January - February 2012

Recreational RFLYER

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

Gone Fishin'

Enjoying your wings in the Canadian Winter

RAA
RECREATIONAL AIRCRAFT ASSOCIATION
RÉSEAU AÉRONEFS AMATEUR CANADA

From The President's Desk

Gary Wolf

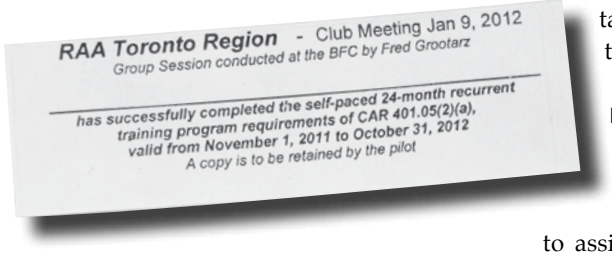
CHAPTER STATUS REPORTS

It is again the time of year when chapters have usually installed their new executive members. Each chapter must then send in a status report, a requirement to be insured under the RAA Chapter Liability policy that covers your meetings and events for $5 million. The minimum requirement is to name the President, Treasurer, and Secretary, and any two other specifically-named chapter members, and all must maintain uninterrupted membership in RAA Canada. Email to raa@raa.ca or mail this to the RAA office and include a complete list of chapter members, and your chapter will be covered under the policy. Surprisingly every year there are some chapters that have named members who allow their National memberships to lapse, and when this happens the chapter is exposed until their errant members correct the situation.

The best way to prevent such a situation is for the chapter's membership secretary to require that each of the named members produce his/her RAA membership card, and then record the end date of each of these memberships. The chapter membership secretary can then remind the five of their renewal dates, and again ask for a new card to prove that the renewal has taken place. This is not a lot of work and the chapter will then have seamless insurance coverage.

MAGAZINE ADVERTISING REP

The position of magazine advertising rep is available to any member who wishes to volunteer. The responsibilities include finding new advertisers and making occasional contact with current advertisers. This position may be handled by anyone with a phone and email, so living in a remote area does not disqualify you from applying. Please email to raa@raa.ca or call 1-800-387-1028 if you are interested.


RAA Toronto Region - Club Meeting Jan 9, 2012
Group Session conducted at the BFC by Fred Grootarz

has successfully completed the self-paced 24-month recurrent training program requirements of CAR 401.05(2)(a), valid from November 1, 2011 to October 31, 2012
A copy is to be retained by the pilot

RECURRENT TRAINING IN CHAPTERS

There is a requirement for each pilot to take recurrent training, usually a Transport Canada seminar, at least once every two years. An alternative is to take the self-paced recurrent training test that is presented in the fourth quarter issue of the Aviation Safety Letter, which is now an on-line publication. (Google "Aviation Safety Letter"). The test consists of some thirty questions, with references to the CARS or other information that gives that the answer, plus the actual answers are printed in the same issue. Take the test and carry your copy with your pilot documents and you have satisfied the requirement for recurrent training.

Fred Grootarz, the new President of Chapter 41 has taken this one step further. He makes a power point presentation of the test and also prints out copies for the chapter members. The entire chapter goes through the test together at their January meeting, with much discussion and reference to the appropriate CAR or the information in the Aircraft Information Manual (AIM). After gaining an insight into the logic of each answer, each member signs his own document and files it with his pilot's license and other documents. Fred Grootarz also provides a sticker that may be placed in the logbook to indicate that the pilot has taken the self-paced examination and is therefore current.

RAA AND TSB

RAA was recently contacted by Canada's TSB to provide background information to assist them in a request from the American NTSB, who were investigating an accident in the USA. It was noted that the A-B aircraft in question, a pusher installation, did not have any form of carb heat for its Rotax 912 series engine. In Canada an A-B must have carb heat unless the engine manufacturer states that it is not required, but Aula's and Bula's are not required to comply with any carb heat regulation.

Some owners of tractor 912 installations find that they never experience carb ice, possibly because the exhaust system and engine are inside the same tightly fitted cowl, and the heat rises to keep the top-mounted carbs warm. A pusher installation is a very different situation, and many

continued on page 41

The Recreational Aircraft Association 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*

The Recreational Flyer is published bi-monthly by the Recreational Aircraft Association Publishing Company, Waterloo Airport, Breslau, ON N0B 1M0. The Recreational Flyer is devoted to the aerospace sciences. The intention of the magazine is to promote education and safety through its members to the general public. Opinions expressed in articles and letters do not necessarily reflect those of the Recreational Aircraft Association Canada. Accuracy of the material presented is solely the responsibility of the author or contributor.

features

columns

Don Dutton

Above: The Oshawa chapter fly-in, October 2011. On the cover: Al Hayduk and his Savannah, C-IPSY.

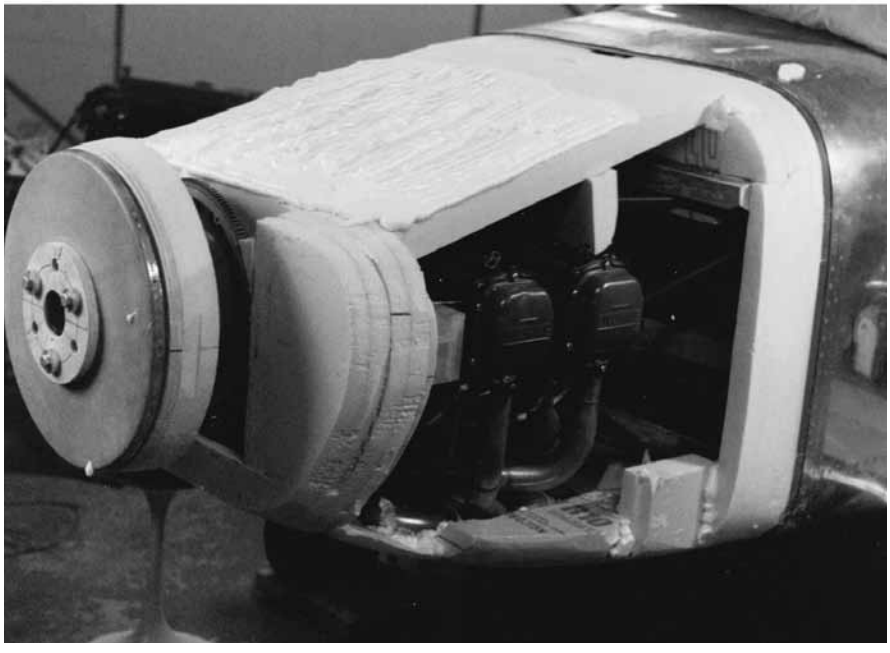
Ray McNally's Mustang II

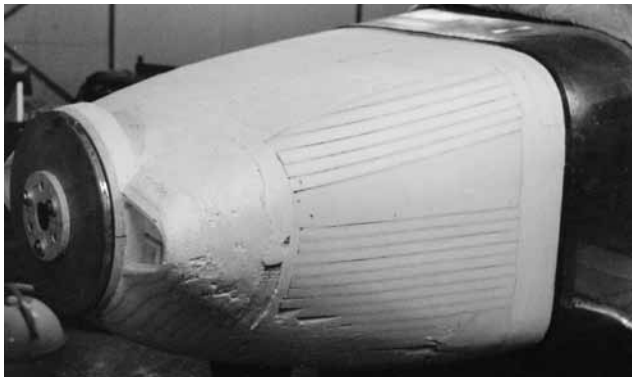
by Ray McNally

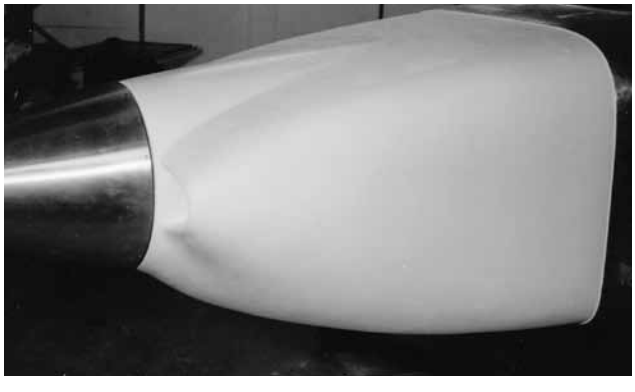
Back in the mid 70s when I was considering choices in plans for building an amateur-built aircraft, there were few designs that met my criteria of two-place, side-by-side, all metal, good performance, efficient cross-country and attractive appearance. The three that became front-runners were the Pazmany PL-2, the Thorp T-18 and the Bushby Mustang 2. There was no such thing as a "Kit" plane, as we know it, at that time. To help establish the timeframe; I had just finished taking flight training in a Cessna 150 (CF-MUJ) owned by the Student Union of the University of Waterloo, which rented wet at the rate of *$11.00/hr.*

After studying the three options it appeared that the PL-2, although a good design, would be the most difficult to build, since Pazmany seemed to think that if two bends in a part was good, three would be better. The T-18 was very similar to the M-2 but lost out due to the less efficient constant-cord (Hershey bar) wing design. The tapered, laminar flow wing of the M-2 should be faster and more efficient. This short-list selection of course took place after the "do everything" fantasy designs had been eliminated by the recognition that planes that are good for more than one water-landing are not usually good performers in most other respects.

The plans were purchased in the late '70s, however serious building did not proceed till the mid 80s. The letter to Transport Canada reporting intentions to build is dated 1984. Work on the project progressed slowly due to the usual influences such as career, raising a family, career changes, moves, etc., however the main cause of slow progress was likely due to my own changes in the design and my insistence in making all the parts myself, even though some were available from outside sources. Examples of some of these changes include, raising the rear deck 3.5 inches at the first bulkhead to improve airflow at the rear of the canopy, extending the propeller shaft, and building a more aerodynamic cowling than the available Bushby blunt-face design, building a ram-air induction system, moving the roll-bar back 6 inches to give better headroom under the canopy, modifying the landing gear from a flat plate steel (Cessna) type to a flat 3M fibreglass spring material similar to that used on the AA-Yankee aircraft. The gear change was a project in it's own right and perhaps deserves a separate account. One year was lost in an attempt at fabricating a one-piece windshield/canopy system hinged at the front, similar to the initial RV-6 style. I am now pleased that that didn't work out since







the sliding canopy is a pleasure to have while taxiing in hot weather.

Building any "plans built" plane is not a big project. It's a series of small projects, which come together sometime in the future to create the entity that was the dream to start with. I started with the wing, which consists of two eight-foot outboard panels, in which all the taper and dihedral are incorporated, and an eight-foot centre section, which becomes integral with the fuselage. The outboard panels were fabricated first and hung on brackets on the shop ceiling to make room for the centre section jig and eventually the fuselage.

The primary landing gear is attached to the wing centre section at the main spar, with a tube extending to the rear spar. At the time there were reports of several failures or permanent deformations of this gear due to heavy landings. I studied the drawings and decided that I could improve on the attach system and by incorporating the energy absorbing properties of 3M Scotchply spring material, make it lighter and softer as well. That was done and has worked out very well for about a thousand landings (not all squeakers).

Looking at the profile view of the fuselage indicated that the position of the pilot's head relative to the canopy was not ideal since the downward and inward taper toward the rear of the canopy would limit headroom. By moving the canopy aft about six inches, the headroom would become acceptable and the slope of the windshield could also be reduced to reduce drag, however this change could only be effective if the top surface of the tail cone was repositioned to blend with the new location of the

Top: the cowling was roughed in with glued styrofoam and finessed with plaster. Pretty traditional stuff! The finished product reveals a beautiful, aerodynamic shape. A custom cowl to accomodate a prop shaft extention was one of the particular changes Ray incorporated into his ride. Opposite, Ray's work was planned and meticulous. Here, a diagram determining the ram-air induction system.

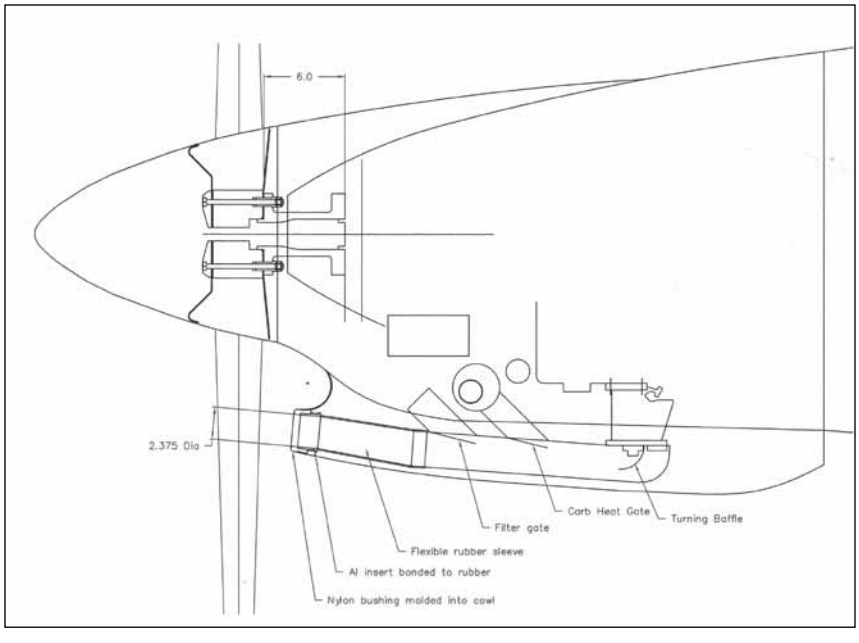
canopy. Of course the domino effect takes over and the dimensions of all the bulkheads and fin attach brackets had to be modified (without the availability of AutoCAD at the time). These modifications were made and the results are worth the effort.

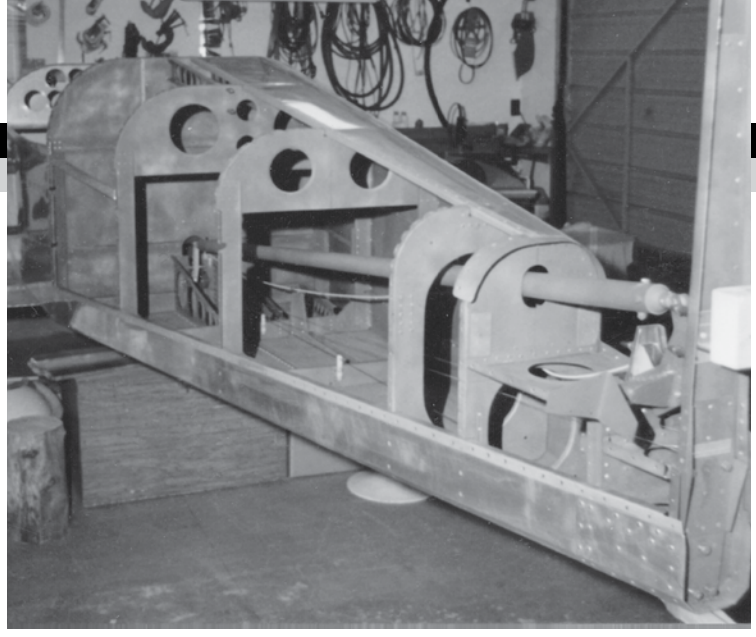
The cowling was constructed by the traditional method of building a one-time foam and plaster male plug over the engine and laying up a fibreglass and epoxy shell on top of that. The shell was then cut horizontally and separated from the plug. Features such as the air induction scoop and the connecting hardware were handled as addenda. The air induction system was designed around the space available for a K&N filter, the location of the crossover exhaust pipe and the location of the carburetor. Gates with controls extending to the cockpit allow for selection of filtered air for taxiing, ram air for flying and carburetor heat as needed.

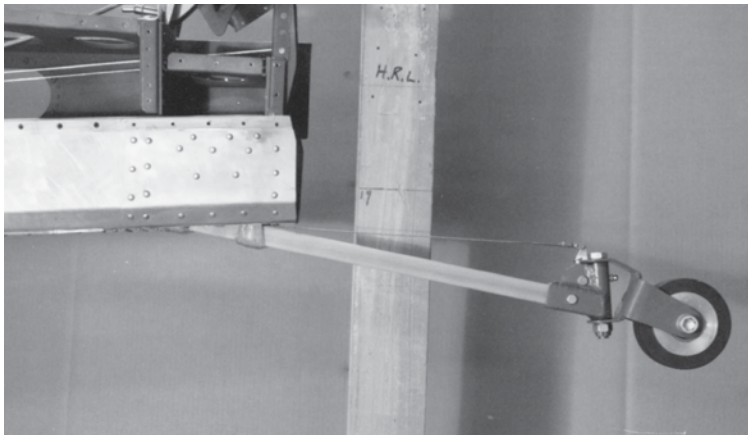
The basic principles adhered to during the project were – keep it simple, keep it light, and make it aerodynamically clean. Since my flying profile consists of day-VFR only, I left out any lighting and vacuum systems. There is no VOR, ADF DME (only GPS) so no high drag antennae are hanging out in the breeze. The ELT antenna is inside the canopy and the fibreglass gear leg allows for the COM antenna to be located inside the gear leg fairing. The only antenna outside the skin is a short blade type for the transponder. The locking type tail wheel also eliminated the weight and drag of steering horns and chains that usually adorn a tail dragging aircraft. Along with the weight saved by use of fibreglass gear, a composite prop (Prince Q-tip 68x76), lightweight starter, lightweight alternator, minimal instrumentation, and limited upholstery resulted in a finished weight of 932 lb. This is about 100 lb. lighter than the average M-2.

The basic principles adhered to during the project were – keep it simple, keep it light, and make it aerodynamically clean.

The engine selected was a Lycoming O320-B3B (160 HP). Many builders of this type go for the O360 (180 to 200 HP) model, then need to install fuel tanks in the wings, fuel pumps and complicated fuel management systems, as well as larger cooling-air inlet ports or even additional cooling-air scoops, all of which add weight and drag resulting in little performance improvement and a significant loss in efficiency. The 96 litre, single tank, no pumps, one valve system I installed gives me an endurance of three hours with reserves at my "economy" power setting which matches my personal endurance quite well. The aluminum tank is riveted together with PRC sealant between each contact surface. That sub-project was made more complex due to the fact that I turned the flanges on the side bulkheads inward in order to get an extra few millilitres of fuel capacity, consequently requiring rivet bucking through the filler port. The tank was airtight from the beginning and has shown no fuel leaks since, however, I have used only 100LL fuel to date. A 3/8" aluminum tube extends from the on/off valve under the tank and connects to a bulkhead fitting at the firewall. From there to the gascolator is also aluminum and a SS braided Teflon hose connects the gascolator to the carburetor. All fuel lines in the engine compartment are encased in heat shield sleeves.







Above: the fuselage staarting to take shape. The push-pull tube for the elevator ensures positive and slop-free pitch control. Left: Ray opted for a locking tailwheel.

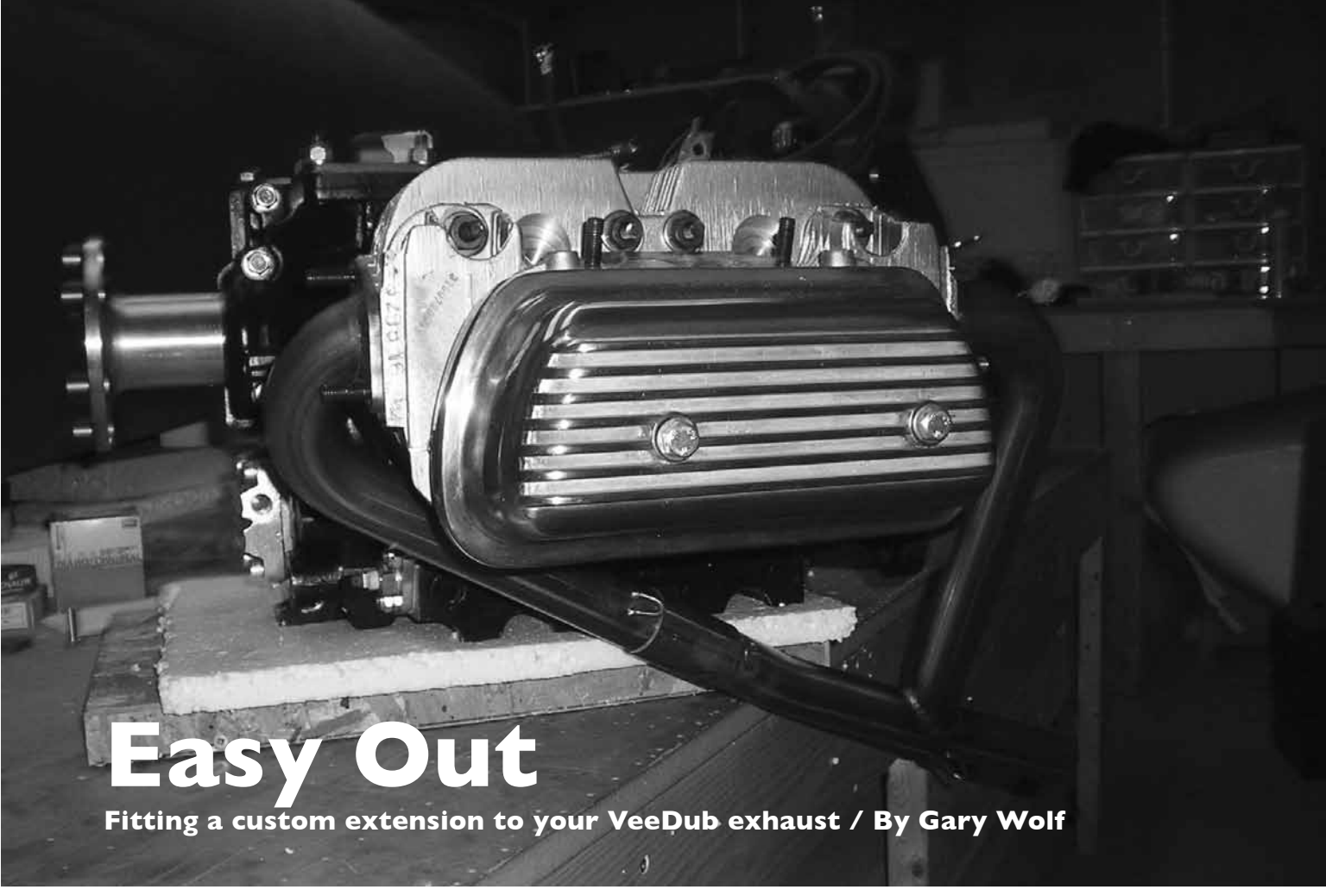
The only sub-project with which I am disappointed is the wing root fairings. They are thin fibreglass skins on top of permanent foam bases bonded to the fuselage and wing. I decided to use a two-part urethane foam material instead of the normal solid SM blocks glued together, thinking that the glue joints might create problems in getting a smooth surface. Unfortunately, although the skins turned out smooth to start, over the following few months the urethane started to shrink differentially so that irregular dimples appeared on the surface of the fibreglass. I have been planning to do something about this for the past ten years but have yet to get around to it.

The aircraft was final-inspected in the fall of 1999 and flew first in January of 2000 (so it's easy for me to calculate how old it is). Most of the flying has been around Southern Ontario along with some excursions to Quebec and three trips to the Left Coast. The trips out west are also separate stories but I've included a spreadsheet (below) that displays some of the technical data recorded on the trip made in 2009 with co-pilot Mike Diaczyk (distances are from the GPS odometer). As the chart indicates, I like to cruise at an economy power setting. That is, at about 2300 rpm, which produces about 18 inches of manifold pressure (at lower altitudes) and 50% power. That gives a fuel burn of about 23 lit/hr (5 imp gal/hr.) and airspeed of about 140 kt (160 mph). At low altitudes with the current propeller, full throttle pushes the engine well about the red line, however, a single two-way GPS groundspeed check at full throttle showed an average of 187 kt. (215 mph).

BC Trip 2009 C-GFAZ - Mustang II

Fuel/Speed Data

Leg	hr : min	Hr.	Lt	Imp Gal	US Gal	$	$/Lt	Nm	S Miles	SMi/IGal	SMi/Hr	Lt/Hr	IGal/Hr	US G/Hr
Collingwood-Marathon, NY3-YSP	2 : 57	2.95	64.9	14.3	17.1	$90.21	$1.39	378	435	30.4	147	22.0	4.8	5.8
Marathon- T Bay, YSP-YQT	1 : 21	1.35	31.1	6.8	8.2	$51.09	$1.64	153	176	25.7	130	23.0	5.1	6.1
T.B.-Atikokan-Kenora, YQT-YIB-YQK	2 : 8	2.13	48.5	10.7	12.8	$84.50	$1.74	269	309	29.0	145	22.7	5.0	6.0
Kenora-Stienbach, YQK-JB3	0 : 44	0.73	19.9	4.4	5.3	$30.05	$1.51	95	109	25.0	149	27.1	6.0	7.2
Stienback-Weyburn, JB3-JE3	2 : 7	2.12	45.9	10.1	12.1	$68.46	$1.49	287	330	32.7	156	21.7	4.8	5.7
Weyburn-High River, JE3-EN4	3 : 4	3.07	65.4	14.4	17.3	$96.17	$1.47	409	470	32.7	153	21.3	4.7	5.6
Local flight at High River, EN4-EN4	0 : 24	0.40	10.8	2.4	2.9	$15.91	$1.47	39	45	18.9	112	27.0	5.9	7.1
High River-Kamloops, EN4-YKA	2 : 25	2.42	48.0	10.6	12.7	$76.51	$1.59	311	358	33.9	148	19.9	4.4	5.2
Kamloops-Cilliwack, YKA-YCW	1 : 9	1.15	26.6	5.9	7.0	$41.23	$1.55	153	176	30.1	153	23.1	5.1	6.1
Chilliwack-Lethbridge, YCW-YQL	2 : 36	2.60	59.6	13.1	15.7	$93.68	$1.57	372	428	32.6	165	22.9	5.0	6.1
Lethbridge-Maple Creek, YQL-JQ4	1 : 3	1.05	27.0	5.9	7.1	$41.85	$1.55	144	166	27.9	158	25.7	5.7	6.8
Maple Creek-Brandon, JQ4-YBR	2 : 33	2.55	63.2	13.9	16.7	$95.92	$1.52	379	436	31.3	171	24.8	5.5	6.5
Brandon-Stienbach, YBR-JB4	0 : 57	0.95	25.7	5.7	6.8	$38.81	$1.51	140	161	28.5	169	27.1	6.0	7.1
Stienbach-Geraldton, JB4-YGQ	2 : 37	2.62	61.0	13.4	16.1	$94.79	$1.55	391	450	33.5	172	23.3	5.1	6.2
Geraldton-Sault Ste Marie, YGQ-YAM	1 : 43	1.72	40.4	8.9	10.7	$55.30	$1.37	237	273	30.7	159	23.5	5.2	6.2
S.S. Marie-Collingwood, YAM-NY3	2 : 16	2.27	61.0	13.4	16.1	$79.91	$1.31	329	378	28.2	167	26.9	5.9	7.1
Total/Average:		30.07	699.0	154	184.7	$1,054.39	$1.51	4,086	4,699	30.6	156	23.2	5.1	6.1



Easy Out

Fitting a custom extension to your VeeDub exhaust / By Gary Wolf

AEROCONVERSIONS SELLS a welded stainless exhaust system for VW engines and it is nicely made but requires that the exhaust studs be removed to install the system. A member brought in his brand new Aeroconversions exhaust system for some advice on how to mount it on his Sonex.

The second paragraph in the installation instructions optimistically assumes that exhaust studs on a VW engine are easy to remove. If the customer has just bought a brand new engine this might be the case but with VW heads that have been run for some years, removing the exhaust studs is anything but easy. The magnesium alloy heads seem to form nature's own loctite with the steel studs that are threaded into it.

The time tested way to remove studs is by tightening two nuts against each other, and using a wrench to turn the stud out. This will generally not work with an aircooled VW. Using a stud removing tool will usually not work either as its teeth will dig into the stud and weaken it, the result being that it twists off flush with the gasket surface.

If the stud will not come out easily the usual solution is to add heat by running the engine, or by using a torch to expand the magnesium head to loosen its grip on the steel studs. The VW engine builders sometimes recommend welding a nut onto the stud and using this nut to turn the stud out. Usually they then follow with recommendations on how to drill out a broken stud and install an 8mm helicoil. This can be a daunting process if the heads are on an installed engine and there are eight

The second paragraph in the installation instructions optimistical

Left: here is the problem - a welded exhaust cannot be spread to fit over the VW exhaust studs, and they must be removed. Bottom: 1) Double nutting is usually fruitless; 2) A stud remover will easily twist off a VW exhaust stud, requiring drilling out and helicoiling. 3) Even heating the area with a torch is sometimes not enough. What to do? 4) Cut the exhaust apart and then remove an extra 1/8" to 1/4". 5) The 1-1/2" sleeves get bored out to provide a nice sliding slip fit. 6) A trial fitup on an old head shows that the flanges fit flat to the head. The two safety wire hooks are made from stainless welding rod

opportunities to learn how to centre a drill bit by eye. Not recommended.

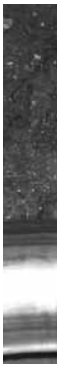
The solution? Split the exhaust and weld in a slip-fit sleeve. Besides making it easier to install the exhaust there is a secondary benefit. In any welded exhaust system there is going to be some variation in the distance between flanges, depending on the shrinkage of the weld where the two headpipes meet. Splitting the exhaust takes the stress off this welded joint and also allows for variations in exhaust gasket thickness. Why would a manufacturer not do this himself? Well it does add to the parts count and makes it more difficult to build the production fixtures, both of which will raise the cost to the customer.

Making the slip-fit sleeve is the difficult part. In 4130 tubing it is common to use .058" wall for a nice sliding slip fit. Unfortunately this wall thickness is not commonly available in stainless. In stainless the choices are .049" or .063" wall thickness, the first being far too loose for a gas-tight fit and the latter being an interference fit.

Since the Aeroconversions system is made of 1-3/8" OD tubing we began with a trip to an automotive muffler shop to buy a short length of 1-1/2" OD stainless tubing with .063" wall, and sawed from it two pieces 2-1/2" long to become the slip fit sleeves.

It is necessary to enlarge the ID of the sleeve and the temptation was to have the muffler shop use their tube expander to do this, but this was resisted. The tolerances in a muffler shop are usually on the loose side, and they rely on muffler clamps to make everything fit. Instead we chose to bore the ID in a lathe to create our own .058" wall sleeves. This is not difficult if the lathe has a boring bar with a carbide tip.

The Aeroconversions exhausts



ly assumes that exhaust studs on a VW engine are easy to remove

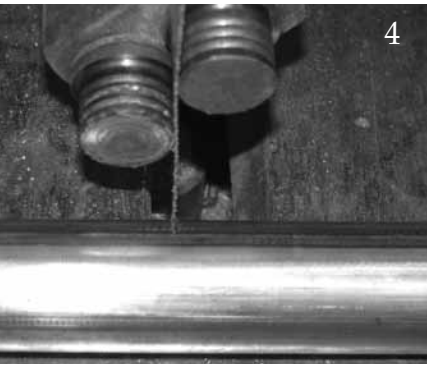
were cut apart in a straight section and then fitted to the cylinder head. Because this was being done without gaskets it was necessary to cut an extra 1/8" from the front leg of each system. The slip-fit sleeve was slid up the front leg before bolting the system firmly into place, and then slid down to allow 2" of upstream overlap with the tubing. While the exhaust was bolted firmly to a cylinder head each sleeve was then TIG welded all around at low heat to prevent distortion of the tubing, using very small diameter #308 filler wire.

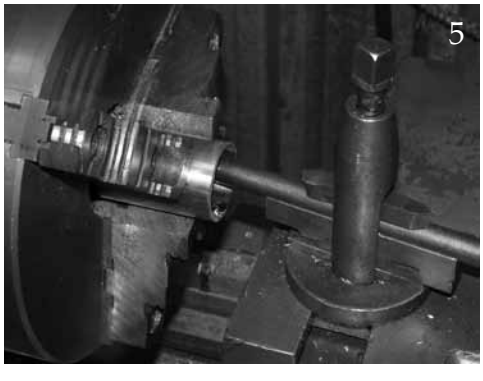
Safety wire perches were formed from a piece of aluminum stick welding rod after the flux was removed with a hammer. These too were welded in place with #308 filler wire. Note that the perches were welded outside of the slip-fit area.

When installing the system on the engine it is common to use a smear of high temperature silicone seal in the slip-fit area. This will provide an initial dam for exhaust gases, and later the exhaust carbon from the engine will supplement this.

The Aeroconversions instructions pay special attention to supporting the ends of the outlet tubes of the exhaust system from the firewall. This is very important, otherwise the weight of the outlet pipes will be suspended from the exhaust studs.

Top left, the exhaust ***must*** *be bolted to a head while being welded.*
Above: The complete exhaust with the Aeroconversions tailpipe. Ensure that the tailpipe is well suspended to take the load off the exhaust flange welds.





Winglets

Winglets are the fins at the tips of wings that in recent times have become a common feature on air transport planes and some smaller aircraft and sailplanes. They have been regarded with some skepticism generally as perhaps only decoration like the fins that were popular on some automobiles in the 1950's. The questions to be answered are: what do they do and are they effective? **/ by Dave Marsden**

The major purpose of winglets is to reduce the lift induced drag that can be a major part of the drag of an aircraft in flight. Induced drag can be as much as 75% of the drag during low speed flight such as during climbing flight. Winglets can have other beneficial effects to the handling and stall characteristics.

To understand how winglets work we first have to review the theory behind induced drag. Induced drag comes from the trailing vortex system that exists behind all lifting wings. This has been known since the earliest days of aviation as shown by the research papers by pioneers such as Lanchester in England and and Prandtl in Germany.

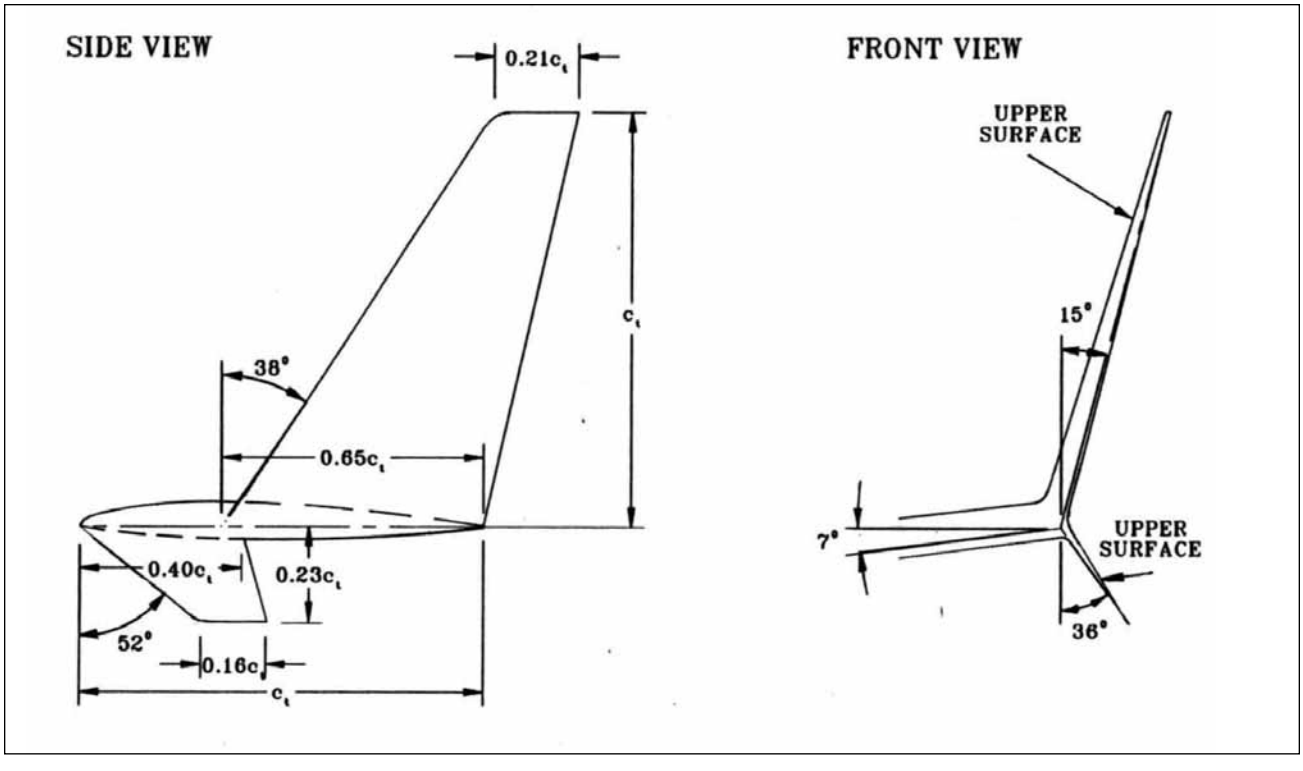
The trailing vortex system sets up a downwash field analogous to the magnetic field around a wire with electric current. This downwash affects the entire wing span and tilts the lift vector back to produce a drag component associated with the lift, the induced drag.

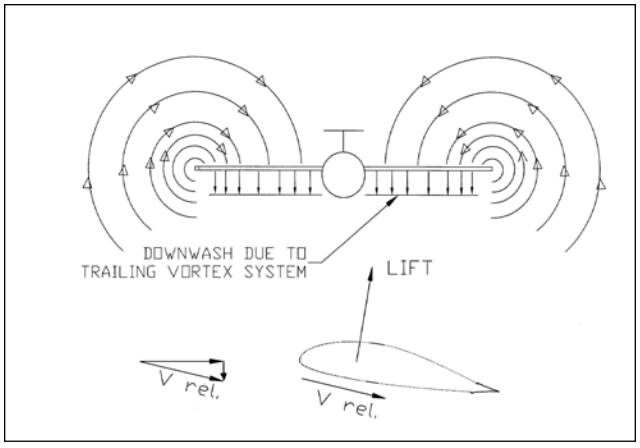
The distribution of downwash across the wing span depends on the wing planform. The ideal elliptical planform shape (as used in the Spitfire for example) produces a uniform downwash across the span and the minimum induced drag for a given span.

The easiest way to reduce induced drag is to increase the wing span. This has the effect of reducing the intensity of the trailing vortex system because the vortex intensity depends on the lift required per unit of span and increasing the span reduces the required lift per unit of span. There are practical limits on wing span due to structural strength and weight limits. More span means heavier structure and increased weight.

Constraints on wing span in the design of sailplanes are an illustration of this problem. Increasing span results in increasing weight and cost. The international body governing sailplane competition, OSTIV, introduced a limit of 15 meters span to limit the weight and cost. There are two competition classes with 15

Induced drag can be as much as 75% of the drag during low speed flight such as during climbing flight.





The end view shows how the lift and vortex flow off the wing. Opposite, below, the plan view of the same phenomenea. Winglets reduce the drag associated with this without the weight and structural complications of increased aspect ratio.

meter span, the Standard Class where flaps are not allowed and an otherwise unlimited 15-meter class. However OSTIV did retain an open class competition resulting in sailplanes of about 25 meter span as a practical limit.

There have been many attempts to modify the wing tip configuration to reduce the effect of the vortex that forms at the wing tip. The Hoerner wing tip is an example. This tip provides a smooth separation of airflow from the bottom and top of the wing tip to form a vortex as near as possible to the maximum span of the wing.

Most modern winglet design started with the winglet developed by R.T.Whitcomb at NASA. This was applied to a model of the military version of the Boeing 707, which was being used as an air tanker. Tests carried out in the NASA Langley 8-foot transonic wind tunnel showed a reduction in induced drag of up to 20% at a cruising lift coefficient of 0.44. Whitcomb specified that the winglet must provide significant lift directed inward.

Wind tunnel tests carried out in the University of Alberta wind tunnel confirmed that the Whitcomb style winglet would produce a reduction in induced drag of about 20%. These tests showed that the wing tip vortex was divided into two cores of about equal strength, one coming from the tip of the winglet and one from the wing tip. Since it is relatively easy to adjust the geometry of a wind tunnel model, the angle of incidence and twist of the winglet could be adjusted to provide strong lift on the winglet and avoid flow separations. In other words the winglet geometry could be optimised experimentally.

Cherokee Winglets

The owner of a Cherokee 6 (Piper PA28-235) aircraft, knowing of my interest in winglets, offered the use of his aircraft for some full scale flight tests. This aircraft has fibreglass tip tanks that provided an ideal base for the attachment of fibreglass winglets.

The Cherokee wing has a main spar approximately mid chord so it was decided that the winglet would be mounted mid chord rather than at the rear of the wing tip as on the Whitcomb winglet. The Whitcomb winglet is scaled relative to the wing chord at the tip. The Cherokee has a constant chord wing with a chord of 60 inches. A 60-inch high winglet seemed to be too big, so a 32-inch winglet with a taper ratio of 2:1 was chosen.

A wing section with a high maximum lift capability at low Reynolds number was used for the winglet. The low Reynolds number requirement was because of the relatively small chord of the winglet.

Development of the aerodynamic shape was carried out in the University of Alberta 4x8 foot wind tunnel. The rear part of the intersection of the winglet with the wing was shaped to ensure there was no flow separation there and that the vortex from the main wing would form smoothly at the trailing edge of the wing tip.

Flight tests were carried out on the basic aircraft to measure rate of climb in the standard condition as it was expected that an improvement in rate of climb would be the most important measurement of winglet effectiveness. Maximum climb rate at 5000 feet altitude was 720 ft/min.

Wing tip tanks were removed from the aircraft and taken to the workshop where the fibreglass winglets were constructed directly onto the fibreglass tanks. Since this is a type certified aircraft an experimental flight permit was required to carry out flight tests. The objective of the experimental flight permit was to obtain a supplemental type certificate for the Cherokee with winglets. Transport Canada required that structural tests be carried on the winglet structure, and these tests were observed by the chief aeronautical engineer from the Edmonton regional office.

It was immediately obvious from the first take off that the takeoff run was shorter and the climb rate better than it had been for the aircraft without winglets. The climb tests showed a maximum climb rate of just over 900 ft/min at 5000 feet altitude, which confirmed the hoped for performance improvement with reduced induced drag. Since we were applying for a supplemental type certificate for the aircraft Transport Canada required further tests of handling characteristics including stall performance and spin recovery tests.

The only noticeable change in the general handling was an improvement in the rudder effectiveness.

Stall characteristics

Winglets are known to modify the spanwise loading of the wing to provide more lift toward the wing tip. In the case of a constant chord wing this is likely to improve the overall lifting efficiency of the wing by making the lift more uniform across the span. We should expect a reduction in stall speed.

It was immediately obvious from the first take off that the takeoff run was shorter and the climb rate better than it had been for the aircraft without winglets

Flight tests showed that there was no sharp pitch down or wing drop at the stall. The aircraft would fly quite controllably at an indicated airspeed of 40 mph and full aft elevator control only produced a gentle pitching oscillation with about a 5 second time period. An investigation with wool tufts on the wing showed that a separation started at the wing trailing edge and moved forward to about a 75% chord position, followed by reattachment of the flow when the aircraft pitched down.

An airspeed calibration was carried out using a trailing static probe to determine a calibrated stall speed. The 40-mph indicated minimum airspeed corresponded to a calibrated airspeed of 54 mph. This is about 8 mph less than the calibrated stall speed given in the POH for this aircraft. It is not unusual for the IAS to be substantially less than CAS at the stall, but 14 mph is unusually high. The airspeed calibration showed that the indicated airspeed is quite accurate at cruising speed and well within the 5 knots at 1.3 times the stall speed required by the airworthiness code. The reduction in stall speed accounts for the shorter takeoff run noted on the first flight. The reduced stall speed also allows a reduced approach speed shortening the landing run.

Spin Tests

Even though the pilot's handbook says intentional spins are not permitted, tests to prove the aircraft will recover from a spin are required for certification. The aircraft was fitted out with a spin recovery parachute in the tail and spin tests were undertaken starting at 10,000 feet altitude. The usual spin initiation starting with a stall and full rudder resulted in a maneuver that looked very much like a spin, but the rate of rotation was much too slow. Recovery was instantaneous when the rudder as released. It was soon realized that this maneuver was only a spiral dive induced by the skid using full rudder.

After trying all possible methods of spin entry, including tests with full aft C of G, it became apparent that the aircraft would not spin.

When the satisfactory results of flight tests were reported to Transport Canada a test pilot was sent out from Ottawa to confirm our test results. A supplemental type certificate for the Cherokee 6 with winglets was granted, but only for this one aircraft.

In order to have an unrestricted supplemental type certificate a stress analysis of the wing structure would be required.

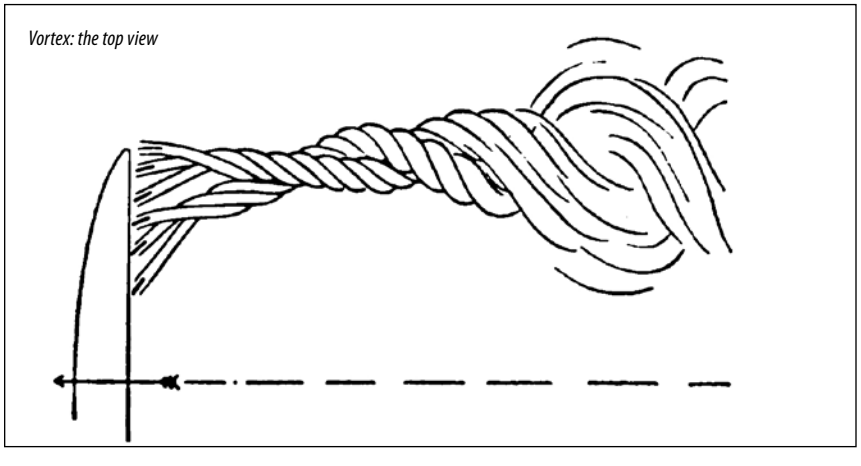
Other Applications

Whitcomb identified the application of winglets to large transport aircraft flying at high altitude. Because of the thin air at altitude these aircraft operate with lift coefficients of about 0.4 which means moderately high induced drag. Winglets can provide about 6% reduction in fuel cost in cruising flight at high altitude.

Another good application is to agricultural spray aircraft. These aircraft operate with heavy loads and at low speed where a reduction in the induced drag would be significant. Winglets have the additional advantages of providing better maneuverability and improved spray pattern.

Sailplanes represent the ultimate in aerodynamic efficiency. In the 15-metre class where span is limited by competition rules winglets can provide the equivalent of a span increase. Even in the open class winglets can improve aileron effectiveness while providing performance equivalent of an increase in span.

An open class sailplane with a 22.9 meter span was fitted with winglets developed at the University of Alberta. Careful flight tests carried out in stable air conditions over an area of rice paddies in California showed a maximum glide ratio of 50:1 without winglets increasing to 54:1 with winglets. The more effective aileron control provided by the winglets improved the climb performance in thermals. This sailplane was later flown in International competitions.



Vortex: the top view

Dave Marsden is a member of Chapter 85 and designer of the Skylark LSA.

Restoring a Tiger Moth

By Jill Oakes and Rick Riewe

RESTORING AN ANTIQUE open-cockpit biplane – which wing to start on first? Brandon's WWII Commonwealth Air Training Plan (CATP) Museum's Tiger Moth DH82A hasn't flown for about 20 years. The trailing edge of each wing looked pretty wavy and some 'broken bones' were protruding from the fabric so the RAA Winnipeg Area and Brandon Chapter members were curious to see the extent of repairs needed to bring this beautiful plane back to flying condition.

Mid-January, we slit into the taut fabric on the lower left wing – it had the most unusual protrusions indicating several broken ribs and collapsed cap strips. Cutting each rib stitch holding the fabric in position and peeling back the fabric, slowly the ribs and spars appeared. Dozens of people dropped in to see the insides of a 1938 wing first-hand. Imagine, these wings were built about 30 years after the Wright brother's first flight! The Tiger Moth wing is similar to Citabria, Champ, Cub, Pietenpol and other aircraft with wooden spars and ribs that we've seen restored at the RAA Workshop Final Assembly building at Lyncrest Airport.

Details found in the Tiger Moth wing proudly show its age! For example, some of the aileron control cables are still the original cables with hand braided connections rather than the modern nicopresss connections. Tom Phinney is trying to remember how he used to make those braided lines! If you know how, we'd love to learn from you!! The drag and anti-drag

Opposite: (left to right) John McNarry, Jill Oakes (seated in cockpit) , and Harvey McKinnon each take a moment to sit in the Tiger Moth at the Brandon CATP Museum before removing the wings for restoration by members of Brandon and Winnipeg Area RAA Chapters. Clockwise from top left: John McNarry, Tom and Steve Phinney, and Maurice April all contributed to the restoration of this beauty.

wires holding each section of the wing square have hand made connections that look like large-scale twisted safety wire. Each connection is identical to the other – we'd love to have a photo of the machine or tool that made those wires. Splices and joints are wrapped with fabric tape, and metal brackets secure each rib to the spar. The brass tacks are as slim as a sliver, much narrower than contemporary brass tacks, and they are truly made from brass.

Volunteers removed five layers of paint covering the ribs so the wooden parts could be inspected for wood rot and cracks. Fortunately, the wood is in excellent condition, and surprisingly only a half dozen ribs have minor cracks to be repaired. In addition to volunteering time and expertise, local builders have brought in valuable supplies, including:

Gil Bourrier – tools, leftover sitka spruce and glue from his Acro Sport project, brass tacks, buckets of clamps
Vic Prefontaine – Whitworth wrenches, specialty tools, hardware
Larry Brown – Sitka spruce
George Inman – tools, sanding blocks, paint removing supplies, Dremel
Harvey McKinnon – primer, tools, and sand blaster
Nancy McKinnon – stripped the flying wires
Scarlette and Ed Ulrich – access to Ed's entire tool box
Bill Gibson – Tiger Moth Pilot's Notes, including rigging details!
Adrian Meilleur – 1/8 thick aircraft grade plywood
Maurice April – clamps, cardboard
John and Jan McNarry – tools, wing racks, trailer, paperwork, museum logistics
Gary Wolf – engine cowl
Bill LeBrun – sitka spruce from his Jungmeister project
Ken Podaima – tools
Rick Riewe and Jill Oakes – tools, supplies.

Gerry Ricard, Transport Canada, is providing advice needed to manage

> The finished Tiger Moth will be used to commemorate veterans from the CATP and to bring to life the historic role Canada played in training hundreds of thousands of airman from throughout the British Commonwealth.

the paperwork for variances so the original WWII paint scheme can be used, including the aircraft's military identification. Tom and Steve Phinney have volunteered to serve as the AMO: Structures-Wood for the project and they have developed the work plan needed to restore the plane to flying condition. Ted Hector, AME, has rebuilt several Tiger Moths and has volunteered to provide advice.

The Brandon CATP Museum's Tiger Moth lower left wing has now been cleaned up, and repairs are being completed over the next few weeks while some volunteers are priming the metal parts and varnishing those ribs that are ready for the next step. Once the wing is complete we are looking forward to opening up the upper left wing to see if repairs are needed on that wing. Our plan is to cover the upper and lower left wings, and then open up the wings on the right side…so we have the opposite wing as a reference. As we proceed the plan is expected to evolve, leading to the final restoration of Brandon's Tiger Moth to flying condition. The finished Tiger Moth will be used to commemorate veterans from the CATP, and to bring to life the historic role Canada played in training hundreds of thousands of airman from throughout the British Commonwealth. We can hardly wait to see the Tiger Moth back in the sky over the Prairies. Thanks to George Gregory, the Tiger Moth project is now live on the RAA website. From the home page (www.raa.ca), just click on the News tab. It is right after the Forum announcement near the top.

Jill Oakes and Rick Riewe work for the University of Manitoba.

Keep in Touch With
Your Board of Directors!

Gary Wolf ..... President
.....519-648-3030 garywolf@rogers.com
Wayne Hadath ..... Treasurer
..... whadath@rogers.com
Dave King ..... kingdws@shaw.ca
Ed Perl..... ed.perl@sympatico.ca

RAA Regional Directors

Mainland BC:
BC Coast .....John Macready
..... jmacready@shaw.ca

Interior BC/Technical Director: .....David King
contact best between noon-10pm 7days work
ph. 250-868-9108 homep ph. 250-868-9118.....
.....emailKingDWS@Gmail.Com

Alberta North:
Pending

Alberta South:
Gerry Theroux .....403-271-2410 grtheroux@shaw.ca

Saskatchewan:
Laura Drinkwater..... 306. 955-1361
lauraprd@shaw.ca

Manitoba:
Jill Oakes.....204-261-1007 jill_oakes@umanitoba ca

Ontario SW:
Jim Tyler..... tyler@orc.ca

Quebec:.....Pending

Appointed Positions:
Translation:.....Pending
Magazine Mailing: .....Dave Evans
Ultralights:.....Wanted
Web Page .....George Gregory
Insurance Committee ..... Gary Wolf
AirWear.....Dave King

Across Canada

RAA Chapters in Action

RAA London St.Thomas

At the December meeting, Angus McKenzie announced that after nine years as President, he is withdrawing from the position as of the end of this meeting. On behalf of the Chapter, Don Hatch thanked Angus for a great job well done over those years, followed by a huge round of applause. Don Hatch agreed to continue producing the Slipstream, health permitting, and he admitted that he actually enjoys the challenge. A big round of applause indicated that Don's excellent publishing skills are much appreciated by the chapter membership.

The Skyhopper flew about two weeks ago, and is now in Mark Matthy's shop, as reported by Denny Knott. The twenty-five hours must now be flown off. Currently it is registered to Denny Knott and Gary Bishop. In any case it must be registered as a separate entity and not directly to the Chapter. Final details of registry and operations will follow the 25 hour milestone next year.

Bill Weir presented a sample nametag that he has been looking into. It is a red plastic over white plastic, about 1-1/8" by 4". The RAA logo and persons name are milled through the red plastic, so that the name and logo show as white letters on a red field. A strong magnetic strip with a small steel button will attach the nametag to any material with no marks or holes as left by a pin. Bill volunteered to hand the nametags out as members arrive at the meeting or club function, and collect them back, store them, and return with them to be handed out

Pictures from the RAA Oshawa fly-in last October. Top, Joe Foster (left) admires Jim Stittle's (right) Osprey II; Chapter members fly their colours at the fly-in. Below, weather and fly-in attendies were great.

Another picture from Hawkefield, courtesy Chris Gardiner. An older Waco, perhaps? Not an INF - the landing gear's not quite right.

again at the next function.

The January meeting, originally scheduled for January 3rd was postponed because of dangerous snow conditions for traveling, and was rescheduled to January 17th, 2012. With twenty-two persons in attendance, at the 427 Wing Building on the London Airport, new president Phil Hicks called the meeting to order at 7:32 PM.

One guest, Thomas Hertner, son of Treasurer Dave Hertner was in attendance. Bill Weir, in reference to the story about "Those Reliable Spitfire Browning Machine Guns" in last month's Slipstream, reported that the father of his friend Phyllis Pitman was the plant manager at the time the plant was hit by a German air raid. The raid happened on a clear moonlit night, and in the following days, Phyllis's father was called upon to identify the victims, a task which had a very traumatic affect on him for many years after. Some five abandoned textile factory buildings were then pressed into service to get the gun production back on line for the war effort.

Phil Hicks reported that he is currently assembling wing spars, on a workbench obtained from Bill Weir. Phil is approaching the solid riveting of the spar connections with some trepidation and great care!

Dave Hertner reported that Dec 10th he received the C of A for his RV-10 project, and hopes to fly it soon. Currently he is sorting out a radio problem.

Denny Knott reported five hours flying time on the Skyhopper, with only a small tail wheel spring problem to sort out. It is going well with the Skyhopper in general.

Roland Kriening is awaiting delivery of his Honda Viking Engine for his Murphy Rebel project. The Viking is a four-cylinder engine, laid over on its side with a redesigned oil sump, and is rated at 110 HP. Ray Taylor is looking for a rotor for a Bendix Magneto for his restoration project.

At 8:10PM Phil Hicks introduced the speaker Dan Oldridge, a career firefighter, due to retire from the London force Jan 27th 2012. Dan is building a Highlander kit from the Justaircraft Company. It is a sideby-side two-seater with a huge luggage bay. The wings fold back without any disconnection of cables, wires or hoses leaving an 8 foot wide aircraft for storage. Dan first built a workshop in the back yard which his wife calls the "Garage-Mahal".

Dan then showed a video of the Highlander which showed the amazing ability of the aircraft when flown in mountainous terrain, with uphill and downhill landings on mountain tops less than 400 feet in length. Even a dead-stick takeoff down a very steep mountain side, and a glide to a creek bed dead-stick landing. A very interesting presentation by Dan ended around 9:35PM.

RAA Scarborough/Markham

We are grateful to Carl Mills (carlmills@

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.

***Members are encouraged to send in news and chapter happenings* for postings on the site. Get the word out, and check frequently for news on upcoming events. You can post them directly on the forum, and we'll make sure they make it onto the main site as well.**

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

rogers.com, 416-495-0907) who spoke to us at our November meeting about Canada's involvement in the Korean War. Carl spent more than 18 years as an officer in the RCAF reserves, much of it with 400 Squadron. (400 Squadron has recently celebrated its 80th Anniversary.) Carl's professional background is in electrical engineering; amongst other things, he has been involved with runway lighting. What we had from Carl was an interesting history lesson on the Korean conflict. He spoke of: the North Koreans crossing the 38th parallel on 27 July, 1950; McArthur's landing at Inchon; the involvement of ~ 1000 Canadian airmen and airwomen, the latter as RCAF RN nurses; all of our people were officers wearing USAF uniforms except for headgear and rank badges; 50 combat missions flown by Canadians, etc. Carl ended with some ideas about the future of the Canadian Aerospace Museum (perhaps housed in a tower near the subway). We thank Carl for an interesting evening.

The Christmas party at the Sisters Restaurant had a good turnout of chapter members. It was very gratifying to see Don Robertson well on the road to recovery. The Lindsay Airport contingent was well-represented by Wally and Sandy Norris, and also Gary Johnson who keeps his T-18 Thorpe taildragger at Lindsay.

Winnipeg

Jill Oakes informs us that a new blog has been started on the restoration of a Tiger Moth. To have a peek at it, check out: http://tigermothrestoration.blogspot.com/

Chapter 85 (RAA Vancouver)

A new member was introduced: Ray Roussey. He owns and flies a Ryan Navion from Delta and has been a tenant of Delta Air Park for 15 years.

President John Macready described his election platform and intentions to improve numbers and expand activities of chapter in 2012. He thanked Past President Tim Nicholas for his service as RAA 85 President.

John introduced new members of the executive namely David McIntosh as Secretary. Raymond Colley as Vice, Tom Boulanger as Treasurer. Bruce Prior as Custodian/Paint Shop. Gary McBride as aircraft chairman. Alex Routh and John de Visser are new directors.

Tell Us What You're Up To!

Help keep the national membership up to date on what your chapter is doing. Send your pictures (the bigger the better!) and submissions to George Gregory (george@sidekickgraphics.com) or Gary Wolf (garywolf@rogers.com)

There will be a meeting in February to review all portfolios, identify goals and set objectives for 2012.

President John hopes to refocus chapter back to the roots, building airplanes and developing home building skills. In other words, return to our mandate to build airplanes, show them off, and improve building skills. He wants to make the chapter more hands on; we have the expertise, facilities, and money and that we can promote ourselves more to demonstrate our RAA "Esprit de Corps." He suggests one small way to do this is to wear RAA apparel with logos, etc. to increase our visibility and promote our image in the local aviation community.

Three projects recently completely recently were: Cessna 170 (Instruments), Emeraude (Deconstruction), Cessna 150 (engine installation).

Vice President Raymond Colley mentioned the upcoming awards banquet; he also described the repairs to the airfield hangars i.e. 32 hangar doors were replaced, with rollers and sliders. New doors have lexan windows at top in order to let in light. Aircraft chairman Gary McBride also reported that basically a top-end overhaul was completed in 2011. The goal is to significantly increase the membership's use of the Turbi in the coming year.

The Barn repairs/restoration may or may not occur due to the cost of the project. It may end up being a very expensive project.

Newsletter guy George Gregory wants someone to forward notes about the meetings and noted that we need to share our great wealth of building knowledge with others.

Because George edits the Turn and Bank and the Recreational Flyer, he would like to encourage us to contact him with any little hints or pointers and easy ways of doing things for the newsletter. We have to encourage our members to contribute small articles if they have completed some project or know something about a topic. George explained that the website is a great resource, but is being underused. We could improve the RAA "brand" if the forum were to become a go-to place for aviation knowledge. He would like to make the RAA Website the touchstone point for homebuilding aircraft to find out what's going in Canada with the RAA.

John Macready described the RAA 85's involvement at the COPA convention last year. George designed 3 posters. John encouraged members to write articles for Turn and Bank.

Cyril brought an excellent about fabric work. It's dated, but still an interesting film that covers all the steps in the project. Cyril will attempt to get a Transport Canada person to a meeting for a talk about homebuilt aircraft.

John adds that the program part of the RAA is very important. The more hands on the better, and he'll talk with other chapters to see what they do to keep members interested.

Go Play In The *Snow*

C-IPSY Goes Ice Fishing / By Al Hayduk

One of the great pleasures of having my ultralight Savannah on skis has been the opportunity to fly into tiny remote lakes deep in the boreal forest for some fantastic winter fishing. I usually go alone because I enjoy both the remarkable winter quiet and the opportunity to see and hear a range of birds and animals that do not appear if there is too much disturbance. To do it safely and comfortably however requires more and different considerations than our normal airport to airport flying. I would like to share a few of these considerations.

Ice

Thickness rules for clear hard ice are well known: 4"for walking, skiing and ice fishing; 5" for one ATV, sled or in my case, small ultra light on skis; 8"to 12" for a car or small pickup; 12" to 15" for one full size pick up…etc. Unfortunately it is not that simple. Four common ice conditions create significant ice hazards for light aircraft no matter how thick the ice is.

Overflow is a condition that sometimes develops when a lot of heavy snow falls on relatively thin ice. (There are other causes such as extremely cold ice that contracts and becomes less buoyant and therefore sinks under a snow load it previously supported. For our purposes the "heavy snow" explanation will suffice.) As ice sinks slightly deeper into the lake, warmer water forces its way up various cracks and weak spots to lie on top of the ice. The water then wicks into the lower part of

Go into the wilderness

the soft snow creating a very cold slushy mixture overlain by dry snow. This overflow layer, anywhere from a few inches to several feet deep, can stay semi-liquid for a long time depending on ambient temperature and the amount of insulating snow. When one unknowingly lands above overflow the first indication is a sudden great splashing of icy water in all directions. As your plane quickly settles into the overflow it can feel like you are falling right down into the lake. The second thing that happens is usually a rapid stop. Next you notice that forward (or backward) movement is not possible in the thick mush. If it is a cold day this mush, once exposed, freezes rapidly all over your vehicle. If you do not do something quickly your vehicle will also freeze in place. I have personally seen more than a few trucks and have heard of several aircraft that have spent the rest of the winter frozen into the ice. This is not in itself as big a problem as it sounds because, come spring, the snow and frozen slush melt off first leaving the vehicle to be driven or flown away on a perfectly flat and safe ice runway.

Al's Rule 1: if you don't know the current ice condition, then before you land always make a flying speed pass along your proposed landing path while allowing your skis to sink partway into the snow. Then pull up and overfly your tracks. If they appear dark, that is water wicking up into the compacted snow. DON'T LAND THERE. Try again, usually closer to shore. Overflow is usually confined to a specific area and a good landing place may be only a short distance away. Animals won't walk in overflow so a check of fresh animal tracks can be informative. Many tracks, all changing or reversing direction along an apparent line probably indicates the overflow boundary. Similarly, many animal tracks in an area usually indicates a safer landing zone.

The initial safety problem with overflow appears when you first find yourself stuck, and step out of your plane to see what you can do. There you are, calf deep or deeper in freez-

s. We are blessed.

ing water. If you are wearing non-waterproof winter boots you instantly have wet and freezing feet. If you have spare warm boots, appropriate survival gear, the stamina to make it to shore by wading through the slush and know-how to start a fire and make a shelter you are still ok. (If the overflow is not too deep you may be able to free the airplane and set it on spruce boughs, wade yourself a take-off path and fly away in the morning once the slush path has frozen over.) On the other hand if you do not have dry warm boots and good survival gear and skills there you are, freezing and alone in a tiny remote lake and in serious trouble. You had better have a good radio, or ELT or PLB. Make sure your rescue vehicle doesn't drive into the overflow.

Al's Rule 2 - always carry water-proof winter boots when flying into remote Boreal lakes. I wear mine and carry spare dry ones. Know exactly where your survival gear is and what you have. Make sure it is adequate for winter conditions (parenthetical note or perhaps footnote: It is important, even in ideal conditions to get your skis on spruce boughs or prop the tips of them up on logs if leaving the plane on snow for longer than a few minutes so that the plane does not freeze to the surface. That can be an unwelcome surprise when you attempt to depart).

The second safety problem appears when you figure out that you are stuck here in the bush for at least the night. Like aviation, winter camping is a lot of fun (really!) if you are prepared and know what you are doing. Your evening begins with a beautiful crackling campfire, a cosy shelter with a fresh spruce scented mattress, fresh perch and bacon frying on the coals, and usually the northern lights dancing in the sky. As night comes on in the clear cold air there emerges a heaven of glorious stars that most Canadians have never seen and never will see. Throughout the night Orion and his two dogs and the rest of the winter six constellations gradually display their overwhelming mastery of the enormous southern

Beavers often leave pockets of stored air underneath the ice between their lodges and food caches. This can lead to thin ice especially close to the lodge.

sky. Turn your eyes northward and you face the mystery and the incredible history of the North Star and the dippers which ought to be close to the heart of every navigator. And then there are the animals; coyotes (or if you are really lucky, wolves) howling around the lake; perhaps a midnight moose will wander across the lake to inspect your fire. In the morning you can pretty much count on being woken by marauding whiskeyjacks and a chattering squirrel or two.

To watch the flickering flames of your campfire and the shifting northern lights reflect off the wing of an aircraft you built yourself and flew here yourself is to be so full of the wonders of our human existence coupled with our mastery of technology that there is room in one's head for nothing else but pure overwhelming joy. Many is the evening when I have sat by the fire, sated, warm and cosy, while smoking an excellent cigar (evidence of stupidity) and watched the smoke drift faintly across the stars. No thought; just a feeling of being filled absolutely with joy.

Unfortunately, like aviation if one is unprepared or careless, inattentive or insufficiently skilled there is no joy to be found during a night in the frigid winter forest. It is not only uncomfortable and scary, it can kill you. Al's rule 3: If you don't know for sure how good your winter survival skills are perhaps take a course or practice some winter camping in a safe location.

Methane Riddled Ice

I don't believe this ice condition is a concern in the lakes of the Canadian Shield. The bottoms of the eutrophic lakes found throughout the Boreal forest in most of western Canada however are comprised of a meter or more of organic sediment commonly referred to as "loon shit." Byproducts of rotting organic material include methane and carbon dioxide gas as well as several lesser gasses. As the ice forms at the beginning of winter these gases continue to bubble up from the bottom where they are trapped under the ice. As the ice thickens it grows down around the bubbles. Normally we don't get to see this process because snow covers the ice. The bottom photo on page 27 shows a small forest of methane bubbles as seen through clear ice.If you light a fire on clear methane ice at night each bubble becomes a small concave mirror that reflects your flickering firelight. This is truly one of the most magical visual experiences one can have on the ice at night. To see, to live it, is to stand in the midst of a thousand, a million, flickering jewels each radiating its rainbow colors from a setting four or five feet thick. The largest methane display I have ever seen was the shape of a large flower about six feet across. I had no fire that night but the flower was so large and the northern lights danced green so strongly that occasionally the convex mirrors would project faint green dancing shadows on my jacket. I was so captivated by the moment that it wasn't until much later that I wished I had had a camera.

Methane riddled ice is not normally a safety concern. The one exception is near a creek mouth or other flowing water where the ice is already thin. The worst you are likely to get is a wet foot when you step through a small hole. Wear your waterproof boots.

Al's rule 4. Go into the wilderness. We are blessed. We are probably the last generation that will have the opportunity to go with our modern tools and understandings into the world as it was a hundred thousand years ago. That is where we evolved

Gas pools found in some lakes in Western Canada can present safety hazards.

from. That is the world to which our senses are attuned. It is not possible to be more fully alive than in the wilderness. Go into the wilderness. Go alone. Take with you only what you need to be safe. Live with every cell of your body. Do it as long as you can. There will always be time for television.

Gas pools

This ice condition is dangerous and potentially fatal. Many lakes in Saskatchewan, Alberta and northern BC sit above huge natural gas reservoirs. These reservoirs occasionally leak causing streams of gas to bubble up to the water surface. In summer this is not a problem. In winter however the ascending gas carries with it warmer water from the bottom. The warm water melts away the bottom of any ice above it. This can cause areas of invisible but extremely thin ice. Occasionally it produces areas of open water. Photo 3 taken in the middle of Lesser Slave Lake in early March shows a pool of open water. The lake is about 30 feet deep here. IF you look closely you can see the gas bubbles in the center of the pool. A typical gas pool opening may measure about 300 by 400 feet. The ice around the edge of the pool will be extremely thin with thin areas radiating out for some unknown distance. Wise people don't go anywhere near it.

From the air, when there is no wind this open water looks like clear ice. When all else is snow, don't land on the clear ice. Much more dangerous however is what happens when there is loose snow on the ice and the wind starts to blow. The open water becomes covered with snow. If you are driving a sled or a quad on the ice this open water is invisible. More than a few deaths have occurred when vehicles driving across apparently solid ice have suddenly disappeared into open water. Although I have never witnessed this myself I have heard from members of recovery teams of the horror they felt when following a set of vehicle tracks that just suddenly stopped.

Gas pools found in many lakes in western Canada can create thin ice in winter, and occasionally even open water. It goes without saying that to venture near these on foot or with an aircraft is a bad idea. In the middle picture, you can actually see the bubbles in the middle of open water. Sometimes, however, thick (i.e., safe) ice forms around bubbles. Usually hidden by snow, if you light a fire on clear methane-riddled ice a beautiful spectacle is created as the bubbles reflect the campfire.

Look carefully at photo 4 and you will see the frozen sled tracks left by someone who passed within inches of death and never knew it.

From the air, these snow covered pools may appear slightly darker than the surrounding snow. If the day is cloudy or the ice is covered with drifts you will never see the open water. Unfortunately, the relative smoothness of the area in comparison to the surrounding drifts may make this lethal area look more desirable as a place to land. Once in this open water you are in trouble. If you have had the "Bry the dunker guy" course, good for you, you are out of your airplane and into the water. If you managed to get your ice picks (see checklist) out of your pocket without dropping them then you may have been able to get out of the water and onto the ice. Many don't. As you roll onto the ice do you notice that you have your waterproof lighter and you SPOT or PLB actually in your pockets… or are they in your sinking plane? As you notice your floater suit beginning to freeze you quickly assess your access to the nearest warmth…. Good Luck. So how do you prevent this scenario? Review and follow rule one. Every time. And get all the local information you can.

To watch the flickering flames of your campfire and the shifting northern lights reflect off the wing of an aircraft you built yourself and flew here yourself is …nothing else but pure overwhelming joy.

Beaver passage

Beavers, our national rodents, build houses along the shores of many of our lakes and rivers. Beavers store a whole winter's worth of food in the deeper water out front of their lodges. Their food is thousands of small poplar branches. They stick the biggest of these in the lake bottom and then interweave many small branches. When the snow is not too thick you can see the tips of many of the main branches sticking up through the ice. It looks like a small willow thicket 20 or 30 feet away from the lodge out into the deeper part of the lake. In the winter when a beaver wants to eat he fills his lungs with air and then swims from the lodge to the food cache, releasing air along the way. Once he has eaten or retrieved what he wishes, he returns to the lodge. If he needs air on the way back he simply rebreathes the air he released earlier and which has remained trapped under the ice. All the motion caused by repeated access to the food causes warm water from the bottom of the lake to erode and thin the surface ice. The inverted ice bowl, thus created, can hold a good supply of air for quite a long time. They are pretty smart animals those national rodents. In photo 5 the ice surrounding the beaver lodge is approximately 10" thick. The blue ice over the feed source and around to the lodge entry is about 1/8" thick. There is a small patch of open water next to the underwater lodge entry where the traffic is greatest. In my experience beaver passages do not normally

cause a significant safety issue except quite close to the lodge. Several times while visiting a beaver lodge I have managed to step through the thin ice with no serious consequences. More than once in spring I have found dead deer frozen into the ice near a beaver lodge which probably does not enhance the beaver's quality of life. I once saw someone drop a quad through the thin ice over a beaver food cache.

Al's Rule 5: Don't taxi your airplane over a beaver food cache or up to a beaver lodge. You might drop a ski through and that makes for some possible damage and a lot of unnecessary work.

Aircraft Considerations

When you have finished a good day of fishing and are ready to head home it is truly a sweet sound to hear your engine roar to life. Unfortunately, cold weather and "Murphy's law of isolated lakes" tend to work against hearing this sweet sound. There are a few things we can do to swing the odds in our favour.

Keep your engine warm As soon as you land insulate your engine. If you have a larger plane you probably have a custom fitted engine cover. In my ultra light I use my survival sleeping bag and that works fine for me. You may choose to start your engine regularly during the day to keep it warm but this has a mixed benefit. Each start that is not followed by a longer run time, takes a little bit out of your battery so you are swapping reserve battery power for engine heat. How often you choose to rewarm your engine really depends on the specifics of your aircraft and your situation (rate of engine cooling, battery size and age, ambient temperature, normal reliability of cold weather starting and so on.) There will inevitably come a time, however when your engine refuses to start, usually because something got too cold. It is best to be prepared.

One Man Boosting

A booster battery pack is an excellent tool especially when you have an AME handy to boost the battery while you work the controls and use the brakes or chalks to keep the plane from moving. When you are alone and on skis boosting your battery it is not quite that simple. Your battery is hidden away under the cowl or perhaps behind a panel in the rear of the airplane. If you remove the cowl to hook up the booster, once the engine is started you must then exit the plane to close the battery hatch and retrieve the booster. If you shut off the engine it may not start again leading you to boost again etc. etc. If you want to leave the engine running you must secure the plane while you retrieve the booster and button up the hatch. If you are close enough to the shore you may tie the airplane to a tree. Usually you are not that close. Another option is to use your ice drill (you are fishing after all) to drill a hole behind the plane part way through the ice at 45 degrees away from the plane. Insert a small log (called a "dead man") into the hole and then tie the plane to the log. This assumes, of course that you brought a drill, a rope and a wood saw.

There is an easy way to avoid

Al Bohachyk

Being Prepared

Here's the gear that I will not be without when I fly alone, in winter, into a remote lake. This is my checklist (in addition to fishing gear, worn and spare warm clothing which is always with me, as well as any legally required safety gear and the basic mechanic's tools that are always with the plane).

Ice fishing Checklist:

Waterproof boots
Spare boots
Mitts / gloves /spare head gear
Hand and Foot warmers
Ice picks
Lighter x 3 /Charcoal /Fire starter
Fry pan
Gerber (or Leatherman) Tool
Wood Saw
Rope (min 100')
Small Tarp (min 8 x 10)
Battery booster
Snare or safety tie wire
Folding Snow Shovel

My friend, Donald Kvill, a former helicopter pilot and a long time light plane ski pilot reviewed this list and claimed I had missed the most important part: "a 110 pound bright and cheerful young lady who can cook and clean fish, set up tents, bundle up the airplane, carry gear and cut firewood while I am busy with the important task of ice fishing."

So far I have been unable to locate a supplier.

One man boosting: when you don't have someone handy to hold heavy wires run from the battery to a welding cable connector under the pilot's seat. The matching connector is attached to the booster pack. When you are ready to boost your battery simply retrieve your booster pack from your gear, start your engine and let it warm up while you re-store your booster.

all this hassle and boost the plane from the cockpit. Photo 6 shows heavy wires run from the battery to a welding cable connector under the pilot's seat. The matching connector is attached to the booster pack. When you are ready to boost your battery simply retrieve your booster pack from your gear, start your engine and let it warm up while you re-store your booster. You never have to get out of the airplane. (An added benefit of this rig is that once your plane is home it is really easy to maintain the battery charge by plugging a float charger or a solar charger into the connector without having to access the battery.) Note: This simple connector does not present any regulatory concerns if you add it to an ultra light: there may be limiting rules for other categories of aircraft.

Priming

I believe most certified planes are equipped with plunger type primers and I assume if you have one you will have used it. Note to owners of ultra light aircraft using Rotax 912 engines. You might want to consider adding a primer to your engine. You can buy a used primer from your local aircraft wrecker (mine cost $80). "T" into your fuel line at a convenient place and connect the downstream tubes to the carburetor balancing ports. If you built your airplane and are confident in your skills this is easy. If not, get someone who is competent working with aircraft engines to help you or to do it for you. Two squirts along with full choke and the throttle set at idle produces the best results on my 912.

Field Preheating. It may be that your plane still doesn't start. Sooooo... the boosting and the priming weren't enough (this is most likely, for exam-

ple, the morning after having spent the night in the bush waiting for your overflow runway to freeze). You have no choice but to warm the engine and perhaps the battery out here in the bush. An open fire is a good way to burn your aircraft. A catalytic heater can work but gives off huge amounts of water vapor. This is not a good thing to infuse into control cables, hinges, air filters and so on when you are about to take off into frigid air.

I always carry a small cast iron frying pan and 5 or 6 lumps of charcoal along with a little fire starter and a mini-torch (or lighter). Light the charcoal in the frying pan. While it is heating, rig your sleeping bag as a tent over the engine so that the heat will flow upward through the engine and out the front. If you want to heat your battery place it under the cowl or on the cowl under the sleeping bag, otherwise well above the charcoal. Position the frying pan where you can't catch anything on fire but not directly on the ice. A couple of moistened branches on the ice work well as a base. It does not take long to warm your engine.

The lighter, fire starter and charcoal are critical survival tools. The frying pan is useful for a whole range of things. It is great for melting coffee or tea water. It is excellent for frying fresh perch or walleye. Perhaps its best use happens just before bed. You reheat the remnants of the bacon, butter and little tiny perch bits left in the frypan. Add little snow. When it is nice and hot pour it, and about three teaspoons of sugar into a noggin of spiced rum and Presto… hot baconned/buttered spiced rum with crispy perch bits. (Butter? Bacon? Rum?… of course! We're not Philistines you know.) I have never found a better drink before going to bed in a shelter under the stars. On the other hand I have never found it particularly palatable at home. Strange...

Coming Events

KARS Rideau Ski Fly In
Kars Chapter 4928 will hosts its Annual Ski Fly-in event at the CPL3 field on Dilworth Road, just East of Highway 416. Com is 123.4, runway orientation is 26 - 08, GPS N 045, 06, W 075, 38. Homestyle food will be served from 11 am to 2 pm in the RAA Chapter's new clubhouse. The public is welcome to attend. Contact David Stroud dstroud@xplornet.com . Field conditions may be checked 24 hours prior to the event by calling David at 613-489-2347

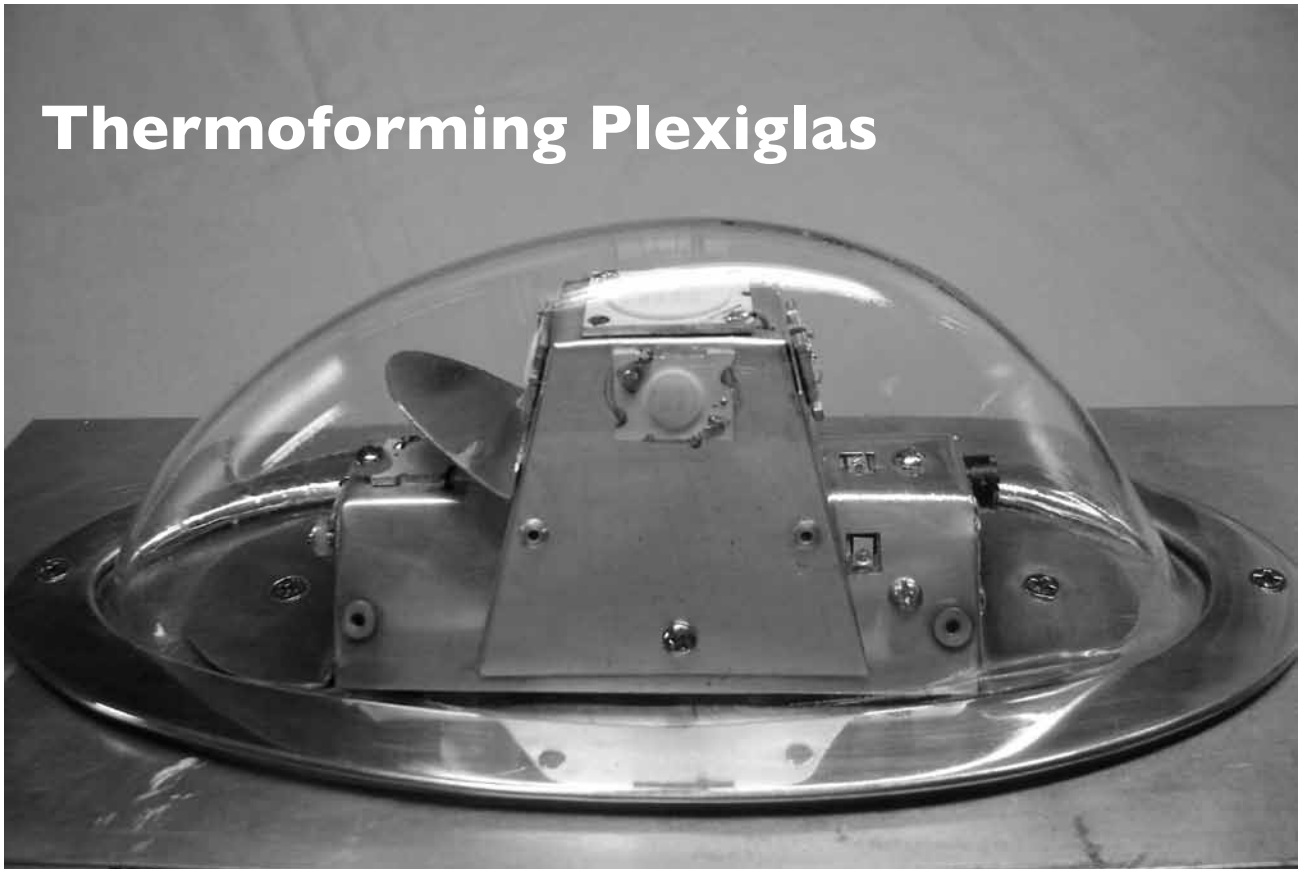
Chatham Seminar, Brekkie and TC Safety Seminar
May 26, Chatham, ON (CNZ3): Breakfast/TC Safety Seminar/Fly Market. The Kent Flying Machines branch of the R.A.A, is pleased to present the 10th Annual Fly-In/Drive-In/Walk-In Breakfast, with a TC Safety Seminar, and Fly Market at the Chatham Airport (CNZ3). Breakfast ($6.00) starts at 8:30 with the TC presentation scheduled for 10:00. The Fly market will be open during breakfast and after the TC presentation. Lunch will also be available. Come and join us in a day of commeradie, increased aviation knowledge, and brousing the Fly-Market. Bring your spare items for sale, tagged and priced. Plenty of parking, a 5000 ft runway, 100LL fuel, and good food. For more information contact Gerrit van Vrouwerff at 519-674-3851 or gerritvan@aol.com

Delta Pancake Breakfast
Second Sunday of each month - Delta Heritage Air Park, Vancouver
Monthly fly-in pancake breakfast by RAA Chapter 85 and DAPCOM. Air Park location is in the CFS. Full breakfast for $4. Breakfast served from 9am until the food is gone or 11am, whichever comes first.

Winnipeg Learn To Land Seminar
Harv's Air, RAA and SFC are co-sponsoring the "Learn to Land Course" designed to ensure passengers are confident being able to land the family plane in the event their pilot has a medical emergency. The course begins with a ground school, April 13 and 20th from 7:00 - 9:00 at the Lyncrest Flight Centre. To register contact jill_oakes@umanitoba.ca

Les Faucheurs de Marguerites
Sherbrooke airport, June 30th and 1 July, les Faucheurs de Marguerites, For more information, visit their web site at: www.lesfaucheurs.com

Thermoforming Plexiglas



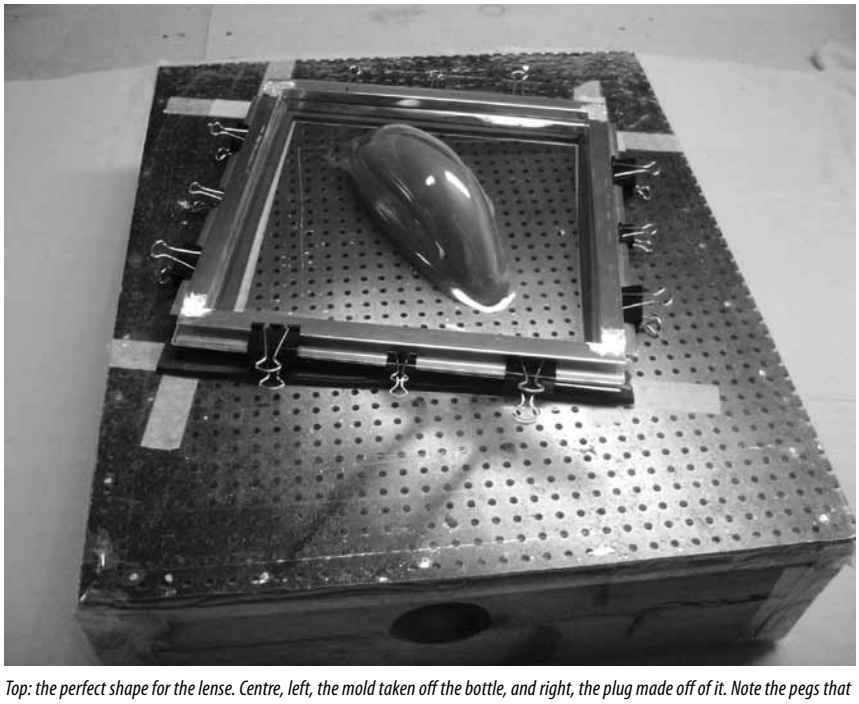
About eleven years ago, I was becoming very tired of flying club fees, schedules and rental costs, so I started looking for a less expensive and less regulated way to keep flying.

by Clarence Martens

I WAS READING EVERYTHING I could find about kitplanes on the market. I even completed the one day CH601 rudder workshop at the local Zenair dealer. Then one day, I happened to bump into a couple of K-W RAA members at the Waterloo Regional Airport. It wasn't long after that first meeting that I joined a group of 5 Pegazair builders who were undertaking what seemed like an impossible task - building real airplanes from nothing more than blueprints.

To date, at least three are now near completion. There have been more than a few interruptions. In my case, last winter's knee replacements gave me some time off to do some 'sit down' work. I started researching aircraft lighting regulations and commercially available LED lighting systems. It got me thinking. How hardcould it be? After all, I had training and experience with electronics back in the 70's and 80's and was looking for something to fill my recovery time, so I came up with a prototype LED Nav/Strobe unit I plan to use on my 'Homebuilt'.The following article explains how I figured out how to cover them.

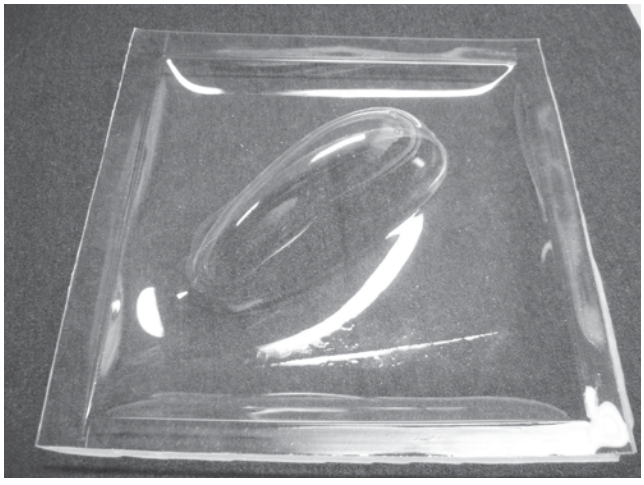
After I came up with my working prototype L.E.D. Nav and wing tip anti-collision lights, I needed something clear and streamlined to cover them. I searched everywhere I could think of, for a lens cover of the right size and shape, but didn't find any. So,

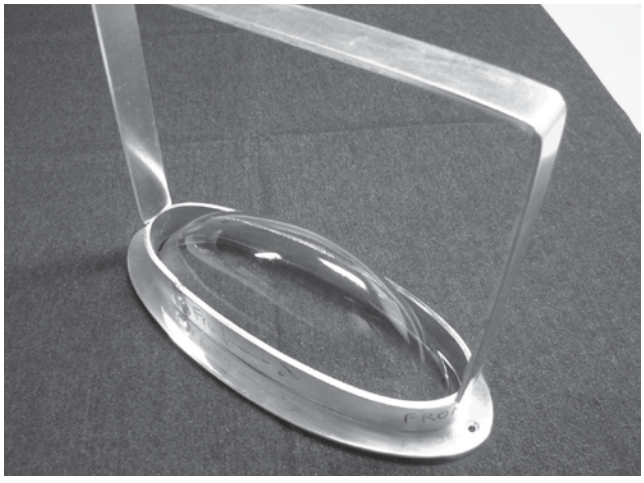


Top: the perfect shape for the lense. Centre, left, the mold taken off the bottle, and right, the plug made off of it. Note the pegs that position it on the pegboard. Meticulous finishing is necessary - the smallest flaw will be visiible on the finished lense. Above: the vacuum frame which was connected to a shop-vac. All the holes outside of the frame area were sealed with clear packing tape.

rather than carving my own shape out of wood or other carvable substance, I went searching for a suitable shape to cut one from. I tried the LCBO, glass and table ware departments of large stores, any place I could think of. I happened across the perfect shape, in the bathroom cleaning supplies at Home Outfitters. It's the container of an environmentally friendly toilet bowl cleaner called 'L'il Bowl Blue' This is when, in the true 'Home Built' tradition, I decided to try making my own. Then I decided I should check YouTube to see if anyone else was doing this. To make a long story short….it seems a lot of people are. With a little more research, I found an extremely helpful article on thermal forming of acrylic on atoglas.com, a 'Plexiglas' producer. (The URL of the actual article is www.atoglas.com/literature pdf/135.pdf). I made an impression of one side of the bottle in plaster and from that, made a plaster plug with two long.¼" bolts imbedded in the bottom. After letting it dry in the oven for several days and then devoting many hours of sanding, priming and more wet sanding, the plug was as close to smooth as I could make it. The final touch was a little silicone lube spray, which was mostly removed, to help release the formed acrylic. Note that even the slightest surface imperfections, or dust left on the form or the acrylic, will be very visible in the final clear cover.

The light cover was formed of 1/8" extruded (not cast) clear acrylic, available at all large BOX stores. I used our kitchen oven, a large shop vac, oven thermometer and an air tight wooden box with a peg board top. I found that the peg board needed to be supported internally with several 1" spacers to keep it flat while pressing down during the forming.. I made a 12 inch square aluminum frame and used 8-12 steel spring clamps to hold the 1 foot square acrylic pieces in place while heating and forming. A tip: using a 15 inch square would





Left: the plexiglass after it comes off the vacuum board ; but how will it fasten to the aircraft? It still needs a usable flange. A flanging tool (right) and a hotplate help flatten the edges to provide a usualble flange; all that's left then is to trin to fit.

probably make it a lot easier. I would also use thinner materials for the lower frame and the gasket under it, to allow the acrylic to be as close to the pegboard as possible while forming.

First I pre-heated the oven , 4 short glasses and the plug, to about 330 deg F. Then I removed the form and put it in place on the vacuum box and covered with foil. The warmer it is when the hot acrylic makes contact, the closer the vacuum will pull it to the pegboard. Next, the frame with the cleaned acrylic, was quickly placed on the 4 shot glasses on the middle rack of the oven . With 10-15 minutes to wait, I set up the shop vac and oven mitts in the most convenient location. This is to be able to get the plastic to the form with the vacuum already

Flying in the Caribbean

WHEN I RECENTLY RECEIVED a copy of the 2012 "Bahamas & Caribbean Pilot's Guide" I was pleasantly surprised to find that this publication has both improved a great deal and has been expanded since that last time I had one, which was in the mid 1990's.

In addition to Airport details you will find other useful information and tips on flying in the Caribbean such as Customs and Immigration requirements, water landing techniques and survival, hotels, fishing, golfing, diving, local attractions and much more.

This is a high quality spiral bound book which is small enough to be convenient in the cockpit. It contains many colour photographs of airports taken from the air, giving the pilot a good idea of field layout and orientation before arrival.

The quality and amount of information contained in this book makes it a good buy at $56.95 and a "must have" for anyone flying to the Caribbean.

Ivan Kristensen
RV-10, C-GMDV

running and manoeuvring the rapidly cooling acrylic into place with the least amount of cooling. When the acrylic has sagged (before bubbles appear) about 1 ¼ to 1 ½ inches, it's time to move. Get the mitts on, turn on the shop vac and get the door open. Grab the frame and move it quickly to the box. Position it carefully over the form and hold it down trying to get a good seal all the way around. Now give it a couple of minutes to firm up. This was the hardest part for me to get right. I had several failures before

continued on page 41

'Homebuilt' Nav/Strobe project

Please note! Some of these parts are surface mount and EXTREMELY small, requiring considerable patience, strong reading glasses (occasionally a 20X magnifying glass as well) and a small soldering iron.

I selected automotive grade, high intensity LEDs and drivers, because they are usually rated to a higher operating temperature and often mechanically stronger than general use devices. The Bridgelux LS and ES L.E.D.s, are on an aluminum pcb and can run directly from a 12-14V supply which simplifies things. The surface mount (SMD) aviation red and green Lumiled Rebels, are on a VERY small ceramic base (3 x 4.5mm) that needs to be heatsunk. I soldered them to one side of double sided pcb and the fixed current regulator to drive the LEDs on the other, for the reasons below.

I did all my shopping at Newark Canada on-line because of several good experiences. They have a very functional website with great search features, an excellent optoelectronics and accessories selection and ship by UPS with next day delivery for $12.00.

Here are the LEDs and LED drivers and hard to find parts I bought from them.

The Allegro A6260 'High Brightness LED current regulator' is designed for automotive use. It sources up to 350mA to a string of up to 3 HB LEDs using only one small current sense resistor. It also provides short circuit protection 5 different ways, reverse polarity, thermal protection for the LED's and itself (up to 150 degC) while ensuring consistent brightness, regardless of variations in the supply voltage. It also allows for PWM dimming, all in a 4 x 5mm package.

I selected 'Aviation' colours for Nav lights. red, (610 nm and longer), cyan (495 -534nm) and warm white (under 4000K). I chose to use cool white LEDs (5600K) for the strobes because of the higher lumen/Watt output.

Strobes :

Newark #	Manufacturer	Part No:	brief description	price	# used	cost
60R6540	Bridgelux	BXRA-C1202-00000	HIGH BRIGHTNESS, COOL WHITE, 1200LM	$18.17	2	$36.34
60R6537	Bridgelux	BXRA-C0360-00000	HIGH BRIGHTNESS, COOL WHITE, 400LM	$ 5.15	8	$41.20
Nav lighting:						
60R6543	Bridgelux	BXRA-W0240-00000	HIGH BRIGHTNESS, WARM WHITE, 265LM	$5.46	4	$21.84
53M8189	Luxeon (Philips)	LXML-PE01-0040	HIGH BRIGHTNESS, CYAN,LUXEON Rebel	$3.43	5	$17.15
53M8188	Luxeon (Philips)	LXML-PD01-0040	HIGH BRIGHTNESS, RED LUXEON Rebel	$2.53	5	$12.65
04R6831	MA522-500M04	TERMINAL BLOCK EUROSTYLE, 4POS		$0.587	5	$2.94
97M3959	Allegro Micro	A6260SLJTR-T	LED CURRENT REGULATOR, LINEAR, SOIC8	$1.54	4	$6.16
26R4136	NFR25H0003307JR500	RESISTOR, METAL FILM; Resistance:0.33ohm		$0.241	2	$0.48
26R4153	NFR2500004707JR500	RESISTOR, METAL FILM; Resistance:0.47ohm		$0.168	2	$0.34
78R8306	FA11126_LISA2-0-PIN-RE	Ledil 10x24 deg. lenses for forward facing Rebel LEDs		$2.27	2	$ 4.54
	Total before taxes and shipping					$143.64
	Shipping charge					$12.00
	Tax					$20.23
	Grand total					$ 175.87

and the small bits and pieces... (most of which I already had on hand):

#4-40 screws and nuts and nylon washers	lots
3/32 alum pop rivets	20 will do
28 gage hook up wire red and black	
Small piece of double sided PCB 4" X 10" will do all (at any surplus store)	about $2.00
Small piece of single sided PCB 4" X 10" will do all (at any surplus store)	about $2.00
various small caps, resistors, 2 small gen purpose PNP transistors	abou$10.00
Ferric Chloride etchant	$12.00
Resist-ink pen (used a Sharpie CD/DVD writing pen)	about $2.50
pieces of .016" and .025" aluminum left over from homebuilding a Pegazair.	
0.80" Acrylic for the lamp covers 2pcs @$ 5.00 sq ft	$ 10.00
2 - 1200uF 20 V caps for the strobe driver at the wing tips	
2 fuse holders (for a 1A SB fuse in case the driver Mosfet) shorts or the timing circuit turns the strobe L.E.D.s on solid (the strobe L.E.D.s are rated at 12.8 and 13.2 V are over driven by 5% but at 10ms pulses they don't even get warm and don't need a heat sink .)	$1.00

ICs and transistors I used for the strobe timer board

1- CD4011BE Quad NAND gate for the 100 Hz oscillator and 2 pulse invertersNewark# 60K5095	1 @ $0.54
2 - CD4017 Decade counter |(Johnson counter) bought at Sayal	2 about $2.00
2 - 2N2907 purpose PNP transistors	$0.02
2- N-chanl MOSFETs as strobe drivers IRF640 or equivalent (the lower the ON resistance, the better)	about @ $1.40
All in all, about $250 should cover everything.	
Performance Measurements	
nav lights (5 Cyan/Red Rebels and 2 Bridgelux warm whites) 0.950A measured each side	= 1.9A
Flashers (Strobes) 2- 10ms pulses at 13.4V (2% duty cycle) (.375A x 8) + (1.05A x 2)	= 0.102A avg.

Note: as of December 2001, the 60R6540 LED is no longer available. . . the current replacement 56T4715 is cheaper! $11.05. Also, the 400 lumen 60R6537 are now only $3.45

The strobe timer board can run directly off of the A/C battery but minor voltage variations can change the flash frequency A voltage regulator for this board is a good idea. CMOS ICs work anywhere from 3 - 18 volts.

RAA Chapters and Meetings Across Canada

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

ATLANTIC REGION

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

QUEBEC REGION

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

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

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

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

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

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

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

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

ONTARIO

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

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

COLLINGWOOD AND DISTRICT; The Collingwood and District RAA, Chapter 4904, meets every first Thursday of every. month, at 7:30 PM except July and August, at the Collingwood Airport or at off-site locations as projects dictate. The January meeting is a club banquet held at a local establishment. For more information contact Pres. 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 7:30 pm at various locations. Contact President , Jim Easter 519-676-4019 jim.easter@teksavvy.com.

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

LONDON/ST. THOMAS: First Tuesday 7:30 p.m. At the Air Force Association building at the London Airport. Contact President 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 613-831-8762 bill@ncf.ca

SAUGEEN: 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 cgmmv.skylane@gmail.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 Kelowna Yacht Club. Dinner at 6:00pm, meeting at 7:30pm Contact President, Cameron Bottrill 250-558-5551 moneypit@junction.net

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

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

CHAPTER 85 RAA (DELTA): First Tuesday 7:30pm, Delta Heritage Airpark RAA Clubhouse. 4103-104th Street, Delta. Contact President President: John Macready jmacready@shaw.ca. Website http://raa85.b4.ca.

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

THOMPSON VALLEY SPORT AIRCRAFT CLUB: Second Thursday of the month 7:30 pm Knutsford Club, contact President - Wally Walcer 250-578-7343

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

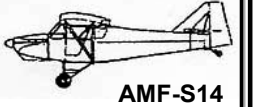
Chapter executives, please advise of changes as they occur. For further information regarding chapter activities contact RAA Canada, Waterloo Airport, Breslau ON N0B 1M0 Telephone: 519-648-3030 *Member's Toll Free line: 1-800-387-1028*
email: raa@raa.ca
web: www.raa.ca

G.A.P.

Geared Air Power Industries
PSRU's for Subaru and Rotary engines
2.2, 2.5 and 3.3 litre
Planetary Gear 2.17-1 Ratio
Reworked Heads, Cams
John A.Vlake **Tel. (604) 820-9088 Fax (604) 820-9113**
email: johnvlake@gmail.com **www.gappsru.com**

PLANS & KITS
Info Packs $10 /ea

2/3 Mustang
one & two seaters



AMF-S14
two & four seaters

Flying Flea
one & two seaters

F12 Cruiser
two & three seaters

HIPEC Covering
NO Ribstitching
NO Tapes Lo Labor
Lo Cost… Proven!

F11 Sporty

FALCONAR AVIA INC.
sales@falconaravia.com
www.falconaravia.com
780-465-2024

Also single seat F9A & F10A & 2 seat tandem Cubmajor, Majorette & Turbi.
*Add $3 postage for info packs.

Classified Ads

To submit or delete a classified ad, please send to classified@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.
Advertising Policy: *The Recreational Flyer Publisher reserves the right to refuse any or all advertising for any reason stated or unstated.*
The Recreational Aircraft Association Canada does not assume responsibility for advertisements, but does exercise care to restrict advertising to responsible, reliable individuals.
Please note: Ads running more than 3 issues must be renewed to guarantee continued display in the magazine.

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

Recreational Flyer Magazine

Registration Mail Publication No. 09869

Contributing Editors:
Gary Wolf, Don Dutton, George Gregory, Wayne Hadath, Tom Martin
Art Director and Layout: George Gregory. Printed by Rose Printing Orillia, ON

The Recreational Flyer is published bi-monthly by the Recreational Aircraft Association Publishing Company, Waterloo Airport, Breslau ON N0B 1M0. Toll Free line: 1-800-387 1028 email: raa@zing-net.ca. Purchased separately, membership in RAA Canada is $35.00 per year, subscription to Rec Flyer is $35.00 per year; subscribers are elegible for reduced membership fees of $15.00 per year. Rec Flyer to have a single issue price is $6.95.

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

For Sale

MINI-MAX ttsn 217 seoh 29.8. Rotax 447 new GSC prop. skis. radio. always hangared. excellent condition $11,900.00 obo Dec11

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

BEDE-4 FOR SALE! 380+ hours TTSN, Lycoming 0-320 E2D McCauley FP prop 75x53 2000 lb GW, 1285 empty. Murphy ext. metal wings, 30 ft with droop tips. Vortex generators, Extended flaps and ailerons. Wing fold mech. built in! Complete set of fairings - all design improvements complied with. Cessna gear legs with solid link in gearbox. Murphy type nose wheel (5x4) Towbar (2 pc) New brake discs and linings! Endura paint - 2002. Complete upholstery, adjustable seats, headliner, door panels, carpets. Instruments: A/S, A/H, Alt., VSI, Turn Co-ord., Slaved mag compass. Tach, Vac. Gauge, Cyl. Temp (2) Fuel (2) oil press., amp. meter, clock/air temp and heated pitot. King KX145 NavCom with KI205 Ind., ValCom 760, Flybuddy Loran, RT359 Transponder with Narco AR850 Encoder (mode C) Magellan GPS with expansion card/software, Sharc ELT, 2 place Flightcom intercom, 2 headsets. Maintenance records, builder manual, some spares, etc., halon fire ext. first aid kit. Any serious offers near $27,000 considered. No tire kickers please. Located CYNJ. Contact Fred Hinsch fred7@shaw.ca

FOR SALE. Lycoming 0-360-A4A. 279 SMOH c/w mags and carb. Recent prop strike inspection by Pro Aero Engines in Kamloops. Yellow tagged. New bearings, rings, gaskets, inhibited and crated, ready to ship. $15,000. Barry Holland 250-785-6431. w-b-holland@uniserve.com

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.) $ 21,500.00

VANS RV7A, by owner and 6 times Van's builder. TT A/F and E 183.3 hrs. Lycoming 0320/ 160, AP, EFIS, KLX 135 with GPS and Moving Map,GRT Engine Monitor, 3 blade Catto comp prop., etc, etc, list of eqpt and more pic avble on request, Prof paint., new FlightLine int, superb workmanship throughout. Manitoba, $110,000 204 371 5209, burtloewen@mts.net

AVID AMPHIBIAN KIT FOR SALE $5,000 Complete kit; tube fuselage and tail, all wing parts, wheels, tires, hardware. Left wing started. No engine, no mount, no instruments, no fabric. Contact Don, located near Owen Sound, ON Telephone: 519 372-1383 . email: we3kingers@yahoo.ca

FOR SALE; MURPHY REBEL KIT, Serial #515. Wings and Empennage complete,also Fuselage from Cabin back. All closure inspections completed. Spring type Landing gear. Reason for sale, lost Medical. Available in Edmonton AB. $12,000. OBO. Ted Taylor,780 455-2524
ted.taylor@shaw.ca

AMPHIBIOUS HOMEBUILT Floats approx 1400'S in need of modification water tight bukheads not watertight.with rigging for installation 2 rudder config Floats too small for my aircraft $6000.00 Larry Taylor 250-492-0488 days ltaylor@pacificcoast.net

THE ORIGINAL PEGASTOL aircraft built by the owners of Dedalius Aviation in 1997. Aircraft is registered as an amateur built aircraft @ 1200lbs gross weight and can be flown with a ULP. Rotax 912S x 100 HP, with slipper clutch gear box and 68" Warp Drive Propellor. Engine has 20 hours on it since coming back from Rotax (Tri-City) for starter sprag clutch replacement. The gear box was also overhauled considering it was on their bench and was done as a precautionary inspection considering it was already there. New engine Barry Mounts upon engine reinstall. New Custom aluminum main fuel tank spring 2010. New windshield and upholstery in 2009. Floats have Lake n Air pump out cups (that are rarely needed as floats are tight). 1/2" sound deadening foam throughout cabin. Wheel gear and forks also included. Airframe Total Time equals 620 hours, 912S Engine Total Time = 380 hrs, Propellor Total Time = 532 hrs, Total Time on Amphibs = 442 hrs. Has new $700 Heavy Duty starter as well. LIMITED TIME ONLY $42,000, so he can put that + winter storage fees towards a 4 place.
For more details view at www.irishfield.on.ca or send us an email oifa@irishfield.on.ca

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

FOR SALE: 1997 Pazmany PL1. C-90 Cont. Total Time: 220 hrs. (Airframe and Engine). Side by side seating. Low wing, tip tanks (24 gals US total). Full inst. panel with mode C. Always hangared. Pictures available. $24,000.00 or Best Offer. Call: Ed at 204-642-9485 or email: edira@mts.net Sep11

FOR SALE Teenie Two, completed in spring of 2011 and has taxi time only. New Great Planes 1835, icom handheld, beautiful construction. Registered as ultralight and currently hangared CYPQ. See the youtube video at http://www.youtube.com/watch?v=d89Gg0TvJ98 $5000. Owner deceased so I am handling the sale. Contact Dave Smith davecsmith2002@yahoo.com Sep11

STITS SKYCOUPE with O-290 125 hp, 240 hrs TT. Garmon 195, Escort 110, ICOM A5, intercom, wing tanks. Located at Burlington Ont CZBA. Must sell due to financial constraints. $16,900 OBO. 905-332-7331

9187 AERO GRINDER M 92 with directions, plus drill guide #d 92. This machine refaces exhaust ports without removing cylinders from thenengine. It has a drill guide for removing broken exhaust studs on Continental and Lycoming engines. Air powered. asking $800 647-298-4461 Toronto area. Sep11

AERONCA CHIEF project, 1160 TT A and E Original 65 Cont, McCauley metal prop Interior, panel, instruments, refurbished, new tires, New ELT, rejuvenated ceconite, requires windshield, Work on wings and assembly to complete. No runout on engine shaft. $10,000 or offer. 416-431-2009 Sep11

FRONT PORTION of RV6 Tilt Type Canopy new, covered with protective material. $60 or offer. Misc chief and champ parts. Call for details. 416-431-2009 Sep11

CHAMP FUSELAGE, ribs, fuel tank, complete tail and numerous other parts $ 1000.00 . Sprint fuselage, spars, ribs, $ 1000.00 Bill Donig 705-842-0801 Dec11

VANS RV-9A.: Inspection Ready, Lost Medical, Sault Ste Marie, Ontario. Certified Lycoming O-235-N2C Engine. TTSN 157 hrs – all logs current. All parts NEW. Professional paint. ($10,000)
Features:
Professionally painted (White, with Blue trim, Red highlights) with grey interior. Lockable sliding canopy. Nose wheel, Daytime or nighttime cross country, Fly from Left or Right seat. Enter left or right side. Professional seats - conform cushions and 5-point seat harness. Large baggage area with 8 tie-downs and Map box. Foot kickpads & wall to wall soundproofing.
Navigation and Communication:
XCOM 760 VHF Transceiver with Intercom Garmin 320A Transponder (Mode A/C) AK-350 Altitude Encoding Reporter ACK Model E-01 ELT - panel display & control Panel controls for Aileron trim. Pitch control and status display Flap adjustment display and control includes three presets.
Firewall Forward:
Quiet, Ed Sterba Wood Propeller 66x68. Oil Cooler with cockpit control cable Lamar Carburetor Ice Detector with remote control Adjustable Carbon Monoxide detector is always ON Jumpstart through oil door requires key access to ignition. Engine heater for winter starts Bird Strike protection for air intake and carburator protection.
Instruments and Panel:
Over voltage protection, and oil pressure protection. Ground power charging, starting and voltage control Stuck Starter protection. Sirs Lighted wet Compass Round instruments (6 for engine, 6 for electrical), Falcon gyro Turn Coordinator Lighted Nav system based upon Removable Navigation computer (HP) and Anywhere MAP software.
Other:
Aeroelectric Connection Z11 schematic based wiring for layout of electrical design / documentation. All outstanding mods have been completed. Extensive documentation includes 180 pages POH.
Details available. $58,000. 705-946-4461. ekells@sympatico.ca Dec11

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

VW engine and many parts. Engine was disassembled after 10 hours for inspection and is still open and appears to be in good condition. Engine has prop flange and one mag. Ten boxes of parts include enough to assemble another complete long block engine. Includes spare oil coolers, spare sidedraft carbs, and there will still be parts left over. Cleaning house - also a set of Firestone 800-6 wheels and axles with tires and tubes. $400 or best offer - bring your trailer or empty car trunk on the first visit. Located near Hamilton ON w.brubacher@sympatico.ca Dec11

Sportsman 2+2 Project for sale ; owner has passed away. This is a nice four place supercub style amateur built suitable for short field work or floats. Nicely welded fuselage is painted and almost ready for cover. Wings are all aluminium structure and almost ready for fabric .Most airframe parts included . No motor, prop or instruments. Call Richard 705-652-6307 $17,000. OBO

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

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.

Send us Photos of your completed projects

Share your accomplishment with others - you've earned it! Please include a brief description of your aircraft and any other details you want to include, and send us a colour print with it. Mail to: Recreational Aircraft Association of Canada 13691 McLaughlin Road, R R 1, Caledon, Ontario L7C 2B2...or email us the information and a high resolution digital picture (jpeg format please) to: raa@zing-net.ca

President's Message / cont'd from page 2

of these have minimal or no cowling. In a pusher application the carbs are forward and they receive the incoming cold air without benefit of engine heating, a recipe for carb ice when the temperature / dewpoint spread is narrow. It is not that difficult to make a heat muff and they do not weigh very much.

ORPHANED AULA'S

Transport Canada treats the Advanced UL category as manufacturer-supported, meaning that TC is hands-off. The manufacturer is responsible to provide all information and support that he deems necessary to ensure continuing airworthiness for flight safety, and he must establish a procedure to contact every owner and subsequent owner of his products. When a manufacturer closes its doors there is then the question of who will be providing the required support?

"As the manufacturer, you are required to issue a Mandatory Action whenever you become aware of any action that if not taken would result in an unsafe or potentially unsafe condition for one of your models of advanced ultra-light aeroplanes. You must advise the owners of all of your aeroplanes of each Mandatory Action you issue applicable to their aeroplane and you must maintain a record of each Mandatory Action you issue. You should advise Transport Canada of each Mandatory Action".

A year ago the manufacturers of the Chinook AULA ceased to sell parts or provide other support, and they certainly appear to have closed the doors. The Yahoo forum that is particular to the Chinooks has since been filled with questions about parts availability. Owners of AULA's may not make their own parts without permission of the manufacturer, so without a manufacturer these owners are out in the cold. In the past there have been other manufacturers who have closed their doors, but subsequently other legal entities have usually stepped in to buy the company and provide support. So far this has not been the case with the Chinook, and not surprisingly the value of these aircraft has dropped dramatically on the used market.

One alternative for the owner of an unsupported AULA is to deregister and then reregister as Basic UL, a category that allows the owner to make his own parts and modifications. The downside is that a Basic UL is not legal for the carriage of passengers, and the pilot must wear a helmet while flying. If you are considering the purchase of a new or used AULA, first have a good strong look at the company selling the product. Your safety and your investment ride on the financial health of the company and its willingness to provide support.

Thermoforming / continued from page 34

I got the aim and the timing just right.

The time it takes to get from the oven to the form, an air tight box, a clean filter in the shop vac, a good seal around the frame, are all very important. You want the flange to make it all the way to the peg board and lay relatively flat before the acrylic cools..

One more step may be necessary depending on how successful the flange forming goes. That is to upset the flange on a hot plate before final trimming. There are many ways you can do this. I had made a 1/8 bezel so I used it and a piece of ¼" aluminum checker plate, upside down on the 'true simmer' element on the stove. Just be careful not to rush it to the point of melting. A little hot water on the aluminum will cool things off quickly and the acrylic will snap off the plate. To finish it off, I used a Dremel metal saw blade to cut off the excess and a table top belt sander to finish the edges. GOOD LUCK!

CAP AVIATION SUPPLIES

HOMEBUILDER SUPPLIES
4130 TUBING & PLATE
ALUMINUM SHEET
2024T3 & 6061T6
AN,MS, NAS HARDWARE
CONTINENTAL & LYCOMING PARTS
148 OXBOW PARK DRIVE,
WASAGA BEACH, ON
PHONE: 705-422-0794

Sidekick Graphics

Digital page design that works right.

Brochures
Newsletters
Branding
Copy Writing
Web Pages

George Gregory
Pagemeister
604-773-0035
george@sidekickgraphics.com
http://SideKickGraphics.com

SPORT PLANES & ENGINES

JABIRU

GT-PROPELLERS.COM
GT since 1969
wood composite propellers

CanadianDealers

SEE OUR WEB SITE: ***www.jabirucanada.com***
Email: ***info@jabirucanada.com*** Tel. (613) 347-3155
Fax. (613) 347-3074

National Aviation Insurance Brokers

Bill Davidson *of National Aviation Insurance Brokers handles the RAA Chapter Liability Policy and he also offers all types of insurance that many of us buy to cover our cars, homes, aircraft, and hangars. He has very attractive prices on the hangar coverage required by many airports and landowners. Here is an example:*

Hangar Coverage ALL RISK / Broadform
Hangar Building $100,000.....Premium $280
Deductible $1,000
Liability $1,000,000.00.....Premium $150
Total Premium $430.00
Subject to Underwriting
National Aviation Insurance Brokers Ltd
Insuring the BEST PILOTS in Canada
Phone: 905-683-8986 / 1-800-463-0754
Fax: 905-683-6977 / 1-866-683-6977
email: bill@jsdavidson.ca

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

raa.ca

tech articles • forum • news • upcoming events • contact info and links

SAVE +$1,200

STOL CH 750
Light Sport Ultility

ZENAIR LTD

www.zenair.com

MANUFACTURER AND SALES OF "CH" DESIGNS FOR CANADIAN CUSTOMERS

ZODIAC CH 650

FLOAT KITS

STOL AIRCRAFT KITS

Quality Aircraft Since 1974

Since 1974, Zenair Ltd has been designing and manufacturing aircraft kits in Canada. You can buy the popular Chris Heintz (CH) designed kits direct from Zenair and save +$1,200 in crating and shipping costs when you pick-up at the factory in Midland ON.

www.zenithair.com
www.zenair.com

Zenair Ltd. Huronia Airport, Midland ON Canada. Tel: 705-526-2871

Everything for Airplanes!

FREE

2010-2011 800+ pg. Parts Catalog, also on CD, and full color Pilot Shop Catalog!

Aircraft Spruce & Specialty Co. SINCE 1965

1-877-4SPRUCE
7 7 7 8 2 3

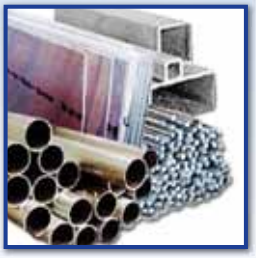
info@aircraftspruce.com

Store Hours:
Monday - Friday
8:00am to 5:00pm
Saturday
8:00am to 3:00pm

AIRCRAFT SPRUCE CANADA (CYFD)
150 Aviation Avenue
Brantford Municipal Airport
Brantford, ON N3T 5L7
Ph: (905) 795-2278
(877) 795-2278

Composite Materials


Wood Products


Metal


Hardware


Airframe Parts


Landing Gear


Engine Parts


Polyfiber / PTI Paints


Instruments


Batteries / Chargers


Electrical


Avionics / GPS


Headsets / Intercoms


Tools


Books / DVDs

www.aircraftspruce.ca