

September - October 2010

# RECREATIONAL FLYER

Recreational Aircraft Association Canada [www.raa.ca](http://www.raa.ca)  
The Voice of Canadian Amateur Aircraft Builders \$6.95



Earl Trimble's Metal-winged  
**Tailwind**





# From The President's Desk

Gary Wolf

## RAA ANNUAL GENERAL MEETING

London St. Thomas RAA will host this year's AGM on December 4th at the RCAF 427 Wing at London Airport CYXU. The business meeting will begin at 10:00am and a lunch will be available afterwards. Pilots wishing to fly in should be certain that they have a functioning Mode C transponder as this is Class C airspace. If you have items that you would like to see on the agenda please email them to [raa@raa.ca](mailto:raa@raa.ca) and place the word "agenda" in the subject line.

## RAA OFFICE

The RAA office has now been moved to Waterloo Airport CYKF (Class D, no requirement for any transponder although the tower might ask if you have one). If flying in, tell the ground controller that you wish to taxi to Apron 5. Head towards the collection of homebuilts tied down at the end of the hangar row, taxi into the

apron, and come in and have a coffee.

The phone numbers are now 519-648-3030 and 1-800-387-1028. Email has changed to [raa@raa.ca](mailto:raa@raa.ca) and Canada Post mail may be sent to Box 22, 4881 Fountain St North, Breslau Ontario N0B 1M0.

## RAA CHAPTER STATUS REPORTS

Many chapters are now having their elections and even if the names are the same as last year it is still a requirement to send in a new status report. Please give the names, membership numbers and expiry dates of the President, Treasurer, Secretary, plus any two other named members, and send this by email or mail. It is also a requirement for status that every chapter send a chapter membership list that is complete and accurate at the time of sending in the Spring. These are the minimum requirements for a chapter to maintain RAA status and to be covered under the RAA Chapter Liability Policy.

## ROTAX 9-SERIES FUEL PUMPS

Will Boles of Transport Canada System Safety has forwarded an email from the FAA to indicate that there can be problems with some of the fuel pumps that are installed on the Rotax 9-series engines. If there is an electric pump upstream of the engine's mechanical pump it is possible for too high a fuel pressure to be delivered to

the carburetors, resulting in rich running and possible flooding.

SB-912-053: <http://www.rotax-aircraft-engines.com/pdf/dokus/d02167.pdf>; and SB-913-053UL: <http://www.rotax-aircraft-engines.com/pdf/dokus/d02169.pdf>.

## ROTAX 9-SERIES ENGINE CRACKS

Ryan Gomes, author of a Lycoming article in this issue, has sent an email to say that Rotax has issued a bulletin about possible cracking of the engine cases of a group of 912/914 engines, those with serial numbers #27811 and below. In a tractor installation the serial number will be below the left bank of cylinders immediately after the words "Made in Austria."

The Rotax engine is unusual in that it is a dry sump engine but without a pump to return oil to the dry sump tank. Instead it relies on pressure fluctuations in the crankcase to chase the oil out of the engine and back to the sump. Cracks will allow pressure leakage which can impair the return of oil to the tank. The bulletin requires a visual inspection of specific areas on the cases, with limits given for the amount of oil seepage allowable. It also outlines a pressure test limit for the crankcase while the engine is warmed up and running. In Canada there are no AD's for non certified engines so compliance is voluntary,

*continued on page 21*

## The Recreational Aircraft Association Canada

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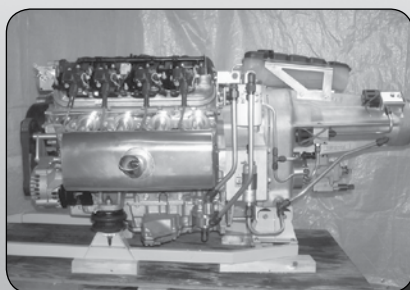
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On the Cover: Earl Trimble's metal-winged Tailwind. Picture courtesy Earl Trimble.





## Oshawa 2010

First came the rain, then at dawn on the Oshawa RAA's Annual Flyin day fog drifted down over HawkeField from the hills north of Lake Ontario. The dozen or more chapter members assigned to the early morning duties were setting up displays and marking out the car parking areas, and the Kinsmen Club men (with several wives) who were caterers for the occasion had their first batch of coffee on and their BBQ ready to go. But where were the visiting airplanes? / by Don Dutton

"IN 14 YEARS the weather gods have been kind to the Fly-in," a neighbor from nearby Orono was explaining. He comes each year to see what's new, particularly in homebuilts and ultralights, and told the a group in Hannu Halminen's HawkeField main hangar: "Just wait - this (the 15th year) will be a good one too."

Then the group's attention turned to a small, gleaming new bronze-colored plane being pushed into the hanger. As a steady stream of "drive in" visitors arrived they gathered around with others to watch the weight and balance procedure and ask about the trim little open cockpit single seater - a Jeannie Teenie 1 - that had arrived earlier by trailer. Owner Gundars Ellsnis explained that he had been searching for a pilot with experience flying home-built Teenies to give his plane a final check, then make the first flight. His search turned up just two. One was in Florida and the other, Brian Buckley who flies his own Teenie out of HawkeField, was much closer so the plane came to Oshawa.

Measurements were taken and weight at the Teenie's three wheels recorded and after some discussion a little weight was added to



the tail, then it was pushed outside, and Buckley slid into the cockpit. A couple of tries and the engine started with the familiar bark of a 4-cylinder Volkswagen and quickly settled into a steady rumble. The wind sock was limp; chapter President Jim Morrison in the observation tower had neither seen nor heard any planes in the circuit so Buckley taxied out, did several run ups and began the taxi tests. He came back once in to discuss the handling with Ellsnis, then went out again, gradually picking up speed on several more runs until the wheels were off the ground briefly. The fog was lifting and there was a good break in the clouds to the south but he cut throttle and came back to the hanger to shut down. Some adjustment to the elevator control was needed, he said.



Top: When the rain stopped, the clouds lifted and the fog drifted inland from Lake Ontario, long-time pilot Jim Dilworth took off from his stip near Newcastle. He was the first to arrive at the RAA Oshawa flyin at HawkeField in his modified Champ, to the applause of a waiting crowd. It turned out to be a "pretty good day," said Chapter President Jim Morrison, with about 40 planes attending, many of them homebuilts and ultralights.

Left, the famous "Father Goose" - Bill Lishman - arrived right on time in his ultralight carrying a sled filled with fresh picked corn for the flyin crowd. "All you can eat" free buttered corn is a tradition at the Oshawa chapter's annual fly-in.

## One of the highlights of the morning was the arrival of fresh corn on the cob delivered in a sled slung under the trike flown by "Father Goose" Bill Lishman

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Roger Langley



Don Dutton



Don Dutton

From the top down: Bill Lishman delivers corn with style; the Harvard takes off while aficionados look on. Above, a Jeannie's Teenie drew a lot of attention during the fly-in.

Then to the south the first sounds of an approaching airplane was heard. Someone in the crowd which had been intent on watching the Teenie, said: "We've got a fly-in," and the crew handling the aircraft parking hurried to their positions as Jim Dilworth landed his good looking yellow and white Aeronca style plane. It turned out to be a rebuilt, modified Champ now flying with an 85 horsepower engine, high compression rings, three new fuel tanks and other additions and now registered as a homebuilt. It was finished less than a year ago and was one of the best looking of the more than 40 planes at the fly-in. He said that when the fog disappeared over his home field near Newtonville he took off to check the weather along the north shore of Lake Ontario and then it opened up to the north, enabling him to be the first arrival at the 2010 HawkeField flyin.

With the improving weather conditions and other planes expected to arrive the first flight of the Teenie was postponed. Many of those who had arrived by car had enjoyed watching the weight and balance procedure and the high speed taxiing of the little plane but the arrival of interesting homebuilts, kit planes and others took the attention back to the field. Ron Seyffer, who supervises the printing of the Recreational Flyer magazine and flies his Kitfox IV on amphibious floats led a three-plane flight from the Orillia area. With him were Wade Tindale in his Starduster biplane and Glen McEachern in his Sky Arrow.

Another eye-catching biplane was Desmond Lightbody's two-place Pitts, done up in red and white aerobatic style. The Oshawa based commercial pilot said his plane was originally one of three purchased for Tuborg Beer commercials and he hopes to develop an aerobatic routine for air shows. David Woodhouse of Caesarea arrived in his Rans. With the aluminium polished up to a show plane glow it was impossible to miss the Seabee flown in by Brian Robinson of Balsam Lake. It is powered by a smooth running, powerful but well-muffled automotive engine. An unusual innovation is the exhaust system directed through the wings with tailing edge exits well away from the fuselage.

A group of Air Cadets from 151 Oshawa Chadburn Squadron, provided car parking assistance, and were impressed with a half-hour

"guided tour" by pilot Don Patrick of a World War II Harvard trainer from the Canadian Harvard Association based at Tilsonburg, and the trike of "Father Goose."

One of the highlights of the morning was the arrival of fresh corn on the cob delivered in a sled slung under the trike flown by "Father Goose" -- Bill Lishman whose experiments with re-establishing

the winter migration routes of Canada Geese inspired the Columbia Pictures movie Fly Away Home featuring Hollywood actors Jeff Daniels and Anna Paquin. With everyone cleared from the runway Lishman swooped down, pulled a release and a sled filled with corn gently slid to a stop. It was carried to the already boiling cooking pot where there was a lineup waiting. The well-

battered corn was free and quickly disappeared while Lishman flew back for a second load.

The 2010 winner in the draw by Hannu Halminen for a ride in one of his HawkeField based Classic Wings planes -- a Harvard or one of two classic bi-planes, a Tiger Moth or Waco -- was David Dutton. He comes from the Ottawa area each year for the Fly-in.



Chris Gardiner



Don Dutton



Bogart Landis

**Top:** Desmond Lightbody's beautiful two place Pitts. **Left,** Canadian Harvard Association Pilot Don Patrick watches arriving aircraft from an advantage point on his plane. He arrived the day before the flyin from his base at Tilsonburg to beat the bad weather which cleared before mid-morning; a Sky Sport Arrow was amongst the attendees.



## HawkeField 2010



Roger Langley



Michael Brown

Top, Bill Lishman heads off for another corn run. Above, the belly pod was the chosen method of conveyance for the traditional corn feed. Right, a Cessna 180 and one of two Champs to grace the occasion.



Michael Brown



Michael Brown



Roger Langley



# ?! **Departure Distractions**

*It pays to stay ahead of your airplane / By Barry Meek*

**Acceleration on the grass at the Hinton-Entrance airport seems a bit sluggish. The elevation of this strip is 3450'. I quickly decide it's the thin air. I'm not too concerned. My thoughts, daydreams really, are ahead of my present situation. It is late in the afternoon and within two hours I'll be landing in Blue River to stay overnight. I've been flying for four hours today, and the fatigue is catching up. However, with smooth air, this leg should be fairly relaxing.**

I'm departing toward the south end, where the terrain drops off to the Athabasca River. When my Cessna 150 clears the trees at the end of the runway, I'll follow the river toward Brule Lake where there is plenty of room in the valley to gain altitude.

After an extraordinarily long takeoff run, the mains break free and I'm airborne. The nose down to gain speed, I briefly note with some concern, the trees are approaching more quickly than they should be, even in this thin mountain air. Raising

the electric flaps in increments . from 10 degrees, to 7, then to about 3 or 4 . I coax a bit more speed from the airplane.

I'm vaguely aware of the effect fatigue is having on my thought processes. My eyes are outside the cockpit, while my mind knows they should be scanning the gauges. The realization that everything is not right is being pushed along now by adrenaline.

Checklist. Think . what did I miss? Or is it just this thin air up here at 3500 feet? My eyes find the airspeed indicator. Something between 60 and 65 mph registers. I never climb the 150 at less than 70 and even that is slow. Eighty is more like it. The VSI is in neutral to negative territory. I have to build speed, and fast.

What else? Check carb heat. Yes! There's my problem. It's pulled out! Quickly it's back where it should be, and there is a perceptible increase in the RPM. With it, comes a bit more gentle acceleration.

How could I miss that mandatory checklist item? I'm too busy for the moment to give it much thought, but I've made a mental note to review that. Right now, I've muscled back the fatigue, my mind has cleared, and I'm

**There's really not much to miss on a Cessna 150, but omit an item and it can be as deadly as on any more complicated aircraft.**

forcing the airplane's normal parameters into my consciousness, checking them against what I see on the panel. Airspeed now 80, rate of climb at 300 to 400 fpm, ball centered, RPM 2600, oil temperature and pressure in the green. Mixture rich, carb heat off, flaps up, fuel valve on.

There's really not much to miss on a Cessna 150, but omit an item and it can be as deadly as on any more complicated aircraft. That thought on my mind, the trees flash by beneath the gear, and below now is the river valley offering a clear path for my airplane to climb at its own speed.

I like to think of myself as a very safe, "by the book" pilot. I live by the checklists, from the walkaround to shutdown. So, how could I miss that carb heat item? It's really quite simple. There are two ways to run through a checklist. Do it WITH or WITHOUT distractions. In my case that day, even though I was alone, I was distracted, for it's not just other people that can interfere with the flow of the pre-flight. Being fatigued can certainly cause a problem with my concentration. Also, I was eagerly anticipating the arrival at my destination later in the evening. That day at Hinton, I had both of those distractions working against me.

So here's what happened. After refueling, I did a walkaround, taxied to the end of the strip and went through a detailed run-up. Even though the temperature was still in the high 20's, I selected carb heat as my last run-up item, then brought


the throttle back to the stop, checking to be sure the engine would idle with carb heat on. It's good practice to leave it idle like that for at least 5 seconds, before pushing carb heat off again. But at that point, I was thinking one step ahead of myself. Within that short 5 seconds, I was already making a radio call declaring my intentions for the straight out departure. Consequently, I was into the roll with carb heat ON.

Take off is probably the most critical part of any flight. Some pilots would argue that it's the landing. However, they're probably flying something more complicated and less forgiving than a C-150. I've certainly flown my share of tailwheel, larger and smaller airplanes, and I believe there is nothing simpler to land than a 150. But takeoff in any airplane can be deadly, because you rely totally on an engine that must be functioning flawlessly. There is no trading altitude for speed as in landing. There is no opportunity for a go around. And usually, there is no chance to pick an ideal spot to put it down when all is not right.

Pilots must be totally focused on procedure during this very critical transition. Our concentration can not be distracted for any reason right from the time we begin our preflight checklist ritual. As a professional pilot, I request, even demand that my passengers not interrupt me. I read the item, look directly at that gauge or control, and focus on what I see and feel. And I stay focused until the last

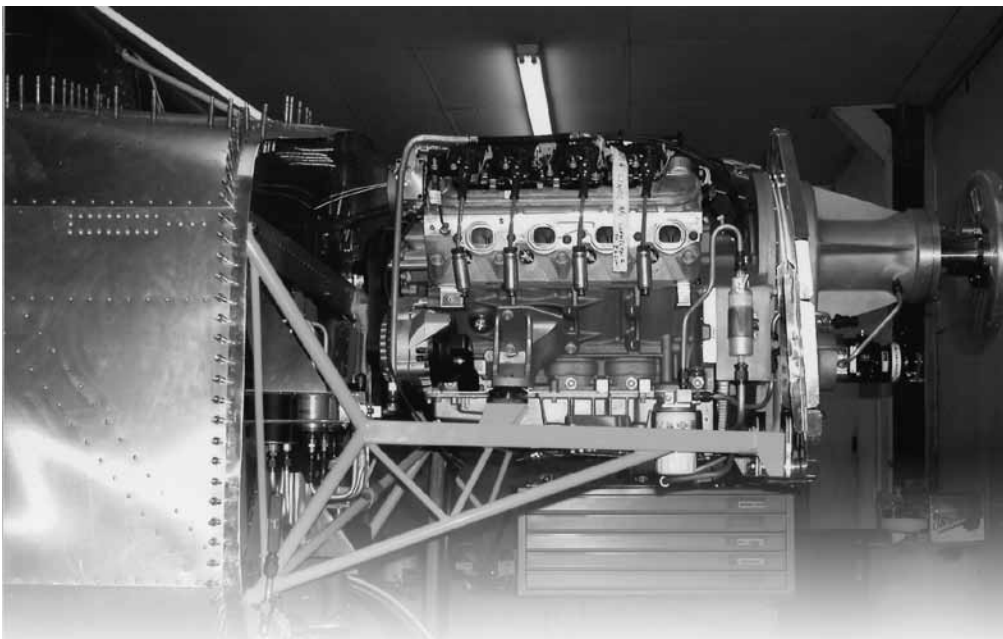
item is checked, even through the carb heat test. But obviously, sometimes I do get distracted.

Having habituated myself to religious observation of checklists, there is a feeling of great confidence when I advance the throttles and begin the takeoff roll. But vigilance doesn't end there. A check of the RPM confirms full power. The engine gauges need to be monitored shortly into the roll. Are they all in the "green"? Once liftoff is attained, the best climb speed is pegged, and I maintain proper rudder pressures to assure the ball is centered. That alone, can increase speed significantly by reducing the drag of cross control. How is the vertical speed? I monitor the RPM and engine gauges every few seconds. After all, the engine is at full power, the time when damage or failure is most likely to occur. And once again, I pay particular attention to the airspeed indicator, probably the most important instrument I have at this point in time.

Do not take anything for granted in the takeoff phase of your flight. It is an extremely critical time, with many things to be aware of. Almost any one of these items can prove fatal if ignored for whatever reason. 

# Auto Engine Endurance

*Tedd McHenry*



**S**ome of you may recall that a couple of years ago I wrote an article hypothesizing that there is no reason not to expect auto engines to have adequate durability when used in an airplane (WC RVator, April, 1998). I based my hypothesis on an analysis of cylinder pressures, piston speeds, and piston accelerations in a Chevy 4.3 compared to a Lycoming O-320 and O-360. My belief is vindicated by this quote from a Chrysler engineer about the test cycle used in the development of their truck V10 engine for use in the Viper sports car (reproduced from Contact! magazine). The test cycle he describes is much more severe than the certification requirements for aircraft piston engines.

"We use an [sic] unique 500 hour endurance cycle. The traditional Chrysler endurance cycle for trucks had been 800 hours. To shorten our program timing, we discarded all of the specified light duty and idle test modes and got it down to a 500 hour cycle. It's pretty much a WOT test between peak torque and peak power with a little bit of light load in between. We set our targets at passing three 500-hour durability tests, a general 500 hour test, an ECE test, which is a European emissions certification procedure and a 100 hour test traditionally done for the exhaust manifold durability. Engines must pass a minimum of those tests."

To put this in perspective, remember that a Lycoming produces rated power at peak torque. So when an auto engine is tested at peak power (which is above peak torque), it is actually being run at loads beyond what a Lycoming ever sees, either in testing or in use. Almost the

entire Chrysler test was run at loads greater than what the aircraft industry would call full rated power. And all of the test was at loads at least equal to "full rated power." Furthermore, the FAA certification requirement is for a 100 hour test at rated power. So the Chrysler test is also five times as long as is required for certification.

I think this test shows that auto engines are extremely durable, and easily capable of handling the loads they would be exposed to in a typical aircraft installation.



**Two Corvette engines used in aircraft applications. Top, installed in a Murphy Moose, and above, Brian Robinson's Seabee**





## Power Plant Inspections

Taking that annual look under the hood  
by Ryan Gomes

*Well, unlike the unpredictable world we live in there is one thing you can count on every year, that approaching and dreaded date (for some) that lingers in the back of your mind every time you go for a flight - your annual. For some homebuilders, this can be a daunting task, and for others not so much. The initial construction of the aircraft, which consisted of a lot of new parts and careful assembly, was a very well guided project. Most amateur aircraft kit manufacturers provide a nice step-by-step guide that will walk you through the process of building an aircraft. However in my honest opinion, where manufacturers really fail and hang their customers out to dry is in the maintenance department.*

They do not provide a "maintenance manual" per se that manufacturers of the certified category would. I have the manual to a Cessna Turbo Centurion on my desk right now... 650 pages, at least. Amateur built aircraft manufacturers really only provide us with some of the standards for the aircraft, a pilot operating handbook and sometimes a set of plans. There needs to be

more support for the homebuilder. I was taught that with inspections, there are two different types of mindsets. You either need to be like a hawk, or an eagle, and it really depends on the type of inspection. An eagle is looking for very particular things to hunt, as one would in a pre-flight check - easy things to pick up like water in your fuel and major oil leaks. A hawk however, flies

overhead inspecting a broader area, looking for things to pop out... It gets the bigger picture. That is key in thorough inspections. Do not try focus on one little area when you are inspecting the engine compartment. You want to keep your eyes open to anything that does not look right in the surrounding area. Take the time to really check every nook and cranny, as opposed to being fixated on one particular thing. Get the big picture!

Now that we have had an overview of the inspection mentality, let us actually discuss some of the considerations during the inspection. This is by no means a complete tutorial on how to do an annual, but a guideline and collection of tips to help in the inspection process and something to help with your judgment in completing your annual check list.

The first place we start is always with four key events. The run up, the compression test, the oil change and last but not least the inspection. Both the oil change and the compression test need to be done when the engine is still hot as this will get you the best results. Now I am sure that you all know how to do an oil change, so I am not going to get into much detail on that, but the run up and compression test are for sure things I am going to cover, because we can extract a lot of useful information that will greatly reduce the time it takes to perform an annual.

### **The Run Up**

To perform a proper run up, you first need the engine idle until the oil temp is in the green operating region. Doing it any earlier than that is not advised - it will actually reduce your engine's life. Once the engine is warmed up we do a live mag check to ensure that the P-lead on the magneto is functioning correctly. This should be done at idle. Now increase power to 1200 (or 1700, there is much debate as to which rpm is best), and perform a mag drop test. You should see a drop of UP to 120 rpm per side, and a max differential between the left and right mag of 50 rpm. Any more means that your mag timing is off and you should obtain a box buzz to check the magneto timing. At this rpm, we are also going to do a mixture check, carb heat check (for non-injected models) and an alternator check. For the mixture check, slowly bring the mixture knob back to the idle cut off position (ICO) and observe the rpm. If the mixture is right, you should see an increase of 25 – 50 rpm. No drop means the engine is too lean, and more than 50 rpm means the engine is set too rich. I will not cover the science behind it in this article, because this is an overview of the overall engine.

The alternator check is easy enough. Turn everything on (e.g. Strobes, landing light, etc.), cut the alternator, and observe your ammeter. It should drop right off, and the alternator light (if your aircraft is equipped with one)

should turn on. If you have a digital display, the voltage reading will drop from 14v and if it drops below 12v, it is indicating that the alternator is no longer charging the battery and that the auxiliary equipment is running from the battery. If your light was on before you cut the alternator switch, then there is a problem with the alternator, the belt, or the voltage regulator. If the charging indicator was already reading below 12v, you get the picture, the alternator is not doing its job.

The carb heat check is just simply testing to make sure that the carb heat is working on your non-injected Lycoming. Pull the carb heat, and you should see a drop in rpm. This has to be done when the engine is warm, because there will be no drop on an engine that has just started.

Other things to note, is that if you are running gyro driven instruments, you must check your suction gauge. The vacuum pumps should be putting out about 5.0 in hg. If it is over the green arc, you need to adjust your vacuum regulator. Anything under the green arc and you should check for leakage, or the graphite vanes on the vacuum pump might be worn out.

This concludes the run up portion of the annual. The run up is a very useful part of the inspection and a lot of information can be gathered from doing these simple checks that should really be performed before each flight.

### **The Compression Test**

So your plane is in the hanger, the cowling is off and it is time to perform a compression test. I must warn that without practice, confidence, and knowledge, this test can be deadly. It should only be performed by yourself if you have prior experience. I do it myself at work every day; I am safe, and always cautious. The key words in that sentence are every day. It is an awkward job and the last thing we want is for someone to not have a good grip on the propeller and to get hit by it. You really should perform this with a second person. This is why we did a live mag check also, to make sure your p-leads are working so the magnetos are grounded when the switch is in the off position.

Pull the bottom (or top depending if it is easier) spark plugs, and place them in a tray in order. Now it is better to have a quick disconnect tester, but most require you screw the whole hose of the tester into the head. Find cylinder number 1; it is the forward cylinder on the right hand side of the engine for all Lycomings. Find top dead center, this can be easily done if you have Slick Magnetos with an impulse coupling, simply put your finger on the spark plug hole of the #1 cylinder, and rotate the propeller until pressure builds at your finger tip, and you hear the snap of the impulse coupling.

This will make sure the engine is at or near TOP DEAD CENTER. Ensure that all valves of the gauge set are in the

off position. With your hands holding both sides of the propeller with a sturdy grip, your friend can proceed to turn the FILL valve. While filling the cylinder the prop might start to move, indicating that the cylinder is not quite at TDC. Stop adding pressure and rotate the prop until the piston is at TDC. You will know that it is correct

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*I can't stress enough the importance of cutting the filter in general. You can gather a lot of information*

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when the prop stops trying to move. Then continue to add pressure until the gauge reads 80 psi.

There are two gauges on the tester, one for the amount of air going into the cylinder, one for the amount of air the cylinder is holding. The air going into the cylinder should be set to 80 PSI. The cylinder will now fill with air and you can move the prop slightly back and forth to try and achieve the best numbers on the regulator.

The cylinder should hold anything from between 60 to 80 PSI. Anything less than 60 means that the cylinder is unserviceable and needs to be overhauled... period. There is no room for budging on that number, at least not with me. If your cylinder is reading less than 60, it means that there is either problem with the cylinder, or the walls and rings are just worn. The cylinder has had a good life, and so have you, so don't fool around with a bad cylinder number; it can kill you.

Repeat for all cylinders, this concludes the compression test.

#### **The Oil Change**

Not much to say here, just some things to point out. If your engine is getting older, cut the filter... I can't stress enough the importance of cutting the filter in general. You can

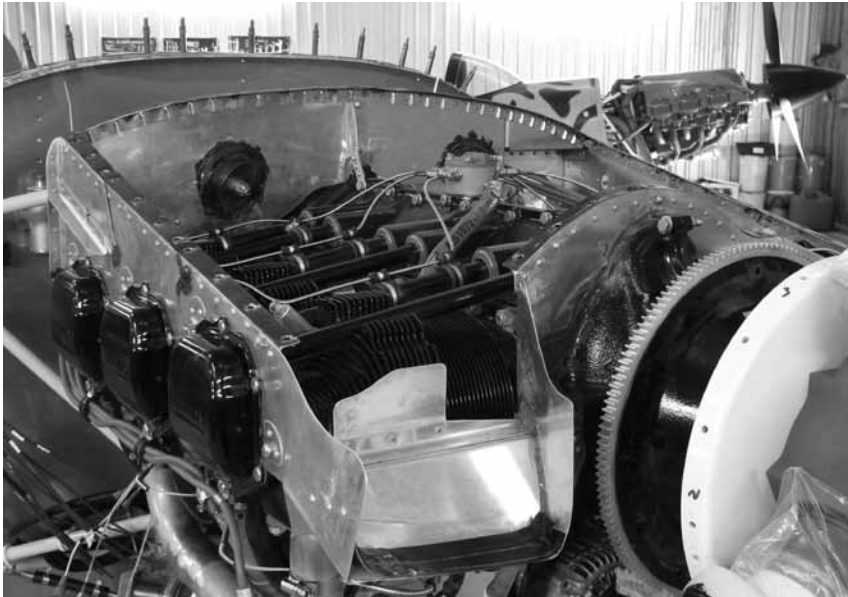
gather a lot of information... Brass, your main bearings are wearing, ferrous metals; your rings are on their way. Cut the filter with a proper aviation filter cutter (Can be purchased at Leavens, Aircraft Spruce, ATS, any aircraft parts store pretty much) pull the element out, cut it with box cutter, or a hack saw. Pull out the element and the trick is to get the oil out of it by squeezing it in the vice. Pull it out and take a look on the outside of the element, that is where you will find your stuff. Always ensure that the alleged piece of "metal" is in fact metal and not a chunk of carbon, which 9 times out of 10 it is.

If you are particular and have money to spend, take an oil sample while the engine is draining of oil, and send it for S.O.A.P testing. That stands for Spectro Oil Analysis Program. It can generate a lot of information about your engine, especially if done from an early age.

Filters, you want to get a brand name filter like a Kelly Aerospace, Tempest Filter from API, or for people who want a more expensive filter, Champion. One thing to note, is that all the numbers for the filters are in fact kind of standardized, in that a Kelly filter will be a ES48110-1 for an IO-360, and the Champion equivalent will be a CH48110-1, so if you wanted to switch filters you have an idea of what part number to look for.

Always refer to an engine's maintenance manual for specifications on the oil and filter. Most Lycoming engines run 15W50 during the winter, and in the summer most people switch to a W100. I personally like to use Aeroshell when I work on an engine, that is just my preference. It is a Semi-synthetic multi weight oil, and I haven't had any type of compatibility issues with it for any Lycoming, regardless of size or aspiration type. Again check the maintenance manual for all types of fluids and servicing requirements.





What you want in baffling isn't tight clearance, but that it is air tight. Wayne Hadath Photo.

### The Inspection

Last but definitely not least is the engine inspection. This is generally where people get lost - they do not know what to look at, or where to focus their attention. I will guide you to some key areas to check on the Lycoming engine, and this applies to pretty much ALL of them.

First off, and this should go without saying, get your engine's serial number, model, and type certificate from the data plate, which is usually located on the oil pan/air plenum. Check for all Airworthiness directives, service bulletins, and service letters that have been issued for it and have not been complied with or check out. I know we are talking about uncertified aviation here, but these really are good practices that will not only improve the overall up keep of the engine, but it will increase its life, and make the owner better aware of what is ahead of the firewall.

Look carefully at the oil dipstick tube - they are notorious for coming loose and leaking oil onto the engine mounts. Oil on the engine mounts is not a good thing and should be cleaned off as soon as possible - oil will deteriorate the engine mount and

you will start getting vibration issues. If need be re do the lockwire on the tube to ensure that it is really tight.

Valve cover screws on Lycomings come loose all the time, especially if you have the old style cork gas-kets. These will develop a leak at the bottom of the cover and start ruining the cork gasket. Give those screws a tightening, and I can pretty much guarantee a quarter of a turn for most of the screws, every annual. I recommend replacing the star washers if you find it is a persistent problem.

Check for leakage at the crank seal, and this goes for pretty much all engines. Replace if necessary. Check for leakage at the case halves. There is not gasket between case halves; it is literally a silk thread with some gasket sealer. Interestingly they use a silk thread, as to not change the deck height of the cases.

Lycoming engines have their cam shaft at the top of the engine, and with the push rod tubes being at the top of the engine, Lycoming had no way to let the oil drain back to the sump. Because of this Lycomings have oil return tubes at the bottom of every head. Check those for leakage and tightness.

There is an AD out to check for

the fuel lines to the injectors on fuel injected models. Just check that the clamping on top of the engine has not caused them to corrode and break apart. Any sign of corrosion is usually a good time to replace them.

Check for blue Avgas stains around the injectors. Fuel injectors have small ports that lead to a place call an emulsion chamber. This is used to help atomize the fuel. Blue staining around the injector means that there is a blockage at the ports of the fuel injector, and that they need to be cleaned. This will also indicate a higher than normal fuel flow rate on your fuel calculator... This is in fact not true. If you are using the "gage" tap from the fuel manifold on top of the engine for fuel flow indication, this is actually fuel pressure, and gives a flow indication. A blockage at an injector will read a high flow, when in fact it is just a build-up of pressure in the manifold and you are running a cylinder very lean. That being said, low fuel flow rate, can mean the emulsion chambers are blocked and your fuel is just dripping into the engine and not atomizing. Confusing huh? I will get more into this, in a more fuel oriented article.

Baffling is very important because it keeps the engine cool. Tight baffling is okay, but it isn't essential. What you want in baffling isn't tight clearance, but that it is air tight! That is a common misconception with baffling. Some people try to design theirs (if

*continued on page 37*

# Winter Flying

*Why not? L.Col. Jerry Milek, CZAF (ret.)*



## *Is it important to fly in winter?*



There are at least two good reasons. First is that some flying skill will be lost through the winter when taking a break. As in everything you do it takes time to get back in shape. It is much more difficult for beginners. Common sense dictates that beginners should get their spring start time with an instructor or experienced licensed friend.

So what is the second reason? It is navigation skills. Anybody who flies in winter will confirm that navigation with your finger on the map is much more challenging. Everything is white and many navigation points and lines which we got use to in summer just disappear. The small roads in the country that we're used

to finding simply disappear with fresh snow. Suddenly even the cottage of our friend is not there. And where is that small lake? Ok, there is the big one. Is it really? The shoreline is quite different on the map. Yes, winter-time country looks quite different from the summer view, with which you are familiar. Long time ago, we use to navigate by the steam railways. They left a black ribbon snow route. We do not have steam machines anymore and most likely you will even miss the railway tracks.

It is very nice to have a plane at the airport with winter service, fuel and clean runways. Unfortunately there are many small airports without this luxury. Pilots mothball the aircraft for the winter and wait for the sunny

days of spring to dry the grass airports. It does not have to be like that.

The last week of February, I was invited by Savage Aircraft Sales Ltd. to test and get a check ride on their "Savage" aircraft equipped with skis. Of course, I would never pass up such an opportunity. I met Alan Dares, the instructor, at Bradford airport which I would never have recognized covered with snow. While warming up with the heater in the hangar, I familiarized myself with the airplane. It is in the

successful participant in the 2009 Canadian rally from west to east coast. This year the company equipped the plane with skis and had success testing for winter operations. Because of the very good results, the company is offering a 5 hour course on ski flying, together with the ground school, ending with graduation and a check ride. Of course that includes the fun of ice fishing on Lake Simcoe, where Savage is renting his own hut, equipped with hot chocolate and coffee and even

## *First you have to keep in mind that you do not have brakes*

UL category, but could have fooled me. It is not much smaller than the Piper Cub and looks a little like one. Tubular, chromemoly steel structure covered with cloth painted in a lovely yellow color. It can fold the wings for storage in your garage. "Savage" is powered by 100 HP Rotax 912 ULS. Flaps are three positions. Baggage compartment can take up to 44 lbs. and with 18 gallons (68 l) you can cruise almost 4.5 hours. The plane cruises at 100 kts (115 mph) and stalls at 41 mph. You are airborne at 360 ft. and your landing distance is 270 ft. This is truly an amazing aircraft that Savage Aircraft Sales is importing from Zlin in the Czech Republic, where it is being manufactured. I have to mention, that in Europe the Savage is certified to tow gliders. The cockpit lay out is comfortable and equipped with all the basic instruments you need. If the airplane was mine, I would certainly add a DG. Only very old pilots know how to fly your whisky compass in turns. (Heads up guys!).

This particular airplane was a suc-

cessful participant in the 2009 Canadian rally from west to east coast. This year the company equipped the plane with skis and had success testing for winter operations. Because of the very good results, the company is offering a 5 hour course on ski flying, together with the ground school, ending with graduation and a check ride. Of course that includes the fun of ice fishing on Lake Simcoe, where Savage is renting his own hut, equipped with hot chocolate and coffee and even

some cooking if desired. So you don't have any reason not to fly. After the briefing on the take-off procedure, taxi with skis, speeds for climb, cruise and landing we pushed the airplane from the hangar, did the pre-flight check, started and warmed up the engine. Taxi on skis certainly takes big curves, so you have to know your area.

Take off was very easy, not much different from a summer take off. Maybe you need even less rudder to counter centrifugal forces from the propeller. The skis hold the take-off heading quite nicely. The aircraft is easy to fly and I did not find, in my one hour flight, any bad habits. We landed a few times at Lake Simcoe; certainly different from your summer flying!

First you have to keep in mind that you do not have brakes. Your landing distance will depend on the depth and snow condition. The outside temperature has an impact on the snow. It could be powder, or can get heavy with the temperature hovering on or above zero Celsius







*It is very nice to have a plane at the airport with winter service, fuel and clean runways.*



(32 F). If the lake is frozen with a little snow, you will find that after touch down the plane runs like lightning. The landing, with a grey sky and far from shore with no visual clues, is difficult. Close to the ground it is almost impossible to judge the height. The landing has to be done very similar to landing on glassy water in a float plane. You have to keep some power on and just inch the plane to the ground. I was lucky to experience that.

On the landing back at Bradford the sun was shining and you could see the contours of the snow and it is quite normal. It was a good learning experience for me and no matter how much experience you have you can always learn something new. The winter days are soon. The flying

conditions will change, so take the opportunity this year, since I am certain that Savage will be running this successful program this year. They are aware that not everybody can afford to buy their own plane or get skis for the aircraft they own. So for the especially young (you are as young as you feel) they are setting up flying squadrons with affordable membership. For info and for your ski course, you can call Alan Dares at (416) 486 7662, or Tony Cianfarani (416) 741 3124. Of course it's the same info if you want to buy this amazing ultralight aircraft.

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*This article originally appeared in the RAA Toronto Chapter's "Up There" Newsletter.*

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# Across Canada

*RAA Chapters in Action*

## **Saskatchewan**

Well hello again. Another summer of activities has past us by. Here is a short recap of what the Saskatchewan RAA folks have been up to.

Back in April we held our steak night fundraiser. It was a great success and everyone had a blast. In May, jointly with the local COPA chapter, our club held a Rust Remover for those that need a brush up. Thanks to Marc DeGirolamo for organizing this event. It was very well attended and everyone got a thorough refresh and update. For Canada Day, Corman Air Park, a local strip held its annual Fly 'n' Fair event in which several members either attended or volunteered at. It's a great event for people to enjoy aviation and get up close and personal with smaller aircraft.

As usual practice in summer our Sunday Breakfasts were held at our club hangar. Thanks to all the volunteers that cooked and made the breakfasts possible and thanks to Ed Zelko for making sure there was food to cook.

Club members hosted various flyins throughout the summer and other surrounding towns had open invitation flyins that also attracted our members. Two of our members took the plunge and went to AirVenture in Oshkosh and braved the rainy weather. What ever the event, our members were happy for an excuse to venture to the skies. There are also still some flyins to enjoy this fall while the weather still holds (hopefully).

September has seen our new season of meetings started up again. This year for something different, we started with a wine and cheese and a video presentation of the trip to Oshkosh made by

Murray Marien and Marc DeGirolamo. It looks like a lot of fun even with the rain and the video was great (thanks Murray)! Meetings are held the 2nd Tuesday of the month if you're ever in our neck of the woods. See you there!

*Laura Drinkwater*

## **Chapter 85 (Vancouver)**

July's Fly-in at Delta was another success. We could not have done it without the many members that stepped up and volunteered to handle the air traffic as well as the ground marshalling and the walk-ins as well. Thanks to all that made it a great day. Hats off to you all and to Ray Colley for donating the hats for the volunteers depicting the Swain's Harvard on it; very nice.

The September meeting featured our Show and Shine BBQ, with the meeting starting an hour earlier.

## **Thompson Valley Sport Aircraft Club**

We had lots of smoke in the air in August, due to all the forest fires, but that still did not keep members from flying. Maybe it was the smoke that kept the sun from warming the ground too much, but we had days of great flying weather without turbulence and strong thermals.

The chapter's computer finally called it quits, so a new one has been purchased. Dick Suttie sent the info to install a new counter on our website to see how many hits we get; that should be very interesting!

## **New Website Online**

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

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

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

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

## **RAA Office Move**

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

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

### RAA Toronto

Vice-President Bill Tee welcomed 34 members to the Sept. meeting at 7:40. There were no new members, but Mike Jackson is a returned visitor from the UK and Texas Constantine, a new BFC student joined the meeting. Mike gave a short update on UK aviation issues. He mentioned that the recession had hit hard, and the only people flying were the Rotax and 100 hp engines. AV gas was averaging £12.50 an imperial gallon (\$4.60 Cdn/litre!). For First Flights, Jim Mosur's restoration of a Zenith 200 has been airborne with Peter Burrowes at the controls. Also Kathy and Steve Sutton had a FF in their Glas-sair.

The summer's Burger Nights were a hit again with one night's attendance maxing out at 70.

Many thanks go to Art Kitching, Alain Ouellet and his wife who were instrumental in cooking up a good feast for the corn roast. The choices included roast beef, roast pork, salads, dessert and of course corn.

Christmas dinner will be Sat. Dec. 11th, with tickets available at the Oct & Nov general meetings. Open Forum: Transport Canada Seminars at 4800 Yonge St, start at 7:00 (not indicated in

their email). Bernie Wurster gave his Five Minutes for Maintenance talk. The topic was Journey Log entries.

Bill introduced the evening's speaker, Ed Cook who, being one of the original flying instructors at BFC had many an enlightening story to tell about past goings-on. He built a Fly-baby which he eventually sold to his son.

His description of flying in the original CNE airshows indicated a dedication to timing and airmanship, but they were still subject to the vagaries of starting, running and maintaining some temperamental engines. The highlight of the evening was a video tape of 8 mm movies taken by George Welsh during the construction, flying and modifications of his Baby Ace. George's movie covered the emergence of the Fly Baby from a basement window almost butterfly-like. First flights, testing and bubble canopy installation were all included. The 8mm camera was mounted on the vertical stab allowing filming of flying and landing sequences. The video tape is currently being put on DVD to be available to all.

Ed Cook answering questions after his talk on the 'Start Up' days.

The speaker was thanked by Bill Tee, then the meeting was adjourned.

### RAA London / St.Thomas

Member Hugh Shields has accepted the task of directing (organizing) the 2011 St. Thomas Air Show. This summer event has become one of the largest and most interesting air shows in the country.

The September 7th meeting, held at the 427 Wing Building on the London Airport was called to order by President Angus McKenzie at 7:45 PM with thirty-seven persons in attendance.

Angus presented a sincere thank you from the Chapter to Bill and Mary Rice for hosting the annual picnic for this year, and for the previous twenty-six years. (Round of Applause)

Angus extended a thank you to Jaye and J. Davis for hosting a fly-in at his Brandywine Airfield. The event was a successful having several aircraft in attendance, great food and good friends. Angus speculated that perhaps the annual picnic could be there in future.

And finally a thank you to Tom Martin for hosting the Air-Rally at St.Thomas this August. Tom Martin reported that twenty-three aircraft were



### Recreational Aircraft Association of Canada (RAA) MEMBER SERVICES PROVIDER

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Please send your resume by January 1, 2011 to Gary Wolf at [raa@raa.ca](mailto:raa@raa.ca)

*While we thank you for your interest, we would like to state that we will communicate only with those candidates offered an interview for the position. May 2010*

in the race, everything from a Cessna 150 to five Rockets. Eight participants came from the USA to enter the event. Twelve entrants had never been in any competitive aircraft event before. Tom also noted that at least 150 persons attended the after-event party at his field for food and dancing to the Sierra Swing Band.

Hilda Smeltzer noted an upcoming walk to raise funds for Parkinson's disease Research, and was accepting sponsorships for same.

**Project Reports:** Dave Hertner pointed out one of the real advantages of belonging to an RAA Chapter such as the London/St. Thomas Chapter. Earlier this summer he had approached Ed Hollestelle and his son regarding the making of an attractive and aerodynamic nose cowling modification to clear his Corvette engine. Dave was informed of newly available materials to stick in place that could be nicely shaped and then form the final com-

posite material while in place around the engine. Dave noted that access to the experience and extensive knowledge of another chapter member (Ed Hollestelle and his son Dave) had been a tremendous benefit on his own RV-10 project.

Then at 7:55, Len Fallowfield was surprised to find that he would introduce the speaker for the evening, Larry Ernewein. Larry is currently an airline pilot, who first learned to fly thirty-five years ago. He spent eleven years building a Bucker Jungmann biplane in which he greatly enjoys doing aerobatics of all kinds.

When the Amelia Earhart movie crew were looking for an aircraft from the 1930's that could do low level aerobatics and a pilot for same, they found Larry Ernewein and the Bucker Jungmann. Larry presented a slide show with many still pictures and several actual movie clips showing how the tremendous amount of movie footage

is edited down to the actual on screen movie time. He even explained how he was instructed to make the aerobatic maneuvers look dangerous for the film. (I tell you what.... It looked dangerous enough to me!)

At the October meet, Pete McLeod with his associate Rob Hogan was our speaker for the evening. Pete McLeod, now a London resident, originally from Red Lake Ontario, is a Red Bull Air Race pilot. When not in the Red Bull Racing Circuit, Pete makes his living in aerobatic flying all over North America in the air show circuit. Pete presented a fascinating slide show with several film clips of the Red Bull Race course as seen from the pilot's position and from cameras on the plane. The aircraft speed and particularly the roll rate are beyond one's imagination. Following the presentation, Pete made the presentation and film clips available on the internet for anyone wishing to review them again.

RAA

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#### *Presidents Message / cont'd from page 2*

but safety should come first for any pilot or owner. If you are the operator of a Rotax 9-series engine please check their service bulletins SB-912-029 and SB-914-018.

#### **POP'S PROPS**

Rob Prior of Delta BC has sent an email to warn owners of Pop's Props ground adjustable propellers that there have been inflight failures on Lycoming powered Van's aircraft, and Pop's Props has now decided not to manufacture any more of these propellers. Since there is no AD process in Canada it falls to the community to spread the word. The thread is available at: <http://www.vansairforce.com/community/showthread.php?t=62775>

#### **CHINOOK HKS - UPDATE**

RAA has previously written about running problems of the HKS engine when it has been installed in a Chinook aircraft. The flaperons

foul the original carb installation so the airframe manufacturer supplies updraft intake manifolds to relocate the carbs below the engine. The problem appears to be that there can be fuel puddling in the intake manifolds when they cool down, as during an approach to a touch and go. Owners have found that when they then open the throttle for a climbout, the engine runs so rich from gulping the puddled fuel that the engine will not make power to climb. There has already been an aircraft damaged from this problem, so a Quebec owner decided to experiment by making and testing his own sidedraft intake manifolds. He found that the engine ran well but the rules of AULA prevent him from flying with these. He has decided to sell his airframe and keep the engine for a different project. Two years ago RAA presented the concerns to Bob Bancroft, then TC's Chief for UL aircraft, but he declined to deal with these and dropped it all back into the laps of the owners. The manufacturer

of the Chinook maintains that there are no problems and that the engines run very well with the intake manifolds that he supplies.

A group of frustrated Chinook HKS owners has recently asked that the manufacturer of Chinook aircraft come to Ontario to show them how to make their engines run properly, offering to give him \$500 to help with his airfare, and even to provide transportation from the airport plus accommodation while he shows them how to correct the running problems. The offers were made on the Beaver/Chinook forum which is commonly used by the manufacturer to disseminate information, but a month has passed and the owners are still awaiting an answer. The manufacturer recently posted an email to say that he was interested in selling out to anyone interested in buying his company.

The HKS engine runs very well when it has their own factory-supplied downdraft or sidedraft intake manifolds.

RAA

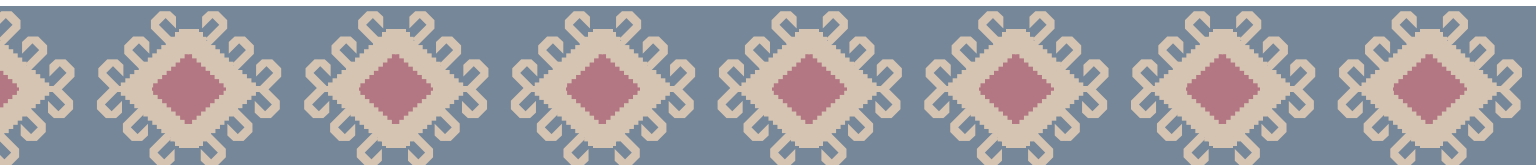




# Tailw

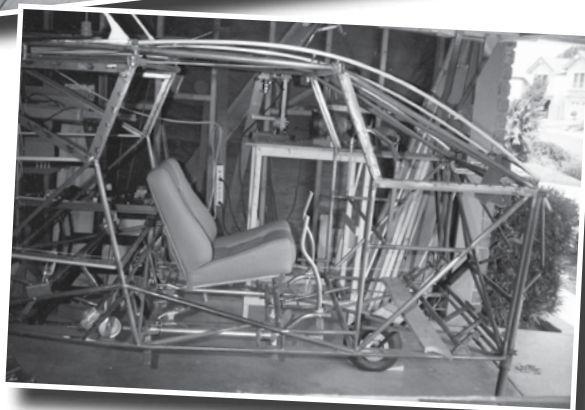
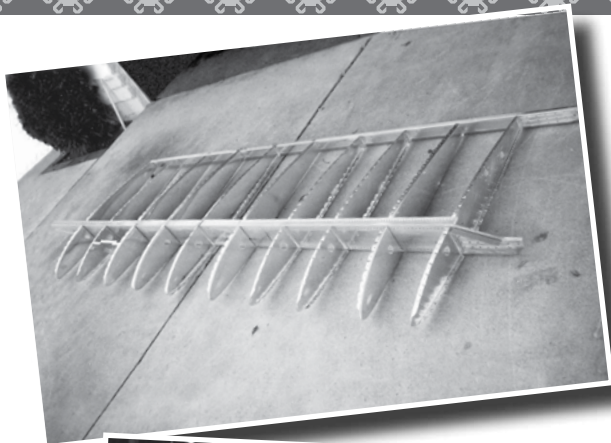
## Earl Trimble's Fabulous Metal Winged W-10

*There's a saying in Southern California: you're either a wannabe or you're not. I was, but now I'm not. More importantly I was a wannabe for years over a Tailwind ... and now I have one. / Story and photos by Earl Trimble*



# Wind





**The metal wing makes  
Earl's Tailwind unique  
amongst Canadian  
Tailwinds; a roomier  
than usual cabin was an  
unexpected benefit**

I BUILT IT IN SOUTHERN CALIFORNIA and flew it back home to Toronto, Canada. I don't know if this wannabe thing works elsewhere but it was a wonderful feeling when I escaped the bonds of wannabe into the area of this fantastic satisfaction.

This being noted, I thought I would like to build a Tailwind for years but two things got in the way: kids and not having the foggiest idea how to do it or the confidence.

I built the Tailwind while living in Irvine, California while my wife was working in the advertising business. About the second year we were in California I had acquired an instrument rating, had done a lot of traveling and flying to keep myself occupied. Just after Christmas, Judy and I rented the 172 that I regularly flew out of John Wayne/Orange County Airport and headed to Tucson for a few days. At dinner one evening she asked me if I was ever going to build the Tailwind. Judy said if I was going to do it, I had better get at it because we are not going to be here for ever. She also made a point: if I was going to do this, don't skimp. Do it right.

When we returned home I started to work. It was January 1. Two weeks short of three years later, it went to Chino Airport for the final rigging and hopefully soon for the first flight.

To make a long story short I did all the grunt work and left the odd specialty item to those who knew what they were doing, like the final welding and the wiring of the panel, since I wanted it IFR.

I told myself every day, Earl, if you do not go out to the garage and do some work it won't get done. There is nobody around to do it for you. So every day I made an effort, I produced something, be it ever so little.

I started out my project with building a 4 foot by 15 foot table. A 4 by 16 would not fit in my garage, hence 4 by 15. It worked OK.


Level table. People say you have to have a level table but they probably haven't tried to level a 4 foot by 15 foot table and keep it level for over three years. There are earthquakes in California, you know.

I decided it was a wasted cause and went the shim route. Don't get me wrong, the table was level, it was just not perfect. Everything on my plane is straight as can be. It will fly hands off but not rudder off for long. This is typical of any short coupled plane.

About the time I started to build, I was talking to a friend who was rebuilding a Cessna 182. I told him about my concern when I build the metal wings for my plane. Where the skins overlap it would not be a smooth transition. He said the way to solve that problem is to shim. He mentioned the Mustang wings, he had rebuilt a few of them over the years and the skins were all shimmed on them to make them come out right.

I kept that in mind, used it where possible and my wings came out perfect. On the table I penciled out one side of the fuselage, drawing the exact size of





the tubes in their place. Next I cut out a lot of wooden blocks, out of 1 by 2s, about 2 inches and 3 inches long. I then laid out the exact size of tubes, in their place in the table, starting with the longerons. The wooden blocks were then tacked to the table on each side of the tubes, forming the shapes. Anyone

dog and since she didn't say it was a bad idea I went ahead.

I got two long straight two by fours and clamped them to the vertical wall studs. These two by fours were positioned horizontal over the two fuselage sides with little wooden blocks nailed to them to hold the upper longerons

a plumb, I tack welded it all together.

At this point I analyzed my welding and realized it would take me about two years to learn to weld to the standard I would like to have in my plane. Not only that, my butt was going to be in the sling and if I welded it I would be forever listening for a

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*She also made a point: if I was going to do this, don't skimp. Do it right.*

---

who has seen Jim Clement's photos know the routine. His pictures helped me immensely and saved me many hours trying to figure this out on my own.

I tack welded everything in place and soon had one side of the fuselage. After removing it from the blocks I started again with new tubes and repeated the process I soon had two sides of the fuselage completed.

I then put new marks on the table representing the bottom of the fuselage, and moved the wooden blocks to capture the bottom longerons.

At this point I cut 1 by 2 wood lengths, a little wider than the fuselage and nailed wooden blocks on them to represent where the top of the fuselage would be. I popped them down over the top longerons and they held the sides the right distance apart. I then pulled the two ends of the fuselage in and tied them, this gave the fuselage shape but still with no cross pieces. My problem at this point was how to keep the sides vertical and straight while I put the cross pieces in place.

After a short period of stewing I discussed my new brain wave with my

in place. The longerons were then clamped in position and this gave me a rigid jig for the top of the fuselage.

I had drawn a center line on the table to make sure the sides would be mirror images.

The next step was to cut the cross tubes and insert them in their place. The cutting and fitting of the tubes was done with a hacksaw and one 12 inch round file. A friend who had built a couple of tube and fabric planes told me that it does not take long to get good at fitting tubes with just a hacksaw and a file, he was right about that.

In a short time I was making perfect fits and all the cutting and fitting went really fast.

I made plumb bobs from welding rod and thread.

On the top cross pieces I marked the center of the tube, tied the thread with the plumb bob rod on the center mark and made sure it lined up with the center line on the table. It just took a little adjustment with the 2 by 4 clamped to the wall to make everything straight and firm.

After all the cross and angle tubes were in place and every cross tube had

creak, groan or ping of a weld coming loose. So I went looking for a welder to do the finished weld.

I got lucky. Dave Cox who worked for McDonnell Douglas put a large Tig welder in my garage and would come by on weekends to do the finished weld. This man is such a fine welder that word got out and soon I had people coming by my house just to inspect his welding.

While looking back over my pictures I had forgotten how I had accomplished certain things. If I mention them maybe they will help some new builder along the way. First, those tubes that run on a angle that are above your head when you are sitting in the cockpit; I drew them on a wide piece of plywood and clamped the plywood to the bottom of the longerons right behind the front door post. This gave me an exact pattern to cut and fit the tubes in place. They needed a little shim with a large piece of thin metal and this also saved the plywood when they were tack welded.

The horizontal stabilizer was built right in place on the plane much the same way. The end of the stabilizer



was drawn on a board and the board clamped into place. The tubes were cut to fit the drawing and tack welded in place. Think about it, it makes it easy.

When I think back, the whole tail assembly took as long to build as the rest of the fuselage.

I put the Clement door opening on my plane with one exception: with the Callbie Wood wings that I built, the back spar pickup is one inch farther back which makes the door a touch larger.

I had put in the Clement cross piece above and behind the head, and then realized I did not need to do this, so I took it out and put back the straight tube. Be patient; I will explain.

I might not have built a Tailwind if it were not for the Callbie Wood metal wings. As a matter of fact, I had not intended to build a plane until I saw Callbie's ad in Sport Aviation. I called Callbie and after a chat I was sold. That said, these wings would change a lot of things about the plane that I did not like; namely having a large gas tank inside and then having little room for the instrument panel or yourself.

I acquired the plans from Steve, the wing plans from Callbie and after looking them over, I knew I could build a plane that would suit my needs.

After a discussion with Callbie about how much fuel I could carry in the wings, it was agreed I would put 18 US gallons in each wing in four bays a wing; that is between five ribs. I would have no header tank, even though Callbie thought I should. Now getting all this fuel out of the cabin ( 216 lb. ) into the wings presented a weight and balance problem.

Another call to Callbie and we decided to move the firewall four inches forward to account for the fuel pretty well over the CG. ( I did not realize what this did till I performed my first landing by myself and dropped it on the tail (going too slow) and bent the tail wheel rod.) When I tried to pick up the tail I found out it was tail heavy on the ground only. You don't have to worry about it nosing over. It has nothing to do with the flying characteristics or the weight and bal-

ance or the handling on the ground. Actually this is the best ground handling plane I have flown and I have flown a few.

Moving the firewall forward four inches allowed me to move the instrument panel three inches forward of the front door post. I then put the seats on tube tracks so I could move them in a range of four inches.

With the tube behind the head back one inch because of the rear spar pick up and the seats that move up to four inches, I had no worry of my head touching the cross tube. With all this rearranging inside I ended up with a large interior. My knees do not come near the bottom of the instrument panel and the passenger is able to stretch his legs out straight. As most of you have probably seen my plane on the Tailwind web-site, the inside does not resemble your average Tailwind.

My first sets of seats were made of round tubing but I discarded them because they would not be strong enough. I then went to 5/8 inch square tubing and did it ever make a difference. I made them much like Jim Clement's seat frames and they worked out great.

The landing gear/motor mount - that was really something. Those who have been there know. The landing gear was built on the plane; I don't know how you would do it otherwise but I bet some people try. I built it without the engine in place and it came out as it should. I have heard of people who say you have to have the engine in place and the weight on the landing gear to do it right but that is not so.

I ran across an old article in Sport Aviation on how to assemble the landing gear, and followed the instructions to a point. My welder, Dave, and I have had a bit of experience jiggling up things so this actually came very easily for us to take it one step further using materials we had on hand.

Once we had all the markings on the floor and plumb lines in place, we put a long two by four crosswise under the plane and clamped the bottom of the gear legs to it with the necessary angles, then used a 1/16 welding rod spacer for the toe in. The tubes that hold the landing gear legs in place had already been cut to size and when in place were tack



welded. The basic frame that attaches to the firewall was all assembled by this time and tack welded. At this point we had the landing gear assembly but not the engine mount. Dave did the finished weld on this part and we planned our attack on the engine mount.

Now it pays to have a welder with a garage full of everything. He came up with a piece of half-inch aluminum that was a little wider and taller than the firewall. Now you are wondering what we are going to do with that.

We measured out on the aluminum the landing gear mounting holes, the ones that attach to the airframe.

Through these holes we ran threaded rod and attached the landing gear to the fuselage and the aluminum 1/2 inch plate the appropriate distance, 9 inches from the firewall. This is where the engine will attach to the motor mount. On the aluminum plate the engine mount holes were drawn and the holes drilled in place. This gave us a simple working jig for the motor mount.

We made the motor mount as per plans, then through the week I tried it on the engine for size. I realized I could not fit on a vacuum pump because of one of the cross pieces, so Dave and I found a good way to change it and still keep it as strong.

The flap handle was made to plans and welded in place, then was moved and moved again. Its place now is in front of the seats, attached to the cross tube that the seats sit on. Instead of a half round circle tube the handle rides on, is now a quarter round tube that is made of stainless steel so it won't show scratched paint.

I had the center stick fabricated and in place for a few months when I said to Dave, "I always wanted dual sticks." He said, "Let's put them in." That took four months and a lot of engineering. The sticks are very fluid because they ride on nylon bearings and they also look great. I made nylon bearings wherever I could.



The rudder pedals, the flap tubes and the center bearing for the push pull tube to the elevators all ride on these bearings.

The sticks are three-quarter inch stainless steel; as a matter of fact the whole dual stick setup is stainless because Dave had a lot of it sitting around gathering dust. He has a friend who bent them for us to our liking and we tweaked it to make it work. Sounds easy but it was not, but then again it was worth it.

There are a lot of tabs on a tube and fabric plane. To make it easy I had some strip one inch wide .025 and .032 sitting around so I took my tin snips and cut the lengths I needed. When it came time to fit them to the airframe I held them in place with vice grip pliers and Dave tacked them in place. This went fast. I left the drilling to later when Dave was not around because I wanted to put nut plates on some, clip nuts on others, and some have rivnuts in them, which all take different size holes.

To jump ahead a little, we built the wing struts on the plane with the wings in place. The streamlined tube for the strut was cut a touch long and we fabricated the top attach piece not like the plans; Dave has a few better ideas how things should be welded together for strength. The bottom end was not done

like the plans either. I had some streamline tube that is one size smaller than the strut tube that I decided to utilize.

About a six inch piece was welded in place, as per plans, with a strap for reinforcing. The strut tube slid down over this short tube for a tight fit. It was then secured with a horizontal bolt that ran through both tubes. Inside the short tube there is a tube welded in place for the bolt to slide through. The actual strut tube has a two foot round tube rosette welded in the center for strength in compression.

I had the airframe powder coated since I had no desire to do the sandblasting and then paint it in my garage. As it turned out I found a small company that builds truck racks and he fit it in as a filler job for \$275. All the bits and pieces. Not bad I thought!

Everybody loves my doors; they are .75 inch square by .125 aluminum and we built them right in place. You wonder why the aluminum is so thick? It is all I could get at the time for a reasonable price and I also wanted to tap them for screws. The skin is held on by screws and all the screw holes around the window are tapped. I wanted a door that just clicks shut when you close it and to accomplish this I used a MD 90 washroom door lock. I even kept the handle and cut it down to a stubby lever. There is no handle on the outside of the doors. I cut a one inch finger hole in the skin and riveted a Camloc access door in place, (the Camloc used for wheel pants.) This is a small spring loaded item and all you have to do is stick your finger in the hole, push the little door aside, then push the lever and presto, the door opens.

I covered the plane and painted it in one month, all by myself. It was a lot of work but rewarding.

A chap, Norm Douthit who worked for Ray Stits for years, came to one of

*I covered the plane and painted it in one month, all by myself. It was a lot of work but rewarding*

our EAA Chapter 7 meetings and gave a talk on covering your plane using the Poly Fiber process. He made it sound easy and he also said he would give us a 35 percent discount if we bought from him. Norm has his own little business selling Poly Fiber Products.

I had a chat with him, mentioned I was ready to cover and I would take him up on his offer. He said, "When you are ready, call me on my 1-800 number every morning and I will walk you through what you want to do that day." Some days I called him four times and it was like having an expert right with me.

The Poly Fiber Process is easy to use, even for someone who has not done it before. I put this in the category of "even my wife could do this". By the way, when covering be sure to start with the vertical stabilizer.

The instrument panel and radio panel are 1/8 inch aluminum and the panel on the right which holds the fuses is .032 aluminum. A friend of mine had punches for the instrument holes so he punched them and also cut out the panel for the radios. The instrument panel is shock mounted, the others panels are not. There is a 3/8 x .035, 4130 angle welded in place to give the shape for the top and to fasten the shock mounts. The bottom has 1/2 x .035 tube running from



side to side with a 1 inch x .035 strap welded along it to attach the bottom of the panel. I painted the panels with a spray bomb and could not believe how well they came out. Most people seem to like the panel with what I have in it. I have enough stuff to go cloud busting which I like doing now and then. I have had a few people ask me what do I want all that stuff for, my only comment is, "If you don't know how to use it you don't need it."

I used 3/16 Lexan for the windscreen and it runs all the way back behind the head.

The three pieces it attaches to are 1/2 x .049 square aluminum. To bend these to fit and all other tubes I needed bent, I used the Y in my bending tree in front of the garage. The Fica tree was only too happy to help.

Into the 1/2 x .049 aluminum pieces I drilled and fastened rivnuts, then used flush screws to hold on the windscreen. All other windows are 1/8 Lexan. The back windows are held in with 3M double sided tape, the tape that holds trim on the sides of cars. There are no other fasteners.

Looking over my photos I realize I had the airframe completed, but not with all the details, when I started the wings. I built the wings while waiting for my welder to come and do all the little welding jobs that needed to be

done. After the wings were completed he still had not finished everything, even though he came every weekend and worked hard.

I must say this - I love my wings because they allow a lot of important changes to be made. The big 15 foot table came into play again. I could build the wings on one end and still have a work space on the other.

You start this project by making wooden form blocks for the ribs. You have to make two form blocks for front ribs and two form blocks for the long back ribs. You also have to cut out a back plate of wood that is just 1/8 inch smaller all around, then the four form blocks. These two sets of blocks and back plates are to make two different, front and back ribs that have the flange going opposite ways.

There is a full size shape of the ribs on the plans and they are the exact shape of a Tailwind rib. Transfer the shape to some wood and trim out these blocks. Be careful to keep the exact shape.

Now that you have the blocks you will want to make a right and left rib, meaning opposite flanges.

To do this you stand the blocks on edge horizontally and together. Now looking at one end of these blocks you file a 3/8" inch radius the length of the blocks but only on the inside edges

where the two blocks touch. OK. On the other side of these blocks on the outer corners opposite the 3/8" radius draw two lines down the side first 3/16" and second 3/8 of an inch, full length. Now you file from the 3/8" radius, but not cutting into the radius, down to the first line. Make sure these filed down pieces are going in opposite directions on the two blocks. When you bend aluminum over these form blocks these filed down angles on the blocks allow for spring back of the flange. At this point if you bent aluminum over these blocks it would go all wonkie and not lie down right. So to fix this problem you file flutes into the wood where you use a dowel to force the aluminum down into the groove. But first you file these flutes into the wood 1 1/2 inches apart using a big round file.

They should be filed down to the second line you put on the block and only up to about 1/4 inch from the top, being careful not to cut into the 3/8 inch radius. The flute closest to the pointy end should be 2 inches from the tip. Now how does that look? Not bad! This is easy.

You now have the tops of the ribs finished with the flanges going in opposite directions. I hope. Well, turn them upside down and do the bottoms the same way. You will be finished in





## *...it is a myriad of things that makes one plane go faster than another.*

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no time. It is important to make these right as you will see when you start banging out ribs. Next you should take one of these blocks and trace it on scrap aluminum leaving more than 3/4 inches all around. Draw a line the shape of the block at the 3/4 inch line and trim out this piece nice and neat because this will be your pattern for your rib blanks. You now have a piece 3/4 inches larger than the form block all around. The 3/4 inch is the flange when bent over. But wait; you still have to trim the front a little because it has too much metal to bend over for such a sharp curve. You do this by drawing a line around the tip 1/4 inch out instead of 3/4 inch. This line will come back from the tip 1 1/4 inches top and bottom and curve up to the 3/4 inch line and blend into it with nice curve. Trim the excess piece of aluminum off, then sand the edges and Bob's your uncle. (An English saying.) Where the ends of the ribs bend around vertically, in the corner where the horizontal edge and vertical edge meet, drill a 5/16 inch hole and snip out the corner. This is so it won't crack when you bend it.

Go to it; cut all the rib blanks out, file and sand up the edges so there are no nicks to start a crack. This takes more time than banging out a ribs.

All the ribs are .025", 2024 T3 aluminum except for the two ribs that are on each end of the fuel tank.

They are .032", 2024 T3 aluminum. Form these four ribs last because you will want to file down the form block a little more for the flange to bend a bit further so the spring back will be the same as the .025 ribs.

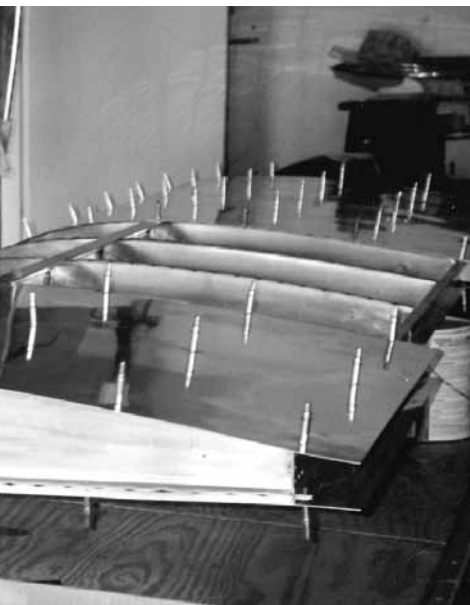
You are ready to make ribs now and this is the fun part because it looks like you have accomplished something.

Take a form block and place the back up block over it so it is centered; then drill two 3/16 inch holes about 3 inches from each end. It really does not matter where, it's just to hold everything in line. Place a rib blank centered between them and drill the hole in the blank so the three line up, then place a nail in each hole. Put this in a vice and now you are ready to bang away.

You have to have a rubber mallet, a must! Start by tapping the aluminum over the form block, not the backup wood. At first you are not sure about this working and then it starts to take a little shape. Wow!

Once you have it banged down and it's all wonkie, take the dowel and lay it on the flange above the flute.

Bang the dowel with the mallet hard and force the aluminum into the flute. Neat eh? It takes the shape of a rib. Can't wait to turn it over and do the other side.



Soon you come to the little tip. It needs a little work tapping the metal around it. It goes wonkie but don't worry, play with it. When you get it off the block you can tweak it with pliers, trim a little off and do some filing. It only needs a bit of curved flange to give it strength.

Now you have formed a rib and you know it is a pretty good rib if you have to pry it off the form block.

Get to it and bang them all out but keep in mind equal number of flanges, right and left. One thing I should mention, it is imperative that they are all the same lengths and that goes for right and left flanges.

There are a few other things to know about building the ribs like joggling and the inside rib being shorter but they are well described on the plans and easy to do. The hard part is finished.

The spars were made on top of two recycling crates that sat on top at the edge of my table. They were easy to build this way after I got a few holes in them to hold it all together with cecos. Oh yes, you need a lot of Clecocs, number 30 and number 40, 40 being the smallest.

With every hole in the wings I started with a number 41 drill

# About Those Metal Wings...

WHAT I KNOW about the Tailwind wooden wing you could just about fit into a thimble - well, maybe I know a bit more than that. I know more about a wooden wing than most know about a metal wing so I will try to enlighten us. At any rate, it will get a good discussion going.

On the information sheet and the plans that Steve sent to me when I contacted him and said I was interested in building a W10, it said the Tailwind wing span is 24 feet and its area is 90 square feet. My aluminum wing span is also 24 feet with a chord of 48", this translates to 96 square feet.

The wooden wing - a 24 foot span, 48 chord also, less 3 square feet on each wing tip area for the triangular shape - comes out at 90 square feet, just as advertised. This difference in wing area is significant in a few ways which I will mention shortly.

The airfoil of the two wings is identical so if the span is the same and the airfoil is the same, they are close to being apples & apples or oranges & oranges, but I guess that is wishful thinking. No two snowflakes are the same nor are two scratch built wings the same and to take this further I would venture to say no two sets of wings that Jim Clement has built have come out the same, damn close, but not quite the same, maybe.

Don't fret, the wings we build will be close enough to do the job - like fly and fly well!

Probably none of us will be capable of building a Tailwind as well as Jim Clement. His will always go faster than the rest and they are the prettiest, probably the best fabricated. That noted, if any one of us built nine Tailwinds we would tend to get better at it and find many ways to make them more sophisticated and slipperier.

Back to the wings, it is not necessarily the wings, it is a myriad of everything that makes one plane go faster than another. If this is your criteria, going faster than others, by all means go for it and for a challenge try to beat Jim at his game but I doubt any can win. In comparing the metal wing with the wooden wing, we see that the metal wing has about 6 square feet more wing area - same airfoil and same chord.

What will that give us?

Well, it gives us more lift, also lower wing loading and a bit more drag. There is 2 inches more chord on the flaps and ailerons. With the squared off wing tips the flaps are longer and the ailerons are further out on the wings. This gives the metal wing 2 square feet of aileron area and a flap area of 4.3 square feet as compared to the wood wing, aileron area 1.5 and flap area 2.7 square feet. The lift from the extra 6 square feet of wing will allow it to take-off quicker. So will the lower wing

loading which allows the wings to lift the weight of the plane sooner. This also says that the angle at which the plane can climb can be increased.

Since both sets of wings are the same length the extra drag comes from the parasite drag (skin friction) of the extra 6 square feet of wing.

I found the metal wing is a breeze to build, exceptionally simple for a first time builder.

All the parts are easily fabricated from the spars to the ribs. The ribs take about 15 minutes each being formed on a form block and since there are only 10 ribs to a wing it is done in no time. There are two spars in the metal wing, not three like the wood wing; this set up allows for the ailerons and flaps to be larger and more effective.

Metal wings have a natural resistance to weather when a plane cannot be hangared. Most manufacturers of commercial planes use metal wings and maybe in the future they will turn to a form of plastic but certainly not to wood.

Another feature of the metal wing is that the fuel can be carried in the wings. My wings are wet wings with 18 gallons in each wing, carried in the four bays (between the ribs) closest to the fuselage. This saves manufacturing a separate fuel tank and also puts all the fuel over the CG along with the pilot and passenger. No more retrimming as the fuel burns off. Another advantage of having the fuel in the wings, the fuel is not in the cabin with you. By moving the firewall forward and without the fuel tank in the cockpit the inside takes on larger dimensions. This allows the seats a wide range of adjustment. I plumbed the fuel lines like a Cessna 172 except for a check valve I added to the line coming from the right wing. I thought it was fool proof. The fuel flow test at the engine was 30 gal per hour but the check valve didn't seem to know that one day when the engine quit even though there were still 12 gallons of fuel on board.

One thing I learned that day is my Tailwind will glide forever if you pick the right airspeed and with a lot of flap and a little slip you can pinpoint your landing spot accurately and at a slow enough speed things don't get out of hand.

But alas, that is a sermon for another day.

*Addendum - My pal Callbie Wood, designed the metal wing for his Tailwind. He also designed and built the Forerunner with a metal wing. In his designs, Callbie leans to the side of strength and safety. I have run the metal wing past eight engineers in the aircraft industry and not one has picked out a flaw or potential problem. The consensus - an extremely strong wing and very efficient.*

and that hole would take a number 40 cleco. When everything was lined up and I was ready to rivet I would re-drill with a number 30 drill and put in a number 30 Cleco; also, this hole would take an 1/8 inch rivet. This way if the holes were not quite lined up you could adjust a little.

Every rivet inside the wings is a solid rivet and every rivet on the outside is a flush 1/8 inch Cherry Max.

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Remember not worrying about leveling the table? Well, this is why. I assembled the ribs to the spars and also skinned the wings while they were sitting on four one gallon paint cans. The spars sat on the cans at their ends and only needed a small bit of shimming to two corners to make both of them level.

Riveting all the ribs to the spars is fun because you are assembling something and it looks like your're accomplishing something. You are - but where do you put these big things?

Next it was time to bend the wing skins. I phoned my friend Tom Griffith to see if he would come over and add a little input. The idea was to bend them on the table, that is what Callbie said to do but you know some of the old timers make it sound so simple or they miss telling you one little key item and you flounder around forever like in a bad dream, saying to yourself, "Why oh why did I ever start this thing?"

Not so. Tom and I clamped a folded over skin to the table; I got up on the table with a flat board and forced the skin down so the leading edge would bend.

Tom was at the edge of the table and when he thought it was bent enough I would let up and he would



try a rib in the fold. We kept doing this till it took the shape of the leading edge rib. I was surprised. Really surprised!

There are only three skins on each wing and they go from the back spar around the leading edge to the back spar again. Out of the six skins we bent for both wings the first five worked out fine; then we blew the last one. It ended up a little caddy wampus so I had to make another trip to Spruce for a replacement skin. It bent fine, thankfully.

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*The spars were made on top of two recycling crates that sat on top at the edge of my table.*

It took most of a day to put one skin in place, drilling through the skin, the ribs and the spars, then clecoing.

For this operation the skins were held in place by long straps, like the ones people use to tie down their planes.

Tom came each day I was ready to put a skin on, because I needed the extra hands to hold things. The two outer skins were put on first, clecoed only. The inside skin over the fuel tank is .032 and the outer skins are .025. All the aluminum on the wings are 2024 T3 except the spar cap.

I gave Tom a rest for a few days while I did some shimmying. I riveted aluminum .025 strips to the top of the ribs and the tops of the spars so that when the center .025 skin was assembled it would flush right across with no dips. It worked.

After all the skins were drilled and clecoed to the 1/8 inch rivet size and everything fit perfectly it was time to think about sealing the tanks and doing the final riveting.

Pro Seal, have you heard about this sticky stuff? Tom knows all about it now because he had it everywhere! This is what we sealed the wet wing with.

My friend Brandon, an engineer on

the C-17 project, told me this is what they use to seal the wet wing on the C-17, your average airliner and also a bunch of fighter planes.

Pro Seal is a two part item with a fairly short working time frame. First you clean everything with MEK and then mix this sealer, 1 part to 5 parts on a piece of cardboard. I put marks on the cardboard that represented 1/4 inch and 1 1/4 inch with the hardener being 1 part, and the sealer 5 parts. I then mixed it up using a tongue depressor. Mixing this small amount allowed me to use it all before it set.

We put the bottom skins on first with the sealant between the skin, the ribs and spars. When that was done we turned the wing over, and propped up the top skin so we could work inside the tank. We sealed everything inside the tank and then went over it again. I wanted to do it a third time but Tom thought it was overkill.

You cannot mix this stuff enough. The more you mix it the less chance of having a pin hole leak. Just a little bit of air left in the sealant will work its way to the surface and presto, you have leak.

I had three small leaks on each wing that were easily fixed.

I finally bit the bullet and agreed

to close up the wing. We put the sealer on the tops of the ribs and the spars, pulled down the top skin and clecoed it in place. Then we went to lunch.

Brandon first said to clamp it down then he said, probably clecoing it will do since we had no way to clamp it. At McDonnell Douglas they have clecos that work as clamps but we did not have that luxury.

The idea is to let it set for a bit so the Pro Seal will squash down and spread out if it is going to. You don't want this to happen after the rivets are shot. In California it seems they shoot rivets, elsewhere they do other things.

After lunch we started the riveting. Tom inserted the 1/8 flush Cherry Max rivet and I used an air puller. We got pretty fast at it but boy there is a lot of rivets. The great thing about Cherry Max is they all break off flush and every hole is plugged. I did not have to drill one out.

We eventually had both wings finished, so it was time to do a leak test.

Another call to Brandon to find out how the Big Boys do this.

This is what they do but on a different scale. Take your vacuum cleaner, hook it up to blow air, and blow air into the gas cap hole, assuming all other holes are taped over. Go



over all rivets and connections with soapy water on a brush and any leaks should show up. And they did. Next step, you are almost done, reconnect the vacuum cleaner to suction and place it back in the gas cap hole. You should have the sloshing compound stirred up and ready to use; then you take a small clean screw driver and put a dab of compound on the spot where the leak is and the suction from the vacuum will pull it through the hole. After about three dabs it won't suck through any more and the hole will be plugged. Is that any good!

It took me about five minutes to do each wing.

The wing tips are from a Thorp S18 and had to be tweaked a bit. Closed up at the front about 1/4 inch, then they fit the airfoil nice and snug. I also had to trim about two inches from it to match the trailing edge, but all in all they work great. These tips are 11 inches wide and this allows for the aileron to be 16 inches further out toward the wing tip, It also allows for a wider flap.

My flaps and ailerons are fabricated much like Clement's. They are larger than a normal Tailwind and very effective. Inside the flap and ailerons there are skin stiffeners little aluminum angles every 5 inches flush riveted top and bottom. The torque tubes ride on nylon bushings and are very fluid.

The indent faring at the root end of the wing was fiberglassed right in position. It was pulled off, cleaned up, trimmed and put back on with soft rivets. I will have to take this off later to cherry it up.

The engine is a Lycoming 0-320 with only 500 hours on it. It had sat for many years in the desert so I had it top overhauled.

The cowling is an Edge Concept and so is the spinner. The cowling needed a lot of work. I had to cut the top sides apart to fit my fuselage and also change some of the shape around the front to match the spinner.

I had to make three carburetor heat boxes before I got one to fit. That seemed to take forever.

The exhausts are stainless steel and made to fit the cowlings. It would be cheaper if you could buy a set but you have to make them. They have cracked four times but I think I am getting a handle on it now. That is another story.

Everything on my plane is new and most everything is aircraft quality. I tried to keep in mind how certified planes are made, for safety reasons, such as my fuel system. It is very close to a Cessna system and that is not all bad.

The electrical wiring was taken right out of a tried and true diagram in a Bingelis Book.

At weigh in, the plane came in at 968 lb. Not bad for everything I have in it.

I blame the extra weight on my friend Skip who helped me wire it. He kept adding all these wires and I don't know what they are for.

Not much more to say other than I love my plane, and I'm happy I am one of the wannabes who finished their project.

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# Sticking Valves

Wayne Hadath

*"There is a Lot to Learn but it is Learnable"*

This year "Little Bit" and I have not done well at the races. My F1 Rocket has over 435 hours on it and the stock 260 hp IO 540 Lycoming with twin mags just didn't seem to have quite the snap it used to have. I had noticed recently that #2 cylinder had lower than normal CHT and EGT readings when the RPM was below 1,000. I had also noticed that the propeller seemed a little easier to move by hand. This summer Hot Starts which have never been a problem, were on a few occasions. I spoke with other aviators and got a list of possibilities: Bent Valve, Burned Valve, Warped Valve, Stuck Valve, Sticking Valve, Bad Plug, Intermittent Plug, Dirty Plug, Bad Sensors, Bad Mag, Intermittent Mag, Stuck Rings, Fouled Injectors..... non of them good but some worse than others.

I decided that I could not wait until winter so off came the cowls and the pressure plenum. A visual inspection showed nothing unusual. I pulled each injector and inspected it and cleaned it. All looked perfect. It was not a fouled injector.

I pulled the bottom spark plugs. They all looked 435 hours worn, kind of football shaped but they all looked dry, clean, nice and golden. I considered replacing them but I decided that I wanted to find the real problem and fix that first. I don't like changing too many things at once. I cleaned them and gapped them. I may do new plugs this annual to prepare for the next racing season.

The engine was warm from a recent flight so I decided to do a Leak Down test. I had been told that it is best to do Leak Down tests when the engine is warm but I have learned that it is

not necessary and Leak Downs can be done on a cold engine with the same results. I was very disappointed to find that #1 cylinder showed 61 lbs and #2 showed 0 lbs. The rest were 77 or 78. I was beginning to think my flying/racing season was over and a big bill was headed my way.

I could hear the air leaking out, but where was the air going? As it happened I was able to get someone to listen while I applied air to the cylinder. We listened at the crankcase breather to determine if the leak was in the rings and all was quiet. We listened at the throttle body intake to determine if the leak was the intake valves and all was quiet. We finally listened at the end of the exhaust pipe and could hear and feel the exiting air. This was the same on #1 and #2 cylinders. This narrowed the problem down to exhaust valves. Were they bent, burned, warped or stuck? Or maybe the seats were bad. How could I determine what the valve problem could be? It was suggested that a light rap with a mallet on the rocker might loosen up the valve and help it seat better. I did this and there was a slight improvement on #2 up from 0 to 5 lbs but none on #1. Because the light rap on the exhaust valve stem improved the sealing it seemed reasonable to assume that some deposits might be holding the valves a few thou off their seat. If only I could look inside the cylinder to inspect the valves and their seating then I could make a proper diagnosis. Fortunately the Kitchener RAA Chapter has a bore scope that I was able to borrow. Snaking the scope's probe through the plug holes showed that the cylinder walls and piston crowns were in good condition, but the probe could not be bent back on itself to give a view of the valves. I checked all of the 6 cylinders and they all looked in great condition. The walls were not scuffed and there were very little deposits on the piston crowns and what was there was a nice golden brown. There was no evidence of blackening or overheating anywhere. So far everything was just the way I had hoped but not

being able to look at the valves was troubling. With out a way of looking at the valves it seem that pulling the cylinder was the next step but I had never pulled a cylinder before and it looked like a daunting task. I remembered that Tom Martin recently wrote an article on the "Old Rope Trick", which allows the valve spring to be removed and the valve to be pushed down its guide and then manipulated until the stem sticks out of the lower spark plug hole. I called Tom and did a Google search and soon I felt that maybe I could continue to trouble shoot the problem without pulling the offending cylinders. Lycoming has a "Service Instruction" No. 1425A dated January 19, 1988 under the subject of "Suggested Maintenance Procedures to Reduce the Possibility of Valve Sticking" which describes the "Old Rope Trick" and the tools necessary to perform it.

I was able to borrow an adjustable Reamer and bought 10 feet of 3/8 nylon rope ( I actually bought 300 feet of different types of nylon rope but you only need a maximum of 10 feet). I could not find a Lycoming Valve Spring Compressor any where on the airfield so I found it a good excuse to fly to Brantford in my RV 10 to purchase one for my use and those who may need to use it in the future. ACS had one in stock for \$75.00. It did not come with instructions but I eventually figured out how to use it.

Here how it goes:

1. Remove the Rocker Cover. This will expose all of the doings.
2. There is a large pin which cannot be seen that secures the rocker arms. This pin is captured at each end by what look like plastic caps. These caps just slide in and are held in place by the Rocker Cover. Use your fingernail or such to remove the cap on the exhaust valve end. The intake valve will be the one that looks like it has the least amount of heat because it does. You will be able to recognize the exhaust valve because it has a metal cap under the rocker arm over the end of the valve stem which blocks you from

**Top, and second down: Ten feet of rope will be fed into the spark plug hole with just a short tail hanging out. Do not allow it to twist as you feed it in. A lever type spring compressor may then be used to remove the keepers and springs**

seeing the keepers. Once you remove the plastic cap you can easily push the pin out part way and remove the exhaust rocker arm. Remove only the exhaust rocker arm. Do not remove the push rod. Remove the cap on the end of the exhaust valve stem. It is just sitting there but you may need a pick or something to overcome the hydraulic pressure.

3. Rotate the prop to bring the piston to bottom dead centre. Use a wire or wooden dowel to confirm this. With the bottom spark plug removed, feed the 3/8 nylon rope through the spark plug hole into the cylinder cavity. Make sure the rope has no twists in it or it may kink or knot and you will not be able to remove it and cylinder removal may be necessary after all. Leave a 6 inch tail hanging.

4. Rotate the prop to bring the piston towards TDC. This will compress the rope and hold the valve from opening.

5. Position your Valve Spring Compressor Tool and compress the valve spring. The half moon valve keepers should be easily removed. Remove the large washer retainer and the dual springs.

6. Rotate the prop to bring the piston to BDC and remove the rope. Be very careful to not touch the prop once the valve has been removed.

7. With both my valves, they move freely with the use of my finger in and out. They seemed to function perfectly. Gently push the valve down the valve guide into the piston cavity. It may need gentle persuasion with a punch and mallet. With cylinder #2 there was evidence of build up almost the full length of the valve guide but on #1 it was about 1 inch.

8. Remove the top spark plug. Get a 10 inch piece of wire and bend a C at one end. Insert it into the top spark plug hole and loop it around the valve

stem. With the use of a magnet on a stick inserted in the bottom hole and the wire from the top and with your tongue held exactly the right way the valve stem should slide out the bottom spark plug hole. The valve stem should have a nice film of oil and will have hard deposits on the part of the shaft which does not ride in the valve guide.

With the use of the bore scope I could now inspect the top and side of the Valve. All look good on both #1 and #2. There was no indication of any wear or abuse on the valve. I still could not inspect the valve seat. So I decided to remove the exhaust system to inspect the exhaust port and try and see the valve seat. I learned that the total removal of the exhaust is not necessary. Just unbolting it and letting it hang down is sufficient. With the exhaust out of the way I could inspect the exhaust port but I still was unable to inspect the valve seat. The exhaust system removal is worthwhile for inspection and it makes the reinsertion of the valve much simpler.

I had purchased some Avblend which is an additive for the oil to stop valves from sticking so I decided to spray some in the valve guide and on the upper shaft of the valve where there were deposits. It took 24 hours for the Avblend to soften the deposits so they could be removed with gentle scraping.

9. I borrowed an adjustable reamer and began gently reaming the valve guide. The purpose of the reaming is to remove the deposits but none of the valve guide material. I turned the reamer using a thumb ratchet and very gradually adjusted the reamer larger, regularly inspecting to make sure I was not removing any valve guide material. Once I felt the reamer engaging along its full length I stopped reaming. I used compressed air to blow out the valve guide and the cylinder. Make



**Second from bottom: with the valve stem hanging out the plug hole, it may be cleaned of deposits...and (above) a reamer may be gently used to clean deposits from the guide.**

sure you secure the prop from turning before you blow air into the cylinder. With the exhaust removed the reinsertion of the valve was quite easy and I was able to slide it in with the use of a magnet on a stick inserted down the valve guide. When I moved the valve in and out with my fingers it slid easily and a solid clank was heard when it came up against the seat. I had earlier been shown an example of a worn valve guide. My guide and valve had very little side to side play and very little wear.

10. Reassembly is the reverse. Insert the rope and remember not to let it twist. Bring the piston up to compress the rope against the valve. Install the dual springs and large retainer washer. Using the Valve Spring Compressor Tool, compress the springs and insert the valve keepers. Release the springs and inspect the keepers for proper seating. Install the metal cap on the end of the exhaust valve. Position the rocker arm and slide the keeper pin into position. Install the plastic retainer caps. Install the rocker cover. If you are using silicone gaskets be careful not to over tighten. Turn the propeller and

remove the rope and install the spark plugs. Install the exhaust system - my system has reusable gaskets. I use anti-seize and new washers any time I drop the exhaust.

After reassembly I did a Leak Down test on #1 and #2 cylinders and #2 came up to 79 lbs which was the same as it was when it was brand new. #1 came up to 74 lbs which was somewhat disappointing but I am hoping and it may be false hope that some debris may be holding the valve from completely seating. We shall see the next time I have the cowls off. At 74 lbs I will have to decide this winter if the Cylinder has to come off.

I buttoned everything up and pushed out and here is what I noticed. The propeller was more difficult to move by hand just like the old days. The CHT and EGT numbers were good at any RPM. The engine start was sharp and crisp and had that old bark and wing rock that I remember now but had forgotten. On the test flight the engine seem to be smoother and GPS Ground speeds and Indicated Airspeeds seemed to be higher. Hot starts were back to being a non issue.

I have decided to begin the search for a bore scope that is flexible or capable of looking at the valves seats. I think it would be a valuable tool in engine troubleshooting and a good practice to do each annual. I have also decided to drop my exhaust system each winter and spray Avblend up inside the exhaust chamber to soften any deposits that have accumulated over the season. By dropping the exhaust and hand turning the prop it is simple to get the Avblend on the exhaust valve stem and up inside the valve guide.

Yes, it would have been easier to just call on the mechanic and trust to his years of experience but I am glad that I chose to do this myself and I gained valuable confidence, knowledge and experience. It was comforting though to know that he was just around the corner if I needed his help or reassurance. It was also great to look inside my engine to confirm that racing my F1 Rocket does not seem to be hurting my engine at all.

There are two SARL races left for the 2010 racing season and hopefully "Little Bit" and I can make it to both to see what our real world numbers are.

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#### *Annual / continued from page 15*

they are home building) so it hugs the cylinders. They don't need to be like that, I can tell you off hand that the Cessna 172 has at least half an inch between the back baffling "wall" and the cylinder. Make sure that your baffling is not chafing against the engine, and that the strip along the top is making an air tight seal with the cowl-ing. Good baffling will help keep the engine cool.

Look at the wiring for your alternator and starter to make sure nothing is chafing. Check the wiring on your thermocouples. If they have chafed and are not exposed... they should be replaced. Check the wiring to your starter solenoid, and your battery. Batteries should actually be enclosed

in their own separate box despite what many people do. The off gassing from the battery will corrode whatever it touches, including your firewall. If you have not already done so, you are best to put the battery in its own box with a drain.

Check all your fluid lines for chafing and proper heat shielding. Provide a means to prevent hoses from chafing too. It is actually acceptable to use a bit of high temp silicone, but it is best to use wire wrap and some type of standoff.

Check all oil lines, fuel lines, vacuum lines etc. for leaking, and tighten as required. When I inspect lines I always put on a dab of witness paste (Torque Seal). This will make inspections easier year after year, as you can see what has come loose.

#### **Conclusion**

This is by no means a complete guideline for an annual, but it gives a very good basis as to what you should be checking. Anyone performing his own annual should really track down the applicable maintenance manual for his particular engine and follow the 50 hour, 100 hour and 200 hour inspection intervals, not only the for engine but also for components like magnetos, alternators and vacuum pumps.

The best way to prepare for the annual is by reading the manuals to thoroughly understand the engine. I hope that this article has provided you with an overview of what you should be checking during your annual.

 RAA



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Ads can be emailed to : [classified@raa.ca](mailto:classified@raa.ca)

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

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## For Sale

Zenith CH-250 Project For Sale. Tricycle configuration First inspection done. Ready for rigging. Have 3 in 1 engine gauge, VSI, ALT, Compass, Tack, and air speed gauges. Have a dinafolcal engine mount for 0320 engine, prop, some pneumatic tools. Plus lots of old news letters for the project and pictures of different configurations. \$10,000.00 Ph. 604-859-6884, John.



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

FOR SALE: (1) a 1967 C-172, 3170 TT, Cont. 0-300, 1020 SMOH, new windshield, new battery in Sept./10, new paint in 2005, a working DME, two 720 com. radios, a 121.5 ELT, current annual till Sept./11. \$35,000.

(2) a 40' x 30' calhoun super structure. It has 5' steel walls, 10' high doors, fabrene roof and will hold a C-172. It was put up in Nov./04 & taken down in Nov./09. \$6,000. Phone 705 544 8743 or [whiteheadbj@msn.com](mailto:whiteheadbj@msn.com) Oct10

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



**NEW PRICE!** Zenair Zodiac 601HDS Tri-cycle gear, registered 1993, Rotax 912 UL, ARPLAST flight adjustable prop. 756 hrs TT. ICOM A-4, 2 headsets, GARMIN 95 GPS, Vacuum AH. Stainless exhaust, new upper paint 3 years ago. Canopy cover. Cruise 120 mph. Asking \$24,000 CDN. At Oshawa. Dave, 416-282-5252 Oct10

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



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

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

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

Williams 780-945-0411 (cell) June/10



Beaver RX 550 serial number BRX0090. 503 Rotax with electric start. Single ignition, dual carbs. Full dash, Altimeter, Vertical speed, Tach, dual EGTs, single CHT, Compass, Hour meter, Capacitive fuel probe and gauge, Airspeed, Slip indicator. Hydraulic disc brakes, individual heel operated. Airframe was totally rebuilt by an AME 4 or 5 years ago. All flying surfaces covered with aircraft fabric. Wings totally rebuilt with turnbuckles in every bay of the wing. Covered with fabric. Has flaps on the wings. Engine has low hours as crosshatch still on cylinders. Checked and regasketed as actual hours not known. 10.9 hours since check on engine. Larger 600 x 6 tires. One of the nicest Beavers around!! Asking \$11,500.00 OBO. Located in Kamloops, B.C. Richard 250-374-6136 richard\_suttie@telus.net Apr10

ED RILEY'S BD-5B: Bare Weight 561 lb. Fuselage; Stretched (Kieth Hinshaw Kit); Belly-scoop Cooling; Taxi Cooling Fan. VHF Antenna Skin mounted on Vert Stab; Barber Pole. Matco Wheels and Brakes. Three Gear Doors Fitted; Windshield Defrost Fan; External Plug-in for Battery Boost or Charge; Wings: Standard "B": Rib Spacing 5 3/8" (Preformed Kit) Auxilliary Wing Main Spar (use optional); Leading Edge Mounted Land Lights; Wing Tip Mounted Nav and Strobe Lights. Fuel Gauge in Skin. June/10

Instruments: Vertical Card Compass; Altimeter (feet); ASI (mph) Manifold Pres (inches); Empty Hole (3 1/8") VSI; T & B (electric); RPM (digital); Exhaust Gas Temp; Coolant Temp; Volts; "G" Meter; Oil Temp; Oil Prss; Hobbs Engine Time/Power: Zero Time Honda Civic 1200cc Turbo; Forged Aluminum Racing Pistons: Power Re grind Valve Cam: Two Coil, Two Breaker Point Ignition, Gated. Power Train:

Jerry Kauth System; IVO Prop, Three Blade Electric Variable Pitch. Built & Painted by; Ed Riley. Asking \$20,000. Phone/Fax 250-339-2887 egariley@shaw.ca June/10

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

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

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

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

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

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

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

C-IFWE Cloud Chaser single seat Basic UL that began life as a Schweizer 126B sailplane. 40 ft span all metal wing, steel tube and fabric fuselage and tailfeathers, tricycle gear with telescoping nose strut and fibreglass main gear. Powered by electric start Kawasaki 440 with belt redrive

and IVO prop. Day VFR panel. plexiglass canopy. \$7000 OBO Bill Rice 519-461-1849June/10



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

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

and put RV-3 in the subject line.

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

Beryl project - tail feathers, all 26 wing ribs, plans - unused. Some Sitka & a/c grade plywood.

The Beryl is a Claude Piel design - like a more robust Emeraude but with tandem seating. Good x-country and strong enough for mild aerobatics. Some instruments too. \$1,000 takes it all.

Call Nigel (705) 429-3449 or [landlaw@sympatico.ca](mailto:landlaw@sympatico.ca) Oct10

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

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

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

Continental A 75 that was installed on

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

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

## Wanted

Wanted: Sonerai or Sonerai 2 project, preferably without engine but all considered. [garywolf@rogers.com](mailto:garywolf@rogers.com) Oct10

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

### Coming Events:

Toronto Chapter's Christmas dinner will be Sat. Dec. 11th, with tickets available at the Oct & Nov general meetings. Open Forum: Transport Canada Seminars at 4800 Yonge St, start at

7:00 (not indicated in their email).

RAA AGM on Dec 4th hosted by RAA London-St.Thomas. RCAF 427 Wing at London Airport CYXU. Meeting starts at 10am.

### Classifieds On The Internet:

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



# New In Canadian Skies



## Charlie Murray's RV-9A Redux

A few months ago the Recreational Flyer published a picture of my plane in the New in Canadian Skies section. Well, since then its been painted and gone on a few trips so I thought I'd send you a copy of recent photos.

The plane was painted by Purple Hill Aviation in Thorndale,

Ontario. It now has 200 hours on it, and has been to Texas, Iowa, PEI, and a few other places. It has an O-320 with a Sensenich prop. In that recent air race in St. Thomas it covered the 125 mile course with an average speed of 182 mph. Still flying great and I'm looking forward to some more trips next year.

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# 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](mailto: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 Ierville, Fermont. Contact Pres. Serge Mihelic, 418-287-3340.

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

**OUATOUAIS/GATINEAU:** Every Saturday 9:00 am to noon at the restaurant l'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.

**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](mailto:lesfaucheurs@hotmail.com)

## ONTARIO

**BARRIE/ORILLIA CHAPTER Fourth Monday 7:30 PM Lake Simcoe Regional Airport** Contact Secretary Dave Evans 705 728 8742

E-mail [david.evans2@sympatico.ca](mailto:david.evans2@sympatico.ca) **COB-DEN:** Third Thursday 8:30 pm at Club House, Cobden Airport. Contact Pres. Clare Strutt, 819-647-5651.

**COLLINGWOOD AND DISTRICT:** The Collingwood and District RAA, Chapter 4904, meets every first Thursday of every month, at 7:30 PM except July and August, at the Collingwood Airport or at off-site locations as projects dictate. The January meeting is a club banquet held at a local establishment. For more information contact Pres. Keith Weston at 705-444-1422 or e-mail at [ckweston2@sympatico.ca](mailto:ckweston2@sympatico.ca)

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

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

**KENT FLYING MACHINES:** First Tuesday 7:30 pm at various locations. Contact President, Jim Easter 519-676-4019 [jim.easter@teksavvy.com](mailto:jim.easter@teksavvy.com).

**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 Clare Snyder [clare@snyder.on.ca](mailto:clare@snyder.on.ca)

**LONDON/ST. THOMAS:** First Tuesday 7:30 p.m. At the Air Force Association building at the London Airport. Contact President Angus McKenzie at 519-652-2734 or [angus.mckenzie@sympatico.ca](mailto:angus.mckenzie@sympatico.ca)

**MIDLAND-HURONIA:** First Tuesday

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

**NIAGARA REGION:** Second Monday 7:30 pm at Niagara District Airport, CARES Building. Contact Pres. Elizabeth Murphy at [murphage@cogeco.ca](mailto:murphage@cogeco.ca), [www.raa-niagara.ca](http://www.raa-niagara.ca)

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

**OWEN SOUND** Contact President Roger Foster 519-923-5183 [rpfooster@bmts.com](mailto:rpfooster@bmts.com) **OTTAWA/RIDEAU:** Kars, Ont. 1st Tuesday. Contact: Secretary, Bill Reed 613-831-8762 [bill@ncf.ca](mailto:bill@ncf.ca)

**SAUGEEN:** Third Saturday for breakfast at Hanover Airport.

**YQG AMATEUR AVIATION GROUP (WINDSOR):** Forth Monday, 7:30 pm Windsor Flying Club, Airport Road, Contact: Kris Browne [e\\_kris\\_browne@hotmail.com](mailto: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](mailto:bstobie@pathcom.com)

**TORONTO:** First Monday 8:00 pm at Hangar 41 on north end of Brampton Airport. Contact: President Brian Heinmiller 905-877-7947 [b.j.heinmiller@sympatico.ca](mailto:b.j.heinmiller@sympatico.ca)

**TORONTO ROTORCRAFT CLUB:** Meets 3rd. Friday except July, August, December and holiday weekends at 7:30 pm Etobicoke Civic Centre, 399 The West Mall (at Burnhamthorpe), Toronto. Contact Jerry Forest, Pres. 416 244-4122 or [gyro\\_jerry@hotmail.com](mailto: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 Café at Wiarton-Keppel Airport. As there are some-time changes, contact Brian Reis at 519-534-4090 or [earlycanflight@sympatico.ca](mailto:earlycanflight@sympatico.ca)

**MANITOBA**

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

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

#### SASKATCHEWAN

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

#### ALBERTA

**CALGARY** chapter meets every 4th Monday each month with exception of holiday Mondays and July & August. Meetings from 19:00-22:00 are held at the Southern Alberta Institute of Technologies (SAIT) Training Hangar at the Calgary Airport. Join us for builder discussions, site visits, tech. tips, fly out weekends and more. Contact president Gerry Theroux 403-271-2410 [grtheroux@shaw.ca](mailto:grtheroux@shaw.ca)

**EDMONTON HOMEBUILT AIRCRAFT**

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

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

#### BRITISH COLUMBIA

**ABBOTSFORD:** Third Wednesday 7:30 pm Abbotsford Flying Club, Abbotsford Airport. Contact President, John Vlaka 604-820-9088 email [javlakeca@yahoo.ca](mailto: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 [moneyypit@junction.net](mailto:moneyypit@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](mailto:jjwvanhalderen@shaw.ca)

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

**CHAPTER 85 RAA (DELTA):** First Tuesday 7:30pm, Delta Heritage Airpark RAA Clubhouse. 4103-104th Street, Delta.

Contact President: Tim Nicholas [vibraanalysis@shaw.biz.ca](mailto:vibraanalysis@shaw.biz.ca). Website <http://raa85.b4.ca>.

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


**THOMPSON VALLEY SPORT AIRCRAFT CLUB:** Second Thursday of the month 7:30 pm Knutsford Club, contact President - Dick Suttie Phone 250-374-6136 e-mail - [richard\\_suttie@telus.net](mailto:richard_suttie@telus.net)

**ALASKA HIGHWAY:** meetings held every third Thursday of every month (except July & August) at the Taylor Fire Hall at 7:30 p.m. For more information call Richard at 782-2421 or Heath at 785-4758.

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

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