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RAA
RECREATIONAL AIRCRAFT ASSOCIATION
RÉSEAU AÉRONEFS AMATEUR CANADA

From The President's Desk

Gary Wolf

RAA –the Year in Review

A milestone this year occurred when longtime Quebec Regional Director Ray Fiset passed away. Despite his wheelchair, Ray worked tirelessly to promote amateur aviation, running welding seminars, setting up displays at fly-ins, and representing Canadian builders at Oshkosh. RAA is now in process of setting up a memorial plaque to be awarded to members in Quebec in the name of Ray Fiset.

RAA worked with CTV this summer to educate their reporter who had been planning an expose of the dangers of amateur aviation. Wayne Hadath and I spent several months educating the reporter on what the A-B category is all about, especially the inspection process that ensures that our aircraft are safe. Wayne even took the reporter for a flight in his RV-10 and showed that A-B aircraft are not just low end ragged little planes for people who cannot afford a real one. When the special aired this summer it had been largely changed into a positive promotion of A-B aircraft.

RAA spends a lot of time working to keep its members informed on safety issues, and the most important recent example has been the series of articles on the failures of ECI cylinders. Tom Martin deserves a lot of credit for writing these and it must be noted that until very recently there was no other aviation organization in Canada that made any mention of the problems, this despite that there have been fatalities resulting in the failure of these parts.

An airspace change that was influenced by the work of RAA was the recent clarification of Class E airspace, specifically its use by UL aircraft. Nav Canada had proposed blanketing Ontario with Class E with floors of 2500 and 3500 ft and RAA found out that when TC had approved the change they had misread the document, and assumed that these altitudes were AGL, when in fact they were ASL. The low ceilings meant that it would be impossible for an UL flight training unit to climb to safe altitudes to do upper air work, and Transport had missed this. Transport then had to write an exemption to 602.29 that clarified that UL aircraft may use Class E in the same manner as any other VFR aircraft.

RAA spent a lot of time with the TSB this year, beginning with their erroneous article in the ASL that blamed the wrong manufacturer for fatal crashes. Pressure from RAA resulted in a retraction and an apology from Transport Canada and a rewrite by the TSB.

There is an implicit bargain between RAA and its chapters – chapters are supposed to be a source of new national members , and in return RAA supplies insurance coverage for all chapter meetings and events.

During that period it became evident that TSB has little knowledge of what an A-B aircraft is, so there was a meeting in July to explain A-B to the Ontario Region TSB, and to encourage them to do more thorough investigations. It became evident that in most cases TSB does not even check their own records to see if there have been other crashes in a given type of aircraft. RAA has kept records of crashed aircraft for ten years and it was agreed that whenever there was an investigation RAA would supply

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features

columns

Tom Martin

On the Cover: A competitor does a high speed pass at the recent SARL/Rocket 100 races in Taylor, Texas. Glenn Watson Photo.

Van's Homecoming 2010

By Rob Prior / Photos by Liz Thornton

After putting 35 hours on Tweety this year, through fly-outs to Victoria, Oliver, Qualicum and Arlington, it was time to stretch our legs and go somewhere we'd never been before. The Van's homecoming was coming up at the end of August, and this is the trip we'd been sort of hoping to make all year, now that we have an RV of our own.

WE LEFT DELTA on Friday morning, first repositioning to Langley where we met up with the rest of the planes flying down, and then stopping to clear customs in Bellingham, WA. The entire EAPIS process went without a hitch; we even filed our Sunday return trip on EAPIS before we left.

From Bellingham to Independence, OR (7S5) was 1.7 hours of air time, on a pretty much straight line. Bremerton, Olympia, then direct to Independence. We managed a good day for it; we only had a little bit of rain over Bremerton, otherwise we had broken ceilings up above 4000' and enough sun to keep us warm without cooking us. The new Koger Sunshade did its job keeping what sun we had off our exposed skin. One thing we were reminded of while flying to Arlington, WA earlier in the summer is that plexiglass doesn't block UV!

At Independence we were re-united with our Canadian contingent, a total of 8 aircraft that made the trip from Langley or Delta for the event:

- C-FKEE - RV-4 "Speedy One" - George Serviss
- C-GOIV - RV-4 - Joe / Angela Schweers
- C-FNEF - RV-4 - Mike Neff / Jose Lins

Above: they don't call it Long Beach for nothing. Top right: Rob's RV at Independence, Oregon with Shona Hirota's Glasair off his port wing. Lower right: This island and lighthouse is at the very tip of the Olympic Peninsula between Makah Bay and Neah Bay. Opposite, Chris and Joan Cox' RV-7.

- C-FRBP - RV-6 "Tweety" - Rob Prior / Liz Thornton
- C-FCOX - RV-7 "Rosie" - Chris / Joan Cox
- C-GMCN - RV-7A "Swee Pea" - George McNutt / Elsie
- C-GTPC - RV-8 "Schooner 49" - Bryan / Marge Carr
- C-GSHO - Glasair I "Glasicat" - Shona Hirota

We visited with the other early arrivals, and then said good night and hopped in the planes for the short flight to Albany, OR (S12) for our hotel. Albany has a hotel (Comfort Suites) at the north end of the airport, with its own ramp and tiedown area. By the time we were all in bed, we had all 8 spots on their ramp full of Canadian planes.

Saturday morning we rose early, enjoyed the complimentary breakfast at the hotel, and then headed back to Independence. We arrived around 11am to a nearly overflowing ramp full of RV's. I didn't do an exact count, but if I had to guess I'd say we had somewhere between 50 and 75 planes. There were some excellent examples of every type of RV made, and a lot of the day was spent talking to builders and pilots about the RV experience.

Independence is a residential airpark, and many of the homeowners that live on the field make guest rooms available for the RV owners that fly in. We opted for a hotel in Albany just to be different, and to give us some more flying to do. It wouldn't be as much fun if we just flew in and parked for the weekend. There is a restaurant on the field at Independence that makes great milkshakes (and other food too), if you're ever in the need for one.

In the afternoon some of us went on a tour of the local wineries. Oregon is home to some nice Pinot Noir and Pinot Gris grapes, and we made sure to select a couple of bottles to bring back with us. It's hard to go wine touring when you can't swallow the samples, but somehow we found a way.

Saturday night we returned to the hotel and ordered Pizza, where we learned a valuable lesson. Here in Vancouver, three large pizzas will feed about 7 to 10 people, depending on their appetites. In the US, three LARGE pizzas will not only mostly cover a king-size hotel room, but they'll also feed 10 people, most of their children, and still leave enough leftovers to do the same thing again the next day. Really, they're HUGE. Still, the pizza was excellent, and it went wonderfully with the wine from the wine tour.

Right: tied down at Albany, Oregon. The Canadians filled all eight spots when they passed through.
Below: it's a pretty flight from Vancouver to Oregon. Here is rugged coastline north of Hoquaim, Washington State.

Sunday morning we rose late (did I mention the nice wines they have in Oregon?) dragged ourselves down for breakfast, and discussed our return trips. Some planes elected to take the direct route more or less straight to Langley. Rosie, Tweety, Glasicat, and the Schweers decided to head first for the coast, and then to fly north and see if it was possible to fly around the tip of the Olympic Peninsula. The clouds had rolled in, but the forecast was still for improving weather, so we elected to give it a go.

The lowest cloud we found was while clearing the ridge just before reaching the coast, just south of Tillamook, OR. After that, the broken cloud at 2500' remained pretty much steady all day, with clear skies below and occasional sunny patches to illuminate the amazing geography along the Oregon and Washington coasts.

We stopped for lunch in Hoquiam, WA (HQM), after 1.2 air time. Hoqiam has a long paved strip, an EAA Chapter clubhouse, Lana's Cafe, and an abandoned terminal building that we all parked in front of. After filling our bellies at Lana's, we called Canada Customs to give our two-hour's notice, Flight Service to file our cross-border flight plans, fuelled the planes, and then took off on the last leg of our trip.

The weather that continued to improve as we had lunch stayed VFR for us, and we had a wonderful flight around the tip of the Olympic Peninsula. There's a lighthouse there on an island that looks just like it was transplanted from Nova Scotia or Ireland. Simply amazing scenery, and I highly recommend this route to anyone who hasn't flown it before.

Arrival at Boundary Bay came after 1.5 air time, and was uneventful as always. Canada Customs didn't come to meet us and were satisfied with my arrival report so we started up again and flew back over to Delta to put Tweety to bed. The rest of the planes all flew back to Langley either directly or via Abbotstford, and arrived safely as well.

With all the little hops added in, the total for the weekend was 5.5 hours of air time (6.7 flight time), which is the longest trip we've made on our own so far in a small airplane. I could get used to this!

Now we look forward to our next trip... Oshkosh 2012? We'll see...

Seeking a Quiet Place

Jim Tyler

As a kid on the farm in the 1960's, my first recollection of noise levels high enough to damage hearing had to do with driving our farm's McCormick Deering W-4 tractor. I was probably 12 or 13 years of age and my tractor work usually involved pulling the cultivator during planting season. The damage was clear although temporary and the ringing sound usually went away by bed-time.

At the time, there were lots of local examples of middle aged farmers who had decades of this sort of noise exposure. Most had some degree of hearing loss and I expect many would not have passed an aviation medical due to their auditory impairment.

When I took flying lessons in the early 1970's at the London Flying Club, the equipment of choice was Cessna 150. No headsets were used for instruction. A centrally mounted speaker and a hand held mic were the standard ATC communicating devices. Unassisted voice was the instructor-student communication method and the volume varied with the age and power setting of the aircraft in use. Somehow it seemed to work OK with only long cross-country flights leaving some ringing in one's ears after the engine was shut down.

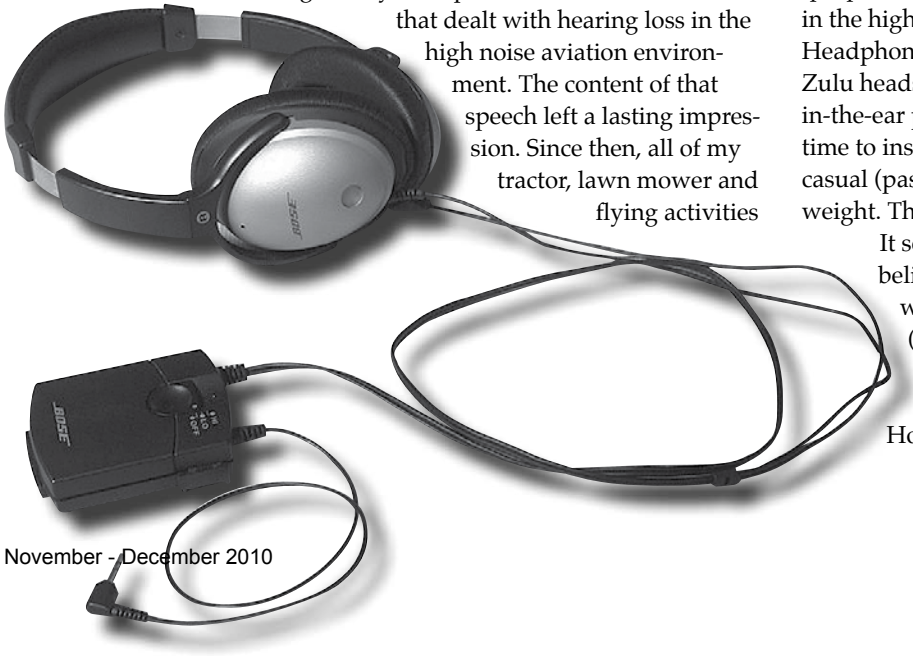
When I worked in Ottawa in the late 1970's, I had an opportunity to hear a speech given by an expert in aviation medicine that dealt with hearing loss in the high noise aviation environment. The content of that speech left a lasting impression. Since then, all of my tractor, lawn mower and flying activities have involved some sort of hearing protection.

When I first flew the Kitfox I built back in 1992, I purchase a couple of inexpensive Sigtronics headsets. They offered passive protection and did a fairly good job of dealing with the primarily high-frequency sound generated by the 2-stroke engine which powered the aircraft. I used them continuously for 18 years with the only maintenance being upgrades to the ear-cup seals.

The RV-6 I finished up last year, with its 0-360 straight-pipe engine installation, has different noise characteristics than a 2-stroke Rotax. For the first 50 hours, I used the Sigtronics headsets with OK results. I had always intended to try out an active noise reduction (ANR) headset in the RV and when I did, I found the noise reduction astounding. I purchased a Lightspeed Zulu headset and found it very comfortable, quiet and expensive.

The Zulu would make a good headset for my passenger. For years I had heard about in-the-ear style of headsets produced by only one or two companies. It seems they used expanding type foam earplugs and some form of hearing-aid technology. Anyone I talked to said they wouldn't go back to an over-the-ear style headset after using this style. I checked both promotional information and critiques on the internet and ordered a set of Halo Headphones from Quiet Technologies. For me, they are as good or better than anyone has ever claimed. The in-the-ear plug style is effective in reducing noise across a large frequency range and the radio/intercom sound quality is superb. The ANR "over the ear" style head sets seem to reduce lower frequency sound (prop, exhaust) really well and not so much in the higher frequencies (wind). The Halo Headphones are about 40% of the cost of the Zulu headset and they use no batteries. The in-the-ear plugs on the Halos take a little more time to insert and could be cumbersome to casual (passenger) users. Another advantage is weight. The Halos weigh less than one ounce.

It seems somewhat a leap of faith to believe that a one-ounce earplug set with a hearing-aid type of technology (and relatively inexpensive to boot) can be as good as the super-hyped and very expensive ANR headsets. However, I am now a believer! R



Syohta Tamura/Wikipedia

A True Emergency

When are you *really* in trouble? / by Barry Meek

A CRITICAL SITUATION is only an emergency to a person who thinks it is! An engine failure in an airplane flying at 5000' above the ground would be an emergency to a non flyer. The pilot however, would be scanning the ground below, looking for a safe place to land. And with 5000 feet of altitude below him, he has something like 7 or 8 minutes to put an act together. Not an immediate emergency at all.

In my 25 years as an ambulance paramedic, I've responded to countless "emergencies". When a caller who dials 911 thinks he has an emergency, an ambulance crew is dispatched with lights and sirens, speeding through the streets. When the crew arrives, 90% of the time they find no emergency, but someone who just thinks he is in serious trouble. This 90% can be verified by counting the number of responses with lights and sirens, and comparing them with the number of times the patient can be transported to the hospital without using the emergency equipment. Anecdotally I would say it is nine times out of ten.

Of course I've seen my share of real emergencies, and an engine failure is not what I consider one of them. My engine failure happened on a sunny, mild spring day while flying in the open cockpit of my Renegade. I'd been sightseeing in the mountains near Harrison Lake, over the Hemlock Valley ski area to be exact. After spending some time at 5,000 feet, I was in a gentle descent on the return trip to the Langley airport. The power was pulled back a bit, and the Rotax 503 seemed to like the lower RPM. Things were smooth as I entered downwind into the circuit and was cleared number two for landing on 1-9, behind a Cherokee.

That's when it happened. It wasn't a complete failure, rather a stumbling, and loss of RPM. I switched tanks first (no carb heat control on the 2-stroke), and then worked the throttle in and out. The sputtering continued, the engine

unable to "catch" and produce that smooth power I was comfortable with just seconds earlier.

My reaction was not what a they put on television shows. No fear, no panic, for this to me was not an emergency. Without a conscious thought, somewhere in my brain was the comfortable knowledge that there was an airport practically right below. That nanosecond reminder was certainly reassuring and allowed the mind to work elsewhere. Like on how to get the power back.

If not fear, then what? Anger! That's what. I was mad at that little airplane. After all the time, effort, money and labor I put into it, all I could think of was the damn thing had let me down! It up and quit on me!

Many hours of flying Cessna L-19 Bird dog tow planes for a glider operation had honed my skills at dead stick landings. Our procedures were get them up, then get back down a.s.a.p. for the next tow. Glider pilots aren't as patient as most of us. So it was always full flaps, power off descent and landings, one after the other. Dozens in a single day. I wasn't concerned about getting down in one piece.

I calmly informed the controller I would need priority landing. Just as calmly, he

In my 25 years as an ambulance paramedic, I've responded to countless "emergencies".

cleared me to land on 1-9. Since I was about midfield downwind, I informed him I would require priority on the grass crosswind strip as I'd lost power. Again he was calm, and said, "OK, cleared to land on the grass".

That rather annoyed me a bit more. No one else seemed to think I had an emergency. No trace of concern in his voice at all. Like this was an everyday occurrence. My moment of glory, I was about to survive an engine-out, and nobody cared.

I went ahead and landed on the grass strip, which was being used by the cadets practicing their soaring for the day. They were aware of my situation from the radio calls, but seemed just as nonchalant as several approached to offer assistance pushing me out of their way.

That done, they left, and I was alone beside the runway with my sick airplane. The non emergency was over. There were no fire trucks, no controller calling to see if I was all right. It was actually just... quiet.

But I was still mad at that Renegade. There was no adrenaline rush to cope with, no shaky knees, no deep breathing. I just needed to find out what went wrong. Float bowls were clean and the carbs seemed to function properly. Not much else to check really. After about 10 minutes, the 503 started and ran perfectly. I taxied back to my tie-down spot and left it for the day.

Although I suspect carb ice, I've never found what caused the problem.

So when is an engine failure a true emergency? Someone once said that an airplane is as safe as the ground it's flying over. Naturally, being over the mountains out of gliding distance to something flat and obstacle free, would create a very serious situation when that engine quits. Since my incident, more than ever, I make it a point to remain vigilant about landing spots. It's good practice to make mental notes of such places as you fly your route. These days, I've come to rely on my Cessna with the Continental engine, but will not completely trust anything mechanical to the point of thinking there will never be a true emergency in the air.

Barry Meek at bcflyer@hotmail.com

Carpe Diem

An Irish girl discovers the sky / Marissa Selman

HOW DID AN IRISH GIRL arrive in Steinbach South Airport, Manitoba to start her Private Pilots License training?

Within a day of each other, two strays arrived at Harvsair at Steinbach South Airport. No one knows for sure where the stray tomcat kitten came from but I had come from my home in County Limerick, Ireland via Duluth, Minnesota.

In order to initiate myself 'into the air' I decided to take my virgin tandem sky jump in Duluth, over Lake Superior before I'd arrive to Harvsair flight school. I think the effects of that sky dive have done their duty as I am still alive and still enjoying my flying lessons and still leaning out of my car window to see what plane is flying overhead.

My first lesson in the Citabria 7ECA was with Greg Royer and I enjoyed being in the front seat with the 160degree peripheral view, but that comfortable feeling was about to change.

The lesson went so fast, as we were coming down to land I was wondering what all the fuss about 'flying a airplane' was. Then bingo!!, in a flash, my eyes focused, my hearing sharpened, my mind cleared and I started to wiggle deeper into the back of my seat as if to somehow get further away from the runway – "ukay I ave coontrool" Greg said in his soft but clear south of France accent, "You have control" I responded. "O la la",

I thought, "focus Marissa, focus!" I whispered to myself, and had to repeatedly whisper it to myself for the remainder of my first week.

the voice of my father boomed in my mind, my stomach churned...

But during my first week I came head on and finally defeated my biggest challenge - the stall horn. "You don't want to stall your airplane, especially so near to the ground" - the voice of my father boomed in my mind, my stomach churned as the forces of lift and drag gave way to my instructions and we entered a stall. By the 3rd lesson I was confident enough to ask Greg did he want me to show him power on/off stall, "Oui, ov kouurse" he replied. That was a good indication to both of us that I had arrived past my comfort zone with stalls and could now get onto the next exercise.

To my biggest surprise the spins were no issue and I just wanted to do more of them. Would aerobatics be my new love? At times, when I did an exercise properly I got a clap from the back seat and to celebrate I, and the cat, would indulge in a little extra milk/chocolate milk that evening.

On my second last de-brief Greg had to lean across the table (as I was giving myself a hard time about not getting the landings smooth enough) "You are landing the airplane safely by yourself" he chanted 3 times at me – I blushed , leaned back in my chair watching his lips move, but still in shock that I WAS landing the plane, Wow! Having just turned 32 years of age, and with only a 12 hours of flight time, Greg had indeed thought me how to fly and land safely. I began to feel proud and humbled by his words, still knowing I had a very long way to go yet.

Now the cat and I sit purring to our hearts content each evening under the dusky Parries sunset reminiscent of our adventures of the day.

What a privilege too - to see the majestic bald eagle soar near by when I last came in to land. I long for it to happen again - Dreams do come true!.

Seize the Day - *Carpe Diem*, I said to myself as I went solo on November 13th at 09:13.

The Elegant Spitfire Elliptical Wing

Spitfire enthusiasts are apt to claim that the Supermarine Spitfire is the greatest and most beautiful aircraft ever to grace the skies of the world. Admirers of other classic airplanes may challenge this assertion, but nevertheless the Spitfire is right up there amongst the most admired aircraft ever built.

BY DON HATCH

THIS IS DUE in no small part to its characteristic elliptical wing. A fact not generally known about this elegant wing is that it may never have been developed without the skills and talent of the Canadian aeronautical engineer Beverley "Bev" Shenstone. In the early 1920s, the still to be named RCAF, (that occurred in 1924) instigated a Provisional Pilot Officers (PPO) program, whereby candidates were drawn from Canadian universities to be trained as pilots during the summer months while attending college. These were the first new pilots trained since the Armistice in 1918. Bev Shenstone, a University of Toronto engineering student, joined the program in the mid 1920s. He graduated in 1929 as the University's first student to earn a Masters Degree in aeronautical engineering.

With the advent of the Depression the PPO program wound down. This caused Shenstone to bypass an air force career and instead he found work in England. He soon was off to Germany to work for Junkers Air-

craft where he gained a strong knowledge of cantilever and smooth metal-skinned wings. In 1931 he returned to England and joined Supermarine Aviation Works, working for the famous chief designer Reginald J. Mitchell.

As late as the early 1930s, the RAF still preferred that fighter aircraft be biplanes. In spite of this requirement, Supermarine was experimenting with a tapered-wing monoplane design that paid off in 1934 when the Air Ministry called for the design of an eight-gun fighter with a speed not less than 275 mph. This led to the Type 300 Spitfire prototype with its novel elliptical wing. The man most responsible for this thinner type of wing was Canadian Bev Shenstone. None other than Mitchell's son Gordon, who has written one of the significant histories of his father's life, gives full credit to Shenstone for the Spitfire's wing. He has stated that his father, despite advice from certain specialists, moved on to the elliptical shape and thin wing that Shenstone pushed for. It was Bev's background and understanding of aeronautics, combined with his knowledge of construction methods and emerging technological trends outside England, that contributed to the success of the wing.

And to boot, it looked nice. Shenstone would say in later years that the ellipse just happened to be a platform that did the job the best. It was simply the shape that allowed the thinnest possible wing with sufficient room inside to carry the necessary structure, including a retractable undercarriage, and the armament. And, of course, the thinner wing produced high lift and less drag. One need only look at the contemporaneous Hawker Hurricane to see an example of a thicker wing, still fabric covered, to see how innovative the Spitfire wing truly was.

Although the design imposed construction challenges, these were overcome and Shenstone credits Joe Smith, in charge of industrial design, for overcoming the problems and contributing to the success of the Spitfire. There have been many books written about all different aspects of the Spitfire, but those dealing with design tend to give most of the credit for the aircraft's design to Reginald J. Mitchell. Few mention the contribution of Beverly Shenstone, but he is undoubtedly significant among those who made the Spitfire what it became. Full and rightful recognition awaits the Canadian who made the Spitfire slick, slippery and smooth. **R**

Reprinted from the RAA London/St.Thomas newsletter ***Slipstream.***

George Gregory

Flying At Aft CG

Or, Exciting the Phugoid / By Chuck Berthe

RECENTLY I ASSISTED a friend flight test his RV-6. But before we get to the flying part, we should lay some ground work and define some terms, to understand the procedures and results. CG placement affects the stability of the airplane. There are 3 categories of static stability; positive, neutral and negative. In each condition, the stick, or "pitch controller" in test pilot lingo, performs a different function.

Positive Static Stability:

An airplane is usually designed with the CG forward of the center of lift (CL). The CL is the result of all lift developed by all surfaces. The major contributor is the wings, but lift is also developed by the fuselage and tail. The aircraft is trimmed by moving the CL forward to match the CG, usually accomplished by adjusting the elevator position. However, any change in lift generated by a gust or change in angle of attack, will act at the original CL.

Consequently the aircraft acts like a weather vane. When deflected from its trim condition it will weather cock back. This is called "positive static stability." Dynamic stability is how the aircraft returns to the trim condition, i.e; does it return rapidly or does it return slowly and overshoot the trim condition several times before settling down?

It turns out that the degree of static stability, i.e; how far ahead of the CL the CG is, determines the character of the dynamic stability. The lower the level of static stability (the closer the CG is to the CL) the slower the aircraft will return to the trim condition.

Two dynamic modes are evident in aircraft with positive stability: the long period and the short period. The long period can be observed by raising the nose from the trim condition for a time sufficient to change in altitude and airspeed. When the pitch controller is released, the nose will slowly lower to below trim condition and as that speed is reached the nose will rise and overshoot and repeat the process a number of times until the motion finally damps out. This long period requires approximately one minute for each cycle. It is lightly damped and will overshoot 5 to 15 times before it settles down. This is why we can't simply trim once on a long flight and forget it. Any gust or bump sufficient to change the attitude or airspeed will excite the mode and oscillations will occur. We normally stop these excursions by re-trimming, until the next gust occurs.

The short mode has a period of 1-6 seconds and is normally so well damped that we don't notice it as an oscillatory mode, but more as a measure of the degree of quickness for making small changes in nose position.

As static stability is reduced or the CG is moved aft, the frequency of these dynamic modes will reduce. That is, the aircraft becomes sluggish and slower to respond to inputs as the forces required to move the nose will become lighter.

What the Pitch Controller Controls: When positive static stability is present the pitch controller controls Angle Of Attack (AOA). When the pilot applies force the airplane will respond with a change in AOA proportional to the force applied. This can be observed by applying a change in trim. The airplane will settle at a new airspeed and a new AOA. An advantage of the AOA command system is that the force required to maintain the new AOA is proportional to the change in angle of attack, and thus to the change of speed.

During landing, AOA is proportional to sink rate, so the pilot can change sink rate by changing force on the stick. If sink is too high we simply apply more back pressure, if too low, we reduce back pressure, then reflare.

Neutral Static Stability

Neutral static stability occurs when the CG is directly over the CL. This could be caused by design, but in light aircraft, the cause is generally improper loading.

stop accelerating, but continue to diverge at the highest rate attained. As if things aren't bad enough, pitch forces will be very light, taking very little force on the controller to achieve an attitude and rate that is unrecoverable. This mode is why the designer, regulators, and pilots are interested in CG location. It is possible to load your airplane in a way that it will be impossible to control.

What the pitch controller controls: Here, the controller controls pitch acceleration. If the pilot applies a back force the nose will pitch up at an ever increasing rate until the force is removed and then will continue to pitch up at the fastest rate achieved. The pilot cannot leave control inputs in very long. Control can only be achieved by making small pulsing inputs in both directions. An input to raise the nose must be countered by an equal input in the opposite direction and then a period of no input. Pitch rates can be achieved that are too powerful for the elevators to overcome.

Weather cocking: When CG is located directly over CL, there is no weather cocking tendency because there is no lever arm between the two. The airplane stays at any pitch attitude selected and will not tend to return to trim AOA. The nose will stay wherever the pitch controller puts it.

Dynamic modes: At neutral stability, there is no short period mode. There are 4 dynamic modes, but the dominant one is a stable first order mode (no oscillations).

What the pitch controller controls: In neutral static stability the pitch controller controls pitch rate. Back will cause a pitch rate proportional to pressure applied. When the control input is released, pitch rate goes to zero. This is desirable in roll, but in pitch it can get us into trouble. Controller force now only tells us how fast the nose is pitching, nothing about airspeed. Good news, bad news. The nose will remain where you put it, but without close attention to power and airspeed, this could result in problems like inadvertent stalls or airframe over speeds.

Negative Static Stability

When the CG is behind the CL, the result is negative static stability.

Weather Cocking: Here, weather cocking tendency is negative. The airplane will attempt to swap ends. Just how fast depends on the degree of instability. It is possible to fly with negative static stability, but only if end swapping takes several seconds and if there is adequate control power. Landing in this condition is difficult to impossible.

Dynamic Modes: There are now 3 dynamic modes. The one that gets the pilot's attention is a first order divergent. When the pilot makes an input, the nose will continue to accelerate until the pilot removes the input. The nose will

Flight Testing For CG Effects

Dave Weston's RV-6 has a 160 Lycoming with a lightweight starter, driving a wood prop. We decided to explore various loading conditions he might encounter. Our goals were: first, to determine the CG limits of this particular airplane, and second, to check the validity of Van's published CG limits.

First Data Flight: (two pilots, full fuel, no baggage)

This condition gave a CG of 75.8" Van's limits are 68.7" forward and 76.8" aft, putting us 1" forward of the aft limit. My normal takeoff technique is to conduct the entire maneuver in a 3 point attitude. If I'm concerned about aft CG, I prefer to raise the tail early in the roll to check for adequate elevator power. The fact that the tail can be raised at a low airspeed gives me confidence that there is enough elevator power to control the aircraft even in unstable conditions. The take off ≫

U of T Ornithopter Flies

On August 2, 2010, a University of Toronto graduate student successfully piloted the first human powered ornithopter in continuous flight. Todd Reichert, who's a PhD candidate at the U of T's Institute of Aerospace Studies flew the aircraft for 19.3 seconds of sustained altitude and airspeed and covered a distance of 145 meters. The average speed was 25.6 km/hr.

The flight, which occurred at Tottingham's Great Lakes Gliding Club, was witnessed by the Canadian vice president of the FAI, the governing world body for aeronautical world records.

The aircraft weights a little more than 42 kilograms with a wingspan of 32 metres. The aircraft motive power comes from the pumping action of the pilot's legs. Pulleys and lines, combined with the elasticity of the wing spar translated this pumping action into the wing's flapping action. "The aerodynamics and the stored elasticity of the wing spar would bring the wing back up. The down stroke was the human-powered part – that's how birds and bats fly." explained Professor Emeritus James D. DeLaurier when interviewed by the Toronto Star.

A video of the flight may be seen at http://www.vimeo.com/album/1199179

was done this way and only moderate forces were required to raise the tail.

Our first task was to check stability in climb. We trimmed to 130 mph. I then applied back pressure and raised the nose 10° until the speed bled to 120. The force required to raise the nose felt normal and some pressure was required to hold 120 mph. Both of these data points indicated positive static stability. Back pressure was then released. The nose lowered and continued past the trim attitude until the trim speed of 130 was reached, where it began to raise again. I was careful not to apply any fore and aft forces to the stick. What we had done was to excite the Phugoid. The fact that it did exist was further verification of positive static stability. We allowed this long period motion to continue for another cycle to assure it was self-damping.

Cruise: We leveled at 5000′ and trimmed for 150 mph cruise. We then repeated the climb tests with similar results. Then, to quantify positive static stability, I asked Dave to roll into a 60° bank and comment on the stick forces required to maintain the level turn. He said they felt normal. This indicated a reasonable level of static stability.

Slow Speed: We slowed to 70 mph with full flaps. The airplane exhibit good static stability.

Landing: Dave's landing was well controlled, with a smooth touchdown.

Second Data Flight: (2 pilots, full fuel, 251bs baggage). We placed 25 lbs against the aft bulkhead. With this CG was .4″ aft of Van's limit. On takeoff, I attempted to raise the tail to check elevator authority. The tail came up without full forward stick, but it required a little more effort.

Climb: Conducting the same checks as before gave the first indication of neutral stability. Pitch forces were light. When the nose was raised 10° the airspeed slowed to 120, and remained there when the stick was released.

Cruise: We repeated the maneuvers of the first flight and the airplane demonstrated very slight positive stability. There was still a phugoid, but the airplane was very slow to return to trim speed. The short period was so slow I couldn't put a number on it. Stick forces in steep turns were light. It was to keep the airplane in trim when cruising.

Slow Speed: At 70 mph with full flaps the airplane exhibited precise neutral stability. Both modes disappeared. The stick was pure pitch rate controller. When stick forces were removed the nose would stay where it was. There was no requirement to trim for different speeds. Pitch forces were light, taking effort not to over control. We discussed the problems this would present on landing. Speed control would be difficult because there would be no feedback through the stick. There would be a tendency to float and forward pressure might be required to touch down.

WHAT DAVE LEARNED:

- Van's CG limits are valid
- Don't mess with aft loadings
- Install a "man sized" starter and move the strobe power pack out of the tail
- Start saving money for a constant speed prop

WHAT I LEARNED:

- Van's CG limits are valid
- Don't mess with aft loadings

WHAT YOU SHOULD HAVE LEARNED:

- Van's CG limits are valid
- Don't mess with aft loadings

The Landing: Conditions were ideal and with Dave paying attention to airspeed, the landing went well, although the touchdown point was not precise. Had conditions not been so perfect I suspect the result would have been different.

Third Data Flight (2 pilots, full fuel, 55 1bs baggage.)

A significant part of my vocation is flying unstable aircraft. I learned this in planes where pushing a button returned a stable configuration. Many times I lost control and that button saved us. In addition I had flight tested my RV-3 and RV-4 at this CG point and had a good idea that we could control it. I certainly wouldn't advise doing this without this background. For this flight we put 30 lbs just behind the seats. The CG fell at 79.6″ or 2.8″ aft of the limit. On takeoff it took significant pressure to raise the tail, but adequate travel remained, so the takeoff was continued.

Climb: Signs of instability were quite evident. Gusts tended to heave the airplane rather than pitch the nose. Pitch forces were very light, and when applied the nose would diverge slowly after the force was removed. We held further testing till reaching a safe altitude.

Cruise: We leveled at 5000′. Trimming was difficult and

continued on page 37

Registering a Damaged Advanced Ultralight

Are some wrecks beyond fixing? by Gary Wolf

ON TWO RECENT OCCASIONS members have asked about buying an Advanced Ultralight (AULA) that has had an accident and needs repairs. This is a situation that is much different from buying a damaged Amateur or Basic Ultralight (BULA) aircraft, and the reason is that the AULA category has a design standard and each plane must continue to meet its manufacturer's type definition.

To transfer registration of an AULA both the vendor and the purchaser must sign a Fit for Flight (FFF) document (see the sample document on opposite page) that affirms that the plane continues to meet the manufacturer's type definition. If the plane is in damaged condition it is illegal for either party to sign the document, so the purchaser then has no way of registering the plane as an AULA. In both cases I have advised the members that they would be heading for difficulty if they buy a damaged AULA.

If someone does buy a damaged AULA, what does he really have? Without a signed FFF document all he has is a pile of parts that resemble an airplane. The plane cannot be registered as an Amateur Built unless the owner uses fewer than 51% of the parts as the basis for the fresh build of a new airplane, a process that is much more complicated and expensive than the average buyer of an AULA is usually looking for.

The new owner could decide to go ahead with repairs using manufacturer-supplied parts and manufacturer-approved procedures, and then approach the vendor to sign the FFF document. The vendor might want to have some assurance that the repairs were done properly before he assumes liability by signing the FFF document. Or he might decide that there is no personal advantage in doing this and he could just refuse to sign anything. Without the FFF document the plane cannot be registered as an AULA, and it is heading for lawn ornament status.

There is still one avenue for registration and that is the Basic UL (BULA) category. There are a few pitfalls to this one too. If the plane in question was previously registered at the AULA category limit of 1232 pounds it will have to give up 32 pounds of payload to become registered at the BULA category limit of 1200 pounds. If the plane in question is a two seater with 100 hp the Minimum Useful Load (MUL) requirement means that the empty weight as a BULA cannot be more than 800 pounds.

The short answer is that if someone is offering a damaged Aula for sale it had better be very cheap.

Assuming that the empty weight of the plane is 800 pounds or less, registration as a BULA means that it loses the privilege of carrying an unlicensed passenger, the main advantage of owning an AULA. Also the crew must wear helmets while in flight, a bother to some. On the plus side, registration as a BULA is simple and cheap. There is no design or build standard so registration is just $110 with a signed statement and registration form, and a photograph of the data plate. The real downside in registering as a BULA is the loss in value – losing the passenger carrying privilege means a loss of $10-15K if the plane is ever resold.

The short answer is that if someone is offering a damaged AULA for sale it had better be very cheap.

See page 18 for a Fit to Fly form.

Fit for Flight Form / Advanced Ultra-light Aeroplane

Aeroplane

Registration: _____Make: _____

Model: _____Serial No.: _____

Manufacturer: _____

I certify that the custody and control of the advanced Ultra-light Aeroplane described herein has been transferred to (name of new owner)

The aeroplane has been maintained in accordance with the Manufacturer Specified Maintenance Program, all mandatory actions have been completed, and no modifications have been made to the aeroplane without the written approval of the manufacturer.

_____ _____
Signature of Registered Owner Date

I hereby accept the custody and control of the advanced Ultra-light Aeroplane described herein and have inspected the aeroplane and have found the aeroplane to be as described by the registered owner and is fit for flight.

_____ _____
Signature of New Owner Date

Across Canada

RAA Chapters in Action

London/St. Thomas

The November meeting was held at the 427 Wing Building at the London Airport.

Tom Martin and Gary Wilcox recently participated in the Tennessee Valley Air Race in Alabama. Gary had a minor problem during the race and did not finish. However Tom had a personal best speed of 270mph. Only 3.7 hours of flying time from St. Thomas to Alabama was not too shabby either.

Under the "name that part" contest no one was able to identify the pumpkin delivery device that was put to use during the Alabama event. Jim Tyler related his experiences with various noise reduction headsets he has been trying in his two planes, everything from Sigtronics to Lightspeed to Noisebuster. His favourite is an in the ear unit made by Quiet Technologies. The audio is crystal clear and sells for about $350.

Howard Faulkner reported that there will be an upcoming meeting in Seaforth regarding the Talbot Wind Project. This proposal calls for 43 windmills to be built near his airstrip despite the potential health effect concerns of sub-audible noise.

Angus then introduced the guest speaker Mr. Jim Benham from Trenton speaking on the recovery and restoration of Halifax bomber NA337. This aircraft was built in 1945 and designated for special operations, which meant that it had certain modifications such as no mid upper gun turret. He started off by giving a chilling account of the night it was shot down while its mostly Canadian crew was delivering drop canisters to the Norwegian resistance. It ditched in Lake Mjosa, Norway where it remained under 750 feet of water until being recovered and returned to Trenton in 1996. Approximately 50 volunteers began the restoration process, obtaining parts from some rather surprising sources. Bomb bay doors came from a monastery in England and the rear section of fuselage came from Norway where it was being used as a chicken coop. Staff at Trenton Air Base pitched in and undertook the painting of the aircraft to its original paint scheme. Jim's slide show took us through the restoration process which is now essentially complete. NA337 has been moved into its permanent home at the National Air Force Museum in Trenton and leftover monies have been turned over to the museum for perpetual care of the aircraft. Angus then thanked the Mr. Benham and the members retired for coffee and more discussion with our guest speaker.

Charlie Murray

RAA - Toronto

Bill Tee introduced the evening's speaker. Mr Ron Newberg who spent a number of years in the insurance business. He met Herb Cunningham, a former president of our chapter back in the early 1960's at the old Brampton field, and they got into the aircraft salvage business together. Ron goes back to the original homebuilt scene and has been experimenting with

New Website Online

RAA's new website is online! We hope to add many features over the next while to enhance the value of your membership. The URL is the same at raa.ca.

Members are encouraged to send in news and chapter happenings for postings on the site. Get the word out, and check frequently for news on upcoming events.

We are hoping to eventually include a forum, online classifieds, and the ability to renew online.

Any suggestions and ideas for improvements are welcome and can be sent to George Gregory at gregdesign@telus.net. Stay tuned for further developments!

RAA Office Move

RAA is on the Move! The office has been relocated, so please bear with us. New contact information is: Phone 518-648-3030 or 1-800-387-1028. email raa@raa.ca

The new mailing address is: 22 - 4881 Fountain St North, Breslau On. N0B 1M0

Kamloops area flyers were active *in November. From left to right: Dave Jones DJ-14, Dan Nelson's PA-18, Ken Martin's Raven and Bart Lalonde's Super Cub. Above, Cam Villeneuve's spectacular shot of Shumway Lake. Cracks in the ice let water to the surface producing interesting patterns.*

vortex generators (VGs) on various aircraft. He showed slides to demonstrate effects on various types. Ron is president of Canadian Aeromanufacturing which owns Niagara Air Parts. He has also been doing investigations into use of autofuel in A/C. Ron was accompanied by Doug Ronan of Doug Ronan Aircraft Sales since the two of them have been working on the vortex generators together.

Ron explained how the VGs create a small tornado, helps the air cling to the wing at increasing angles of attack. Moving VGs forward on the upper surface give the wing a high stall angle and high-speed drag. Moving them back provides a low stall angle and low high-speed drag. VGs make little difference on the vertical stabilizer. A major feature of VGs is their contribution to stability and safety. They make the aircraft less twitchy at the approach to stall and cause a gradual transition. 'VGs bring the wing alive'. Significantly increased climb rates are obtained, and Ron had slides to demonstrate the short take-offs and climb attitudes. He encouraged anyone to experiment with VGs and document the results with pictures of inexpensive wool and stickers (like he obtained at the Dollar Store) during various flight regimes. Slides showed the effect Ron obtained before and after VG installation.

The speaker was thanked by Bill Tee for an informative and animated talk extolling the virtues of VGs on Aircraft.

Break for coffee and D'oh nuts when everyone inundated Ron with questions about VG application.

After the break, everyone got the newsletter, there were no new members, and one visitor, George Christie, with a Murphy Rebel which he is going

to get airborne again. For first flights we had Ron Teal with a refurbed Stits Skycoupe which he imported from the States. Three years of paperwork has dampened enthusiasm for importing as a fast track to flying. Congratulations Ron on getting airborne!

Chapter 85 Vancouver

At the November meeting our speaker was none other than Dr. Dave Marsden, formerly of Edmonton, and now a member of Chapter 85 and designer of the Skylark sport aircraft. He gave an enlightening presentation on the aerodynamics of wing tip vortices and the use of winglets to reduce induced drag.

Thompson Valley Sport Aircraft Club

Having fun! That's what recreational flying is all about! A number of fly-outs were enjoyed by local aviators recently. In early November Dave Jones, Bart Lalonde, Ken Martin and Dan Nelson were landing on the sand bars on the North Thompson River by Vinsulla; After being grounded by weather for an interminable time Cam Villeneuve finally "slipped the surly bonds" to explore Sugarloaf, and a day later Gerald Gibbons went for a hop after digging his airplane out of its hanger at his home (nice problem to have). Several of them then headed out for a tour of local spots on that and days following, including Beaver and Shumway Lakes

RAA Winnipeg

Congratulation to Harry Hill, this year's winner of the Arro Award. Harry was one of the founding members of our chapter, often holding chapter meetings in his home for the fledging organization. Harry served as chapter president for several years. Harry started his aviation career in with the Canadian Air Force then after leaving the military completed a Engineering Degree at university then joined Pratt and Whitney Aircraft. Harry then worked for the Transportation Safety Board as an Aviation Safety Investigator. Harry is always willing shares his knowledge, numerous contacts and continues to contribute to the aviation community in general and our chapter in particular. Harry is definitely a deserving recipient of this year's Arro Award. Congratulations Harry.

Congratulations are also in order to Rick Riewe, Jill Oakes and Vic Prefontaine on the completion and First Flight of Rick's Land Africa. Their first flight took place on June 2, 2010.

Coming Events

RAA Winnipeg Rust Remover

RAA Manitoba, COPA Flight 35, CASARA Manitoba and MAC annual Rust Remover will be held at the ANAF Veteran's Hall, 3584 Portage Av in Winnipeg Thursday February 3, 2011 at 7PM. Presentations will be by Nav Canada and Transport Canada with names and topics to follow

Winnipeg Composite Course

Steve Sadler will be giving a composite construction course on Saturday, November 20th in the RAA hanger. Steven's hands-on presentation will begin at 9:00am and will end at approximately 15:00. He will be covering mould construction including hot wire cutting, use of different types of cloth including carbon fibre, Kevlar and fibreglass. Also a brief review of various types of resins will be covered and their use.

During the class we will make a mould, do a lay-up, and practice finishing techniques.
Please give Steve a call at 736-3138 or e-mail him at steven244sadler@gmail.com if you are planning to attend. Bring a lunch and work clothes. All other supplies will be provided.

Saskatchewan Aircraft Adventure

Last year more than 200 adventurers flying 100 airplanes made an outstanding trip
to the Yukon in what was the largest group flight in Canadian history.
The Century Flight Club will conduct the third annual 100 aircraft flight on July 16 - 23, 2011. This time into Canada's northern wilderness.
Registration is $695.00
($595.00 for registrations booked before Dec.1.2010)
Call or go online now to register!
Limited to 100 aircraft.
1-778-297-7377
WWW.CROSSCANADAFLIGHT.COM

November 21, 2010 is the date for the Rocket 100 Race. It is the last race of the SARL (Sport Air Racing League) season and a race I look forward to each year. It takes place in Taylor Texas which is just outside of Austin and is the Homecoming for F1 Rockets. It is the home airport of Mark Frederick who is the designer of these wonderful F1 Rocket flying machines. It is also the home airport for Mike Thompson who is the ti
SARL.
This year there were 48 airpl
There were two T38 ‘s, one F
in the line up. Next to the A
largest field of Racers that I
There were three racers leav

{Last}Chance

By Wayne Hadath

ireless volunteer who started

lanes registered for the race.
P51D Mustang and 7 Rockets
Air Venture Cup, this was the
have ever seen.
ing from Ontario.

Jo Hunter Photo

Tom was last year's winner of the Rocket 100 and holder of the 2009 "Fastest Rocket in the Known Universe Award." He was looking for a chance for a repeat and a chance to best the T38s and the Mustang. He was traveling with Ed Perl who was the man in back, tasked with the group's overall navigation and travel needs. This means not getting us lost and making sure that when we landed for the day there were services and entertainment for our needs. He almost lost this responsibility once before on a previous trip when he put us in a dry county for the night. The horror!

Gary Wilcox was flying his fast RV 7 named "Heinz 57". He was traveling with Ed's son Brahm. Brahm is 21 years old and is a Commercial Pilot who has flown Float Planes up north and is working on his helicopter license. He was tasked with making sure we kept air regulation violations down to a minimum.

I was traveling alone in my F1 Rocket "Little Bit". Traveling alone meant that I was by default tasked with carrying as much cargo as I could. When it was all loaded it sure felt like I had a man in back. One of the difficulties of traveling to Texas at this time of year is you never know what weather you will experience. It could be hot and sunny like the Caribbean or freezing and windy like Northern Ontario in February. Pack everything from sandals to parkas. I placed third last year in the race with a good run but not good enough to beat my arch nemesis, Major Greg Nelson with over 2750 hours flying U2's. His award-winning F1 was always the fastest until Tom finally beat him last year. He took me by 2 mph last year and I was looking forward to the opportunity of another shot at him this year. Greg is a good man to chase. He has built a beautiful and fast F1 and is well trained with a lot of flying experience, and he never makes a mistake. If you can beat him it sure means something.


Glenn Watson

THE JOURNEY OUT

For weeks we had been watching the weather. We had a straight line distance of over 1300 miles to cover with a race briefing Saturday morning at 8:30. With this distance, direction of travel and the time of year we were

Left: Gary Wilcox' fast RV-7. Below, Wayne's Rocket Lil'Bit (left), and Tom Martin's EVO Rocket. Opposite: Not everything at Taylor was a Rocket: several SX-300's, a P-51 and Tailwind were in attendance as well as numerous other types.


Glenn Watson


Glenn Watson


Jo Hunter

Glenn Watson

Ernie Butcher

pretty well guaranteed we would be traveling through multiple weather systems. It would be very unlikely that we would be able to take a direct path due to the weather and this would extend our time enroute. With the F1 Rockets together this would, depending on how lucky we got with the winds, be around a 6 hour flight with one Customs and one fuel stop. Traveling with an RV 7 with its lower cruising speed and smaller fuel tanks it would require, depending on winds, more than 8 hours flying with one Custom stop and fuel stops every 2 hours. At this time of year weather around the Great Lakes it is always a concern and here in Kitchener it is not uncommon for us to get morning fog lasting until at least noon, long after all of South Western Ontario has cleared. It was the last long cross country of the year for all of us. We had all decided that we would leave as early as needed to make sure we made the race. We tentatively planned that we would spend Thursday night in Austin, Texas, a city none of had been to and we wanted to explore. Friday during the day we would attend a Formation Clinic in Taylor and prepare the planes to race. Friday night we would attend the Racer's Welcome Dinner. Saturday we would race in the morning and get a ride in a B25 Bomber in the afternoon. Late Saturday afternoon we would attend the SARL Year End Award presentations and Saturday evening we would attend the F1 Rocket celebration at Mark and Cheryl Frederick's home. Sunday Morning we would depart Taylor for the trip home.

In the days leading up to our departure it became obvious that the weather was at best unsettled. Forecasts for our route changed pretty well by the hour. Sometimes

One of the difficulties of traveling to Texas at this time of year is you never know what weather you will experience.

there was beautiful weather all the way and sometimes weather which would require large deviations. It soon became apparent that if we were going to make the race, let alone our additional plans, then we had better be packed, planes fueled and ready with paperwork prepared, for an immediate departure should our weather window appear. Wednesday morning came and we were still at home on the ground. It looked as though a window would appear from London south around noon but it may not happen at all in Kitchener. Winds were blowing 26 knots gusting 30. The strange thing about the winds is they were 6 knots near Chatham which is just 50 miles south of Kitchener. We decided that we would make Customs Clearance appointments at 1:00 pm in Toledo Oh at Metcalf Field. (KTDZ). If I could not get out of Kitchener, Tom and Gary would continue on and hopefully I could catch them later enroute or in Texas. Weather is a funny thing and even though weather technology in imagery and forecasting has vastly improved in the past few years, it is by no means an exact science. An example of this is the Weather Underground satellites that showed no precipitation from Kitchener to Toledo but Intellicast and XM Weather (I have XM Weather on my Garmin 696

Jo Hunter

GPS) showed heavy rain between London and Woodstock as well as south to Lake Ontario. At 11:30am Kitchener was reporting 2700 MSL with 6 miles visibility with heavy winds from the south. I decided to take off and fly south to Lake Ontario to avoid the rain and follow the lake to Toledo. My F1 Rocket is a clipped winged aircraft with heavy wing loading. The down side of this is the high stall speed but the upside is the ability to handle rough air very well. Due to the high winds and low ceilings the air was extremely rough, rougher than I had ever experienced: so rough that I decided I would not try to key in the Toronto frequency for flight following until the air got smoother. As soon as I took off I could tell that the reported ceilings were accurate but I could also tell that my XM Weather was not. I decided to fly south to the 401 and follow it westbound. My experience with XM Weather has taught me that the clouds may or may not be where they show but up until now participation has always been accurate. There was no participation all along the route. I was able to contact Tom and Gary who were already in the air about 50 miles ahead of me. They reported clear skies and reduced winds just west of London. 15 minutes later I was at 4500 feet under Toronto control in smooth air grounding 200 knots. After another 30 minutes I was landing in calm, clear, warm weather at Metcalf Field in Toledo OH. Clearance took a total of 15 seconds with the Border Officer calling me "Sir" and wishing me good luck in the Race.

Jo Hunter

Above: Greg Nelson taxis out with another competitor. Left: Not everything there was a Rocket. One of several SX-300's competed in the race. These are seriously fast aircraft

GOING SOUTH

I have crossed the border many times from southwestern Ontario and I think I can fairly say that it makes a big difference as to which Port of Entry you chose to use and what

experiences you should expect. I have decided it is way more pleasant and in some cases faster to choose an out of route Port of Entry. Kudos go to Metcalf Field which is staffed by the Agents out of Toledo. It is now my first choice for clearance into the US for Southbound trips.

A recent change that has happened is that in the past you have needed to use a land line to close your flight plan in the US. You can now close your flight plan while sitting in your aircraft with your cell phone. There have been times in the past when I have received a quick clearance but I had forgotten to depart the plane and hunt down a land line to close my flight plan. This resulted in a phone search being initiated and harsh words the next time I spoke to a briefer. Using a cell phone is much faster and way better.

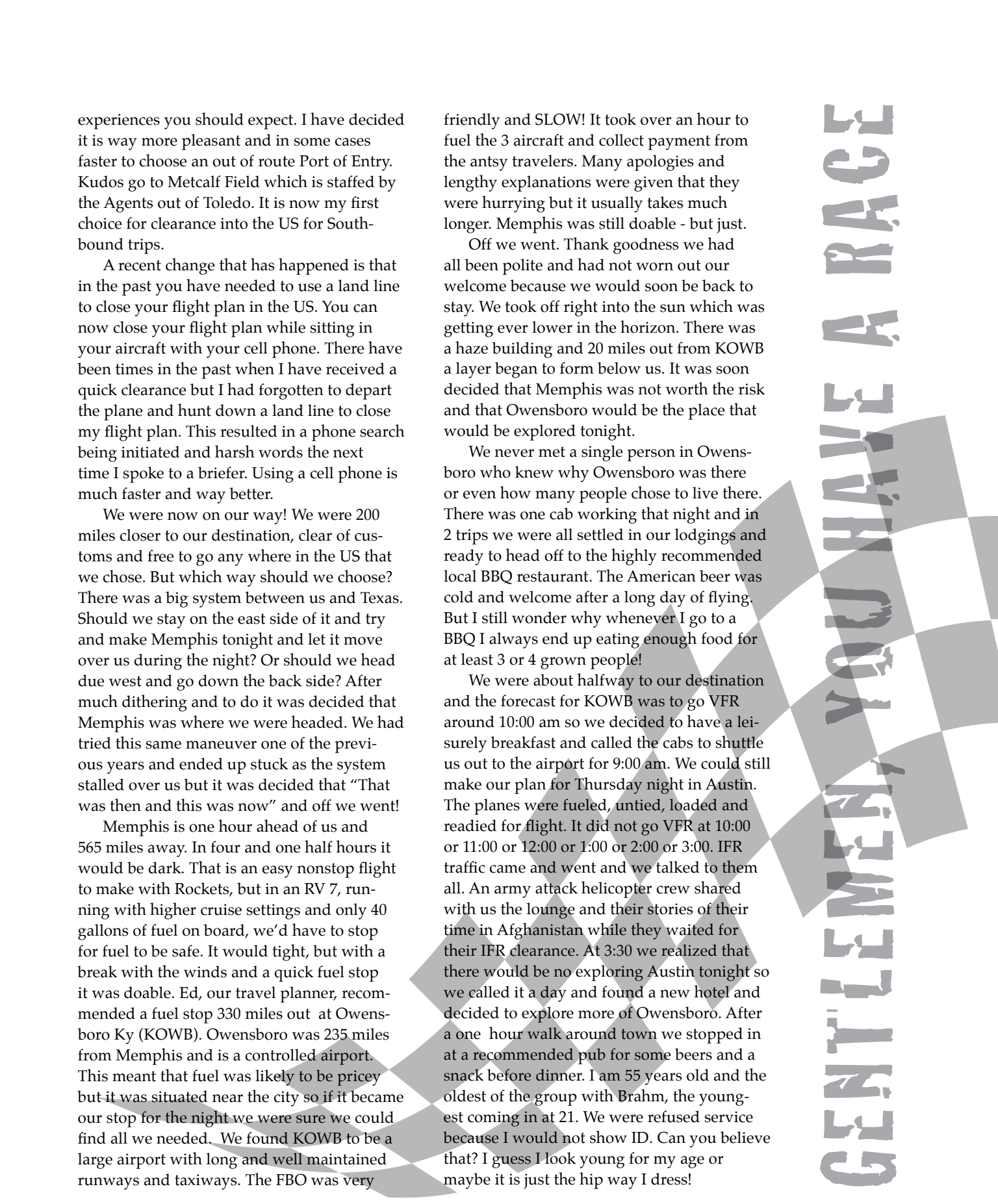
We were now on our way! We were 200 miles closer to our destination, clear of customs and free to go any where in the US that we chose. But which way should we choose? There was a big system between us and Texas. Should we stay on the east side of it and try and make Memphis tonight and let it move over us during the night? Or should we head due west and go down the back side? After much dithering and to do it was decided that Memphis was where we were headed. We had tried this same maneuver one of the previous years and ended up stuck as the system stalled over us but it was decided that "That was then and this was now" and off we went!

Memphis is one hour ahead of us and 565 miles away. In four and one half hours it would be dark. That is an easy nonstop flight to make with Rockets, but in an RV 7, running with higher cruise settings and only 40 gallons of fuel on board, we'd have to stop for fuel to be safe. It would tight, but with a break with the winds and a quick fuel stop it was doable. Ed, our travel planner, recommended a fuel stop 330 miles out at Owensboro Ky (KOWB). Owensboro was 235 miles from Memphis and is a controlled airport. This meant that fuel was likely to be pricey but it was situated near the city so if it became our stop for the night we were sure we could find all we needed. We found KOWB to be a large airport with long and well maintained runways and taxiways. The FBO was very friendly and SLOW! It took over an hour to fuel the 3 aircraft and collect payment from the antsy travelers. Many apologies and lengthy explanations were given that they were hurrying but it usually takes much longer. Memphis was still doable - but just.

Off we went. Thank goodness we had all been polite and had not worn out our welcome because we would soon be back to stay. We took off right into the sun which was getting ever lower in the horizon. There was a haze building and 20 miles out from KOWB a layer began to form below us. It was soon decided that Memphis was not worth the risk and that Owensboro would be the place that would be explored tonight.

We never met a single person in Owensboro who knew why Owensboro was there or even how many people chose to live there. There was one cab working that night and in 2 trips we were all settled in our lodgings and ready to head off to the highly recommended local BBQ restaurant. The American beer was cold and welcome after a long day of flying. But I still wonder why whenever I go to a BBQ I always end up eating enough food for at least 3 or 4 grown people!

We were about halfway to our destination and the forecast for KOWB was to go VFR around 10:00 am so we decided to have a leisurely breakfast and called the cabs to shuttle us out to the airport for 9:00 am. We could still make our plan for Thursday night in Austin. The planes were fueled, untied, loaded and readied for flight. It did not go VFR at 10:00 or 11:00 or 12:00 or 1:00 or 2:00 or 3:00. IFR traffic came and went and we talked to them all. An army attack helicopter crew shared with us the lounge and their stories of their time in Afghanistan while they waited for their IFR clearance. At 3:30 we realized that there would be no exploring Austin tonight so we called it a day and found a new hotel and decided to explore more of Owensboro. After a one hour walk around town we stopped in at a recommended pub for some beers and a snack before dinner. I am 55 years old and the oldest of the group with Brahm, the youngest coming in at 21. We were refused service because I would not show ID. Can you believe that? I guess I look young for my age or maybe it is just the hip way I dress!



Ernie Butcher

Ernie Butcher

Tom Martin

Above: Tom (left) and Wayne (centre) both recieved trophies for their perfomances. Wayne didn't beat Greg this year - but he'll be back. Gary Wilcox, above, won second place (but not in the P-51!) in the RV Blue class.

ON TO TAYLOR

We finally were able to leave KOWB at 11:00am on Friday and after 50 miles we were able to climb up to 6500 feet for a heavenly flight into Taylor. On the way in we were able to do some of the Rocket 100 race course. We did turn 7 and turn 8 and the finish. This area has a plethora of water towers and turn 8 is around one of these water towers. There was a new water tower that had been built just east of the one at turn 8 and both Tom and I set course for the wrong tower. I had blown the finish last year so it was good to prerun that part also. There is only 3.5 miles after turn 8 to the finish so a good roll out with a controlled descent is important for a good time. It had taken 3 days to go 1300 miles. The ramps were full to the brim with race airplanes but the organizers had saved 3 tie down spaces for the delayed Canadians. We had missed the Formation Clinic but we had 1.5 hours of daylight left to tie down the planes and prep them for the race in the morning. We were glad to be a part of the Racers Welcome Dinner to catch up with fellow racers and to discuss different strategies for the next day's race. Fog was forecasted for the next morning. The race briefing was scheduled for one half hour after the airport went VFR and the race start would be one hour after that.

RACE DAY

On the day of the race, there was the Rocket 100 Air Race along with a Fly In and the event was actively promoted by the City of Taylor as a Family Day for the local citizens. There were airplanes everywhere! The ramps were full, taxi ways were jammed and airplanes were parked on the grass everywhere. There were vendors selling food and drink with toys for the kids.

There were people milling all around, old people, young people, couples, families with small children, all enjoying the day and the large variety of airplanes. Warbirds as big as a house, Homebuilts of all shapes and sizes, all kinds of certified aircraft, helicopters giving rides and making wind and noise all day long

When It's All Said and Done...

Tom Martin posted a record breaking fastest time by an F1 Rocket in a SARL race of 277.3 mph. He won First Place in the Sport FX Class and First Place Overall for the Year in the Sport FX Class. He also won the much coveted 2010 "Fastest Rocket in the Known Universe Award".

Gary Wilcox won Second Place in the RV Blue Class with a speed of 195.6 mph. He was just 2 mph off Jason Rovey who flies a very fast RV 8 and who won First Place Overall in the RV Blue Class.

Wayne Hadath won Third Place in the Sport FX Class with a speed of 260.9 mph. It was a personal best but not fast enough to beat Greg Nelson who was 1.5 mph or 14 seconds faster.

Maybe next year, Greg.

and one lonely gyrocopter. There was a great turn out of F1 Rockets at the Homecoming and it was good to see more of these aircraft being completed.

The Rocket 100 started out as a four turn, 100 mile course but has morphed into a 150 mile, challenging 8 turn course. The major factors which come into play in this race are navigation, winds, altitude restrictions at some turn points, tight turns, a hard to spot finish line, and then there is turn 7 known as the Garmin Killer. Turn 7 is a turn around a Ray Dome and it has been known to cause some Garmin GPSs to recycle. It has never before happened to me on this turn but this year I had upgraded from a 196 to a 496. We shall see.

While we waited for the airport to clear we debated about what we should do after the race. After taking 3 days to get here, we were a bit gunshy about the weather for the trip home. Maybe it would be best to depart right after the race and get a good start northbound. Ed said he wanted to be home for Christmas so we all decided that we would make our decision in the line waiting to be fueled after the race. The fog finally burned off to show good visibility but only a 3000 foot ceiling. The ceilings would impact anyone looking to go high to chase the winds. I liked it because it evens the playing field and keeps those EVO Winged Rockets down where the Sport Winged Rockets shine. I had planned on running low so I had transported my clipped racing wing tips down to Texas and had installed them the night before. Things were looking good and I was ready. *Little Bit* was prepped. The engine had been warmed and was sounding strong. My GPS was programmed and all turn points were checked and double checked. I had been experiencing a static in my headset on the way down but I had troubleshot and the fix seemed to be holding. At last there was a call for the Race pilots to come to the Race Briefing.

THE BRIEFING

The Race Briefing is a very important part of the race and it goes a long way to make these events go smoothly and safely. Attendance was taken and 6 of the 48 planes were a scratch. Three for mechanical and three due to weather. Sadly one of them was a T38. The race order was announced and Tom was the lucky fellow who got to start behind the Mustang. I was hoping and I'm sure it was the same for most of the rest of the racers, that it would have been me. In the position a few behind Tom was Major Greg Nelson, the man I wanted to beat. Mark Frederick, in his F1 EVO with a 550 Continental, was next. Mark had beaten me in every race this year.

Then was *Little Bit* followed by the rest of the Rockets. If I couldn't start behind the Mustang, I wanted to start behind Mark because the start point was his own field and I figured if I followed him to his own field then I had the best chance of getting a good start. The rest of the Rocket racers were well aware that at Tom Martin's race this summer the start and end points were at Tom's home strip. I botched the start and had to come around for a restart. Then I totally blew the finish with my family standing to cheer me

Some of the raceplanes. Note Gary Wilcox' RV-7 ready to rock 'n roll. Tom Martin photo.

Ernie Butcher

Race starts are an exciting time. Heart pumping, hands sweating, final checks...

on at the finish line but wondering where I was.

With the briefing completed, the race pilots headed out to their planes for final preparations and positioning. As I was heading to my plane, getting my head into the race, doing my final review of frequencies and strategies, Bob Mills who is a friend and fellow Rocket racer, came up and asked if I knew that Mark had left his Master Switch on over night and his battery was dead. Did I have any ideas? Mark approached and we went over the obvious ideas. Ten minutes before a race does not give anyone alot of time to troubleshoot. I told them I would go to the front of the line to find Tom to see if he had any suggestions. Tom said engine start is in two minutes and that Mark knew his plane best and if anyone could get it started it would be him. Tom hopped up to enter his plane and strongly suggested that I do the same. This would mean I would start behind Greg Nelson. Greg has smoke in his aircraft and I had started behind him the year before. Problem solved, I would just follow Greg's trail of smoke to the start line. I moved forward to take my position in line behind Greg but I was waved to a stop and coming in from the other row was Mark. He must have got it started after all. I got a big grin and a tip of his hat as he taxied ahead of me and settled in behind Greg.

GENTLEMEN, YOU HAVE A RACE

Race starts are an exciting time. Heart pumping, hands sweating, final checks, a wave out onto the runway and then the long awaited flag drop. Throttle full forward and we leap from the runway. Nose down to accelerate down the runway, here comes the crowd of spectators off to our left, a sharp pull up and hard bank to the left. Man, I sure love showing off what this airplane can do! I activate my route and prepare to turn on course for the full power dive to the start line. I see the smoke of Greg's plane as he dives and I see Mark turn to begin his dive. I need to stay close enough to Mark to keep him in sight but not too close as to rush the timekeepers so they miss my time hack. I am hitting 230 knots passing over the assigned reporting landmark. I key my mike "Racer 14 Start". I am low down the runway for my time hack and photo shot. At the end of the runway a gradual

I chased a

climbing turn to turn 1. I can see Greg and Mark and Greg calls, "Racer 22 Turn 1", I am two miles out from turn 1. I can get an idea by listening to the turn calls to see if I am gaining or losing on a racer. Mark seems to being growing larger. I know what that means. He either blew turn 1 or I am running faster. "Racer 14 Turn one" I come in real close and bank hard over and pull. I had reset my g-meter before the race. It read 2.5. I was real happy with turn 1. I wanted to start climbing to be at or near the cloud bases at turn 2. I dropped speed as I climbed but turn 2 was even tighter. I was at 2800 feet and was now seeing 240 knots over the ground headed for turn 3. Mark had chosen to stay lower and I think it was hurting him. I could see him getting larger. I began to plan for the pass. In SARL racing most passing is done on the left, not always but most of the time. It is a requirement that on a pass the overtaking aircraft never lose sight of the aircraft being overtaken. I was at least 1000 feet higher than Mark and it looked like I would overtake him near or at turn 3. Turn 3 is a turn to the right so this would mean I would have to go wide to pass him on his left. Turn 3 is a turn over a dam and it was clearly visible below me and I knew my GPS coordinates were inputted correctly. Mark continued past the turn point as he was flying his GPS and had inputted the coordinated incorrectly. I turned to see him realize his mistake and begin his turn. With Mark behind me I scanned for the racer I really wanted to beat and there he was. He was still a long way ahead and maybe he was pulling farther ahead but maybe not. Turns 4, 5 and 6 went well but I was not gaining on Greg. The run to turn 7 was into the wind and I did a descending turn out of turn 6. I could see Greg had chosen the same strategy. It started to get bumpy but even though I knew this would knock down my speed, I stayed my course. I could see Greg chose a slightly higher route. Upon reflection I think on this leg his choice was

P51

WHEN I HEARD that there was going to be a Mustang in the Rocket 100 race I was very pleased that our league was getting this type of competitor, not to mention the two T28s that had entered. Being a competitor I started to wonder how fast is a P51 down low? The day before the Courtland race Chris Murphy had tested his speed dash system with a mustang and it clocked 299mph. This is faster then my plane but what, I dreamed, if he did not want to work his engine, how big are his turns, has the pilot done this type of thing before, etc. Chances are I will never get to ride in a Mustang but keeping close to one would be awesome.

When the race order was posted I was even more excited as I was following the big bird right from the start. The first thing I learned is that three plane lengths are not enough spacing when he turned his aircraft for a run up. My little bird was dancing on the taxiway for a few minutes when that big prop spun up.

I maintained our 20-second flight separation until the race start and then I was on the chase. Right off the bat I knew that I could get up to speed faster then he could and I was gaining ground up to turn one. Here he did make a much bigger turn then I did and I was closing the gap even more, Oh man, this is going to be close! My flight plan was to climb after turn one to catch some upper winds. He stayed low and thus started to pull ahead while I lost airspeed in the climb. Turn two comes up very fast and just before turn two he turned to the right to go around the WRONG water tower. Of course now I am wondering if I have the right turn point entered! He makes his turn climbs and banks and there he is right in front of me 90 degrees, wide open. How often has a tin can built in a barn caught a P51 in that position? I made my turn and climbed even more. I now was even with him and if I could just stay there my finishing time would be better then a P51! But I made a mistake. When he had made his turn in front of me I should have stayed behind him. I am sure that he saw me, perhaps not, but after that he started to pull away, obviously applying more power. I did have one more chance though, as he started to go way off course to the right. I pondered for a minute and made the call "Mustang turn left to course". By the time we got to turn three he was well ahead and my visions of glory were gone but I will never forget the site of him in a bank right in my line of sight. How good is that? His speed of 298 mph was 22 faster then my 277mph. I did manage to best the T28, 262mph, by 15. What a great end to the race season!

Tom Martin

Glenn Watson

I scanned the skyline looking for the Hutto Water tower which was turn 8. You have no idea how many towers clutter the landscape down here...

the faster choice. Turn 7, the Garmin Killer, was coming up. I had to make a choice, go high and wide and take the added time but keep my GPS active or go low and tight and chance the killer beam. I chose to go tight. I had a roll out land mark chosen and I instantly realized my GPS had been hit. The screen was bright but frozen as I started into turn 7. I had written down a heading on this leg of 210 degrees and I flew that heading while impatiently waiting for my GPS to recycle as the others had reported that theirs had done. Minutes passes and my screen stayed frozen. I pushed and held the GPS power button to shut it down. Nothing! The GPS would not power down. I reached and turned off the Master Switch. Everything went dark except… my GPS! It shone its frozen screen back at me. Master on. I guess I will have to fly the rest of the way to turn 8 and to the finish by memory. I scanned the skyline looking for the Hutto Water tower which was turn 8. You have no idea how many towers clutter the landscape down here. I guessed at one and then remembered on my trial run I had chosen the wrong one - which was just left of the Hutto Tower. I decided I would sight the next one to the right of the one I had guessed. By sheer good fortune it worked out to be the right one. I could hear Greg call turn 8 but I had no way to know how far out I was. Turn 8 was tight and clean and I guessed at the roll out for the 3.5 mile dash to the finish. Again, to my good fortune I could see Greg turn on the smoke as he headed into the finish line and he pulled straight up. I never would have found it otherwise. I made my calls and entered the pattern to land. As I was pulling off the runway my GPS recycled and recognized where it was. I was grateful but it was a bit too late! I have no way to check my track from turn 7 to turn 8 but I doubt it was clean and straight and I have no way to tell how much time it cost me. I will tell you if next year any of the turns are the Garmin Killer, I will be nowhere near it.

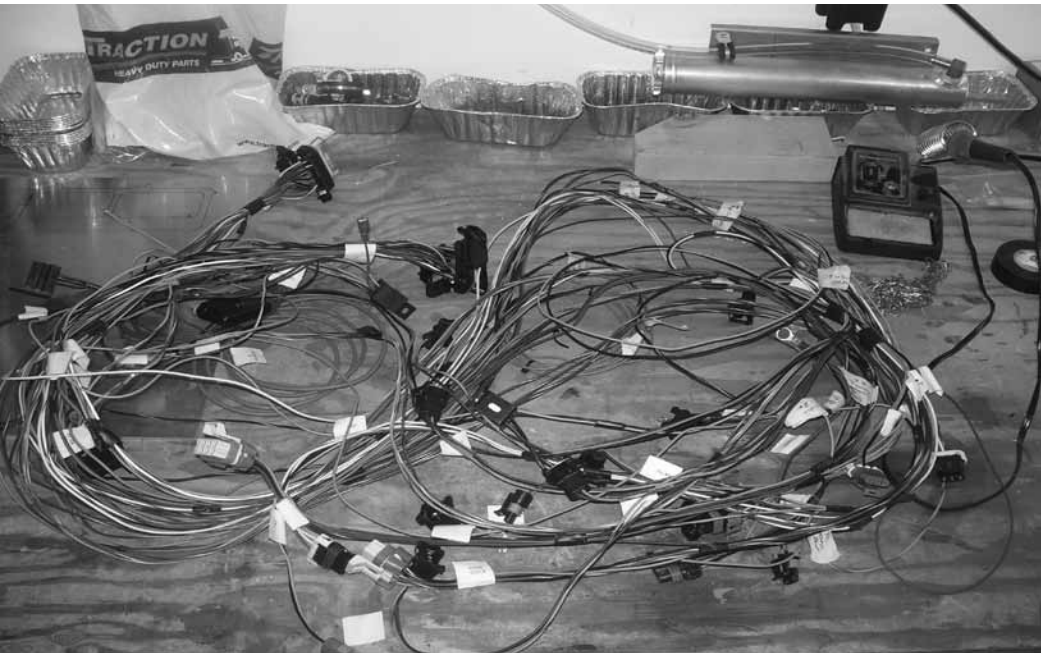
We all met in the long line up for fuel full of excitement and stories. In the fuel line I asked how Mark got his engine started. Did he get some giant to hand prop that 550? Lots of laughs were had at my expense. It was all a ruse to get me to start in front of Mark so I would not follow him to the start line! Thankfully the marshalls were not part of the prank and they moved Mark to his proper starting position. We all decided right away that we were going to stay in Taylor for the after race camaraderie, the *Year End Awards* and the *F1 Rocket Gathering*. We made an agreement to check weather in the morning and deal with it then.

Next morning we departed Taylor once the fog had lifted and since Gary and Ed did not have to be home until Christmas after a few hours the F1 Rockets push the levers forward and made it back to their respective airports before dark. My total flying time from Taylor Tx to Kitchener was 5. 5 hours. Gary and Ed in the RV 7 made it home the next day about 4:00 pm. I love my F1 Rocket. It is a long winter and I wonder what changes it will bring? Little Bit is already apart and the work has begun.

Full details of the Rocket 100 Race results can be found at http://www.sportairrace.org/id374.html

Alternative Engine Wiring Harnesses

Does your harness use the correct wire?
Article and photos by ***Dave Hertner***



I AM BUILDING a Van's RV-10 with a Chevrolet LS1 V8 engine in place of the Lycoming IO-540. My build has progressed along pretty much as planned, but I did run into a bit of a problem when it came to wiring the firewall forward. As many of you have seen under the hood of your automobile, there is a large mass of wires that originates at the engine computer module (ECM) that fan out to the various sensors and actuators throughout the engine compartment. As the engine I have chosen is of the same automotive origin, I have had to play in their sandbox, so to speak, when it comes to wiring harnesses.

I first started looking into this issue when I received my engine computer and wiring harness from Geared Drives. They are a distributor of Painless Ignition Systems. These are the people who supplied my propeller speed reduction unit (PSRU). The trigger for me was in looking at the terminal ends that went into the ignition relay. I saw bright shiny copper!

I remembered then that the Tefzel wire that was used in the rest of the airplane had a silvery colour rather than a copper colour. This led me to do some more digging because I wanted to understand the issue fully. Up to this time I had followed the wire recommendations found in the assembly manual and AC 43.13, but I didn't fully understand the reasons behind them.

Tefzel coated wire has 4 things going for it that standard PVC coated automotive wire doesn't.

1. The extruded coating (ethylene/tetrafluorbethylene) on Tefzel wire has a much higher melting point as compared to PVC. 150 deg. C verses 75-85 deg. C. This is a significant difference!

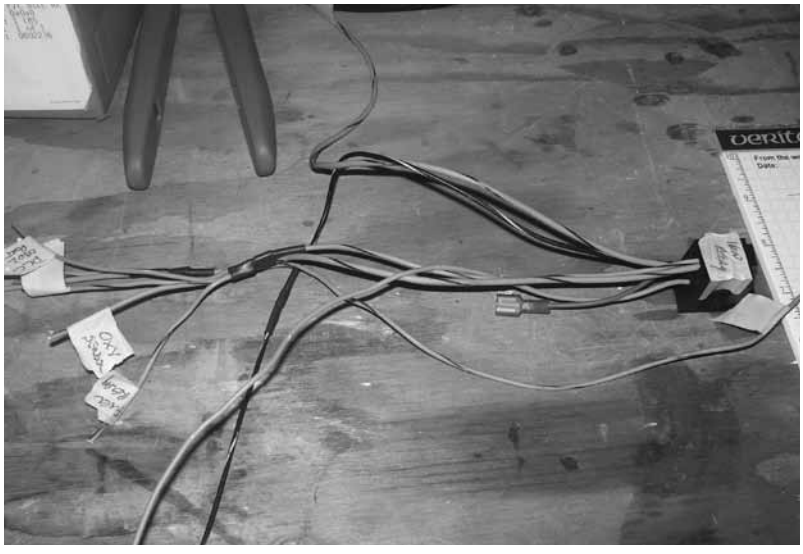
2. Polyvinylchloride (PVC) is toxic when it burns which it does at a much lower temperature.

3. The wire used in the core of Tefzel is tinned throughout so it is much more resistant to corrosion than bare copper.

4. Lastly, the core wire has many more strands that are able to withstand voltages up to 600v.

This led me to a decision I need to make regarding the safety of my aircraft. I sat down with Charlie Murray one day over coffee to discuss the issue. Neither of us had ever heard of an instance where the builder of an aircraft with an automotive conversion engine had replaced the wiring in the engine wiring harness with Tefzel. This said, he agreed with me that

Left to right: *Ignition relay isolated from the harness and labeled;*
Centre, *A typical 3 into 1 automotive connector;*
Far right, *the engine's injector wiring has been replaced with Tefzel*
Previous page: *the automotive wiring harness as purchased.*



it would be proper to follow AC 43.13 and change it out. I decided at that time to convert to Tefzel wire. The first step in the replacement process was to define a couple of firewall forward wiring standards relating to my LS1 installation.

1. The main wiring run from the front of the engine to the ECM has to be thermally protected as it comes in close proximity to the exhaust headers. This will be done using the same type of fire sleeve used on fuel lines.

2. As completely as possible, all wiring in the engine compartment will meet the MIL-Spec wiring standard. Next, the supplied wiring harness needed to be documented so that its operation was understood and pin diagrams could be made. This process involved searching the internet for specific wiring diagrams and becoming intimate with the Delphi MEFI-4b ECM. All of this information was readily available. MSD was a great source of information as they manufacture a very similar harness and ECM combination. Their documentation was superb. Each of the connectors incorporated into the engine wiring harness had to be identified along with the terminals within them. This was a very important exercise as there are 6 different types of terminal used in the harness. I ended up purchasing 4 types locally and had to order 2 from the U.S. I will list the terminals used, the manufacturer/distributor and part numbers at the end of the article.

The wire had to be researched as well. I needed to know the gauge of the wire used in the automotive application so that I could choose a comparable Tefzel product. Again I turned to the internet for this after counting the number of strands and determining their individual gauge. This information led me to the decision to use predominantly 18 Gauge wire throughout the harness. The only heavier wire used in the original harness was used to supply power to a number of sites all at once.

Having gathered all of this information and making a number of trips to Auto Parts Centre in Dorchester to compare terminals to the original I was able to order all new components for the engine wiring harness. While waiting for the materials to arrive, I was able to get a good start on the fabrication of my magnetic alternate air door. More on that at a later date. Embarking on this project was purely academic to this point. That all changed when I had to make the first cut of a harness wire! With paper and pen in hand I systematically cut and recorded the wire colour, position and terminal type. I did this one

wire at a time. Each connector has identification numbers or letters on them so you know where the wire is supposed to return to. I got ahead of myself once. I cut the wires and pulled them out before recording their position in the connector. It took a frantic few minutes on the internet before I turned up a pin diagram for that specific sensor connector posted on an LS1 engine forum.

Here is where we get into the nitty-gritty of the job. After having separated the old terminal ends from the 2 ECU connectors and labeling the wire ends, I untangled the individual sections of the harness such as the injector connectors and the temperature sensors etc. and set them aside. I then took them individually and removed the terminal ends from the connector blocks. With this complete I cut new wire lengths from the 4 colours I had in stock. Red, White, Black and Yellow. All of this was recorded for future reference.

One of the other decisions I made early on in the project was that as many ground wires as possible would be run to a common grounding point. As such, I have installed a 48 tab grounding block on the cockpit side of the firewall and a 24 tab grounding block on the engine side if the firewall. The engine block is grounded to the large lug common to these two blocks which are back to back on the firewall. This allowed me to run separate grounds back to the ground block instead of merging them into a single wire as had been the practice in the original harness.

As I replaced sections of the harness I connected them to their corresponding sensors and such on the engine. This enabled me to run the wires very neatly along a common path back towards the ECM which is mounted on the firewall. I am looking for a very neat installation and will be tying the bundle with waxed cord when they are all in place to keep them from chaffing. There are a number of wires that need to penetrate the firewall to be terminated in the cockpit. I have them running through a specially designed stainless steel flange that gets lined with fire sleeve (surrounding the wire bundle). A separate fire sleeve is then placed over the flange and is held in place with gear clamps. The end is sealed with high temperature silicon. One of the groups of wires passing through the firewall leads to the OBD2 con-

nector. This connector is very similar to the one in your car where a technician can connect to it while the engine is running. I fabricated a bracket to mount the connector where it can be easily accessed. I mounted it to the right side of the throttle quadrant just under the lower lip of the instrument panel. The relay block that came with the harness has 3 relays. One for the ignition, one for the Air conditioner and one for the fuel pump. In my application the ignition relay is the only one of the three that I am using for its original purpose. The other two are going to be re-assigned to handle the switching of the dual coolant pumps. These will be controlled by the pilot via a switch on the panel. Final assembly of the various wires into the Delphi main harness connectors is the last large job to be completed in this swap out. Each wire is stripped and hand crimped to the terminal after having been inserted through the hole at the proper location. Un-mentioned before in the article, when talking about terminals was the fact that they have been soldered as well as mechanically crimped. Vibration can come into play over time and a bit of solder on the exposed end of the wire will go a long way towards keeping electrical gremlins at bay. Be sure though, to make sure that the soldered portion of the wire does not migrate too far. This could lead to the strain relief area becoming less flexible and a future failure. The MDRA inspectors are aware of this wiring issue and have started to fail inspections as a result. I hope that I have been able to shed some light on a problem that I think has gone unnoticed in the past. We are all responsible for the safety of our amateur built aircraft. We need to consider the wiring used in every area of the aircraft and replace it with proper Tefzel coated MIL-Spec wire wherever necessary.

We are all responsible for the safety of our amateur built aircraft. We need to consider the wiring used in every area of the aircraft

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Bolts and Safety

Tedd McHenry

I was moved to write this by a recent fatal crash involving a strut-braced, ultralight aircraft in the U.S. The crash was caused by the failure of the strut-to-fuselage attach bolt, which was in turn caused by improper installation of the bolt. Granted, RVs don't have struts, but they do have lots of bolts, most of which are critical to flight safety.
In this case, a rudimentary understanding of the proper use of bolts would have prevented the owner from installing the strut bolt improperly. This information is readily available, and not at all difficult to understand. The bolt bible, so far as I'm concerned, is:

"Nuts, Bolts, Fasteners and Plumbing Handbook"
by Carroll Smith
ISBN 0-87938-406-9
Motorbooks International
PO Box 2, 729 Prospect Avenue
Osceola, WI 54020
USA

This is not an aviation book, it's a car racing book. But it covers the use of aviation fasteners and plumbing better than any aviation book I've seen. It is available from Amazon.com (www.amazon.com), or directly from Motorbooks International. Buy it, read it. I don't want to lose another homebuilder only because he didn't read this book.

Another excellent book is John Schwaner's "Sky Ranch Engineering Manual." This book is primarily about Lycoming and Continental engines, but it has an excellent section on fatigue, which covers bolt fatigue. It is well worth reading.
If you want to learn more about fatigue than most practicing mechanical engineers know (trust me, I are one), you should read Carroll Smith's "Engineer to Win." This is another car racing book, also available from Motorbooks International and Amazon.com. Okay, it's not an aviation book, but take a look at some of these chapters and tell me if you think knowing this stuff might help you build your RV.

-Introduction to Metallurgy
-Plastic and Elastic Deformation of Metals
-Iron and Steel Making
-Alloying and Heat Treatment of Steels
-Historic Overview of Man's Production of Iron and Steel
-Non-Ferrous Metals and Their Metallurgy—Composite Materials
-Metal Fatigue—Or Why Things Break
-Threaded Fasteners—An Educated Re-Look
-The Joining of Materials—Riveting, Bonding, & Welding
-Plumbing Revisited
-Braking System
-Tools and Tips

Smith can be a bit bombastic at times ("The single-shear mount is a crime against nature and a perversion of the bad engineer.") But he explains materials science more clearly than anyone else, in terms easily understood by the layman, yet without glossing over details.

C of G / continued from page 16

the nose would drift at a slowly increasing rate. When the nose was raised 10° the forces were very light and it took forward pressure to hold the slower airspeed. When the stick was released the nose continued upward, indicating a slight negative stability. I asked Dave to repeat the 50° bank. It took forward pressure to maintain the turn. If he released the stick, the turn tightened up. Even in cruise this condition generated a high workload. We noted another problem. RVs normally have well balanced pitch and roll forces. Here, pitch forces were much lighter than roll. This causes inadvertent pitch inputs when attempting to roll. We had to determine what stability conditions we would have for landing. Experience had shown that instability become slightly worse in the landing configuration.

Slow Speed: At approach speed in landing configuration, instability was slightly worse. We had very light stick forces, the airplane could not be trimmed, and even moderate turns required forward pressure. Dave's controller technique had become short pulsed sampling inputs. Close attention must be paid to speed control. No steep turns in this approach. Everything must be set up well in advance, and Dave could expect to do some pushing on the stick during the landing.

The Landing: The approach was good, speed control was good and the air was smooth. Dave started a normal flare, but the airplane leveled off high. He made a correction and again floated above the runway. Then the airplane stalled and dropped in from about two feet; what my Navy instruction would have called a good solid squat. So: a good pilot in a good airplane couldn't make a good landing, even in ideal conditions, with the airplane loaded too far aft.

Reprinted with permission as supplied by Jim Tyler. Jim is Regional Director for southwestern Ontario and past president of RAA London St Thomas.

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SIDEWINDER. All metal two seats. Equipped with Lycoming O-290-D engine with logs. 3-blade ground adjustable Wrap Drive Prop. Bendix / King KY97A radio, Icom portable standby radio; transponder / c. Full cockpit & panel lighting; strobes, nav lights & L/L lights. Ready for MD/RA final preflight inspection. All drawings and building manuals included. $20,000 CDN. Call Norm @ 519-745-7971 or e-mail Idservice@rogers.com. June/10

FOR SALE: (1) a 1967 C-172, 3170 TT, Cont. 0-300, 1020 SMOH, new windshield, new battery in Sept./10, new paint in 2005, a working DME, two 720 com. radios, a 121.5 ELT, current annual till Sept./11. $35,000.
(2) a 40' x 30' calhoun super structure. It has 5' steel walls, 10' high doors, fabrene roof and will hold a C-172. It was put up in Nov./04 & taken down in Nov./09. $6,000. Phone 705 544 8743 or whiteheadbj@msn.com Oct10

For sale, new RV9A parts; Lycoming conical engine mount, 3 L/G legs with mounting brackets, nose wheel, fairings. All the parts I didn't use when I converted to tailwheel. Approximate cost to buy $3000. Contact Terry Elgood for list at TMB_Elgood@shaw.ca or 250-503-5188 Feb 10

NEW PRICE! Zenair Zodiac 601HDS Tricycle gear, registered 1993, Rotax 912 UL,

ARPLAST flight adjustable prop. 756 hrs TT. ICOM A-4, 2 headsets, GARMIN 95 GPS, Vacuum AH. Stainless exhaust, new upper paint 3 years ago. Canopy cover. Cruise 120 mph. Asking $24,000 CDN. At Oshawa. Dave, 416-282-5252 Oct10

Early model Zodiac HDS Speed Wing spars, ribs & plans. $400 or best offer. F.O.B. Don Benton 1-519-442-2962 dorothybenton@hotmail.com Apr10

One set of aluminum floats for sale. Were built for a Super Koala ultralight. Gross weight of Koala is 830 lbs.Approx. 12 feet in length. The floats are very light in weight. Similar to a Murphy float design. Pump out ports in each compartment. Rudder on right float. Asking $2500.00 OBO. Contact, Richard at 250-374-6136 e-mail: richard_suttie@telus.net Apr10

MINI-MAX ttsn 217 seoh 29.8. Rotax 447 new GSC prop. skis. radio. always hangared. excellent condition $11,900.00 obo

Lazair project. ttsn 123 hrs. total new Ceconite 2.7 covering. ROTAX 248 24 hp engines and 4017 props. skis. $4900.00 obo New Colin Walker prop SAE1 6856 epoxy LE $500.00 GSC 48" prop with adjustable hub Rotax 75mm bolt pattern.$200.00 Scott tailwheel, C65 to C90 Starter, Cessna 180 generator, NAS3 carburetor Stromberg. All for $200.00 Contact 780-460-6841 (Home) J J Williams 780-945-0411 (cell) June/10

ED RILEY'S BD-5B: Bare Weight 561 lb. Fuselage; Stretched (Kieth Hinshaw Kit); Belly-scoop Cooling; Taxi Cooling Fan. VHF Antennea Skin mounted on Vert Stab; Barber Pole. Matco Wheels and Brakes. Three Gear Doors Fitted; Windshield Defrost Fan; External Plug-in for Battery Boost or Charge; Wings: Standard "B".: Rib Spacing 5 3/8" (Preformed Kit) Auxilliary Wing Main Spar (use optional) ; Leading Edge Mounted Land Lights; Wing Tip Mounted Nav and Strobe Lights. Fuel Guage in Skin. June/10 Instruments: Vertical Card Compass; Altimeter (feet); ASI (mph) Manifold Pres (inches); Empty Hole (3 1/8") VSI; T & B (electric); RPM (digital); Exhaust Gas Temp; Coolant Temp; Volts; "G" Meter; Oil Temp; Oil Prss; Hobbs Engine Time/Power: Zero Time Honda Civic 1200cc Turbo; Forged Aluminum Racing Pistons: Power Regrind Valve Cam: Two Coil, Two Breaker Point Ignition, Gated. Power Train: Jerry Kauth System; IVO Prop, Three Blade Electric Variable Pitch. Built & Painted by; Ed Riley. Asking $20,000. Phone/Fax 250-339-2887 egariley@shaw.ca June/10

For Sale: C 90 engine core $2500. Four overhauled cylinders with new pistons and rings $1000. As a package, $3200. Bob 519-884-9094 June/10

Acro Sport II project. Tacked fuselage, wings ready to cover, tail feathers, wheels, tires, brakes, instruments, fuel tank, windscreens, hardware, much more. $8,500.00. lussierm@telusplanet.net June/10

For sale KR-2 fuselage in boat stage and metal kit for retractable landing gear castings $300.00 call Ian 604-856-1159 or email tri-pyramid@telus.net

For Sale: Lycoming 0-235-C engine, disassembled, rebuild started,crank good, needs carb and ring gear hub. $1800.00. Tom at 1-519-822-6693, 1-519-638-5075, millfly@sympatico.ca June/10

For Sale: CH-701, Basic Ultralight, Rotax-912, jeep gear, gull wing doors, $24,500. Tom 1-519-822-6693, 1-519-638-5075, millfly@sympatico.ca June/10

C-IGVE Cara-two (Karatoo) 2 seat basic UL with overhauled Continental 75 hp engine and Zenith wood prop. Steel tube and fabric taildragger fuselage with all metal wing. Day vfr panel, no electrics, 600-6 wheels with disc brakes. $12000 OBO Bill Rice 519-461-1849 June/10

C-ICPZ Silverbird single seat Basic UL with aluminum fuselage, all metal wings, HAPI VW 1600 direct drive engine with dual ignition and Ellison carb/injector, day VFR panel. First $5000 takes it all Bill Rice 519-461-1849 June/10

C-IFWE Cloud Chaser single seat Basic UL that began life as a Schweitzer 126B sailplane. 40 ft span all metal wing, steel tube and fabric fuselage and tailfeathers, tricycle gear with telescoping nose strut and fibreglass main gear. Powered by electric start Kawasaki 440 with belt redrive and IVO prop. Day VFR panel. plexiglass canopy. $7000 OBO Bill Rice 519-461-1849 June/10

2002 Emeraude with 47 TT. O-290G Lycoming with 393 SMOH. Sensenich metal prop, Icom A5 and intercom. Full conventional panel, custom interior, all logs. Always kept in a heated hangar in Stratford. Asking $29K. Jim Demerling 519-348-9655 for details. Sep10

RV-3A project with original construction drawings, not updated to B model. Includes a set of original spec wing spar channels made by Leggatt Aviation and a set of Van's factory made wing ribs. Also includes several fuselage bulkheads and vertical tail spar, plus some tail ribs. This project has been donated to RAA Canada, so please make your offer by email to raa@raa.ca, and put RV-3 in the subject line.

Ed Johancsik's 1991 W-8 Tailwind C-FHCE As seen in Sept-Oct 2005 Recreational Flyer, 450 TAFH, 115 HP O-235-LC2, 35 hrs since TEOH in 2008, cruises at 150mph on 4.5gph, Climb out at 800-1000 fpm. Located in Brantford, Ont. Asking $25000 OBO, Contact Colin at Johancsik@shaw.ca or 403 225-0639. Oct10

Beryl project - tail feathers, all 26 wing ribs, plans - unused. Some Sitka & a/c grade plywood. The Beryl is a Claude Piel design - like a more robust Emeraude but with tandem seating. Good x-country and strong enough for mild aerobatics. Some instruments too. $1,000 takes it all. Call Nigel (705) 429-3449 or landlaw@sympatico.ca Oct10

Citabria instruments for sale. Airspeed,

vacuum turn and bank, whiskey compass, oil pressure, oil temperature, 2 ammeters, battery powered red cabin light. John Foubert 289 752 1650 Brampton. Oct10

Sonex Ser# 0551 Airframe complete, Ready for engine of your choice, some instruments. Asking $ 16500.00 (780) 968 6739 George Minchau. Email gminchau@telus.net Oct10

Cougar project for sale. Fuselage and tail feathers complete, controls installed, on wheels and ready for inspection. Lycoming 0235 mounted. Some instruments installed. Spars are ready, wing materials available. Price $8,000 obo. Call (519) 945-8731 or nseiler@netcore.ca. Oct10

Continental A 75 that was installed on Davis DA-5A homebuild aircraft. Total time since major overhaul 63.5 hours, Balanced, no electrics, two advance magnetos, engine has excellent compressions and 75 - 80 Hp at 2300 RPM $ 7,800 Negotiable Rob (905) 484-0804 Oct10

Homebuilt Davis DA-5A less engine, All metal tricycle aircraft with 136.05 hours total time. Built to fly with C65 Continental (....it did fly with A 75 Continental) No electric system, includes Sterba wood propeller and basic instruments. Always hangared $5500 OBO (905) 484-0804

For Sale; CH-601 Canopy cover, professionally made, like new, Value $400.00+ Will sell at $300.00 Phone Mike @ 905-476-3438 Dec10

For Sale; New 66"dia. 3 blade Warp Drive propeller with 4" dia. bolt pattern and bolts for Rotax 912S. Never used as it was purchased as a backup. $1500.00 Call Mike @ 905-476-3438 Dec10

STRETCHED PACER PROJECT - ESTATE SALE 0320 160 HP Lycoming engine in crate - extended fuselage 18" - ready for covering - new windshield - side-by-side sticks and toe brakes - large luggage compartment - 2 doors - welded float fittings - seats included - main gear with new Cleveland wheels and double puck brakes - tail wheel and spring - wheel pants - super cub wings with cuff leading edge ready for covering - extended flaps and ailerons- fiberglass wingtips - 15 Imp. Gal. Tanks/wing - most instruments included $29,500.00 complete (905) 985-3195 Rose Dec10

Brand new dynafocal ring for Rotax 912/914, never used. Regularly $800 plus tax, I have one for $375 CDN plus shipping. gpeees@hotmail.com Dec10

RV-3 Parts: RAA has received a donation of RV-3 components. The package includes a set of the original drawings, factory made wing ribs, a pair of wing spar channels to the original spec, some fuselage bulkheads, and many small aluminum and steel parts. The package will be sold to the highest bidder. Dec10

Wanted

Wanted: Sonerai or Sonerai 2 project, preferably without engine but all considered. garywolf@rogers.com Oct10

Wanted: Zenith CH701 wings and landing gear. Partially completed kit would be considered. Call Fred at 519 924-2594 or karatclub@bmts.com

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

President's Message / cont'd from page 21

pertinent background information. Most recently RAA has been working with the coroner who is handling the double fatality at Edenvale in November to assist him with recommendations to improve safety in the UL category.

As usual RAA has provided the $5 million chapter liability policy to all chapters that meet the requirements for status in RAA. If a chapter has only national members there is no requirement for any payment at all. Chapters that do allow non national members must collect $15 from each non national and submit the fees to the RAA office.

There is an implicit bargain between RAA and its chapters – chapters are supposed to be a source of new national members, and in return RAA supplies insurance coverage for all chapter meetings and events. The bargain breaks down when chapters accept a large number of non national members and the number of national members begins to diminish. In some chapters the non-national members far outnumber the national members, and while it is nice to receive the $15 fees it is at the expense of the national membership fees that are required to run the organization.

Aviation is going through a rough patch right now and aviation organizations around the world are having problems with declining membership. RAA accomplishes an awful lot for its members but if chapters do not do their part this cannot continue forever. Please encourage your chapter to convert those non-national chapter members into national members of RAA Canada.

Gary Wolf

Classifieds On The Internet:

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

Top: Wayne Hadath's *Lil Bit.* Greg Nelson's winning F-1 Rocket taxis by, smoke on. Maybe next year, Wayne. Jo Hunter photos.

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 Monday 7:30 PM Lake Simcoe Regional Airport Contact Secretary Dave Evans 705 728 8742

E-mail david.evans2@sympatico.caCOBDEN: Third Thursday 8:30 pm at Club House, Cobden Airport. Contact Pres. Clare Strutt, 819-647-5651.

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. Keith Weston at 705-444-1422 or e-mail at ckweston2@sympatico.ca

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 7:30 pm at various locations. Contact President , Jim Easter 519-676-4019 jim.easter@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 Angus McKenzie at 519-652-2734 or angus.mckenzie@sympatico.ca

MIDLAND-HURONIA: First Tuesday 7:30 pm Huronia Airport. Contact Tom Massey 705-526-5304, fax 526-5310

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 613-831-8762 bill@ncf.ca

SAUGEEN: Third Saturday for breakfast at Hanover Airport.

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 8:00 pm at Hangar 41 on north end of Brampton Airport. Contact: President Brian Heinmiller 905-877-7947 b.j.heinmiller@sympatico.ca

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 Gerry Theroux 403-271-2410 grtheroux@shaw.ca

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 Kelowna Yacht Club. Dinner at 6:00pm, meeting at 7:30pm Contact President, Cameron Bottrill 250-558-5551 moneypit@junction.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: Tim Nicholas vibraanalysis@shaw.biz.ca. Website http://raa85.b4.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 - Dick Suttie Phone 250-374-6136 e-mail - richard_suttie@telus.net

ALASKA 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 Richard at 782-2421 or Heath at 785-4758.

Chapter executives please advise of changes as they occur. For further information regarding chapter activities contact RAA Canada, 13691 McLaughlin Rd, R R 1, Caledon, ON L7C 2B2 Telephone: 905-838-1357 Fax: 905-838-1359 or call toll free: 1-800-387-1028 email: raa@zing-net.ca www.raa.ca

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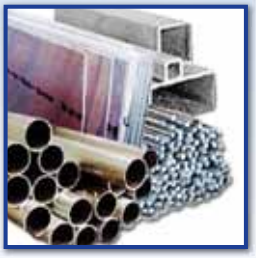
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