January - February 2013

Recreational Flyer

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The Voice of Canadian Amateur Aircraft Builders $6.95

Mike Skoczen's
rocket

RAA
RECREATIONAL AIRCRAFT ASSOCIATION
RÉSEAU AÉRONEFS AMATEUR CANADA

From The President's Desk

Gary Wolf

IN THE INTERESTS OF SAFETY?

It was so nice and quiet for awhile at Transport Canada while they were downsizing and everyone was hoping not to be the one left without a chair. However the fallout has been that job justification is running rampant, and you the owner of an Amateur Built aircraft have just become subjected to a major change in what you are allowed to do when maintaining your aircraft. The regs have always had some loosely written areas, so policy is frequently what TC operates on instead of doing a rewrite of the regulation. CAR Std 571 (d) , the regulation requiring independent inspection and dual signatures after an aerodynamic or engine control has been disturbed, has always been in the regs but the policy has until recently been that this does not apply to A-B aircraft. The reason for this is that CAR 571.11 states that only an AME or the owner of an Amateur Built aircraft may legally sign the maintenance release in an Amateur Build aircraft logbook. The problem has always been that precious few AME's will sign any Amateur logbook, so this leaves only the owner, and he can sign only once. For this reason the policy has until now been that CAR Std 571 (d) does not apply to A-B aircraft.

Three weeks ago a note was sent from Ottawa to state clearly that henceforth the independent inspection and dual signatures will apply to Amateur Built aircraft. What does this mean to you, the owner? Well you will have to find an AME who will inspect and sign after you disconnect the cable that operates your carb heat or throttle, or a rudder cable, or anything else that affects the engine or the aerodynamic controls. And no, this is not an early April Fools joke either. Failure to have two legal signatures means that you will be conducting a takeoff in a plane that does not have a properly signed maintenance release. If you decide instead not to log the work, this too contravenes the regs.

At annual time it is normal to disconnect and inspect all controls and fittings for inspection and lubrication, and possible replacement. Unless your plane is owned in partnership so that both owners may sign, you will probably not be able to find anyone who can legally provide the second signature. The norm will then become to inspect externally only, for fear of exposing yourself to an Enforcement action. Someone at TC has justified his job by closing what he considers to be a safety loophole, but because of the real world lack of AME's willing to sign a logbook, the result will be less inspection instead of more and safety will deteriorate.

To put this into perspective, as owners of Amateur Built aircraft, we have the right to dismantle and rebuild our own engines, and log this work with only the owner's single signature on the maintenance release, but heaven help us if we want to remove and reinstall a throttle cable. We can even dismantle and rebuild a fuel injection system or carburetor, as long as we leave the part with the throttle arm hanging from the cable. Ridiculous but true. Would you like to recover or reskin your rudder? You had better make a fixture that allows you to do this while it is still attached to its cables. Was your plane apart this winter for its annual? I hope you reassembled it and signed the maintenance release in January, before this half-baked bit of regulatory shortsightedness was imposed on us.

RAA Canada has already made the above situation clear to the powers that be at TC, and we have asked them to explain if there is anyone besides an AME whom they will authorize to provide the independent inspection and second signature. So far they have not come up with any alternative such as allowing another pilot to do this. If they cannot allow anyone except an AME or the owner to sign, then a lot of us are going to have some hard choices to make. Let us hope that common sense prevails at Transport Canada.

RAA Canada operates an email Announce system that during the season sends out weekly notices of events and timely news that affect our sector of aviation. The next issue of the Rec Flyer will be here in two months but in the interim we will be sending out emailed updates as

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features

columns

George Gregory

Paragliding off of Mount Woodside, British Columbia.
On the cover: Mike Skoczen's incredible Rocket.

Os

A Practical Airplane for the Wet Coast (or anywhere else there's water)

By Jim Stunden

If you're thinking about building an Osprey, there are some important things that should be considered before starting: location, cost, time, and purpose. An Osprey can be built virtually anywhere; components can (and have) be lowered out of a balcony in an apartment. The components could be built in your dining room; however, you would probably be single… or about to be. More likely locations to build an Osprey are the home garage or inside an airport hangar. The majority of people that build at other locations, apart from home, experience a number of inefficiencies resulting in incomplete projects. One will need an abundance of time and money, both of which rarely go together. The biggest reason to build an Osprey, or any other homebuilt, is to see if you can accomplish a working final product. Planset number 374 is the one I used to construct my Osprey.

When I started my project, some told me I could build an Osprey for $5,000, so I doubled that price and figured it would most likely cost me $10,000. It actually cost me $25,000; a Lake Buccaneer was worth $30,000 when I started and $60,000 when I finished. My homebuilt took me 10 years to build, which is about average from what I have seen. The projects will often change hands several times, and out of a 100 sets of plans sold, I have heard that only one or two will fly. A lot of people buy plans just to read them and never actually start building. An old figure from the EAA stated that only 10% of scratch builds were completed. George Pereira told me that there were 1,693 Osprey sets of plans sold as of November 12, 2012.

Originally, I started my Osprey in my father's basement. He loved it; my mother did not. At age twenty, it was a good way to stay single. Family members may eventually become involved in some aspect and slow down the process - the results of this could be positive or negative depending on the interests and/or motivations of individuals involved.

Following completion of my Osprey, George Pereira, the designer of the Osprey, tried to interest me in building the GP4, but I did not consider myself to be a serial builder - yet. Eventually, I got married and had kids: I barely had time to change the oil in the Osprey. Now that they're in university, I have more time for recreational activities. A friend with a hangar at the same airport as me is building a GP4. He constantly tries to tempt me with taking on the project and says he will even help with the build. Occasionally we sit and talk about the possibilities.

One day I replied, "The wife won't support it," to which he said, "You could give her a new kitchen!"

"Yeah! That's a good idea".

PREY II

So that night I approached her, "Paul thinks I should build a GP4 and he will even help." She made some sort of noise and a face. Trying to sound convincing, I brought out the kitchen renovation bribe. She stopped dead and paused. My heartbeat increased, my mind raced. Is she is going to approve it? "Sanctioned building!" I thought; but she caught on to my thought process. "I want the kitchen first!" It's like sweeping a street. I have to keep my side cleaner than hers.

When I first looked at the Osprey project I felt overwhelmed. I started to think of it as a series of projects: Today I will build the table, tomorrow the elevator. Eventually a box of parts turns into an airplane. In order to finish, I had to do something every day, no matter how small. Some days it was as simple as ordering parts. The key was to not be afraid to try. The serial builders can produce a plane in 2 to 4 years if they have no interruptions. Life has a habit of getting in the way; new jobs, moving - or getting robbed which could result in at least a month's setback, to say nothing of tools to replace.

During the initial stages of my project, I would build a part for the Osprey incorrectly. The second attempt in building the same part would result in a superior, but not quite ideal, fit.

Off to the airport! The Osprey's main gear serves as its own trailer - a pretty handy arrangement.

Finally, the third attempt would be the most appropriate fit. By the time I was finished building all of the components and parts, I did not have to rebuild any first attempts. I became faster, more efficient, and preformed a higher quality of work. An inspector once told me that once someone has acquired the skills to build something, the quality of work is more dependent on how one feels about the work. At this point, I could do a good job but how I felt was a bigger factor in the quality of my work.

I learned to weld in high school. I had already built a boat and worked as a motorcycle mechanic; I guess I thrive on this sort of thing and was lucky to have had a lot of experts around me. I would try to find others that were building, and read the EAA books on how to set up a shop; it saved me a lot of time. To make building easier, read all of the books before starting anything.

I began welding the seats first. I figured if they broke I would only fall a few inches. I did my own welding, painting, electrical, radios, fabric and woodwork. There were a few parts, including a fibreglass cowl and the wing tanks that I bought from Derrick Industries because there were no plans for the tanks at the time. I believe it was more time and cost effective. There are plans for the tanks now but the company is no longer in business.

Pereira really supports his airplanes. He has only made one change since 1975 to the osprey plans (hull widening at STA 0). I have called him a lot to ask questions over the years and he always answers the phone. I do not know how he does that! There have been several options introduced to the osprey, but they are not part of the plans. Remember that anything changed in the plans will generally affect six others, creating a lot of work. Some popular options you may want to consider (some of which George incorporated) include:

Wing extensions add one foot to each outboard wing. Ailerons move out one foot. These are useful if you have a heavy airplane (1100 pounds +) or fly high altitudes. If you build light (940 pounds or less) this is not so useful! Longer wings will produce a slower cruise (≈ 3 knots)

Center line rudder cables provide smoother operation but make the center console busier.

Wing tanks: the original design had a centre tank only in fuselage, about 26 or 35 gallons. Wing tanks move fuel out of fuselage; it's safer but range is limited. Wing tanks can be made bigger but do not take out the drag spar.

My Osprey has 26 gallons US, giving 3 hours endurance.

Fuselage is wider at STA 0 (3 inches) gets on step faster and gives a higher nose attitude in the water at an idle. This is the only official change to the plans.

Wing Fences: the original did not have them but this provides a lower stall or at least makes it more controllable.

Gear Springs: A Ford hood spring can be installed on the inboard section of the wing for gear retraction. It saves re-rigging gear tension when outboard wing panels are removed.

Getting out of the front of the airplane poses certain challenges when coming up with adequate panel space. This is Jim's approach.

I used Lexan for my windows. You do not have to heat mold it because it is strong and will bend like sheet metal. In the Osprey application, the problem is that it retains its original shape, so it springs the canopy bow out ≈ 1/8th inch. It is also noisy compared to plexi-glass. Flying boats are noisy anyway because you sit at the end of a megaphone, tail section, with a propeller beating over it.

Some boat pilots have mirrors to see the engine.

Brake lines: I use nyla-flow tubing for brake lines with one line master cylinder per caliper. Some would put brass inserts inside the line at the fittings to prevent crushing. I have not since they do not have to be that tight. I have had no problems in 25 years. There are two types of nyla-flow tubing: one is lower pressure and one is higher pressure. Use the higher pressure rating.

Some people add a ¾ inch W 4 inch L steel skid plate on the keel at STA 86-82.

Someone suggested removing the foam in the nose gear cavity to save weight. This seemed like a good idea and so I did this once. In addition, I thought it would be a good space for a storage compartment. It still might be if it is water tight. Do not remove it. The aircraft needs the flotation in the nose, also after time, I developed flex cracks in the paint at station zero from the deck flexing when I move the plane around. This occurs because there is no support from the foam.

Bubble canopies seem to be common. If you want a good flying Osprey, stick to the plans on this. Air flow into the engine and propeller are critical. Pereira spent a lot of

time trying to settle it down for good performance. I believe a lot of Osprey experiencing troubles have a non-standard canopy causing disruption to the air flow.

Hydraulic Gear: On a 180 amphibian with manual hydraulics, it takes something like 120 pumps to raise the gear so you remember where it is. It is too easy to flip a switch, manual works just fine. The manual gear is a lot less work and lighter. If anyone wants to see the manual gear retract, I could make a video.

Three Bladed Wood Prop: The original Osprey had a three bladed wood prop. It gave the best performance but it also failed after 100 working hours. They studied the problem and the maker recalled all the props and replaced them with two blades. It is a special prop and gives a similar performance. A three blade wood prop is not recommended because the hub fails and blades will let go. I do not know about composite props.

I have seen plans to build a spar on the wing floats. Do not do it. The wing floats are designed to break off without the wing.

Moving to the airport

The Osprey 2 can be towed behind a car (see page 5 picture) or loaded on a boat trailer backwards with bunks, a car trailer or loaded on a flat deck auto hauler. There is a wide deck model that easily accommodates the Osprey 2. The regular deck can do it, but use as a last resort. On a boat trailer the rig is top heavy with the engine on so a short travel distance is okay. A standard tow truck can lift the whole plane by the engine hook.

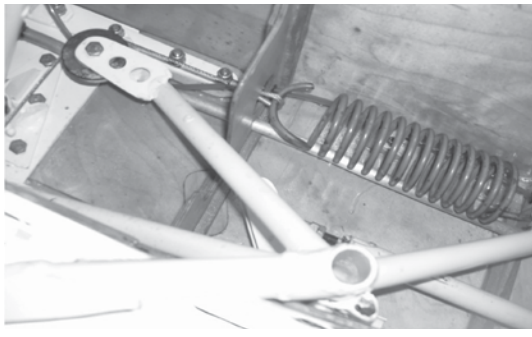
Ready to Fly

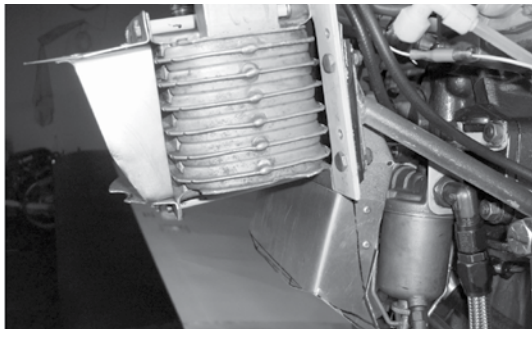
Test flight can be on water or land but you probably will not find anyone that is qualified for water, so stick to land. Plan for escape routes! What are you going to do when it all goes wrong? The shorter your runway the more important slow flight will be on the first flight. If a return is required, slow flight can be explored at 2 feet with a long runway.

For the first flight, somebody that has flown an osprey is your best choice. Get an airport with a long runway, and spend time taxing. The pilot is very low to the runway, less than a foot, and it takes time to get use to this. Do some runs with the nose in the air and hold it steady. Make slow gentle power changes to start. Pitch changes with power are more noticeable the quicker they are made. They are most noticeable at stall speed power off, to full power on. If you are at 2000 ft, no problem! At 5 feet, not so good! If your steering is too sensitive at higher speeds, you may need castor in the nose wheel. Castor is the angle of your nose wheel fork to the ground. Vertical is 0 degrees, easy to steer and unstable. Horizontal is 90 degrees and you cannot steer. The castor angle can be adjusted with the nose gear push rod to some degree. On my first flight, the carb heat came on and caused a power reduction. It gets your attention at 200 ft. My cylinder temperatures were high at 380 degrees. I left the gear down and landed. Minor cable adjustments and all was well. I ran through a test flight profile and recorded data.

At gross weight, with two people inside, I have 140 pounds on my nose wheel, so I always seem to lift the nose wheel early - 2 or 3 inches. On a normal pavement take off the airplane flies off in less than 8 seconds, depending on wind and weight. The airplane

Flying boats waddle through the air. Compared to conventional airplanes, they are slow since they have too much frontal area and too much weight.





Top down: the Osprey's Ford gear spring; the oil cooler, and bottom, Jim's sister painting on the Osprey logo

Time to fly: Jim prepares for the Osprey's first flight.

flies on rudder and 2 rudder and 3 rudder then elevator and some aileron.

Flying boats waddle through the air. Compared to conventional airplanes, they are slow since they have too much frontal area and too much weight. They have to be strong for water loads. They also have big ailerons for slow speeds in the water. Look at the Osprey's tail section: it is huge, twice the size of a PA-28. You need the big controls to keep the plane going where you want in all environments.

Engine Readings

My cylinder temperatures ran high for a while until I followed the advice in the EAA manuals. The engine limits from the Lycoming Tech tip manual are: cylinder temperature in flight more than 150ºF less than 400ºF. Today my cylinders run at 280ºF to 320ºF. Oil temperature is 140ºF to 160ºF. This is an inlet temperature outlet will be 50ºF warmer. I made no changes to my cowl but spent 3 weeks working my baffle seals as per the EAA books and was rewarded with nice cool temperatures. The engine will heat up if a lot of water work is performed. That is why I want my temperature on the cooler side. A typical run up will bring my cylinders to 250ºF to 300ºF, in climb 320ºF, in cruise 300ºF, approach 280ºF and 25ºC day. Fuel consumption is 7.5 to 8.9 US gallons per hour or 30 litres per hour. That's 5 litres or 10 dollars a circuit. Auto fuel with alcohol or alcohol based additives will eat fibreglass tanks. Sealers can be purchased (sloshing). For thought fuel is the cheapest thing you will put in it just use av gas.

Creature comforts

I have flown the Osprey in -10ºC to +35ºC. I think cabin air heat is futile. Air pressure is high at the front and low at the back, so any air heat is gone. It is your feet that get the coldest and large boots are not an option. If you really want heat, think of maybe a heated suit like motorcyclists use. Keep a soft cloth handy for window fogging on the ground if rainy weather is expected. In addition, the cloth can be used in cold temperatures until you get moving when frost is a problem on the inside of windows. It can be very hot in an Osprey because of all of the window. I have seen sweat beading out of my arms, so for cooling I climb to cooler altitudes. I have been as high as 10,000 feet, but not for cooling. As a rule, when the water is white, it does not matter what kind of white, it is time to do something else.

Landing on a runway

Do not land on water until you water test your hull!

80 MPH is a good approach speed to start with. With power off, the Osprey 2 has a very high sink rate. 1500 to 1800 RPM on approach will give a reasonable profile. Landing is easier with power on because fewer pitch changes are required. Remember pitch changes with power

Motion Induced Blindness Jill Oakes

In a motor accident, wherein a speeding car hits a slower moving vehicle coming from the side, the speeding car drivers often swear that they just didn't see the vehicle coming from the left or right. Well, they aren't lying. They really don't see the vehicle coming from the side, in spite of broad daylight. This phenomenon on the car drivers' part is known as "Motion Induced Blindness". It is unbelievable but it is true, and it is definitely frightening. Armed forces pilots are taught about motion induced blindness during training, because it happens faster at high speeds; and to some extent it is applicable to car drivers also, especially the fast ones. So, if you drive a car, please read this carefully. Once airborne, pilots are taught to alternate their gaze between scanning the horizon and scanning their instrument panel, and never to fix their gaze for more than a couple of seconds on any single object. They are taught to continually keep their heads on a swivel and their eyes always moving. Because, if you fix your gaze on one object long enough while you yourself are in motion, your peripheral vision goes blind. That's why it is called motion induced blindness. For fighter pilots, this is the only way to survive in air; not only during aerial combat, but from peacetime hazards like mid-air collisions as well. Till about three decades ago, this "heads on swivel & eyes moving" technique was the only way to spot other aircraft in the skies around. Nowadays they have on-board radars, but the old technique still holds good. Let me give you a small demonstration of motion induced blindness. This is the same demonstration that is used for trainee pilots in classrooms before they even go near an aircraft. Go to http://www.msf-usa.org/motion.html. You will see a revolving array of blue crosses on a black background. There is a flashing green dot in the center and three fixed yellow dots around it. If you fix your gaze on the green dot for more than a few seconds, the yellow dots will disappear at random, either singly, or in pairs, or all three together. In reality, the yellow dots are always there. Just watch the yellow dots for some time to ensure that they don't go anywhere! (You can alter the background color or the rpm of the array by clicking the appropriate buttons. So, if you are driving at a high speed on a highway and if you fix your gaze on the road straight ahead, you will not see a car, a scooter, a buggy, a bicycle, a buffalo or even a human being approaching from the side. Now reverse the picture. If you are crossing a road on foot and you see a speeding car approaching, there's a 90% chance that the driver isn't seeing you, because his/her peripheral vision may be blind! And you may be in that blind zone!

are more noticeable the quicker power is changed. They are most noticeable at stall speed power off to full power on. Do not take a lot of power off in the flare; leave some on until you gain experience. The more power you carry when landing, the less elevator control will be required and the more stabilized you will be. You will try to flare 5 feet in the air. It will take awhile to get used to the eye wheel height. Use a long runway - 3000 feet is okay but 4000 is better. It depends on your experience of course. As you gain experience, you will quickly be able to land in 1500 feet or less without effort. I've landed in cross winds of 20 miles per hour at 90 degrees. You do not need a lot of aileron because with a little bank the engine weight pushes the wing down. Side slip is a function of stall speed and the Osprey has a higher stall speed so it is good. Remember that for the water, the 300 pound engine is 25% of your gross weight at 1200 pound. It matters where it wants to be. I have been on a lot of grass strips with no problem but the tires are small so it is not a tundra machine.

Wear Items

After 200 hours:

- The rubber in the leading edge of the propeller is in great shape. It's the same as the rubber used in roller skates and can be replaced.
- Brass bushings were added to aluminum hinge parts (rudder hinges).
- Brake pads lasted 200 hours first set (lots of taxi time).

As well, wheel bearings will need grease every 25 hours if you put your gear in the water a lot.

Oil change at 25 hours without spin on filters.

When I finished building the Osprey, I told a friend that it was good to be finished because I would be able to save some money now. 'No!' he said, 'it is way more expensive to fly than build.' He was right!

Now that I have built, repaired and explored what an Osprey can and cannot do, I find it is like having an addiction. Every 3 weeks or so, I need a fix. Oh, a circuit on the runway gets the monkey off but the real cure is a circuit on the water, maybe in a remote lake. They could not do it 100 years ago. When the wind is calm, sky blue, no one around and not a bump, I touch down in some remote lake in my homemade airplane. There is nothing like it - I grin for a week!

I hope these notes help you in some way to complete your own project. *I* did it - so can you! Join the club; it is very exclusive but a lot of fun! What an Osprey does well is land on water, more than once. If you do not use it in the water, it's only half a plane. If you put it in the water, it is twice as good as the next two. Building and flying the Osprey has its challenges , and care is required, but it's well worth the effort. **R**

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

The Longest Flight

by Barry Meek

LAST SUMMER on a contract job, I flew an average of about five hours a day. There were stretches lasting several days when I'd be aloft for over ten hours, landing just once for fuel. If the weather was bad, there would be a break, or a short flight of two or three hours. Most pilots do what they do because they love the work. But after a few days of nonstop ten-hour flights, it gets a bit grueling. The noise, heat, vibration, mental and physical fatigue can be really tough on the mind and body

If you think that's difficult, imagine spending over *two months* in a Cessna 172, flying twenty four hours a day, without even landing for fuel. That's exactly what two pilots did back in 1958 in the California and Nevada desert. Bob Timm and John Cook set a world endurance record, remaining airborne for just under 65 days. It was a publicity flight, sponsored by the Hacienda Hotel in Las Vegas. Timm worked at the Hacienda, and he had the passion for flying, along with a dream of setting a world record by staying airborne for longer than any other pilot in history. He convinced his boss to sponsor the flight, reasoning it would bring a lot of publicity to the hotel.

A stock Cessna 172 was purchased, then modified for the flight. Although the Continental engine was basically untouched, two oil systems, filters, and a 95 gallon fuel tank were installed. The oil could be changed and the plane refueled without shutting down the engine. Except for the pilot seat, the interior was

Boredom and fatigue were the biggest problems. One night, both men were asleep for a period of time lasting over two hours.

gutted, then re-done to include a mattress and a sink. The right side door was collapsible, providing access to the exterior and enabling the co-pilot to operate a winch for bringing supplies aboard from below. Re-fueling and re-supplying the airplane were the tricky parts. Twice daily, the plane was flown just above a speeding truck from which a hose was hoisted up to pump 95 gallons of avgas into the belly tank. Food, water and other supplies were lifted up from the truck as well.

Boredom and fatigue were the biggest problems. One night, both men were asleep for a period of time lasting over two hours. The plane, on autopilot, had continued south until it was almost in Mexican airspace before Timm woke up and realized they were way off course . On about day 40, their heater failed. Even in the desert, winter nights can be cold. The men wrapped themselves in blankets for a few days, until something could be rigged and lifted up to fix the problem. As the end of the flight neared, Bob and John began to check each other's work fearing a human error would cause them to fail in their quest for a world endurance record. Each procedure, every item, every decision was carefully planned and discussed.

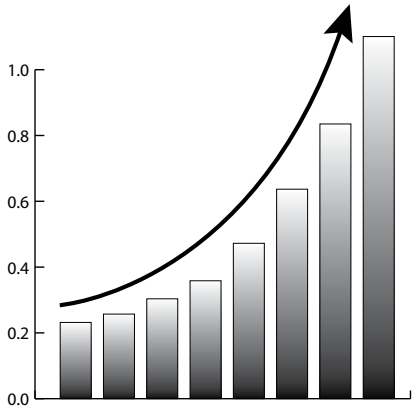
The previous record was 50 days. As that day passed, they decided to extend their flight as long as possible, finally touching down over two weeks later. By then, the engine had started to carbon up and lost so much power that climbing out with full fuel was dangerous . The list of 'snags' included the generator, heater, tachometer , fuel gauge, winch and electric fuel pump.

It was a tremendous achievement for both man and machine. Sixty four days and twenty two hours in the air. Pilot Bob Timm Bob Timm died unexpectedly in 1978. John Cook passed away in 1995. The Cessna 172 was sold to a Canadian pilot, but was eventually brought back to Nevada, where it now hangs from the ceiling at McCarran International Airport. The entire story of this flight, and the record which stands to this day, is available to read at the Howard W. Cannon Aviation Museum at McCarran Airport in Las Vegas.

Editor's note: some simple math (24 hours/day multiplied by 65 days at 120 mph cruise speed suggests Cook and Timm covered about 187,000 miles - about 7 times around the world. The record-holding aircraft presently hangs (opposite)from the ceiling of McCarran International Airport in Las Vegas.

Who's the Cheapest of them All?

The RAA looks at what it costs to feed your ride



One of the main topics of discussion among pilots has for the past few years been the cost of fuel. In many areas of the country it is $2.00 per litre including tax, and many of us remember the good old days when it was under a dollar per gallon. Many of the engines we use, Lycomings and Continentals, are from the dollar per gallon days, and the average wage has not risen as fast as the cost of fuel so it's not surprising that we complain.

Big heavy engines use a lot of fuel to produce a lot of horsepower, small lighter engines use less fuel to produce fewer horsepower, and 2 strokes can use quite a bit of fuel to produce low horsepower. Modern electronic engine controls can improve fuel burn, but at the cost of more complexity and cost, and sometimes the loss of redundancy.

What can we do about this? The first matter is come to terms with the type of flying you really do, and to choose the airframe that is best suited for that mission. Do you need a plane that will shrink distance? This means speed, and speed costs money but what really matters here is miles per gallon. A clean airframe and good engine management will produce good miles per gallon numbers and save a lot of time. Our members in the Prairies appreciate Van's RV aircraft because these efficient planes cover distance quickly.

Or do you fly for entertainment, heading off to a Saturday fly-in 100 miles away? A fast plane then just means that you have to find a BBQ that is further from home, or else you would not get much time in your logbook. Pilots who do this sort of flying are concerned with both miles per gallon and gallons per hour. For many of these pilots the magic combination is 2 seats,100 mph, and four or five gallons per hour.

Pilots who live in bush country need an entirely different type of plane, something with STOL characteristics, good engine dependability, and landing gear that can handle rough ground. 100 LL fuel can be harder to find, so the ability to burn auto fuel becomes attractive, for both price and availability. Fuel mileage and fuel burn rate are a consideration, but not as important as being able to take off and land anywhere.

Two strokes are popular for the around the patch crowd, but their high fuel burn usually keeps them close to

Buzz Steeves' Belwood Special C-140 with O-200 is the ideal plane for many. Two crew can fly at 100 mph and 20 mpg, just right for attending fly-ins.

home, and the UL-type planes they are fitted into have a lot of wing area for STOL, combining to produce slow cruise speeds, therefore low miles per gallon and high gallons per hour. For many pilots this is not an impediment, as they are not flying far and just enjoy the experience of simple flying.

RAA has surveyed members across the country to get their real world numbers for fuel burn and cruise speed, and it is interesting to note that usually only the owners of the fastest planes knew their fuel burn numbers for full throttle. Most use about 75% power for cruise, manage their mixture if the engine allows this, and enjoy the flight.

In this report unless it is mentioned otherwise, the fuel is 100LL, gallons are US, and speeds are in mph. Some reported their fuel burn in litres per hour and some in gallons per hour. We have rounded off so that 4 litres equals one gallon, close enough for amateur observations.

Starting with the four seaters, Ivan Kristensen flies his IO-540 Van's RV10 at 195 mph cruise and runs lean of peak to burn 10.5 gph. Ivan uses his plane to fly cross country IFR at high altitudes to Florida and the Caribbean with his wife and their luggage, so both speed and mpg matter. He has given attention to drag reduction and this has paid off with 18.5 mpg, much better than he gets in his motorhome, and the -10 gets him to Florida in half a dozen hours. Wayne Hadath's RV10 is a bit lighter but flies VFR 5-8000 AGL, and always with all seats and full baggage. Wayne used to fly LOP and cruised at 170 mph, at 10.5-11 gph, resulting in 16 mpg. He finds the engine is happier running rich of peak at a higher power setting; the oil stays cleaner and the filter is cleaner too, and there is less lead buildup on the plugs. His current cruise is 180 mph and the plane burns 13-15 gph for 13 mpg.

RAA surveyed members across the country to get [the various aircraft] real world numbers for fuel burn and cruise speed

Tom Martin and Wayne Hadath have very clean Rockets that are similar but different. Tom has the tapered wing EVO and a 300 hp engine. Wayne has the Hershey bar F-1 wing and 260 hp. Not surprisingly, Tom's is faster at 264 mph with a full rich burn of 24 gph for 11 mpg with everything pushed forward. Wayne's does 250 mph at 23 gph for 10.8 mpg. When cruising to races both run lean of peak using 11 gph, but Tom's tapered wing reduces the drag to produce 235 mph and 21.3 miles per gallon. Wayne's straight wing cruises at 210 mph, resulting in 19 mpg. Tom points out that his late model pickup truck cannot match the gas mileage of his EVO.

A surprising plane in this group is Jack and Mike Wiebe's Falco, a 205 mph plane that uses 8 gph. The IO-360 with constant speed prop and retractable gear result in 25.6 mpg.

Ray McNally has a very clean Mustang 2 with 160 hp and a Prince prop and usually uses 2300 rpms, 18" MP, about 50% power. On one long leg of his trans Canada trip he cruised at 172 mph on 5.8 gph, returning 29.6 mpg. His measured two way top speed is 215 mph.

These numbers are impressive, and planes in this category can save a lot of time and money on a long trip. Even an economy car cannot match these numbers when the cost of overnight accommodations is factored in.

The 150-200 mph (top speed) club is frequently the domain of RV's with fixed props. Mike Bilinsky's 160 hp RV-6 tops out at 193 mph but he has not measured the burn at that speed. He cruises at 158 mph and burns 7-7.5 gph for about 22 mpg.

Don Kingsley's 160 hp RV-6 does 179 but he has not measured burn at this speed either. He cruises a bit slower than Bilinsky, and at 140 mph his burns 5.5 gph for 25 miles per gallon. Clearly, pulling back the throttle on a clean plane results in better mileage.

Jim Mantyla's Thorp T-18 with 160

hp and a constant speed prop cruises at 158 mph on 7.8 gph for 20.2 miles per gallon, very similar to Bilinsky's RV-6.

Jay Davis' Sonex with a 6 cylinder Jabiru is clean and fast, and its engine uses modern technology to produce a top speed of 165 mph on 7.5 gph and 22 mpg. He cruises at 145 mph on 5 gph, resulting in 29 mpg.

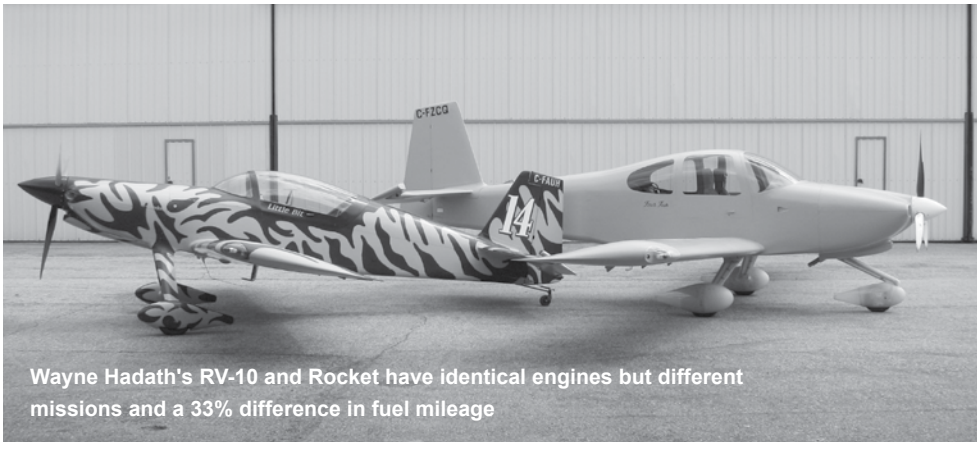
Peter Meszaros' Quickie 2 is a very clean canard airplane with well-faired landing gear. It's 2100cc VW engine runs on 100LL and the plane will make 155 mph on 4.5 gph, and 34 mpg. It cruises at 138 mph on 3.5 gph which gives 39 mpg..

Chris Walterson's Dragonfly is powered by a 1.8 litre turbocharged Subaru and it cruises at 145 mph on 3.5 gph, for 41.5 mpg. It too is a canard aircraft with faired landing gear, somewhat larger than Mezaro's Quickie. That it returns such good fuel mileage is due in part to the turbonormalizing of the Subaru engine to ensure good volumetric efficiency. Both the Quickie and the Dragonfly have fiberglass fuel tanks integral with the structure so they use 100LL to be free from damage by alcohol-bearing fuels.

The newest kid on the block is the Pipistrel. Reinhold Dresler's Virus SW has a top speed of 187 mph (consumption not measured though,) and cruises at 169 mph on 4.3 gph using mogas. The small frontal area allowed by the Rotax 912S and the extreme care in streamlining produce 39 mpg. At a slower 132 mph cruise the burn rate is 2.7 gph, producing 49 mpg, this on mogas at a 30% discount from 100LL.

Not surprisingly, all the planes above are cantilever wing aircraft.

Chris McHugh's O-200 Tailwind is very quick – he has not measured top speed fuel burn but he cruises at 140 mph on 5.5 gph for 25 mpg, pretty good for an early 1950's design. This engine runs on mogas so the cost per hour is further discounted some 30% compared to 100LL, equivalent to achieving over 30 mpg.



Wayne Hadath's RV-10 and Rocket have identical engines but different missions and a 33% difference in fuel mileage

Cathy Sutton's IO-360 Glastar cruises at 150 mph on 10 gph of 100LL, to return 15 mpg. Both the Tailwind and the Glastar have single strut-braced wings with efficient airfoils.

Members who responded with aircraft having top speeds between 100 and 150 mph have predominantly powered them with new generation engines.

At the top of this group is Matt Roung's 912S Titan Tornado which with its inflight adjustable prop can achieve a top speed of 142 mph. Matt cruises at 100 mph for economy and uses 3 gph of mogas for 33 mpg. A Rotax is equipped with Bing carbs that compensate for air density, so the mixture is always rich of peak.

Thomas Kawasaki built his taper wing Zenith 601 XL with a Jabiru 6 cylinder 120 hp and while he does not fly at top speed, he cruises easily at 135 mph on 5.5 gph of 100LL, resulting in 24.5 mpg.

Chris Gardiner built his KR-2 with a 2180 VW and at its 135 mph top speed it consumes 4.5 gph of either 100LL or mogas, giving 30 mpg. Slowing to a cruise of 125 reduces the burn rate to 4 gph, and improves mileage to 31.2 mpg.

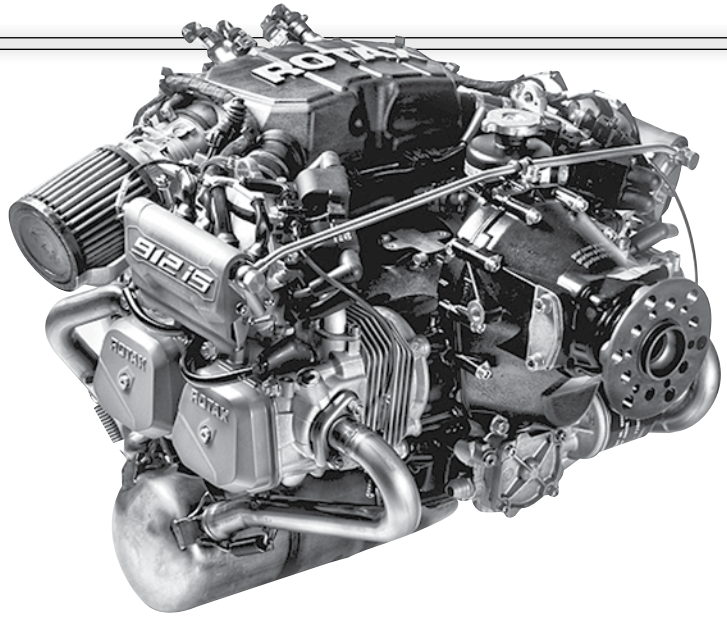
John Goodings has a Zenith 600 with Rotax 912S, and has a top speed of 120 mph at a 5 gph burn, for just under 22 mpg. Cruise is 105 mph on 4.1 gph for 25.5 mpg. John uses either 100LL or mogas, as available.

Ed D'Antoni's Aerotechnik Sportstar with 912S has a full gross cruise of 100 mph on 5.5 gph of mogas for 18 mpg. With only the pilot aboard Ed cruises at 115 mph on 4 gph to make almost 29 mpg.

For comparison, here is a traditional 2 seater with a Continental. Buzz Steeves did a complete rebuild of a Cessna 140, powering it with an O-200 and registering as an Amateur Built. His Belwood Special cruises happily at 100 mph on 5 gph, for 20 mpg.

And at the other end of the spectrum, George Elliott's amphibious 4 seat Cyclone is powered by a Continental 520, and cruises at 110 mph on 15 gph of 100LL, for a mileage of 7.3 mpg.

Murphy deserves its own category



because the plane is so versatile. It has a roomy 44"wide cockpit and 150 square feet of wing, both of which produce drag, but the plane can still return reasonable fuel mileage. It has been powered with everything from an 80 hp Rotax 912 to the large Lycoming 4 cylinders.

Tom Inglis decided to use the 80 hp 912 for his landplane Rebel, and for years has enjoyed its performance and economy. He flight plans for a cruise of 93 mph and burns 4 gph at this speed, whether flying solo or with a passenger, resulting in 23 mpg, pretty good for such a roomy aircraft.

Ken Lehman converted a Subaru 2.2 litre engine using a Marcotte redrive. On wheels he has hit a level flight airspeed as high as 138 mph but did not measure fuel flow there. However at 125 mph his plane burns 8 gph of mogas to produce 15.6 mpg. He usually cruises a lot slower though, and at 97 mph the engine burns 4.1 gph for 23.6 mpg. When sightseeing he flies at 86 mph and burns 3.5 gallons, giving 24.5 mpg.

Bob Patterson has an O-320 E2D 150 hp engine in his Rebel landplane and cruises rich of peak at 118 mph on 8 gph. This results in just under 15 mpg.

Ken Lehman also flies his Rebel on Murphy 1800 amphibs and in that configuration cruises at 92 mph and burns 5 gph, for 18.4 mpg.

John Davidson's Rebel has 150 hp and amphibs. It will fly as fast as 115 mph but he usually cruises below 100 mph. At 95 mph the burn is 10 gph, for 9.5 mpg.

Jack and Mike Wiebe's Murphy has 180 hp and amphibs, and cruises at 112 mph on 9 gph. They run lean of peak in cruise and get 12.4 mpg.

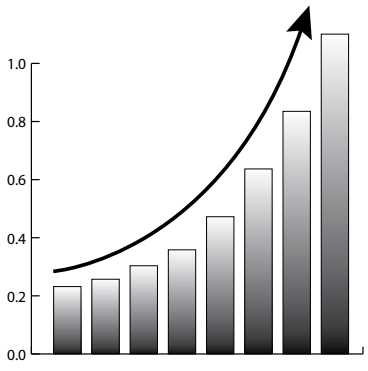
Walter Klatt's Rebel on amphibs formerly had 150 hp but he flies into a lot of high altitude lakes in BC and he wanted more power. He commissioned the build of a high performance Lycoming 360 that produces 190 hp. Full throttle with amphibs produces 140 mph and burns 18 gph, for 7.8 mpg. When cruised at 120 mph it burns 8.5 gph, making 14.1 mpg. Slowing to 110 mph reduces the burn rate to 7.5 gph, giving a minor improvement to 14.6 mpg. At an 80 mph cruise the burn is 5 gph for 16 mpg. Walter's Superior intake system gives very good fuel distribution so he leans aggressively, well past lean of peak.

Clearly the Rebel on wheels is a fairly economical all-round aircraft. On amphibs the consumption increases markedly but the extra drag is the price for the ability to land on water.

Planes that top out around 100 mph are typically used for bush work or around the patch flights. Fairings and streamlining are usually not a concern. Many have wire bracing on the empennage and lift struts are frequently round tubing.

Mike Diaczyk's Amateur built Cub with a 125 hp O-290 cruises at 95 mph on 7 gph of mogas. This is 13.5 mpg, not unexpected for a STOL plane with

New generation four stroke engines are very efficient, and if the airframe is optimized they can give great mileage.



Fast planes can be economical if they have clean airframes; if they are used for travelling long distances they can save a lot of time and hotel bills.

unfaired gear and wheels.

Dave Stroud's 2 seat Christavia is powered by an O-235 and cruises at 85 mph on 4-3/4 gph, for 17.8 mpg.

Bob McDonald built his Zenith 750 with a Rotax 912S and it tops out at 105 mph, even with its bush wheels unfaired. At a cruise of 93 mph it burns 4.5 gph of mogas. This roomy STOL plane returns just over 20 mpg, gets in and out of short fields, and flies all over Ontario.

Paul Bevilacqua's Zenith 701 has the same Rotax 100 hp as Bob's and hits a top speed of 100 mph. Paul cruises at 80-85 mph on 4.5 gph of mogas for about 18 mpg.

Jill Oakes has a Rotax 912S engine in her Land Africa, a plane very similar to the Zenith 701. She cruises at 85 mph on 5 gph of mogas to produce 17 mpg.

Matt Roung has a Buzzard that has had two different 2 stroke engines and he has finally settled on a Subaru EA81 that produces a top speed of 95 mph. He cruises at 70 mph on 3.5 gph of mogas, for 20 mpg. This is in contrast to the economy of his Titan Tornado but the Buzzard has large wing area and spacious side by side seating instead of the Tornado's tandem layout.

Brian Kenney's classic Pietenpol has wire spoke motorcycle wheels and a Continental A 65. Flat out at 90 mph it burns 6 gph, for 15 mpg. Pulling back to 70 mph for cruise reduces the burn rate to 4.2 gph, which translates to 16.6 mpg.

Harish Jadeja's side by side X-Air is powered with an HKS 4 stroke flat twin engine. At its 55-60 mph cruise it burns 2 gph, for 27-30 mpg, a testament to the efficiency of the engine.

Allen Mattice repowered his Beaver 550 with a Geo Metro 3 cylinder engine and an Airtrikes SPG reduction drive. Flown solo it cruises at 63 mph on 2.5 gph for 25 mpg. Slowing the cruise to 57 mph reduces the burn to 2 gph and improves mileage to 28.5 mpg. For comparison the same airframe with a 503 two stroke burns about twice the fuel, plus of course the added oil. The Metro is a very efficient engine.

Ed D'Antoni sent the numbers for the Rans S-12, one with a Rotax 912 and the other with a Rotax 582 two stroke. The 80 hp 912 cruises full gross at 85 mph on just over 5 gph, for 16.6 mpg. Another S-12 with a 582 two stroke has a full gross cruise of 65 mph while burning 7.5 gph, returning a mileage of 8.4 mpg. Leaving the passenger out of this plane raises the cruise to 70 mph and reduces the burn to 5 gph, improving mileage to 14 mpg.

As seen with the Rebels and the Cyclone, adding water landing capabilities can cost money in fuel mileage, but not so markedly in lighter and slower planes. Besides owning a Rebel, Walter Klatt also has an 80 hp 912-powered Chinook on Full Lotus amphibs. He usually cruises it at 70 mph and burns 4 gph, for mileage of 17.5 mpg. Walter says that a round trip from Langley to his cottage at Harrison Lake costs about the same in

the Chinook or the Rebel.

Dennis Vogan has an 80 hp 912 Searey that cruises at 80 mph on 3-3/4 gph of mogas, making 21 mpg. He flies this plane all over Ontario and enjoys its versatility.

And now the two strokes. These engines are small and light, well suited to planes that can fly on 50-65 hp. The downside is that fuel burn is higher than a 4 stroke, and most require mixing rather oil with the gas.

A Challenger is a very clean tandem plane that makes good use of a 503 or 582 Rotax. Bill Huxley's long wing 582 version with faired landing gear slips through the air at a top speed of 95 mph while consuming 3.5 gph, for 27 mpg. Cruising at 85 burns 3.1 gph for 27.4 mpg. Challenger owners use this economy to advantage and do a lot of traveling.

Fred Gayford has a Thunder Gull with 503 Rotax. This is the plane that was the inspiration for the Titan Tornado. With a 503 Rotax Fred's plane cruises at 90 mph on 5 gph of mogas, producing 18 mpg.

Fernand Ferron has a Kitfox 3 on straight floats, powered by a 582 Rotax. This plane cruises at 80 mph on 5.5 gph, for mileage of 15.5 mpg of auto fuel.

Ed D'Antoni also sent numbers for a Kitfox 1 with a 582 Blue Head Rotax. This plane on wheels flies at 90 mph on 4 gph, giving 22.5 mpg.

- **Fast planes can be economical if they have clean airframes; if they are used for travelling long distances they can save a lot of time and hotel bills.**
- **Flying a clean airplane, even if it has a Lycoming, at a reduced power setting can give mileage equal to an efficient sedan, and gets to destination a lot quicker.**
- **Running Lean of Peak in cruise gives improved fuel burn.**
- **New generation four stroke engines are very efficient, and if the airframe is optimized they can give great mileage.**
- **Auto conversions can be very economical too, even in a draggy plane like a Beaver.**
- **STOL planes are very versatile but they are usually not optimized for low drag, so mileage is not as good.**
- **Water landing capability exacts a price in fuel consumption.**
- **Murphy Rebels are very versatile and can be set up for widely varying requirements.**
- **And while two strokes are frequently considered to be wasteful of fuel, efficient airframes can still get good mileage with them.**
- **Now jump into that SUV and head to the airport, and consider that you could be flying a plane for less money.**

Left: Harish Jadeja's X-Air is not fast but it's HKS engine barely sips fuel. Above, Tom Martin's EVO and Ken Lehman's Subaru powered Rebel get similar low-20's mpg, but the racer cruises over 200 mph and the roomy bush plane cruises at 100. Below: Dennis Vogan's 80 hp Searey flies economically at 80 mph and 21 mpg to places landplanes can't go.

Women Fly! With National and Local Corporate Sponsorships

Women of Aviation International Week will include "Women Fly" March 9th at St Andrews Airport, which includes sponsorships from local, national and international aviation related corporations. Individuals and corporations are invited to take advantage of this advertising and recruitment opportunity by:

Providing a tax deductible sponsorship to help reduce volunteer pilots' fuel or aircraft rental costs.
Fly some of the 460 women.
Put up a display booth designed to attract women to various aspects of aviation.

As a token of appreciation, logos and links to web sites will be posted on the Women of Aviation International web site, viewed by tens of thousands of people, locally and nationally.

The following has been planned to date for St Andrews March 9th, , 8:30 am – 5:30 pm during Women of Aviation Week International; women get the free flights, however, men are invited to attend the ground displays as well!
Free flights for 460 women invited from MB universities, colleges, high schools and general public, Pre-registration required;
Fixed wing flights will be about 10 minutes, an elongated circuit: YAV to Lockport to YAV;
Custom Helicopter flights, about 5 minutes each;
Harv`s Air, Winnipeg Aviation, Mt City Aviation, and Millennia Helicopters are providing mini Ground School or `Walk-Arounds`, pilots, planes and/or demos;
Western Canada Aviation Museum and Commonwealth Air Training Plan (CATP) Museum are providing historical perspectives; the CATP volunteers will be in WWII costume!;
Universities & Colleges will have recruitment booths;
The Canadian Forces is providing power point presentations throughout the day, a recruitment booth, and their Dash-8 (CT142) will be doing a NDB31 practise on their way back from Kenora around 1100 hrs;
Nav Canada is providing Tower Tours and recruitment info.

Co-sponsors include: RAA, COPA, 99s Manitoba Chapter, Northern Spirit Women in Aviation International, CASARA, MAC, and Airlines, for example, Missinippi Air is providing their Piper Chieftan or C206, Keewatin Air is providing their King Air 200, Perimeter, local flying clubs, and other aviation related organizations will have displays and/or are volunteering to flying the women. Many of the 35 aircraft involved in this Women of Aviation International Week event will be homebuilt by members of the RAA! Male pilots are welcome!
We are raising funds to help defer fuel costs for volunteer pilots and are inviting aviation-related corporations to contribute towards the $10,000 required, corporate sponsorships are tax deductible.
Volunteer Air Cadets, pilots in training, and airline pilots who aren't current on small aircraft are being recruited for marshalling, photographing and registering participants.
If you or someone you know would like to contribute in anyway, email jill.oakes@ad.umanitoba.ca. We look forward to hearing from you.

Across Canada

RAA Chapters in Action

RAA Winnipeg

Since August, 2012, over 32 lives have been saved by STARS Air Ambulance using Lyncrest Airport on the outskirts of Winnipeg in the RM of Springfield! Lyncrest Airport, Springfield Flying Club, Recreational Aircraft Association and the RM of Springfield are thrilled to be part of the behind-the-scenes network that enables Manitobans to benefit from the fastest and highest quality ambulance service. STARS begins 24 hour service in February, 2013!

January 17th, 2013, at the RAA monthly meeting, about 60 participants including first responders (fire, medics, and nurses) from Beausejour, Winnipeg and the RM of Springfield, teachers, St Andrews Scouts, Lyncrest neighbours, Ward 1 Councillor, fixed wing and helicopter pilots, counsellors, Harv's Air CFI, residents from the RM of Springfield, Winnipeg and surrounding area.

The event began with an unexpected, REAL medi-vac (medical evacuation)! STARS Air Ambulance transferred a critically ill patient from Morden to the ground support ambulance waiting on the ground at Lyncrest Airport. In less than 15 minutes, the ambulance was on its way to St. Boniface hospital, shaving valuable minutes off the trip to the Intensive Care Unit (ICU).

STARS, Robyn Stewart and Troy Pauls, provided valuable insights as to the background and services provided by STARS Air Ambulance. Later the STARS Air Ambulance returned with pilots David Harding and Paul Adams doing two different approaches:

1. Hover landing, and
2. High hover and slow decent to touch down

...to demonstrate the two techniques used to reduce the effects of snow obscuration. There has been times when first responders from Fire Departments have had to stand on the landing spot so the pilots could use their uniforms as points of reference... apparently the fire crew is best suited for this because their clothing provides the most protection! Would be quite an experience for the fire crew member standing that close to the action!!

The audience was spell bound as we were walked through a day in the life of a state-of-the-art service that the Manitoba government and private donations support. This service not only shortens time to the hospital, it saves community medical doctors' time-expensive trips escorting critically ill patients to Winnipeg. For example, Swan River is only 2 hours away via the STARS Air Ambulance and six hours each way by ground support! The one-doctor medical unit closes when the medical doctor escorts patients via ground ambulance. With STARS, the community doctor remains at Swan River and the STARS medical crew (including a doctor!) is able to provide top quality medical service to the patient during the 2 hour trip to a Winnipeg hospital...leaving Swam Lake with their doctor and providing the patient with a significantly shorter journey, a critical benefit when time saves lives!

In addition to search and rescue support, child birth difficulties, and other medical emergencies, STARS Air Ambulance services local emergencies. Whenever traffic jams, road or weather conditions make it difficult to get to an accident site, STARS helicopter is called to help - for example the multi car accident on the north Perimeter, another on Dugald Road, and numerous within the city limits during rush hour.

The Recreational Aircraft Association, Springfield Flying Club, Lyncrest Airport, and RM of Springfield are proud to be able to support this significant health benefit for Manitobans.

Toronto Rotorcraft Club

The January meeting consisted of dealing with fuel gauges, fuel pressure valves, fuel stabilizers and the benefits of using premium fuel. The workings of the impulse mag was explained, as was pitot tube calibration using a fan and a Hall airspeed disc tube (which is available from Aircraft Spruce).

Don Hundt has made the decision to go ahead and purchase a larger power plant. Hopefully the road gets easier with this purchase. Winter is the time to review your flying procedures.. Just because you did it twenty times before, doesn't make it right. Go back to the basics and it will help save you if reviewed with an open mind. Find out what others are doing and compare.

RAA Okanagan Chapter 433

What a winter we have been having! It has been fantastic for my snowboarding with big dumps of snow and warmer than normal temperatures. However, the flip side to that has been the low valley cloud and IFR visibility here in Vernon; particularly on the weekends. I have not pulled the plane out of my hangar since the end of November and this is the first year that I can remember, that I was not been able to fly over my Christmas break! Two weeks of low ceilings and dangerous flying. I have shoveled the snow from in front of the hangar 5 times just in case I can open the doors again and pull out my baby.

RAA London-St Thomas

Our first Flying Club meeting took place last Tuesday evening, January 15th. We were creating something from scratch and had lots of input from all in attendance.

We decided to start off with ideas for a Vision Statement to use as a reference. It has not been completed in a statement yet but included desire for; group participation, camaraderie, fly-outs, learning, hands on maintenance to lower costs, flying skills, with concern for affordability and liability of members.

We discussed what to include in fixed and operational costs. We also discussed the addition of the Karatoo ultralight that will be joining us soon.

At the February meeting, Chris Staines introduced David Zwart as a Visitor. David is the builder of a Van's RV-8 and is a Commercial pilot flying through the summers in Northern Manitoba. Phil thanked Bill Weir for the publishing of the "Trustees of the Tool Room".

Denny Knott spoke next about the Sky Hopper. He said that it is flyable and the restrictions have been lifted. He indicated that the next phase of the project needs to be determined. The club needs to determine how and when the structure of a flying club will be put in place. To make this discussion even more interesting is the recent donation to the club of Bill Rice's Karatoo ultralight.

Gus Cameron mentioned to the members that there is going to be a De Havilland Mosquito at the Hamilton Air Show on June 15th and 16th. It is American owned but was originally a Canadian plane. It was restored/rebuilt in New Zealand where they created new molds for what was one of the original composite aircraft. There is only one flying example in the world so it would be a treat to go and see it.

Dave Hertner brought a new propeller speed reduction unit case and final drive shaft for members to have a look at. He hopes to have his PSRU rebuilt and back on his RV-10 sometime in 2013.

Phil Hicks talked about his Sonex project. He has been working on the wing skins and said they are looking very porcupine-like with all of the clecoes sticking out of them. He said that he is starting to think that it might fly some day!

Roland Kreining shared that he is about a week away from starting his Honda FIT engine in his Murphy Rebel. He talked briefly about the manufacturer and his experience in the purchase of his engine. Good luck with your first start!

Bruce brought examples of the ELTs that have been offered by Pointer Avionics over the years. He walked us through the many changes in ELT design and also spoke about the regulations regarding the manufacture and use of ELTs. He gave us a history of his company and had numerous anecdotes about the testing of the ELT his company currently offers. Of particular interest to the group was the way in which Pointer has become an industry leader in design and how they have made the servicing of their units so simple. They have designed the unit such that any licensed technician can plug your ELT into their computer and connect it to Pointer through their Internet portal. This has done away with a majority of the shipping

Join the RAA Forum

RAA's new forum is online! We hope to add many features over the next while to enhance the value of your membership. The URL is the same at raa.ca - once you're on the home page, simply click on the "forum" tab to get there. You'll find it a useful place to exchange ideas and ask questions - but it's only as good as the people who contribute to it. Help make this a useful resource for builders and pilots.

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

involved in re-certification. Bruce answered all of the group's questions and there was quite a scrum around him at the end of the presentation.

RAA Scarborough-Markham

At our January meeting, our first DVD showed a vast array of military aircraft, which have been employed by the Royal Air Force and the U.S. Air Force. To name just a few from a very large number, we saw historical pictures and commentary concerning the: B- 52 and Avro Vulcan bombers, Bell X-1 experimental aircraft in which Chuck Yeager broke the sound barrier, SR-71 Blackbird (> Mach 3 at 85,000 feet), Shackleton and Nimrod Search & Rescue/Patrol aircraft, Red Arrows (U.K.) and Thunderbirds (U.S.) aerobatic teams, C-130 Hercules transport, Starlifter and C-5A Galaxy giant transports (the aluminium overcast), F-15 Eagle and F- 16 Flying Falcon, low-level Bucaneer (500 mph) and Jaguar (800 mph) strike aircraft, A-10 Thunderbolt (Warthog), and F-117 Nighthawk stealth fighter as used in the Gulf wars. Altogether, a truly dazzling array. Much more down to earth, this was followed by a construction video on the Vans RV-8. These films were very good.

RAA Chapter 85 (Vancouver)

President John Macready introduced Eric Munzer. Eric and Gordon Hindle who presented an Introduction to Gyrocopters, and Eric proposed a plan whereby the chapter would build one during chapter meeting nights. A lot of interest was generated, and Cyril thanked the speakers for their presentations.

Membership Chairman David Marsden reported that we have 25 members signed up for 2013.

President John reported on Turbi repair/restoration progress. The structural repair and fabric work is completed and painted. The Turbi repair team is now focused on parts cleaning, replacement and reinstallation. We are about a week or two from re-installing the wing on the fuselage.

Trevor Skillen reported on recent activities at the Air Park. They will be reinstated later in the file copy. Trevor asked everyone for their financial support of this event.

Trevor explained that the big DapCom budget item for 2013 is barn refurbishment--the barn hangar is at risk of collapsing. Runway levelling is still under review. Runway improvement would include levelling and new sod and would likely mean the runway would be out of service for at least a week.

The Annual Delta Fly-In will be on Saturday 29 June. Also a biplane fly-in is being considered; no date has been set. An option for March will be to continue discussion of Eric's gyrocopter project proposal.

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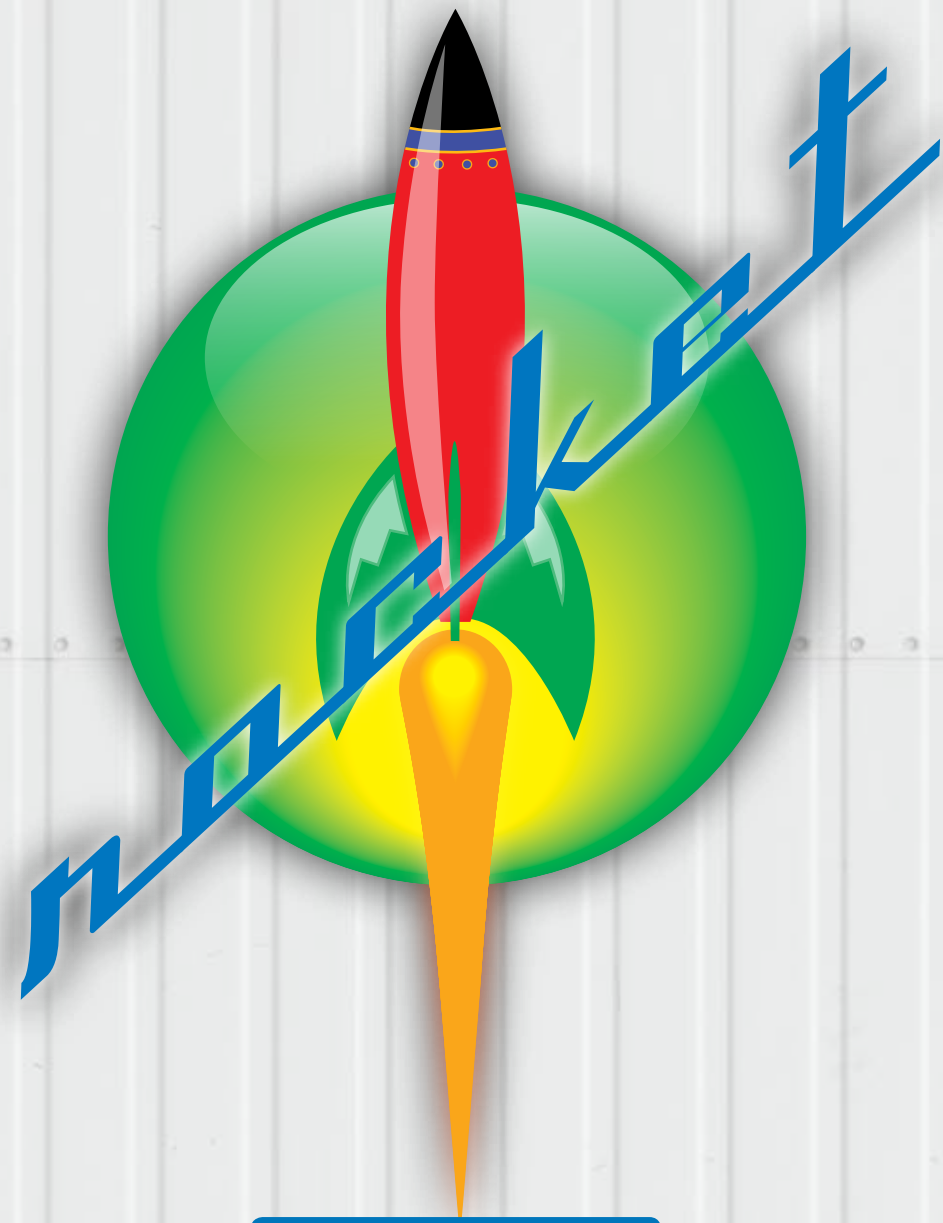
AirWear.....Dave King

MIKE SKOCZEN'S



ONE BUILDER'S
IDEA OF HOW THINGS
OUGHT TO BE / BY GARY WOLF

Rocket graphic by George Gregory

SOME OF US

are merely observers of aviation, some build but never fly, and some actually complete and fly an aircraft. Mike Skoczen began as a young balsa boy flying U-control and then R/C planes in his teens. At eighteen he got an UL permit and began flying and teaching in a Beaver 550 UL. The money earned from teaching UL students was spent on lessons in a Citabria until he had his Private ticket, followed by licenses for Glider, Helicopter, and type ratings on the Canso PBY and the DC-3. Mike rounded this all out with an AME license and went to work at a Canadian aircraft manufacturer, eventually managing their Final Inspection and Test Flight Department. He also worked at the main factory in Europe, helping with the certification of a new model and performed the first flight of the production version off the London production line.

Mike Skoczen's current plane is a much modified RV-4 that is his personal statement of what a sports airplane should be. Mike has built six aircraft, three of them aerobatic. He has competed in Canada and the US, and holds a Special Flight Authorization for low level aerobatics, so he definitely knows what he wants in an aircraft. The plane before this RV-4 was an RV-3 that came close but could not stay within the aerobatic weight when fitted with a constant speed prop, so an RV-4 was the obvious next starting point. The RV-3 has a 12% 23012 airfoil and the RV-4 is of the same series but 13.5%, allowing a deeper spar for greater strength. He was influenced by Bruce Bohannon's Tiger and John Harmon's Rocket 3 but felt that he could achieve his objectives better with a lighter four cylinder engine instead of their heavier sixes. With a smaller engine weight saving was going to be important and so was drag reduction.

Mike began with a partial RV-4 kit but he wanted the wider firewall of the Harmon to eliminate the cowl cheeks and reduce the drag of the fuselage. This part was not available separately so he lofted his own firewall with the stock width at the bottom and 33 inches at the top.

The solo pilot now sits in the rear seat, while the aerobatic fuel tank resides in the front bay. The CG is still within range as on a stock -4 the passenger and luggage are well behind the centre of the range. Changing the firewall and moving to the rear seat meant making many modifications to the fuselage structure, among them supplementary top longerons, new fuselage sides, extra bulkheads to support the new fuel tank, and a set of hanging pedals. The narrower rear cockpit required an electric actuator for the flaps, and Mike incorporated his own reinforcement to the flap actuating torque tube. He had noticed some flexing in this part on his RV-3 so for this plane he added a riveted-

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MIKE SKOCZEN EAR

in tubular internal reinforcement.

The rearmost bulkhead of an RV-4 fuselage is somewhat wider than the rudder, encouraging turbulence. Mike drew and formed up a new bulkhead to provide a smooth drag-reducing transition from the fuselage to the rudder.

The 15 gallon aerobatic fuel tank was formed by Mike from .040" aluminum sheet and was expertly tig welded by Trevor Rafferty. It incorporates a flop tube and is fitted with a standard Aircraft Spruce welded-in bung and cap. The tank has upper and lower straps holding it firmly in place to the longerons and bulkhead, and it is covered by a quickly removable aluminum skin. The standard Vans leading edge wing tanks remain, and all three tanks run to a left –centre-right fuel selector valve. The wing tanks have float-type senders and a gauge, and the aerobatic tank has a sight gauge. Boost pressure is by a Facet pump that delivers 34 GPH. The gascolator is positioned in a protected position at the lowest point of the forward fuselage, and is NOT in the engine compartment above the exhaust.

The cockpit canopy and turtledeck are both custom parts designed my Mike to provide smoother airflow back towards the tail. He tried the Harmon bulkheads but did not like their width and the resulting wider canopy, so he drew a narrower custom canopy that was blown by Aircraft Plastics. It is double curvature but the windshield section has a curved point instead of the customary half circle. The bubble was trimmed to fit the fuselage and then a skirt was made from carbon fibre and glass, bonded to the canopy and laid onto the waxed fuselage. Stiffener ribs were incorporated into the layup and finally the bubble was cut transversely to produce the windshield and slider section. UHMW plastic blocks similar to the ones used on an RV-8 are used as slides. The canopy is fastened for flight with a primary latch on the left and a secondary latch on the right. Bleed holes in the glare shield allow warm cabin air to access the windshield for defogging and defrosting.

The canopy's slider portion ("real airplanes have sliders"-Mike) fairs into

Above: the handmade cowling has a ducted plenum for the oil cooler; right, the cockpit is simple and purposeful as befits the Rocket's mission

ET TO HAVE AN EXPERIENCE LIKE THIS.
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a narrow supplementary fiberglass turtledeck, essentially an extended headrest. This runs all the way to the vertical fin, and fastens with screws onto the original RV-4 aluminum turtledeck. To make this part Mike first wetted out two layers of cloth and laid them onto a flat surface until they were partially set. He then pushed this sheet into a female form and laid more cloth inside to reinforce this new turtledeck, and a bulkhead was bonded to each end. The flanges were made by wetting two layers of cloth and laying them onto the waxed aluminum turtledeck, and the glass turtledeck was then bonded to the flanges, resulting in a removable part that has no visible fasteners. An added streamlining benefit is that the antennas are placed inside the glass turtledeck, reducing the number of drag producing projections.

Mike chose to use the stock RV-4 wing spars and ribs but he shortened the span by 40". It would have been simpler just to shorten the ailerons too but Mike wanted a fast roll rate for aerobatics. He kept the full length ailerons, and this necessitated moving the aileron bellcranks inwards and modifying their linkages. The d-cell of the ailerons had a bit of a cusp at their spar line so these got a bit of filler to smooth the airflow. The flaps were shortened appropriately and Mike made positive bump stops against which the flaps retract, to ensure that there would be no trim change at high airspeeds. Root fairings were made by cutting and taping Bristol board to the plane, and glass was laid onto these forms. The resulting fairings attach to the fuselage with nutplates and countersunk screws.

Wheelpants are made from carbon fibre. below, Hooker Harness system keeps the pilot well tucked in for his aerial adventures.

The wings themselves are fitted at an incidence ½ degree lower than stock to position the fuselage at the correct attitude at the higher expected airspeeds. This was accomplished by shifting the main fuselage bulkheads during its build. The wingtips are currently the stock RV-4 items but their mean camber line does not match that of the wing airfoil, and Mike's tuft testing has shown that there is considerable turbulence in the rear third. They also weigh some 4-1/2 pounds each so Mike plans to make smaller, lighter ones in the future.

The horizontal stab is the stock RV-4 part but it has been fitted with the nose a bit higher than stock. The elevator is 100% mass balanced and at high airspeeds there is still a need for some nose-down trim so there will be some more fine tuning to come. Of course this will necessitate another intersection fairing so out will come the Bristol board and foam again.

The vertical fin is stock RV-4 and the rudder is stock except that its

Don Curtis Photo

Above: after building six aircraft, the Rocket might be considered an opus. Left: At dunnville museum. Opposite, the Rocket features shortened wings but full length ailerons for fast rolls

lower edge has been trimmed to match the line of the bottom of the fuselage. The rudder is not mass balanced – the Harmon uses the same part and there has been no flutter up to 245 mph.

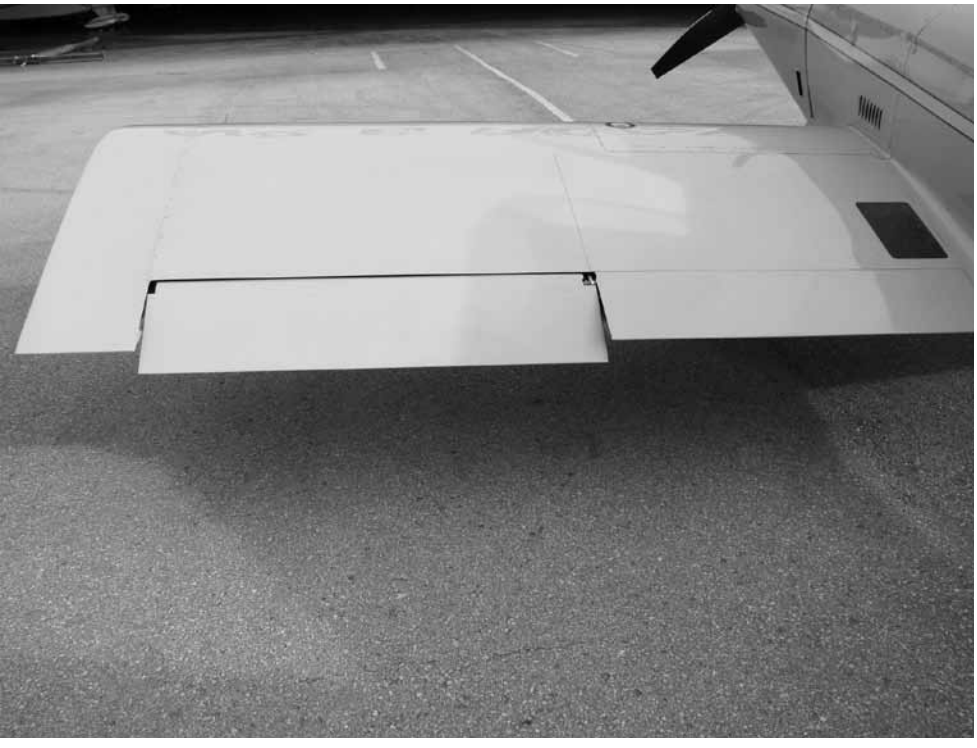
Landing gear is stock RV-4 and Mike made his own fairings and wheelpants from carbon fibre. If he had it to do over he would use glass cloth because there is little weight saving and it is easier to drill and fit glass parts because they are translucent. Still, every bit of weight saving helps.

The cockpit is spartan and purposeful. Upholstery is a thin pad on the metal seat frame, the interior is painted, and all control linkages and cables are completely exposed for ease of inspection. There is of course a snug five point harness for aerobatics, and a fire extinguisher readily available right under the pilot's knees. The electric flap actuator is against the right cockpit side

The panel has day VFR steam gauges, plus a Grand Rapids 4000 engine monitor, a Trutrak Gemini attitude indicator, and Flight data systems G-meter and fuel flow. Radio is an Icom A-210, and transponder is a Sandia STX 165 with built-in encoder.

Everything in the Rocket's cockpit is within reach when strapped in, as would be expected in a high performance aerobatic plane.

The engine cowling is a one off part, and initially Mike began with a Harmon cowling but realized that very little of it would fit with a four cylinder engine. He pulled moulds from the front corners to get their shape and the air inlets but everything else was made the usual hard way with foam and plaster. An air inlet on the left side ducts air to the oil cooler, and this duct continues to the side of the fuselage where the air exits. Cockpit adjustable cowl flaps at the lower rear edge control the exit of air from the engine compartment.



The engine that powers this plane is an O-360 M1A with roller rockers, built by Aerosport Power of Kamloops BC. It has their standard build with Superior cylinders that have the stock compression and valves, and Aerosport's own aerobatic mods to the case. The engine mount is the stock dynafocal RV-4 unit with aerobatic mounts.

A Christen inverted oil system has been fitted with a crankcase breather alongside an exhaust pipe. The intake system uses the Superior Cold Air forward facing sump and an Ellison 4-5 throttle body injector. Mike prefers this unit over fuel injection because it runs at the stock low pressure and there are no high pressure fuel lines inside the fuselage. Exhaust is a Vetterman four pipe system that was designed for the RV-7. Ignition uses a Slick mag on the left and a P-mag on the right side with automotive plugs and harness firing the top cylinders. Power is converted to motion via a certified 3 blade MT swept blade prop set for 2700 rpm's.

Mike is very happy with Aerosport's engine – it runs smoothly and without any leaks, and shows zero oil consumption, plus they are Canadian!

What does this plane fly like? There is no one better able to describe the experience than Mike himself.

"Philosophically it's the culmination of all my experience building and flying; it has a nice blend of speed, climb and handling. It's an original, I've been able to build the vision I had in my mind of the fighter… the racer… the aerobat.

I've been inspired over the years by those who concerned themselves with utility and performance versus fashion, the latest technology, and swooshy paint jobs. The goal was 950 lbs empty and 200knots. I missed the weight by 12 pounds but did meet the speed goal.

As for the flying…

I still get excited when I walk into the hangar and see it waiting for me. I don't rush the walkaround; I like looking at it, getting ready…

I STILL GET EXCITED WHEN I WALK INTO THE HANGAR AND SEE IT WAITING FOR ME

Strap in…checklist, ready to start.

It rocks when I crank it - I like that - it starts and is instantly smooth… the 3 blade prop was worth every penny…I smile.

As it warms up I look around inside the cockpit, get my head in the game, use the checklist…OK to taxi.

Head outside now, check the brakes. S-turns to the runway, run-up, checklist complete and its time to go.

Eyes ahead and smooth with the power; I feel the push in my back and

Three of Mike's planes - Acro-Cub (Pilot/Owner - Bernard Neiberg), RV-3S (Pilot/Owner – Bill Scott), and of course Mike Skoczen in the Skoczen Rocket. Don Curtis Photo.

the tail comes up.

The stick floats in my fingers and I apply some right rudder to keep it straight.

Pressures and temps are good, and a little the back pressure.

Airborne now and no need to wait…keep pulling to keep the speed down to 100 ias…coming up on 1000 agl now and its time to turn, look over my left shoulder as the ground goes away.. I smile again.

90 seconds from the start of the take-off and I'm leveling off at 2500 agl looking for the shoreline and the aerobatic practice area.

Power set to 24 inches and 2400 rpm, settling on 185 ias, HASEL checks and tighten the seat belt ratchet a few more clicks.

No need to dive for speed and the loop only needs a 2.5 g pull, back at the same altitude with 190 on the clock and a nice, smooth pull with the slightest bit of left aileron for a barrel roll, it's a half loop half roll affair that I am in no rush to complete.

Some slow rolls, inverted flight with some turns for practice, and it is time to head home.

Eastbound now, in a gradual descent with 10 knots on the tail I push all the levers fwd and watch the ground speed read out on the GPS. 250 is a good number 10 miles back and I start thinking about the circuit, traffic and radio calls.

Enter the downwind at 140 slowing to 120 with 10 degrees of flap, base at 100 with 20 degrees and final at 85 and 30 degrees with a trickle of power.

Flare when it feels right, wipe the power off and place the main wheels on before we get too slow.

It tracks straight, a little pedal work as the tail comes down, canopy open for the back track … I smile one last time."

Not many of us get to have an experience like this. Mike Skoczen earned his.

The Princess Auto Heavy Duty Air Hydraulic Riveter *by Chris Staines*

I recently completed the installation of a new engine in my Europa and had to redesign parts of the cabin heat system to accommodate changes Rotax had made to the dimensions of the muffler system on the 914 power plant.

This involved the use of more than a few pulled stainless steel rivets and I ended up with muscles in my hands that ached for a week after. This prompted me to look for a better way to complete such a task in the future.

The Aircraft Spruce and Speciality Catalogue had an air powered unit for about eighty dollars U.S. and I almost purchased one through their store in Brantford until I realised the Princess Auto store in London, Ontario carried what seemed to be the same item. Though I did not examine the Aircraft Spruce product, the one from the local Princess Auto store appeared to be well made - with no shipping costs attached. Many items at Princess Auto are made in China with the quality that sometimes implies, but their Air Hydraulic Riveter is beautifully fabricated in Taiwan. The finish, machining and assembly of this unit appear to be first rate and similar to other products that I have purchased of Taiwanese origin. Many of the 'high tech' items we use every day are manufactured by Taiwanese companies and their quality control is very good.

I have used this riveter to place about fifty 3/32" and 1/8" Cherry 'N' pulled rivets on a recent project and was impressed by the ease of use, quiet operation and low air consumption. The unit is balanced for upright operation and if a lot of rivets have to be placed it would be wise to position your work piece to allow upright operation. It works well in any other position, but is a little more awkward to handle, especially with an air hose attached at the base. At just over three pounds it is a fairly light device, considering it has almost sixty parts, but the base is bulky and most of the weight is there as well.

I was concerned about rivet shanks jamming in the jaws, as this has happened with hand powered riveters, but had no incidents or mechanical problems of any kind. The unit appears to be maintenance free and the instructions contained no mention of recurrent attention in this regard.

The device uses only 1 ½ liters of air per actuation and for smaller projects or repairs , without easy access to an air compressor, a small tank of compressed air would work well, due to the low air consumption.

Overall I am pleased with this purchase, as are my hands. My only regret is I did not purchase it three weeks later as it was then on sale for just under fifty dollars. If you have a lot of pulled rivets to place, this will put a smile on your face.

Chris Staines *is a member of RAA London-St Thomas chapter and is building a GP-4.*

The Bi-annual Pitot Static Check *by Tom Martin*

Based on CAR 605.35, if we fly in transponder required airspace the owners of amateur built aircraft are by law supposed to get their pitot/static/transponder/encoder check done bi-annually. I recently had this testing done by Kitchener Aero, Kitchener, Ontario. I have dealt with this company numerous times over the years and this time I asked if they would mind if I took a few pictures and asked for some basic information regarding what they actually look for.

There is some pretty sophisticated equipment used for this testing (High end RVSM and XPDR test sets can typically cost around $50,000 and $20,000 respectively + $1,500 in annual calibration costs). The first thing that happens is that the altimeter is removed from the aircraft and bench tested to make sure that it meets certain criteria. It was tested from -1000 feet to 20,000 feet (in accordance with CAR Standard 571 Appendix F). There is an allowance for error of a +/- 20 feet at lower altitudes to +/- 130 feet at 20,000 feet. The instrument is also checked for case leaks, hysteresis, after effects, barometric scale error, and for friction lag. It was interesting to watch the needle climb as a vacuum was applied. It is not a real smooth motion and this is due to internal friction. The technician actually tapped on the case lightly to simulate engine and airplane vibrations. Apparently my altimeter was very good and had negligible errors. This was a mid to low priced unit and is six years old.

The verified altimeter is reinstalled in the aircraft and the pitot and static sources are plumbed to an expensive piece of equipment that will test the system in place. The pitot-static test set applies a vacuum to simulate a slow climb, 1000 feet per minute and compares what it says the altitude is compared with what the altimeter and the transponder read out. In my case I have an Advanced Flight Systems 4500 EFFIS and we were able to initially show that it was reading about 30 feet low. The nice thing about an EFFIS, at least this one, is that making

adjustments to errors is quite easy. Now that the EFFIS and my altimeter were reading the same number, the test continued. The transponder and encoder itself is checked (in accordance with CAR Standard 571 Appendix F) with another piece of equipment that tests the antennae, that the unit has adequate power, it is operating in the correct frequency range, has the ability to reply to the tower and also to check the ident button. As the encoder only reads in 100 foot increments it is also important to note were it changes to the next level. This should occur as it passes each 50-foot mark. For example, as it was passing 3550 feet the encoder should change from 3500 to 3600 feet. At 14,800 feet, a CARS required test level, the rate of climb is stopped and the error between what the altimeters and the transponder are showing, with what the level actually is, are recorded.

Above, opposite: the removed altimeter being bench tested. Here, the testing equipment is connected to the pitot static system of the airplane.

The allowed error at this level is +/- 125 feet. This is as high as the testing is required to meet the regulations but I occasionally fly higher and thus the system was tested to at least the maximum operating altitude of the aircraft.

My airspeed system was also checked for errors and had a small error at lower airspeeds but at my cruise speeds of 200 knots it was quite accurate. It is important to note that all of these tests are done on the ground and if you have static errors that occur due to flight conditions this can introduce significant error. Determining static system errors in flight could be an entire separate article. Kevin Horton, Ottawa, has an excellent website, http://www.kilohotel.com/rv8/index.php

Check the flight test links for more information on this issue.

The whole process can be done in a couple of hours if there are no problems encountered with the system. While I was there another aircraft was tested and the transponder failed the Appendix F test requirements. This unit appeared to be working properly and had not been flagged by the operator or the tower as being in error. In this case the transponder was removed from the aircraft and the staff was able to reset it in their avionics shop.

As amateur built owners we often have panel equipment that is not certified, as is the case with my EFFIS. Typically certified avionics are required to pass certain tests and are then labeled "TSO'd". Basically this means that they have been tested for various conditions and have been proven to behave in a predictable fashion. My EFFIS has a built in encoder but as the unit is not TSO'd it falls into a grey area in the regulations. Apparently it is legal to use non-TSO'd equipment but we have to be able to prove that it functions to the same standards as does the certified versions. In the case of encoders Kitchener Aero, my shop, is unaware of any facilities in Canada that would perform TSO certification of a third party's encoder. It might be possible to find a shop that would sign out the equipment but they would be pushing the limits of the regulations. Thus I have a separate TSO'd Sandia encoder, mounted in the aircraft. Interestingly, the altimeter itself does not necessarily have to be TSO'd equipment. I would suspect this is because it is quite a simple piece of equipment and is also easy to test in shops for accuracy.

If there are no problems you can expect to pay around $410 for this bi-annual check and if there are problems then you should be relieved that they were found, especially if you fly in controlled airspace. I find this to be an interesting exercise as it also provides a bi-annual review of the systems and how they work together.

Tom Martin *is the builder of an EVO Rocket, races it on a regular basis and knows a lot about making airplanes go fast.*

Electric Ceramic Engine Preheater

Jim Anderson / RAA Flamborouugh

I was approached by a fellow Glastar Builder this winter with a problem starting his cold engine on his 180 hp Lycoming powered Glastar.

He had already tried the Silicone electric heating pad on the oil sump and it wasn't hot enough and didn't bring the engine oil temps up high enough or fast enough. Different solutions were discussed including things such as oil dip stick heaters, using a light bulb inside the cowling and gas flame engine pre heaters.

Each of these solutions had limitations and I was not too fond of using a flame sourced heater around the cowling of an airplane inside a hangar.

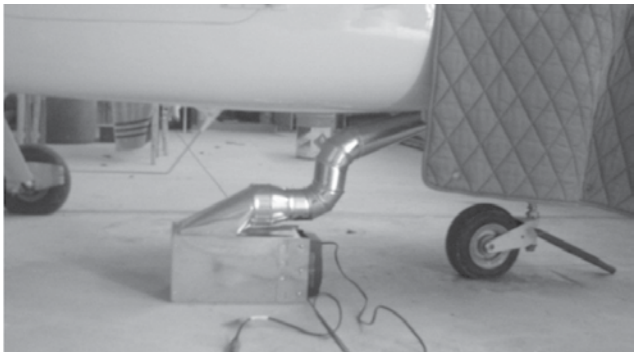
After I left the luncheon with my friends I drove to Rona lumber and browsed the Aviation Isle for a possible solution to the problem. First I hit the Aviation Isle for Ceramic Electric Heaters and found a suitable heater with a somewhat flat and rectangular shape that would fit inside some sort of an enclosure. The shape is important to simplify fabrication, sealing and fastening the heater to the unit.

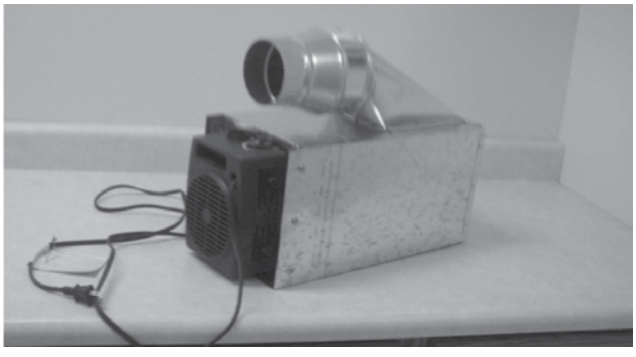
Armed with this discovery I pushed my cart over to the Aviation/Furnace Ducting Isle and browsed through the various parts available off the shelf to make up the rest of the heater.

The Ceramic heater was roughly 5 1/2" wide by just under 8" high and I quickly decided to use an 8 inch square box for the design. Next I chose a piece of Galvanized sheet metal 16" wide and 36" long normally used in the heating industry for cold air returns by nailing them to the bottom of the floor joists. I selected one straight undamaged piece for my heater prototype.

The 16" X 36 " piece of galvanized sheet metal was marked with 4 parallel lines spaced 8 inches apart starting from the unbent, flat 16 inch long edge. The other end the sheet has some funny bends that we don't need and I measured another line 1 inch past the last marked line and cut off this surplus piece of sheet metal approximately 3" wide X 16 " long.

I bent the sheet metal on each of the marked lines up 90 degrees to form a square box tube. The 1" X 16" tab that is left over wraps around the straight edge of the 16" long side that meets it's bend and holes are drilled through the mating edge of the box and the 1" flange. (This is a good place to use your clecos to hold everything into alignment) The box is pop riveted together along this 1" wide overlap.





Top: side view of heater with duct inserted into the cooling air outlet. Above, the Ceramic Heater modified for Engine preheater application on the author's Glastar . The duct insulation is removed for clarity of the ducting

I searched through the bins for a suitable end closeout for the box. I found a standard 8" X 8" furnace duct close out prebent to slip onto the end of the 8 inch square ducting. This was perfect and only required minor bending to complete the closeout.

In fabricating the end cap for the box I used a standard heating 8" X 8" Closeout that you buy prefabricated from Rona. Two opposite side are totally shaped and the other two opposite edges will need to be bent to match the other two edges.

I bent these in a vice between two pieces of angle iron to 90 degrees and then completed the bends using standard flanging pliers.

Next place the end cap onto one end of the box. Note that by design it captures the edges of the end of the square tube between an inner and outer layer of sheet metal. Drill carefully through the outer layer of the cap, the end of the box and the inner layer of the end cap with a 1/8" drill and Pop rivet the end on. I then had to decide how to get the hot air from my 1500 watt heater up into the engine to heat the oil sump.

I decided on using a top take-off used in the heating industry to run 5" pipes from the top of the main heating trunk lines in your house to each individual room. I chose

Left: opposite end view showing the stock end cap. Centre, end view showing Facto Heater with left and right side retaining pop riveted to the end of the fabricated heaterbox. Angle Brackets Trimmed to fit side contour of the heater. Right, the view showing the end close-out and top take-off.

to use a 5″ diameter take-off to ensure good air flow. Install the take-off so that the round outlet faces the heater end of the box. (it is more compact this way)

By using this type of take-off it simplified the construction of my heater in that the boot was already fabricated with the rectangular side that would fasten to my fabricated box by simply cutting a rectangular hole with tin snips and inserting the provided tabs through this hole and bending them back over to firmly clamp the boot to the box. The Take-off Ducting is formed with a top flange around the rectangular perimeter of the hole and numerous tabs that are bent under once they are all passed through the hole.

The final step was to drill 1/8″ holes through the top flange of the boot, through the edge of the hole in the sheet metal box and through the tab that was bent back under to secure the boot to the box. This provides a strong attachment of the boot.

This top take-off comes fabricated with a round transition at the other end which was real convenient.

Next I had to come up with a solution to get the heat into the cowl and the simplest way was to use 2-90 degree elbows which are also standard fare in the heating industry. I was sure glad that their industry adheres to the same high standards we have in the aircraft industry and their parts were compatible with my project.

The advantage of using the standard heating industry 90 degree bends is that by rotating the various segments of the bends we can change the angle that the pipe leaves the heater and approaches the underside of the airplane cowling. Everything from 90 degrees vertical to 90 degrees horizontal is possible with most aircraft requiring something in between.

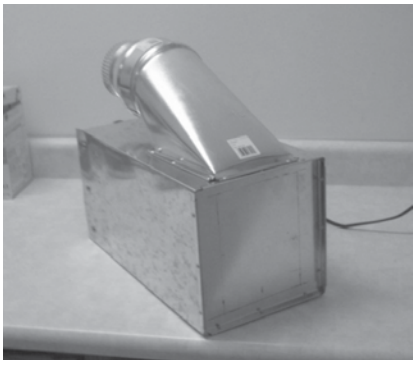
Each of these solutions had limitations and I was not too fond of using a flame sourced heater around the cowling of an airplane inside a hangar.

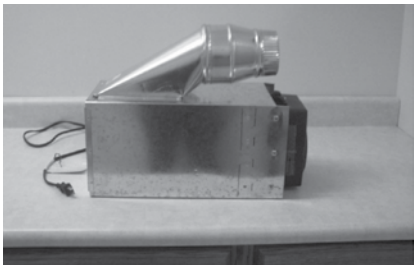
Stock heating fare elbows can be twisted to obtain the optimal angle to enable your pipe to enter the cowling on your particular application

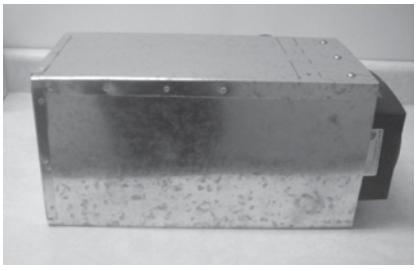
For the application on my Glastar I needed to reduce my pipe down to 4″ to fit into the cowling exit at the bottom juncture with the firewall. This was accomplished with a standard 5″ X 4″ reducer from Rona. On the unit I built for my friend that inspired all of this nonsense and his Glastar I was able to use the optimal 5″ duct and using 2 - 5″ 90 degree bends turned every-which-way so that the duct passed into the bottom of his cowling where the exhaust exited through a fairing he had around the exhaust which also acts as the exit for cooling air on his Glastar.

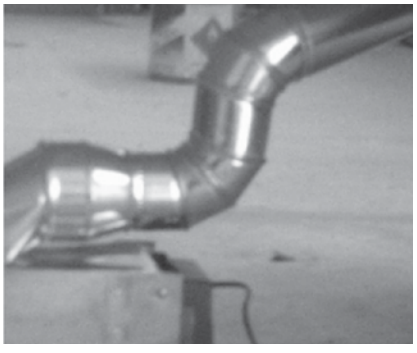
The best part of this design for our aircraft is that the heater can sit on the ground under the airplane and the Ducting placed directly into the lower cowling without flexible floppy tubing that could fall out.

I fastened the heater into the other end of the square tube using bent angles pop riveted to the inside of the square box. I cut 4 pieces of 032″ aluminum 2 3/8″ wide X 7 7/8″ long. I trimmed them and deburred the edges. (Remember to cut these across the









Below left, stock heating fare elbows can be twisted to obtain the optimal angle for cowling ingress. Top left, the compact design of the box and top duct take-off. Above, side view with the forward facing take-off boot and 5 inch to 4 inch reducer. And finally, the bottom view (right) showing the one inch lap seam with pop rivets.

grain on the aluminum sheet). I marked a line at 1″ and bent each piece into a 90 degree angle using a 032″ piece of scrap wrapped around the nose of my bender to give a good radius for the aluminum so it wouldn't crack.

This gave me 4 equal angles 1″ X 1 3/8″ X 7 7/8″ long. I marked the box back on the two vertical sides 2 5/8″ on the inside with a felt marker and clamped the angles with the 1″ flange against the box facing in. This leaves the 1 3/8″ flange to act as a back support for the face of the heater. I repeated this for the left and right side. Drill 3 equally spaced 1/8″ holes on each angle through the box sides and pop rivet them to the box.

I then placed the face of the heater against these angles and slid first the right side angle in along the side of the heater with the 1″ flange against the box and the edge of the 1 3/8″ flange tight against the side of the heater. The 1″ wide flange should face out to make it easier to install. Clamp with side grip klekos or some type of similar small clamps. The heater I chose has a rectangular face on it but the aft side of the face has a curved edge of the heater body that meets with the edge of the aluminum retaining angle.

I took a felt marker and ran it along the curve of the heater body and marked a curved line on the angle clamped to the side of the box.

I removed this angle and cut along the line with a band saw and smoothed the cut. I placed the last remaining angle back to back with the completed angle and marked it with a felt marker to make a mirror imaged angle of the one I just completed and then cut and smoothed that retainer. I clamped the heater back in place and using the first bracket and side grip fasteners, I again clamped it to the heater box. I then test fit the last angle and trimmed it and the other opposite angle to fit. I clamped the last angle into place so that the heater was held firmly into place and drilled 3 – 1/8″ holes through both angles and the box they were attached to.

I removed the clamps and angle retainers marking them for sides and installed #10 plate nuts on the inside of each angle drilling up the holes in the angles and Box for the #10 screws.

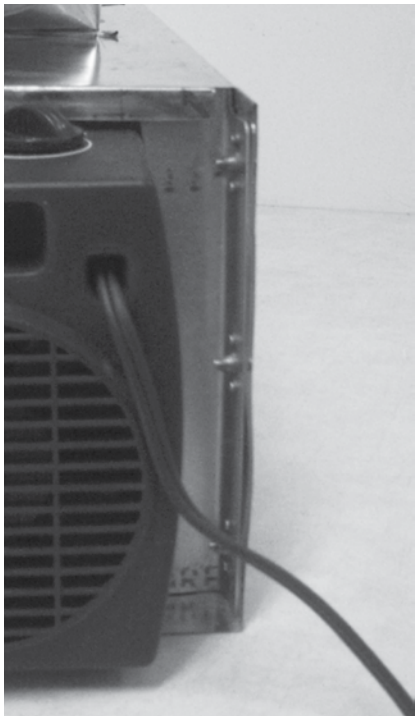
I finished the box by fastening the heater to the box using the removable retainers and 6, #10 /32 screws.

The top of the box above the heater will need to be trimmed and bent down so that the heater controls can be seen and operated. I marked mine with a line that was lined up with the outside retaining angle and cut back from that line about 3/8″ and bent it down to stiffen the top edge.

When I tested the first prototype on my Glastar it was in the hangar and the EIS oil and engine temperatures at the start were 15 degrees Fahrenheit. I checked the progress and monitored

Pre-Heater Parts List

1. Facto 900 / 1500 watt ceramic heater from Rona $27.00, Model #97955006
2. 1- 16" X 36" sheet of Galvanized metal Cold air return ducting from Rona
3. I – 8" X 8" Galvanized metal Duct end closeout from Rona
4. 1 – Top Take–Off for 5" diameter pipe from Rona
5. 2- 5" – 90 degree elbows Galvanized from Rona
6. 6 - #10 Plate nuts and rivets. (could use bolts and nuts as well)
7. 1 piece of .032" aluminum 9 3/4" x 7 7/8" for retaining angles.
8. 26 - 1/8" pop rivets
9 6 – 3/8" long # 10/32 screws
10. Compressed fibre flat board heating duct insulation (optional)
Total cost per unit with heater is about $60.00



Above: view showing detail of the retaining angle trimmed to fit the curved side of the heater. Right, the end of the sheet metal box showing the stock end closeout riveted through the double folded end cap and the edges of the fabricated box

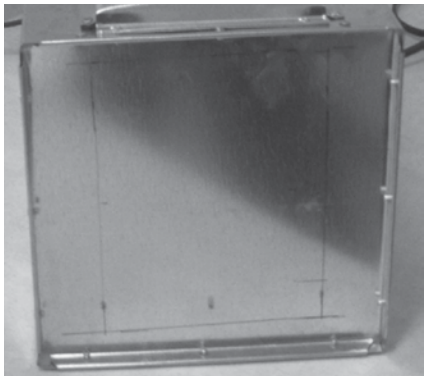
the temperatures during the test.

After the first hour the oil temperature was up to 58 degrees Fahrenheit and the CHT and EGT were all rising and were around 40 degrees F. I left it run for 1 hour and 45 minutes and checked again. The Oil temperature was at 78 degrees Fahrenheit and the

EGT were 54-68-55-82 (the egt of 82 reflects the Open exhaust valve on that cylinder) The Cylinder head temperatures were 42,50,44,59. (the 59 degree cylinder again reflects the cylinder with the open exhaust valve). On my airplane the heat was ducted in onto one side of the cowling due to the design of the dual exhaust pipes and the cooling air outlet on the bottom of my cowling.

I will refine a duct to put air into the cowling along both sides of the exhaust pipes rather than just the one as was done on this test.

This heater design has several advantages over some other methods. It should be safe because there is no open flame and the ceramic 1500 watt heaters have built in thermostats to shut them down should they overheat. I chose the Facto from Rona because of its shape, size and price (around $27.00) It has two heat settings 900 watts and 1500 watts) It is the type of heater that could be turned on and left to heat the engine while you went to the club for breakfast it could be hooked up through wireless to be turned on by a call from home before you leave for the airport and have your engine toasty when you arrive. A programmable timer could also be employed to turn it on at a given time of day and even day of the week.



Also the design was decided on based on several factors. I wanted to have a suitably sized box and ducting so that the heater would run at its full 1500 watt capacity and not trip off its internal thermostat. (Thus the 16″ box length) I also wanted it to be fairly compact and robust. The top take-off was installed facing towards the heater end to make a shorter package than facing it the other way around. I also chose the rigid ducting route so that I could place it flat on the floor or ground and push the rigid ducting up inside the cooling air outlets in a cowling.

On some applications one 90 degree elbow could be used to duct air in vertically from the bottom.

I use an insulated padded type moving blanket over my cowling to hold the heat in while heating it and this works well and is cheap.

I used it this winter to preheat our SE 5a replica and the Lycoming fired right up after the pre-heat. This was a major achievement given all of the openings on an SE 5a cowling.

I have provided this as one person's perspective on preheating an engine and don't guarantee the results however the little heater puts out a lot of heat (1500 Watts and is fan driven) and most of us know that even a simple 100 watt light bulb given time will preheat an engine. The unit could be improved by insulating the inside of the box with Duct insulation. There is a product called duct board which is used to fabricate insulated ducts and is available in thicknesses from 1″ to 2″. Home depot sells this as a plenum kit under the Master Flow name with enough material for a 24″ X 24″ X 24″ duct which will provide enough material for insulating 4 heaters. This Duct Board has a foil face on one side and is treated on the other surface. Larger sheets of duct board are also available from suppliers of furnace ducting materials. Place the insulation inside the box and fasten with a suitable adhesive or mechanical fasteners. There is also a sleeve type fiberglass duct insulation available to insulate the round duct from the heater to the cowling. If you decide to build one please use caution the metal box gets very hot and gloves should be worn when handling it or the heater be allowed to cool before touching it after use. All cautions pertaining to hot appliances should be followed.

Jim Anderson *is a member of the Flamborough chapter, flies out of Cetinski Field and spends his spare time hanging out at Rona Hardware.*

RAA Chapters and Meetings Across Canada

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

ATLANTIC REGION

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

QUEBEC REGION

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

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

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

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

ASSOC DES CONSTRUCTUERS D'AVIONS EXPERIMENTAUX DE QUEBEC (QUEBEC): Third Monday 7:30 pm at Les Ailes Quebecoises, Quebec City Airport.

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

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

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

ONTARIO

BARRIE/ORILLIA CHAPTER Fourth Saturday (and second Sat. as well) each month 9:00 am at the restaurant at Lake Simcoe Regional Airport Contact Secretary Dave Evans 705 728 8742E-mail david.evans2@sympatico.ca

COBDEN: Third Thursday of the month at the Cobden airfield clubhouse 20:00 hrs. President - Grantley Este 613 432 0797 este@compmore.net

COLLINGWOOD AND DISTRICT; The Collingwood and District RAA, Chapter 4904, meets every first Thursday of every. month, at 7:30 PM except July and August, at the Collingwood Airport or at off-site locations as projects dictate. The January meeting is a club banquet held at a local establishment. For more information contact Pres. George Elliott gaelliott@sympatico.ca 705-445-7054

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

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

KENT FLYING MACHINES: First Tuesday 7:00 pm at various locations. Contact President Paul Perry 519-351-6251 pkperry@teksavvy.com

KITCHENER-WATERLOO: Meets the third Monday of each month in the upstairs meeting room of the cadet building at CYKF, except during the summer months when we have fly-ins instead. Please contact Clare Snyder clare@snyder.on.ca

LONDON/ST. THOMAS: First Tuesday 7:30 p.m. At the Air Force Association building at the London Airport. Contact President Phil Hicks p.hicks@tvdsb.on.ca 519-452-0986

MIDLAND/HURONIA

Meeting: First Tuesday, 7:30 pm at Midland/Huronia airport (CYEE) terminal building. Contacts: President Ian Reed – 705-549-0572, Secretary Ray McNally – 705-533-4998, E-mail – raa.midland@gmail.com .

NIAGARA REGION: Second Monday 7:30 pm at Niagara District Airport, CARES Building. Contact Pres. Elizabeth Murphy at murphage@cogeco.ca, www.raa-niagara.ca

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

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

OTTAWA/RIDEAU: Kars, Ont. 1st Tuesday. Contact: Secretary, Bill Reed 613-858-7333 bill@ncf.ca

SAUGEEN: Third Saturday for breakfast at Hanover Airport. President: Barry Tschirhart P.O. Box 1238 27 Ridout Street Walkerton, Ontario. Home: 519-881-0305 Cell: 519-881-6020. Meetings are held every second Tuesday evening, at 7:30pm. Location(s) Saugeen Municipal Airport, Kincardine or Port Elgin. All interested pilots are welcome. Email: barry.tschirhart@bell.net

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

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

TORONTO: First Monday 7:30 pm at Hangar 41 on north end of Brampton Airport. Contact: President Fred Grootarz -

Tel: (905) 212-9333, Cell: (647) 290-9170; e-mail: fred@acronav.com

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

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

MANITOBA

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

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

SASKATCHEWAN

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

ALBERTA

CALGARY chapter meets every 4th Monday each month with exception of holiday Mondays and July & August. Meetings from 19:00-22:00 are held at the Southern Alberta Institute of Technologies (SAIT) Training Hangar at the Calgary Airport. Join us for builder discussions, site visits, tech. tips, fly out weekends and more. Contact president Don Rennie drennie@hemisphere-eng.com 403-874-0876

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

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

BRITISH COLUMBIA

ABBOTSFORD: Third Wednesday 7:30 pm Abbotsford Flying Club, Abbotsford Airport. Contact President, John Vlake 604-820-9088 email javlakeca@yahoo.ca

DUNCAN: Second Tuesday 7 pm members homes (rotating basis). Contact Pres. Howard Rolston, 250-246-3756.

OKANAGAN VALLEY: First Thursday of every month except July and August (no meetings) at the Mekong Restaurant.1030 Harvey Ave. Dinner at 6:00pm, meeting at 7:30pm Contact President, Cameron Bottrill 250-558-5551 moneypit@uniserve.net

QUESNEL: First Monday/Month 7:00 p.m. at Old Terminal Building, CYQZ Airport. Contact President Jerry Van Halderen 250-249-5151 email: jjwvanhalderen@shaw.ca

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

CHAPTER 85 RAA (DELTA): First Tuesday 7:30pm, Delta Heritage Airpark RAA Clubhouse. 4103-104th Street, Delta. Contact President President: John Macready jmacready@shaw.ca. Website www.raa85.ca.

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

THOMPSON VALLEY SPORT AIRCRAFT CLUB: Second Thursday of the month 7:30 pm Knutsford Club, contact President - zzALASKA HIGHWAY: meetings held every third Thursday of every month (except July & August) at the Taylor Fire Hall at 7:30 p.m. For more information call Gerry at 250-782-4707 or Heath at 250-785-4758.

Chapter executives, please advise of changes as they occur. For further information regarding chapter activities contact RAA Canada, Waterloo Airport, Breslau ON N0B 1M0 Telephone: 519-648-3030 *Member's Toll Free line: 1-800-387-1028*
email: raa@raa.ca web: www.raa.ca

Classified Ads

To submit or delete a classified ad, please send to raa@raa.ca and place "RAA ad" in the subject line.

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 : classified@raa.ca

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

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For Sale

FOR SALE KR-2 FUSELAGE in boat stage and metal kit for retractable landing gear castings $300.00 call Ian 604-856-1159 or email tri-pyramid@telus.net Dec11

PROPELLERS, wood, new, never mounted, tractor cwise (view from cockpit), priced OBO plus shipping: One 42x23, weight 2 lb., Lepper, conventional outline, 4 bolts on 70 mm b.c., $195. One 43x34, 4 lb., squared tips, 6 bolts on 75 mm b.c., $295 Call Frank, 905 634 9538

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

0320 E2C currently mounted on my Osprey which could be included in sale. Osprey has 175 hrs since new engine has 1850 but was dissassembled for a propstrike inspection 200 hrs ago Compression 125 lbs cyl on all four jugs oil pressure good complete with accessories. $6000 for engine $9000 for all aircraft needs refinishing and recover Larry Taylor 250-492-0488 days ltaylor@pacificcoast.net

SKYBOLT FUSELAGE with Marquart Charger cantilever U/C., tail feathers, rudder/brake pedals, metal fittings, axles, wheels. Offers. Bill Phipson #3954. Phone 416-431-2009 Dec11

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

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

ZENITH CH300 for sale First flight 1990 265 hours TT airframe and engine. Lycoming O320 E2D 150 HP engine professionally "zeroed" by Leavens aviation with all documentation. New McCauley cruise prop installed 3 years ago (cruise all day at 135-140 mph on 8gph). Professionally painted by flying colours in peterborough..$10,000. New sliding tinted canopy installed 5 years ago. New interior Full IFR steam gauges. Blue mountain EFIS light. 3 axis auto pilot. True Trak pictorial pilot AP coupled to Garmin 396 Truk Trak Altrav VS altitude hold with verticle rate. Flo scan fuel management system computer with opitical transducerKing digital 720 radio. Narco mode C transponder with encoder. Ammeter and Volt meter. 4 place intercom for front and back seat headsets. Full lights inside and out for night flying. New tires 2010.12 volt recepticals front seat and back seat for PAX. Reiff full pre-heat system for winter operations..(oil pan heat and cylinder bands for each jug.). Air Wolfe remote oil filter system installed for 50 hour intervals and added engine protection.
New Marvel carb installed 2007. All logs and plans..All owners manuals and professionally produced POH Always maintained to highest standards…$ 35,000….(certified and e-tested!!). I would have no qualms selling this aircraft to anyone…..a joy to fly. Warren 289-259-6460

TWO NEW 600-6 CLEVELAND WHEELs complete with brake discs and hydraulic pucks. 1.5" bearings included. New tubes and Mallory Airhawk tires 600-6 type 3, 6 ply. Selling for $240 per side. Complete front landing leg and engine mount including oleo and nosewheel with tire from 65 Cessna 150, not damaged. This has been sandblasted and undercoated. $400. O-200 Continental starter, cable type with 60 hrs since major. $100. Carb airbox for O-200, $40. 403-545-2609 in Bow Island, west of Medicine Hat.

MINI-MAX. TTSN 220. 31 hrs since ROTAX 440 and GSC prop overhaul. Always hangared VG condition. ICOM Nav/Com. Medical forces sale. $9,900.00 OBO.
780-460-6841 or cell 780-945-0411

ENGINE - LYCOMING 0-320 A3A, 968 SMOH, with starter, generator, mags,
to remove from flying a/c, $9000 + shipping. 905.878.4017, mohne40@yahoo.ca

Bowers Fly Baby, Continental 85, 350 TT on engine and airframe. Always Hangared, flown regularly, owner built. Fun, affordable flying, $12,000. Phone 403-614-3855 or email, jw.gray@shaw.ca

Bendix/King KY 97A vhf com radio with shelf and wiring harness. ($1500). Collins transponder (mode 'C') with antenna, shelf and wiring harness ($1100). I-com 4 place intercom (with music option) ,with shelf, wiring harness and head phones jacks. ($100). 2, 4 point hooker harness. ($ 100 ea. set) Contact Norm at graham110@rogers.com for details.

VAL 760 TRANSCEIVER, SN. 04275. Worked when removed for panel upgrade. Asking $600 obo. Comes with mounting tray and connector. Estimated mailing cost $35. Direct inquiries to blehmann@pris.ca

CESSNA RT-459A TRANSPONDER, PART No. 41470-1028, SN 6993, 14V Unit, (for use in 28V aircraft use dropping resistor on mounting) Authorized release dated 11-Jul-13. Worked when removed for panel upgrade. Asking $600 obo. Comes with tray and connector. Estimated mailing cost $35. Direct inquiries to blehmann@pris.ca
Tail wheel assembly complete, New, off Rebel, also main wheels. $350 for all. Chris 1-866-733-8432

1960 Bellanca Cruisemaster 2555 TT 260 HP IO-470F A fast aircraft with good short field performance and triple tail style.Full size nosewheel suitable for grass fields.1000 mile range. Gami injectors, engine analyser,white polyurethane paint . Otherwise stock. Have paperwork to turn it into an amateur built.
$65,000.00 Richard 705-652-6307

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

ACEY DEUCY 2 seat open cockpit project. Fabric covering completed and painted. Engine Continental 0200A rebuilt with logs. New Warp Drive 3 blade ground adjustable prop. B and C Light weight starter and alternator. Full instruments and guages in rear cockpit basic flight instruments in front cockpit. Full electrics. Aluminum fuel

tank. Radio included. ELT included. Gross weight 1230lbs. Estimated 50hours to final inspection. Asking $18000. Will sell only as a package. Many extras. 905-786-2482.

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

Stinson 108-3, a classic aircraft for sale. Airframe 2365TT. Franklin 165 hp engine 998 TT, 82 hours since top overhaul. Fabric in 2005, float kit, wheel pants, spare engine parts, 2 metal props - seaplane and cruise. 30K OBO. 250-991-7958 Quesnel BC.

SMYTH SIDEWINDER LANDING GEAR LEGS with axles. Never used - free to good home. 519-648-3030 garywolf@rogers.com

LYCOMING 0-290-D ENGINE. Comes with: alternator, gascolator, starter, cooling shroud, newly rebuilt carb, 6 bolt pattern prop extension, logs and maintenance manual. $10,000. Bendix / King KY 97A VHF com-radio with shelf and wiring harness. $1500. Collins mode 'C' transponder with antenna and wiring harness. $1100. Two sets of 4 point 'Hooker harnesses' seat belts. $100 each..Please contact Norm @ graham110@rogers.com.

1964 Corben Baby Ace . 600 TTAF. Recovered and TOH in 2000. A65. Metal Prop. Great flyer. Can be flown with ultra-light permit. $15000. Gary Wallace 519-223-0368 Hangared in Roseville, Ontario.

FIBERGLASS FLOATS-1500 lb+, all bulkheads installed, just ends need finishing, can be finished as amphibs or straight floats- complete with aluminum streamline spreader bars, rigging tubing,fittings. 15' 2" L x 22"W at step- $1500, pictures available.- Also MA-4 SPA carb set up for 125 HP with new float and pump plunger. Includes aluminum airbox- $200. Bob 519-271-9575 trirmb@cyg.net. Stratford ON Fiberglass floats-1500 lb+, all bulkheads installed, just ends need finishing, can be finished as amphibs or straight floats- complete with aluminum streamline spreader bars, rigging tubing,fittings. 15' 2" L x 22"W at step- $1500, pictures available.- Also MA-4 SPA carb set up for 125 HP with new float and pump plunger. Includes aluminum airbox- $200. Bob 519-271-9575 trirmb@cyg.net. Stratford ON

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

65hp Franklin engine for sale, zero time since major rebuild. Needs carb. $2200. Located in Orangeville, Ontario. 519-925-3639 Pat pjb@ornithopter-pilot.com

CLEANING OUT THE HANGAR! Continental C-85 crankcase and rear case. Champ tail surfaces, some PA-18 tail surfaces, PA-18 gas tanks, Scott tailwheel for Cessna 180. Box of new O-200 parts including rings, pins and valves.Sensenich 74-45 prop, 2 SL 13623 pistons low time. 8 pieces SL68763 bearings, low time. 8 pieces 65006 chrome pushrod tubes. 8 pieces O-320 pushrod tubes. 8 pieces (2 sets) O-235 anodized pipes.4 pieces O-235 intake pipes. 3 pieces O-235 oil sumps.10 pieces O-200 intake pipes. 8 pieces O-200 pushrod tube housings. 2 pieces O-200? intake manifolds. 16 O-200 lifter cores.24 pushrod tubes. 3 O-320 vacuum pump gears and housings. alternator support and 2 adjustable brackets.2 mag housings. 8 O-290 steel cylinders. O-290 GPU bottom end. 6 pieces Bendix magneto cores. 3 O-200 box covers. Met-L-Pro S/N 17207. flyings@shaw.ca

Lyc. 0-235-L2C 115 HP 0 time SMOH $7,450.00 OBO. and Lyc. 0-290-D 125 HP 0 time SMOH $7,750.00 OBO. Both of these engines are for Experimental Aircraft. Crank was checked in a certified shop and is good but not certified. Cylinders honed and new pistons and rings. All new bearings. These parts are certified parts.

Lycoming O-290 D that throws oil. This engine is quite rebuildable and is going cheap. make an offer.

Super Cub in O-M category. This plane is in beautiful shape and has been flown for only 74 hours by a careful pilot. Photos available. flyings@shaw.ca

Cavalier 102.5, "Aero Sport Power" O-320-B2B; 152 TTSN. Sensenich metal prop. Airframe was totally rebuilt in 1997; 1750# GW, 622 lb useful load; VFR instruments + Garman GTX 327 TXP Mode C & Val Radio; Trutrak Turn & Bank; Kept in heated hangar; 8/10 inside and out. $29,000 OBO. cavalier102@uniserve.com or 250-558-5551. Ask for Cameron.

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

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

A Handy Tip

FOR A LONG TIME I have owned a hand punch as shown in Fig. 1. This is a very useful tool that punches (where it can reach) a nice clean round hole. It comes with a set of punches and dies which produce holes from 3/32 " to ¼". I recently discovered a new use for it.

A recent project Fig. 2 required the removal of a bunch of 3/32" FH rivets. They were in an awkward location which would have required one of those tiny right angle air drills. Not having same what to do? I could drill from the shop head side but this is very tricky and usually results in over size holes. Enter the hand punch.

Setting it up with a 3/32" punch and a 1/8" die I could punch out the rivets. The important parts of this approach is that the 1/8" die fits right over the shop head which aligns the punch so it drives the rivet from the center. Even if there is a small misalignment the punch tends to follow the original hole. This works very well and very quickly.

I have used this approach with pop rivets and because the "shop head" end is typically much more consistent it works even better. The real icing on the cake comes when you are removing rivets with a steel mandrel. The usual practice is to punch out the mandrel before attempting to drill out these rivets. Using the hand punch you simply punch them out! Of course for a larger rivet one uses a correspondingly larger punch and die set.

A further thought which I have not tried but should work is to use a suitable punch and die set in one of the dimpling tools. These, for those who do not know, consist of a "C" shaped frame which carry a set of dies used to form the conical recess in thin sheet metal to accommodate the head of a FH rivet. The important benefit here is that the throat depth of the dimpler is on the order of 16" allowing access to rivets in the center of larger sheets.

I hope this tip helps people out!

Grantley Este *is president of the Cobden Chapter.*

President's Message / cont'd from page 2

the situation changes. If you would like to be included in receiving these, please email to raa@raa.ca and place announce" in the subject line.

Fred Grootarz conducts a seminar on the Aviation Safety Letter.

RECURRENT TRAINING

There is a CARs requirement for recurrent training, and many of us attend Transport Canada seminars to get a two year sticker for our pilot logbooks. There are other ways to satisfy the requirement, among these completing the self-paced exam that is in the fourth quarter Aviation Safety Letter each year. This is available online going through the www.tc.gc.ca website or you can just google Aviation Safety Letter.

Fred Grootarz, President of the RAA-Toronto Chapter 41, has for the past year been presenting a power point seminar using the exam from the Aviation Safety Letter. His Power Point has a page for each question, with the answers left blank. The chapter members offer possible answers, and there is then a lot of discussion that brings to light many considerations that might not occur to someone doing the exam on a solo basis. Finally Fred's program fills in the blanks with the correct answer as given in the ASL, with references to the documents that support that answer. More discussion ensues until everyone fully understands. It takes about two hours to complete the exam this way, and at the end the members have satisfied the recurrent training requirement for another two years. Fred then issues stickers for the pilot logbooks.

Fred Groot- *(continued next page)*

arz has generously given his own time to do this not only for his own chapter, but also for the surrounding chapters in Ontario. If your chapter would like to take advantage of Fred's work, please contact him at fred@acronav.com . Fred also offers to send his program to any RAA chapter that wishes to do this themselves.

NEW MEMBERS / STATUS REPORTS / CHAPTER LISTINGS

Chapter members are the farm team for National membership, and if chapters wish to have a strong RAA Canada to represent their interests it is necessary that they encourage chapter members to become full members of RAA Canada. John Macready, President of Chapter 85 in Delta BC has been very active in this, and rarely does a week go by without someone from his chapter joining up.

Each spring the chapters must send in an annual report stating the names, membership numbers, and expiry dates of a minimum of three specific executives and two others, plus a list of all chapter members with their contact information. At the very minimum the President, Treasurer, and Secretary, plus two other national members must be named, and must maintain seamless national membership to ensure that chapter events and meetings will be covered under the $5 million RAA Chapter Liability Policy. The status report may be emailed to raa@raa.ca ; please place "status report" in the subject line. Alternatively it may be snail mailed to the office address.

At the same time as your chapter is preparing its status report, the chapter contact person should send in any revisions to the chapter listings in the magazine. Have a look at your chapter's listing in this issue to see if it is accurate, and if not please ask your chapter contact person to send in new wording. Please send to raa@raa.ca; place "chapter" in the subject line. R

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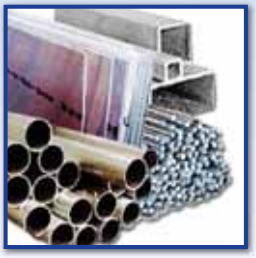
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