

July - August 2006

RECREATIONAL FLYER

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



Ross Glass' Honda-powered
Mustang I





from the president's desk

Gary Wolf

Oshkosh Taxi Fatality

It was very disturbing to hear that EAA Chapter 245 President Gary Palmer had been killed at Oshkosh by the propeller of a TBM Avenger, that taxied over the RV-6 of Ottawa RAA President Bill Reed. Gary will be missed by his many aviation friends in Ottawa and Brampton, where he was a sustaining member of the Brampton Flying Club.. The NTSB preliminary report has been posted at:

www.aero-news.net/index.cfm?ContentBlockID=6fbfb718-62f9-4057-9a00-a77fea44daf&

Canadian Accomplishments

Dr. DeLaurier of the University of Toronto Institute of Aerospace Studies has realized the dream of thirty years when his amateur-built ornithopter took to the air for 14 seconds on July 8 2006 at Downsview Airport. The plane lacked ailerons due to the difficulty of actuation in a flapping wing machine, and rudder was not enough to keep the plane from drifting in the crosswind. The flight ended with one wingtip slightly damaged, but it will be repaired. www.ornithopter.ca.

Csaba Lemak and Patrick MacKenzie of Toronto have flown a powered backpack parachute solely on batteries, for a period of 35 minutes at a training field near Niagara Falls. This was not a "limp into the air and maintain altitude" flight. Csaba did many high angle climbs that consume a lot of power. Most of us have little interest in these airframes, but it is notable that they are very high drag. The batteries used are from the model aviation market, and the electric motor was 18hp, so it is not unreasonable to

expect that an electric motor could soon be used as the powerplant for a light aircraft or a self-launching sailplane.

Industry Changes

Ultravia, manufacturers of the Pelican light aircraft, has stopped answering their phones and their website has shut down. A call to LAMAC has confirmed that the company has ceased operations, and one of their creditors will be taking over the company.

Zenith Aircraft and Czech Aircraft Works will terminate their licensing agreement which saw CAW producing Zenith aircraft for the European market, effective January 2007. It has been reported but not confirmed that production of Zenith floats will be taken over by the Canadian Zenith distributor.

Rans has stopped producing models that rely on 2 stroke engines, and are concentrating solely airframes that will accept the Rotax 912 series engines. This is a sign of the times, now that the FAA is cracking down on the so-called "fat ultralights" that were unable to meet their 254 pound requirement.

Fuel prices are on the minds of all pilots these days, and one solution is being marketed by Valley Engineering of Missouri. Valley is the manufacturer of Culver Props and Valley Engineering belt redrives, and for many years they have been converting VW and V-twin industrial engines for use in airboats and light aircraft. Their engineer Gene Smith reports that their demo plane consumed only three gallons of mogas during a week of demos at Oshkosh. A video is available at their website www.culverprops.com.

US Part 103 ultralights are coming under the stern gaze of the FAA, and many of these are now being listed on the E-Bay and Barnstormers websites, at asking prices from \$3-10,000. These may easily be imported into Canada by paying the PST and GST on the purchase price. Since there are no design or construction standards for Canadian Basic UL aircraft, these Part 103 planes may be registered in this category. For many around the patch pilots one of these might just fill the bill. The cost to register is \$105, and a one page registration document must be filled out. Be aware that Part 103 aircraft were not inspected in the US, and they are not even registered as aircraft. You would be advised to take a second set of eyes along to appraise your new plane before purchasing.

Transport Canada Working Group

Since March of this year your RAA Board members have been attending the meetings of the CARAC Working Group to rationalize the non-certified categories, and to determine how to incorporate the US Light Sport aircraft into our regulations. We have also discussed how to handle the growing number of over-5000 pound non-certified aircraft that have more than our currently allowed maximum of four seats. Some of these aircraft are pressurized and have turbine or jet engines, and construction and maintenance standards for these are part of the recommendations of the Working group. The draft of the report has been completed and will shortly be presented to the Technical Committee for review. If everything goes smoothly we could

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On the Cover: Ron Glass's Mustang I.

Back cover, the "Snowflakes" flying formation over Chilliwack, BC. Rob Prior photo



JUST TOO MUCH

FUN



I was fortunate enough to have a plane to fly on a regular basis while I was building. It was an older homebuilt I rescued from a quarter inch layer of dust, refurbished it to flying order, called a Cavalier SA102.5. It was great for local flying and going on the odd cross-country. I averaged about 50 hours a year, and was happy flying it. How I perceived flying was about to change.

The project, an RV-7A was finally finished and its first flight was on June 20, 2005. The test period went fast forward and by the 4th of July I had the C. of A.

Doing 26 hours flying in a compressed time period was indescribable. That was normally a half year's flying for me time wise, and I did it without losing feeling in my butt or requiring physiotherapy either!

Oh, and the RV-7A was awesome too.

My wife had booked holiday days coinciding with my completion of the flight test period, so a little trip East was planned for the new plane. We'd go as far as we or the plane could get in 3 days then turn back. *Waterville, Nova Scotia & Charlottetown, PEI* were as far as weather would let us get. A few days being tourists, then Hurricane Dennis caused us to hastily retreat back towards home. Proving to my wife the new plane was capable & reliable caused me to rack up another 26 hours. So in 3 weeks since MMJ was finished, I had the equivalent of *a normal year of flying*.

Back home about a week later, a friend walks into the hangar and says "Ralph, my plane is broke & you have to fly me to *Oshkosh!*" Who was I to refuse? 8 hours there & 8 back, my friend says his Bonanza couldn't do better, and that was before the RV-7A gear leg fairings & pants were installed. The rest of the summer was taken up with installing the fairings, more test flights, and lots of 'fam flights'. I still managed to rack up to the equivalent of *a year & a half of normal flying in 2 months*.

Fall coming & two gents expressed a strong interest in creating a three way partnership in the RV, hopefully this would cool down my flying hours but still provide me something to fly while building my second project, an RV-6. The Cavalier was sold and went to Cranbrook to live. Short hops and lots of 'fam flights' fill out the fall & winter months.

Spring flying season opened with a group flight down to Billings, MT, followed by a hop to Nelson BC for lunch, then Cutbank, MT to escort a friend flying a newly purchased homebuilt across the line. I'm supposed to be cutting back my flying?

I heard of friends that are organizing a group flight up to Dawson City, Yukon, and I mistakenly told my wife about it... For some reason a trip north wasn't something I would do on my own, the term 'sparsely populated' didn't instil confidence in me... but with others? We departed with the group, which eventually involved 7 aircraft to be in Dawson for the Summer Solstice. We found we were fairly evenly matched with a 250 Comanche in the group and flew loose formation up the Alaska Highway through Ft. Nelson, Watson Lake, Whitehorse and finally landing on the gravel strip in Dawson. Some planes joined up late, some turned back for home early. Another couple in a 231 Mooney and us were last to leave Dawson and decided to continue north together along the Dempster Highway to Inuvik, then Tuktoyuktuk, *the Arctic Ocean*, then down the McKenzie River to Norman Wells, Yellowknife, Ft Smith, Ft McMurray, Edmonton, then home. We deemed *this the most enjoyable trip* the RV-7A has afforded us yet. We were away for 7 days, and another 26 hours of flying. Is it 2 or 2 1/4 *normal fly years* by now?

The latest trip, actually just a dayhop, was a jaunt out to the *Arlington Airshow* just north of Seattle. We couldn't have

picked a nicer day for the trip, clear and smooth, we didn't dare complain about the 10 knot head wind. Departed Calgary Springbank in the morning, flew direct to Penticton for quick stop to phone for our trans border code, then topped the Cascades into Arlington's busy arrival pattern and parked among the hundreds of RV's. We saw some neat planes & stuff, as well I was able to pick up some parts for the RV-6 while there, self justification for the trip... 3 hrs there, 3 hrs at the show, and 2.5 hrs direct back to Calgary, setting a new standard for day tripping. The years tally is what?

Being so comfortable & capable, it is definitely the plane's fault that I have put in so many hours flying in the past year. MMJ truly inspired us to visit the Maritimes (first time for me), the Great Canadian North (awesome!), plus the many local hops, and of course an excuse to trip out to the West coast again. All totalled that's 9 provinces, 2 territories, and 5 states visited, not bad for MMJ's first year of flight.

Oh, a friend just said he wants to go to OSH... Who am I to refuse? **RAA**

Ralph Inkster
RV-7A C-GMMJ *flying (too much)*
RV-6 C-GYBW *flying soon*

Previous page, top down:

An interesting plane we saw in Yellowknife, a Russian AN-12;

My wife Cheryl at Tuk on the longest day (summer solstice), but their day has probably been a month long up to that point (actually noon to them); Tuktoyuktuk & the Arctic Ocean.

Below: McKenzie delta @ my 9 o'clock - and 12 and 3 and 6...



Flight Planning

by Chris Basham

Flight Planning has always been a favorite of mine. It is and always will be a prelude to an adventure. Going to new places and meeting new people.

There are many elements necessary to prepare a plan. Elements are:

- A place to start and a place to go
- An up-to-date map of the route
- Flight Supplement
- Payload -- Fuel Budget
- Weather, METARS, FT and Upper Winds
- NOTAMS and
- Our familiar Planning tools, E6B Computer, Plotter and Protractor. Throw in the aircraft's flight manual, weight and balance and calculate the following:
- Center of Gravity
- Take off run and Take off distance
- Landing run and Landing distance

- Cross wind component
- Climb allowance
- Cruise True Airspeed, fuel burn and time enroute
- Indicated Airspeed, drift correction, Magnetic and Compass Heading.

Having done all the calculations for each leg of the plan, prepare a flight log to track progress to the plan. However, planning was always a chore, but minimized by preparing the initial plan the night before made things relatively easier. However, the next day is never as planned and minor to major modifications to the flight plan always ensued. The net result was the

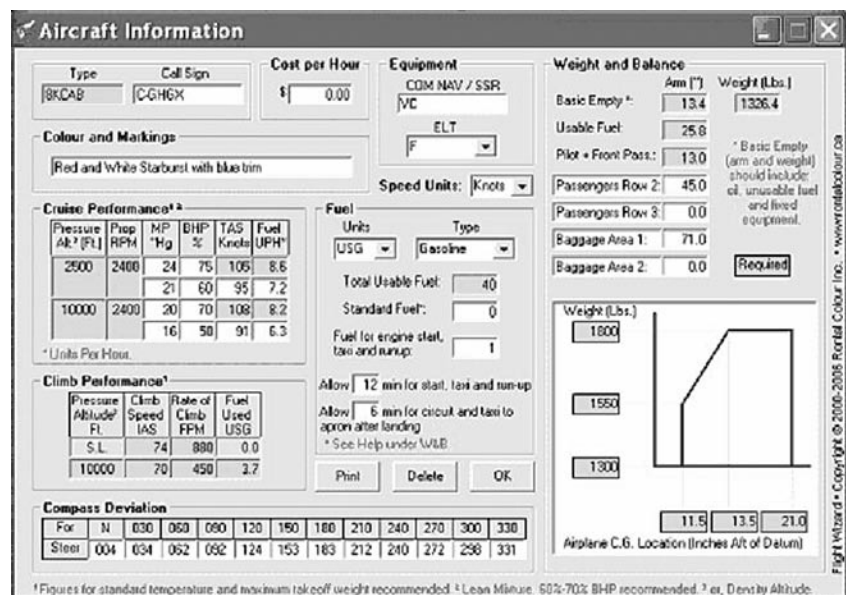


figure 1

re-plan was rushed and may contain critical errors. The idea was to have a reasonable plan and fly the plan. Mr. Murphy is effective at disrupting all our plans. Phone calls ahead determined that there was no fuel on the field or the field is not attended. Crosswind limits exceeded -- yours or the aircraft.

Having done this many time, I began to dream about what if I had a tool that would assist me with the flight plan preparation could there be a better way. Face it computers have

changed everything we do. Aircraft are no longer designed on the drawing board – the drawing board is no where to be found in a design office. Aircraft are designed using Computer Aided Design and Engineering packages. Very complicated problems are solved using these tools. Such are the advances in aircraft design. So I began a search for a solution for my desire for a tool to aid in flight planning.

My search started by reading advertisements in aviation publications. Four vendors were located pro-

None of the flight planning software is useable right out of the box. Customization is absolutely necessary.

viding such tools. The four vendors and their links are:

Jeppesen:
<http://www.jeppesen.com/wlcs/index.jsp>

RMS Technology, Inc.:
<http://www.rmstek.com/>
 Sentient Software :
<http://www.sentientsoftware.ca/>

Rontal Colour Inc:
<http://www.rontalcolour.ca/>

My other requirement was to spend as little as possible for the solution. That is definitely a difficult requirement. Rontal Colour Inc offered the lowest cost solution to the problem. Given the old saying "you get what you pay for," is there a price performance benefit here.

Obtaining a copy of Rontal Colour's Flight Wizard 4 was very easy over the internet. Download a copy either as a trial version or purchase at the cost of \$89.00 Canadian – yes Canadian dollars.

None of the flight planning software is useable right out of the box. Customization is absolutely necessary. Though there are aircraft in each package there are significant differences between models of the same type of aircraft. So pull out your flight manual, latest weight and balance and create your aircraft and your profile within the package (See Figure 1, previous page).

Note that aeronautical maps and Toporama maps are not included. Aeronautical maps need to be scanned in, whereas, Toporama maps are available free on-line from Natural Resources Canada. A link is provided within the help function. You can get

Toporama maps on CD but at a price.

Rontal Colour provides a simple seven step cookbook approach to preparing a flight plan. It is very useful but is intended to show how you interface with the software. All the steps you do when preparing a flight plan by hand must still be followed. Here are the steps that I follow when preparing a flight plan using Flight Wizard:

- 1) Choose a destination ;
- 2) Review Charts and determine a planned route minimum operational cruise altitude;
- 3) Review flight supplement field data on destination and possible refuel points;
- 4) Using the flight Wizard, select

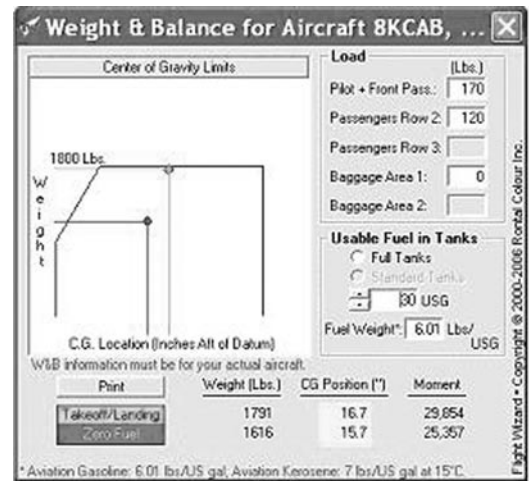


figure 2

your aircraft and check weight and balance;

My example, Figure 2 (above, right), shows that for my Decathlon (8KCAB) is limited in fuel for a flight with the proposed payload. I work with a hour fuel reserve day or night. With this payload, I will consider very carefully any plan for a flight greater than two hours without a refueling stop.

- Select your starting point;
- Select a waypoints to your destination.

Figure 3 (below) above shows the

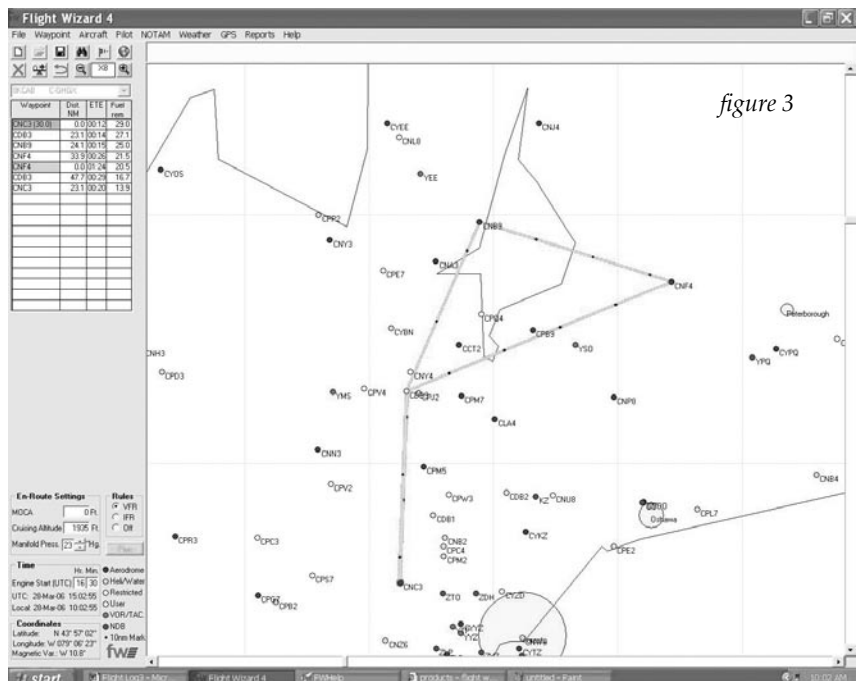


figure 3

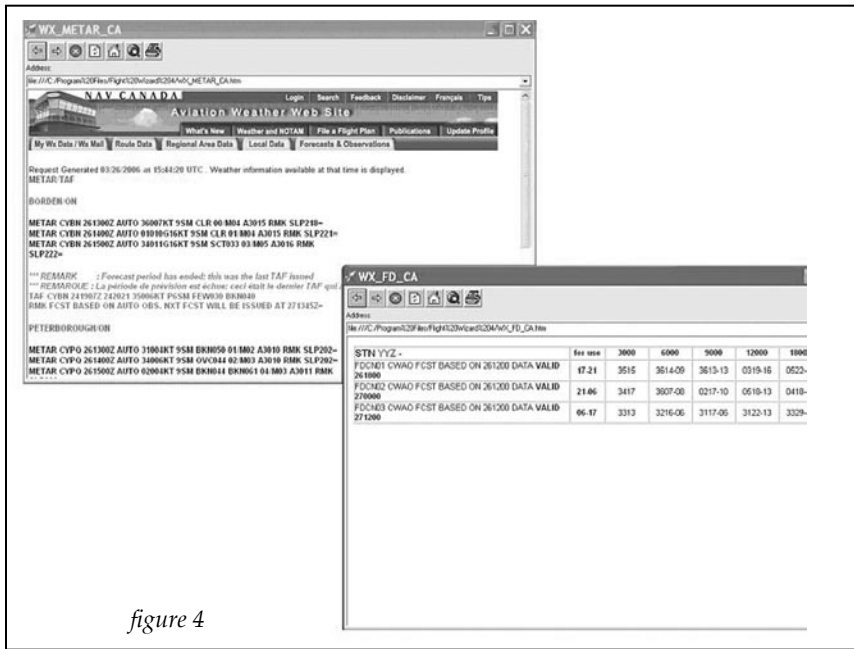


figure 4

layout of the draft flight plan. Areas of note are Cookstown (CCT2), Borden (CYBN) and Baldwin (CPB9). Each of these locations is of significance to NOTAMs. Both Cookstown and Baldwin have active skydiving operations whereas Borden you could gain a few bullet holes in your plane.

Another feature of Flight Wizard is the direct call of Toporama maps. Through a single click of the mouse the Toporama map for that location is automatically loaded and calibrated to the display. Other features are available such as GPS driven moving map and GPS interface. At the time of writing I could not get the interface going with my Lowrance Airmap 100. See Rontal Colour's website for further details

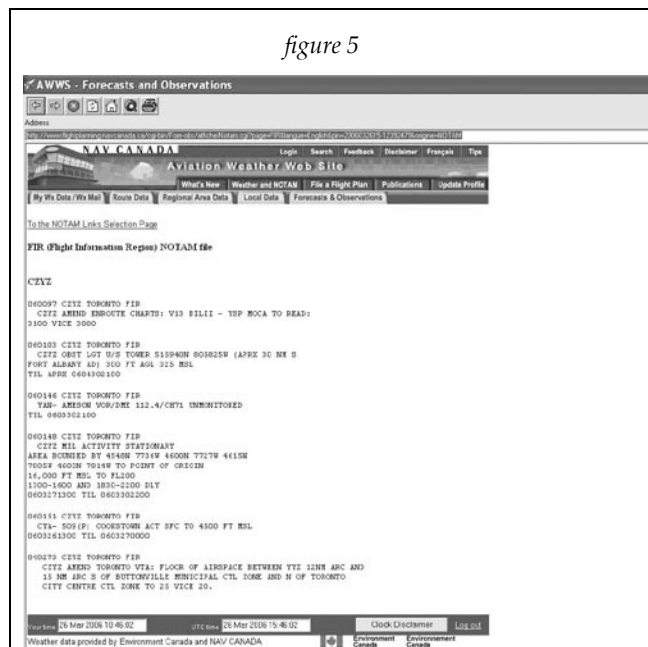


figure 5

Specify the Engine Start Time (UTC), i.e., the time you plan to commence your flight – this is critical to the Upper Wind Calculations;

Select METAR/TAF/FD (Figure 4, left) and review conditions along planned route – modify routing to suit weather, fuel etc – quick and easy now repeating steps 5 through 7. Furthermore give you and the aircraft's capability determine the planned cruise altitude;

Select NOTAM and review conditions along planned route – modify routing to suit by repeating steps 5 through 7 (fig 5, below left).

Check Take-Off, Landing field length requirements and crosswind limits using the performance Calculator.

Figure 6 (below, right) illustrates an example of crosswind and field performance calculations. Unfortunately, information here must be added by hand as Flight Wizard does not maintain a database of your aircrafts field performance. This is a nuisance as other performance data is stored. Other useful information is available such as critical time for night operation and moon phase so that you are prepared to howl.

- Enter MOCA, cruise altitude and power settings for each leg;
- Select get weather auto wait while the Flight Planning Form appears or is updated;
- Review flight planning form for reasonableness and consistency;

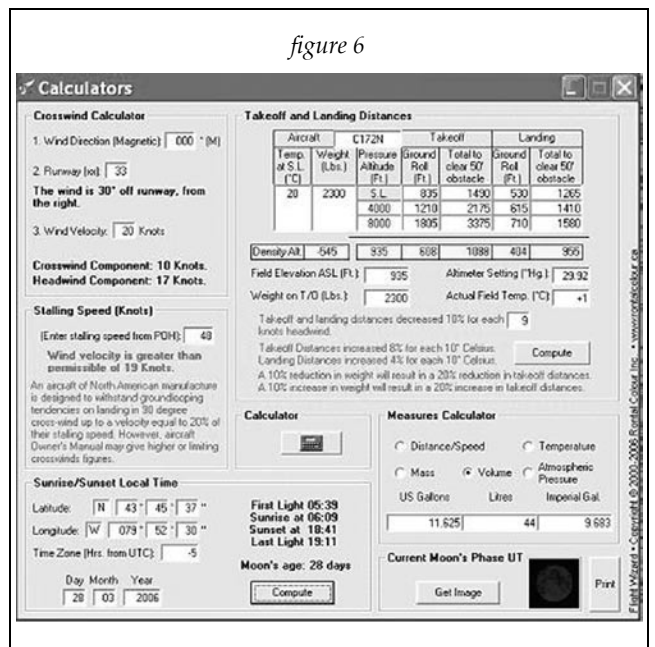


figure 6

-Print Flight Planning Form, Flight Log and any other document needed.

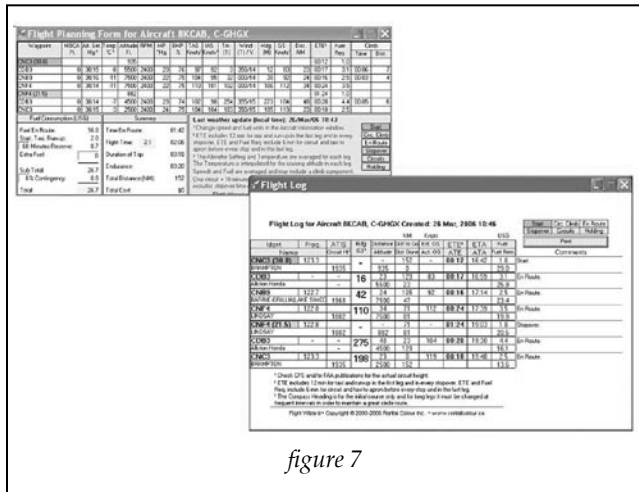


figure 7

Figure 7 provides a view of the flight planning form and the flight log. Each is printable from within Flight Wizard 4 and will fit a standard knee board. I print both on the same page but on the opposite sides. Having both available on the knee board is essential in my view, i.e., power settings, IAS and wind information is not on the flight log.

File flight plan with flight service by phone or directly on-line with Nav Canada.

Go to your aircraft and Fly the Plan.

Other features

The proof of the pudding is in the eating. Given all this information how does the plan represent the actual flight? My opinion, the flight plan is very accurate. Your aircraft data stored on Flight Wizard is infinitely variable. You can modify the parameters to match your aircraft's actual performance. Specifically, my cruise data calls for a much higher cruise speed than I actually achieve. This is not new; I have never flown an aircraft that really meets the book performance. My aircraft is 31 years old with over 1000 hours on the engine and propeller and does not have the speed modifications on the machine. Speed mods are wheel pants,

wing strut fairings and elliptical flying wires. Book values for climb and fuel burn are actually achieved. The following table gives the planned and actual times achieved on the flight to Lindsay and Return (table 1, below):

Winds aloft are best described as an educated guess. If they are close I am ecstatic. However, the plan itself is an estimate and must be respected as such. Total air time for this plan was 1.7 hours the actual was 1.8 the difference is best accounted for by the addition of a touch and go at both Lindsay and Brampton.

Cruise performance estimates was outstanding, given I have tailored the cruise speed. Figure 8 illustrates the observed values at cruise between Alliston and Barrie-Orillia airfield. Compass heading and airspeed predicted on this leg was 043 and 101 knots respectively. After settling down with drift corrected the achieved Compass heading and airspeed predicted on this leg was 045 and 100 knots respectively. Whether there is an error in the calculation is debatable. The indicated airspeed achieved is slightly better than 115 mph and the aircraft may still be in a gentle climb. Throughout the flight the IAS varied by as much as

figure 8



| Leg | Planned(minutes) | Actual(minutes) | Comments |
|----------------------------|------------------|-----------------|--------------------|
| NC3 to Alliston | 17 | 19 | |
| Alliston to Barrie Orillia | 16 | 17 | |
| Barrie Orillia to Lindsay | 24 | 26 | Touch and Go added |
| Lindsay to Alliston | 28 | 27 | |
| Alliston to Brampton | 18 | 20 | Touch and Go added |

table 1



Each pilot must understand the process of flight planning and ensure that output of the tool is reasonably accurate and does not alleviate the pilot of properly flying the airplane

5 MPH from plan. Such cycling is not unusual. Fuel burn, temperature wind changes at altitude all cause a deviation from cruise (*figure 8, previous page*).

The final question was fuel burn. When fueling an aircraft to 30 gallons which is $\frac{3}{4}$ full fuel, accurate measurement is not possible. An earlier calibration flight was completed from Brampton to Mohawk airport. Predicted air time and fuel burn was 1.3 hours and 13.3 US gallons respectively. Filling up at Mohawk the achieved air time and fuel burn was 1.3 hours and 11.6 US gallons respectively. Essentially, average fuel burn was 8.9 US gallons per hour. Book value, (*see Figure 1*), indicates a value of 8.6 US gallons per hour. The difference is explainable, in that, fuel estimates takes into account start, climb and cruise. Also, note climb to altitude in winter is quicker due to the low temperature conditions. Excluded from the estimate is descent and approach which represents 16 minutes at reduced power. Descent is at 17 to 18 inches and circuits done at 20 inches manifold pressure. Fuel burn in this configuration is between 6 and 7 gallons per hour. As such, book values are used for fuel burn.

The flight to Lindsay and return was conducted on a beautiful VFR day. Figure 9 (*above*) shows the view over the nose at 7500 feet enroute Barrie Orillia airport turn point.

Summary

Flight Wizard is the economy flight planning software.

It has quirks and could be improved upon. Nevertheless, the objective of low cost and accurate flight planning is achieved. Overall the software is easy to use and has an on-line help for you to self support. Product support is excellent. Questions I have on Flight Wizard 4 were answered within a day.

Would I recommend this software to anyone else? Yes I would, but keep in mind a fool with a tool is still a fool. Any package should not be used blindly. Each pilot must understand the process of flight planning and ensure that output of the tool is reasonably accurate and does not alleviate the pilot of properly flying the airplane. When you run out of fuel, don't blame the tool. The pilot is responsible for all calculations.

What would I like to see improved – here is my wish list:

- Airfield performance data added to the aircraft information
- Link the calculator with the airfield data and the aircraft information
- Improve mapping where Toporama maps can be automatically netted together on the main display.
- Print the flight route map from Flight Wizard
- (This one is for the governments) provide aeronautical charts in raster or bit mapped graphics.

Cruising altitudes do not apply below 3000 feet above ground level. The flight wizard seems to apply the rule to 3000 above sea level. RAA

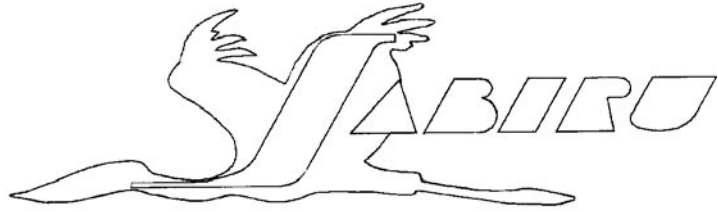
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A woman on her first plane trip found herself a nice window seat in a no-smoking area. But no sooner had she settled down than a man appeared and insisted that it was

his seat. Despite a lengthy argument, she flatly refused to move and told him to go away. "OK, madam," he said, "if that's the way you want it, you fly the plane"

LIFT

FOR THE LAYMAN

by Chuck Jersch/Part 2

Now, let's look at the airplane wing. This is where Daniel Bernoulli and Sir Isaac Newton form a conspiracy. I'll let you know how the apple falling on Newton's head affects your flying later.

The airfoil I have selected has a span of 10 feet. (that is wing tip to wing tip) and a 4-foot chord. That is from the front of the wing to the rear of the wing). It is one inch thick and is completely flat with no camber or under camber. Not the most inspiring airfoil, but it was used on the tail section of almost all aircraft manufactured prior to the 1940's and many home-built aircraft to this day.

For demonstration purposes, let's give it an angle of attack of 5 degrees. Hence the leading edge is about 4" higher than the trailing edge. This creates a high-pressure area under the wing, just as water skis or a boat pushes down on the water and the water pushes up on the ski or boat.

I had better stop right now and explain another law of physics -- the conservation of energy. It is the law that claims that energy cannot be created or destroyed.

Since about 1850 it is believed that this principal of the conservation of energy applies everywhere, to atomic and molecular changes to electrical phenomena, to biological phenomena, to all process of nature.

It is this law that makes airplanes fly, makes your air conditioning and refrigerators cool and by altering the atomic structure of hydrogen you have the hydrogen bomb. Enough about that !

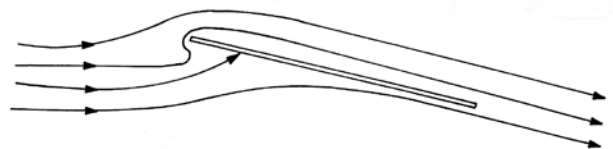
If a liquid or a gas flows faster, it has more kinetic energy, therefore it must lose some other form of energy, for example pressure energy.

Bernoulli discovered that if a fluid speeds up, pressure decreases and conversely if a fluid slows, pressure increases. This theorem is part of the law of the conservation of energy. The formula for energy is $E=MV^2$. Energy = mass times velocity, in feet per second squared. Hence, if you have a mass of 1 moving at 1 foot per second, energy would equal 1. ($E=1 \times 1^2=1$). However, if you take the same mass and double the speed, your energy = 4 ($E=1 \times 2^2=4$). Since we cannot create energy, something else has to change and Mr. Ber-

noulli discovered that it was pressure.

I am sure we all agree that with the 5° angle of attack, a wedge of air is, shall we say trapped under the wing and this will increase the air pressure to some degree, and according to Bernoulli's formula the speed of this air must decrease.

I know this is contrary to pilot manuals that talk about molecules splitting at the leading edge and meeting up at the trailing edge, the upper ones having a greater distance to travel over the camber of the wing. This explanation will not be found in any credible physics manual because it is



contrary to Bernoulli's theorem.

This high-pressure area under the wing or boat created a bow wave, visible in front of a boat and is also present in front of a wing. Alex Strojnik in his book 'Low Power Laminar Technologies', speaks of the air coming up to meet the wing and then bends down behind the wing. He recommends that the fuselage be bent 4 to 6° downward on gliders and perhaps half that on fast aircraft to accommodate the oncoming air. Looking at modern fighter planes and Burt Rutan's designs, it seems that they have adopted this school of thought.

We have some rising air meeting the leading edge of our

wing, and with a high pressure area under the wing, the bulk of the air will take the easy way over the top of the wing, where it accelerates from zero feet per second to the speed of the wing. That would be 147 feet per second at 100 miles per hour. Some people find this acceleration of 147 feet per second, of the air over the airfoil, hard to understand or comprehend. So, let's take my speedboat for a spin. It travels at 147 feet per second (one hundred miles per hour). Unbeknownst to me there is a log in the water with its top side flush with the water. My boat hits it at the center of the log at right angles to the boat and "wow" all hell brakes loose. Assume my boat is 10 feet long. In $10/147^{\text{th}}$ s of a second, the keel of my boat tried unsuccessfully to push the log down into the incompressible water. Mr. Newton stepped in and pushed up on the keel of the boat with equal enthusiasm and with the keel of the boat made of 'unobtainium', the boat takes to the air like a pool shot off the side rail.

With our wing, the same acceleration takes place from the leading edge to the trailing edge. With my 4-foot chord, it takes the air exactly $4/147^{\text{th}}$ s of a second to traverse the wing chord but the leading edge is continuously encountering cu. ft after cu. ft of air. Again, Bernoulli's conservation of energy laws apply and a low-pressure area is created above the wing.

At this point, Mr. Newton steps in and says, "**MR. BERNOULLI, WHAT HAVE YOU DONE?**" He quickly pushes up on the bottom of the wing and down on the air below and with the lower pressure on top, pulls up on the wing while pulling air down from above. This is what creates what is known as down wash. How much effect would this have on my 4-foot chord by 10-foot span wing? The formula for lift is $\frac{1}{2} \times \rho \times \text{wing area in sq. ft} \times \text{coefficient of lift} \times \text{speed in feet per second squared}$ or $\frac{1}{2} \times .00238 \times 40 \times \text{cl} \times 147^2$. (ρ is the Greek term for air density) I don't have the coefficient of lift for the airfoil, but with some basic assumptions and no complicated math, we can get some idea.

Let's assume that the upward push on the wing is 1/3 of one percent of atmospheric pressure, say .30%. This is the downward push the wing is exerting on the air, and because of the greater low-pressure area above the wing that there is about 2/3 of 1% or say .60% differential created above the wing. We know that the air pressure at sea level is 14.7 psi. Converting that to feet, we multiply by 144 (12 x 12) and now have 2116 pounds per square foot of atmospheric air pressure. With Mr. Bernoulli messing with it, we have a .30% pushing up and .60% pulling up, giving us $.90\% \times 2116 =$ or 19.04 pounds per square foot of up force. Multiplying this times 40 square feet of wing area and we would have 761.76 pounds of lift.

Applying the same 19.04 pounds per square foot to a Cessna 172's 174 sq. ft of wing, you would have 3313 pounds of lift, which probably isn't too far off at 100 mph and a 5° angle of incidence. You would be climbing fast, perhaps

planning a loop. Wait minute, according to "THE THEORY OF WING SECTIONS", the 2412 wing section used by Cessna would have a .7 coefficient of lift at a 5 degree angle of attack. If we plug that into the lift formula we have $\frac{1}{2} \times .00238 \times 174 \times .7 \times 147^2 = 3132$. Just a little less than our ballpark figure.

In wrapping up, I chose the flat airfoil to offset the idea that the molecules split and that the acceleration is caused by the camber. The camber certainly affects the low pressure and moves center of lift forward or back depending on the airfoil selected. Higher cambers generally produce more lift. As illustrated by a Piper Cub with a flat-bottomed USA35B (modified) airfoil, making an inverted pass at an air show, a flat airfoil will work. I'm sure you can see now why aerobatic pilots prefer the symmetrical airfoil to say a Clark-Y for inverted flight.

WING TIP VORTICES


Oh yes, wing tip vortices. Air is considered non-compressible at speeds below the speed of sound. We have this air some what trapped under the wing. It can move laterally and so it does and leaks out of the wing tip where it folds into the low-pressure area it finds above the wing. If you were to have a parasol wing with two wing panels and a 3 ft. gap between the panels at the fuselage you would have 4 vortices, two at the wing tips and one at each of the wing panels in the center where the three foot gap occurred. Many attempts have been made to 'capture' this air. Early attempts often included fences and drooped wing tips. These did work to some degree. Modern thought is to utilize winglets to take advantage of this air. It must work because all new airliners use them.

Wind tunnel tests have shown that a flat uncambered wing is actually the most efficient airfoil for speeds from 0 to 15 mph. You will find it used exclusively on insects and butterflies. Incidentally, the Monarch butterfly takes an annual excursion from Mexico to Canada and return. It is quite easy to determine the speed of these flat wing travelers by counting one thousand and one, one thousand and two, for timing and one and a half feet per second equals 1 mile per hour.

Moving up the airfoil chain, the Wright brothers under cambered airfoil works best in the 15 to 35 mph ranges.

The Clarke Y, 23012, and modern laminar derivatives win if your desire is to fly faster.

Earlier I said that I would tell you what the apple falling on Newton's head had to do with flying. If we look at the formula for lift - $\frac{1}{2} \times .00238 \times \text{cl} \times \text{wing sq. ft} \times \text{ft per sec squared}$, equals lift. So where does the $\frac{1}{2} \times .00238$ come from? We are overcoming gravity, which equals 32.167 ft per second, per second acceleration. Air weighs .0765 lbs. per cu. ft. If we divide $.0765/32.167$, we get .002378 and because we are dealing with acceleration, we need to balance things with the $\frac{1}{2}$.

I hope that this helps with the understanding of lift. 

There are two basic forms of combustion, deflagration and detonation. In deflagration, the propagation of combustion is carried out by simple convection; the hot combustion gas heats what is ahead of it, raising its temperature to the ignition point. This process of heating what lies ahead takes time. The burning of a dormant gasoline air mixture is in fact slow - only a foot or so per second. Combustion in an engine cylinder is much faster than this because of turbulence, which so distorts the flame front that its area increases exponentially. This area, multiplied times the slow dormant combustion speed, produces a very large volume combustion rate.

Detonation is totally different, and not all fuel mixtures will detonate. It is a form of combustion in which the unburned material is heated to ignition at least partly by shock compression, as the detonation wave moves at the local speed of sound through the medium. This has to happen extremely quickly, so fuels with a simple molecular structure or those with low stability lend themselves to this form of combustion. So how does the end-gas auto-ignite? It does so when by any combination of effects its temperature is raised to a critical value in the range of 900-1000 degrees F.

Air is drawn into a running engine at a given ambient temperature, and begins to pick up heat as it contacts internal engine parts. When it finally enters the actual cylinder, it is heated by even hotter surfaces and while trapped there, is heated again by the process of compression.

In being heated, some little understood chemical reactions begin to occur in the fuel. These pre-flame reactions take the form of a slow, partial breakdown of the least durable types of fuel molecule. There are three basic forms of hydrocarbon fuels; straight carbon chains, branched chains, and ring structures. Straight chain Hydrocarbons are a fragile structure. Temperature is a measure of average molecular activity, but there are always some gas molecules moving significantly faster than the others. These faster moving molecules hit and break some of these less durable long chain fuel molecules, dislodging some of their more weakly bonded hydrogen atoms. This released hydrogen is very reactive (normally hydrogen molecules travel in bonded pairs, but this is atomic hydrogen) and instantly pairs with an oxygen atom from the air to form what is called a radical, a chemical fragment that is highly reactive because it contains an unpaired electron. Its attraction for the missing electron is so great that it can snap one out of other chemical species it happens to collide with, thereby breaking it down as well.

DETONATION

Part II / By Clare Snyder

At some point in the compression stroke, the spark ignites the mixture and combustion begins. The burned gases, being very hot, expand against the still unburned charge, compressing it outward into the squish band. This compression

rapidly heats the unburned charge even more, accelerating the pre-flame reactions in it. As a rule of thumb, the rate of chemical reaction doubles every seventeen degrees F. All this while, the population of radicals (reactive molecular fragments) is increasing in the unburned end-gas. If this process of heating is allowed to continue long enough, and the end-gas reaches a high enough temperature, this population of radicals becomes great enough that its own propagation rate, one radical creating more and more through further reactions, accelerates into outright combustion. This is auto-ignition.

Now why does this heated, chemically changed end-gas detonate instead of simply burning? The fuel in the end-gas is no longer ordinary relatively stable gasoline. The pre-flame reactions that have taken place in it have changed it into an unstable (reactive) mixture, much like a mixture of hydrogen and oxygen, or acetylene and oxygen. It is in a hair-trigger state, being filled with free radicals from pre-flame reactions. When it auto-ignites, combustion accelerates almost instantly because the material is now so unstable. The combustion front accelerates to the local speed of sound, igniting the material it passes through simply by suddenly raising its temperature, through the shock wave it has now become.

PREVENTING DETONATION

Anything that reduces the temperature that the end-gas reaches will make detonation less likely. Anything that slows the process of conversion from normal gasoline into a sensitive explosive, will make detonation less likely. Anything that speeds up combustion, so that it is completed before the conditions needed for detonation can develop fully, will make detonation less likely.

Therefore the following will work;

- (1) Lower intake temperature
- (2) Reduce Volumetric efficiency (cyl filling) with lower throttle position, or reduced turbo boost. The less mixture that enters the cylinder, the less it is heated by compression
- (3) Lower intake manifold, crankcase, and/or cylinder, piston, or head temperatures.
- (4) Lower compression ratio. The less you squeeze it, the less it is heated.
- (5) Use a more breakdown resistant fuel, such as tolu-

There are endless ways of trying to tame the beast – none of which will ALWAYS work. Detonation suppression is as much a “black art” as a science.

ene or isoctane. If straight chain molecules are not present, the fuel will not be broken down so rapidly by pre-flame reactions.

(6) Add a negative catalyst, something that will either pin down active radicals or convert them into something harmless. Tetraethyl lead, MMT, or other antiknock compounds function in this manner.

(7) Retard ignition timing to shorten the time during which pre-knock reactions can take place.

(8) Induce cylinder turbulence or anything else that will speed up combustion (faster burning fuel such as benzene). This works by ensuring combustion completes before pre-flame reactions progress enough to cause auto-ignition.

(9) Run the engine at higher rpm. This simply shortens the time for the mixture to absorb heat and react. Honda found in the 1960's, that an engine's octane requirements began to decrease steadily over 12,000 rpm, and were

below 60 octane up around 20,000 RPM. In a more common example, engines knock when they are “lugged” (run at low rpm, wide open throttle) and stop knocking promptly when you shift down a gear and let the engine rev up more. This stops detonation by not allowing enough time for the reactions that cause it as well as by reducing cyl fill.

(10) Redesign troublesome exhaust systems. Some pipes give great numbers on the dyno, but can't be used because they cause seizures because they either simply overcharge the engine in some narrow rpm band (pushing it into detonation just as too much turbo boost would do), or they back pump mixture from the header pipe that has picked up too much heat (this is why nobody heat wraps header pipes anymore).

(11) Avoid excessive backpressure. Exhaust pipes always create back pressure, but the more there is, the higher the amount of hot exhaust gas that will be unable to leave the cylinder during exhaust. Its heat, added to the fresh charge that next enters the cylinder, may push the engine over the line into detonation. Sometimes a one or two millimeter reduction in tailpipe ID will get you a couple of extra horsepower, but it may also push enough extra heat into the charge to make the engine detonate after a few seconds.

There are endless ways of trying to tame the beast – none of which will ALWAYS work. Detonation suppression is as much a “black art” as a science.

Note: The MYTH that high octane fuel burns slower than low octane fuel would indicate that high octane fuel should be MORE susceptible to detonation! **RSA**

A helicopter was flying around above Seattle when an electrical malfunction disabled all of the aircraft's electronic navigation and communications equipment. Due to the clouds and haze, the pilot could not determine the helicopter's position and course to fly to the airport.

The pilot saw a tall building, flew toward it, circled, drew a handwritten sign, and held it in the helicopter's window. The pilot's sign said “WHERE AM I?” in large letters.

People in the tall building quickly responded to the aircraft,

drew a large sign, and held it in a building window. Their sign read: “YOU ARE IN A HELICOPTER.”

The pilot smiled, waved, looked at his map, determined the course to steer to SEATAC airport, and landed safely. After they were on the ground, the co-pilot asked the pilot how the “YOU ARE IN A HELICOPTER” sign helped determine their position.

The pilot responded “I knew that had to be the MICROSOFT building because they gave me a technically correct, but completely useless answer.”



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Close Encounters

... and how to avoid them

by Paul Sharpe

ATC: "Air Canada 935... traffic... 12 o'clock, 3 miles... slow moving, type and altitude unknown!"

Aircraft: "Air Canada 935 roger... negative contact, we'll keep our eyes open."

Inbound to Toronto's Pearson Airport on an IFR flight plan, but in CAVU weather conditions, traffic was reasonably heavy. We were being radar vectored on a long downwind for Toronto's runway 06L, descending to 4000 feet. Scanning the horizon left to right, up and down, there was no sign of anything in our immediate vicinity, nor was anything showing on the TCAS. We had gone by Burlington Airport a minute or so earlier, and were expecting Arrival Control to give us a base turn momentarily. Suddenly there was a momentary flash of light; the afternoon sun reflecting off an aluminum wing. There it was, a small single engine airplane, eastbound at what I estimated to be 3500 feet, now making an abrupt turn toward the south! With a closing speed of at least 250 knots, the traffic would have been by us in a flash, but obviously the pilot had suddenly seen us. The sight of an Airbus A-321 unexpectedly filling his windshield had probably caused him more than a little anxiety, and he had decided that the airspace was becoming too crowded for him. And since he wasn't talking to ATC he didn't know that we would be leveling off above his altitude

Was he legal? Probably! At just over twenty miles from Toronto, the floor of the class C airspace is 3500 feet. He was probably flying just below that, which seems to be common practice in the Toronto area. Was he safe? That's what this article is all about.

We all know that Canada is a big country, and there are places where you can fly for hours without ever encountering another aircraft. But much of Canada's population is concentrated within a couple of hundred miles of the U.S. border, with most of our major urban areas in that zone. And that is where the vast majority of our aircraft movements are also concentrated.

Simply look at the VTA charts for Toronto or Vancouver. Within 40 miles of Toronto's Pearson International airport, you also have City Centre Airport (Toronto Island), Buttonville, Oshawa, Markham, Burlington, Guelph, Waterloo, and Hamilton. Now look at Vancouver, and within a similar radius you have Boundary Bay, Delta, Pitt Meadows, Abbotsford International and further up the valley, Chilliwack. Further complicating life for the flyers of the Fraser Valley are both geographical and political constraints; namely, mountains to the north and east and the U.S. border to the south. In fact, all of Canada's major airports have their own unique, but similar situations.

Hang around any airport coffee shop and you'll hear pilots telling their tales of flying just below, or just outside of controlled airspace in these busy areas, seemingly secure in the knowledge that because they're outside of controlled airspace, they won't encounter commercial jet traffic. But there is a lot of activity that they are obviously unaware of, that could result in some very close encounters. On occasion I've even heard our coffee shop heroes boast of flying through controlled airspace without talking to ATC, despite the fact that this is illegal, potentially dangerous, and just plain dumb.

So what's a VFR pilot to do if he wants to fly in these busy places, and really be safe? There are really only two alternatives. The first: simply pick a route giving you a very wide berth around all of the busy terminal areas, and stay low, thereby avoiding the heavy traffic. Although you may have to go many miles out of your way, you may find it very scenic and peaceful. If you're not in a hurry, what's the difference? Carefully consider where you plan to fly though, and the altitude you plan to fly at. Don't think that simply staying out of class B and C airspace will keep you out of the path of the airline and corporate traffic. For example, if you are thirty miles west of Toronto, in VFR conditions, you're quite legal flying your single engine Cessna at 7000 feet in the class E airspace, but airliners arriving from the west,

counters

intending to land on runways 05 or 06 will also be descending to cross Rokto intersection (south side of Guelph) at 7000 feet. You'll be sharing the same airspace!

The other alternative, the better choice, is to use the "system". If you own an airplane (unless it's an ultralight), you're probably paying your annual Nav Canada fee anyway, so why not get some value for your bucks. If you're not familiar with current Air Traffic Control procedures then start by educating yourself! Go out and get the latest, up to date charts. Just because you flew a certain route or procedure last year, don't assume it will be the same now. Things change often! And if you just spent the last ten years building your airplane, but had to give up actually flying so that you could afford all that aluminum, then trust me, things have really changed! The Canada Flight Supplement is a good place to start, but check the date on the front cover first. Procedures, routes, specified reporting points and current communications frequencies will all be listed here. What you won't find in the CFS are detailed maps or charts. For this type of detail Nav Canada publishes terminal area, or VTA, charts for the busier terminals such as Toronto. These charts are much like the VFR Navigation Charts (Sectionals for some of us old guys) we normally use but are of a much larger scale, with more geographical data in addition to the airspace structure.

A word of caution, however; charts don't tell the whole story. For example, they don't depict the IFR routes that the airliners fly; they can't because not all of the IFR arrivals fly the same route. Although there are standard arrivals depicted in the IFR charts, only in a perfect world could these routes be used exclusively. At the major airports, such as Toronto and Vancouver, aircraft are arriving randomly from all over the globe. It's the air traffic controller's job, particularly the arrival controllers, to sort them out with radar vectors, altitudes and airspeed assignments in order to bring them onto final approach in a properly spaced and orderly flow, so that one can be landing about every 100 seconds. (I've been told

that ATC can vector aircraft as far as 50 miles on a downwind leg before turning them onto base and final, but in 30 years of IFR flying all over North America, and particularly in the Toronto area, I don't remember being vectored beyond the class C airspace.)

Next, equip your aircraft with a mode C transponder. It's required in the controlled airspace surrounding all of the major airports, and it's the only way that ATC can truly know where you are; they can't help you if they can't see you. Another added bonus is that the larger commercial aircraft are now equipped with TCAS (traffic alert and collision avoidance system), which can detect your presence if you have a functioning transponder, and are thereby able to avoid inadvertently colliding with you.

So, now that you've equipped yourself with the latest information, and equipped your aircraft with a transponder, you're ready to use the system to your advantage. Start by letting ATC in on your intentions: file a flight plan. Once airborne, call them on your radio, tell them where you are, your altitude, and where you want to go. (This is all explained on the VTA charts, so don't take notes now.) They'll assign you a transponder code, perhaps an altitude and maybe radar vectors; whatever it takes to move you through their airspace while avoiding conflicting traffic. You'll transit the busy airspace all the while under the watchful eye of the air traffic controller. Once beyond controlled airspace they'll clear you on your way.

If you plan to fly in busy airspace, this is by far the safest means to your destination. You'll often save many miles too, and in today's world, that means less money spent on fuel.

Paul Sharpe is a Captain with Air Canada and has built and flies a Zenith 601HD for fun. And yes, it has a mode C transponder in it.

Alaska Highway Fly-In

August Lehmann

Our place back home in BC is found under DAWSON CREEK (FLYING L RANCH) in the VFR Supplement, identifier CDC3. It's about 10 miles NW of the Dawson Creek airport. Local members of the Alaska Highway RAA Chapter met there on July 2, 2006 to enjoy Bonnie Lehmann's cooking and view August Lehmann's completed Cyclone 180, with already 35 hours in the air.

The Cyclone 180 had tough competition when Rick Henderson arrived in his DHC2 Beaver in absolutely cream-puff condition (top, right).

The flightline in the second photo shows Lehmann's Cyclone 180, Rick Henderson's DHC2 Beaver, Chris Pearson's Super C172, Stan Gladysz's Champion, and David Verbisky's Cessna 180.

The third airplane (below) shows Ed Pawluski touching down in his Turbo Arrow III arriving from Eaglesham, AB.

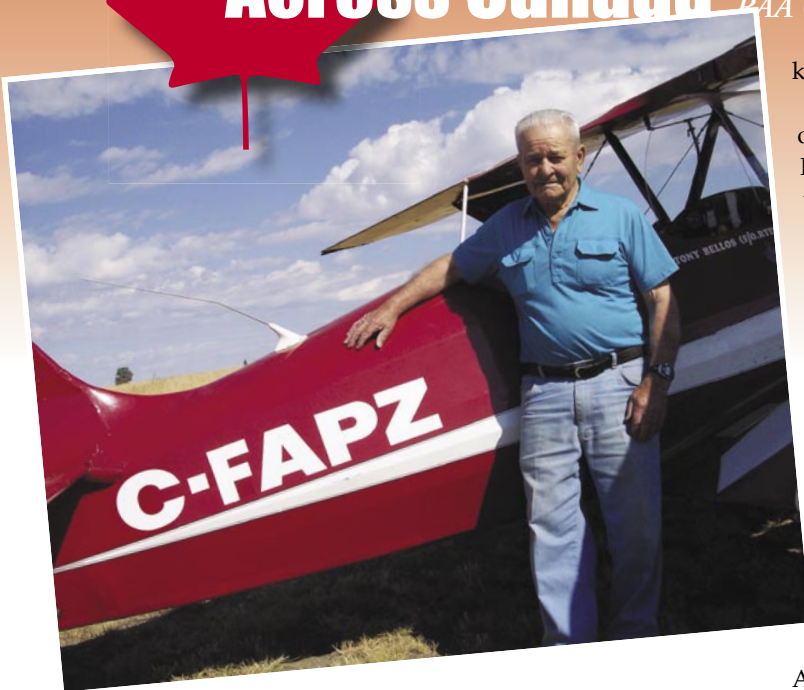
The weather was in calm wind condition but quickly heated up to near 30 degrees Celsius by the time the last airplane departed at noon. Anticipating the heat nearly half of the membership arrived by car to avoid the potential high altitude density problem in some of their low powered airplanes.

A safe aviation event was concluded with all participants having had an enjoyable Sunday morning socializing with fellow aviators.



Across Canada

PAA Chapters in Action



Thompson Valley Sport Aircraft Club Tony Bellos - Still Flying

Tony started his aviation career with a first flight at the age of 8. He stood, as his father sat on the cockpit floor of a Jennie. Waving throughout his ride the seed was planted! The cost \$2.00 per person. The year was 1924.

After years of ranching and wrangling, in 1937 Tony started a Aeronautical Engineering Correspondence course, offered by Brisbanes in Vancouver. Completing the 2 years, Tony then went to California and entered a 3 year engineering course at Northrup School, receiving a 1 year credit for the correspondence course completed. As Canada was getting involved with the war Tony switched to a Airplane Construction course. He also learned to fly. At the time Wacos and the like could be rented for \$2.00 per hour wet!!! Those were the days!!

After completing the course Tony went to Montreal to work for Nordyn Aircraft Company. While spending 2 years working for Nordyn, Tony continued to fly, with every intention of becoming a bush pilot. He then made the decision to join the Canadian Air Force.

Tony joined up in the winter of 1942/42 and was trained as a fighter pilot. He went overseas and was assigned to a bomber crew as co-pilot and bomb aimer. Bomber crews were expected to make 30 trips to every tour, on their 29th Tony and crew were shot down. The shot up airplane managed to limp back to England, Tony and one crew member were able to get out when the plane broke-up in rough air, but five crewmen were

killed. Tony was injured in the escape.

After convalescing, Tony returned to Canada to help organize the Tiger Force, training to fight the Japanese. Halfway across the ocean the Japanese surrendered and the war was over.

During his time in England Tony met his future bride Trixie. As of this year they have been married for 61 YEARS!!

Tony returned to ranching and cattle buying. Tony joined the Prince George Flying Club after a period of not wanting to see an airplane, due to the war. There he test flew planes for prospective buyers.

After retiring Tony became involved with the Kamloops Air Show. Getting a chance to fly with the Ray Ban Golds during a practice, rekindled an old spark for aerobatics. Tony built a Murphy Renegade Spirit from a kit in 1989. He hangars the plane on his property and flies whenever the weather allows.

Tony is a member of the Thompson Valley Sport Aircraft Club and has always enthusiastically supported the club in all of its endeavors. On July the 28th 2006 the TVSAC hosted a dinner at a local restaurant in Tonys honour. It was one day before his 90th birthday!!! At the dinner Tony was awarded with a lifetime membership in the TVSAC, and we most certainly hope he will take advantage of it for many years to come!! The weather cooperated and as the pictures show Tony went flying that morning with other club members.

Here's to wishing Tony all the best of health and happiness in his 90th year. Congratulations Tony!

Submitted by Richard Suttie TVSAC.

Some information taken from article by Alice DeMarni.

Chapter 85 Vancouver

The Delta Heritage Airpark Canada Day Fly-In was a huge success, although it would be difficult not to be, with



Rob Prior



Rob Prior

Left: Registration at Chapter 85's fly-in. Rob Prior photo.

Below, from the top down:
A Sonex taxis out at Edmonton's AirFest;
A beautiful natural metal RV;
David Marsden's prototype Skylark; and bottom left, a
Canadian Forces Dakota.

that beautiful sunshine we had all day.

Pictures of the fly-in are up at <http://www.airframe.ca/>. Click on the link to the Delta album, or enter the code CAK306 in the Event Code box.

Highlights at the show were not one but two Fairchild 24's, parked side-by-side. One of the antique car owners rolled his Packard over to park next to one of the Fairchilds so we could take some pictures, one was built in 1937 and the other in 1938 so they both come from the same vintage and are both in immaculate condition.

There was only one For Sale sign on the entire field this year, a 1982 RV-3A. It was flying up until it was disassembled for storage 5 years ago. The engine was filled with preservative, and the spark plugs replaced with drying plugs, and then it was all covered up and put away.

Submitted by Rob Prior

Edmonton Homebuilt Aircraft Association Airfest 2006

Airfest 2006 was hosted by the Edmonton Homebuilt Aircraft Association...July 1-2, 2006 at the Alberta Aviation Museum/Edmonton Aviation Heritage Center, Edmonton Alberta

If you missed it you *should* be sorry.....

Airfest Trade show ran both days, featured a wide selection of both vendors, clubs and aviation associations. 28 booths busy both days.

The Fly In on July 2nd was an



Dave Irwin's Spitfire on display at Oshawa



Chris Gardiner

absolute gas....morning started with a wonderful pancake breakfast and arrival of a CF-18 from CFB Cold Lake.

Also on display from the Canadian Armed Forces...

-BAE HAWK trainer/light fighter

-Dehavilland Twin Otter

Then there were the other 45 aircraft ranging from a Challenger Ultra light to a 737 in Pacific Western Airlines colours. The Alberta Aviation Museum was open to all participants. Just to add a little colour, the Edmonton City Police had brought out their helicopter and 20 custom cars were on display. Even Bill Carter brought out his new Pitts Special and signed autographs.

The RAA should be justifiably proud of the Edmonton Homebuilt Aircraft Association which hosted this event.

-100 volunteers from Air Cadets to CASARA, they all got Airfest T-shirts

-Everyone that flew in got a FREE breakfast and FREE admission to the event

-The first 25 received a \$20.00 fuel certificate from Shell

Canada

-Approx 5000 people attended Airfest 2006 and proceeds of the \$2.00 per person admission went to support the Alberta Aviation Museum/Edmonton Aviation Heritage Society and of course the Edmonton Homebuilt Aircraft Association.

The only disappointment was more homebuilt aircraft did not fly in. Out of the roughly 55 aircraft on 25 came from the amateur built community...come on, people, support the sport.

Next year our target is 100 aircraft from Western Region, 10,000 spectators and some active aviation events...come join us.

Submitted by Tom Hinderks

OSHAWA CHAPTER/CANADIAN AVIATION EXPO '06

With the addition of a crowd – pleasing old style aerobatics air show including a wind walker and parachutists, the 14th annual Canadian Aviation Expo set a new attendance record said show manager Stephen Wilcox.

Pilots from many parts of eastern Canada and several from the U.S. took advantage of near perfect weather to fly in to join with the crowds that drove to the 2006 show at the Oshawa Airport. Show features included Warbird rides, flights in trainer planes and a daily fly pass of many of the latest certified aircraft, a variety of show quality homebuilts including a replica Spitfire, numerous ultralights and the Canadian Forces Snow Birds. Filling out the show area were rows of shelter and tents as well as two large hangars offering aviation products and services.

Oshawa District RAA members, backed up by mem-

Continued on page 35

Contributions to our Chapter Activities section are encouraged. Keep your fellow members updated on what is happening across Canada! Send your reports and newsletters to :

Recreational Aircraft Association

Brampton Airport, RR#1, Caledon ON L7C 2B2

Telephone: 905-838-1357 Fax: 905-838-1359

Member's Toll Free line: 1-800-387-1028

email: raa@zing-net.ca

World's fastest Honda Civic? This is not what Ross Glass of Sarnia started out to build but it is what he ended up with. All of those kids street racing in their tuned rice rockets could take a lesson from Ross's Honda powered Mustang I. Just drop the weight and drag by s you will never have to look over your shoulder again.

Ross G

Mustang



Glass's

Mustang

sixty percent and



Ross Glass is a tool and die maker from Sarnia Ontario who decided in 1989 to build a Midget Mustang, also called a Mustang 1, a Long Midget, or a Bushby Mustang. The original was designed as a Goodyear Racer, and the current model is true to this mission. It is small and light, has sensitive and nimble handling qualities, and goes like stink on low horsepower. Ross drove to Bob Bushby's farm in Michigan to check out the plane and came home with a set of plans for his project. Eight sheets of 2024 Alclad and fifteen years of spare time work, and Ross had his baby done. When Ross began this project there were no snap together kits available, and the only parts from the designer were the landing gear legs, the canopy bubble, and some fibreglass fairings.

Ross began construction with the wings, and found that the full scale drawings of the ribs were well lofted. The Mustang has a tapered wing, so every rib gets its own set of blocks. Poor lofting by the designer will mean

that the ribs will not fit the correct stations between the spars, but this was not the case with Bushby's drawings. Ross cut all of his ribs from .025 sheet and handformed the ribs, cut and flanged the lightening holes, and pressed the stiffener beads into the nose ribs. The third and tip ribs do not have lightening holes because the leading edge between them is sealed to become a wet wing fuel tank.

The C-channel spars were formed from .040 and the main spar was reinforced with cap strips of 1/8" flat bar, 1-1/4" high at the root tapering to 1/2" at the tip. At the root there are five laminations on each side of the C-channel, and the number is stepped down as the laminations approach the tip of the wing. This spar is rated for 9 G's ultimate, and it is attached to the carrythrough by one bolt through the top cap and another through the lower cap. These bolts are 1" diameter and the carrythrough has steel reinforcement where the bolts go through.

The wings are skinned in .025

by Gary Wolf



sheet and the nose of the 64A-212 airfoil has a very tight radius. Ross says that some builders make this on a knife edged brake and end up with an even pointier leading edge. Ross stayed true to the original radius and finds that even with this shape the stall is fairly abrupt. All external riveting is flush, and the wet wing area is sealed with Proseal. Ross had the foresight to ask Proseal if their product would be safe with alcohol bearing fuel, and they replied that it is. Two years of use with Sunoco 94 octane Gold have not yet shown any deficiencies in the Proseal. Ross found the Proseal to be fairly nasty to work with but he cannot argue with the results.

It is small and light, has sensitive and nimble handling qualities, and goes like stink on low horsepower.

Ailerons and flaps are both skinned in .016 Alclad, and the flaps are piano hinged to the lower flange of the rear spar. Flaps are mechanically actuated by pushrods and a lever. The ailerons have a torque tube for actuation, and motion from the stick transferred by pushrods and bellcranks. The aileron hinges are weldments from 4130 sheet and tube, and Ross made these himself. He bought a gas welding outfit and taught himself to weld by cutting apart and checking sample coupons until he had consistent results. 4130 filler rod was used, and the fittings were post annealed with his torch after welding.

Tail construction is similar to the wings except that there

are root and tip ribs only. The spars are all formed .032, C-channels and everything is solid riveted. The moving surfaces have light aluminum angle stringers as stiffeners between the root and the tip ribs. Ross borrowed some time in a friend's metal shop to step the edges of the elevator and rudder skins down at their trailing edges. Because there is not enough thickness for dimpling for flush rivets, the trailing edges are riveted with domed heads. Stepping down the edges keeps the domes out of the slipstream. Tail skins vary from .032 to .016 in thickness, depending on location. The tail surfaces are hinged on U-brackets formed from 4130 sheet with AN-3 bolts as the hinge pins. There is no mass balancing of the tail surfaces and Ross has not encountered any flutter yet. A trim tab is set into the left elevator and is mechanically actuated by a Bowden cable from the cockpit. The plane trims well, can be flown hands-off, and maintains altitude nicely.

Ross made his own wing and tail tips and root fairings using pink Dow foam that he carved to shape with a bread knife, and sanded to final fit right in place on the wing. These were then skinned with 4 oz glass cloth and System 3 epoxy. The foam was left in the tips for reinforcement, but the root fairings had theirs dug out and their insides sanded. The result is tips and fairings that fit perfectly with no gaps next to the aluminum skins. All glass parts were painted in a high gloss silver grey to complement the polished Alclad skins. Ross spends twelve hours per season to keep the Alclad polished, and breaks this up into three four-hour sessions.

The fuselage is a semi-monocoque fabrication with formed aluminum bulkheads of oval cross section. The floor in the cockpit area is slightly curved and the overall impression is that there are none of those painfully flat surfaces so common on today's crop of kitplanes. The downside is that the fuselage cannot just be assembled on a flat table. Instead the construction is more like that of a boat. A wooden 2 x 10

Building

strongback was used as the base of the building fixture, and vertical 1 x 4's were screwed to it to become station supports for the formed ring bulkheads. The drawings were all full size, and this made it a lot easier to lay out and cut the form-blocks. Ross cut and formed all of his bulkheads, aligned and fitted them to the strongback, and began fitting the skins. The skins were fitted and dimpled for flush rivets three-quarters of the way around while everything was still attached to the

strongback. Finally the fuselage was removed from the fixture and the last quarter was closed in to complete the tail cone. The forward section of the fuselage has four longerons to carry the engine loads back into the side skins. The lower longerons terminate at the spar carrythrough, and the upper longerons end at the rear cockpit bulkhead.

The rear cockpit bulkhead serves as the seat back and is very well tied into the side and floor skins, the rear spar, and



George Gregory



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The canopy was a bit of a challenge. Previous Mustangs had been fitted with a side hinged throwover canopy, and Ross was one of the first builders to use a slider

the upper longerons. For good rollover protection a steel tube rollbar is fastened into this area. Ross formed his own rollbar from 1" 4130 tube using his torches to hot bend the tube to the pattern. The lapbelt is fastened into the hard point where the rear spar meets the rear cockpit bulkhead. There are two shoulder belts which are fitted to a Y, and this is fastened to the next bulkhead back, at a reinforced hard point. The panel bulkhead is a load bearing member that is flush riveted to the skins, and ahead of this is an aluminum 15 gallon cowl tank. Although the cockpit is only 21" wide, the layout is comfortable for Ross, who is 180 pounds and about six feet tall. I asked Ross where he carried his luggage in this plane, and he smiled and pointed to his shirt pocket. This is a good cross country machine but you'd better plan to buy your change of clothes when you land.



The canopy was a bit of a challenge. Previous Mustangs had been fitted with a side hinged throwover canopy, and Ross was one of the first builders to use a slider. There was a lot of head scratching but the result is a smooth working sliding canopy that may be moved rearward for ventilation while taxiing. Ross has not tried flying with the canopy open, but some of the earliest Long Midgets were open cockpit. Ross's bubble was average for optics, but later ones are excellent. A small diameter steel tube frames the inside of the forward canopy, but it is there as a stiffener only, not as a supplementary roll bar.

The flat spring landing gear of the Mustang takes its loads into the spars by a torque tube that is flange mounted to the front spar, and extends to a hole in the rear spar. A plate welded to the torque tube serves as the fastening point for the tapered spring gear. The tailwheel spring is a tapered, solid rod that has been heat treated, and it fastens into the two rearmost bulkheads of the tail cone. Ross bought all of these parts from Bushby, rather than doing his own heat treating locally. Wheels and brakes are from Matco and the wheel pants are a generic item from Aircraft Spruce.

Once the airframe was completed, Ross embarked on the firewall forward. Not content to take the common route of using an O-200, Ross chose the Honda Civic conversion from Canadian Airmotive in BC. Ross bought his package in 1989, and at the time they were using the 1500cc three valve per cylinder carbureted engine. The conversion uses a crank triggered ignition with dual lead motorcycle coils, and a permanent magnet alternator on the rear end of the crankshaft. A checkered ring serves as the trigger for the optical tach. The redrive is unusual in that there is an outer bearing for the lower pulley, and two bearings to support the driven shaft. Ross used the supplied exhaust system initially but soon made his own from stainless steel, and wrapped it with heat tape to keep the engine compartment cooler. Although there is no silencer, the four into one exhaust sounds mellow and quiet. Ross then made his own engine mount with no offset or downthrust. The airframe was blocked up level and the engine was hoisted to the correct position. Continental rubbers were used in the forward casting, so Ross used the same when he made his own rear aluminum mounts. The bed mount was made from 4130 tube, and again this

Ross's panel is old school analog panel, very businesslike

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was gas welded by Ross.

Radiators proved to be a bit of a problem in that at the time there were few suppliers of aluminum cores. Ross found a couple of small racing heat exchangers and had the tanks modified to clear his intended cowl line. The two rads are in series and Evans waterless coolant is used in this installation. Oil cooling is direct to the oil pan via a NACA duct set in the lower cowling. Ross uses Mobil 5 w 30 in winter, and 15 w 30 in summer. Temperatures of both water and oil are 180F in winter. In summer these rise to 210 for water and 215 to 220 for oil.

Carburetion is the stock Honda downdraft without provision for leaning. Ross changes main jets to suit the season but otherwise the carburetion is a non issue. He fabricated a ram air scoop to provide pressurised air to the intake through a filter. Hot air is available from the exhaust shroud, and it too is filtered. Spark plugs are NGK resistor types to minimize radio interference, and these are one heat range cooler than those used in the car. The battery is a Y50 glass mat sealed unit meant for Harley and Gold Wing motorcycles. The battery is mounted behind the pilot seat to balance the engine package. Ross says that the engine package is comparable in weight and power to a Continental O-200 when it is fitted with starter and alternator. He feels that he is getting at least 100 hp at its 6000 rpm peak. Cruise at 75% power is 5300 rpms.

The propeller is a warp Drive 66" three blade with SAE 1 pattern. Ross machined a 4" dumb-bell extension to push the prop further ahead so that he could obtain a clean cowl line for his baby. Once the engine package was in place the area was covered in sections of pink Dow foam, and again this was cut and shaped with bread-knife and sandpaper. A few layers of glass cloth and epoxy, a lot of sanding and prep, and the job was done. It sounds easy but determination is required. The cowl splits along a horizontal line and is joined by piano hinges. Removal involves a few screws at the firewall, and the cowl may be completely removed within a couple of minutes for full engine access.

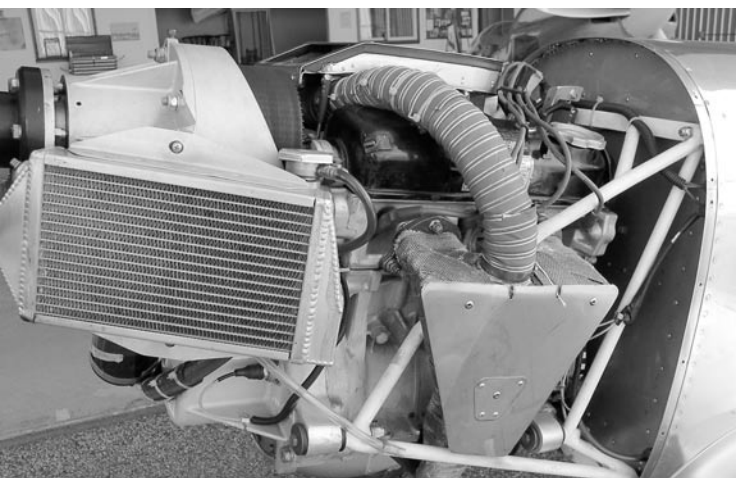
Ross is old school when it comes to panel, and almost everything is steam gauge technology. The fanciest pieces are the optical digital tach and the Lowrance GPS. The radio is a handheld wired to the bus for power. This plane is meant for day VFR and ease of maintenance, so steam gauges fill the bill well. When everything was assembled and running, Ross took

his Mustang to Sky Harbour in Goderich for the distinctive paintwork. There is no mistaking Ross's plane when he joins the circuit at a fly-in. The speed, the mellow exhaust sound, and the WW 2 shark mouth mean that Ross is about to land.

How does it fly? Well, first flight at Chris Hadfield Airport in Sarnia was a bit of a near disaster. The prop was pitched too fine and the airspeed was low, even though the engine was at high rpm's. Cooling air was lacking at this low speed so temperatures climbed but the plane did not. Ross managed one brief circuit and got back on the ground. Repitching the prop cured the problem, and the plane now has a top speed of 180 mph at 6000 crank rpms, with a 75% cruise of 150 mph at 5300 rpms. Handling is very light and the control efforts are well balanced in pitch and roll. A one inch deflection of the stick results in a very quick roll or pitch change, so the pilot quickly learns to use very small movements. The stall is abrupt and occurs at 65 mph indicated. Ross was accustomed to stalls in a Citabria but says that it is a pussycat compared to the Mustang. The wing gives a warning but recovery takes some altitude. The Mustang follows its nose well, and rudder trim has not proved to be necessary. The rudder is powerful, and cross controlling to spill altitude is easy. The elevator trim provides good altitude holding while the pilot is occupied with map reading, so cross country work is relaxing. The 150 mph cruise consumes 4.5 gallons per hour, and there are 45 gallons of unleaded on board.

Takeoff and landing are more of a challenge than flying, not unexpected with a short coupled plane flying on 65 square feet of wing. Ross finds that with the prop pitched for cruise, he lifts the wheels at 70-75 but does not begin a climb until he reads 90 on the airspeed. This gets the prop into the efficient range, and he can climb at 1500 fpm anytime, and up to 1800 fpm on a cold day. On the downwind

The densely packed engine compartment, filled with 1500cc's of Honda



Ross is already planning his next project, a self-designed 2 seat low wing tandem, powered by a Chev conversion.

he maintains 100 mph, keeps his circuits tight, and pulls back to 1800 crank rpms for base. He does his base leg at 90 because at this speed the plane has a reasonable sink. On final he slows to 85 mph and the sink rate increases to 1200 fpm, the proverbial greased anvil. He selects flaps on final and flares at 70 for a wheel landing. The tail is kept up for good directional control, and when it finally wants to drop he lets the tailwheel touch, then pulls gently back on the stick to give the tiny caster wheel some grip for steering. Still air landings consume 2000 feet of pavement, but a bit of wind will lower this to 1500. Ross says that you have to be on your game to do a short landing in the Mustang.

What did it cost to build? Ross is a bachelor so the real figures can be printed. The firewall forward cost \$6500 CDN in 1998 and is double that price now. Eight sheets of Alclad cost about \$1600, and would be about \$2500 these days. Canopy, wheels and brakes, composite materials, some chrome moly tube and sheet, and the steam gauges and radio, together should eat up nearly \$10K. Call it \$25,000 to build a fast little fighter plane. Not bad for the money.

Ross would like to thank Bob Bushby for all of his advice during airframe construction, also his friends at Sarnia Equipment Services for assistance with blueprinting the cylinder head. The current suppliers of the engine package are Firewall Forward in BC, and they were helpful with information to make this Mustang a success. Ross would especially like to thank his MD-RA Inspectors, George Opacic and Bob Buchanan for their prompt and efficient service. And of course COPA and RAA receive thanks from Ross for their work to maintain this hobby.

Ross is already planning his next project, a self-designed 2 seat low wing tandem, powered by a Chev conversion. This time there will be no fibreglass anywhere. He is learning how to form parts on the English Wheel and plans to have an all aluminum airplane, fully polished. The current plane shows what can be achieved with a little Honda engine. A Chev should show the Corvette owners what that engine will really do. Ross is shooting for 250-300 mph next time, and we have no doubt that he will achieve his goal. **RAA**

For more information: Mustang Aeronautics, Inc. 1470 Temple City Troy, MI 48084 Phone: (248) 649-6818 · Fax: (248) 649-0098 <http://www.mustangaero.com/>



Power

It's Always Been about

By Tom Hinderks / Part 3

Mark Munzel

“New Generation Alternatives” - The Automotive conversion

Auto conversions are the current rage in Amateur built/ Experimental aircraft and they can be a very good alternative. But in my opinion there is a lot more than meets the eye.

First things first...

What's the difference between an automotive engine and an aircraft engine? Other than the obvious physical differences there are some very important design differences.

Aircraft engines are designed to work at 75 to 100 percent of their design power for most of their life. Auto engines are the opposite; they spend most of their life producing less than 30 percent of their design power and only rarely (passing) produce their maximum power.

Think about it: when was the last time you drove your car with your foot to the floor other than for a few seconds to pass or make it up a real steep hill. *Not very often!* Yet the same engine in Aviation use is expected to live at 75% plus power settings all the time.

In actual terms of operation the operating cycle of an aircraft engine is very similar to the operating cycle of a Super Speedway race engine (NASCAR). So if you want

the auto engine to live in the aviation environment you had best prep it the same way racing teams prep their engines.

In my opinion the minimum would be:

- Full overhaul top to bottom! (using top quality parts)
- Balancing

That said an automotive conversion could be a very good alternative. The modern auto engine is well designed; benefits of mass production means greatly reduced expenses and prepared for the task can be extremely reliable.

If the automotive conversion is your choice you now have three options:

- Purchase of an already converted engine or firewall forward package
- Build your own firewall forward using commercially available products
- Do it all yourself.

Option 1- Purchase of an already converted firewall forward package.

If you have neither the tools, time or expertise to do the job this is most likely your best alternative in an automotive conversion, but be careful.

While things are much better than years back you can

get burned. The solution is research!

Check out what is available in your power range, talk to people currently using the conversions, Get their experiences with the various suppliers. This is buyer beware country: know exactly what you are getting into, exactly what you are going to get, and what warranty, delivery date, every detail.... before purchasing!

Option 2- Build your own using commercially available products.

No doubts this will save you a bunch of cash over option 1, but in exchange you will invest a lot of time and do you really have the skills to do the job? Be sure before you start. Thor-

oughly research not only your conversion of choice but also the suppliers you are planning to use.

All the same caveats apply here as they do with buying a complete package - but if you think it through, do your research and allow enough time you can build your own. In addition it can be a wonderful learning experience and make your aircraft truly ALL yours.

Option 3- Do it all yourself

Not the place for the faint of heart and generally not a place where you will save money.

Making one of a kind parts is not cheap. Working out each and every

engineering detail is not fast, it is time consuming. I speak from experience as I have converted several engines as one offs. Once again it can be done, and many have done it successfully, but you need...

- A place to work for a long period
- The time to complete the project (and it is a project to itself),
- The tools
- The knowledge or be willing to learn it

- A lot of help from those that know more.

- Clearly defined goals and plans

Starting from scratch and doing it all can be as big a project as the building of the aircraft it is for. If an automotive conversion is your choice it can be a very good one, but make your choices carefully and research every detail thoroughly. The real key to finding the perfect engine for your project is:

- Defining your goals and expectations, including your budget
- Defining the time you want to devote to this part of your project
- Realistically evaluating your abilities
- Carefully researching your options
- Making your plan and sticking to it

Your choices need to be what is best for you! Each of us is different, make the choices that fit your goals, expectations and budget.

Most of all FLY SAFE. **RAA**



Mark Munzel

About the author:

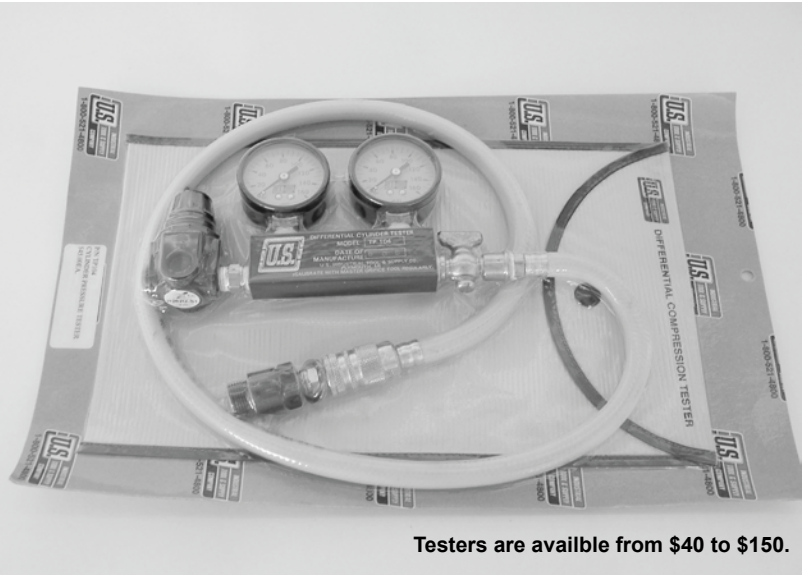
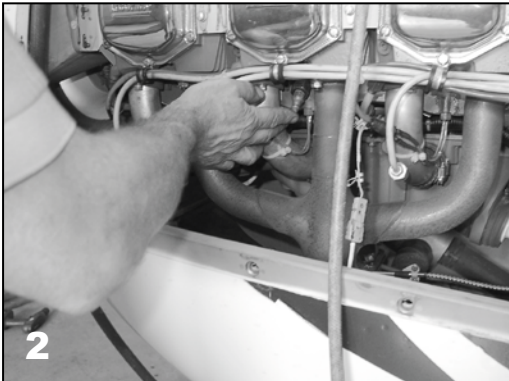
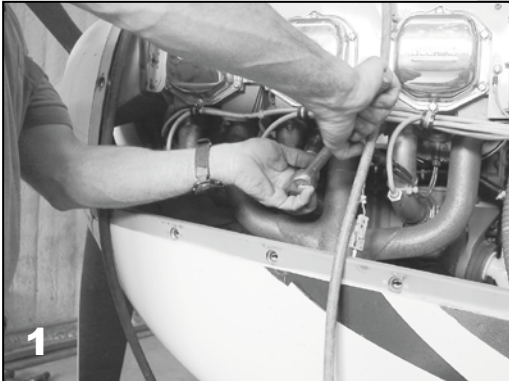
Thomas Hinderks comes from a family with a history in aviation that goes back over 50 years. Past holder of a Private pilot's license and current holder of both a Glider pilot's license and Recreational Pilot's Permit. Tom's automotive background also extends over several decades. With his father being a licensed automotive mechanic and an automotive instructor, he had excellent start into the world of engines.

15 years of auto racing has given him a practical background in the building of engines and what makes them survive. A career in the recycled automotive parts business going over a two decades has kept him up to date in what's new and what is failing in the field.

Tom has also been involved in the conversion of the Suzuki automotive engine for experimental aircraft use as a long-term project going back to the early 1990's.

CYLINDER LEAKDOWN TEST

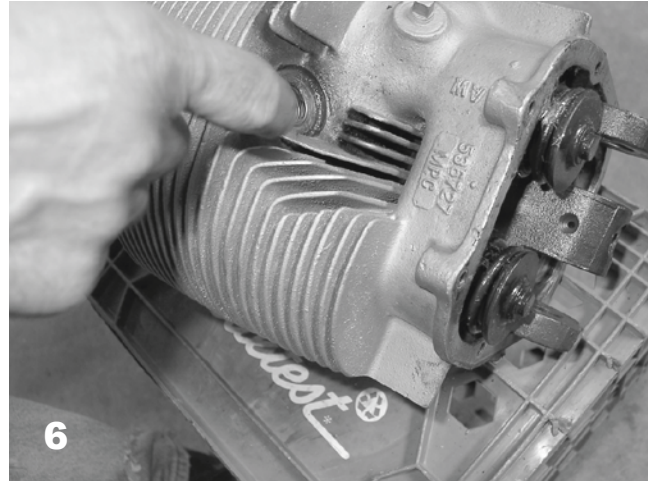
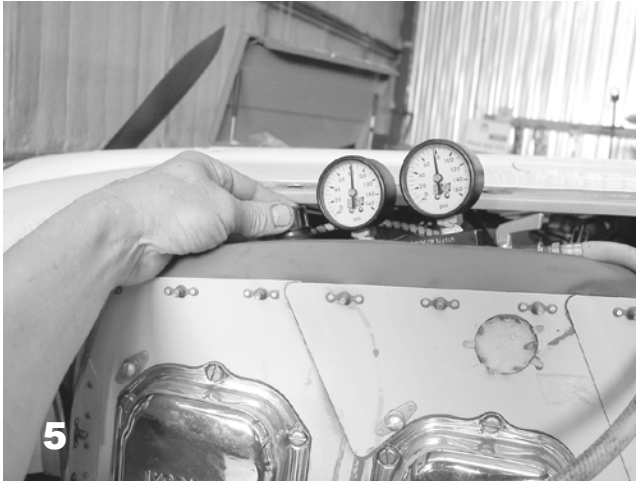
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Testers are available from \$40 to \$150.

THE LEAKDOWN TESTER is a very handy tool for determining the condition of the top end of a four stroke engine. Essentially it is a means of pressurizing a cylinder to a known number of psi, and then measuring how well the engine retains that pressure. To do this test you will need a leakdown tester available from an aviation or auto tool supplier or from Princess Auto, and you will need an air supply at 80 psi. Here's how to do it:

- 1: Turn off the mags and remove one plug from each cylinder. Install the pressure adapter and tighten as you would for a sparkplug
- 2: Rotate the prop by hand and feel for pressure with your fingertip, to determine when the cylinder is at compression TDC.
- 3: Back the regulator down to zero and connect to the shop air supply
- 4: Turn the regulator up to 30 psi and rock the prop gently to be certain that you are at TDC. The prop will not try to turn anymore when it is at TDC.
- 5: Now wind the pressure regulator up to 80 psi on the left hand gauge. Stay out of the way of the prop, and keep one hand on it to warn you if it begins to move. The right gauge shows how much



pressure the cylinder is retaining. This is a freshly broken in engine, and it holds 79 psi. Check your manual to see what is acceptable. 20% leakdown is not unusual.

6: If there is leakage, the air has to be going somewhere. Worn rings will produce a hiss at the oil filler. Leaking

valves can be heard at the carb or the muffler outlet. A cracked spark plug seat can be found with a solution of dish detergent. Leaking air will produce bubbles. On Continentals the screwed joint between the head and the barrel can leak too. *RAA*

President's Message

Continued from page 2

expect to pass these changes by Fall of 2007. Change sometimes comes slowly at Transport Canada.

Transport Canada breaking its own rules?

Despite that the Working Group has dealt with overweight and overseated turbine pressurized non-certified aircraft, Transport has come under strong political pressure to allow one manufacturer to jump the gun by issuing an exemption to our regs. His planes have seven or eight seats, are pressurized, and have turbine or jet engines. The manufacturer applied for an exemption to our Amateur-Built category, it was granted for the customary 18 months, and is renewable at the end of that period. Initially Transport told the Working Group that they were recommending that these aircraft be fully built by the manufacturer. This news was broken to us by the same people who at January's CARAC meeting had been trying to wipe out small scale mass production of amateur-built aircraft. I have no issue with the manufacturer himself - he did what was necessary to influence

Transport Canada. The problem is with Transport, and the sweetheart deal that they are offering, even though it could jeopardize the privileges that amateur-builders currently enjoy.

Availability of insurance for the rest of us could become a problem. Canada is a small market with a small pool of amateur-built aircraft over which to spread the risk. The premiums are currently calculated with the assumption that our maximum gross weight is 5000 pounds, and no more than four seats. These exempted aircraft have 50% more gross weight and almost double the number of passenger seats. The owners of Pietenpols could end up subsidizing the owners of high end aircraft.

Ability to cross the US border might also become compromised by having these aircraft registered in the amateur-built category. Transport initially told us that they would be fully manufactured without input by the purchaser, and that this was in the interests of safety. Later they changed their story to say that these planes would be registered in the Limited category. Then it was changed back to amateur-built with full manufacture by the company. At last contact Transport were saying that the planes would be built under the direct supervi-

sion of the purchaser, in a builder assist program. The FAA was represented at all of these meetings and it is not unreasonable to expect this waffling would become part of their report. The FAA earlier made it clear that the reason that our Owner Maintenance aircraft are no longer allowed into the US is that they view O-M aircraft as certified aircraft that are no longer being maintained by qualified personnel. Therefore they shut the door. They have also stated that aircraft that are fully manufactured should go through certification. These planes are well outside the limits and intent of our category. There are currently two of these "amateur-built" heavyweights on the Canadian registry, and we are being told to expect more. The correct place for these is in their own category, where they can have their own insurance pool and make their own deals with the FAA for border crossing. There is nothing about them that meets the education and recreation requirements that were the original justification to set up an amateur-built category.

Again, the manufacturer has done everything right to get what he wants. It is Transport that is playing fast and loose with the rules that the rest of us are expected to obey. *RAA*

Product Reviews



PRINCESS AUTO AIRCRAFT SNIPS

I heard them calling to me as I went down the aisle of Princess Auto. Aircraft snips for \$5.99. However I have had lots of junk snips at that price, the worst being the checkout counter no name Wiss copies that everyone sells around Father's Day. Wiss makes a fairly good snip but they are expensive. Craftsman used to make an excellent snip until they moved their production out of the US. Then they became horrible. I had a close look at the Princess snips and the jaws fit well, had not too blunt a point, and the serrations were well done. I figured that I could waste \$5.99 worse ways, so I bought a pair of the red handle left cut snips.

Back at the hangar I gave them the test - snip a fish-mouth from a 3/4" chrome moly tube. The Princess snips did this easily. The serrations allowed the jaws to get a good initial grip. The half-round was cut easily, even at the end of the cut where a blunt jaw will make it difficult.

Next test was .050 stainless sheet. Some of the cheap

snips will not even begin a cut in this material, let alone actually snip out a part. These snips easily cut out a piece the size of a loonie. I was impressed.

There is a caveat to all serrated snips. They leave a row of stress risers on aluminum sheet, and should not be used unless you are on a desert island and have nothing else to build your plane with. Filing or sanding these marks out of aluminum sheet is not a productive way to spend an afternoon.

These snips will fishmouth .050 chrome moly tube in one pass, or cut parts from .050 stainless, not bad for \$5.99

I can now throw out all of my Father's Day awful snips, my old worn-out Wiss set, and my Craftsman off-shore disappointments. The next time I am at Princess I will be buying the right cut and straight cut snips, and get change back from \$20. **RAA**

Gary Wolf RAA # 7379

Chapter News continued from page 21

bers from the Midland, London –St. Thomas, Scarborough/Markham and Niagara RAA chapters and Quebec Regional Director Ray Fiset presented a series of builders' seminars and talked homebuilt aviation with many of the visitors. A new feature this year was a wing rib building area for future pilots. Materials were supplied by the Oshawa RAA for a steady stream of youngsters who built wood wind ribs under the guidance of members Doug Raine and Weldon Howell. The children returned later, after the glue had dried, to pick up their ribs.

The 2006 showplane on display at the front of the RAA tent was Ed McDiarmid's beautifully finished yellow and white CH 601. Ed, who had made his 601's first flight just a few days earlier, spent most of the



Chris Gardiner

Above: The Oshawa tent was busy all weekend during the Canadian Aviation Expo

Left: Ed McDiarmid's 601XL was featured at the RAA Builders' Tent, organized by RAA Oshawa

Chris Gardiner



three days of the show answering questions about building and flying his plane. Inside the tent Stan McClure of the London-St. Thomas Chapter conducted a woodworking seminar beside his partially completed Corby Starlet.

Bert Parsons and Don Morrow of the Midland chapter brought in their soon to be completed Texas Parasol to the show. It is one of about 15 of these small planes being built by RAA members from several chapters in the Central Ontario area. On the other side of the tent Oshawa brothers Peter and Jim Morrison conducted Tig welding seminar and answered questions about their partially built AcroSport II. Beside them was the Fiberglass seminar with Oshawa member Wayne McCarron showing the fiberglass parts he has built for his Vision EX.

Continues

A MEMBER HAS DONATED a complete Zenith 601 HD wing kit for which he originally paid something like \$5000. He has found that he does not have time to build a plane, so the components have been donated to RAA Canada to sell, and the proceeds will be used for more sets of Weight and Balance scales. There are two wings, the centre spar, wing tips, and a rudder.

These will be sold as a lot, with bids to be received by email or phone until close of business September 15th. You may bid by email to garywolf@rogers.com, or by phone to 519-648-3030. The RAA website www.raa.ca will carry updates on the bidding.

In the classified ads of this issue there is a member with two brand new 601HD canopies for sale at half the going rate. There is also a rebuilt Rotax 912 for an asking price of 10K. Combine the RAA's components with a canopy and an engine, and you will be well along on the construction of a Zenith Zodiac 601 HD.

Please bid generously. The funds will be used to the benefit of our membership.





Left: Ed Johancik (l) admires Lawrence Shaw's immaculate Wheeler Express

Along the flight line the replica Spitfire Mk VIII, built by Dave Austin of the Scarborough-Markham chapter, attracted a lot of attention. It was constructed from an Australian based Super Marine Aircraft kit and is powered by the Walter LOM 250 h.p. supercharged engine.

Famed airshow pilot Gene Soucy had the crowd holding their breath as he swooped and turned his Grumman Ag-Cat with Teresa Stokes waving from the upper wing. Rick Volker in the Sukoi completed the thrill-filled acrobatic show. Among the many eye-catching commercial and kit aircraft in attendance were the Cirrus, Seawind and the four place MS 760 jet.

-Don Dutton

RAA NORTHERN REGION FLY-IN

On July 8 & 9, 2006, Midland, Barrie and Collingwood RAA Chapters held their annual Fly-In at Collingwood Airport.

Over 70 aircraft flew in on the Saturday during perfect weather and 18 on the Sunday with less favourable weather. Two well-attended recurrency seminars were conducted on the Saturday by Transport Canada representatives Will Boles & Suzee Detombe.

RAA President Gary Wolf provided a demonstration on the use of the English Wheel to form complex shapes such as cowling blisters from aluminum sheet. This was of particular interest to home builders who are allergic to polyester & epoxy resins used in fibreglass lay-ups.

Commercial displays were provided by Leavens, represented by Will Kalyn. Also in attendance was Paul Fleming of Kitplane Builders, who are also representatives for Aircraft Spruce. Aerocovers had their display where John Higgins was showing a range of canopy covers, windsocks,

prop & pitot covers as well as many other aeronautical items.

Art Mitchell of Mission Aviation Fellowship had an information booth and Edenvale Flying Club flew in with two advanced ultralights that they are agents for. Gerry Trimble had a stand selling various aviation items of interest to homebuilders.

Larry Quinton displayed his beautifully restored and re-engined 1952 Bellanca 14/19 Cruisemaster. During both days Al Leslie provided a lively musical background for the event.

Longtime Collingwood Chapter member Fred Terry organized a display of British sports cars belonging to himself and fellow members of the Georgian Bay British Car

Marcotte

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Club . Breakfast and Lunch were provided on both days by Collingwood RAA's food trailer.

On Saturday evening Chris Weston provided a BBQ Steak supper with all the trimmings for just \$10 per person. 18 people attended the supper and then were joined later by others around a campfire until late in the evening. .

None of this would have been possible without the help and support of Airport Manager Pierre Lajoie, Ken & Lee-Anne. Our thanks to them all and also to Jorge Alonzo for allowing us to use part of Cross-Flo Engineering facilities. Plans are already under way for our 2007 Fly-In!

by Pete Hodkinson RAA 1341 RAA



Right: RAA Collingwood's catering trailer provided breakfast and lunch for the Northern Region Fly-in

Keep in Touch With Your Board of Directors!

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Quebec:

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..... 7925 Hamel Blvd., Ste Foy, PQ G2G-1C8

Appointed Positions:

Translation: Pending

Magazine Mailing: Dave Evans

Ultralights: Wanted

Web Page Frank Noordhuis

Insurance Committee Gary Wolf

AirWear Bill Tee

Classified Ads

The Recreational Flyer is pleased to offer you colour advertising within the magazine. Previously limited to the back cover, we have added 4 new colour pages which will be available with limited space for your advertising needs. Our rates for both black and white and colour ads remain very competitive and you reach a captive and qualified audience.

Ads can be emailed to :raac@inforamp.net

Deadline for submissions is the first of the month preceding date of issue.

Artwork: Rates apply to camera ready artwork. Digital files are preferred and should be sent as email and in .txt format, PDF, JPEG, MS WORD, Photoshop or other common file types. Advertising is payable prior to printing of magazine unless other arrangements have been made. Payment is in Canadian funds. 10% Discount applies to one year (6 issues) insertion paid in advance. Commercial Classified ad rates 1/8 page minimum.

Advertising Policy

The Recreational Flyer Publisher reserves the right to refuse any or all advertising for any reason stated or unstated.

The Recreational Aircraft Association Canada does not assume responsibility for advertisements, but does exercise care to restrict advertising to responsible, reliable individuals.

Please note: Ads running more than 3 issues must be renewed to guarantee continued display in the magazine.

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Vice President (Programs): David Moore
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George Gregory

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

For Sale

McCauley IC160/CTM7557 , with logs - \$1,000 . Prop bushings set Lycoming O320 diameter 5/8" drilled 7/16" - \$150 Bill Smith evergreeninternational@sympatico.ca 705 526 9279

For Sale: Sonex serial number 320. Included: plans, machined spar caps, formed alum kit, form block kit, Titanium gear legs for std tailwheel, tail tips, seat belts, lead counterweight, cherry rivet kit, stainless steel firewall, all hinges, all 025 aluminum sheet, angle and plate - wings skins and fuse sides layed out and pilot drilled, some hardware and tailwheel, Total cost about USD\$6300 plus tax - Save over \$2300 over Sonex cost -Priced to sell quick at USD\$4000 or best offer. Bonus - I will throw in a Lightspeed 20xl Active noise canceling headset in as new condition with case. Email me for more info at airplanes@sympatico.ca or call Chris at 1-866-733-8432.

SPACEWALKER 2 : 38 Hrs. Engine and airframe. Lycoming 0-290-D2 135 HP. Full Flow Oil Filter Cyl. Head Temp. Gauge Oil Pressure and Temp Gauge Electric fuel gauge all tanks Electric start Val Comm 760 radio Narco Transponder mode C ELT Fitted Intercomm Fitted 18 Gal Main tank 2 - 5 Gal wing tanks Polished prop and Spinner Absolutely outstanding aircraft. \$23,000.00 CDN. O.B.O. George 403-931-3449 George@ace-aero.com e-mail for pictures

Tailwind with C-90, Located Kelowna, B.C. \$25,000. 1-250 762 4924 tedstrange@shato.ca

For Sale - one three blade 68" warp drive prop for Rotax 582 engine, one blade missing Contact Don (519) 372-1383 or kinge@bmts.com.

For Sale: Zenair Zodiac 1996. Cont. 0-200 125 hrs. A/F 340 hrs. Beautiful flyer. Photos available on request. Must sell, bought RV. Asking \$34,000 CDN. 519-442-2962 dorothybenton@hotmail.com

For sale: 3 sets of axles, 1 π" x .120" 4130 steel tube. Mains are 8" long, nose is 9" long. No fittings cut or welded, no holes drilled, just the plain tube. Offers on one or more sets. Proceeds to RAA-Toronto Region. Ken Yates, 905-857-3218, kennan@rogers.com.

Titan Tornado 2 set up for Rotax 912 assembled includes electric flap, hydraulic disc brakes, wheel pants 25 gal fuel tank VFR instruments, primer & paint. No engine. \$22000.00 CDN 418-661-1328 marie_andre@b2b2c.ca

Stolp Starduster II, 200 HP, C/S, Inverted, Canopy, 300 TT, \$35,000, PA22/20 Super Pacer project, wings ready for inspection, fuselage lengthened & painted, every thing here to complete, 200 HP, 3 pld C/S McCauley, 2400 Floats \$40,000. Buy both, fly the Starduster finish the Pacer, good deal for both. 1-250-785-6789 Jim. Central Time.

Subaru EA81 engine and redrive by Reductions. Engine 105 hp @ 4500 rpm. Redrive is 2.1 to 1. Run up time after assembly only. \$5000 firm 204 488-0829 or bwkirk@mts.net

FOR SALE Member of a local RAA Chapter has passed away and widow wants to find a good home for her husband's Luscombe 8A on owner-maintenance. It has the C85 engine with starter and generator. This Luscombe had corrosion inspection of the tank areas in wings carried out before changeover to owner-maintenance. Airframe hours are around 2500, and engine hours are in the mid 1600 and runs well. Aircraft was hangared almost all of the last 10 years. Sacrifice at \$22,500 OBO. For more information call 250-843-7525.

RV-4 project. Empennage finished. Flaps and ailerons finished. Wingspans finished..(Ribs were drilled and attached with clecos. Now removed, numbered and boxed) Fuselage on the jig. Will try to attach bottom and side skins so it can be removed. All parts primed. Asking \$12000.- (519) 461-1464

Air Strip, new 42'x 40' hanger, trout stream, trout ponds, sugar bush, fruit, newly

renovated bungalow, 61 acres. Mt Forest \$359,000 e-mail pennantmanor@hotmail.com

RV-6 Empennage and wing kit. Later version with pre-punched skins. Phlogiston pre-assembled main spars. Both kits in original boxes. Manuals and drawings included. Asking \$ 7000.- (519) 461-1464

Lancair 360 MkII FastBuild. All accessories and all options to completely build the plane except engine, prop and avionics. OutBack gear, Hydraulic gear doors, fuel pumps, bracket kit, Lights/strobes/servo's, epoxy pump, everything. 20% completed. \$35,000 firm or trade on truck/camper. (604) 574-8384

Upper wing - uncovered, no apparent damage. Starboard lower wing - uncovered, some damage to two outer ribs and tip bow. Set of wing struts. Misc: Two Hoover prop blades, possibly AvroAnson. Phone L. Katocs 905-725 5719

Wanted - 3/32 and 1/8 clecos, countersink dies, micro countersink drill attachment. Contact Don (519) 372-1383 or kinger@bmts.com

Looking for aluminum extrusions for the keels of floats. any parts or suggestions? r_lewis@nf.sympatico.ca

For Sale: Hush-A-Com 2-place intercom with 2 headsets and boom mics. Voice-activated, operates on 9V or acft power. Has its own PTT switch. Exclnt cond; no tears, breaks, or corrosion. \$250 or B.O. Ken Yates 905-857-3218, kennan@rogers.com

Lowrance 2000C GPS. New in box with Americas database May 2006, CDs, RAM mounts etc. \$750. 403-274-0154.

Delcom 960 portable 760 CH VHF Transceiver, all jacks and controls are on the top face. All mechanical selector switches. May look ancient but this radio works well is still being produced. Comes with wall charger and a downloaded manual. Asking \$150. Lowrance 1000 GPS, with RAM yoke and suction cup mount. 32 meg data card replaced with 512 meg card. Large

display area. Hardly used. New with taxes well over \$800.-. will sell for \$650 or best offer. FlightCom Nighthawk Headset model 40LX, as new condition. \$95

1962 Cessna 150B, one of very few Patroller versions built. Long range tanks, zinc chromated airframe and unique patroller doors. Hooker 4-point harnesses installed two years ago as well as Hoerner wing tips. Most of the 14.5 K hours were flown as a patrol aircraft, NOT as a trainer. 1470 hrs SMHO and 600 STOH. Compression in the mid seventies, minimal oil consumption. Great flyer. After two extensive annuals, the next one is not likely to cost a fortune. Asking \$22,500

A set of 5 inch Cleveland Wheels and Brakes, used for about 50 hours on Gerry Younger's Extra 300. They are Gerry's and you have to deal with him, but I gladly relay your inquiry.

KR 2 Turtle Deck, removed from a once flying aircraft. It's in good shape and could save you a lot of work. I have pictures I can email. Any reasonable offer accepted (I need the space in the barn!) Cessna 150 parts: Landing gear legs of an early 150, set of flaps and an engine cowl for mid seventies C150, set of doors for same. Wheel Pants for a variety of aircraft: C172, C182, Citabria. I have some backing plates but don,t know exactly what fits to what. Bracket Air filter assembly, new in Box for a C172 N model. Could certainly work on a project Fiberglass Air Intake scoop for a Mustang II, but could be adapted for your project, also a BD 5 spinner with back plate. RPM Gauge from a BD 5 kit, new. A Pantograph used for Engraving. This machine could produce any type of small flat part if you are handy with machinery. Rudy Hane, (519) 648-3006 or rudyhane@rogers.com

FOR SALE by RAA - Winnipeg Complete wing kit for the CYCLONE which is a replica of the 1954 Cessna C-180 aircraft. This kit can be adapted to six different Cessna models, the C-172, C-175, C-182, C-170, C-180, or the C-185. Asking \$10,000.00 or best offer. Contact Ken at 204-257-1275

continues

Rotax 912 80 hp rebuilt from a Diamond Katana core, by a fully qualified Rotax factory trained technician. \$10,000. Please call Jake at 519-648-2044

McCauley fixed pitch prop 1C1601 CTM 7553, from a 150 hp C-172, 75" pitched to 53". Included prop logbook. Asking \$900. Contact Adler Aviation 51-648-3886

Complete set of Sport Aviation from 1963 to present. Any ideas or offers contact Lloyd Windh 619-836-9725

1991 Zenair CH 701, Float plane, 1060 TT, Advanced Ultralight, Factory built by Zenair. Brand New 912s 100hp with 80 hours now. EDO copy straight floats (mint). Leather seats. Excellent performer. Lots of fun! Currently being used. Strobes, Aux fuel, Intercom, Electric bilge pumps (2), Cockpit cover, Also available New BRS 1350 soft-pack kit for this plane (not installed yet). Located at Lake Simcoe, Ontario, tedco21@hotmail.com 416-410-9101

11946 Taylorcraft BC-12 D. White with red. TTAF 1713:17 hrs; TTAE 726:57 hrs 65 hp Continental. Recent headliner, mats, cowl cover, and tires. Radio, DG, CHT, lighted compass, nav lts, strobe light, ICOM 23. Complete wing rebuild by certified shop. C of A Feb 2006. Federal A1500A skis and rigging available. \$20 000. Call (204) 745-3122 or cell at (204) 745-0426.

Pober Pixie Project Single seat parasol fuselage (Pober Pixie), VW prop hub, intake & exhaust manifolds, Hegy 53 x 34 prop (like new), new Sitka spars (6 pcs.) \$1200 or trade for other a/c related items. Contact ShawnWolk shawnwolk@sprint.ca Winnipeg, MB204.589.1594

1980 C152 9300 ATSN 700 SMOH \$33,000 Call Matt Riddolls 204-822-9621 or 204-823-0423

2006 Challenger 2. 15 TTSN Rotax 503 elec. start, full enclosure and most options. All flight and dual Engine instruments. Priced well below replacement cost. Great fun flyer. Built by experienced builder. Why wait - fly now. \$25,000 Cdn. Call 905 892 9649 or rjohnson18@cogeco.ca for additional information or pictures.

Pegazair STOL P100 project including plans, factory preformed ribs, tubing, and skins. Tail mostly completed. Best offer. 519-590-2269

1 Set of Zodiac 601 Wings HD complete with wing lockers and joiner plates. Total time 450 HRS. No damage. Asking \$1950.00 CN. 2 New Zodiac series Canopies grey tinted, still with flanges and paper covered. Asking \$ 550.00 CN each. Please contact Erwin Hornemann @ 905 457 3716, ore Email me @ erwin.hornemann@sympatico.ca

CF-VML (Classed as "Amateur built") 1968 Taylor Mono Plane Aircraft legal to return to flight. 150 hours TTAF (flown with VW engine), One owner ago removed VW engine. A75 with very low time slick mag's 150hours SMOH added and current owner and signed off by Ministry. Currently based at CYKF (Waterloo) Too many projects on the go this one needs a new home. Willing to part out. Call Darren Pond 519-651-2522 or pilotpond@rogers.com for details. Asking \$4000 for engine and \$3000 for fuselage or best offer. I have over \$12k invested.

EA81 subaru engine by NSI, 110 hp. model .complete firewall forward. Presently flying on a kitfox model 5 ,includes a in-flight adjustable propeller,(model cap 140). Total time since new 70 hrs. Asking \$ 14500 or best offer.call yvon at 1-705-967-5311 after 6 pm. or at work 1-705-897-3333

2 series 3 lazairs(1) one complete need a little work ,second one for parts almost complete, also include a home- made enclosed trailer. will sale as a complete package. asking \$ 5500 or best offer. call yvon at 1-705-967-5311 after 6 pm. or at work 1-705-897-3333.

CLOSING SALE Flypass Aircraft Company New Zenith 701 Airframe Factory Built 95% Complete \$19,900 Cdn. Older 701 Kit. 70% Complete As is Special \$5500 Cdn Call Jim 519-500-4011 or Mike 519-827-6515

DYKE DELTA JD2, all construction complete. Wings, elevons, rudder covered, fiberglass skins for balance of aircraft fitted ready to install. Documented inspections, pictures and history available, \$3000 usd, 403-282-6253.

FORD 3.8 V6 complete with Blanton 1/1.6 redrive. Engine rebuilt by well known shop. Dyno time of only 5 hrs. shows 187 hp @ 4800 rpm, 500 cfm carb with electronic leaning, all new accessories. Pictures and details available \$5000 usd. Ken 403-282-6253

Wanted

Wanted to purchase good or rebuild able IO 540 for Steen Sky bolt project, also any airframe or parts for the same. Wanted to purchase FLYING OR PROJECT DR1 Fokker Tri Plane. OFFICE 1-705-653-4525 or davidcarlaw@prototyperesearch.com

Wanted: Airbox for Rotax 912. Contact Dennis Vogan at 416-606-0753.

Ads run for a maximum three issues depending on space available. Please direct all classified inquiries and ad cancellations to wolfpack@sentex.net

On The Internet:

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

New In Canadian Skies



Harvey Rule's Pietenpol

The plane was started back in 1977 by George Uranick of Perth and Robert Graham of Manotick Ontario from plans obtained from Bernard Pietenpol (with Grega mods) and I finished it this year at the end of July with the help of Bob Moorhead and Tom Bennet, both from my local RAA chapter. The covering materials are metal and ceconite with automotive paint both sprayed and brushed on the wings and dope colour on the fuselage (sprayed and brushed in some spots) I believe the paint

job was done by Bob Graham with touch ups by me. I would only estimate the total cost to build at roughly \$16,000.00 CAD. It employs a Franklin 80 hp engine with a 72 X 42 Tennessee Prop which I might add is a real piece of art work. I am very proud of the workmanship that went into this aircraft long before I took over the task and I am very thankful to the people who I previously mentioned for helping me. It certainly sped things up and their guidance was much appreciated. They are still guiding me through the flight part of the operation as well. Since I have never flown a Pietenpol before, their information is invaluable.

Send us Photos of your completed projects

Please include a brief description of your aircraft and any other details you want to include, and send us a colour print with it. Mail to:
Recreational Aircraft Association of Canada
13691 McLaughlin Rd, RR 1,
Caledon, ON L7C 2B2
...or email us the information and a high resolution digital picture to: raac@zing-net.ca



Grand-daughter Sorcha Rule checks things out.



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 Ibergville, 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. President Jacques Genest president@raa415.qc.ca (450) 447-9042

OUATOUAIS/GATINEAU: Every Saturday 9:00 am to noon at the restaurant 19 Aileron in the airport terminal. Contact Ms N.C. Kroft, Gatineau Airport, 819-669-0164.

ASSOC DES CONSTRUCTEURS D'AVIONS EXPERIMENTAUX DE QUEBEC (QUEBEC): Third Monday 7:30 pm at Les Ailes Quebecoises, Quebec City Airport. Contact Pres. Ray Fiset, 418-871-3781. rayfiset@qc.aira.com

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: Fourth Monday 7:30 pm, Lake Simcoe Regional Airport. Contact Treas. Gene Bemus 705-325-7585 gene@encode.com

COBDEN: 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 the first Thursday of every month, at 7:30 p.m. except July and August, at the Collingwood Airport or at off-site locations as projects dictate. For more information, contact Keith Weston, 705-444-1422 or e-mail at kceston@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 Editor Frank Ball fdnmeball@sympatico.ca 905 822-5371

HAMILTON: Second Friday 8:00 pm Months of Feb, April, June, Aug, Oct, Dec, at Hamilton Airport. Contact Pres. Brian Kenney, 905-336-5190

KENT FLYING MACHINES: First Tuesday 7:30 pm at various locations. Contact President, Mac Mazurek 519-692-5309 macmaz@mnsi.net

KITCHENER-WATERLOO: Meets the third Monday of each month in the upstairs meeting room of the cadet building at CYKE, except during the summer months when we have fly-ins instead. Please contact arankadd@rogers.com for information, or call 519-885-1155.

LONDON-ST. THOMAS: First Tuesday 7:30 pm. At the Air Force Association Building, London Airport. Contact President Angus McKenzie 519-652-2734 angus@lweb.net

MIDLAND-HURONIA: First Tuesday 7:30 pm Huronia Airport. Contact

Secretary, Ted Aldred 705-526-4909 wings@csolve.net

NIAGARA REGION: Second Monday 7:30 pm at Niagara District Airport.

Contact Pres. Len Pettersen swedishcowboy29@aol.com

OSHAWA DISTRICT: Last Monday at 7:30 pm at Oshawa Airport, 420 Wing RCAF Assoc. Contact President Chris Gardiner 905-668-5703 cgardn628@rogers.com

OWEN SOUND: Contact President Roger Foster 519-923-5183 rpfooster@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. Contact: Ed Melanson 519-665-2161 meled@weightman.ca

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 pm at Ch 41 Hangar on north end of Brampton Airport Contact: President, Earl Trimble 905-787-8524 northernwind@aol.com

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

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

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. Contact Jill Oakes 204-261-1007 raa_wpg_executive@yahoo.com

SASKATCHEWAN

NORTH SASKATCHEWAN: Third Monday 7:30 pm at Westwind, Hangar #3. Contact President Garth Pippin for info at 306-666-4476

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 Calvin Thorne at 403 932-4325 or email: cbthorne@telus.net

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

780-485-7088

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

MEDICINE HAT: Last Thursday of the month 7:30 pm RAAC Club Rooms, Airport. Contact Secretary, Boyne Lewis 403-527-9571 handblewis@thehat.ca

BRITISH COLUMBIA

ABBOTSFORD: Third Wednesday 7:30 pm Abbotsford Flying Club, Abbotsford Airport. Contact President, John Vlaka 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 RAACHAPTER 580: Second Sunday 13:30 pm Sechelt Airport Club-

house, sometimes members homes. Contact Pres. Gene Hogan, 604-886-7645
CHAPTER 85 RAA (DELTA): First Tuesday 8pm, Delta Heritage Airpark RAA Clubhouse. 4103-104th Street, Delta. Contact President Gerard Van Dijk 604-319-0264, vandijkg@yahoo.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: Third Wednesday of the month (except July & August) at 7:30 PM, alternating locations: even numbered months in Fort St. John and odd months in Dawson Creek. Phone Richard Lawrence for location, details at 250-782-2421.

Chapter executives please advise of changes as they occur. For further information regarding chapter activities contact RAA Canada, Brampton Airport, 13691 McLaughlin Rd. Cheltenham, ON L0P 1C0 Tel. 905-838-1357, Fax 905-838-1359 or call toll free 1-800-387-1028

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The "Snowflakes" (because no two are alike) over Chilliwack Airport.
Lead aircraft is an RV-4 piloted by George Serviss.
#2 is an RV-6A piloted by George McNutt.
#3 is an RV-6 piloted by Scott Jackson. All 3 aircraft
were built by the owners/pilots.
Rob Prior Photo

