding a vertical load equal to 3.0 times the aircraft gross weight, i.e. a 3 g landing. Table 2 of Figure 1 shows a theoretical comparison, at 3g loading, using standard textbook formulae and factors, between a cantilever flat steel spring and one made of ScotchPly. After investigating various top widths, taper ratios and attach angles for the fibreglass material, a 6" top width with a 3" bottom width and an angle to the vertical of 32 degrees was selected as the best compromise among vertical deflection, angular deflection, energy absorption and safety factor.

The gear now has 13 years of service and probably 1,000 landings

The main function of landing gear springs is to absorb the residual vertical kinetic energy remaining in the aircraft after the wheels contact the surface, without overstressing the airframe or its occupants. If we were all perfect pilots and the air was always perfectly calm, we wouldn't need springs in our gear, only a structure tall enough to keep the prop from contacting the runway and a means of lowering the coefficient of friction between the aircraft and the surface enough to allow us to taxi. Table 2 shows that for a 3g landing the selected ScotchPly leg would absorb 70% more energy than the standard steel leg. Therefore, it is worth considering the case in which the fibreglass leg is subjected to only the energy required of a steel leg involved in a 3g landing. Table 3 outlines that case. For the sake of simplicity, contributions made to energy absorption by the compression of the tire sidewalls as well as by the sideward scuffing of the tires on the runway surfaces are not quantified, since they would be similar for both arrangements. This "equal energy" case lowers the stress level in the glass gear to less than 20% of its yield strength. It also produces an angular deflection of 11.6 degrees versus 8.4 degrees for the steel, which would absorb additional energy from tire sideward motion. The vertical angles of the gear leg, as well as the angle of the lower bracket, were selected to accommodate this additional deflection without compromising prop ground clearance.



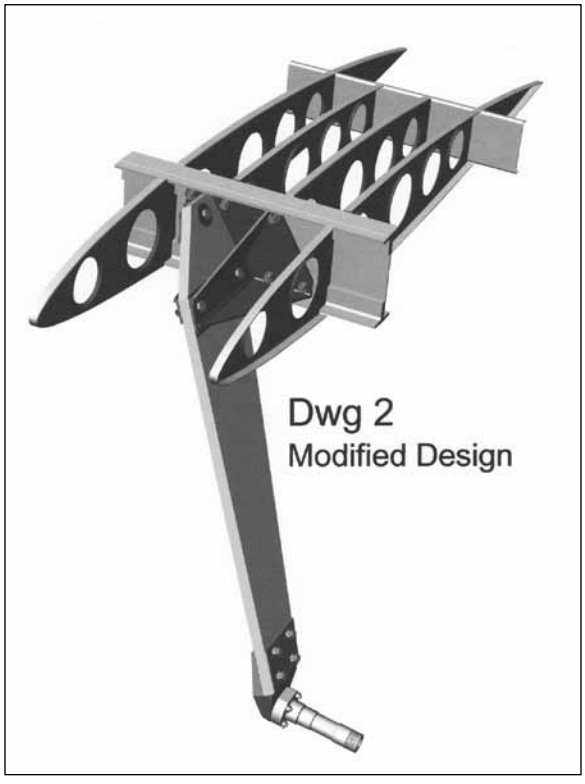


FIGURE 1

Flat plate spring comparison – Steel vs. ScotchPly Fiberglass

Given:		
t =	Leg Thickness (in.)	
b =	Leg width at root (in.)	
b' =	Leg width at end (in.)	
Kj =	Taper factor (unit less),(function of b'/b)(See Table 1)	
a =	Angle of leg from vertical (deg.)	
L =	Length of leg (in.)	
E =	Flexural modulus of elasticity x 10^-6	
F =	Vertical load at end (lb.)	
S =	Flexural Strength of material (psi)	
Calculated:		
g =	So call "gravitational" load (unit less) = Vertical load on each gear leg/half of gross weight	
P =	Load at end perpendicular to leg (lb.) = F*sin"a"	
d =	Deflection at end perpendicular to leg (in.) = (Kj*4*L^3*P)/(E*10^6*b*t^3)	
dv =	Vertical deflection at end (in.) = d*sin"a"	
da =	Angular deflection at end (deg.) = (Kj*6*180/pi*L^2*P)/(E*10^6*b*t^3)	
U =	Energy absorbed in leg deflection (in.– lb.) = 0.5*P*d	
s =	Maximum stress in leg (at root) (psi) = (6*P*L)/(b*t^2)	
sf =	Safety factor (unit less) = Yield strength/maximum stress	

Table 1

b'/b	Kj
0.0	1.50
0.1	1.39
0.2	1.32
0.3	1.25
0.4	1.20
0.5	1.16
0.6	1.12
0.7	1.09
0.8	1.05
0.9	1.03
1.0	1.00

Table 2

	3 G Landing	
Given	4140 Steel	ScotchPly
t =	0.625	0.813
b =	5.0	6.0
b' =	2.5	3.0
Kj =	1.16	1.16
a =	34.0	32.0
L =	24.0	24.0
E =	30.0	6.0
F =	2,400	2,400
S =	250,000	192,000
Calculated		
g =	3.0	3.0
P =	1,342	1,272
d =	2.351	4.217
dv =	1.314	2.235
da =	8.4	15.1
U =	1,577	2,682
s =	98,947	46,180
sf =	2.5	4.2

Table 3

	Same Energy as stl. @ 3G	
	4140 Steel	ScotchPly
t =	0.625	0.813
b =	5.0	6.0
b' =	2.5	3.0
Kj =	1.16	1.16
a =	34.0	32.0
L =	24.0	24.0
E =	30.0	6.0
F =	2,400	1,841
S =	250,000	192,000
g =	3.0	2.3
P =	1,342	976
d =	2.351	3.235
dv =	1.314	1.714
da =	8.4	11.6
U =	1,577	1,578
s =	98,947	35,424
sf =	2.5	5.4

From Dwg 1 of the original gear design, the total calculated weight (according to AutoCAD) for the steel parts, including bolts, is 32.0 lbs. per side. From Dwg 2 of the final modified version, the aluminum parts came in at 1.2 lb., steel at 8.2 lb. and glass at 7.9 lb., for a total of 17.3 lbs. per side. Therefore the total weight saving for the modification amounts to approximately 29.4 lbs. (13.4 kg.).

The modified aircraft first flew in January 2000, so the gear now has 13 years of service and probably 1,000 landings. The Mustang II design has gained a (perhaps unwarranted) reputation of being somewhat of a handful to land; however, my experience has been that, with this main gear modification, combined with the change to a locking tail wheel, it really is a pussy cat that can make a mediocre pilot look respectable.

COMING EVENTS

London/St. Thomas RAA Chapter annual picnic
July 9th, 2013. Once again Karl Pfister has graciously offered to host our annual picnic.

Kars 'N' Planes Summer Fly-In BBQ July 14. Kars Rideau Valley Airpark BBQ served from 11 AM till 2 PMWorld Famous Steamed Hotdogs & assorted beverages. Large Brats on a Bun Homebuilt, Classic and Antique Aircraft Rideau Valley Soaring Club Glider Rides - www.rvss.ca Vintage Cars Swords and Plowshares Military Museum Hosted by Kars RAA Chapter 4928 Info:

victorthompson14@gmail.com
Fly in or Drive in to Brandywine Aviation
Sept. 7th. Once again Jaye and J. Davis will be hosting their annual potluck aviation event.

18th Annual, Hawkefield Fly-in
September 8, 2013 Orono, Ontario, 11 NM East of Oshawa. N 44 00 W 78 39 ELV: 620 ASL Hawkefield is a very well kept 3,300 ft grass strip situated just outside of Orono, privately owned by Hanu and Karen Halminen Food , Drinks , corn available ,also featuring Ribs For Kids and Flymart Contact: Jim Morrison, 905-434-5638 , e-mail: jamesmorrison190@ msn.com

HIGHER AVIATION EDUCATION COMES TO SOUTHERN GEORGIAN BAY ONTARIO.

Collingwood RAA Chapter and its Community Youth outreach program was in full flight on Wednesday afternoon June 5, 2013 at the Collingwood Regional Airport.

Our airport neighbours have been running the COPA for Kids for a number of years. A good percentage of our RAA Chapter are also COPA members and some are very active with the COPA Flight in Collingwood.

For RAA folks not in the know, COPA Flights across the country - especially at this time of year - hold COPA for Kids events. These events are run with volunteer pilots and ground crews provide free introductory brief ground school about how an aircraft works followed by a 20 to 30 minute flight and the award of a Junior Aviator Certificate to boys and girls ranging from eight to 17 years old.

So we were pleased to volunteer some safety officers and ground crew escorts at the Collingwood COPA Phase 1 ground school and familiarization, on May 16 at our own CNY3 classroom, teaching 36 would-be aviators, their leaders and some parents and local media.

Phase 2 was a flight in a very large local circuit on a mostly sunny and calm afternoon. The flight pattern included panoramic views of the Blue Mountain ski hills, the Beaver Valley and Thornbury, the Town of Collingwood, across the longest fresh water beach in the world - Wasaga Beach, then a view of the Edenvale Airport and Stayner before landing back on runway 13 at CNY3

Our RAA mini squadron for these flights included , but was not limited to: Dr David Ripley flying his Piper Warrior C- GPXV, George Elliott flying his Amateur Built Cyclone (Cessna look alike) C- FTMV on amphibious floats, and Captain George Daniels flying the Collingwood Flying Club Cessna 177 Cardinal C-FQEK.

We helped COPA fly thirty six youth from 5 organizations; Big Brothers/Big Sisters, The Y , Stayner H.S., Nottawa Elementary Snrs. and 3rd Collingwood Scouts.

The results were impressive with positive comments from the tuned-in teens; they love our in flight head sets. These guys are savvy with smart phone cameras to boot, resulting in this kind of cockpit chatter:

"Look I can see my house on Fourth street. "

"Hey - there is the glass Plant where my Dad works--can you tilt the plane some more so I can get a photo?"

"Look how shallow the water is in the Bay, yet so blue it could be the Caribbean."

"I faced all my fears and the take off was the best part."

Rounding out the fun filled day was a complimentary BBQ and Pop from the Airport's First Class Cafe... which we RAA types helped partially subsidize.

We look forward to repeating this venue again. One enthusiastic participant wrote:

Dear Mr. Elliot,

Sorry for the delay. I only opened the email requesting the pictures yesterday. I wanted to personally thank you again for volunteering both your time and your amazingly built floatplane of yours, and taking me and my

classmates for the flight of our lives. It was my first time flying and I really enjoyed myself. It really makes you think when your way up there looking down on the world as so small. I hope your article for the RAA chapter goes over well and this email wasn't sent too late. Take care of yourself and that beast of an airplane of yours.

- Robby Ledger (Stayner Collegiate)

P.S.- *Thanks for dropping off my flight certificate. I hope to be returning to Collingwood airport real soon!*

Scarborough Markham

At our April meeting, we saw the first two episodes of Canada Above And Beyond, the 100-year history of Canadian aviation. We first watched Episode 2, Conquering Geography, which traced the rise of the Canadian bush pilots. We were introduced to Air Inuit that initially used small twin Fokker rag and tube aircraft. The film also had a segment on the De Havilland Beaver (DHC-2). 1657 were built, 980 for the U.S. Army. The Beaver gave way to the Otter, Caribou, Twin Otter and Buffalo. The latter did a famous demonstration flight in and out of a baseball field. The film also covered the CL-415 water bomber by Canadair; it had a gross weight of 47,000 lbs, and could pick up 7 tons of water in 12 seconds at 130 km/hr. Curiously, there was a segment on the Avro Arrow, an aircraft well before its time. 1500 employees were laid off in 1959 when the programme was scrapped by Diefenbaker, with the infamous destruction of all aspects of the Arrow.

Episode 1 was entitled First Flights. These covered a wide range: the first flight of a child in an aircraft; Alexander Graham Bell's Silver Dart flown by J.A. Douglas McCurdy at Baddeck, Nova Scotia; of an air force pilot in an F-18 Hornet at 1,000 km/hr; of a husband and wife flying an aerobatic dogfight in the Arizona desert; of the Lockheed Electra; of a 9-year-old girl in a Piper Cherokee flying across Canada; of the astronaut Julie Payette in 1989, etc. There is something for everyone in this episode. A major feature was the provision of popcorn by Bill Phipson! Dave and Anne Austin have very kindly agreed to host our Summer BBQs again this year at their home at 435 Rouge Hills Drive. These will occur on the third Thursday of July (18th) and August (15th) commencing at 6 p.m.

Chapter 85's Dan McGowan washes his Champ on a fine spring morning. Dan is one of the chapter's charter members and worked with Gogi Goguillot on the design of a replica SE-5A back in the 1960's.

At our May meeting, we saw the first two episodes of Battle For The Skies, the history of the RAF. Episode 1, Useless For The Purpose Of War, began with the flight of the Wright Flyer at Kittyhawk, moved on to Bleriot's flight across the English Channel, and then to the formation of the Royal Flying Corps.

RAA London St. Thomas

The May meeting of the London-St. Thomas RAA was awesome! We had a good business section where several items moved forward. Please review the minutes for details. We had two guest speakers for the evening's entertainment. First off, Rod Bell gave us insight into how to fly into America without a transponder and information on border crossing procedures. Rod's information and explanation of how he worked through the process made it very clear on just what it takes in the way of paperwork and procedures to cross the border. So, there is no reason not to fly to Oshkosh (other than the usual end of July thunderstorms, expensive fuel and the fear of lake crossings). Daryl Kings then led us through a video presentation of his Texas Parasol project. Daryl has scratch built this aircraft. This includes rebuilding his Volkswagen motor and even carving his own propeller. This is a truly an incredible project. The Chapter welcomed Mike Stoddard who has moved from Rochester NY to London. Mike came as a guest, but left the meeting as a chapter member. He was doubly welcomed as a Sonex builder as that is also the project of President Phil.

RAA Vancouver Chapter 85

On June 2, Chapter 85, COPA Flight 5, and many friends and admirers came out for a celebration of the life of Mary Swain, who passed away in early April. About 300 folks attended, and gallons of Mary's traditional hamburger soup was served.

There was a memorial flypast, and a bursary is being considered in Mary's name to support a young person who wants to fly.

23 newly enrolled student pilots from the BCIT Aviation Program came out to help the volunteers and

Chapter 85's Fly-in was a great success, with lots of airplanes, cars, antique engines and people. Above, a few pictures of the action. Right, chapter volunteers Bruce Prior, Peter Lenger, Vice Prez Peter Whittaker and Chapter President John Macready.

a number were given rides in the chapter airplane later in the day. In all, a fitting tribute to one of aviations Great Ones.

On June 29, Chapter 85 hosted its annual fly-in. The weather cooperated and chapter volunteers sold a record 164 breakfasts - possibly a new record. Roy Taylor brought his RV-6A out, which just did its first flight this year. It was a great day with perfect weather and lots of planes, antique cars, and people.

Our annual Fly In was held on June 29. The weather cooperated just in time as the clouds cleared and the sun came out. We sold approximately 130 pancake breakfasts. A total of 38 pilots registered who arrived by aircraft. As with other years, the Antique Engine Club and the MG Car Club contributed with an interesting collection of equipment.

Our chapter contributed yearly to a bursary for the BCIT Aviation program. This year we decided to increase our contribution to $750.00. This amount will be reviewed yearly.

We have had two workshops presentations concerning fabrication techniques. Peter Whittaker demonstrated wing rib formation at the May general meeting using a similar process for his Zenith 601 aircraft. At the June meeting, Peter Klein presented a method of multi surface object construction using foam blocks, e-glass and crazy glue. Both workshop presentations demonstrated practical methods for manufacturing these aircraft parts required in amateur aircraft construction.

John de Visser has embarked on a project to clarify our hangar policy. The Turbi has been operational until just recently when Mark ter Keurs discovered a faulty mag. Now we are looking for replacements for both mags and the aircraft will be off line for a couple of weeks.

The chapter will participate in the Boundary Bay Air Show on July 27 with an aircraft and our RAA booth.

Volunteers to man will be required. Hopefully the Turbi will be operational by then.

We are continuing to look for a major project. With 2 potential projects in mind it is important to identify a team leader and a team ready to take on the task. Who would like to do this?

Charlie Longstaff, one of our oldest and most talented members has moved to Manitoba. Charlie will be missed and we all wish him the best. Good luck, Charlie!

INFORMATION SOUGHT

Member George Opacic writes:

"When Ben lived in Sechelt, he did a series of interviews of Ayliffe "Pat" Carey. Pat was a respected pioneer aviator who started flying in Chilliwack, then did bush flying from the 1930s to 1972 around northern BC, the Prairies and NWT. He ended his flying carrier after his first bad accident in August of 1972. It was reported in the Lethbridge newspaper. He had flown for a few of the important first airlines in western Canada.

"We are looking for original pictures that could be used in the book, and any direct incidences that people may have had with him. Of course, all attributions will be noted in the book."

Contact George or Ben at bnuttall_smith@shaw.ca

Speed Merchants

Chris and Peter McHugh's W-10 Tailwind

Story and Photos by Gary Wolf

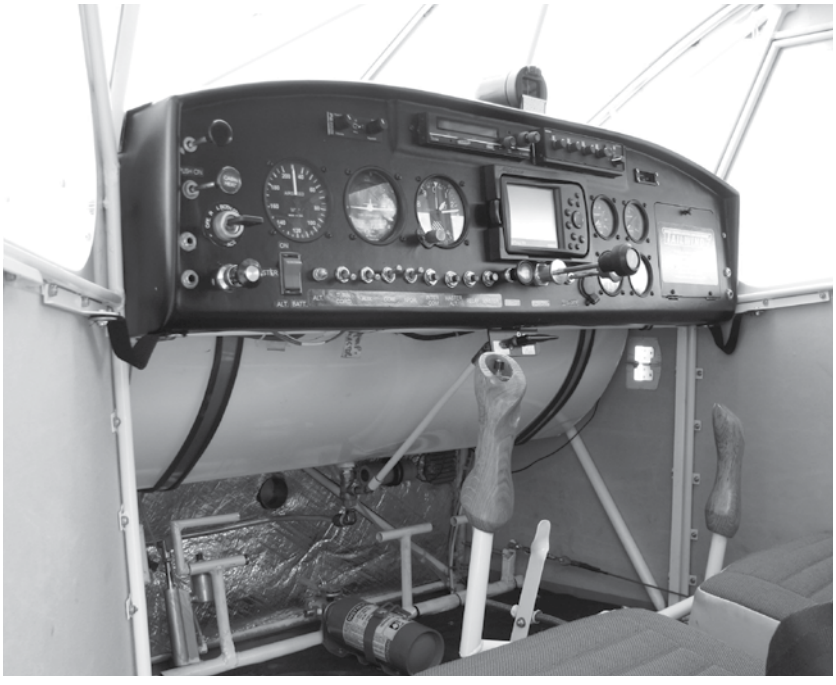
flag background courtesy all-free-download.com; logo art by George Gregory

The light 2 seat certified planes of the day were saddled with prewar thinking... The fastest was the Luscombe that cruised at 120 mph but Wittman's Tailwind eclipsed this with a cruise of 150 mph on the same engine.

STEVE WITTMAN dropped a rock into the pond when he introduced his Tailwind in 1953. The light 2 seat certified planes of the day were saddled with prewar thinking when 50 hp was the norm, so they had long wings and chugged rather slowly around the sky. By 1953 many had repowered with the the Continental 85 but most kept their 32+ ft. wingspans so they chugged around a little less slowly and climbed a lot better. The fastest was the Luscombe that cruised at 120 mph but Wittman's Tailwind eclipsed this with a cruise of 150 mph on the same engine.

When asked how a plane with such short wings could produce such good performance numbers, Wittman used to point to the fuselage. In side view it is a high camber airfoil that itself produces lift, allowing the plane to have smaller, lighter wings. Smaller wings require smaller and lighter control and tail surfaces, reducing the weight of the airframe. Less airframe weight means that a smaller engine that uses fewer pounds of fuel per hour can do the job of carrying two crew and luggage. Wittman's design was completely at odds with the rest of the aviation world but it certainly did work. The method of construction was low tech, requiring no special tooling or skills. Anyone with average skills and a good dose of determination could build a plane that would run rings around the conventional fleet.

Chris McHugh's Tailwind began life as his father Peter's project many years earlier when Chris was just out of short pants. Peter had been flying a Pietenpol



Fibreglass panel with glare shield holds day VFR instruments. Twin sticks sprout from central mast, and a thumb actuated lever applies spring pressure for pitch trim. The fuel tank is close to the pilots knees, but incorporating the Clement mods will give better leg room and more recline to the seat.

built by Geoff Noble and was enjoying it but became enamoured of the Tailwind when he met Steve Wittman at Oshkosh in 1977 and flew in Steve's W 10, N375W. Peter bought plans and began construction in his basement, and occasionally corresponded with Wittman. In 1982 Steve and his wife visited the McHugh household and stayed with the family for awhile, inspecting Peter's work and giving it the thumbs-up. At the time Chris was unaware of who this man was, and stayed occupied with his motorcycle projects.

Peter says that the W 10 plans were adequate, and when he had questions he phoned or wrote to Wittman for clarifications. At the time there were no kitted components available so Peter set up workshops in the basement and the garage. He built a large flat table long enough for the side layout, bought oxyacetylene welding gear, a tabletop grinder, and some other tools and began construction of the 4130 fuselage. In those days it took some sleuthing to find materials and this was made somewhat more difficult because for some components Wittman called out a wall thickness of .028", a size that is rarely available. Attention to weight is what it takes to produce a light aircraft so Peter persisted and then did all the fish-mouthing fitting and welding, holding everything square with 2 x 4's. There is always a bit of distortion as a weld cools but his fixturing minimized this. Peter's day job was at Stelco where he was a Metallographer and Service Metallurgist, dealing with welding, heat treating, and failure analysis so this work was right up his alley.

The flaps and ailerons of Tailwind are steel weldments with formed sheet metal used as the ribs and trailing edges. The leading edge of each is a 4130 tube that actuates the control, with the aileron's torque tube running through the centre of the flap's torque tube. Each aileron has a balance weight box welded to its torque tube at the outer end.

Peter next built the wood wing. It has two spruce plank spars and is unusual for its very low camber, just 9% of the chord. This would normally require heavy spars but the very short wingspan of the Tailwind means that the beam and buckling loads can be resisted with lighter components. The wing is an epoxy bonded wooden torque box with the skin handling drag-antidrag and twist loads, so it is torsionally stiff enough to get away with a single lift strut per side. Peter pointed out that in those days it was difficult to get the correct thin plywood with 45 degree plies, essential to resist the drag-antidrag loads without excessive weight. Today this is easier, now that Aircraft Spruce sells a complete wood package for the Tailwind wing.

Eventually the fuselage and wings had to come out of the basement and this required some excavation of the garden and removal of some of the basement wall. In the garage the fuselage and steel components were prepped and coated with zinc chromate. By this time it was becoming apparent that building an airplane was at odds with having a family life. Peter's friend George Opacic bought the project in 1986, stored it away, and in 2003 resold it to Chris for the same price he had paid to Peter.

Chris had no experience in build-

ing aircraft and he had only a few years earlier completed his Private license so he had a lot to learn about fabrication. He had a lot of seat time though, flying two hundred hours in each of a Stinson 108 and a vintage Aeronca Chief. He also had a 32' x 35' heated shop and a group of "Friday Night Friends", fellow pilot-builders who dropped by to provide encouragement and assistance. By this time Steve Wittman had passed away so Chris stuck with the plans, received guidance from the Friday group, and did not modify anything. His dad had earlier formed and heat treated a set of gear legs but these got lost somewhere along the way. Chris bought new heat treated landing gear legs from Harmon Lange, did his own fitting of the motor mount and lift struts, and the Friday Nighters welded them up for him, using the fuselage, engine, and gear legs as the jig. Wittman was very clever here, fitting the gear legs directly to the engine mount. The landing loads imparted by the engine go directly to the gear legs, allowing the forward fuselage tubes to be sized for flight loads only.

Chris did some of the less critical welding himself - the tabs, seat frames, and baggage compartment brackets. He then sandblasted the chromate from the fuselage and the other steel components and applied epoxy primer for a smooth tough finish.

Many Tailwinds now use an O-320 but Chris wanted to stay close to Wittman's original intended engine. He found an O-200 and one of his friends did the rebuild for him. Another Friday Nighter fitted and welded up a four-into-one exhaust that works great. Chris made the cowling the traditional way with foam, bondo, and fiberglass. He could have bought an off the shelf cowling but he wanted a better transition to the spinner. While he was doing the sticky work Chris also made a set of wheelpants using a mould lent by one of the Friday crowd.

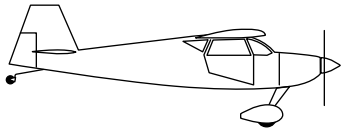
The O-200 engine has been fitted with a lightweight starter and alternator, and an oil cooler and a remote oil filter. Chris runs 100w oil and burns only 1 litre per 15 hours, with oil changes every 50 hours. The oil temperature never gets above 185 degrees and the cylinder temp is never above 400, with cruise temp at 325. A set of Champion D16 spark plugs and automotive ignition wires are used, and these work well without radio problems.

A Tailwind uses an aluminum cowl tank, and 25 US gallons occupy all the space behind the panel. The tank vent is plumbed to an air inlet at the wing root to ensure positive pressure when in flight.

Chris covered the wings, tail, control surfaces, and fuselage using the Stits process through to silver, and then sprayed Endura as the final finish. He drew the graphics in Coreldraw, had a local shop cut these from vinyl,

Many Tailwinds now use an O-320 but Chris wanted to stay close to Wittman's original intended engine. He found an O-200 and one of his friends did the rebuild for him.

Flap and aileron are actuated by concentric torque tubes. Aileron mass balance is submerged in the wingtip slot. Inside the cabin the rear arm is operates the flap, while the forward one is for aileron.



The Tailwind began the modern era of amateur aircraft construction... It is a great testament to Steve Wittman's expertise that sixty years later the Tailwind is still a popular design

and applied them himself.

The interior of Chris's Tailwind is spare and clean. He used lightweight Sunbrella fabric for interior panels, and a friend did the seat upholstery using Cordura. The luggage compartment has a ¼" plywood floor and a cargo net for security.

Chris made his panel from fiberglass laid over blue and pink foam, and the edges have a second layer of foam that was sanded to provide smooth radii. This form was then covered in packaging tape, waxed generously, and 5 oz cloth was laid up for the face. The radiused lips and edges were made from many layers of 1.5 oz cloth on the bias, and the assembly was oven-cured to resist softening from the heat of the instruments. The finished panel was strong enough to support the instruments but in the control area Chris added a steel reinforcement that bolts to the fuselage structure. He did some careful shopping and some horsetrading and ended up with day VFR instruments plus an electric turn coordinator, GPS 196, Icom 200, and a basic Garmin Mode C transponder.

Creature comforts have not been ignored, and an exhaust muff provides good cabin heat, while a small Van's air door on the right side cools the cabin quickly, even on hot days. The door latches are simple and effective spring loaded pins that are actuated by a cord under the window, as found in early English sports cars. In 1953 Wittman claimed an empty weight of under 700 pounds for his original W-8, and Chris's W-10 came in at 770 with starter, battery, and radio.

Before first flight Chris took a few hours of transition training in the right seat of a friend's Tailwind. His first flight was at 3000 ft above Brantford airport to check the handling and engine parameters. After a few adjustments the plane flew hands-off, trimming easily for cross country work. The Tailwind can be rolled into a turn with either rudder or aileron, and the rudder has enough authority for a 20 mph crosswind. Landing can be a bit twitchy because when the tail drops the rudder does get blanked, so differential braking is vital to keep the plane straight on rollout.

Chris enjoys the economy cruise speed of 140 mph at 2300 rpm and has flown from Brantford Ontario to Lyncrest Manitoba in one day. Despite the 4 hour range he made several fuel stops along the way because Northern Ontario's terrain does not allow for off-field landings. Occasionally Chris winds the engine up to 2700 rpms and sees a true airspeed of 160 mph. His typical flying day takes him all over Southern Ontario, easily handling visits to several airports and fly-ins scattered around the province. The Tailwind gets in and out of 2,000' strips easily and can handle 1500' if necessary, either pavement or grass.

A design that has been around as long as the Tailwind is bound to attract modifications. Jim Clement of Baraboo Wisconsin focuses on large 4 cylinder Lycomings for 200+ mph airspeeds. He also makes some modifications to the fuselage to allow better

continued on page 41

MEMBER BILL PRATT of Edmonton has been building his Tailwind to use a Lycoming O-235 and a Callbie Woods metal wing. At one time there were a few professional welders building Tailwind fuselages and when Bill found one he bought it despite that he is equipped to fit and Tig weld his own, saving quite a bit of time. He has been spending this time on the metal wing and has gone through several iterations of the wingrib formblock to get the finished ribs to the exact size. He made a full sized layout of the rib on hardboard and jigsawed and filed the cutout to become the gauge through which each finished rib is pushed as a check for fit. Bill says that the .025" 2024 has a lot of springback, while .032" stays put and is easier to work with. If he were doing the wing again he would use .032, remove one outer rib and respace them from 12" centres to 14.5". The Woods wing uses wingtips from the Thorp T-18 but Bill is replicating the trapezoidal W-10 Wittman tips in metal.

One of the advantages of the metal wing is that wing bays may be sealed and used as the fuel tank. Bill is using the first two bays between the spars as tanks and has added the first three D-cell bays as well. Using the D-cells moves the CG forward and takes some of the load off the tailwheel, giving 14 gallons per wing. Bill has added a sump at the floor behind the seats to be certain that condensation can be removed from the fuel system.

Bill's O-235 has a Fred Felix bicambered prop, one electronic variable timing ignition and one mag, and a crossover exhaust, and the plane uses an iPad electronic instrument panel.

Left to right: Bill Pratt's metal wing with its pitot and angle of attack tubes; Bill Pratt's adaptation of the Wittman trapezoidal wingtip to the Callbie metal wing; On Bill's project the fuel sump is below the carb when the plane is on its wheels

ANNEALING ALUMINUM SHEET

Making aluminum workable for non-structural purposes / RAA

ANNEALING IS A PROCESS that can render aluminum sheet soft and workable, and it is easy to do as long as it is utility grade aluminum that you need to have softened. 1100 and 3003 aluminum must be briefly raised up to about 700 degrees Fahrenheit, well within the capability of a propane torch.

Determining the temperature is not difficult – just rub bar soap onto the surface of the aluminum and heat it up evenly by playing the propane torch over the surface. The soap will first turn brown, and then black. As soon as the soap has turned black turn off the torch and let the aluminum cool. It is not desirable to hold this elevated temperature for an extended period – as soon as the soap turns black the aluminum is ready. You may even quench the aluminum in water to speed the cooling process, and you might as well do this to wash the burnt soap off.

The sheet aluminum can now be bent and formed easily to make non-structural parts. This simple process is only for the lower utility alloys that are used for fairings, blisters, and some cowlings. As you work the material you will find that it becomes stiffer, a process appropriately called work hardening. 1100 and 3003 utility aluminum may be annealed many times if there is a lot of shaping and stretching to be done.

Higher alloys like 2024 and 6061 must not be shop annealed if they are to be used for structural purposes. This amateur method is only for non-structural parts. RF

Opposite: this is all it takes to anneal non-structural aluminum sheet - bar soap, a torch, and the aluminum. Above: Rub the soap evenly onto one side of the aluminum. Heat the sheet until the soap chars, and then stop. The aluminum sheet is now soft and may easily be formed; working the material hardens it. Repeat as necessary.

Funny airport Codes

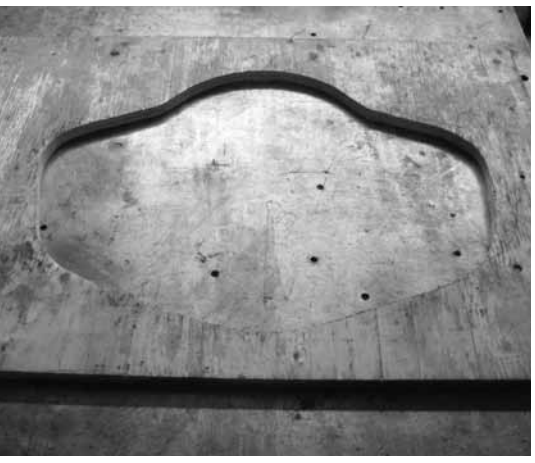
EEK	Eek, United States
FAQ	Freida River, Papua New Guinea
FAT	Fresno Air Terminal Airport
MOM	Moudjeria, Mauritania
DAD	Da Nang, Viet Nam
YEP	Estevan Point, Canada
OMG	Omega, Namibia
PEE	Perm, Russian Federation
POO	Pocos De Caldas, Brazil
BRR	North Bay, United Kingdom
FUN	International Tuvalu
GAG	Gage, United States
IOU	Ile Ouen, New Caledonia
LOL	Field, United States
WOW	Willow, United States

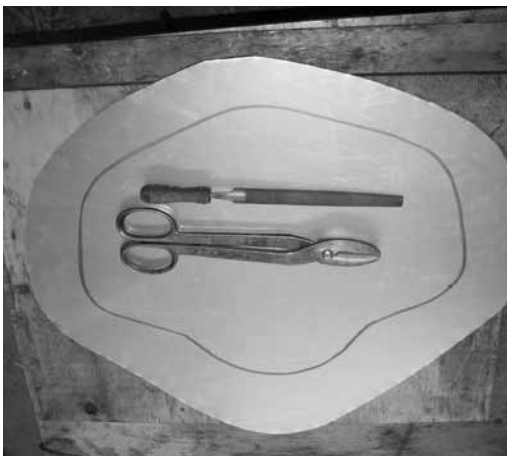
Making an Aluminum Nosebowl

Gary Wolf

THE NOSEBOWL can be a stumbling block on a project, especially when the builder has decided to use a different engine. If the engine is wide enough to use a Continental or Lycoming nosebowl the easiest route is to choose one from the dozens available from Aircraft Spruce. The hard way is to make your own composite cowl, beginning with blue foam, plaster, bondo, and then a lot of grinding and sanding. Finally the form gets covered in fibreglass, the foam and plaster get dug out, and more filler and resin produce a nosebowl. Few builders ever consider making an aluminum nosebowl because they think it involves special skills, machinery, and welding. Some resort to using roasting pans, dog bowls, and other household shapes.

Here is a simple method of forming a nosebowl from aluminum sheet, and it does not require any welding. Two sheets of plywood are jigsawed out to define the perimeter of the shape, and a sheet of soft aluminum is then trapped between them, with clamping pressure applied by c-clamps and screws. I use deck screws 2" apart, just outside the flange of the sheet. Make a magic marker line around the perimeter of the shape to show if the sheet is moving during the





Two pieces of 3/4 ply were jigsawed to define the perimeter of the part. The working edge of the lower one was rounded over with a file and sandpaper. Centre, A sheet of aluminum was placed between the boards and the perimeter was marked; right,the blank was trimmed evenly around the line, about 2-3" chord, and the edge was then smoothed. The sheet must be able to slide a bit, allowing material to be drawn towards the centre of the nosebowl

forming process.

The choice of aluminum alloy and its temper is critical for successful hammer forming. 6061 and 2024 have no place here. The best alloys are 1100 or 3003, both sold as utility grades, and you want the thickness to be .040" to .060". For a shallow nosebowl you may use the readily available H14 temper which is the designation for the commonly sold half-hard sheet. For a deep form you should either anneal the sheet with a propane torch or preferably just buy it already annealed from the aluminum supplier. They will call this 1100-O or 3003-O, and either will do. Annealed sheet forms easily and work hardens from all the hammering and stretching.

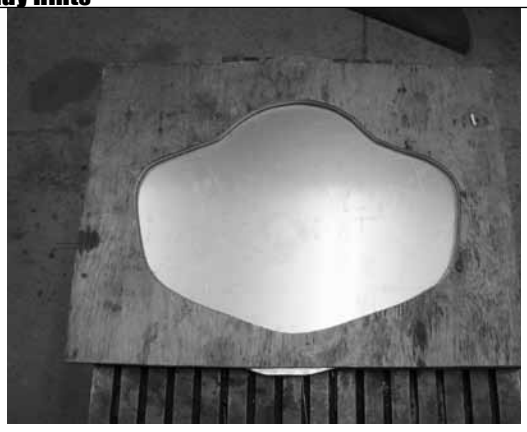
Select a firm rubber mallet of 3-5 pounds and belt sand one end to the radius of the perimeter of the nosebowl. Sand the other end to the radius of the face of the nosebowl. It might be necessary to have a second hammer if there are a lot of radius changes. The forming does not require heavy blows of the hammer -it is the weight of the hammer that does the work. It is tempting to start in the centre of the nosebowl but the centre is actually done last.

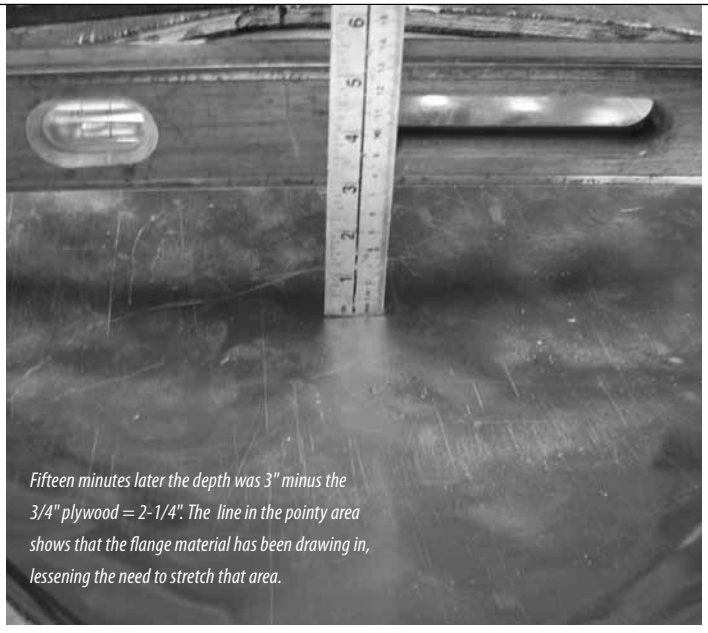
Begin by doing a few circuits with the hammer around the perimeter to start the stretching. The hammer blows should overlap as this will produce a smoother surface that requires less cleanup work later. Many light circuits with overlapping blows will result in better depth control and a better surface finish. If you have used 3/4" plywood for your wood forms you will shortly be striking the aluminum sheet against the top of the workbench. It is now time to add one or two layers of 2 x 4 to the bottom of the plywood die. You may then resume working the perimeter, with occasional forays with the other end of the hammer to bring the face of the nosebowl down to the same depth. Again, overlap the blows.

At some point, usually when you have drawn the material down a couple of inches, the aluminum around the perimeter will not stretch as readily, and this is because it is work hardening. There are two choices at this point - you can either anneal the part with the propane torch and continue stretching, or you can loosen the perimeter screws a bit to allow the unused flange material to slide into the nosebowl area. It takes very little loosening to allow the material to slide, so tread lightly here. If you loosen too much the flange will pucker and then it will not slide.

Resume forming the perimeter

Few builders ever consider making an aluminum nosebowl because they think it involves special skills, machinery, and welding.





Fifteen minutes later the depth was 3" minus the 3/4" plywood = 2-1/4". The line in the pointy area shows that the flange material has been drawing in, lessening the need to stretch that area.

Left, top down: The material was registered between the two boards and everything was clamped together. Screws were also used to provide clamp pressure, just outside the perimeter of the aluminum.
Next, After a couple slow circuits around the perimeter, using light blows of the mallet, I proceedd to a few inner circuits. Of course the max depth at this point will be limited by the 3/4" thickness of the plywood. Notice that the blue line shows that so far all forming has been by stretching the material inside the blue line
Second from bottom: 2 x 4 risers were screwed to the bottom board and everything was then screwed and clamped back together for deeper forming. To allow hammering to the desired depth a scond course of 2 x 4 risers was later added.
Bottom: After more circuits I opened it up to see if the flanges were staying flat. The puckers at the bottom show that the plywood was spreading apart in that area, allowing puckers. These lock the material and will not allow it to be drawn into the work area. I whacked them down, reassembled everything, and clamped that area just a bit tighter.

and keep an eye on the magic marker line, which by this time should be gradually travelling into the bowl area. If one area is travelling overmuch it is time to screw or clamp that area a bit more firmly. I usually undo everything every once in awhile to inspect the flange - it should remain flat. If the flange is puckered you will have to hammer the puckers down so that the sheet may continue being drawn into the form. Clamp everything back together and resume hammering, and every once in awhile lift up the whole assembly to have a look at the outside face of the nosebowl. A straightedge and a tape measure may be used to measure the depth. If you are attempting to reproduce a part you will also need some templates to check curvature and depth. It is a lot easier if the nosebowl is a one-off and you have some leeway on shape.

This particular nosebowl has a 12" diameter rather abrupt projection that follows the shape of the spinner, and it required considerable torch annealing to get enough stretch to allow the 90 degree drop from the flange, and this nosebowl also has abrupt cross section changes. For an initial project I would recommend

It took a day to make the wood form and to hammer out the general shape of the part and do the last bits of surface finishing.

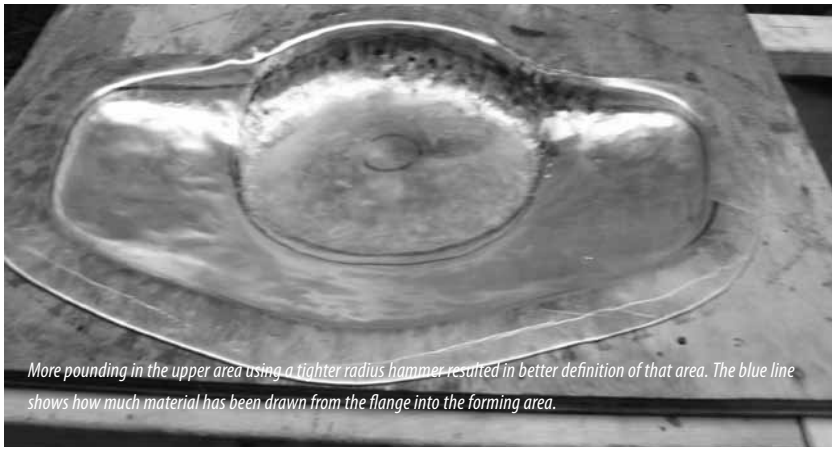
a simpler, more gradual shape as on a Champ.

Eventually you will arrive at a shape that suits your purpose. Unclamp everything and if you are lucky there will still be 3/4 to 1 inch of flange material left lying flat. This is the time to examine the nosebowl for symmetry of contour and bumpiness. The part can go back into the die for more bumping to correct all three. Even if all you have to correct is bumpiness it is best to do as much of the dolly work as possible while the part is contained in the die, otherwise it can become distorted.

A wood slapper can be bandsawed from a piece of hardwood and sanded smooth. Used with a wood or metal dolly, for amateurs a slapper will produce a better surface finish than a metal hammer will. Evertually the part will have to leave the die to complete the smoothing. An English wheel can be used too but it is usually too large to work abrupt contour changes. A slapper and dolly and a dose of patience will do a better job.

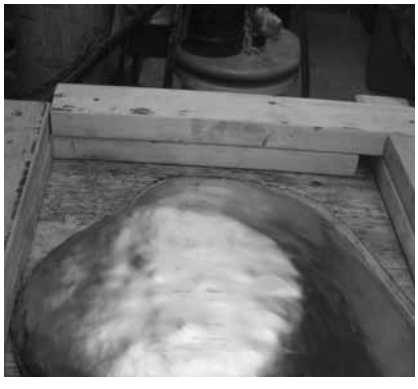
There is still the matter of the flange to deal with. Draw a magic marker line all around the front face of the nosebowl and snip off the excess flange material. You will want 3/4 to 1" of material left. A Leather mallet and a dolly may be used to turn this material to become the flange against which the cowl will rest. There will inevitably be some puckers and you may either use your fluting pliers to put them into a regular pattern, or you may use a steel hammer and a wood dolly to shrink them. Annealing with a torch might be necessary if the flange is too stiff to shrink easily.

Cutouts for cylinder head air may now be cut out. I have not progressed this far on my nosebowl but I intend to snip the shape 1/4" small all around; the corners will be hole-sawed, and the edges will be sanded smooth before forming. A half-pound steel hammer and a wood block will b used to tip the flange over. The edge of the wood block will be sanded to 1/8" radius and I will use light



More pounding in the upper area using a tighter radius hammer resulted in better definition of that area. The blue line shows how much material has been drawn from the flange into the forming area.

I drew the 12" circle for the bulge area and pounded that down with the flatter side of the rubber mallet. The depth went to 4-1/4 - 3/4" = 3-1/2", limited by the thickness of two 2x4 risers and the 3/4" plywood form. I hammered the circle down to the table surface. The upper part of the circle was not well defined yet, having too much radius. By this time the material was work hardening so I had to anneal that area with the torch.



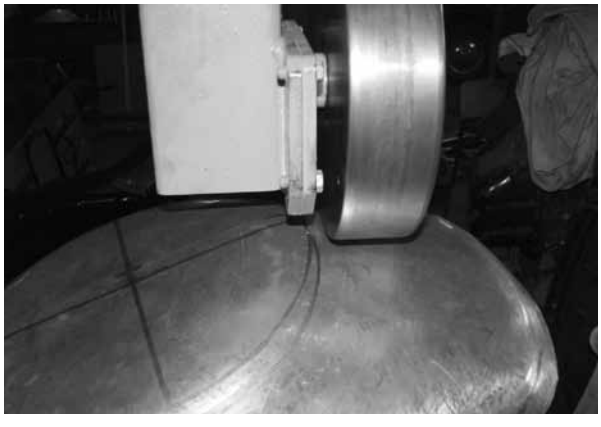
Here is what the part looked like at this point. The top needed more definition and stretching.

I sooted the area with the torch, then heated it with a neutral flame. The soot is just an indicator - the temp at which it combines with ambient air and disappears is close to the annealing temp of the aluminum. Bar soap can also be used as the indicator - a propane torch will char the soap at the annealing temperature of aluminum

hammer blows to gradually tip the flange. Pliers with tape on the jaws help here, and patience is important.

It took a day to make the wood form and to hammer out the general shape of the part and do the last bits of surface finishing. The nosebowl holes and a bit more metal finishing will take another day. At the end the hangar will not be filled with plaster and plastic dust and no resins and solvents will have been used. R

For future reference I marked the perimeter both inside and out and used a leather hammer to begin tipping the flange. In the corners I used a dolly to provide support while forming. Pad the jaws of a pair of pliers with masking tape, and they can be used too. Work your way gradually around the perimeter, about thirty degrees of change per circuit.



An Engish wheel is like a bull in a china shop here, and it can do more damage than good. A leather mallet and a wood slapper, both backed up by a dolly, are more controllable.

A home made wood slapper and a metal dolly will flatten any ripples and bumps. Shape the surfaces of the slapper to match the desired radii of the nosebowl, and use small overlapping blows.

Turn the nosebowl over and finish tipping the flange from the inside. A doubled towel on the bench provides a firm but resilient surface

Sand the face of a leather mallet to the desired contour and use it to chase the transitions. A metal dolly supports the back side of the area.

The plywood forms define the perimeter, the rubber mallet does the major shaping, and the leather mallet, wood slapper, and dolly do the finish work.

Keep in Touch With
Your Board of Directors!

Gary Wolf ..... President
.....519-648-3030 garywolf@rogers.com
Wayne Hadath ..... Treasurer
..... whadath@rogers.com
Dave King ..... kingdws@shaw.ca

RAA Regional Directors

Mainland BC:
BC Coast .....John Macready
..... jmacready@shaw.ca

Interior BC/Technical Director: .....David King
contact best between noon-10pm 7days work
ph. 250-868-9108 homep ph. 250-868-9118.....
.....emailKingDWS@Gmail.Com

Alberta North:
Pending

Alberta South:
Gerry Theroux .....403-271-2410 grtheroux@shaw.ca

Saskatchewan:.....pending

Manitoba:
Jill Oakes.....204-261-1007 jill_oakes@umanitoba ca

Ontario SW:
Jim Tyler.....jimtyler@rogers.com

Quebec:.....Pending

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President's Message / cont'd from page 2

time Nav Canada sent out the notice of the consultation meeting three days after it had taken place. And that is how it is done, folks.

If you are based in or near Class D airspace and you hear even a whisper of a change to Class C you should organize quickly and demand a real consultation process. Nav Canada's mandate requires that they consult but their recent behaviour shows that they are willing to pay only lip service to this.

The result of a change to Class C is that transient aircraft end up buying their fuel and services elsewhere and the airport restaurant sees a drop in traffic. In theory a non-Mode C aircraft can be granted access to Class C but this will not be given by radio. The pilot must obtain permission in advance by telephone, and this will be granted only for a valid reason such as needing to get to the radio shop on the field to buy a Mode C transponder.

...the regs exempt gliders and motorgliders from having a transponder in transponder airspace. Does this make sense?

There is always the empty promise that if the traffic declines the airspace can be changed back to Class D. That would take a great deal of time and money so downgrading airspace has rarely happened. It is your airspace but if you are not vigilant you will lose it. And PS, the regs exempt gliders and motorgliders from having a transponder in transponder airspace. Does this make sense?

Kars'n'Planes Summer Fly-In BBQ Sunday, July 14

All day event - food served 11 AM to 2 PM
Everyone Welcome - Fly, Drive or Boat in
Kars Rideau Valley Airpark
http://tinyurl.com/karsrv

Airport Identifier CPL3Comm 123.4
Runway 26-08
Glider activity in the area

BBQ served from 11 AM till 2 PM
World Famous Steamed Hotdogs &
assorted beveragesLarge Brats on a Bun
Homebuilt, Classic and Antique Aircraft
Rideau Valley Soaring Club Glider Rides -
www.rvss.ca
Vintage Cars
Swords and Plowshares Military Museum
Hosted by Kars RAA Chapter 4928
Info: victorthompson14@gmail.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 Fourth Saturday (and second Sat. as well) each month 9:00 am at the restaurant at Lake Simcoe Regional Airport Contact Secretary Dave Evans 705 728 8742E-mail david.evans2@sympatico.ca

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: Meets the third Monday of each month in the upstairs meeting room of the 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, www.raa-niagara.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 Don Rennie drennie@hemisphere-eng.com 403-874-0876

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

GRANDE PRAIRIE: Third Tuesday, Chandelle Aviation Hangar, contact Jordie Carlson at 780-538-3800 work. or 780-538-3979 evenings. Email: jcarlson@telusplanet.net

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 - zzA-LASKA 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*
email: raa@raa.ca web: www.raa.ca

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

Recreational Flyer Magazine

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The Recreational Flyer is devoted to the aerospace sciences. The intention of the magazine is to promote education and safety through its members to the general public. Material in the Flyer is contributed by aerospace engineers, designers, builders and restorers of aviation devices and vehicles, used in an amateur capacity, as well as by other interested persons, publications and organizations. Contributions to the Recreational Flyer are voluntary and without remuneration. Opinions expressed in articles and letters do not necessarily reflect those of the Recreational Aircraft Association Canada. Accuracy of the material presented is solely the responsibility of the author or contributor. The Recreational Aircraft Association Canada does not guarantee or endorse any product offered through articles or advertising. The Flyer and its publisher welcomes constructive criticism and reports of inferior merchandise or services offered through advertising in the publication.

For Sale

2002 CP 301-A EMERAUDE. First flew June 2003. TTAF 50 hrs. 0 290G Lycoming 396 hrs. since major. Sensenich metal prop inspected and refurbished by Hope Aero June 15/09. Dual controls (pedals, sticks throttle) custom interior. Annual due May 2012. Always kept in a hanger. Contact Jim Demerling 519-348-9655 (Ont.) $19,900

FOR SALE: ZENITH CH601XL , airframe 80% complete, controls installed. Canopy mold. No landing gear. Subaru 2.2L no re-drive. $3000 or best offer. Call 705 279 4399 or 519 351 6251

EUROPA XS MONOWHEEL with Rotax 914 turbo engine and Airmaster constant speed prop, 87 hrs total time. VFR panel with Mode C transponder, KMG GPS, Becker 720 com with intercom and headsets. This is a fast and efficient cross country aircraft with low fuel consumption. Asking $65K, no reasonable offer refused. Contact Hazel Peregrym at 250-672-5587 snowgoose@telus.net

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

RV6 PROJECT FOR SALE - sliding canopy taildragger model. Wings and tail surfaces complete, fuselage is on metal jig 50% complete and ready for skinning. Jig included - readily transportable. Started in 1995, lost medical. All parts from the original kit are primed and ready for assembly. $20,000 complete. Required sheet metal tools available - negotiable. Available: the ideal engine for the RV-6 - Lycoming 0320 160 hp (stored with preservative oil) low time (120 hours) since remanufacture by Lycoming. Call for viewing at Waterloo Regional Airport. Photos of parts available on request. Peter Hanna 905-629-8836 Mississauga peterdhanna@gmail.com or Terry Jantzi 519-748-1817 Kitchener tjantzi@p3tec.com

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.

FOR SALE: Advanced Flight Systems Engine information system. Some probes, fuel flow. $750 OBO. Chris 1-866-733-8432

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. 30K OBO. 250-991-7958 Quesnel BC.

FIBERGLASS FLOATS-1500 lb+, all bulkheads installed, just ends need finishing, can be finished as amphibs or straight floats- complete with aluminum streamline spreader bars, rigging tubing,fittings. 15' 2" L x 22"W at step- $1200, pictures available.- Also MA-4 SPA carb set up for 125 HP with new float and pump plunger. Includes aluminum airbox- $150. Bob 519-271-9575 trirmb@cyg.net. Stratford ON

BAKENG DUCE, built in 2001. Low time airframe with 180 hour O-290 D2 Lycoming. Good compression on all cylinders. Oil filter, oil separator, Cleveland main wheels, stainless exhaust. Aymar-Demuth wood prop 72 x 52. 100 mph at 2450 rpms. This is an easy flyer that is not aerobatic. Asking $15,500 or make an offer. david.evans2@sympatico.ca. Plane is in Barrie Ontario.

CAVALIER 102.5, "Aero Sport Power" O-320-B2B; 152 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.

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)
McCauley metal prop, markings - DES 1 C60, DTM 7557 M1, sn# 735006 -history-unknown. Please contact JOHN SHYKULA 403-607-8539

ONE PAIR OF AERONCA CHAMP WINGS with a fuel tank in each. They were briefly on a Volmer Sportsman and have been recovered in Ceconite. The wings include the ailerons and cabling. $3000. Located in Westbank BC. 250-768-2346 dgupton@shaw.ca

O-290 G ENGINE converted to D with dual mags and O-290 cylinders. Includes starter, generator, carb, and Sensenich metal tractor prop. Rebuilt 12 hours ago, this is a very nice running engine. $7500 OBO. 250-768-2346 dgupton@shaw.ca Westbank BC

GOOD HOME WANTED FOR TRUSTY STEED ! Zenith CH300 with 0-320 Power Plant- uses 5 gph at 100 mph. Nav/Strobes/Beacon/Toebrakes. Excellent viewing of countryside. I was denied by DOT on Medical Grounds so my plane is now for sale.$16,900 . albanus@rogers.com 905-686-7546.

Lycoming 0-235 C1BX 115 HP ZERO (0) HOUR SINCE (0M) OWNER MAINTENANCE 2013. 1456.1 SMOH 446.4 Stoh on tbo of 2 400 h. come with carburetor starter and mags it has flown 60.8 h. last summer 2012. Presently flyable on my PA 22-108. Also Sensenich 76 AM2-48 (74 x 48) never been repitched. Reason forsale: upgrading to 0-320A2B Price: $7,000 OBO. Paul Gagnon 819-429-6022

"NEW" 2011 CHALLENGER LIGHT SPORT XS50, only 21 hrs. For Sale $45,000 TTSN 21, TET 6 Built professionally by the late Rob Lake of Lake Aviation Wing tanks Brakes, Heater
Upgrades include: Rotax 582 engine installed professionally September 2012 Flip-up nose cone hinge (Aeroloite Flight) for easy access to battery, panel wiring Custom fabric interior with pockets Hinged third door for easy entry and exit to cockpit Oil injection Strobe lights, wing tip lights from Kuntzleman Electronics upgraded Throttle assem-

bly from light Engine Services. Avionics: BECKER CCX 175 COM/XPDR COMPAC FALCON VSI2FM-3 VERTICAL SPEED BANKINDICBALLTYPE20-20M2010-00700 Falcon Gauge Voltmeter, 6-16V, 2-1/4. Model number is VM16-2Q. AmeriKing AK-350 encoder. Avcomm AC-2EX intercom TED antenna for the transponder 11-17995 Miracle Air Whip Antenna 11-03018 for the radio additional ram mounts. Contact Bev 613 478-2923 or bevie01@ho mail.com

PIEL EMERAUDE (ESTATE SALE) - This classic wood design was built by a skilled Tool and Die Maker and is covered and painted. It has been fully assembled but is now disassembled to fit into shop. Final inspection is required. The project includes: Lycoming O-235-C1 engine, 72" x 56" prop, overhauled Bendix magnetos, overhauled carb, fuel pump, new plugs, lightweight starter, lightweight Nippon Denso alternator with 4" pulley, complete exhaust system, 6 x 600 Cleveland wheels and brakes, autopilot, new Falcon-Gauge artificial horizon, new turn coordinator, altimeter, 12 V clock, 180 mph ASI, VSI, 2 fuel gauges, circuit breakers Magneto switch, new tachometer, manifold pressure gauge, oil pressure gauge, oil temp gauge, amp meter, volt meter, CHT gauge. Asking $10,000 OBO. Fly to the Midland airport (CYEE) and drive to the nearby location. Book the airport courtesy car at 705-526-8086. Contacts: Ian at 705-549-0572, Ray at 705-533-4998 or raa.midland@gmail.com

2006 ULTRAVIA PELICAN PL with Rotax 914 Turbo 115hp. 170 TT. Airmaster constant speed prop, Garmin GTX320A Mode C transponder, ICOM AC200. Grand Rapids EIS, Lowrance 2000C GPS; NAT intercom, dual controls, plus extras. This plane has always been hangared. $75000 OBO . rupertgruen@shaw.ca 250-763-9109 BC time zone.

Rotax 582 engine firewall forward. came out of a Zenair CH 701 - ONLY 25 HOURS since rebuild . Comes with- new muffler, engine mount for ch 701 c/w float fittings, carb main jet update , radiator and mount , GAUGES AND REBUILD WORK ORDER . Runs very well. $ 2,500. Magnetawan Ontario, 705-349-3555

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

CHEROKEE PA-28-140 with 160 HP factory engine, IFR certified, 6 pack, EI engine monitor, elect tach, VOR/ILS, ADF, KT76A transponder, 2 comm radios, audio panel, Metco tips with stobes, Trutrak auto pilot with alt hold, all ADs done, outstanding condition, all oil filters saved since TOH and available for inspection (no metal ever). $35K . more pics and specs call 519 371 4673 or email dmersich@gmail.com

TRANSFER TO USA FORCES URGENT SALE:
Zenith CH-200 59 hrs SMOH TTAF 460 hrs Avionics and interior - recent upgrades ($15,000 value). MGL V6 Com and Anennae, Garmin 327 Transponder. MGL Alt-4 Encoding altimeter, MGL ASI-3 airspeed indicator. Misc. wiring supplies, Zenith premade cabin seats with interior fabric, Stick grip model G1, carpet, glareshield, Todds Canopy. Vinyl wrap "HEXIS" used approx 30 yards of 60". Garmin hard wired GPS. Further info and pictures available on request. Contact Glen Muir at 647-297-3632, email gmuir@cott.com

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.

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http://www.ocis.net/tvsac/buyandsell.html - more ads from our Kamloops chapter
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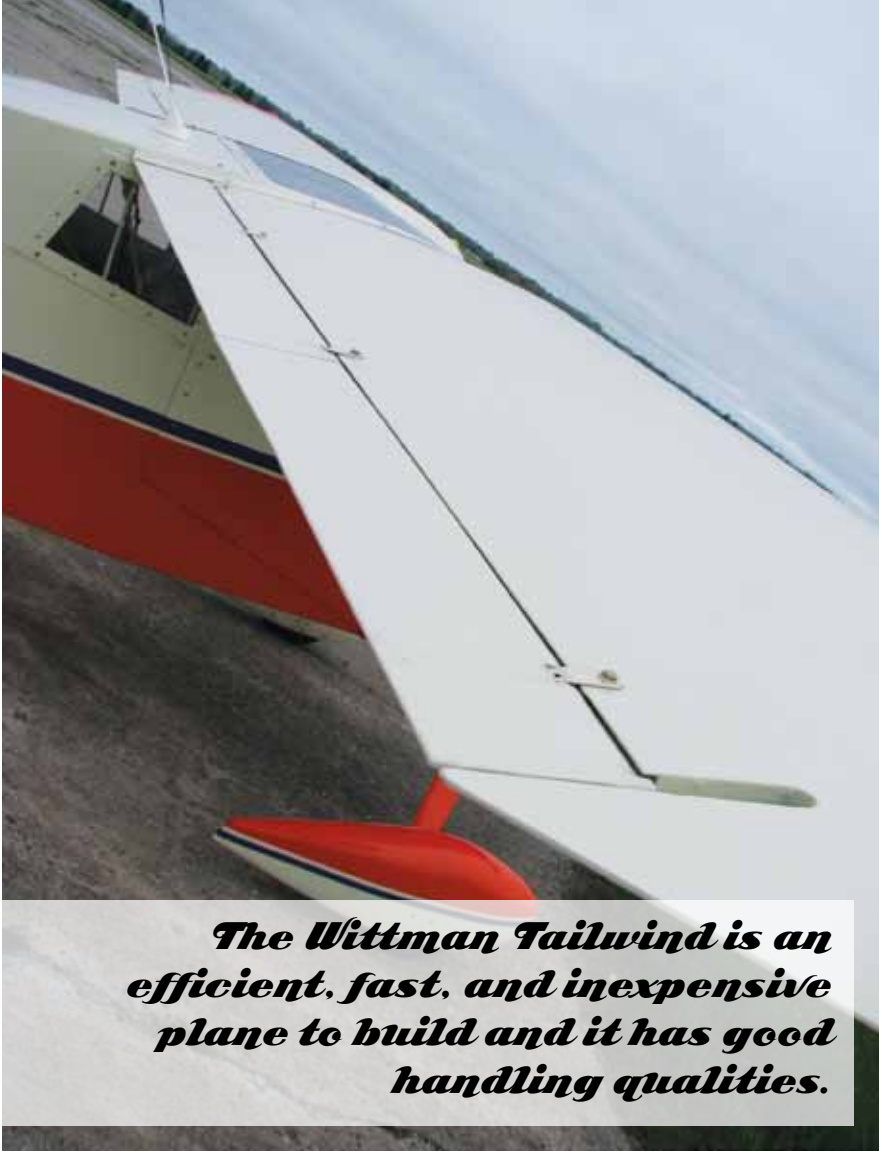

The Wittman Tailwind is an efficient, fast, and inexpensive plane to build and it has good handling qualities.

The Tailwind's control surfaces offer far more authority than their size suggests, though control feel is quite light. Tail surfaces can be small when the wing has only 90 square feet; the low rudder assists in picking up a wing. Bottom right, the son and father team of Chris (l) and Peter McHugh.

Tailwind / continued from page 27

comfort for tall pilots. The firewall moves forward 2" and the rear cabin doorframe goes back 2", allowing the seat frame to be moved rearward a similar amount. These changes allow a six footer to recline and stretch out his legs.

Another popular change is to build the wings from metal instead of wood. Callbie Woods sells his plans for $75 and although they are a bit sketchy in places the wings have become a popular change, especially if the plane is to be left outside. We have several members currently building metal wings to retrofit to their Tailwinds, among them Karl Wettlaufer and Ron Teal. Both report that the plans are rudimentary but workable.

For those who wish to build a Tailwind, plans and materials kits are available from Aircraft Spruce. There is no need to chase materials as in the old days; everything is now easy to find. The wood kit for the wing is ~$2400, and the tubing kit costs about the same. Landing gear legs are also available at ~$860. Plans cost $195.

Cartesian Tube Profiling in Stratford Ontario produces a complete set of fishmouthed and formed tubes for the W-10 at a current price of $3900. This kit has the Jim Clement mods that move the firewall and doorpost. The empennage kit is $500, and the partial landing gear mount tube kit is $350. Don Van Raay may be contacted at 519-273-6660 or www.cartesiantube.com .

Besides the materials suppliers there are many Tailwind builder groups on the internet. Yahoo Groups has several and there are others.

The Tailwind began the modern era of amateur aircraft construction and this year is its sixtieth anniversary. The Wittman Tailwind is an efficient, fast, and inexpensive plane to build and it has good handling qualities. It is a great testament to Steve Wittman's expertise that sixty years later the Tailwind is still a popular design.

RAA Executive Director NOMINATION FORMS 2013

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To Nominate National Executive Director, fill in name

Nomination for _____National Director

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Being an RAA member in good standing, accept nomination
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Note - Five Nominators are required; it is good practice to obtain several additional nominators in case of an inadvertent lapsed membership by a nominator.
Three seats on the Board of RAA Canada are expiring this years, and we need your help in running this national organization. Please photocopy this form and have five National members sign. Send it the RAA by September 1, 2013. The nominations will be posted in the July - August issue, plus on the Announce e-mail list, and the www.raa.ca website.

Complete the above, and send before Sept 1, 2013 to -
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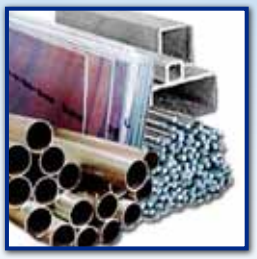
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