RECREATIONAL FLYER
May - June 2006
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Murphy's Incredible Rebel

A Canadian Classic

RAA
RECREATIONAL AIRCRAFT ASSOCIATION
RÉSEAU AÉRONEFS AMATEUR CANADA

from the president's desk

Gary Wolf

TRANSPORT MEETINGS

The Transport Canada CARAC Working Group meetings continue, and in the past months RAA directors Ernst Schneider, Wayne Hadath, and Terry Wilshire have attended with me. The purpose of these meetings is to make an industry recommendation how Transport should deal with Light Sport and how to harmonize our current non-certified categories. The next meetings will be in Oshawa on June 26-27 .

ULTRALIGHT ISSUES

On May 1st many ultralight pilots got a surprise when they found that Global Underwriting was no longer willing to insure their risk. They will now cover only conventional ultralights that are on wheels, whether the aircraft is being used for personal or instructional use. Powered parachutes, trikes, and ultralights on floats are no longer covered, with the explanation that the risk of loss is too great. There are alternatives - COPA will cover any of these, although not for flight training. Also, RAA's insurer, J.S, Davidson, will write coverage on an individual basis. 1-800-463-0754 or bill@jdavidson.ca .

If you are looking for an inexpensive Basic Ultralight, there are many of them for sale these days on Ebay and Barnstormers. You may register them in our Basic UL category, but you should be aware that as in Canada, there is no design or build standard for American ultralight aircraft. The planes being sold are generally the overweight "Fat UL's" that are now being flushed out by the Light Sport category. They do not fit Part 103 and they cannot meet the requirements of Light Sport. They will fit into our Basic UL category a long as they gross at 1200 pounds or less, and stall at under 45 mph.

WEIGHT AND BALANCE SCALES

There are currently seven sets of scales, and we will purchase more if the demand is there. Here is where to find them:

-BC Coast: Terry Wilshire terwil@telus.net 604-721-7991

-BC Interior: Dave King kingdws@shaw.ca

-Alberta North: Ralph Knight rdknight@telusplanet.net

-Alberta South: Gerry Theroux grtheroux@shaw.ca

-Ontario North: Keith Weston kcweston@sympatico.ca

-Ontario South: Frank Noordhuis condor@rogers.com 416-275-5767

-Quebec: Serge Ballard balrob@videotron.ca

Payment of $30 is to be made beforehand to Marina at the RAA office, 1-800-387-1028. A security deposit will be applied to your credit card, and will be removed upon return of the scales.

RAA NOMINATIONS

The annual nomination form is in this issue. Now that communications are so inexpensively available, Board directors may come from any part of Canada. Three seats are coming available this year. If you wish to take part in the direction of this organisation, have five National members sign your form, and mail it to Bill Rice. Elections will take place this Fall.

RAA REGIONAL DIRECTORSHIPS

The Board of RAA Canada would like to thank Terry Wilshire and Tom Martin for accepting the regional directorships for Coastal BC and Southwestern Ontario, respectively. Both men are longtime builders of aircraft, and they are willing to make their experience available to our members.

NEW RAA CANADA ADDRESS AND E-MAIL

Canada Post has changed the mailing address for our office. Henceforth it is:

RAA Canada
13691 McLaughlin Rd.
Caledon Ont
L7C 2B2
email: raa@zing-net.ca

The Recreational Aircraft Association Canada
13691 MCLAUGHLIN ROAD, R R 1,
CHELTENHAM, ON L0P 1C0
Telephone: 905-838-1357
Fax: 905-838-1359
Member's Toll Free line: 1-800-387-1028

email: raac@inforamp.net
www.raa.ca

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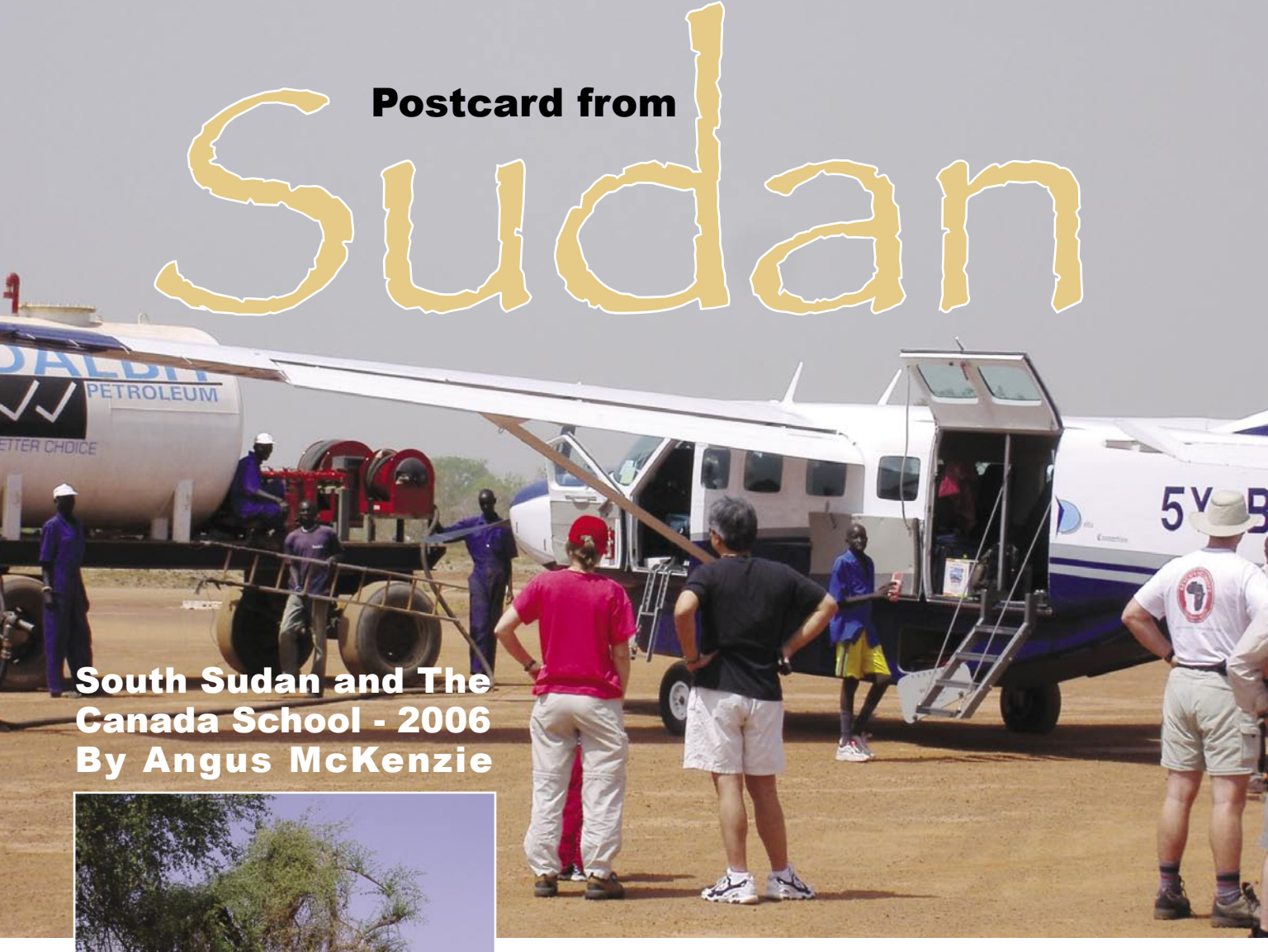
Postcard from Sudan



South Sudan and The Canada School - 2006
By Angus McKenzie

The old Cessna Caravan touched down in a cloud of dust, on a small central Africa landing strip hacked out of the scrub of South Sudan. Soon Angus McKenzie, a former crop duster and president of the London-St. Thomas RAA chapter and three friends would transfer the essentials of another mission and themselves into the box of a clattering Toyota diesel truck for a six mile ride down a dirt road pockmarked with bomb craters. For the four men, all London, ON firefighters, building a much needed school in war-ravaged Sudan was their second major mission - they had packed a few things in their bags and headed to New York City to help out after 9/11.

They were part of Canadian Aid for South Sudan (CASS), a London, ON based organization working to help the people there to rebuild their lives after decades of war that has claimed the lives of almost all the adult men of the region. Among the Sudanese helpers on the eight-room Canada School project were "child soldiers" learning how to lead productive lives after knowing nothing but war in their lifetime. Having seen first hand the devastation of that civil war, McKenzie said he was glad for the opportunity to help out.

This story does not have much to do with aviation but if it wasn't for airplanes we would never have gone to war-torn South Sudan on a mission to build a school. For several years I have been the president of the London-St.Thomas RAA and the chapter membership has always been very supportive of my personal undertakings. This trip proved to be no exception.

The membership voted to help me by making a donation toward my expenses and, as well, some members came forward with personal donations to help fund my trip.

January 12th, 2006 I and three fellow firefighters from the City of London, Rob Warren, Steve Beasley and John Peter, embarked to the area of Aweil in South Sudan after learning that a London, ON based NGO (Canadian Aid for Southern Sudan) had funding in place for a school structure but no skilled help to build it.The four of us are used to working together and had previously helped in New York after 9/11. Most of the adult men from this area of Sudan have been killed during the long-running civil war and the young men who are left have few skills, knowing only service as child-soldiers in the army of the South.

Airplanes are the main method of transportation into this region and most of these are powered by turbines. The first leg of our journey from Nairobi to South Sudan was flown in a Beech 1900. After that we flew in the most common workhorse for transporting passengers and all manner of freight, the Cessna 208 Caravan. Many of these airplanes had seen service with FedEx before finding their way to Africa. Buffalos, Twin-Otters and Dornier STOL light transport aircraft are often seen working out of dusty sand strips, and I noticed lots of abandoned DC-3's, Convair variations and other unidentifiable planes sitting around strips we visited. A twin engined turbo-prop Czechoslovakian plane called a Let (looks like a Dash 8) seems to be popular and on more than one occasion Let pilots told me the engines are "loose" and perform better in the dirt environment then a Pratt and Whitney.

The Let sees service in several variations and I have heard that the Walther 750shp turbines which power the Let are sent to North America for homebuilt and other uses when they are time-expired.

Many ex-patriot Antonov heavy transports from eastern block countries come and go from the UN depots

The ends of airstrips are scattered with airframe remains from the victims of density altitude and over-load

for food drops to South Sudan and Uganda. Most of these planes are staged from a remote airstrip at Lochichokeo, on the border of Kenya. This is considered a war-zone and much armament abounds and photos are forbidden. It was there that I met an American missionary pilot putting a cylinder assembly on the Cessna 206 he was flying. As we visited he told me it was almost impossible to get a-gas for the piston-engine planes and how he hoarded all he could stock-pile in drums at his home. The ends of airstrips are scattered with airframe remains from the victims of density altitude and over-load. Mode C is required everywhere and it is important to know what hill tops to stay away from to avoid small arms fire. Quite often a circuitous route must be taken to remain clear of hazardous air-space. One of the pilots I met was British and had purchased a BAe Hawker 748 twin-engine turbo-prop for cash from the Syrian Air Force and was busy making a living flying freight into South Sudan. During my time in Africa until I returned to Canada on February 15th, I got a good bit of right-seat time in Caravans and an offer of employment on the Hawker.

Through our time in South Sudan we lived and worked building the Canada School with the former child-soldiers and became great friends as we learned about one another. We ate lentils, rice, beans and boiled goat all cooked over a fire, three times a day. I still can not look at a bowl of lentils.

We had a 45 gallon drum filled with water each day to wash from and one broken toilet with no running water for 12 people, and no electricity unless the mission generator was run at night to charge radio batteries. The land is near the equator and is hot and incredibly dusty. Water is always in poor supply and the worst drinking water we tested showed 3500ppm E.Coli. In Canada 35ppm is recognized as unacceptable.

The local drinking water tested 2300 ppm before it was boiled over a fire. Each of us eventually became sick and the young Slovakian physician working with a group similar to Doctors Without Borders at the mis-

The land is near the equator and is hot and incredibly dusty

sion told us to eat no food for two days and he could give us medication and clear the illness up in 7 days or let it run its' course and be better in one week and hopefully build some immunity. My friends blamed my sickness on the bugs I had been eating. The children had been eating them and offered some to me which I ate in an effort to fit into the local culture. Other hazards existed in the form of civil unrest and land-mines. Without going into the history of Sudanese conflict I'll just tell you that several different factions vie for power -- the Arabs Militia called Janjaweed and the LRA (Lord's Resistance Army) prey on the residents of many regions. The night we arrived an attack by one of these groups shot-up and burned a portion of the local market and the buildings we stayed in also showed the effects of bomb damage.

The plans for the school called for two buildings, 100 ft. by 28 ft., each with four classrooms.All the cement was trucked in months in advance and the structural steel and hand tools were flown in on the Hawker 748. The tools all arrived with no handles so we cut tree branches and shaped them into handles. We dug all the trenches for the footings and installed hundreds of feet of re-bar. The corner posts and upright supports were cemented and bolted into place, using a laser level we brought from Canada at night to do the alignment. The side walls and partitions were built of brick made on site with cement and a hand operated brick making machine which we took in with other school supplies on the '748. Our plans for completing the school proved to be overly optimistic as we met some daunting logistical problems slowing our progress. We adapted, however, and working with about 25 '"helpers" much was accomplished. The former child-

The former child-soldiers continued to work on the project after we left

soldiers continued to work on the project after we left, under the guidance of John Olut Abeno, the Nairobi who manufactured and supplied the school's steel structure. John and I had shared a room at the mission during my stay.

This was indeed the trip of a lifetime, although not much like working on a construction job in Canada. One day I was approached at the site by a young man carrying a gun who suggested that I needed to give him some money so I would be safe. Using a steel bar I drew a map in the sand showing North America and London on one side and Africa and Sudan on the other and told him I had paid to fly to Sudan, had taken time from my job and family and was working there for free. "You pay me," I countered. He thought about it for a minute, then said: "No, we can be even." Then we were buddies and he even handed over his AK47 and we had our picture taken together. I believe him offering me the gun was quite a display of trust.

I am so thankful to have had the opportunity to go and help the people of South South Sudan. Thank you to all my friends in the RAA for your help and support.

I was a Pan Am 727 Flight Engineer waiting for start clearance in Munich, Germany. I was listening to the radio since I was the junior crew member.

This was the conversation I overheard: (I don't recall call signs any longer)

Lufthansa: (In German) "Ground, what is our start clearance time?"

Ground: (In English) "If you want an answer you must speak English."

Luft: (In English) "I am a German, flying a German airplane, in Germany. Why must I speak English?"

Beautiful English Accent: (before ground could answer) "Because you lost the bloody war!"

Fun with SR-71's: Los Angeles Center reported receiving a request for clearance to FL 600 (60,000 ft). The incredulous controller, with some disdain in his voice, asked, "How do you plan to get up to 60,000 feet?

The pilot (obviously an SR-71 driver), responded, "We don't plan to go up to it, we plan to go down to it."

He was cleared.

The pilot was sitting in his seat and pulled out a .38 revolver. He placed it on top of the instrument panel, and then asked the navigator, "Do you know what I use this for?"

The navigator replied timidly, "No, what's it for?"

The pilot responded, "I use this on navigators who get me lost!"

The navigator proceeded to pull out a .45 and place it on his chart table.

The pilot asked, "What's that for?"

"To be honest sir," the navigator replied, "I'll know we're lost before you will."

2006 RAA Annual General Meeting

RAA AGM May 13 2006, Welland Ontario, Minutes by Ed Melanson

34 members in attendance

Meeting called to order at 1:00 pm

Gary Wolf called the meeting to order, followed by an opening address and introductions. Gary called for volunteers to help in the operation of RAA. A brief address was given on the Builder's manual, and weight and balance and availability of RAA scales were discussed. RAA chapter liability insurance and the benefits of technical seminars were discussed.

Treasurer Wayne Hadath presented the 2005 financial report with a comparison to the 2004 year. Questions were brought forth and discussed, among them charitable status of the RAA. The work on this area is moving slowly. Trillium Foundation funding was discussed but this is not available to a national organization. Cost of liability insurance was discussed. Frank Ball of Flamboro made the motion to accept the report. Ron Fleet of Hanover seconded the motion. All in favour, the motion was passed.

Motion to affirm the affairs of the organization for 2005, made by Gary Wolf

Motion seconded by Ron Turnbull of Niagara.

Brief discussion.

All in favour, the motion was passed.

Webmaster's report was presented by Frank Noordhuis. A new email forum is in the works. This will be a secure system for National members only, and will support photographs, and video and audio files.

Quebec Regional Director Ray Fiset gave an update on activities in the Province of Quebec. Ray encouraged all to attend the Faucheurs fly-in at Sherbrooke on July 1st and 2nd.

BC Coastal Regional Director Terry Wilshire gave an update on activities in his area. RAA is alive and well in BC. Terry has recently become the Regional Director so he has plans to contact all chapters during this year and will being a complete report for the 2007 AGM.

Southwestern Ontario Regional Director Tom Martin of St. Thomas was recently appointed to the position. Tom introduced himself to the members and said that he has now built seven amateur-built aircraft, the most recent being a taper-wing Rocket Evo which passed its final inspection the day before the AGM.

Question and Answer period followed. Gary Wolf was asked about the status of Advanced Ultralight and Owner Maintenance in light of recent Transport Canada meetings. Gary recommended that members not put

Left: the ubiquitious Ray Fiset attended the AGM. Ray's involvment with the RAA has been immense.
Below, New RAA-BC Rep (and notorious Spitfire lover) Terry Wilshire chats with President Gary Wolf and Ed Russell.

their certified aircraft into this category because the US will not allow them across the border any longer. Advanced ultralights could come under greater scrutiny as Transport makes changes to incorporate Light Sport into Canadian regulations.

The availability of the Builder's Manual was discussed, and it was announced that the revision was currently on hold, because the member who had been handling this ran into health problems. Gary asked for a volunteer to take this over. At the end of the meeting Wayne Hadath and Tom Martin offered to handle the revision. Both are very familiar with the amateur-built regulations and the Inspection process.

The Young Eagle programme was brought up when a member asked if the RAA chapter liability could be expanded to include these flights. Gary agreed to ask our insurer if this could be accomplished.

Gary asked for a member to become the salesperson for display ads in the Recreational Flyer magazine. No volunteers for this position.

Peter Van Caulart asked about donations to RAA Canada and offered three Subaru engines and all of his manuals. Henri Boisvert of Quebec immediately bought one of the engines and donated the $200 to RAA Canada.

Motion to adjourn made by Gary Wolf

Motion seconded by Bill Reed of Ottawa

All in favour, motion passed and meeting adjourned at 2:30 pm.

Ed Ru

RAA Niagara's invitation to RAA National Annual General Meeting started with a story about an aircraft enthusiast with an extra ordinary goal.

Ed Russell.

Ed as young man was an air cadet with the Squadron in Welland, and ever since then he wanted his own aircraft. As did so many others, he liked the Spitfire, it's shape and sleek lines and it's success in the services.

Being an architect one gets busy with one project after the next and over the years not much time was spend on aviation. After a winning a lengthy court battle with Walt Disney over design rights, the possibility to fulfill a long time dream was made possible: a Spitfire had come for sale in Great Britain,

Top Left: The April 22-23 Tiger Boys advanced level fabric seminar was another successful RAA-sponsored tech event. Below, Walter Wiegels and Niagara President Len Petterson chat while Alf McEwen handled the barbecue chores.

ssell's Collection

and Ed tried to purchase the plane.

Some folks over there were reluctant to let it leave the country, as they consider it a historical artifact. For Ed obstacles are to be overcome and Ed now has the Spitfire.

In the war years pilots were trained in Harvards, and Ed needed training, so a "trainer" was purchased. Those two aircraft needed a home, a WW2 airdrome is preferred and the airfield on Sodom Road was available and is now home of the "Spit" and the Harvard.

One day a friend calls with a message about a Hawker Hurricane for sale in California. The interest was raised in Ed who was going to California on business shortly thereafter. During negotiation to purchase the Hurricane it's owner mentioned he had another aircraft for sale as well.

What is it? Came the reply to Ed: A ME 109, the only flyable German built one.

Ed bought both.

Today we can see all four aircraft here in Niagara and we were delighted to see them in conjunction with RAA's Annual Meeting.

Time to visit the Russell Collection was from 9.30 to 11.30.

Many of us don't have the opportunity to visit here in Niagara too often, and RAA Niagara wanted to give something special to visitors to remember, so we arranged for a visit.

An aerial display was planned for June 9 - 10 - 11 and guest aircraft were invited to attend as well - more warbirds off course! Fran and Ed would not have had it any other way.

***-Lennart "Len" Petterson, President RAA Niagara*.**

Introducing New BC Rep
Terry Wilshire

Born in Chester U.K. in 1942, Terry's family moved to South London at the end of WW2.

He graduated from The John Fisher Public School in 1958 with a General Certificate of Education (GCE).

In 1959 applied for a short service commission in the Fleet Air Arm as pilot, and was offered rotary option but declined.

He then commenced a varied career as office clerk, gas jockey, door to door Kleen-E-Z brush salesman, merchant seaman, construction laborer, iron worker and rough carpenter (very rough).

Arriving in Canada with his wife to be, Gillian, in late 1965, he worked over the Christmas period as a waiter on the CN railway and then joined H A Simons as trainee draftsman in early 1966 and commenced at BCIT, fall semester,

graduating Civil and Structural Engineering in 1968 and commencing a career in industrial construction management working in western Canada, the U.S. and the far east.

Terry obtained his Private Pilot rating in 1973 and began construction of his Spitfire replica project in 1987, completing it in 1996. He founded Industrial Laser Cutting Ltd., Delta, B.C. in 1991 and sold the company in 2004.

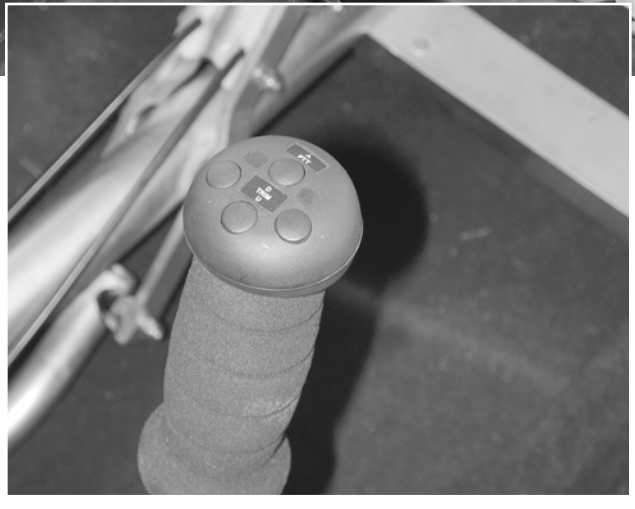
He is the owner and President of Tally-Ho Enterprises, preparing and marketing Spitfire replica drawing packages.

He is presently the Chairman, Delta Heritage Airpark operations committee, Vice Chair, Recreational Aircraft Association, Chapter 85. In 2005, he was appointed Regional Director, B.C. Mainland, Recreational Aircraft Association Canada, and in 2006, elected Regional Director, B.C./Yukon, Canadian Owners and Pilots Association (COPA).

He is a recipient of the 1995 COPA "Good Show" award for working to save the Delta Heritage Airpark and a recipient of the RAAC "Howard Bexon Memorial Award", 1998 for contributions to Western Canada Recreational Aviation.

Below: Terry Wilshire and Don Dutton in front of Ed Russell's Spitfire. Terry has built an 80% replica, and refers to this one as a "125% scale replica" of his Tally-Ho Spitfire. Thirty RAA members viewed Ed Russell's warbird collection in the morning before the AGM. Bottom, the attendees gather around the Spitfire to talk (what else?) about airplanes, days gone by and days to come.

Get A Grip



One only has to thumb through the pages of an Aircraft Spruce catalogue to realize that there are many aftermarket stick grips offered to the recreational aviator. The writer has a particular concern with any style of stick grip that offers flush or slightly raised momentary contact button switches on the upper face. These switches are often advertised for trim systems but can also be used to actuate radios, flaps etc.

Last summer the SeaRey community lost a good friend, Doug Rogerson, at the Oshawa Canadian Aviation Expo. Although the cause of that accident is still under TSB investigation the writer has good reason to believe that the RAC G205 stick grip, as installed in C-GCWR, may have contributed to the accident.

Many SeaRey builders have installed similar stick grips on their control columns and/or throttle. These builders invariably use the fore and aft slightly raised buttons for horizontal stab trim and, in the case of Doug's SeaRey, the left and right buttons for electric flap. The writer has flown C-GCWR and three other SeaReys that use this or similar stick grips. Unfortunately the slightly raised buttons provide little tactile sensation if accidentally touched by the palm and take very little pressure to activate. Invariably the trim or flap gets moved without the intent or knowledge of the pilot. The problem was serious enough to prompt the installation of button guards (slices of Tygon tubing superglued to the stick grips.) These ring guards did not remain in place and C-GCWR had its flaps up at the accident site.

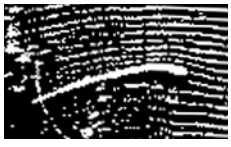
When the builder considers using control column or throttle mounted switches to actuate features that could compromise the safety of flight, care should be exercised in choosing switches that can be easily differentiated, provide a tactile sensation when touched and some resistance or feedback when operated. It is the writer's opinion these RAC grips should not be used for flap or trim switches unless modified by the user or the manufacturer to include a permanent ring type guard over each button. Alternatively, there are grips such as the RAC G300 series that provide the tactile feedback missing in the G200 series. RAA

John Dunlop
Canadian Light Amphibians

LIFT FOR THE LAYMAN

by Chuck Jersch

I don't think there is any topic more controversial than how or what makes an airplane fly.



It is explained in detail, in the book "Theory of Wing Sections" by Ira H Abbot and Albert E Von Doenhoff. Mr. Abbot was director of aeronautical and space research, National Aeronautics and Space Administration (NASA) and Albert E Von Doenhoff was a NASA research engineer. They were responsible for the design and testing of all the airfoils designated NACA (National Advisory Committee for Aeronautics) now NASA. Their book is a composite of mathematical calculations and wind tunnel test results of various airfoils. Almost every aerodynamist will refer you to this book as a revelation as to how airfoils function. Only one catch: this book assumes that you have a firm grasp of related physics and much more than a cursory understanding of mathematics.

I would like to bring the understanding of flight to the level of a high school student or a lay person.

I am very much aware that Newtons first law of physics will prevail – for every action there is equal and opposite criticism, but anyway, here goes.

ATMOSPHERIC PRESSURE

Before you can begin to understand 'lift' you have to have a firm understanding of atmospheric pressure.

Lets start off with water pressure. Take a submarine and submerse it to 10 feet below the surface. The water is going to exert a pressure on all parts of the submarine of 624 pounds per square foot (psf) because water weighs 62.4 pounds per cubic foot. We have 10 cubic feet of water stacked one on top of the other pushing or pressing down on the top of the submarine. By the same token, Newton's Law claims an equal and opposite force pushing up on the bottom of the sub. If we go down to 100 feet, the pressure will increase to 6240 psf, or if we go down to 1000 feet the pressure trying to collapse the sub will be 62,400 psf. The ocean is 5 to 6 miles deep so I will leave it to you to calculate the pressure down there.

Now let's turn to atmospheric pressure. We are actually 'bottom feeders' in an ocean of air. We have about 100 miles of air above us pushing down on us, putting a pressure of 14.7 pounds per square inch (psi) or 2116.8 pounds per square foot (psf) on us at sea level which is generally accepted as the bottom of our ocean of air. The Dead Sea is actually over 1300 feet below sea level but lets not confuse the issue.

Unfortunately we cannot calculate atmospheric pressure as we did water pressure because air is compressible and expands and contracts when heated or cooled. Air at sea level on a standard day weighs .0765 pounds per cubic foot. A standard day is 59 degrees Fahrenheit, with a barometer reading of 29.92 inches of mercury.

In other words, if we take one cubic foot of air and place it on top of another cubic foot of air you won't have two cubic feet of air because the weight of the cubic foot of air on top will slightly compress the one below and you will no longer have two cubic feet of air. This may seem insignificant at two cubic feet, but at 100,000 feet altitude atmospheric pressure is reduced to about decimal .15 psi. At 50,000 feet, pressure increases to about 1.7 psi. At 25,000 feet, it is about 5.5 psi and at 10,000 feet it is about 10 psi.

Air also expands when heated, making hotter air lighter per cubic foot than cooler air. Water does expand a little, enough that early cars and tractors used thermo siphoning to circulate the water for cooling, but water expansion is negligible when compared to that of air.

It is this expansion of air that causes hot air balloons to fly. The air in the envelope of the balloon is heated, causing it to rise to the top, replacing heavier air that escapes out of the bottom. The balloon soon starts to rise like a cork would if it were released under water.

Let's have a look at pressure. The atmospheric pressure as previously stated is 14.7 psi. We will take a portable air tank and open the valve until all the air is gone. Most people would say that we have no air pressure, but we actually have 14.7 psi. If we were to close the valve and take the laser powered space elevator that was featured in Popular Mechanics, to 100 miles up, the gauge would now read 14.7 psi. We open the valve and sure enough we hear the air hissing out. Lets close the valve now and take the elevator back down to sea level. Now we will hook up our tank to a tube that has been placed in a bowl of mercury. We open the valve and we see atmospheric pressure push the mercury up the tube to 29.92 inches. Now we know why purists say that there is no such thing as a vacuum. We can only go down to zero psi of atmospheric pressure.

Before I leave atmospheric pressure and turn to lift, let's take a quick look at pumps.

In another life, I was very involved with water pumps of all varieties. My favorites were referred to as self-priming centrifugal pumps. To prime them, you simply filled the impeller chamber with water, attach the suction hose (inlet hose to purists), the outlet hose, and plug it in or start it up. In a few seconds or a few minutes, depending on how far below the pump the water was, the flow would begin.

Occasionally a pump didn't work, and I was the one who had to find out why. My first test was to prime the pump and insert a plug with a vacuum gauge into the suction port. For every inch of mercury that the pump would pull on the gauge, the pump would lift 1.13 feet of water. In other words, if the pump would pull 25 inches of mercury it would self prime to just over 28 feet of water. If it didn't, it meant that either the inlet hose was plugged or had an air leak.

Finally, let us take the perfect pump, (believe me there is not one but lets assume that we have one). It will pull a full 29.92 inches of mercury. That means that it will lift water 29.92 x 1.13 = 33.81 feet. Lets assume that we have a well 50 feet deep. The water fills the well to 10 feet from the surface. The well has a recovery rate of 5 gals a minute and is 10 inches in diameter. The pump will move 10,000 gallons per hour. With 50 feet of inlet hose, how long will it take to empty the well? The answer is we can't, but do try the math, as it's a fun question. As soon as the water level in the well reaches 33.81 feet below the inlet to the pump, the pump can no longer lift the water. Why?

Just as zero pressure can lift mercury 29.92 inches, zero pressure in the inlet hose can lift water 33.81 feet. Because we are not actually sucking or pulling the water, we are reducing the pressure in the suction hose and the 14.7-psi atmospheric pressure is pushing the water or mercury into the low-pressure area.

We would often pump water from a higher elevation to a lower elevation using a pump to pump the water up and over the bank. Once the flow had been established we could shut off the pump and let gravity be the motor driving what now became our siphon. The water would continue to flow until stopped by closing a valve or allowing atmospheric pressure into the lines. Incidentally in most cases the, shall I say suction or atmospheric pressure was so great that it was impossible to disconnect the hoses while the water was siphoning. Just as an aside, when siphoning water, the maximum height the siphon hose will lift the water is about 30 feet at sea level and correspondingly less when at higher altitudes. OK enough about the power of a differential in atmospheric pressure

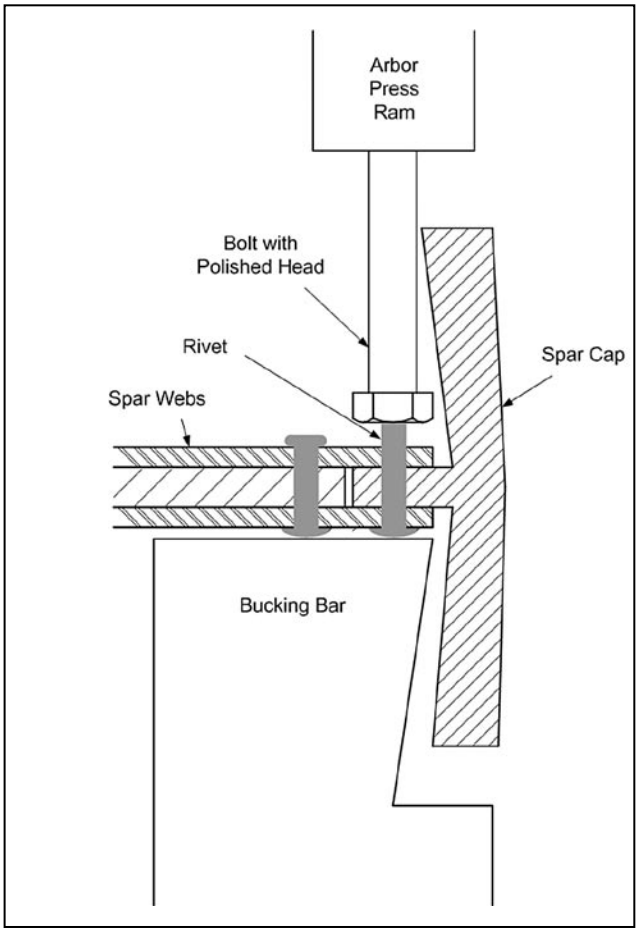
Similar things are happening when we fly. We look at the isobars on the weather map and we know that the wind is going to move from the high-pressure area to the low-pressure area and if those isobars are too close together, we could be looking at a hurricane. RAA

Next issue: looking at the wing.

Chuck Jersch lives in Vernon, BC.

Riveting Exp

by Graham Luckhurst



ONE OF THE REASONS I CHOSE THE SONEX is its aluminum construction simplified by the majority use of pulled rivets. As a novice to aircraft construction, this choice of simpler construction gave me confidence that I might actually have a chance of succeeding. Unfortunately, I was still faced with a 'riveting' challenge, as the Sonex kit requires assembly of the spars using 5/32 solid rivets. The spar caps have an interestingly shaped extruded aluminum section that does not make it easy for these large rivets to be set using regularly available tools. Sonex recommends use of a bucking bar they supply, a 1⁄2" hex head bolt and a 2lb hammer. The rivet is set with 2 or 3 'bold' strikes to the bolt. I procured their custom bucking bar and I do own a 2lb hammer, which I have typically used in some sort of demolition around the house. Sonex wisely recommend you follow their plans exactly and treat each part as if it were jewelry. However, I had trouble with the concept of using a 2lb hammer on what will become one the most structurally important parts of my aircraft. One slip up and I would have a mighty dent! Touring my local hardware store, I spotted a 1 ton arbor press at a reasonable price and realized it had potential if I were to mount the hex head bolt into a suitable threaded hole in the end of the ram. I spoke with Gary Wolf about this concept and he was very skeptical about the strength of the 1 ton press. However, I persisted with the idea as that 2lb hammer still seemed more like a wrecking ball than a tool for creation. As I started to experiment I soon found out that I needed to extend the arm of the press from 1' to 3' to accommodate my 'desk jockey' physique. A rough estimate of the force I was using and a 40:1 mechanical advantage indicated I was applying about 4000-5000lbs to get these 5/32" rivets adequately squished. Gary was right; these forces were somewhat beyond my 1 ton presses specs. Again, I was faced with potential destruction in this riveting process, though this little press did show potential for the idea. A bigger press was needed. No luck with the local second hand stores, I looked for something new. It surprised me to find a 3 ton press for $150 from an Ontario distributor. This looked like it would do the job and was worth further investment. Again I mounted the hex head

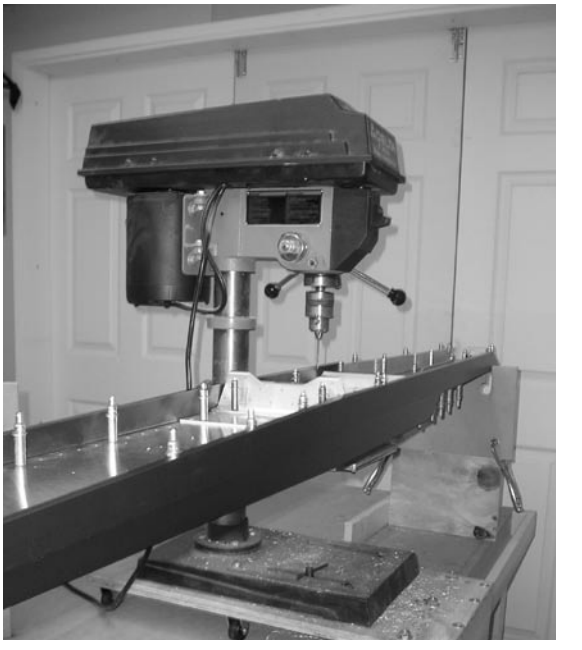
Top: The trolley for the drill press was guided by bearings running in a channel on the edge of my bench. Note the piece of wood going under the rail to prevent the drill tipping over. Also note the block at the end of the channel preventing the trolley running off the bench

perience

bolt in the ram, though I used a 3/8" bolt to allow me to get into some tight spots more easily. Dan Adema, a knowledgable mechanical engineer from work helped me in the machining process to get the bolt and bucking bar accurately mounted. (It's always handy to know the right people.) Dan pointed out that I should use the right hardness for the bolt, which can be identified by 3 or 5 radial 'tick' marks located on the hex head, which of course I filed and polished off to ensure the integrity of the formed rivet. This setup worked great, and it's totally quiet! The diagram shows the basic setup.

Allowing the arm to slide allows me to push it back where its weight will hold up the ram while I position the work piece and rivet. The arm can be slide forward where its weight is then used to apply a light pressure to the rivet while I perform a hands free inspection to ensure everything is square and lined up, prior to the big squish. Getting the rivets properly set is reliably done by feel. Actually, the rivets almost establish the correct set themselves, as the applied force rapidly increases beyond my ability to apply pressure as the formed head reaches the right size. Most of my rivets are perfectly round and within about 0.010" diameter and height of one another. To ensure this consistency, my initial experimentation showed that it is vital to have the bolt, rivet and therefore holes as close to perpendicular as possible to the spar surface being riveted. The spar also needs to be maintained square and stable which was achieved with some simple wooden stands. My drill press was the right tool to ensure the hole consistency, however, the Sonex spars are 12 1⁄2', my work shop is 17 1⁄2' and I would be up and down that spar many times drilling pilot and finished holes. Since my drill press was fairly small, I decided to mount it on a small trolley guided by bearings running in a channel mounted on the edge of my bench. Again, this worked well, saving me a lot of time over having to reposition and secure the drill or finding supports for the spar as it hangs off the bench and out the work shop door. The arbor press was too heavy and the forces too great to also put on the trolley, so I was forced to fuss with regularly reconfiguring my setup. I also found a use for that little 1 ton press, as it made an excellent dimpling tool for the spar webs where they mount to one another. I secured one dimple die in a hole drilled into the hex head bolt and the other in a hole drilled into a piece of hard wood. Again, 'feel' could be used to ensure a correctly formed dimple.

Sonex use round head solid rivets in their design. Since the bucking bar has a flat surface, this riveting technique results in some flattening of the rounded head which would normally be considered unacceptable. The Sonex instruction manual clearly documents this flattening will occur and is not an



From the top down: The drill trolley also proved very useful during the riveting process. Using it as a movable rest allowed repositioning the spar while standing at the press without having to pick up the whole spar up

-The trolley for the drill press was guided by bearings running in a channel on the edge of my bench. Note the piece of wood going under the rail to prevent the drill tipping over. Also note the block at the end of the channel preventing the trolley running off the bench

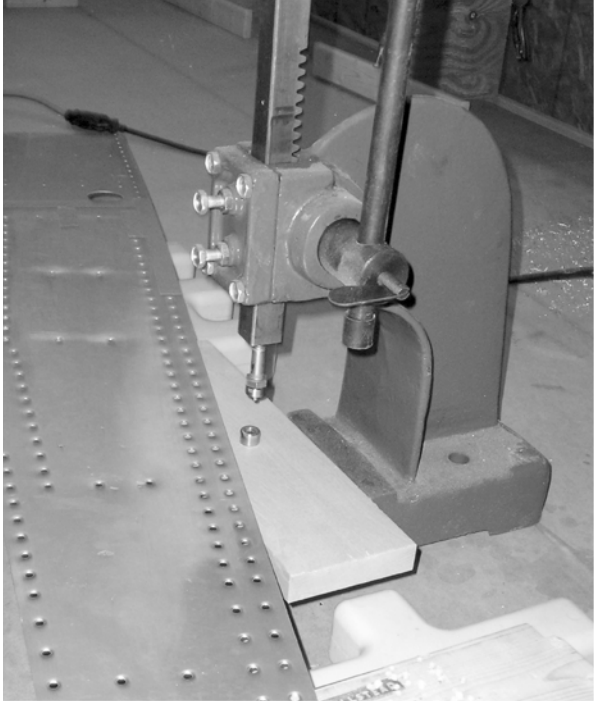
-Allowing the extended arbor press arm to slide let me push it back and rest against a simple wood block stop, keeping the ram elevated while I set up for the next rivet.

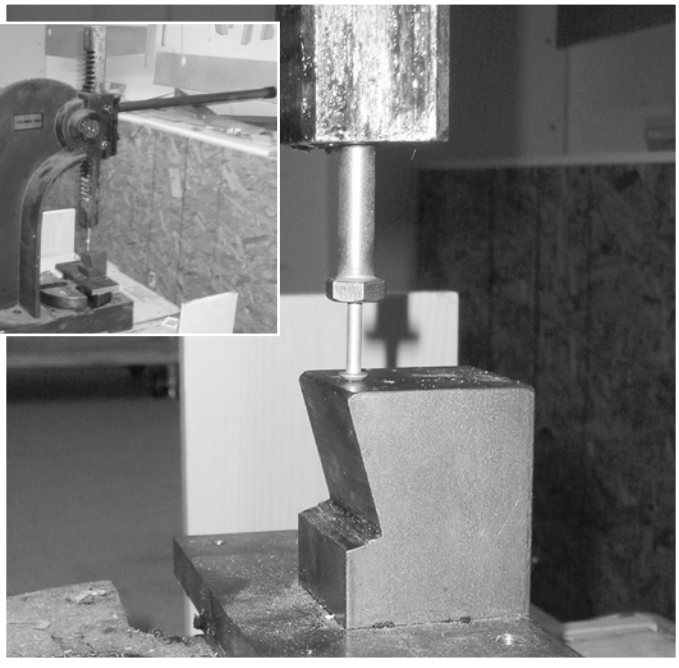
issue. Bob Buchanan, my MD-RA inspector, though first concerned, read the statement and indicated the flattening would be acceptable as the designer must have taken the strength of the flattened heads into consideration during the design.

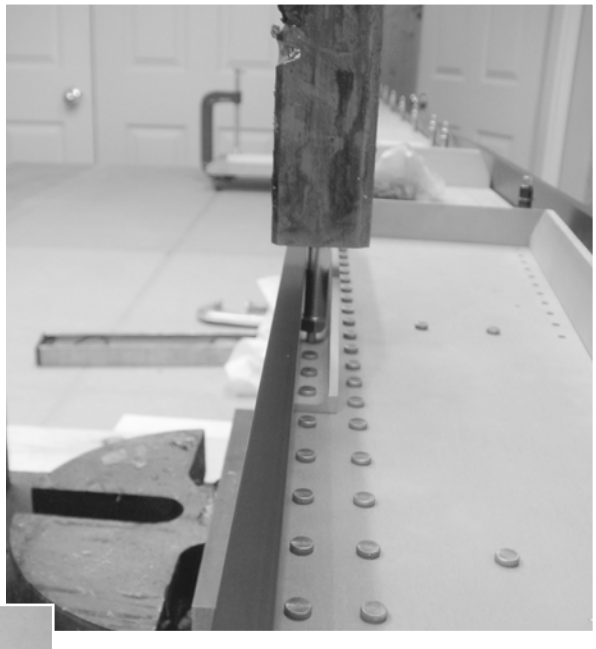
A rivet gun and suitable offset rivet set probably could have been used with a lot of practice, patience and care. You RV folk have my respect! However, a good tool would have set me back about twice my investment, excluding the 1 ton press experiment, and is only needed for the spars.

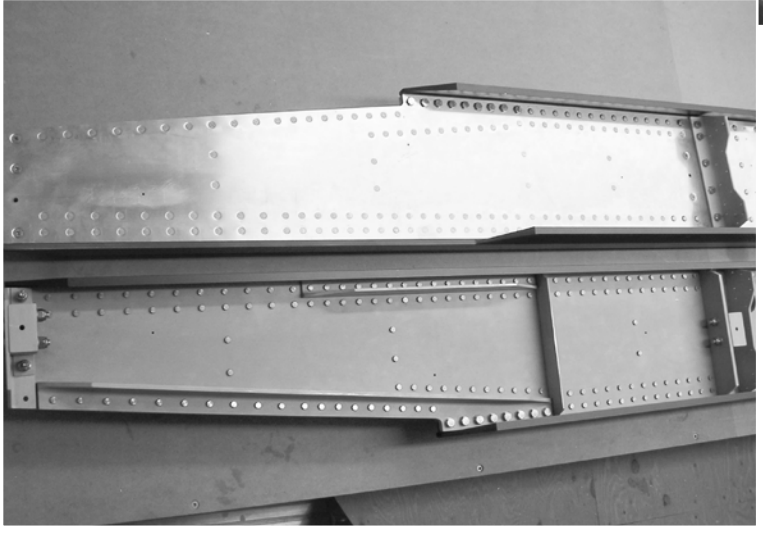
Having your own ideas is great, but access to true experts and good customer support is invaluable. I feel lucky being close to an excellent RAA chapter like Kitchener's. I have a long way to go and much to learn. Hopefully as I gain experience, I can begin to contribute more to RAA and its members.

Graham Luckhurst is a member of KW-RAA and an avid Sonex builder.









Left top with inset: Using the arbor press arm's weight to apply light pressure to the rivet, which would normally be in the spar, made it much easier to check everything was aligned and in position before the big squish.

Left: The finished left and right spar ends where they eventually get bolted together. This picture shows the full range of riveting required to complete the Sonex spar.

Top right: The one ton press I first experimented with proved useful for dimpling

Above: This was the tightest spot requiring riveting. The shank of the 3/8" bolt just fit and I had to file down the head to prevent damage to the inner radius of the part

Across Canada

RAA Chapters in Action / by Don Dutton

Chapter President Jim Morrison presents a donation to the Major Dale Bliss, CO of the Chadburn Air Cadet Squadron

OSHAWA

Members of the Oshawa District chapter kicked off a fund raising drive with a substantial donation to the Chadburn Air Cadet Squadron to finance their exchange visit with cadets in Britain. Chapter President Jim Morrison presented a cheque to Major Dale Bliss, commanding officer of the air cadet squadron which draws members from the Oshawa-Whitby area. Morrison said the RAA appreciates the contribution the cadets make in the community and particularly for their assistance at the chapter's annual Barnyard Fly-In each September -- this year on Sept. 10 at HawkeField near Orono. Twelve cadets, under the command of Capt. Mario Puglisevich, will be selected for the trip. They are scheduled to fly to England on Aug. 25 and will be based for the 10 day visit with the City of Wells Air Training Camps Squadron in Somerset. Side trips will include the RAF Museum, The Imperial War Museum and the popular sights of London.

TORONTO REGION

For builders of aluminum aircraft the disposal of the toxic waste from the Alodining process, regularly used for protection against corrosion, can be a serious problem, writes member Mark Rataj in Up There, this chapter's newsletter. But a new method of applying the Alodine, the chromic acid that chemically oxidizes aluminum to give it extra resistance to corrosion, has been developed by Henkel Corporation and is available through their Canadian office in Mississauga, Rataj said. The Henkel method cuts down the number of process steps and does not leave the builder with gallons of toxic material for disposal. Once the parts are cleaned and abraded the Alodine is applied using the Henkel Touch-N-Prep pen – which resembles a highlighter pen – and then allowed to dry. That's it. The one drawback is that the company sells the pens only in boxes of 12 although he has found that single pens are available through some U.S. distributors but at a substantially higher price. He bought a dozen and is selling off his surplus pens to other builders at cost.

RAA SCARBOROUGH/MARKHAM

The unexpected offer of a flight in one of the latest composite Advanced Ultralights was a one chapter director Helmut Bayer couldn't refuse. Bayer wasn't expecting to go flying while visiting at Buttonville Airport when two of the CT Flight Design planes from Trillium Sports, flown by Tom Reavell and Jim Donnelly dropped in. The CT was proven for it's long distance ability, having crossed the

Atlantic on a flight from Germany to Canada last June and a month later Ernst Schneider, the Canadian distributor, flew one from Greenbank (north-east of Toronto) to Invermere, B.C. in one day. Bayer said he accepted the offer of a flight quickly, not even taking time for pen and paper to take notes, and it was "an outstanding experience" he recalled later. These CT's, designed in Germany and built in the Ukraine with final assembly in London, ON, are powered by 100 hp Rotax 912S engines although models with 80 hp Rotax are also available. One had an in-flight adjustable prop, two axis auto pilot, glass cockpit and wheel pants and the other was on wheel-skis. But it was the CT's performance and handling that impressed Bayer. Climb out was 1200 fpm, cruise was about 115 kts. and it wouldn't stall, he said. Once the air speed dropped to 20 kts. it began to loose height – "just mushing down. It would take time to adjust to the habits of this slippery little bird, but what an exciting adjustment."

The chapter reports the death of Alan Trail, a life member and a friend of many members over a long period of time. He built and flew a Zenith CH250.

FLAMBOROUGH CHAPTER

Many members find books on the World War II exploits of RCAF members make interesting readings but it is even more interesting when the subject of some of those books is a long time member of your RAA chapter, notes Flamborough newsletter editor Frank Ball.. The exploits of a "very young" Austin McManamy and his crew members, who flew in Short Sunderlands on anti-submarine patrols over the North Atlantic, is featured in the photos and books of RCAF 422 Squadron. For links to this historical collection of information log on to http://www,georgian.net/422sqdrrn/422mcnan.htm

They may have been accused of "voting with their stomach" as the chapter approved a motion to make long time member Ivan Nichol an Honorary Member. No one can recall the many times and tremendous effort Ivan put into chapter barbecues, breakfasts and special events, members were told before bestowing the honor on him with a unanimous vote.

On a sad note, chapter members were told of the death following a short illness of Jack Gibson.

RAA VANCOUVER

It makes it all the more interesting when the author of a popular aviation book on pioneer bush flying is "by a writer in our own back yard," notes a review in this chapter's news letter, the Turn and Bank. Rex Terpening, and aircraft engineer in the 1930's, kept a stubby pencil and a camera in his tool box – making notes in his journal and takng photos that helped him recall what life was like for those who flew into uncharted areas of the North West Territories, Alberta and BC. The book, Bent Props and Blow Pots, recalls the winter flights in Fairchild 71, Fairchild FC-2w-2, Junkers and Norseman aircraft, erecting engine tents in the bitter cold, draining engine oil into pails which he would hang with steel hooks off the exhaust collector ring. In the morning he would heat the oil and the engine using blow pots. He tells of the characters he met on the flights to outposts to pick up passengers or drop off supplies, of the friends he made and sometimes searched for, of wilderness repairs to a propeller and sewing up the fabric on the belly of a plane ripped open by a willow branch. Terpening is now a resident of White Rock. His book is available at Chapters.

Voices all tend to sound so much alike through headphones and intercoms that you sometimes can't tell if what you're hearing is coming from your own aircraft or someone else's, as the following conversation shows all too well.

In this case, a helicopter was in a holding pattern at an altitude of 3000 feet over the Cubla beacon, which is an electronic navigation aid.

Helicopter pilot to Approach Control: "Affirmative, I'm holding at 3000 feet over Cubla beacon."

Second voice, also on the same frequency: "NO! You can't be doing that! I'm holding over that same beacon and at the same altitude, too!"

Brief pause, then the first pilot's voice again (loudly): "You idiot, you're my co-pilot!!"

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

Recreational Aircraft Association

Brampton Airport, RR#1, Cheltenham, ON L0P 1C0
Telephone: 905-838-1357 Fax: 905-838-1359
Member's Toll Free line: 1-800-387-1028
email: raac@inforamp.net

British Sonerai

Brian Hope. brian@jodell.freeserve.co.uk

When I joined the PFA in the mid seventies the Monnett Sonerai was still a new design, the prototype having flown in 1973. Like the slightly later Rand KR2, it moved VW powered aircraft a quantum leap forward in performance, and with it's folding wings seemed to me at the time, to offer a very affordable answer to owning an aeroplane. Though ultimately my circumstances moved me in a different direction, I have always liked the Sonerai, so when the opportunity came my way to buy a project for a reasonable price about a year ago, I decided to take the plunge.

The aircraft in question was built by John Eggleston, and though it has never flown, it was given a Permit to Test in 2003. It subsequently sustained a bent nose leg and broken propeller, and was put into storage.

One of the major issues with this type of aircraft is weight. Just as the KR2's often end up as single seaters because the airframe weight has ballooned, so too with this particular Sonerai. It was 140lbs heavier than the 520lbs of the prototype, an enormous 32% weight penalty that would have seriously impaired its performance.

Fortunately most of the additional weight was not built into the basic structure of the aircraft, and so could be removed. The nose leg and wheel were 161bs, compared to the 51bs of tailspring and wheel that replaced them. Replacing a nicely crafted accessory case, two magnetos, and a starter, ring gear, and huge battery with twin Leburg electronic ignition and an 'X' casting dispensed with another forty pounds. The modified cowlings were 13 Ibs heavier than a new factory cowling (available from Great Plains Aircraft in the States), and more instruments than were necessary, more flooring than necessary, and a heavy paint application also added excess pounds.

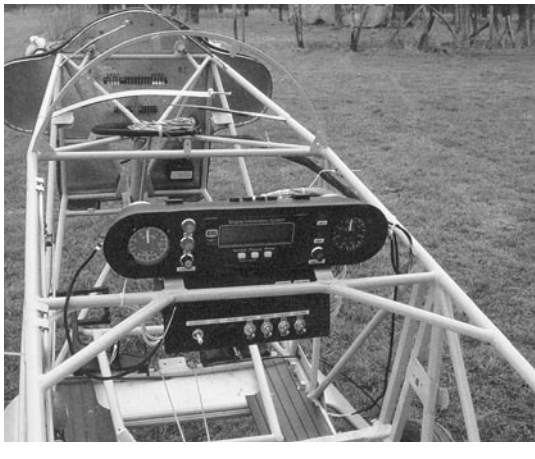
After a slow start due to flying my Jodel rather than building, the project took off in earnest in the late summer. The fuselage was stripped of all paint, a truly laborious job I wouldn't wish on anybody, and then repainted with epoxy primer and grey gloss from Skycraft. By the time that was finished it was too cold to do the fabric work, so I have been fitting out the fuselage.

Though I am doing all I can to keep the weight down, and I'd be happy with 550lbs empty weight, I do not intend operating the aircraft as a two seater. I have therefore fitted an instrument pod where the top of the front (passenger) seat back would normally be, which contains a 2 1/4 inch altimeter and airspeed, plus a Grand Rapids engine information system which will take care of all the engine monitoring requirements. Though the Sonerai is a very simple aeroplane, the EIS and electronic ignition make it electrically quite complex and I am most grateful to a friend of mine, Frank Rothera, who has been taking care of that side of the build. The original instrument panel will contain a compass, fuel sight gauge, and slip ball. A handheld Icom and GPS will complete the instrumen-Vavionic fit.

The engine is a Great Plains 2180cc running a fairly low 7.5:1 compression ratio so that it will run happily on mogas, and a new Chris Lodge propeller awaits fitting. An alternator but no starter is fitted, and carburetion is by conventional Zenith carb, rather than throttle body, in the cause of simplicity.

With practically everything to hand to complete the aircraft I have spent no more than £8000 in total, and I certainly haven't gone for a budget job. The reality is that there are more than a few Europas and RVs flying around with instrument panels that cost more than that, so I reckon it's a good deal.

I hope to finish and fly the Sonerai some time later this year, but with the flying season not too far away, progress is likely to slow down a bit.



Rebo

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Cause

Home-Grown Bushplane

Imagine that you lived in a large country with vast trackless spaces covered in trees and lakes, where most of the population huddles along one edge. Imagine that part of the year all of this space covered in snow, and the rest of the year the lakes thaw and teem with fish. It seems to have occurred to many of our members that this is exactly what we have in Canada, and that a Murphy Rebel is the perfect bushplane for exploring this country. Most of the members who responded for this article keep their Rebels on floats in the summer and skis during the winter, and use wheels only briefly between times.

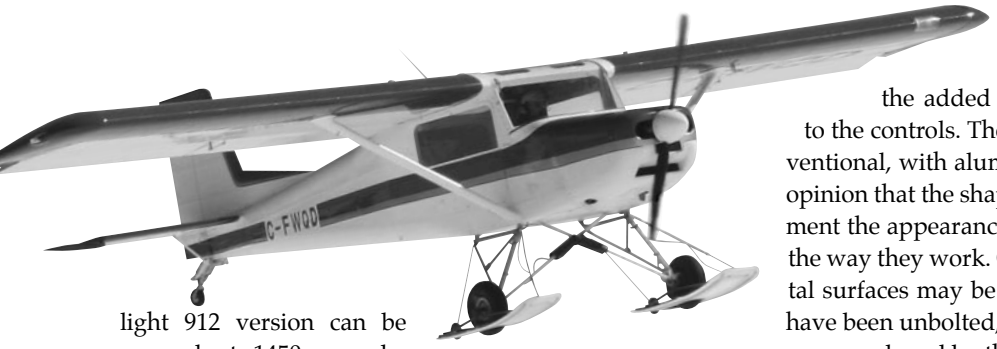
The Murphy Rebel pedigree goes back to the 1940's at Downsview Airport where Dehavilland had been building Tiger Moths and Chipmunks, and were looking for a new product. The late Mike Davy told me that management felt that there might be a market for a hundred or so Beavers for which Richard Hiscocks had designed. The Beaver was meant to be an aerial truck that could get in and out of small fields and lakes while carrying an enormous load. Then the Korean War came along, the Beaver proved to be better than anything the Americans had, and the Beaver production went to over 1500 units.

Fast forward to the Eighties, when Darryl Murphy, encouraged by the success of his Renegade ultralight, decided to manufacture an all-metal bushplane for the kit market. He hired Richard Hiscocks to do the engineering, and forty years of Beaver experience resulted in the Rebel, a 6061 aluminum miniature of the Beaver. The heritage is unmistakeable, and the later enlarged Moose variant with its MP-14 radial is the spitting image of the Beaver. Only the fin and rudder shape give a clue that the Moose is not a Beaver. Darryl wanted a roomy all-round bushplane that would work on wheels, skis, or floats, and it had to be metal so that harsh weather would have minimal effect on the airframe. Initially it was designed around the Rotax 912 and the Lycoming O-235, but it was not long before builders wanted to install the O-320 or O-360 for use on amphib floats. Such is strength of the basic Rebel that with only minor modifications, owners have fitted engines from 80 to 200 hp.

The initial impression of the Rebel is that it seems to be a very simple airplane design. This is true but it takes a lot of clever and artful work to design something simple. Complicated is easy, simple is difficult. The payoff is that the Rebel is fairly easy to construct, especially because it is assembled with Avex pulled rivets. The entire airframe is prepunched to pilot hole size to ensure precise alignment of all critical parts without the use of jigs, a big plus for a first-time builder. Members have reported that the build process is very straightforward.

The tailcone is a good example of a well planned design. The cone is constucted of four longerons that are of a generous cross-sectional radius. The four sides that are riveted to these longerons are all the same, and each side has several brake marks down the length to add stiffness without extra weight. Internally the tailcone is braced with a series of bulkheads which are assembled by the builder. Every one of these bulkheads is made from four of the same corner stamping, with different length channel sections riveted in. The builder sets the corners and channels onto the plans and rivets them together. The result is a tailcone that avoids that sharp-cornered "homebuilt" look that so many aluminum aircraft have. And it is strong enough to take the tailwheel loads in a rough field landing.

The cabin of the Rebel is 44" at the elbows, one of the widest in the industry. The floor is nearly dead flat, and with the seats pushed forward it will accommodate two fishermen if they wish to sleep overnight in the plane, rather than become dinner for a bear. The size of the cabin is emphasized by the huge doors, and access is made even easier by a wing with enough torsional rigidity to use only one strut per side. The interior space and payload of the Murphy allow the option of a third seat in the rear for a child or light adult. Alternatively an enormous number of fish may make the ride home from an expedition. Even the



light 912 version can be grossed at 1450 pounds, and with a real world empty weight (on wheels) of 700 pounds, that can mean a lot of fish. With the larger engines, there is enough power, payload, and space to carry even a folding boat and a small outboard. Murphy offers a set of vacuum-formed interior panels for the Rebel, but most of our members prefer to keep their planes as utilitarian and spare as possible.

Interior height of the Rebel cabin is unusually high, with several inches of room above the head of a 6'3" pilot. In most planes "TWITT - the wing is the thing" is true, and especially so in the case of the Rebel. The all-aluminum wing has three spars, but it is not the main spar that has the forward carrythrough in the cabin. Had this been the case the carrythrough would hit the pilot's forehead, so the floor would have to be some 9" lower to provide the same headroom. This would have meant more frontal area, and a Rebel on amphibs would have to use a taller hangar. Instead, the Rebel has close-pitched ribs near the root, and a series of stringers to carry the main spar loads through the .020" skin of the D-cell, and over to the front spar. This means that the forward carrythough is right at the front doorpost, well out of the way of the pilot's head and field of view. The top skin of the cabin is also the top of the wing, and there is no lower skin, leaving all the inside of the centre section open for better headroom. The single lift strut is attached at the front edge of the door and this gives a wide opening angle for unimpeded loading.

Murphy and Hiscocks chose the 4415 airfoil for the Rebel, same as was used on the original Beaver. This 15% spar height provides a good G-rating without excessive weight, and it also means that the wingskins can be lighter. The chord is 60" on all Rebel variations, and the span is 30 ft, for 150 sq. ft. of wing area. Forty-four US gallons of fuel may be carried in the wet wings. Full length flaperons are used on Rebels, and are the only fabric-covered flying surface. Some builders have opted to make these all-metal but the added metal does provide a bit more weight to the controls. The tail surfaces of the Rebel are very conventional, with aluminum spars and skins. Some are of the opinion that the shapes are a bit square, but they do compliment the appearance of the plane. No one complains about the way they work. One unusual feature is that the horizontal surfaces may be folded against the fin. Once the wings have been unbolted, the fuselage may be stored or trailered unencumbered by the width of the stab and elevator.

The controls are by two sticks, with cables for rudder and elevator, and pushrods with rod end bearings for the flaperons. The elevator cables run down the centre of the fuselage floor and are protected by an unobtrusive aluminum hat section. The flaperons, aileron function is actuated through a bellcrank on the left front floor, and a pushrod to a mixer on the cabin,s left side, well out of the way of the crew. The flap function is by a roof-mounted handle and a push-pull cable to the mixer. The result is a cabin uncluttered by cables and pushrods. Other manufacturers could take a lesson from the Murphy layout. Eighteen degrees of flaperon are available in six degree increments, and they can be reflexed five degrees for best cruise speed. Stick forces are light and well balanced.

All Rebels are taildraggers, and the early models had a cub-type bungee gear made from bolted aluminum tubing and gussets. This was accepting of rough field operations but for the heavier engines and gross weights, more was needed. Subsequently the factory went to an aluminum spring gear that cleans up the aerodynamics and the appearance, and this appears to be the preferred gear now. Many types of straight and amphib floats have been used on Rebels, and in the winter all manner of skis have been fitted. These are truly all season aircraft, and the width of the cabin allows winter gear to be worn so that the pilot may do his walkaround in comfort, and then remove the outer clothing layer while inside the plane.

There are many aircraft on

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Jack Wiebe is 6'3" and has this much room above his head in the Murphy
Below: Jerry Purdom loves his Bart Lalonde O-360 and 4 blade Warp Drive prop.

the market with nice-looking specs but little in the way of engineering information. Here is the statement that Murphy makes about the standard to which the Rebel is designed and built. "The structure of the Murphy Rebel has been designed to meet the airworthiness standards of the U.S.A. FAR Part 23, Subpart C, the U.K. BCAR Section S. and the Canadian TP10141E. Depending on the gross weight and power selected, it will comply with the acceleration factors and airspeeds specified for the normal, utility or aerobatic categories of Part 23.

"In general, the structure is conventional and compliance with these standards has been demonstrated by detailed analysis using well established methods. In many areas of the primary structure the strength is set by the minimum gauges of available material and the margins of safety are very large. A major portion of the wing structure is redundant and a full scale component has been tested to support the analysis.

"The maximum design loads on the horizontal tail result from a combination of Balancing and Gust loads at V (D) on the flight envelope. In addition to the analysis, this structure has been tested to ultimate loads."

Any popular aircraft will spawn an aftermarket for modification and maintenance. Angus McKenzie of London manufactures the McKenzie STOL kit which is essentially a 65% scale copy of a commercially manufactured kit for the Beaver. The kit consists of a 12 ft. drooped leading edge cuff over foam stiffener blocks, with the ends capped by air dams. A wing fence is installed at mid-span, and the increase in weight is 14 pounds including paint. Angus has one of these kits on his own Rebel, and Jack Wiebe installed the same kit on the Rebel that he and his son Mike built. Jack reports that he got airborne from water with 7 mph less speed, and that it assisted in getting in and out of short lakes when fishing in the North.

Wayne O'Shea of Midland specializes in the assembly of

Rebels and has rebuilt many of them for Canadian and US customers. Rebels leave his hangar for all parts of the world, fitted with new engines, skis, floats, and other mods. Wayne shares his experience and knowledge on the Rebel builders, forum, and many Rebel builders owe a debt of thanks to Wayne for his advice.

What is it like living with a Rebel? Here is the experience of Tom Inglis, who chose to build his with a Rotax 912, in the early nineties, when the alternative engine was the O-235. (This was before the introduction of the 100 hp 912S.)

"After a while I realized that the spec sheet from Murphy indicated that with the exception of rate of climb and an extra 5mph of speed, the 912 specifications were better. I wanted more than an ultralight, because I planned on taking trips into the states and control zones. However I also wanted to build some flying time as economically as I could. By that time, the 912 was developing a good reputation, and my previous commitment to myself to avoid the use of used parts meant that I was going to have to shell out an additional $8000 for the new Lycoming (again, you can justify it a thousand ways, but money talks).

"So I compromised. I built the airframe with the 1650lb gross weight in mind, but installed the 912 up front.This gave me the option to increase the size of the engine later if I needed to. The plane was built pretty well to the factory plans. I opted for 32 us. gal. fuel tanks (two bays each wing, just in case I went with a bigger engine later).with the 4 gallons of auto fuel/hr, this gives the airplane 7.5 hours / 700miles range (which, by the way is about 2-3 times the range of the pilot!).

"My 912 Rebel weighs 730lbs empty and has a gross weight of 1550. This gives me a great useful load. I am planning on more trips to the United States in the future, and I fly up to Ottawa on a regular basis. My flight planning is at 92-95 mph. I am adding a transponder and some cabin insulation this year, so I expect my empty weight to go up about 30 lbs. With the wheelskis installed in the winter, my empty weight will then be up to about 800lbs. The kit was

good to build, but more than once, making a living got in the way of getting it finished. With a lot of on again/off again sessions, and some help from some friends and family, I finally got it flying in 2000.

"It exceeded all expectations.

"At 20 hours, I had a catastrophic failure of a GSC prop (turns out I wasn't the only one), that set me back over a year and another $4000, I got it going again, this time with a Warp Drive prop.

"The 912 has performed very well, but I wasn't happy with the original carbon steel exhaust, which had cracked twice at a weld in 80 hrs.I had an RAA member build a new stainless one that not only improved the reliability, but as a side benefit, increased the horsepower significantly.(after a prop pitch change, my cruise went from 90 to 95 mph). I am quite satisfied with the performance of the 912. The 80 hp is more than enough for the type of flying I am doing."

At the other end of the spectrum our members are using O-320 and O-360 Lycomings. With 150 hp and Murphy 1800 amphibs, Water Klatt of BC reports that "the specs listed on the Murphy website are quite accurate and maybe a little conservative. With my 150 hp Lyc 0-320, I cruise at 120 mph on wheels, and 105 mph on the amphibs. This is at 65% power and 7.5 US gph using regular mogas. I have an on-board fuel monitor. Climb angle on wheels was very steep at about 1600 fpm solo. Even on floats I can still get 1100 fpm solo. Of course, as you pile on the weight, climb rate goes down considerably. When fully loaded on floats, with passenger, fuel and camping/fishing gear in the back, it's down to a still respectable 700 fpm."

Jack and Mike Wiebe of Hamilton built their amphib Rebel with 160 hp so that they could indulge in their hobby of fishing. The 160 hp Lycoming provides enough power to get both of them in and out of small lakes, even when loaded with fishing and camping

West Coast Rebel

RON EAGLESTON built his first project, a 1992 Rebel kit over a period of 2400 hours. With a Lycoming O-235 (113 hp) and a Colin Walker prop it would cruise about 108 mph. Ron reports a "slow" stall, about 3 mph less than a 152, though more reponsive. In its life as a landplane he says the climb and range were entirely adequate.

Ron has no beefs about the kit quality, "almost on par with RV value". He should know, because his second aircraft was an RV-8A. Most of the project was built on a big flat table in a one car garage, a feat that was doable, but required some organization. And he painted it there too. And the Rebel's pop-rivet construction? "Despite what a few Chapter 85 wags opinioned, not one pop rivet popped, even after flying over the mountains in turbulence".

He got it to the airport "loaded on the biggest Budget truck I could get from down the street" and managed the whole deal in one trip in one morning.

He eventually sold the aircraft to George and Jacquie Korisanszky in order to make room for his RV-8.

Top: Ron's project sitting pretty. His was one of the first with the then-new spring landing gear, which replaced the bungee-sprung landing gear in the early '90's. Above, the Rebel's spacious panel. The interior is huge. Right, Ron flies in the beautiful Widgeon Creek area north of Pitt Meadows

gear. Cruise is 105-110 mph even at full gross. They are now readying a new Elite for its final inspection, with a specially-built Lycoming and a lot of Jack,s detail work including top-hinged doors and side windows. The Rebel has just been sold and the new Elite will be flying this summer.

Jerry Purdom of Kelowna built his Rebel with straight Edo 2000's, a Bart Lalonde O-360 and a 4 blade 72" Warp Drive prop. He shortened his firewall 3" and grossed his Rebel at 2000 pounds. 300 pounds of baggage is normal for this plane. Jerry regularly packs an inflatable boat and a 2 hp outboard into his Rebel for trips to the Arctic. So far he has been to Nahanni, Fort Smith, Tuktoyaktuk, and all through British Columbia. His O-360 has low compression pistons so that he can burn mogas. For Jerry, power is the name of the game. Push the throttle forward and it is already on the step, and from that point it just goes up. He appreciates the gentle stall - power-off it loses only 100 ft - and that the plane requires very little rudder to fly. All controls forces are light and comfortable, and the Rebel trims well.

Jerry says that he chose the Rebel because it is one of best kits made and it has a good support system. Wayne O'Shea and the factory website can provide all the information required.

The www.murphyair.com website gives all the specs and performance charts, and from our members' reports the numbers are accurate. For anyone interested in the design considerations of the Rebel, Hiscock's book "Design of Light Aircraft" explains all the technical considerations that went into the design of this fine aircraft. Murphy Aircraft, Angus McKenzie, and Wayne O'Shea can provide good aftermarket support. If you have a hankering to build a great airplane to see this country, a Rebel is definitely the way to do it!

Contacts:
Murphy Aircraft Company www.murphyair.com
Angus McKenzie: angus@lweb.net
Wayne O'Shea www.irishfield.on.ca
Design of Light Aircraft, Richard Hiscocks
Thanks to: Dave King, Jack Wiebe, Walter Klatt, Jerry Purdom, Wayne O,Shea, Angus McKenzie, and Tom Inglis.

McKenzie STOL Mod

OUR FACTORY STOCK Murphy Rebel was an exceptional STOL aircraft but when an offer was made to adapt a set of CAD designed, CNC manufactured drooped leading edges to our plane we had to try it. From past experience with STOL kits on certified aircraft I was positive we would be impressed with the results and our Rebel proved to be no exception. This modification was simply a personal choice as I am always interested in finding ways to get off the ground sooner.

A few Rebel fliers soon inquired where they could get a set of these cuffs and so we began to supply them. A very inauspicious beginning and still only marketed by word-of-mouth as a hobby type enterprise.

The STOL kit we offer for installation on the Murphy Rebel is a 65% scale copy of a commercially manufactured leading edge cuff used on the deHavilland Beaver. The Rebel uses an NACA 4415 modified airfoil which is very similar to the Beaver and our expectation was for similar performance enhancement as one would expect on a STOL equipped Beaver versus a stock aircraft.

For kit installation on a finished aircraft three rivets must be removed at each wing rib and replaced with the supplied counter-sunk rivets, this allows the STOL leading edge to sit flush on the wing. The .025 slightly drooped leading edges are each 12' in length and fasten over the factory leading edge with Avex rivets. Foam stiffener blocks are initially adhered via Sikaflex to the factory leading edge at measured stations and the STOL leading edge fits over these stiffener blocks and spans from the wing root fairing to the wing tip with the ends capped with air dams. A wing fence is installed on top of the wing at mid-span. The supplied materials are pre-drilled, epoxy-chromated, and all required fasteners are supplied, also adhesive and tape.

Painted and installed the typical weight increase is 14 pounds.

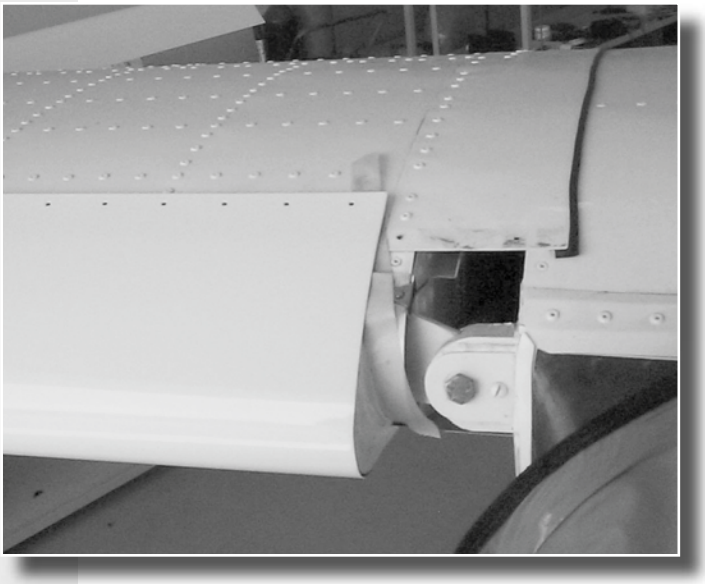
Usually a kit can be installed in 1 or 2 days depending on all of the typical variables. Likewise, considering that every homebuilt aircraft is a different as the individual who builds it so varies the performance data from plane to plane after installing a STOL kit.

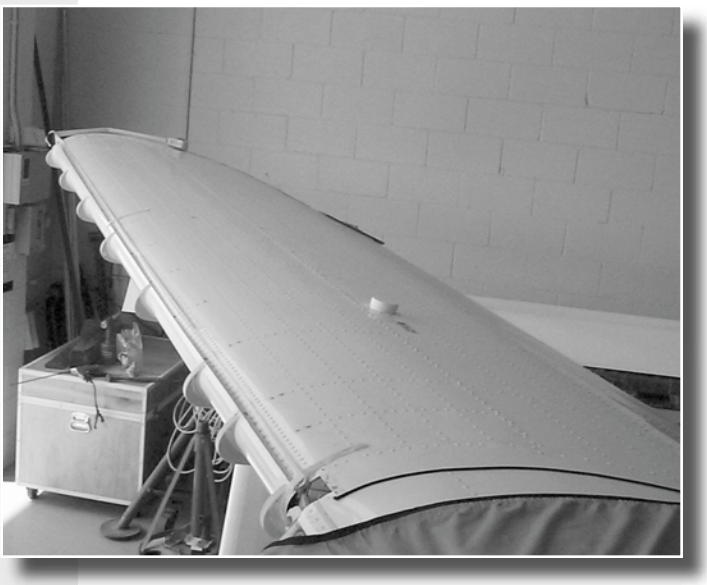
Engine power and aircraft weight are just two of the many differences which will affect the performance, add to that, prop choice, builder skill etc. and you can see why I am hesitant to quote performance figures to people who ask.

Though one builder told me that with the STOL kit on his amphibious plane he got airborne from water with 7mph less speed.

Installation of the kit does not allow for any increase in gross weight.

We continue to enjoy flying our own 160hp amphibious Rebel to all kinds of exciting wilderness destinations and are ever thankful for Daryl Murphy's vision of a homebuilt Canadian bushplane.





So you've decided to deviate from the norm and reach into the realm of alternative engines for your aircraft project. The first thing you should realize is you have not decided to be just an aircraft builder, but also an aircraft designer.

It's always been about POWER

Part 2 / by Tom Hindirks

BY CHOOSING AN ENGINE other than specified by the designer or kit manufacturer you now need to contend with the issues of:

-weight and balance

-engine mounting and construction of the mount

-design, construction and aerodynamics of a new cowl

The decision to use an alternative engine is a major one and as you can see one not to be taken lightly. It is also a decision that needs to be made before starting construction of the fuselage or better still, before you start building at all.

Before you decide on an alternative ask yourself a few simple questions…

•Will the alternative be better than the engine(s) specified?

•Will the alternative be reliable enough for the intended use?

•Will the alternative provide adequate power for the application?

•Will the alternative weigh the same or less than the engine(s) specified?

•Will it fit the designed weight and balance?

•Will the alternative be less expensive initially than the engine(s) specified?

•Will the alternative be less expensive to operate, overhaul?

•Are parts readily available for the alternative?

•Do you have the real desire and ability to make the alternative work?

•Can you realistically, safely design the components needed to fit the alternative?

•Do you have the ability and equipment to build the new components?

•Are you willing to devote the additional time to building that the alternative will require?

Only you can decide if the pro's out weigh the con's. Do the advantages overcome the extra work? Are you capable of the additional work required to safely fit the alternative?

Just remember, if the alternative is not going to cost appreciably less, weigh significantly less, have at least comparable reliability or more power, is it worth having considering the additional money, work and skill required to make it fit?

Now you can start to understand why going a different path is such a large decision.

Now I'll assume you've just got to be different and have something special powering your aircraft.

Alternative dedicated aircraft engines

I define these as certified or non-certified engines, in long-term production, designed for aircraft use from the moment pen first hit paper. No auto or any other conversions.

Engines in this category would be:

-Eastern bloc engines like:

-LOM engines

-Walter Mikron

-PZL Franklin

-Rotax four cycle certified engines

-Dedicated non-certifieds in common use, designed for aircraft applications

-Hirth

-Limbach

-Rotax two and four cycle non certified

-HKS

There are many others that fit my definition but you get the idea from this short list.

Many of these designs are decades old and well proven, but ask yourself the questions listed above. Talk to people who have built aircraft using the engines of your choice and find out the problems they had to overcome.

Be extremely careful about parts availability and consistency of supply. Delivery can also be a problem, are engines on hand, if not what is the delivery period. Be very careful as you tread off the beaten path. Ensure the journey is worth the effort.

The bright side is there are some very good choices possible in this category, proven reliable products. But you must do careful research to be sure you are making a choice that you can live with in the years to come.

In the next segment we will venture farther away from the norm and deeper into the more radical choices as we take a look at "The New Generation Alternatives" the Automotive conversion.

Till next time… RAA

About the author:

Thomas Hinderks comes from a family with a history in aviation that goes back over 50 years. Past holder of a Private pilot's license and current holder of both a Glider pilot's license and Recreational Pilot's Permit. Tom's automotive background also extends over several decades. With his father being a licensed automotive mechanic and an automotive instructor, he had excellent start into the world of engines. 15 years of auto racing has given him a practical background in the building of engines and what makes them survive. A career in the recycled automotive parts business going over a two decades has kept him up to date in what's new and what is failing in the field.

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

Newsworthy: The Canadian Museum of Flight in Langley, BC gets its new Tutor after being painted in Snowbirds livery by ArrowTech Aviation Graphics. Below, some of the CMF's volunteers stand with their new baby

DETONATION

Books will tell you what Harry Ricardo learned back in 1918; that detonation is not the same as pre-ignition. Pre-ignition is lighting of the charge before the spark , by some hot object in the combustion chamber usually the overheated center wire of a spark plug whose heat range was too hot for the application or a chip of hard carbon, or even an overheated valve margin. Pre-ignition (usually) ultimately provokes detonation, so the confusion is understandable.

By Clare Snyder

Detonation, by contrast, is self ignition of some of the last parts of the charge to burn the so-called "end gas" AFTER the spark has already ignited and mostly burned the charge. This self igniting end-gas does not then burn normally, as a flame front spread by turbulence at the usual speed of a few tens of feet per second. This gas burns at the local speed of sound, which is very high because the temperature is high. This form of combustion, called detonation, forms a shock front, a sudden jump in pressure that propagates at thousands of feet per second.

When it hits parts, it hits hard. If we hear it al all, it is as a high, dry, irregular clicking, not unlike the reverberating sound of rocks struck under water. Detonation's pressure front can damage bearings by its hammering shock, but the real problem is what it does to an engine's natural, internal insulation.

Any time gases move next to solid surfaces, there is a boundary layer of significant thickness that remains largely stagnant because it is attached to the surface. In internal combustion engines, this quite effectively shields the engine's internal surfaces from direct contact with combustion gas, keeping them significantly cooler .

Even under light detonation, this boundary layer is scoured off by the shock waves, and heat transfer from hot gas to cool metal accelerates. In only a very few detonation cycles, piston temperatures rise dramatically, along with the rest of the parts exposed to combustion.

When this happens, exhaust gas temperature falls. This seems odd because people associate detonation with heat, and heat with failure. But the fact is that as you lean down an engine, its EGTs don't peak when the mixture becomes lean (that is, too little fuel to react with all the oxygen in the air charge), but when the mixture is chemically perfect. EGTs fall and head temperatures rise when detonation begins because the engine's internal insulation is destroyed so some heat that would otherwise go out the exhaust is now being diverted into the piston, head, and cylinder walls.

When it hits parts, it hits hard.

A QUICK DROP IN EGT, COMBINED WITH A PEAK IN HEAD TEMPERATURES, IS A SURE SIGN OF DETONATION.

It is generally believed that running lean causes an engine to run hot. With air cooling, this seems to be true, but isn't. The engine runs cool when it's rich because the extra fuel reduces peak flame temperature, and as we jet down towards chemically correct mixture, the engine runs hotter and hotter. On many engines, one cyl runs significantly leaner than another. Often, in a modified engine with high compression, detonation begins even before we reach correct mixture and peak flame temperature. Then the engine really heats up. This leaves us with the idea that leaning down the mixture raises engine temperature, in a straight-line relationship.

Detonation *continued from page 18*

Now we know, from experience with water-cooled engines, that power, engine temperature, and exhaust gas temperature all rise as we jet down until we go beyond chemically correct mixture. Then power, engine temperature, and exhaust gas temperature all begin to fall again. We don't see this with air-cooling, because the power we are making overwhelms the engine's cooling ability, but it makes perfect sense because heat release in combustion depends upon finding enough oxygen so that each and every hydrogen and carbon in the fuel is completely reacted to form water and carbon dioxide. Any fuel left over is potential chemical energy unreleased which is why running lean makes less power. On a well cooled engine that is not detonating, you can jet down until it starts to slow down.

The real problem is what it does to an engine's natural, internal insulation.

Now back to detonation. The common explanation above leaves important questions unanswered. Why does detonating combustion travel at the local speed of sound, and not at normal burning speed? Why does the end-gas auto ignite, instead of waiting for the flame front to arrive?

More next issue! RAA

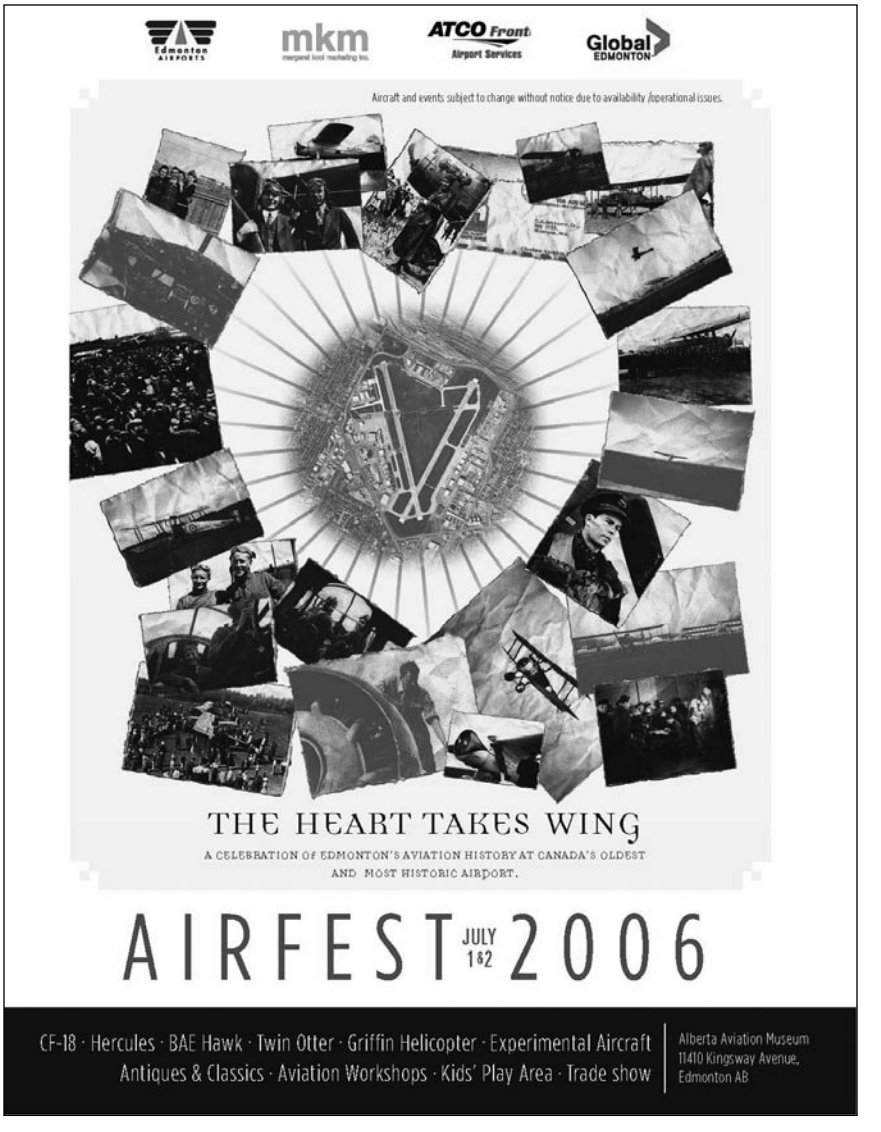
Coming Events

June 18: FATHER'S DAY FLY-IN BREAKFAST. Dad's Go-To-The-Airport-Free card. All-you-can-eat buffet breakfast includes pancakes, sausages, bacon, eggs, coffee, juice, toast. All are welcome. Nominal cost. RAA-TR hangar at the north end of Brampton airport (NC3). Earl Trimble, 905-787-8524, northerntailwind@aol.com or Bill Tee, 416-742-8939, steec551@rogers.com

June 12: MONDAY NIGHT BARBEQUES begin for the 10th season. Your choice of beef, turkey or veggie burgers, sausages or hot dogs; all the trimmings. Coffee, and other refreshments available. An established tradition that keeps growing. All are welcome. RAA-TR hangar at the north end of Brampton airport (NC3). Earl Trimble, 905-787-8524, northerntailwind@aol.com or Bill Tee, 416-742-8939, steec551@rogers.com

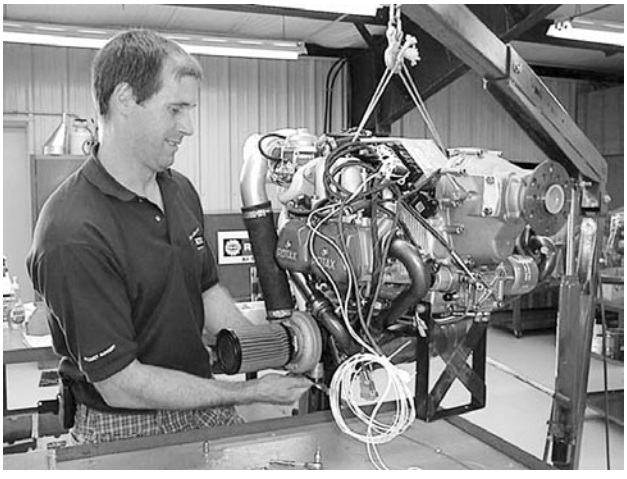
Aug. 11-13: FLY-IN, HEARTS CONTENT AIRFIELD- Dundalk, Ontario. N 44 11.0', W 80 21. 5' Runway 05/23 Turf 1500'x110', (wires on appr. rwy 23) Runway 13/31 Turf 1850'x150' (slopes up to North) Elev. 1700' ASL. Unicom 123.2 Nick Bruzzese, (905) 453-5408; (519) 923-9870

continued on page 35



Rotax Spring Prep

Rotech Research Canada



This is a good time to think about safety issues and take a critical look at your engine installation or have an AME/A&P inspect it for you. Is the fire protection up to snuff? Are wires cables and hoses properly tied up so they do not rub and wear? Do you have poor quality fittings/parts that need to be upgraded to aviation standards? Remember just because some components "work" or "do the job" and may cost much less than aviation components doesn't mean they are a good choice; we have seen many cases of "saving money" cost the owner thousands of dollars and even their life. Please learn from their mistakes.

-Update your operators and maintenance manuals as required. Review them at the same time.

-Check for any new service information from Rotax or the airframe manufacture.

-Follow the 200hr inspection check sheet in your maintenance manual as well as extra attention to the following:

-Drain all the gas and put in your truck. Fill up from a busy gas station. Buy the premium stuff, the extra cost can save you thousands of dollars by avoiding detonation (Except for 100LL users, that is not an issue with avgas)

-Check the float bowls and gascolator. (Remove any in-line fuel filters and install a proper aviation gascolator)

-Replace any fuel, oil or coolant hoses that are cracked/crazed/worn or older than 5 yrs.

-Fire-sleeve all fuel and oil lines in the engine comp.

-Pull engine through by hand to check for "hydraulicing" (oil in the cylinders)

-Change the oil according to SI-912-010 even if it was done just before storage (you should also change the oil at the end of the season so all that contamination does not sit in the engine all winter)

-Check throttle and other engine controls cables for smooth, equal operation. Sync carbs.

-Check battery and ground connections

-Inspect spark plugs, replace if corroded or fouled.

-Remove ign grounds on 1/3 manifold. Clean brass terminals with red Scotch-brite and plated terminals with contact cleaner and a toothbrush (do not remove coating with abrasives, this will only promote corrosion) and replace bolt if corroded. Cover with DC-4 before and after reinstall in order to fill any gaps. This will prevent electrolysis/corrosion.

-Check wiring for proper crimps and chafing. Check any solders joints for wire breakage and corrosion.

-Check the exhaust system for cracks, distortion and leaks. This is a critical component that has a harsh life, expect to have problems and get them fixed/replaced properly

-Check coolant. Replace any green stuff with Dex-cool or Evans

-Check all vent/reference lines by blowing them out. (carb ref lines, oil tank vent, coolant overflow line)

-Check carb sockets for cracks and over torque of clamp and attachment bolts

-Clean/replace intake filter/filters

-Clean engine, run-up as per ops manual and check for leaks

RECREATIONAL AIRCRAFT ASSOCIATION
RÉSEAU AÉRONEFS AMATEUR CANADA

4th ANNUAL BRUCE PENINSULA FESTIVAL OF FLIGHT
RAA FLY-IN & SEMINARS

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ROOF TOP CAFÉ OPEN FOR BREAKFAST FROM 8:30AM TO 1:00PM
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Coming Events *continued*

No fuel facilities. Homebuilts, U/L's, Antiques, Production, Surprises? Weekend camping on the field - $10.00 per site BBQ and camp fire Sat night (stories will be provided by the membership at large) All welcome! Fly or drive. Gate admission $5.00 per adult, kids under 12 are free Fly in: Free!!! Driving: Take Hwy. 10 North past Shelburne to Dundalk Rd. 9. Turn right and proceed to 2nd Line Melancthon. Turn right again, onto 2nd Line, and go to the second house on the right. (You can see the windsock and runway from the road).

September 4: LAST MONDAY NIGHT BARBEQUE for the season. RAA-TR hangar at the north end of Brampton airport (NC3).

Sept. 9: FALL CORN ROAST. Past events have featured roast pork, deep-fried turkey and BBQ bratwurst sausage to complement the succulent, farm-fresh corn. Pot luck for salads, desserts, and buns. Coffee, and other refreshments available. All are welcome. Nominal cost. RAA-TR hangar at the north end of Brampton airport (NC3). Earl Trimble, 905-787-8524, northerntailwind@aol.com or Bill Tee, 416-742-8939, steec551@rogers.com

RAA Executive Director NOMINATION FORMS 2006

Photo Copy This Page

To Nominate National Executive Director, fill in name

Nomination for _____National Director

I,_____ _____ _____
Nominee's Signature Printed RAA #
Being an RAA member in good standing, accept nomination
Note - Nominee's signature constitues acceptance of nomination

I,_____ _____ _____
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I,_____ _____ _____
Nominator's Signature Printed RAA #

Note - Five Nominators are required; it is good practice to obtain several additional nominators in case of an inadvertent lapsed membership by a nominator.
Three seats on the Board of RAA Canada are expiring this years, and we need your help in running this national organization. Please photocopy this form and have five National members sign. Send it to Bill rice by July 20, 2006. The nominations will be posted in the July - August issue, plus on the Announce e-mail list, and the www.raa.ca website.

Complete the above, and forward before July 20, 2006 to-
RAA Chief Electoral Officer Bill Rice RR#3, 22027 Prospect Hill Rd, Ilderton Ontario N0M 2A0

Left: Jerry Purdhome's Rebel in it's wheeled iteration has the early bungee gear. Opposite, top: It has to be admitted that float flying has its benefits, especially in the Great White North (eh).

Keep in Touch With Your Board of Directors!

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Gary Wolf ..... President
..... 519-648-3030 garywolf@rogers.com
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..... 905-668-5703 cgardn628@rogers.com
Darrell Lynds ..... darrell@lynds.net
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..... condor@rogers.com 905-874-1911
Bill Weir ..... 519-461-0593 billweir@lon.imag.net
Mary Wiebe ..... (on leave) weebee1@sympatico.ca

RAA Regional Directors

Vancouver Island:
Ken Armstrong 250-652-3528
..... aviator-horizon@telus.net
709-6880-Wallace Dr., Brentwood Bay, BC V8M-1N8
Mainland BC:
BC Coast ... Terry Wilshire terwil@telus.net 604-721-7991
Interior BC/Technical Director: ..... David King
contact best between noon-10pm 7days work ph. 250-868-9108 homep ph. 250-868-9118.....
..... emailKingDWS@Gmail.Com

Alberta North:
Ralph Knight..... 780-456-1650 rdknight@telusplanet.net
Alberta South:
Gerry Theroux ..... 403-271-2410 grtheroux@shaw.ca
Saskatchewan:
Curt Halpenny 306-934-2965
cth.saskatoon@sasktel.net
Manitoba:
Jill Oakes..... 204-261-1007 jill_oakes@umanitoba ca
Ontario SW:
Denny Knott..... 519-471-7058
..... 36 Guildwood Walk, London ON N6H-3X2
Ontario S/Central: ..... Gunnar Doerwald
..... 905-468-3713 gunnar@doerwald.net
Ontario East: ..... TBA
Ontario North:
Morris Frandsen ..... 705-732-2789 frandsen@vianet.on.ca
..... RR#1, Rosseau, ON P0C-1J0
Quebec:
Raymond Fiset..... 418-871-3761 rayfiset@qc.aira.com
..... 7925 Hamel Blvd., Ste Foy, PQ G2G-1C8
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The Recreational Flyer is pleased to offer you colour advertising within the magazine. Previously limited to the back cover, we have added 4 new colour pages which will be available with limited space for your advertising needs. Our rates for both black and white and colour ads remain very competitive and you reach a captive and qualified audience.

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

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The Recreational Aircraft Association Canada does not assume responsibility for advertisements, but does exercise care to restrict advertising to responsible, reliable individuals.
Please note: Ads running more than 3 issues must be renewed to guarantee continued display in the magazine.

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Contributing Editors:
Owen MacPherson
Don Dutton
George Gregory

Art Director and Layout:
George Gregory

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

For Sale

ACRO SPORT airframe including all fittings, controls, empennage but minus wings $4000.00 USD 418-871-3761

PIPER COLT complete airframe $3000.00 USD 418-871-3761

Subaru EA81 engine, running well when removed from under 100K car. $300 meled@wightman.ca 519-665-2161

Set of dimpling tools. Avery Dimpling Tool (arm) with 22 inch throat $149.00 CDN. Set of dimple dies for the above - 3/32, 1/8 and 5/32 $102.00 CDN. Poly dimpling mallet $18.00 CDN. 3 X 5 foot dimpling bench for the above $25.00 CDN. TATCO hand squeezer STH-90 with STY-20 2 inch yoke $98.00 CDN . Total group price - $392.00 CDN or near offer. Will sell individually. Shipping is extra. Dave at 416-282-5252 or daveaustin2@sprint.ca

1962 Cessna 150B Patroller, unique airplane with long range tanks, equipped with Horner wingtips. Fresh, extensive annual just completed. Was used as patrol aircraft. 14,400 hrs TT, 1450 SMOH, 650 STOH. Great flying aircraft, strong engine. Well maintained. Stationed at CYKF. Asking $23,500.- Send email to rudyhane@ rogers. com and I will supply more info and pictures.

ACRO SPORT airframe including all fittings, controls, empennage but minus wings $4000.00 USD 418-871-3761

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

For Sale: Sonex serial number 320. Included: plans, machined spar caps, formed alum kit, form block kit, Titnium gear legs for std tailwheel, tail tips, seat belts, lead counterweight, cherry rivet kit, stainless steel firewall, all hinges, all 025 aluminum sheet, angle and plate - wings skins and fuse sides

layed out and pilot drilled, some hardware and tailwheel, Total cost about USD$6300 plus tax - Save over $2300 over Sonex cost -Priced to sell quick at USD$4000 or best offer. Bonus - I will throw in a Lightspeed 20xl Active noise canceling headset in as new condition with case. Email me for more info at airplanes@sympatico.ca or call Chris at 1-866-733-8432.

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

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

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

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

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

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

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

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

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

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

Air Strip, new 42'x 40' hanger, trout stream, trout ponds, sugar bush, fruit, newly renovated bungalow, 61 acres. Mt Forest $359,000 e-mail pennantmanor@hotmail.com

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

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

Upper wing - uncovered, no apparent damage. Starboard lower wing - uncovered, some damage to two outer ribs and tip bow. Set of wing struts. Misc: Two Hoover prop blades, possibly AvroAnson. Phone L. Katocs 905-725 5719
Wanted - 3/32 and 1/8 clecos, countersink dies, micro countersink drill attachment. Contact Don (519) 372-1383 or kinger@bmts.com

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

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

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

Delcom 960 portable 760 CH VHFTransceiver, all jacks and controls are on the top face. All mechanical selector switches. May look ancient but this radio works well is still being produced. Comes with wall charger and a downloaded manual. Asking $150. Lowrance 1000 GPS, with RAM yoke and suction cup mount. 32 meg data card replaced with 512 meg card. Large display area. Hardly used. New with taxes well over $800.-. will sell for $650 or best offer. FlightCom Nighthawk Headset model 40LX, as new condition. $95

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

continues

Right: Rebels on display at O'Shea's Irish Field. Below, a Rebel shares a beach with a Super Cub: both in their natural element.

the next one is not likely to cost a fortune. Asking $22,500
A set of 5 inch Cleveland Wheels and Brakes, used for about 50 hours on Gerry Younger's Extra 300. They are Gerry's and you have to deal with him, but I gladly relay your inquiry.
KR 2 Turtle Deck, removed from a once flying aircraft. It's in good
shape and could save you a lot of work. I have pictures I can email. Any reasonable offer accepted (I need the space in the barn!)
Cessna 150 parts: Landing gear legs of an early 150, set of flaps and an engine cowl for mid seventies C150, set of doors for same.
Wheel Pants for a variety of aircraft: C172, C182, Citabria. I have some
backing plates but don,t know exactly what fits to what.
Bracket Air filter assembly, new in Box for a C172 N model. Could certainly work on a project Fiberglass Air Intake scoop for a Mustang II, but could be adapted for your project, also a BD 5 spinner with back plate.
RPM Gauge from a BD 5 kit, new.
A Pantograph used for Engraphing. This machine could produce any type of
small flat part if you are handy with machinery. Rudy Hane, (519) 648-3006 or rudyhane@rogers.com

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

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

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

FORD 3.8 V6 complete with Blanton 1/1.6

Wanted

redrive. Engine rebuilt by well known shop. Dyno time of only 5 hrs. shows 187 hp @ 4800 rpm, 500 cfm carb with electronic leaning, all new accessories. Pictures and details available $5000 usd. Ken 403-282-6253
Wanted to purchase good or rebuild able IO 540 for Steen Sky bolt project, also any airframe or parts for the same. Wanted to purchase FLYING OR PROJECT DR1 Fokker Tri Plane. OFFICE 1-705-653-4525 or davidcarlaw@prototyperesearch.com

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

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

New In Canadian Skies

Tom Martin's EVO

Tom writes: "This EVO aircraft is the seventh project that I have completed and the fourth in the last four years. My first build was a RV4 followed by two Harmon Rockets, three standard wing F1 rockets and this tapered wing F1. It was the second customer built tapered wing to fly and so far I am very happy with it. The ailerons are quite light and responsive and the stalls to date have been normal in both feel and recovery. Other than the beautiful tapered wing the main difference between it and the standard wing is the remarkably lower stall speed. This has been confirmed in side by side flights with Wayne Hadath and his F1. The decrease in stall speed is around 10 knots which puts it in the RV4 category. This huge improvement will encourage more people to consider a rocket in their future. Top speeds have not been done yet as the main gear fairings and wheel pants have yet to be installed. The factory prototype demonstrated at least a five knot improvement in the top end. More information is available at http://www.teamrocketaircraft.com/

As per usual the inspection process moved along smoothly and I thank all the people involved. The paper work is getting much better as the examples are more relevant and the regional differences in interpretations of the regulations are getting closer. There are a lot of volunteers in this process and even though it seems like we are spending quite a bit of money on the inspection process, we are getting good value for our money, and as members of RAA we do have an opportunity to have input."

Send us Photos of your completed projects

Please include a brief description of your aircraft and any other details you want to include, and send us a colour print with it. Mail to:
Recreational Aircraft Association of Canada
13691 McLaughlin Rd, RR 1,
Cheltonham, ON L0P 1C0
...or email us the information and a high resolution digital picture to: raac@inforamp.net

RAA Chapters and Meetings Across Canada

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

ATLANTIC REGION

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

QUEBEC REGION

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

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

MONTREAL (LONGUEUIL): Chapter 415, Meeting in French second Wednesday at 8 pm, at CEGEP Edouard Montpetit 5555 Place de la Savane, St. Hubert, PQ. President Jacques Genest president@raa415.qc.ca (450) 447-9042

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

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

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

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

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

ONTARIO

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

COBDEN: Third Thursday 8:30 pm at Club House, Cobden Airport. Contact Pres. Clare Strutt, 819-647-5651.

COLLINGWOOD AND DISTRICT: The Collingwood and District RAA, Chapter 4904, meets the first Thursday of every month, at 7:30 p.m. except July and August, at the Collingwood Airport or at off-site locations as projects dictate. For more information, contact Keith Weston, 705-444-1422 or e-mail at kcweston@sympatico.ca

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

FLAMBOROUGH: Second Thursday 8:00 pm at Flamborough Airpark. Contact Editor Frank Ball fdnmeball@sympatico.ca 905 822-5371

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

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

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

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

MIDLAND-HURONIA: First Tuesday 7:30 pm Huronia Airport. Contact Secretary, Ted Aldred 705-526-4909 wings@csolve.net

NIAGARA REGION: Second Monday 7:30 pm at Niagara District Airport. Contact Pres. Len Pettersen swedishcowboy29@aol.com

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

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

OTTAWA/RIDEAU: Kars, Ont. 1st Tuesday. Contact: Secretary, Bill Reed 613-831-8762 bill@ncf.ca

SAUGEEN: Third Saturday for breakfast at Hanover Airport. Contact: Ed Melanson 519-665-2161 meled@wightman.ca

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

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

TORONTO: First Monday 8 pm at Ch 41 Hangar on north end of Brampton Airport Contact: President, Earl Trimble 905-787-8524 northerntailwind@aol.com

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

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

MANITOBA

BRANDON: Brandon Chapter RAA meets

on the second Monday of each month at the Commonwealth Air Training Plan Museum at 7:30 PM except in the months of July and August. Contact Pres. John Robinson 204-728-1240.
WINNIPEG: Winnipeg Area Chapter: Third Thursday, 7:30 PM. Contact Jill Oakes 204-261-1007 raa_wpg_executive@yahoogroups.com

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

ALBERTA
CALGARY chapter meets every 4th Monday each month with exception of holiday Mondays and July & August. Meetings from 19:00-22:00 are held at the Southern Alberta Institute of Technologies (SAIT) Training Hangar at the Calgary Airport. Join us for builder discussions, site visits, tech. tips, fly out weekends and more. Contact president Calvin Thorne at 403 932-4325 or email: cbthorne@telus.net
EDMONTON HOMEBUILT AIRCRAFT ASSOC: First Tuesday 7:30 pm EAHS boardroom. Contact President Bill Boyes 780-485-7088
GRANDE PRAIRIE: Third Tuesday, Chandelle Aviation Hangar, contact Jordie Carlson at 780-538-3800 work. or 780-538-3979 evenings. Email: jcarlson@telusplanet.net
MEDICINE HAT: Last Thursday of the month 7:30 pm RAAC Club Rooms, Airport. Contact Secretary, Boyne Lewis 403-527-9571 handblewis@thehat.ca

BRITISH COLUMBIA
ABBOTSFORD: Third Wednesday 7:30 pm Abbotsford Flying Club, Abbotsford Airport. Contact President, John Vlake 604-820-9088 email javlakeca@yahoo.ca
DUNCAN: Second Tuesday 7 pm members homes (rotating basis). Contact Pres. Howard Rolston, 250-246-3756.
OKANAGAN VALLEY: First Thursday of every month except July and August (no meetings) at the Kelowna Yacht Club. Dinner at 6:00pm, meeting at 7:30pm Contact President, Cameron Bottrill 250-558-5551 moneypit@junction.net
QUESNEL: First Monday/Month 7:00 p.m. at Old Terminal Building, CYQZ Airport. Contact President Jerry Van Halderen 250-249-5151 email: jjwvanhalderen@shaw.ca
SUNCOAST RAA CHAPTER 580: Second Sunday 13:30 pm Sechelt Airport Clubhouse, sometimes members homes. Contact Pres. Gene Hogan, 604-886-7645
CHAPTER 85 RAA (DELTA): First Tuesday 8pm, Delta Heritage Airpark RAA Clubhouse. 4103-104th Street, Delta. Contact President Gerard Van Dijk 604-319-0264, vandijkg@yahoo.ca. Website http://raa85.b4.ca.
VANCOUVER ISLAND AVIATION SOCIETY (VICTORIA): Third Monday 7:30 pm Victoria Flying Club Lounge. Contact Pres. Roger Damico, 250-744-7472.
THOMPSON VALLEY SPORT AIRCRAFT CLUB: Second Thursday of the month 7:30 pm Knutsford Club, contact President - Dick Suttie Phone 250-374-6136 e-mail - richard_suttie@telus.net
ALASKA HIGHWAY: Third Wednesday of the month (except July & August) at 7:30 PM, alternating locations: even numbered months in Fort St. John and odd months in Dawson Creek. Phone Richard Lawrence for location, details at 250-782-2421.
Chapter executives please advise of changes as they occur. For further information regarding chapter activities contact RAA Canada, Brampton Airport, 13691 McLaughlin Rd. Cheltenham, ON L0P 1C0 Tel. 905-838-1357, Fax 905-838-1359 or call toll free 1-800-387-1028

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