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RAA
RECREATIONAL AIRCRAFT ASSOCIATION
RÉSEAU AÉRONEFS AMATEUR CANADA

From The President's Desk

Gary Wolf RAA 7379

RAA MAIL PROBLEMS

If you sent in a membership renewal in December or January and received it back marked MOVED-UNKNOWN, this was the work of one poorly trained postal employee at the sorting station that handles the RAA's incoming mail. He took it upon himself to return some hundred pieces of RAA's incoming mail. The station manager was apologetic and corrected the fellow but the damage was done. At our own expense we sent out another round of renewal notices and many then resent their cheques but for some it was too much and we lost them as members.

For the record, the address must not say Box 22, just "22". And it is helpful to include "RR2". The new address is on the renewal form and in this issue.

COLLINGWOOD CHAPTER

Collingwood RAA Chapter President Skip Reeves sent a note to say that his group has decided that all in his chapter must be National RAA members. Many years ago the KW RAA passed the same motion and it has worked very well for them. The advantage is that all in the chapter are equally committed, and no longer are there some carrying the chapter and others tagging on. Thank you Skip and Collingwood members for this.

FRED GROOTARZ RECURRENCY SEMINARS

RAA Toronto chapter president Fred Grootarz has for several years been providing recurrent training to RAA chapters in Southern Ontario. This year he has presented to RAA Flamboro and KW, Copa 28 and the CHAA Tillsonburg, and will shortly travel to Copa 26 in Kitchener. This is grass roots aviation at its finest, sharing safety information and providing volunteer service to fellow aviators. fred@acronav.com

RAA MEMBER OUTS AMERI KING

RAA member Tim Vader has had disappointments with the function of the Ameri King 406 and frustrations in dealing with the company. Recently he forwarded an FAA document that has ordered Ameri King to cease and desist selling and repairing a long list of their products. The FAA document is on the www.raa.ca website and Tim's article is printed in this issue.

ROTAX 915 IS

Rotax has been teasing the market with promises of a turbo engine based on the 1350 cc normally aspirated 100 hp 912 S. The current 914 engine is based on the smaller 1200cc 80 hp normally aspirated engine that started it all. The aftermarket has lately been pumping up the larger versions and eating Rotax's lunch, so it is no wonder they are taking this step. The new engine will of course incorporate the latest IS upgrades, but unfortunately Rotax is not promising the engine before the second half of 2017. The industry, especially the gyroplane industry, has been waiting for this higher hp engine so that they can produce three and four seat aircraft.

ARTICLES

In the last issue I asked for members to send in articles, even in point form. The request continues – without your input we cannot produce a magazine. The experience of our members is our greatest asset and we should share with the rest of the club.

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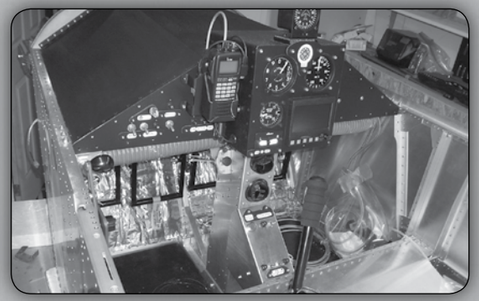


features

columns

George Gregory

An Ercoupe at the Vancouver Chapter's Fly-in, July 2015.
On the cover: Neil Laubach flying a Magni M 16 powered by a Rotax 912S. Eric Dumigan Photo.

Frugal Man's Panel

Saving Money on VFR Panels

By Dan Oldridge

WHEN I STARTED BUILDING my Highlander a few years ago, the Canadian dollar was flying high and outfitting my plane with a nice dedicated EFIS was part of the game plan. Fast forward a few years and the dollar plunged to 75 cents US.

Not only has the devaluation of the Canadian dollar negatively affected the cost of the few components I needed to finish the plane, it significantly impacted the cost of installing the i-EFIS that I originally planned on installing. A basic MGL four cylinder i-EFIS package had gone from just under $6000 to over $8000 for the same package in just a year. Whether permanent or temporary, I needed to find a solution that would get me flying.

First let me state that my flight requirements are very basic. I fly VFR only and although I have a night rating, I hadn't used it since I obtained it several years ago. I considered a basic six pack of instruments and a few engine gauges, but also liked the idea of having multi-use displays to simplify the panel. I know that many pilots still prefer the steam gauges where a simple scan can reveal a gauge no longer in the green, but most of the modern electronic gauges provide the same level of confidence once you get used to them and often provide alarms for out-of-range readings.

Top, Dan taped some inkjet printed mockups to decide the placement of the iPads. Above, the Savage Bush "i-Cub" sports a single tablet that displays scads of information along with some regular-army steam gauges on either side. A nice, clean panel.

I had been watching the developments in the iPad applications on the market, including popular programs like Foreflight and wondered if there was a simple solution to my needs. Savage had recently released the Bush i-Cub, which used an iPad as a central display with a couple of steam gauges on either side. It seemed like an interesting, if still early, development that needed further consideration.

Around the same time, a number of mainstream avionics companies were developing packages that allowed the pilot to use an iPad as an adjunct to their main systems. Later developments such as the MGL i-box allowed the use of any Wi-Fi capable device including two iPads and negated the need for their own i-EFIS if the owner decided not to install one.

Although the original plan was to have the i-EFIS, two iPads seemed like a possibility. Four interesting developments set my plan in motion.

First, I was able to install multi-function primary instruments for flight and engine parameters. The MGL Avionics Flight-2 http://www.mglavionics.com/FLIGHT2.pdf. contains all the basics plus a few nice features only digital gauges can provide, especially in the small space of a single 3 1/8" gauge. Additionally, the E-1 engine monitor http://www.mglavionics.com/E1.pdf is also a good multi-function gauge that allows the user to configure the read-out for the particular type of probes and engine parameters that he/she wants to monitor. It also has alarms for out of range readings.

Second, Appareo had recently announced the release of Stratus II (*https://www.appareo.com/aviation/ads-b/stratus/*), which was designed to give Foreflight a whole range of new capabilities.

Third, Foreflight was now offering the Canadian VFR and IFR data and maps as a separate subscription, meaning that in theory, I could dispense with all of the charts, CFS, and other miscellaneous documents that always seem to expire far too quickly. The subscription meant that all of the data, maps, charts and supplementary information could be updated as often as I liked, as long as I had access to the internet through a Wi-Fi connection.

Fourth, the iPad 2 was now on sale as the new i-pad Air was being released. I opted for the 3G models because they also offered an internal GPS capability that serves as a back-up when the Stratus is not connected via Wi-Fi.

I had always liked the look of a glass panel, but a number of friends questioned the lack of traditional steam gauges. Although I understand the logic of being able to glance at a gauge to determine airspeed, altitude and ensure other important parameters are 'in the green', once you become familiar with the layout of the digital gauge and your brain adjusts to the ranges you expect the numbers to be in, it's almost as quick.

Again, it's important to note that I have a 'low and slow' aircraft that tops out at just over 100 mph. If I had an RV or any other 200 mph plane, I might have considered analogue for at least the ASI and ALT gauges. That said, I do have one analogue gauge, which I made from plans on the RAA website. With all that I had read about them, I knew that I wanted an

Top, the Lift Reserve Indicator (LRI) is mounted smack dab in the middle of the panel. . Above, the top bracket, and lower bracket (right) provide a snug and secure home for the iPads.

angle of attack gauge, but I believe it should be called a lift reserve indicator.

Angle of attack is relative to the airflow, which is dependent on so many things like bank angle, wind direction, climb angle, etc. Besides, what do I care about angles? I just want to know when I'm running out of lift and approaching a stall.

To ensure this information was readily available, I mounted the LRI dead center in the panel. I use this gauge so often I think it may have been better to mount it on the pilot side on top of the panel, so I couldn't look forward without seeing it. I also believe it would be better if it were digital and showed red, yellow and green lights instead, but the analogue Airsoob AOA/LRI will have to do for now. It was very inexpensive to build … around $50 to $60 or so.

To lay out the components on the panel, I used full size photos printed on my colour printer at home. This allowed me to move things around and try different configurations before settling on the one I thought would work best for me.

My panel design went through several iterations before I finally decided on the current configuration. I knew I wanted two screens, and the iPad 2 was just the ticket.

I originally tried surface mount plastic snap-in brackets but didn't like the look and felt they had too much movement. The over-the-counter in-panel mounts take up too much additional space for my panel, so I designed and fabricated a couple of aluminum pieces that cradle the top and bottom of the iPads and fasten in with cam-locs. This allows me to remove them easily after each flight and take them home to ensure they are fully charged and have the latest software and flight planning data before my next flight.

The bottom mount (above) is basically a u-channel (closer to a v-shaped channel) that the iPad sits in and is riveted to the instrument panel.

I have a couple of thin foam strips with adhesive backing mounted on the panel behind each iPad to cushion and protect them. This also applies a slight bit of pressure to hold the iPads from slipping sideways in the mounts. The installation is clean, very low profile, and looks surprisingly like a dual EFIS mounted inside the panel. Almost everyone who first sees my plane comments about the glass panel; then looks quite surprised when I tell them it's actually two iPads.

...for now, the dual iPad system seems to provide all of the resources I need at this point in time without the huge price tag

I installed iPad chargers in a small box and mounted that behind the panel, but they don't quite keep up with the charging needs when the iPads are running at full brightness for several hours. Since my longest flight so far has been about 3.5 hours, it hasn't been an issue anyway. I suspect they will continue to run long after I stop for the day, unless I leave them running when I'm not in the plane. If there is any concern for running out of charge, I will just operate with one i-Pad and leave the other one turned off until I need it.

As for the readability, the iPads are certainly not as bright as a dedicated EFIS unit, but I have a significant glare shield overhang and have never found readability to be a significant issue in my installation.

With my headphone and mic jacks mounted behind the seats and the built in wi-fi of the i-pads and Stratus II, the installation looks very clean, with no visable wires.

I really enjoy using Foreflight on the iPads and find longer trips a breeze. Diversions, changes in flight plans and even flight planning on the go are all easy to do, especially with features like "Direct To". The only issue I have found is trying to use touch screens when there is turbulence. You need to plant one finger firmly on the panel beside the i-Pad then use another to ensure you hit the right controls on the iPad.

Depending upon the settings, a lot of the routine paper-based operations normally required are automated. Runways and approaches can be displayed automatically as you approach an airport, while runway and taxi diagrams "pop up" automatically after landing and during taxiing.

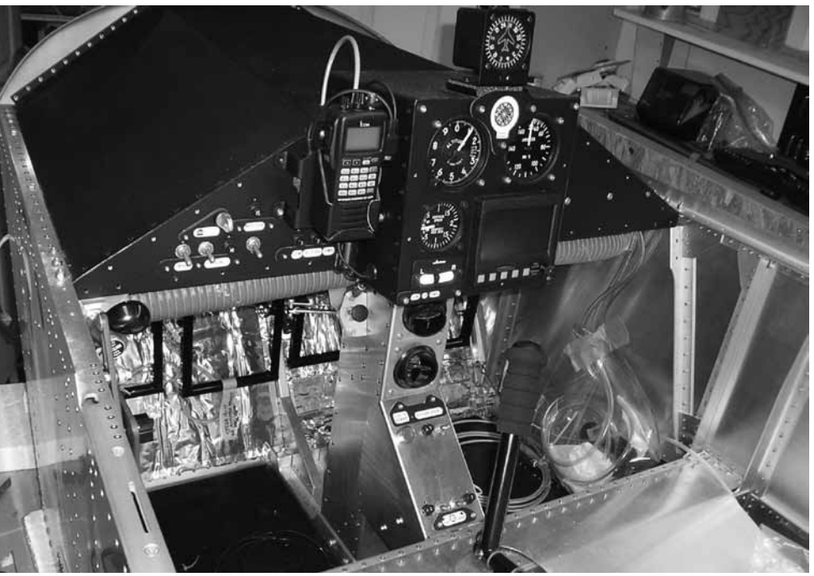
During flights near the border, US-based ADS-B weather and traffic are displayed. At all times, the local hazards such as radio towers are displayed and change size and colour to warn of approaching danger. The Stratus II provides WAAS GPS for accurate position and tracking on the VNC charts stored in the iPad, AHRS to provide attitude and heading, which is displayed on the iPad, as well as synthetic vision. The synthetic vision feature provides a lot of great information about surrounding terrain, position above the runway, and a plethora of other useful visual ques. Although it cannot be used as a primary display for IFR, it certainly could be a lifesaver as a backup, or even for a VFR pilot when weather conditions deteriorate very quickly.

There are a lot of other great features that make Foreflight an ideal product in the cockpit and I am sure there are other great products on the market that work well too. However, at this point in time, I don't know of any other product for the iPad that offers a complete Canadian subscription with the entire set of charts, maps, diagrams, supplements and other information to replace all of the paper normally carried in the plane.

For anyone looking at this installation as a possibility for their own craft, I reiterate that this is not a full replacement for a dedicated EFIS, but it certainly provides many of the bells and whistles at a fraction of the cost. If you do your research and compare the two, you should have a pretty good idea of whether this type of installation will work for your plane and your own particular flight requirements.

Maybe at some point in the future I will install a dedicated EFIS, but for now, the dual iPad system seems to provide all of the resources I need at this point in time without the huge price tag. I have always considered this as a transition process to get to a full dual EFIS installation, but after using it for a couple of seasons now I can't imagine flying without the iPads and Stratus II in the cockpit. If I ever do complete the transition to a full EFIS, I suspect an iPad with Foreflight and Stratus unit will still play a prominent role as a reliable backup to the EFIS. For now, I will continue to fly with my frugal man's glass panel.

***Dan Oldridge** is a retired firefighter who began his career in Cambridge, ON before eventually rising to the postion of senior manager in London. He is a member of RAA National and two local RAA chapters.*



Implementing A Basic Panel

Graham Luckhurst

MY INTENDED MISSION is to fly local VFR, so I could be frugal but not cheap with my panel. This decision was not really hard as the Sonex panel is rather small and therefore cannot accommodate much. I experimented for quite some time with various instrument scenarios before settling on what I found satisfactory. Early ideas were based on some of the reasonably priced EFIS's , GPS's and panel mounted radios, but I was not satisfied with these and the price started to add up. I was concerned this electronic type of instrumentation would not give me the readability I am accustomed to with conventional gauges, particularly the altimeter, airspeed, vertical speed and slip/skid. Engine instrumentation needed to accommodate RPM, 4 CHT's, 4EGT's, oil temperature and oil pressure plus a fuel gauge and current draw, so a small EMS was the only reasonable choice considering the space available. Due to ergonomic reason associated with the ease of getting in and out of the aircraft I moved the panel location a few inches further forward. However, I still needed to ensure the altimeter pressure adjustment and EMS were easily reached so I fabricated a small center panel for the instrumentation that sits proud of the left and right panels, while still not restricting leg room when getting in and out.

Ventilation:

A low wing aircraft is prone to getting rather warm in the cockpit on sunny days while sitting on the ground with an idling engine. I therefore wanted to add a fan to the ventilation system to boost any air flow coming from the two NACA scoops on either side of the fuselage. To meet this need I added a center column where I could locate a 30CFM 3" fan and route air from the NACA scoops with SCAT ducting, through the fan and then to two eyeball ventilators. Switching the fan off still allows air flow to the ventilators and they have shut offs to block the flow on cooler days.

Adding Panel Space:

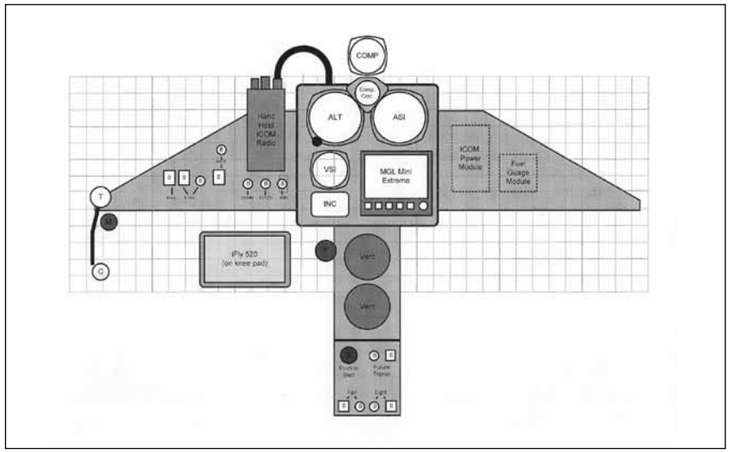
With the center column in place, I was able to add a small lower panel between the center column and the spar tunnel. This I used for the start push button, switches for the fan and lights plus space for a transponder if I ever want to go to that expense, or an intercom. The center column also provided a hidden path for routing wires and antenna cable to the lower panel and the rear fuselage.

Maintenance Considerations:

The easier it is to perform service the more likely it will be done, and done properly.

I wanted to ensure I could remove the fuel tank for service which is behind the panel under the glare shield. This meant all panels needed to be removable including the entire support structure and center column.

The thermocouples and oil pressure sensor represent a lot of wiring. I did not want to disconnect all of these at the engine or panel if I ever needed to remove the engine for service. All of these go to the EMS and I chose one that uses a remote data acquisition module. I located this on the engine side of the firewall in a custom made zinc plated steel box, well ventilated to the cabin.



The module is mounted on the lid so minimal cabling needs to be disconnected as the lid can go with the engine if removed. The module is connected to the EMS mounted on the center panel via a single differential pair cable that communicates all sensor data.

Firewall Forward Wiring:

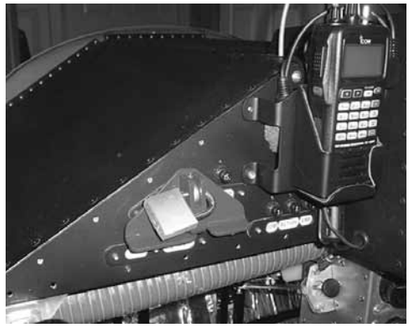
Before considering what switches I needed on the panel, I had to sort out the firewall forward electrical components and how they would interconnect and operate.

Starter Circuit:

One key requirement I wanted is a single fault tolerant starter motor energizing arrangement. This means if any one solenoid or switch fails closed in the starter circuit, there is still some means to switch off the starter motor. Certainly this adds some complexity and an additional relay, but for me it is worth it. The starter circuit I designed also helped resolve other issues such as the master relays continuous 60 amp maximum rating prohibiting the starter motor being routed through it due to currents of 100-200amps. Also I did not want to route to the panel the 30 amps switching required to energise the starter motor's integral solenoid. I could not readily find maximum solenoid contact current ratings for both the starter and master relays. The distributor's specifications did not include these critical figures. I did eventually find 'similar' parts with full specifications on the Internet but it took hours! The outcome for the starter circuit is a start push button that only needs to accommodate 1 amp switching and the master switch, also accommodating 1amp switching, which could be turned off as a secondary means to kill the starter motor. You can follow the circuit diagram to see how this was achieved.

Master and Ignition Switching:

This wiring is not very complicated but there were a two items to con-



Graham wanted some full size instruments on his Sonex, so he augmented the small panel with an extension to accommodate. He also added a centre column to mount fans for keeping the occupants cool. Left, a very solid looking lockout protects the ignition switches from being activated inadvertently.

sider. The Aerovee engine has two ignition systems, one based on a pair of 'magnatrons' each serving two spark plugs and a secondary electronic ignition system. Like magnetos, the magnatrons are switched off by preventing the field generation by shorting some of the coil windings to ground. The two grounding wires cannot be connected together as each magnatron would interfere with the other when operating, and therefore a two pole switch to ground is required. The electronic ignition requires 12V but I did not want this to turn off with the master switch so I added a separate switch not connected to the master bus.

Over current (short) and over voltage protection:
The voltage regulator used with the Aerovee is a shunt type. If these fail an overvoltage condition can occur and therefore I felt it necessary to include an overvoltage protection circuit. The 'off the shelf' solution I used includes a relay which goes in the cable to the regulator energised via 'crow bar' and circuit breaker to the master bus. If an overvoltage occurs, the crow bar shorts to ground, the circuit breaker opens and the relay de-energizes, disconnecting the alternator & regulator. This relay can also be de-energized by switching off the master bus or pulling the over voltage circuit breaker so I did not add a separate alternator switch. If it ends up I need one, I'll have to find the space.

Panel Layout:
Instruments:
All my instrumentation is located in the upper center panel. It is 8.5" x 8.5", and is taller than the other panels, resulting in more space to fit what I needed. 2" gauges for the altimeter and airspeed are too small for my liking so I used 3 1/8th gauges. They are also less expensive. However, I was forced to use a 2" VSI for fit reasons. The altimeter and airspeed are at the top of the panel so I do not need to glance down far for a quick check. The altimeter is on the left to more easily reach the barometric pressure knob. A non-sensitive altimeter was chosen for cost reasons but it can be readily upgraded to a sensitive type if I get into more serious flying. The airspeed indicator is in knots as this is the standard for aviation. The VSI is just below the altimeter as these are kind of related instruments and the slip skid below that. The EMS consumes the bottom right corner, a little harder to reach but flight instrument layout was my priority.

Radio:
I chose to use a hand held radio rather than a panel mount version. This was a significant cost saving without sacrificing functionality or performance. I also liked the number pad rather than a multi-function knob. The radio is mounted in a custom made bracket raised off the left panel. This allows the headset & PTT harness and connector jacks to be routed behind the radio, keeping it tidy and secure.

Compass:
For me, a vertical card compass is less confusing as it appears a conventional compass reads backwards. I have always used the DI as a means to visualize and plan my approach to the circuit and hopefully the vertical card compass will be a suitable 'poor man's' substitute. I mounted the compass on top of the upper center panel so it is in close proximity to my other flight instruments, plus I wanted to maximize its distance from electrical components to minimize magnetic interference. The round label below it is the compass correction table designed around a compass rose. It is large and bold, and should be easier to estimate heading adjustments close to north and south as compared to a the layout of a typical correction table....plus I like to try something a little different.

This is the value of joining the RAA: developing a strong and active network of people who may be able to provide support when needed

Switches & Circuit Breakers:
Master and ignition switches plus associated circuit breakers are located on the left panel for easier reach. Circuit breakers for the Radio, Over Voltage protection and EMS are located just below the radio. However, there was insufficient space on the left panel to locate switches for the Radio and EMS so these are located on the bottom left underside of the center panel. I did not want the panel to get crowded with switches as they could become more difficult to manipulate individually, especially when in turbulence or wearing gloves. The start push button is located on the lower panel, allowing it to be activated with the right hand while freeing the left hand to control the throttle, mixture and ignitions switches as necessary. The fan and light switches and associated circuit breaker are also located on the lower panel. A switch and circuit breakers are also provided on the lower panel for a transponder if ever installed. A power outlet will be added to the left wall of the lower panel to supply a GPS which will likely be located on a knee board.

Fuel Level & Comm Power modules:
The right panel is dedicated to mounting of the fuel level sensor module and the power regulator for the radio. Mounting these two left no other space behind the right panel. The radio power regulator is required as the radio's external power supply input rating is 11 volts and with the alternator charging the battery, the master bus voltage will run around 14 volts. The regulator will also filter the master bus supply, reducing interference from any conducted electrical noise.

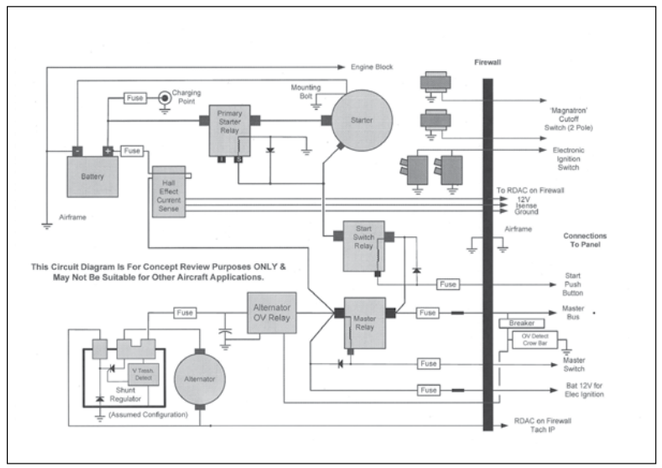
The switches and circuit breakers require ring terminals as connectors and therefore I used ring terminals throughout. Four terminal blocks were used to support all the electrical

interconnections.
Two 6-connector terminal blocks are mounted behind the left panel, one for the master bus and the second for a ground bus. Adjacent sides of each terminal block are electrically connected together with a bus bar constructed from brass shim stock. The primary connection to each bus is made with a ring terminal, nut, bolt and lock washer mounted on the bus bar, thus freeing up an extra terminal on each.

One 12-connector terminal block is mounted to the right side wall of the center panel. Four connectors are electrically connected together to form the EMS bus and another four for a ground bus. The EMS bus supplies the panel mounted EMS module, the EMS remote data acquisition module and the fuel level sensor module, leaving one spare. The two remaining connectors are used for the differential pair communications bus connection to the EMS cabling and two spare.

Two 4-connecter terminal blocks are mounted to the left and right side walls of the lower center panel. Three connectors on one terminal block are electrically connected together to form an extension of the master bus and three on the other terminal block for a ground bus.

Even though I tried to minimize the amount of cabling between the engine compartment and panels, there are still quite a few wires that need to be routed, protected and out of sight. I achieved this by routing all these



Graham's wiring diagram for the Sonex Panel.

cables through a 1" SCEET duct. This runs quite close to the plastic fuel tank and using a SCEET duct would ensure an overheated wire would be contained, which I hopefully have prevented by appropriate wire gauge selection, fusing and breakers. I first ran a string through the duct by tying a small rag to the end of the string and sucking it through with a vacuum cleaner. The string was then used to individually pull each wire through the duct. The duct terminates at the remote date acquisition module steel box on the firewall and all wiring is distributed from there.

I found the American Wire Gauge (AWG) standard using the internet. I checked several sources and they all showed the same table. I used this to determine suitable wire gauges based on the current draw specifications for the various components and the potential short circuit currents that could occur in the wiring. The table includes ohms/1000' so you can also determine the resistance on any wire and calculate the voltage drop and power dissipated in any wiring during normal operation or a short, which would of course be time limited by a fuse or circuit breaker.

Fuses:
A circuit breaker on the panel only protects wiring of the circuits to which it feeds power. Therefore some means is required to protect the wiring that feeds the breaker. The protection needs to be as close to the source as possible which means next to the battery or master solenoid. Since this protection cannot be seen or reset from the cockpit I used inline fuses. I included a fuse at the battery positive terminal to protect wiring going to the various solenoids, one in the wire going to the electronic ignition, another at the master solenoid output and one was specified by the over voltage protection vendor in the alternator circuit. I also included fuses in the wires going the master switch and starter push button. I had used a small gauge for this wiring as it carries a low current, but a solenoid winding short circuit would connect these directly to 12V that is only protected by a 40A fuse at the battery.

Diode Protection:
When a solenoid is turned off, the magnetic field in the solenoid core will collapse very rapidly, causing a high negative voltage spike sufficient to cause arcing at the solenoid switch contacts. This arcing will degrade the switch contacts and potentially make them unreliable. This voltage spike can be prevented by placing a reverse biased diode across the solenoid winding. The diode will only allow a small voltage to develop across the winding and will prevent the field collapsing quickly. You may notice this as there will be a short delay between the switch contacts opening and the solenoid contacts opening.

Securing the Panel:
I contemplated using a keyed ignition switch but the contact arrangement was not quite suitable for what I needed. Therefore, I went with two separate switches. However, this left me with an issue on how to secure the panel. By aligning the magnatron, electronic ignition and master switches I was able to fabricate a single removable bracket that prevents all three from being turned ON. The removable bracket is secured with an eye bolt attached to the panel and padlock. It is painted red so at a glance I can see I've installed it when leaving the plane.

Labels:
The labelling technique I used was detailed in my May/June 2015 RAA magazine article.

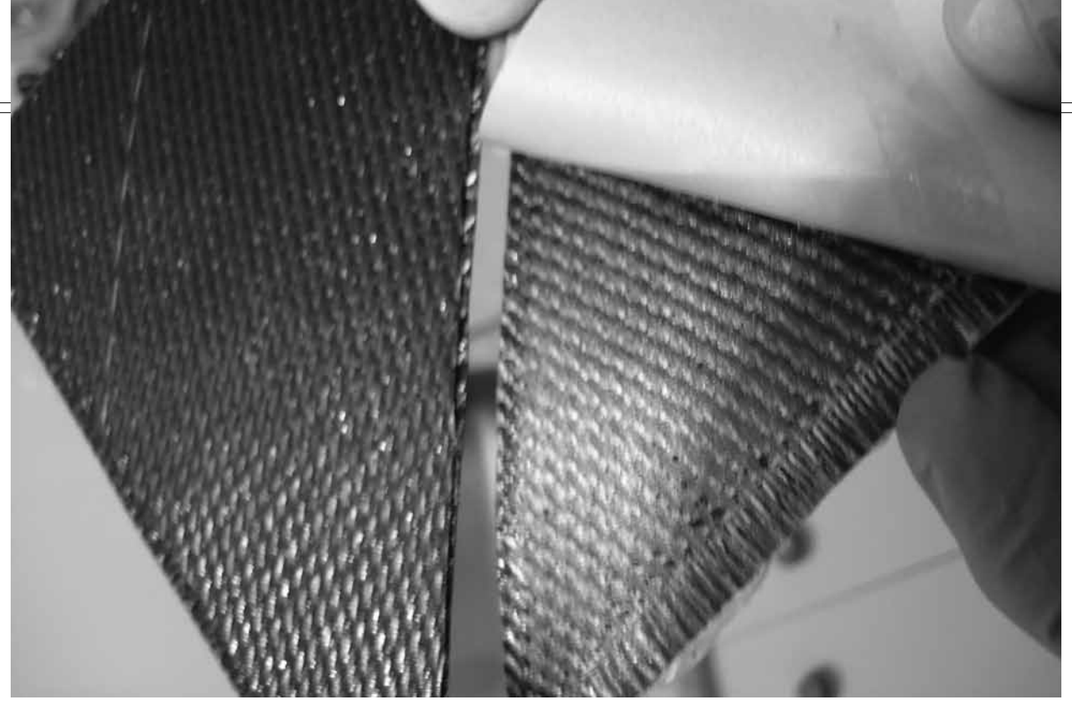
Engine Controls:
The throttle, mixture and carb heat controls are all attached to the side left side wall of the cockpit thus freeing up space on the left panel for switches and breakers. The flap and brake lever plus elevator trim are all in the same location so there is not much room for anything else, which was another reason I located the ventilators in the center column.

Fuel Shut Off:
My fuel tank has a small sump at the bottom where the fuel exits directly to a shut off valve. The shut off valve is located several inches ahead of the center column and feeds fuel forward to the fire wall. It is an MDRA requirement that the fuel can be shut off by the pilot while secured by safety belts. My shut off valve cannot be reached and therefore I need some means to remotely control the valve. A rod is connected to the valve actuator arm using a small rod end bearing and the rod is supported by a nylon sliding/rotating bearing from Triangle MFG attached to the left side of the center column with a bracket. The other end of the rod has a small plastic knob which ends up located on the left side of the center column just under the upper center panel when ON. When pulled to the OFF position, it does not interfere with the joy stick or the radio and EMS switches. However, it is very noticeable when in the OFF position.

I still have the cowling and canopy to complete so my panel has yet to be inspected by MD-RA and tested to see how well it works out in the air. So far, the panel has been the most complicated but still a very satisfying part of the construction project and it nice to see it come together.

Determining wire gauges, solenoid, circuit breakers and fuse ratings will depend on components selected and their associated specifications, the interconnections used to form the desired busses and switching arrangements, the safety margins you want to include and regulations that may be applicable. Many kit manufacturers leave these decisions to the armateur builder as the panel design is an area where we often want to personalize our aircraft. Depending on our knowledge and skills we may find it necessary to seek out help in certain areas. This is the value of joining the RAA and developing a strong and active network of people who may be able to provide support when needed, and where perhaps you can offer that support when the knowledge is established and its implementation verified.

Graham Luckhurst *learned to fly in England where he grew up. He now lives in Waterloo, Ontario and is building a Sonex with Aerovee engine.*



Composites Made Easy with Pre-Preg

J-F Alexandre

IN THE FIELD OF COMPOSITES there are many materials and processes, but of these "Prepreg"is by far the quickest, strongest, and easiest. Prepreg is just dry fibre fabric over which the manufacturer pours an epoxy system and allows it to get halfway to the gel point (partial cure.) The material and resin are then stored at nearly 0 degrees Celsius, which stops the cross link reaction and leaves the fabric workable.

Prepreg is fully tacky and a little less stiff than a Corn Flakes box. Waxed paper is used as a separator between layers of prepreg to prevent inadvertent bonding (*fig 1, above*), and a large roll comes packed in dry ice, accompanied by a data logger. Smaller pieces are OK without this as long as the shipping window is no more than two days.

One of the advantages of prepreg is that you can use dollar store scissors and cut the shape you need. Then you can do your layup stack and apply the vacuum bagging system. This is the easiest way to work and it results in no waste at all. All cutoffs can be reused to make small brackets for the instrument panel, seat rail brackets or so on. There will be no frayed fibre anywhere; all pieces fully retain the shapes to which they were cut. (Fig.2)

The resin of the prepreg feels tacky and to process it you need to place the pieces in their proper positions without too much delay. If you wait too long and try to reposition a second ply, the resin system might start to create a link, bonding due to the heat of your shop. The propensity to do this depends on the specification of the resin you have, as some can be handled for up to 3 weeks at 20 degrees C before becoming unusable.

For more information on this and a lot more, visit John-Francois' blog at http://jfairplane.cf

On the downside, prepreg needs heat to activate the resin and pressure to make the fabric conform to the mould. In the early days prepreg needed to be worked in autoclave to get the ultra-high fibre fraction and compaction level, which results in the best strength. An autoclave is a big pressure cooker with a heater inside. You place your bagged part under a vacuum and the autoclave applies extra pressure over it.

There is also a new version of prepreg called Out Of Autoclave (OOA) which lessens the machinery requirements. It is still the same starting molecule of DGBEA (epoxy) but they just add the right level of chemistry to assist the cross link, and it is then named OOA. There is a more complete explanation on the web: (bit.ly/206Q1oS). The main characteristic is as the name indicates: it can be used just about the same as prepreg, but without an autoclave. With just a full vacuum of 29.8"Hg (fig.3), using OOA you will get same strength as a prepreg done in autoclave.

This is the easiest way to work and it results in no waste at all.

For homebuilder purposes, if you use OOA you will be able to do any structural part. However, if you cannot find any OOA you can still use standard vacuum bagged prepreg without an autoclave. It will still be better than a wet layup. The properties will just not be at their maximum.

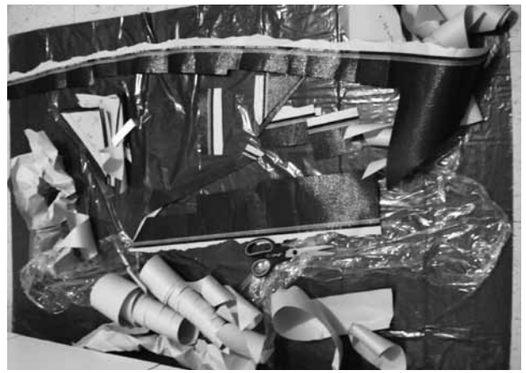
The challenge in working with OOA is that the parts really do need a specific process. The datasheets give all the info, but in brief:

1- If you do a layup thicker than 5 plies, you need to place the first 4plies under full vacuum for a few minutes, and then afterwards continue with further plies. In *Fig.4*, I work on my foldable propeller hub and apply vacuum again at 10 ply.

2- Place a perforated released film and bleeder (ACS:01-14810) and then proceed with the bagging.

3- You must follow a temperature ramp cure of *x* degC/min. And many resins do have some step cure plateaus of *x* min too. (Check the spec sheet for your material.)

To monitor the temperature ramp *(continued on page 30)*



Opposite: Pre-preg comes in layers separated with wax paper. Top, all cutoffs can be reused wherever you need them. All pieces retain the shapes to which they were cut. Centre, with a vacuum of 29.8" Hg you will get the same strength as pre-preg done in an autoclave. Above, using pre-preg with the author's folding propeller hub

Wisdom from the Future

THE DAY WAS BETTER than perfect. It was one Mother Nature saves up to bestow on all her subjects when they've been particularly good to each other. Sometimes we do deserve it. Sunshine, a warm gentle temperature, the perfumed scent of wild flowers drifting in a refreshing breeze.

I was fortunate to be free and sitting on a rocky beach on Gabriola Island that flawless spring day. Tiny waves stroked the shore following the occasional passing of a boat. Over the course of the afternoon, a few small airplanes droned by on their west-northwest headings for destinations up Vancouver Island. A 172 from the Vancouver area flew westbound, altering course at Pourlier Pass and was soon overhead, probably enroute to a hundred dollar hamburger joint. That's what I'd be doing if I were flying that day!

Using my daypack for a pillow, it seemed the right thing to do was have a nap. In short order, a great sense of relaxation flooded through me, and all was right with the world.

The next thing I remember was the distinctive sound of a radio controlled airplane. It seemed strange that someone would be flying one so close to the water. The "pilot" was standing a short distance down the beach, totally concentrating, enjoying his flight. It was a terrific aerobatic display performed by an obviously seasoned flyer.

The little airplane finally landed on an impossibly short, flat stretch of sandstone. Always curious about anything that flies, I approached the owner and as expected he was genuinely pleased and open to discussion. Generally, the fellows who fly RC models are predictable. He fit the mold. Late sixties, retired, relaxed, sincere, optimistic and had definite ideas on how the government shoul d and should not be involved in aviation. His story too was familiar. A flying career that began with a PPL when he was 20 and seeking a future with the airlines. Those dreams were crushed with the birth of his first child, when money was needed more than ideals.

Flying was relegated to the back burner, his medical lapsed, and for the next 18 years, life was back to "normal". But the flame never died. Anyone who has the dream of flying knows that feeling. It smolders, then flares up when an airshow comes to town, or when the wife decides it's vacation time in Hawaii. Even boarding that Airbus fans the flames and they lick at his heart.

Life carried on, the children became independent, even left home, for a while at least. The mortgage was paid off, and things settled down. The security of a savings account and promise of a pension were comforting, but the restlessness of the mid life crisis was upon him now. That's the point in time that signals some men to buy the motorcycle, the sports car, or some other toy to caress an ego.

And so it came to pass that this man's flying career resumed. Armed with a renewed medical, he was back in the air as a private pilot. He worked hard and obtained a commercial license, even did a bit of flying as a jump pilot, a tow pilot, a charter pilot and an instructor. Not much money, but a whole lot more fun than he'd had in his entire life.

Flying was good, but he was haunted by his health. The doctor wasn't optimistic when there were changes in his ECG. Transport Canada was even harder on him, and soon his medical was invalidated. His time in the pilot's seat was over. Ironically, this man was healthy enough to drive a car, but he was considered unfit to fly an airplane. But those are the rules. The next step was obvious. Radio controlled models.

Along with age comes wisdom. The man on the beach flying the RC airplane shared his wisdom with me on that gentle spring day. After the initial criticisms of government re gulations, he seemed to soften. He spoke of caring for yourself, both physically and emotionally, of being aware of the stress life heaps on us all, and of managing it. " Stay on course with your values" he said. " Remember the Golden Rule and maintain the courage to change what you can, while accepting what you can't. Develop the wisdom to know the difference.

It's the only way to stay sane, he reasoned. And above all, live with integrity, the conviction to do the right thing even when no one is looking.

Eventually, he seemed to have said his piece. He picked up his model airplane and walked away, leaving me alone on the beach. I found myself sitting on a rock, looking for the flat sandstone he'd used for his runway. It was gone, perhaps covered by the incoming tide. A float plane was departing Silva Bay, the sound thundering off the rock faces of a few closeby, small islands. It became apparent to me that I'd been sleeping, and I wondered, could the encounter have been a dream? There was something strangely familiar about him. Some 20 years my senior,

Barry Meek

Source Photo: https://wall.alphacoders.com

he vaguely resembled my father, or was it my grandfather? In many ways, he reminded me of myself! Had I actually been privileged to see into the future, catching a glimpse of myself in 20 years? Except for the part about the heart trouble, the history fit. Did this come from someone much wiser, or from within? One thing is certain, I've never found that sandstone runway again.

The encounter that day, real or imagined, has encouraged me in a couple of ways. I will work at staying physically healthy and emotionally happy, so that I may fly as long as possible. And if my health fails, RC models may be in my future too.

__Barry Meek__ is a retired ambulance paramedic, former broadcaster, mountain bike tour guide and commercial pilot. His articles have appeared in the COPA newsletter, the Aviation News Journal, and (of course) the Recreational Flyer. He resides on Gabriola Island in British Columbia.

Kent Flying Machines (RAA Chapter 4975) News

Kent flying Machines, RAA Chapter 4975, is off to an active start again this year. Our January meeting was hosted by Brad Carnie of Ridgetown. Brad is an expert welding instructor at the University of Guelph Ridgetown Campus. He gave an excellent demonstration of TIG welding on steel and aluminum. Everyone brought their welding helmets to enable them to watch and try their hand at welding under Brad's instruction. Much was learned during this informative evening. In February our group held the Kent Flying Machine's Annual Valentine Dinner and AGM . This is our yearly event where we treat our partners to a catered dinner and try to as hard as we might to limit the hanger- talk. A very interesting presentation was made after dinner by Mr. Mark Poissant . Mark is a local entrepreneur who flies drones for film and video inspection purposes. A short business meeting was conducted and the year-end director's reports were accepted. We then presented our dates with flowers and sweets to close the evening. Our March meeting brought a discussion of medical issues by Dr David Lapierre of Chatham. There were many questions about repair and maintenance of our aging bodies as well as the incapacitating effects of diabetes and other chronic ailments. It was a unique opportunity to have a candid discussion about common health issues that affect pilots. With Dr Lapierre's encouragement and advice the diverse pilot population of Kent County will continue to enjoy sport flying for years to come!

Letter to the Editor

A response to "Loners"

As always, the latest RAA magazine was full of informative and entertaining reads. One of them, however, stood out as a difficult one. "Loners" tries to exploit the misfortune of some hapless pilots to bolster membership in RAA and other aviation organizations. I have not come across any solid evidence that pilots belonging to RAA, EAA, COPA, UPAC and whatever else are less likely to have an accident in an airplane.

What is more disturbing though is the disrespectful, condescending tone of the article. The unfortunate pilots were repeatedly referred to as "fellows". They were pilots and builders too. A neutral, factual wording such as used in NTSB reports would have been more appropriate.

Learning from the mistakes of others is a valuable concept and is being employed in many publications. Such articles are volunteered by survivors or published in factual, unbiased manner in publications such as the TC safety letters or NTSB report. I doubt that the widows of the deceased pilots have been asked for permission to have their husband's misfortune published in this context.

R. Hane

Midland Chapter's Zenith 601 Project

A Progress Report / by Ian Reed

LAST JANUARY, CHAPTER MEMBERS interested in the build met at Ian's shop at 10am. The plan is to meet at his place during the winter months on Thursdays from 6:30pm to 9 and from 10:00 to 1pm on Saturdays.

We had discussion on build times, suitable engines, Zenair workshop to show us techniques and construction standards (date to be decided), how to proceed, and future tasks.

On January 9, we drilled out the rivets and removed the top and bottom wing skins exposing the spar. Everyone in attendance was able to gain experience in drilling out rivets.

Our next task is to build a more suitable work bench. Jim is going to bring 2 sheets of 4 x 8 plywood to our next get together for the table.

Future tasks were identified. We need to register

our project with Zenair. Michael gave us the forms and we are currently looking for a serial number that is missing from the plans. We'll check with the MD-RA to see if the original builder (Gary Curtin) had any inspections done on the work so far. With Bob Gow's concurrence and quidance, to build shelves in his hanger to hold the material we have purchased from Gerry Adderly. We will then have to cataloue our parts inventory with the Zenair itemized packing list to see what we have and what we need. We'll be checking into the feasability of registering as a educational non-profit organization.

We all thought it would be helpful to have a workshop at Zenair, or in Ian's shop, with a Zenair representative who could show us Zenair build techniques and procedures. Michael agreed to this.

Michal Heintz gave us a book with Construction Standards for Zenair Light Airplanes that is available for us to read and familiarize ourselves with.

Ray also directed you to the YouTube site to view the videos on installing the wing spar upgrade. Participants were encouraged to familiarize themselves with the work required to install this upgrade which has been ordered from Zenair.

We had some snacks and drinks, made some progress, learned a few new tricks, and had a very enjoyable social first get together. Everyone is welcome to participate. No experience required. On January 14 we discussed the fact that the MD-RA has no record of this project. Michael Heintz is checking with Zenith to see if they have any records and a serial number. At any rate, a letter of "Intent to build" will have to be sent to the MD-RA.

It was decided that no more money from chapter funds will be used for this project. To date, we've spent $4,000. We're hoping that members that want to be involved in this project will contribute $50.00 each to a fund that will be used for acquiring parts and supplies.

Adam Rigden offered to set up a Facebook page to show the world what we're doing and link it to the Huronia Airport website.

Crowd sourcing has been discussed (Go fund me.com) to see if outside interest may be willing to contribute to our educational project. It was decided to move the project further along before we contact interested young people and others interested to become involved in our project. An open house was proposed at the Northern Regional Fly-In on July 9/16 to show people what we are building.

On January 14 the group removed the ribs from the right wing of our 601 project and it is now ready to be drilled out and taken apart in preparation for the wing upgrade kit.

We again met at 09:30 this time at Bob Gow's hanger at the Huronia Airport on January 16. The fuselage and all parts are stored here except the right wing, which is at Ian's. We built shelves from skids and lumber given to us by Gerry Addley when we purchased our 601 project.

We did a general inventory and went through the boxes to see what we got with the airplane. We wrote it dow, categorizing and numbering the various boxes and contents: cables, instruments, strobes, wiring, AN hardware, brakes, etc. It appears we have most of the parts that are required to finish this project. We wrote down a lot of the part numbers but we will have to do a detailed parts inventory checking it against the parts list that Michael Heintz supplied us with for this airplane.

We repacked the boxes and put the big stuff on our new shelving.

Jim H. brought the plywood and lumber required for our new table top over to Ian's Hangar at Copeland Creek Saturday morning.After viewing the video on the wing upgrade we will proceed with drilling out the required rivets on the wing spars on Sat. Jan. 23/16 at Ian's.

Build team members outfitting the build site with the requisite shelves and general infrastructure involved in the construction of an airplane. The project represents a great opportunity to learn the ins and outs of aircraft sheet metal. All are welcome!

UPCOMING

Chatham Ontario Fly In
May 28th Chatham Airport Beautiful (CYCK). Breakfast and Transport Canada seminar. Hosted by RAA chapter 4975 Kent Flying Machines. Fly in or drive in. Fuel available. Breakfast 8:00 to 10:00. Transport Canada seminar @ 10:00. For directions check out our web site or the Canada Flight Supplement. For more info call 1-519-798-3286
http://clarkey1.com/raachapter4975/

Transport Canada Safety Seminar
While attending the fly-in, you can check out the TC Safty Seminar. So You Think You're Smarter Than A Student Pilot? Whether you're a student pilot or a licensed pilot who has been flying over 50 years this interactive presentation will challenge you on some of the basic questions and knowledge you may have forgotten regarding your next flight. Are you up for the challenge? Attendees will qualify for the 2-year recency requirement as per CAR 421.05(2)(b). For further information, please contact Will Boles (Civil Aviation Safety Inspector, Standards Coordination) at (416) 952-3858 or will.boles@tc.gc.ca.

Air and Auto Extravaganza at Wiarton Airport
Saturday June 11, 2016, Rain date Sunday, June 12. Wiarton Keppel International Airport (CYW). 50+ Aircraft Exhibitors including antique, military, corpoate, SAR and recreational. Car and motorcycle exhibits, and a Hangar Village Market with over 70 vendors. There will be live music, food vendors and face painting and clowns for the kids. For more info contact Peter Ceponis at 416-388-4193 or email pdceponis@rogers.com

Arlington WA Fly-In, Arlington Municiapl Airport.
July 7-9 2016 For more information call 360-435-5857
email: info@arlingtonflyin.org

RAA Midland/Huronia Northern Regional Fly-In
July 9, 2016, Midland/Huronia, ON, CYEE, Unicom 122.85: Annual RAA Northern Regional Fly-In (NRFI) hosted by the Midland chapter. A Transport Canada seminar is scheduled for 10:00. Zenair factory and the Midland Model Railway Association, both located on the field, will hold coincident open houses. Antique/Classic cars and motorcycles will also be on display. Breakfast and lunch will be available at the picnic pavilion. For further information please contact Rob MacDonald at 705-549-1964, Ray McNally at 705-717-2399, Midland airport at 705-526-8086 or raa.midland@gmail.com .

Airventure 2016
July 25-31 - Air Venture Oshkosh in Wisconsin

UPAC Convention
August 19-21 Lubitz Field, Plattsville ON

Canadian International Air Show
Sept 3-5 - CNE Grounds

Gyroplanes 101

Eric Dumigan

Eric Dumigan

ANYONE BORN in the 40's or 50's must remember the enticing ads for Bensen "gyrocopters" in the classifieds of Popular Mechanics. The teaser was that you could build one from plans, initially as a towed glider; later you could add a surplus McCulloch, also from the classifieds, to make it into a powered aircraft. Many of us dreamed and bought plans sets, and many were built. The sixties and seventies were the high point of activity for amateur gyroplanes, but by the late eighties they had been relegated to a small corner of aviation. There were only a few kits and plans sets available, so most of us built fixed wing aircraft and left gyroplanes to exist in some nebulous parallel universe. Anything to do with gyroplanes was denigrated, and even Donald Duck comics took a shot by naming the crackpot inventor "Gryo Gearloose."

The father of the modern gyroplane is Juan De la Cierva, a Spanish engineer who had watched the Wright Brothers when they did their demonstration flights in Europe, and he felt that there was a need for a safety device to prevent a stall when landing a plane. After several prototypes he took an AVRO 504 fuselage and tail, and added small low wings and a pylon to mount a five bladed freewheeling rotor. His first successful flight was in 1920 and he shortly found that the landing speeds could be so slow that the conventional controls had little effect. His next step was to invent a tilting rotor head to eliminate the need for ailerons and elevators. Finally he added a pull rope prerotator to spin the rotor and shorten the takeoff roll, and the die was cast for the mechanics of all gyroplanes to this day.

De la Cierva sold licenses to Pitcairn and Kellett in the USA and Focke-Wulf in Germany, and gyroplanes began proliferating worldwide as the Roaring Twenties developed gyro fever. They were used for mail delivery, news photography, and record setting; in the late 20's a Cierva gyroplane crossed the English Channel, and in 1931 Amelia Earhart set an altitude record of over 18,000 feet. In 1938 a gyroplane was touring Australia and when it came to Bendigo an eight year old Australian Frank Ball had a ride in it. Frank is now a member of the Toronto Rotorcraft chapter of RAA and he is certainly the first RAA member ever to have gone aloft in a gyroplane.

During WWII gyroplanes were used by the British to calibrate their radar installations, and all sides used them for reconnaissance. The Japanese also used them for antisubma-

The prerotator cable turns a ring gear via a bendix drive, as in a car starter; the panel includes a separate tach for the main rotor

rine warfare to drop depth charges. By this time helicopters were becoming more practical as they could take off vertically and hover. Gyroplane manufacturers tried to accomplish the same but the machinery became so complicated that a helicopter made more sense, so gyroplanes went onto the back burner.

POSTWAR

After WWII Igor Bensen was an engineer at General Electric, working on small gyrogliders and from these he developed his Bensen "Gyrocopter." He offered plans and kits and became the first president of the Popular Rotorcraft Association which works to provide oversight and communications within the gyroplane sport. Bensen's pusher layout became the template for almost every gyroplane built since the war.

In 1950's Canada several AVRO engineers began developing a large gyroplane, the IO-360 ducted fan Avian. It was very sleek, like an elongated egg with a Townend ring at the rear end. With government funding they took the plane through Canadian certification but there was no market for such a craft at the time. Lately it has been reborn in the USA as the Pegasus, now certified by the FAA.

In Alberta Bernard Haseloh was at the same time developing his own Bensen-type gyroplanes which later became the Rotary Air Force (RAF) 2000, with a full fiberglass cabin and Subaru pusher power. This aircraft set the standard for future amateur designs. Unfortunately some lawsuits finished off RAF and the rights were sold to a South African company. Gyroplanes interest in Canada again went cold except for small pockets of true believers.

THE NUTS AND BOLTS

So what makes a gyroplane fly? The rotor is not powered so what makes it turn? The answer lies in the aerodynamics of a maple seed, which has a small elliptical cambered wing as an outgrowth of the seed itself. It would be much simpler for a maple just to generate seeds the size of an aspirin and let them drop vertically to the ground. Unfortunately these non-aerodynamic seeds would have to compete with the parent tree for nutrients and few would survive. Natural selection has resulted in a seed with a wing that rotates as it drops, and as the relative wind moves upwards through the disc of the rotating maple key enough lift is generated by this rotation to keep it from falling ballistically. This allows it to fly to a patch of dirt that does not have competition for nutrients.

The same occurs with a gyroplane rotor. The freewheeling rotor is tilted back so that in side view its disc's leading edge is higher than its trailing edge.

As the gyroplane is pushed forward by the engine's propeller the air approaches from the underside. Essentially the rotor disc has a positive angle of attack. As air passes up through the rotor blades it causes the same lift and forward thrust component as a yacht's sail experiences. This forward component is the reason that a sailboat can tack into the wind and the reason that the gyroplane's rotor begins turning. It is a rotating wing and at some rpm, depending on the "wing span" it develops enough lift to allow flight.

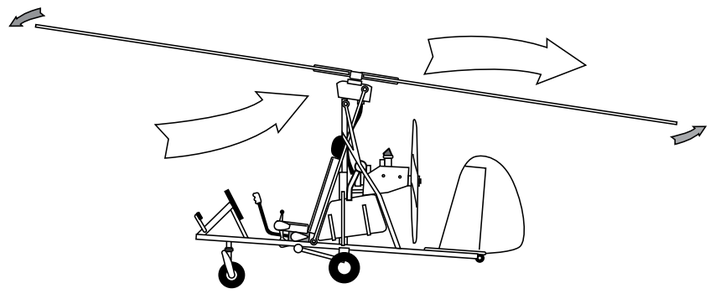
It is possible to taxi fast enough to get the rotor up to liftoff rpms but most gyroplanes use some sort of prerotator to shorten the takeoff roll. Some have used a car starter, some use a hydraulic pump and motor, and some like Magni use a large diameter speedo cable powered by a belt driven PTO from the propshaft.

Rotor design and construction varies, with some blades being made from aluminum extrusions, some from carbon fibre and glass, and some built up like wings from wood and metal. Balance is important to ensure smooth operation for comfort and parts longevity. Chordwise balance is very important for blade stability and the balance point is frequently in the 25% chord range, similar to the CG point for a wing. Longer blades have a higher aspect ratio and can be more efficient but care must be taken to limit the tip speed to below supersonic, just as with a propeller. Whatever the length, it is handy to have some means of preventing the rotor from turning while taxiing between hangars so that the tips do not hit the buildings. A simple rope looped over one blade can do this nicely in an open cockpit gyroplane.

In flight there is an imbalance of lift between the forward-going and the rearward-going blades. In a helicopter a swash plate is used to change each blade's angle of attack as it proceeds around the circle. Gyroplanes have tried this but the machinery is heavy and they tend instead to hinge the blades at the root to allow the tip of the upward-going blade to rise and lessen its lift. Some made from composites can get by with the natural flexibility of the blades to accomplish the same thing. However flexible the blade is, at operating rpm it is flung out by centrifugal force and becomes rather rigid.

The rotor head is the device that holds the axle that is the pivot for the rotor and it is constructed so that it may be tilted fore and aft and left-right simultaneously. A mixer allows a combination of the two, controlled by the stick and pushrods like those used to actuate a set of ailerons. The rotor head and its bearings are very highly stressed, so regular and thorough inspection of the bolts and bearings is important. Amateur built heads are usually bolted together from aluminum plate and angle, while modern factory built gyroplanes tend to use a CNC-machined block of alloy with precision bearings.

The gyroplane fuselage is typically a simple inverted "T" with a main landing gear crossmember and a nosewheel. There is not much attention paid to suspension because landing speeds are so low. In the Bensen days the only aerodynamic surface was a rudder and occasionally a small fixed horizontal stabilizer which did more to protect the pusher prop from rocks than to impart pitch stability.



As air passes up through the rotor blades it causes the same lift and forward thrust component as a yacht's sail experiences. This forward component is the reason that the gyroplane's rotor begins turning. It is a rotating wing and at some rpm, depending on the "wing span" it develops enough lift to allow flight.

Top: The Magni M 16 is typical of the new breed of gyroplane with its Rotax 912S engine, prerotator, long tail boom, and nicely finished cockpit. Right, Neil shows how two gyroplanes can fit in the centre of a T hangar, and two more crosswise. Above, Frank Ball was only eight years old when he first rode in a gyro. He's still passionate about these unique and capable aircraft.

SAFETY CONSIDERATIONS

Each category of aircraft has its own particular cautions, and it is the job of the flight instructor to teach the student how to recognize and deal with the limits of his aircraft. A fixed wing taildragger has negative yaw stability as soon as the main wheels touch the ground. A pilot who is slow to recognize yaw can end up making a series of corrections, each a bit too late, resulting in increasing yaw angles until a ground loop results.

Another fixed wing concern is the possibility of a stall-spin, especially in the base to final turn which usually does not leave enough altitude for recovery. Spin awareness and recovery are an important part of fixed wing flight training. We accept that this is a possibility and we learn to stay away from the edge of the cliff.

Similarly a tailless early generation gyroplane is sensitive to pitch, and if the pilot is insensitive he can make his corrections half a bubble out and end up in a Pilot Induced Oscillation (PIO), sometimes called porpoising. The result can be an uncontrollable flapping of the main rotor blades, and structural damage if the rotor contacts the airframe.

The other gyroplane caution is a Power Push Over (PPO). The freewheeling rotor must always be in positive G's and the relative wind must always approach from below the rotor to keep it spinning. As a gyroplane increases its forward speed the angle of attack of the rotor flattens, and if the pilot induces a downward pitch it is possible for the relative wind to enter the rotor disc from above. This quickly reduces rpms and can result in the gyroplane tumbling, an unrecoverable condition. The Vne of a gyroplane reflects the airspeed at which the rotor angle of attack is positive enough to minimize the possibility of a PPO.

Similar to stall-spin training for fixed wing pilots, gyroplane flight training pays careful attention to PIO and PPO to keep pilots from the edge the cliff that is particular to gyroplanes.

THE NEW DESIGNS

It is important to emphasize that the bad press that sticks to gyroplanes is from the first generation short-coupled craft, and it is a good thing that many of them never left the shed. The rebirth of gyroplanes has been with fully engineered aircraft that meet a recognized design standard.

Modern gyroplanes now sport a tailboom extension that holds a large horizontal stab and the rudder. The CAA in the UK set the design standard for the modern gyroplane, requiring this tail to minimize Pilot Induced Oscillations, and the Power Push Over. Having a horizontal stab at the end of a long tailboom provides passive resistance to pitch changes instead of relying on the pilot to do this actively with rotor pitch.

CABIN

In the old days a plastic seat out in the open sufficed for accommodations but now there is a race among the upmarket manufacturers to produce the most plush interior, even some with heated leather seats. All controls are CNC-machined and jewelry-like, and carbon fibre is de rigeur for panels. Glass and carbon cockpits are built to upscale automotive standards and everything fits just so.. Most manufacturers are from Europe and they are selling fully engineered products to a well-heeled market, and the European customers are lining up to buy them. Two place gyroplanes are available in tandem and side by side configurations, and manufacturers are working on three and four seat versions.

ENGINES

MTO from Germany sells so many gyroplanes that they are the single biggest customer for Rotax 912-914 engines. The Rotax 912-914 series appears to be the only engine the Europeans use. Besides their service network the Rotax has an unexpected benefit for manufacturers. Some are now proceeding towards type certification and since Rotax produces certified versions of the 912-914 engines, the airframe manufacturers can make this transition without a major engine reconfiguration.

WHY A GYROPLANE?

Why would a fixed wing pilot want to fly a gyroplane? Well they are an absolute ball to fly, like a sports car compared to a minivan, or a dirt bike to a Gold Wing. It would be a shame to spend a lifetime flying without ever having tried a gyroplane. A gyroplane with a prerotator will get off the ground in a few yards and climb smartly. Cruise will be in the 85-110 mph range and they are marvelously nimble. The rotor is always in autorotation so it is possible to do zero radius turns and a near vertical descent to the numbers, with a short flare and a soft landing. An engine out means very little because the main rotor is not powered by it. A forced approach is just another landing. A gyroplane can fly in much higher winds than most fixed wing aircraft so most days can be flying days. Any bare patch of ground becomes an airfield and any shed becomes a hangar. Four gyroplanes can fit into the T hangar that would house one Cessna, and if you want to trailer your gyroplane home it is necessary only to remove the rotor blades. It is a whole different world of flight that few of us have experienced.

REGISTRATION

If you look at the Transport Canada registrations for gyroplanes you will see that there was a boom in the 60's and 70's and then it went very quiet until 2008. That was when several schools opened in Quebec and shortly afterwards another in Ontario. There are now some forty new gyroplanes in Canada and many more are arriving as pilots find out how much fun a gyro is to fly.

Unless you have bought a certified Pegasus there are only two ways to register a gyroplane in Canada. Neither the Basic or Advanced Ultralight categories allow rotorcraft, so if the

continued on page 42

Safety

When You Need It Most

My Ameri-King ELT Story / Tim Vader

NOW I'M WELL AWARE that for a lot of people ELTs are a touchy subject in that their failure rate after crashes is very poor. They become submerged and won't transmit, they burn in the post fire crash and won't transmit or they don't transmit well with an overturned aircraft on them. The fact is that certified and amateur built aircraft are required to have a functioning ELT on board the aircraft. So, after Transport Canada started making noises about mandating 406 mHz ELTs and that SarSat satellites stopped monitoring 121.5 mHz I decided it was time to buy and install a new 406 model. I had been waiting for ACK to get their new 406 model certified but it was taking forever for them to jump through all the government hoops. When it looked like it would take another six months or a year I bit the bullet and bought the Ameri-King AK 451, their 406 and 121.5 mHz offering.

I paid $704.00 for the unit from Aircraft Spruce in November of 2012. The installation in the airplane was simple as it has the same footprint as the Ameri-King 121.5 mHz I had in the plane. I flew with the new ELT for a short time and then had some major engine difficulties with the plane so it only had a few hours of flight time on it. I turned it off but left it in the plane while I made my repairs. The repairs dragged on but I finally was able to get back to flying last spring and was going to do some cross country flights last fall. I thought I better check the functionality of the ELT and found it to be completely dead. The battery pack for this unit will set you back $200.00 but the batteries are supposed to last for 5 years. Not so. I started researching for problems associated with this ELT and found lots of complaints on the web. Many complaints were that the batteries didn't last even until the warranty period was up because of some sort of short in the circuit board that put a small yet constant drain on the batteries, some people even found that the audible alert would constantly buzz at a very low level draining the batteries. Most of the complainants would also state that Ameri-King would recommend that the unit be returned for repairs costing between $200.00 and $500.00. As my warranty period of two years was up that is what I was told.

I thought this might have been just be a battery problem but wasn't sure so once again I checked the web and found you can buy the same 4 batteries that Ameri-King for which they charge $200.00, for $7.00 each online. I bought the online batteries and tested the ELT after they arrived. I also had a 20 year old Artex ELT that I had left the D cell batteries in and tested it at the same time. The Artex fired up on the 121.5 frequency immediately during the test. The Ameri-King would not. I tried the shake test with the Ameri-King and got nothing. I set the Ameri-King on the coffee table with no movement. About an hour later with once again no movement the Ameri-King started sending signals.

There must be tens of thousands of these things installed around the world and may or may not work when lifesaving equipment is needed the most.

I spoke with the surly staff at Ameri-King and they said to send it to them and that I may have to pay as much as $500.00 to fix it. Didn't want to do that. I thought I might get Aircraft Spruce involved as they were the vendor of this very important piece of potential lifesaving equipment. Jim Irwin, the owner of Aircraft Spruce responded to my complaint. In a string of emails between myself, Mr. Irwin and Ameri-king I made the point that I would not pay another nickel to fix this piece of equipment and that I felt that Spruce should not be selling a product of lifesaving equipment of dubious quality.

A very entertaining You-Tube video posted by a Swedish helicopter company who bought many of the units claims that the units have a 70% failure rate. (check out Ameri king 406 elt ended by dynamite) There is a wrongful dismissal suit going on in the States by an ex employee of Ameri-King who claims he was fired because he told people outside of the company that his job was

FAA Issues Cease and Desist Order to Ameri-King

The Federal Aviation Administration (FAA) has determined Ameri-King Corp., located at 17881 Sampson Lane, Huntington Beach CA 92648, manufactured, sold or distributed parts and articles for installation on FAA type certificated aircraft, which did not conform to an approved design, but were represented as FAA approved. On December 28, 2015, the FAA issued an emergency cease and desist order to Ameri-King Corp., terminating their TSOA and PMA. The emergency cease and desist order required Ameri-King Corp. to immediately cease and desist manufacturing, selling, and distributing any parts and articles for installation on FAA type certificated aircraft.

Prohibited activities also include advertising, repairing, rebuilding, and altering any articles intended for installation on type certificated products.
It appears Ameri-King Corp. may be continuing to produce parts and articles represented as TSOA or PMA approved despite the emergency cease and desist order. Any parts and articles produced by Ameri-King Corp. after December 28, 2015, were produced without an FAA production approval.

The full order can be found on the RAA website: www.raa.ca/News2.html or at www.faa.gov/aircraft/safety/programs/sups/upn.

to scrape off the “Made in China” stickers and put “Made in USA” stickers on. He also alleges that Ameri-King repairs the ELTs with used parts from returned models. This story is available at: http://www.orangecountybusinessattorneyblog.com/2015/01/29/huntington-beach-manufacturer-faces-whistleblower-case-ex-employee/

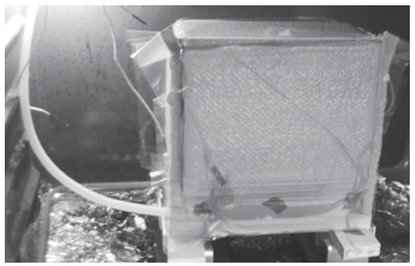
I spent $35.00 to send my ELT back to Ameri-King. They told me the unit was not repairable but I could purchase a new one from them for $370.00; a 50% discount of the retail price. I adamantly kept telling them in subsequent emails that I would not pay for another AK 451. They kept reducing my cost to a final price of $198.00. I told them to drive over it with a car.

My option was then to reinstall my old Ameri-King AK 450 (121.5 only model) bought in 2010 which was taken out of service when I installed the AK 451. It had been stored with the batteries out of it since the fall of 2012. I believe it was serviceable when I removed it but I did not check. I bought new batteries for the AK 450 and installed them. When I switched the unit on the red light came on but there was no signal on 121.5. It would not give a signal in the arm position with a shake test. It too was unserviceable. In contrast the 25 to 30 year old Artex ELT (that I had previously replaced with the AK 450) that had been stored since 2005 with the batteries in it gave a clear signal on 121.5 as soon as I switched it on. The Artex worked fine on the shake test as well.

The saddest part about this story is not the $704.00 that I lost on the AK451 or the non functioning AK 450, but the fact that an essential piece of lifesaving equipment mandated by government to be on most aircraft in the world can be of (in my opinion) such poor quality and can be marketed so readily with no follow ups to check its reliability. I believe in this case there should be ongoing certification checks. There must be tens of thousands of these things installed around the world and may or may not work when lifesaving equipment is needed the most.

If you have one of these in your aircraft do a function test before your next flight. Maybe you can get it back to them before your warranty is up. If you are considering purchasing a 406 mHz ELT I would strongly recommend you give this one a pass. Your life may depend on it.

Tim Vader *is a wellsite geologist who flies his 2276 cc VW powered Kitfox IV from Indus Airpark near Calgary. He and his son are currently refurbishing a 1958 Piper Pacer.*



Composites / continued from page 30

(and plateau) you will need at least 2 sensors to provide good temperature readings. For a big part it may be tricky, but for smaller pieces I just put them into the oven (when my girlfriend is not present) and adjust the ramp manually by opening the door. (*left, fig.5,*)

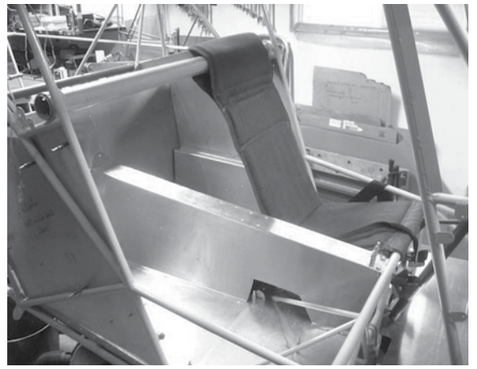
Oven safety is no concern, because fiber and resin are inside the bag and the sensor (thermocouple) is just a piece of wire. On Fig.6 (lower left), note the pump at right, thermocouple sensor pcb at top left and with computer monitoring to adjust temp by following the reading.

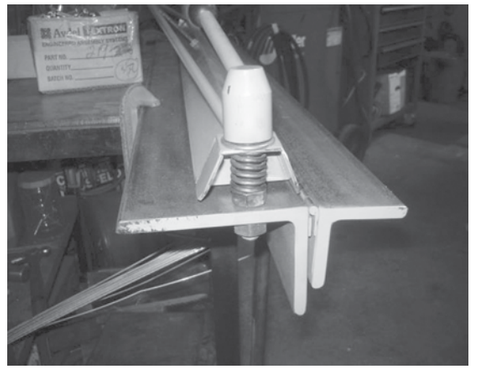
In conclusion, using prepregs you do not need to mess with any resin at all, as the resin is already impregnated into the fabric. Just cut out the material with plain scissors and off you go. With prepreg you cannot end up with resin starved areas but it is a bit more expensive at $60-120 per yard, and an oven of some sort is required.

In Canada you can find prepreg at:
Composites Canada
Freeman Supply Bmbsc
In the US you may try acpsales.com

Homemade Metal Bending Brake

Clarence Martens





Top: Here is a shot of the finished centre console in the Pegazair. Above: Mission accomplished for about $45 in parts.

I NEEDED A TOOL to bend 40" of .025" 6061T6. In the past when appearances didn't matter, in a pinch, a couple of 2x4s and a rubber mallet had worked on short pieces. I wasn't about to try it here. This was for the centre console in my Pegazair, which happens to double as a cover for the torque tubes in the baggage area... and sometimes also a "butt rest". Getting into a Peg can be very challenging for a big person with the lower wing struts in the way. This console is often the main support for safely getting in to the seats.

You know home builders ... resourceful and as frugal as they come. So, I looked through my ever growing inventory of (salvaged/rescued from the recycling bin) metal and hardware and came up with this. (see cover photo)

I don't have a drill press or lathe, so everything was done with hand/power tools and a TIG welder. The clamping levers were left over from an aluminum 'Safety Tripod', which I was given many years ago and have since recycled. The inside thread was 5/8” NC and I just happened to have some 5/8” threaded rod lying around. The outside diameter of the levers was 1.5” which gives a large flat surface to push on the clamping bar. I don’t have much hot rolled heavy steel lying around, so whenever I need a substantial piece, I go to Production Metal Steel Sales in Cambridge. http://www.goldentrianglesteel.com/.

I wanted to be able to form a channel under 3", so I chose a 48” length of 2” x 2” HR 1/4" wall angle. This would let me form a channel as narrow as 2.82" if needed. I also wanted a solid base plate, but hadn’t decided what to use. Then I spotted the perfect base... a 4 ft. long 3"x 5" x 3/8" wall angle, already cut and leaning against the band saw. For the lower bending plate I chose 4 ft. of 2 1/2 3/8" wall HRS angle. Over the years, I had scavenged many short lengths of formed 304 SS hinge with 3mm pins. After carefully placing and plug welding them every 2”, the bottom plate and bending bar were one piece. After searching the images on the internet and having tried a Chinese 30" apron brake, I didn't want to have to un-clamp and re-clamp the work every time I wanted to form a simple angle. Luckily, I had two exhaust springs from a long retired Honda Civic lying around that could

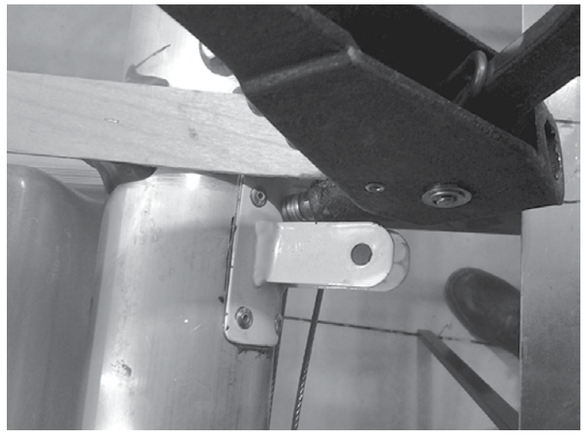
do the lifting of the clamping bar for me! Perfect!

One challenge was that the I.D. of the springs was smaller than the 5/8" threaded rod and drilling the base for 5/8" was a little more than I could do in my garage. So, I welded a 1/2" bolt, minus the head and zinc plating of course, to it. This 1/2" bolt would be the "stud" that the whole thing mounts to the base. Measuring of this part was the most complicated and time consuming part of building the brake.

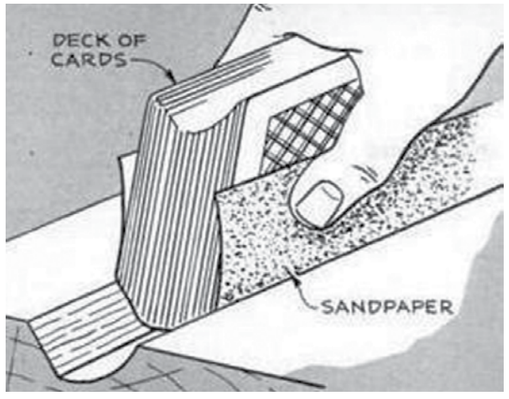
The height of lift I was able to get was 3/16", which far exceeds the brake's capacity (unless you're talking cardboard). So far, I've been able to get very straight bends of 40" with .025" 6061-T6 and .025 mild steel sheet over 30".

The Straight Goods on Pulled Rivets

Here's a very simple fix to get to those hard to reach pop rivets that cause them to pull at a slight angle and not seat correctly. I had been wondering how to extend the reach of the rivet squeezer, when it came to me that all I needed was a temporary extension about 1/3" long in order to make the squeeze. I placed 4 rivet washers on the shaft of the pop rivet before inserting it into the riveter and sure enough, I was able to reach every rivet well enough to get a nice clean pull. When the rivet pops, the washers just fall off onto the bench and you're ready for the next one.



Use rivet washers to extend the reach of the rivet squeezer. It works well up to about 1/3" after which the tool cannot get a good grip on the rivet shaft.

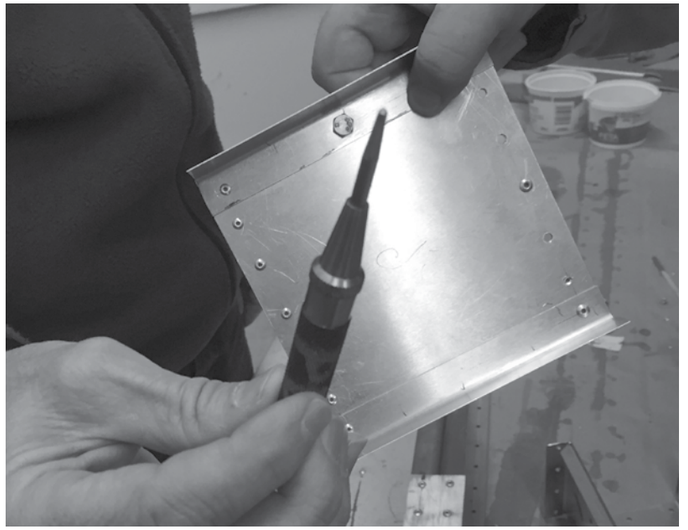


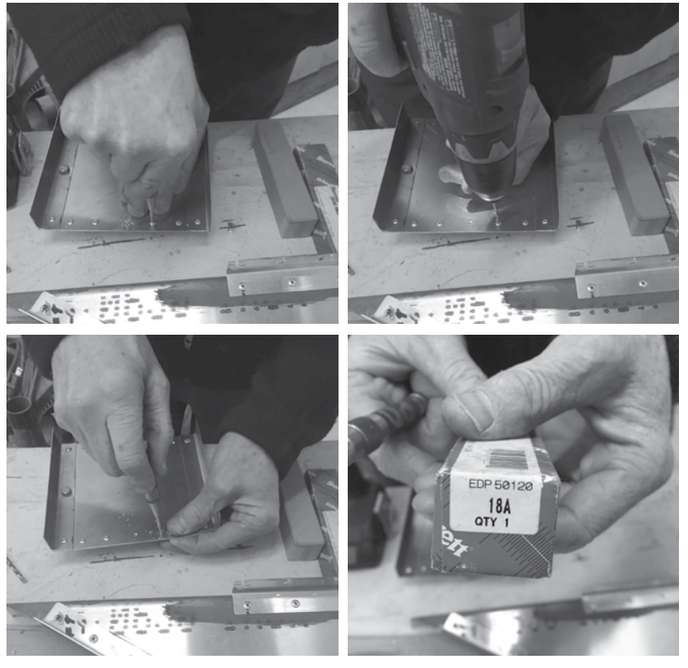
A Great Card Trick

This tip seems to have originally appeared in an issue of Popular Science in the 1950's. Thanks for letting us know about this simple but effective idea. I tried this one and it works best on concave surfaces, but also works well on convex surfaces if you can squeeze the deck tightly as you work the sandpaper.

This trick works well on metal, wood or composite. Just match the grit type and size to the material you are sanding and you find things will go smoothly.

Now that's what I call a great card trick!





Easy Removal of Pulled Rivets

George Gregory

PERRY DELANO demonstrated this techique at a chapter meeting recently. Chapter 85 is building a Zenith 750 Cruzer, and as with any build, sometimes mistakes are made or we get ahead of ourselves and some of those rivets just have to come out.

Conventional wisdom suggests selecting a drill bit the same diameter as the rivet and drilling it out. But what if the second layer of aluminum skin pushes away as the bit goes through? You will wind up with an elongated hole. Or if the bit jumps or skates off the work, damage to the skin is possible.

There is a better way. Obtain a spring-loaded centre-punch (Perry says 18A is a good size) and poke it through the hole on the top of the rivet until the punch clicks. Do this a few times if you have to; what it's doing is pushing the mandrel in the rivet further down.

Then take your drill and drill down until the head comes off; there's no need to go further.

Finally, take the punch again and push it into the hole a few more times until the bottom of the rivet falls off the work. It's clean, fast, and you eliminate the possibility of harming your project with poorly drilled holes.

The punch is initially pushed into the head of the rivet a few times to push the mandrel down; the head is drilled off, and the punch used again to push the back of the rivet off the work. Piece of cake!

Cleco Cleanup

Dan Oldridge

IF YOU HAVE EVER built a set of aircraft floats, you know that the cleanup process can be just as challenging as the construction of the floats.

Whether you use 3M 5200 adhesive sealant, RTV, or some other adhesive sealant, they all have one common property that makes them work well. As my late father would say, "It sticks like snot to a blanket!"

Clecos often end up covered in the stuff and cleaning them up afterward seems like an impossible task. While the sealant is still wet, isopropyl alcohol will work in most cases, but seldom are you in a position to clean them at that point. Generally, you are so busy installing rivets and removing clecos, that cleanup takes a back seat until the assembly job is done. By then it looks like a tube of bathtub caulking exploded in your cleco container!

After much experimentation using solvents, wire brushes and cleaning agents, I found a simple, non-destructive environmentally friendly method to clean them up.

While building my Highlander, I had found that a crepe block worked very well for removing excess Eko-bond while I was gluing the fabric. Eko-bond is a latex-based glue, so it is very stringy when pulled away from a surface to which it is adhered. The crepe block is like a giant rubber eraser that tugs at the glue bonds along the adhesion line. By rubbing the Eko-bond, it removed the excess without touching the material between tapes and fabric. Lee Valley Tools has crepe blocks for about $10.

I had a few small used cut-offs from the crepe block that I could try on the 3M adhesive and found that although it tugged away in a similar fashion as the Eko-bond, the small contours of the clecos were extremely difficult to clean by rubbing them. What I needed was a method by which I could get at the contours of the small end of the clecos. It turned out the solution was quite simple.

By drilling a one inch deep 1/8 inch diameter hole in the crepe block, I was able to use the cleco pliers to insert the cleco into the block.

By simply rotating the cleco in the block, or the block around the cleco, it only took about 3 rotations to remove the dried sealant. Any that remained, usually came off by opening and closing the cleco inside the crepe block hole. This operation was done in my hands, but I had to set things down to photograph it.

Right: drill a hole in the crepe block big enough to accommodate a cleco; insert it into the block and give it a few turns. Adhesive inside the clecoe can be removed by opening and closing it a few times while it's in the block. Below, after the treatment the clecos look as good as new.

Every so often, I found it handy to re-drill the hole to remove the dried adhesive that was left behind to clog up the hole in the crepe block.

To clean the shaft of the cleco, I drilled a larger hole to fit the entire cleco into … right up to the pliers clamping ring. Again, by rotating the cleco, it removed the sealant and even shone the copper surface up a bit.

Occasionally, I found a cleco that required a little wire brushing to shine them up a bit, but the wire brush did little to remove the sealant as I had discovered earlier.

I found that a few of the older clecos had some epoxy on them from a prior project and the crepe block did not work to clean the epoxy off. However, if you are faced with cleaning up a bunch of clecos you used during a float sealing operation, try this simple trick to get them looking almost new again!

Dan Oldridge *is a retired firefighter who began his career in Cambridge, ON before eventually rising to the postion of senior manager in London. He is a member of RAA National and two local RAA chapters.*

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 4th Monday of the month at 6:00 PM at the Lake Simcoe Regional Airport for the months of June, July & August (BBQ nights) For other months contact Dave Evans at david.evans2@sympatico.ca or 705 728 8742

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

COLLINGWOOD AND DISTRICT; The Collingwood and District RAA, Chapter 4904, meets every first Thursday of every. month, at 7:30 PM except July and August, at the Collingwood Airport or at off-site locations as projects dictate. The January meeting is a club banquet held at a local establishment. For more information contact Pres. Skip Reeves 705-429-5154

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

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

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

KITCHENER-WATERLOO. Meetings are on the second Monday of each month at 7:30pm upstairs at the Air Cadet building at CYKF except during the summer months when we have fly-ins instead.

Please contact Dan Oldridge at kwraa@execulink.com for more information or visit our newly expanded website at http://www.kwraa.net/.

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

Meetings: first Tuesday of each month, 7:30 pm, at the Huronia Airport terminal building (CYEE). Contacts: President Rob MacDonald - 705-549-1964, Secretary Ray McNally - 705-717-2399, e-mail - raamidland@gmail.com

E-mail – raa.midland@gmail.com .

NIAGARA REGION: Second Monday at 5:30 pm in the orange hangar at Niagara Central Airport June to September. Contact Pres. Elizabeth Murphy at murphage@cogeco.ca , www.raaniagara.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

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

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

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

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

TORONTO: First Monday 7:30 pm at Hangar 41 on north end of Brampton Airport. Contact: President Fred Grootarz - Tel: (905) 212-9333, Cell: (647) 290-9170; e-mail: fred@acronav.com

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

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

MANITOBA

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

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

SASKATCHEWAN

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

ALBERTA

CALGARY chapter meets every 4th Monday each month with exception of holiday Mondays and July & August. Meetings from 19:00-22:00 are held at the Southern Alberta Institute of Technologies (SAIT) Training Hangar at the Calgary Airport. Join us for builder discussions, site visits, tech. tips, fly out weekends and more. Contact President Bob White 403-472-1035 pittsflyer111b@gmail.com

EDMONTON HOMEBUILT AIRCRAFT ASSOCIATION: meets second Monday - Sept. to June. Contact Pres. Roger Smeland - 780-466-9196 or Jim Gallinger 780-242 5424. Website www.ehaa.ca

GRANDE PRAIRIE: Third Tuesday, (September to April), 7:30, 2nd floor boardroom of the Grande Prairie Terminal Building. Summer events on an informal schedule. For more information contact Lee Merlo at 780-518-4254 or e-mail arniesusanmeyer@gmail.com

BRITISH COLUMBIA

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

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

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

QUESNEL: First Monday/Month 7:00 p.m. at Old Terminal Building, CYQZ Airport. Contact President Jerry Van Halderen 250-249-5151 email: jjvanhalderen@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 Peter Whittaker pwhitt@telus.net Website www.raa85.ca.

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

THOMPSON VALLEY SPORT AIRCRAFT CLUB: Second Thursday of the month 7:30 pm Knutsford Club, contact President Darren Watt 250-573-3036

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 Gerry at 250-782-4707 or Heath at 250-785-4758.

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

Emails can be sent to President Gary Wolf at: **garywolf@rogers.com** *and George Gregory at* **gregdesign@telus.net.**

Classifieds

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

The Recreational Flyer is pleased to offer you colour advertising within the magazine. Previously limited to the back cover, we have added 4 new colour pages which will be available with limited space for your advertising needs. Our rates for both black and white and colour ads remain very competitive and you reach a captive and qualified audience. Emails can be sent to President Gary Wolf at: garywolf@rogers.com and George Gregory at gregdesign@telus.net

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

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

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

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

STINSON 108-3 with heavy case 165 hp Franklin. Airframe 2365 hrs, and recovered in 2005. Engine 998 hrs. Float kit. Two props, one fine for climb and one coarse for cruise. $24000 Quesnel BC. 250-991-7958

LYC. 0-320-E2G 150 HP. Total time 500 hrs/logs. New mags, cam, pistons and rings Jan 2015 by Aerotec Halifax. All accessories including Sensenich propeller M740M-0-49 and SS crossover exhaust system. $15000,- Guy 902-682-2888

WARP DRIVE three blade prop hub with 4" extension.to fit SAE 1 hub (Continental engines) $300. 3 blade Warp drive hub with 4" extension. Believed to be a SAE 2 - fits Lycoming 0235. $300. este@compmore.net

PELICAN AIRCRAFT PROJECT. Side by side seating. HKS 60 hp motor with 420 hours Last flown 4 years ago. 1980's design. $9500 este@compmore.net

CUB PROJECT, Wag Aero plans, fuse on gear, brand new Riblett wing kit(still in crates) new windscreen , new J3 style cowls. May sell wing kit separately. Ask $15k. (647) 981-0044.

KR 2 TRIGEAR 2180cc Great Plains VW. 3.5 gph @ 130 mph Cruise. TTAF/TTE 54hr. int/ext 10/10 $15000 call Ray Larson 905 892-6389

SENSENICH PROPELLER M76 AM-2-54 with Saber bolts and includes spinner. $800 CDN OBO. Conical style motor mount up to 150 hp but from unknown plane. $350 OBO Gary Johnson 705-879-4696 Kindsay ON

LYCOMING IO-540 A1A5 wetsump; this is a certified engine with logs, includes injectors and 2 mags, timed out at 1200 hrs but running condition. No starter or alternator or ring gear. Great core for rebuilding. $6000 OBO 519-331-9760

WANTED - ZENITH CH 200/250 TAIL-DRAGGER, flying with a basic panel. Sheraldm@yahoo.com 416-427-5410 Alliston ON

REBUILT GROB 102 GLIDER, all fibreglass, modified to motorglider with Rotax engine, 190 hours, flew from Lindsay Airport. Trailer is included. Selling because owner is now too old to continue flying. Glider is in Pickering. $14,900 or best offer. Hans Lohr, telephone (905) 509-2356. Arthur Ontario CMZ2

TEE HANGER FOR RENT, $150 negotiable....37ft wide and 10ft high . Hanger was designed for ultralights with a high mast, but would suit most aircraft . Front section is 15ft deep and the ' Tee' part is 12ft wide and 11ft deep . N/S runway is approx. 2000ft and E/W approx. 1200ft both with clear approaches . Contact Mac at macpat@live.ca

New Aero Vee 2180 cc VW engine, assembled but never run. Baffle kit, oil press & temp sensors, prop plate, carb filter, oil cooler, exaust pipes, CHT sensors, 36 mm socket. . Landed cost was 12K CDN when our dollar was higher. I am asking 9K CDN. . I am getting too old and tired to finish the project. Don 519 372 1383 . we3kingers@yahoo.ca

Lycoming O-235 dismantled for inspection. One mag, no carb, includes ring gear but missing bellhousing. $900 millfly@sympatico.ca 519-822-6693

Full Lotus 1220 floats with new aluminum stiffener tubes, $800. EDO 1400 certified floats asking $10K. 519-2898-5792

Acro Sport 2 project for sale,close to first inspection, O-320 motor fresh rebuild, wings on plane. For more info contact morrisonpeter42@gmail.com for pictures and price, good deal lots of work done.

"CLEANING OUT THE HANGAR" Best Offer: New Fly Baby fuselage and vertical tail/rudder. Thorpe 18 fuselage, gas tank, lots of small parts and front landing gear. Complete EAA Bi-Plane with 0290 wood prop, always been hangared, not flown in years. Benson Gyrocopter complete, very nice rotor blades, always stored in Hanger, Continental 65Call or email for photos and information 705-653-4525 davidcarlaw@prototyperesearch.com

Stack of Sitka Spruce, up to 16 feet long planks, some wing rib sticks and partly completed wing spars for an unknown application. Half a dozen set of wheel pants (Cessna and Piper PA-28). Rebuilt O-200 Cylinder assembly. 7" Nexus tablet 32 GB running on Android 5, purchased and used primarily for GPS Navigation. Lowrance Air 300 GPS working but obsolete database. Cheap. Flight control assembly from a Grumman AA-5 and flap motor for same. Sidewinder aircraft Project in taildragger configuration. 600+ TT. Craftsman high frequency arc stabilizer to convert an AC welder to a TIG welder. Pictures available upon request. All items located at or near CYKF. Open to reasonable offers and negotiation. Contact Rudy at rudyhane@gmail.com

FLY-IN RESIDENCE/SHOP/HANGARS • $729,000 • FOR SALE BY OWNER • Private S.W. ON 2000 x 85' grass strip and dream home on 50 acres. 3000 sq ft four+ bedrooms, two baths. Modern, efficient 27 year old three story home with attached 2 car garage. 4 beds, 2 renovated bathrooms and brand new dream kitchen with granite counter tops. Wood stove, 1500 sq' drive-in shop w/attached office. Deep well, two ponds. 35 acres crop annually rented to neighbour pays taxes. 15 acres hardwood wood lot with groomed trails. 25 min. S.W. of London at N42.78 W81.6 See http://www.cleco.ca/gallery2/v/Brandywine for more info • Contact J. Davis, Owner - located Appin, ON Canada • Telephone: 519-868-0447 • jwd3ca@gmail.com

DONATION! I wish to donate the following to any interested club, group, cadets squadron or RAA member:
A complete set of plans and some parts for a Beryl aircraft. Parts include all 26 wing ribs for the semi-elliptical wing, rudder, elevator etc. Also a/c grade plywood and one piece Sitka spruce 12ft 3ins long x 7.5 ins wide x 2 ins deep. Will also throw in two books by Tony Bingelis, the homebuilt Guru - "Firewall Forward' and " Sportplane Construction Techniques". Call or e-mail me or it all goes to the dump by mid summer. Contact Nigel at (705) 429-3449 or landnlaw@gmail.com. Collingwood Ontario area

FOR SALE: CONTINENTAL A75-8 ENGINE.APPROX 30 HOURS SMOH $ 8500 contact: Pat pjb@ornithopter-pilot.com

ENGINES 0-200A & I0-360 • CLEANING OUT THE HANGAR • Cont 0-200A 2600 TTSN $5500. / LYC IO-360-A1B6D 200HP-224.4 SMOH $10,500 Log Books both engines. • Contact Fred L. Austin located Sparks, NV USA • Telephone: 360-477-3100 .

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: garywolf@rogers.com and place "RAA ad" in the subject line.

Classifieds On The Internet:
http://tvsac.net/BS1.html - more ads from our Kamloops chapter
http://www.lyncrest.org/sfcclassifieds.html - more ads from our Winnipeg chapter

January - February 2016

RAA Midland-Huronia

At the January meeting, we finalized our details for the winter fly-in to be held on February 13. Adam updated the group regarding the Base Borden Airshow scheduled for June 11 and 12 as well as his progress in setting up a FaceBook Page for the Zenith CH-601 Project.

He also reviewed information from the Airport Commission planning meeting on March 10 which included a proposed new 60'x180' hangar/maintenance building.

Rob M. then updated the group on several issues: First, progress on the Zenith 601 project; then a proposal to involve High School students in it: many of these need to accumulate hours in volunteer time as part of their curriculum. He will check with a school regarding details of the program and if applicable will arrange for students' participation. Finally, he had an outside contact that suggested we should make a presentation to the Rotary club to explore possible areas of mutual benefit. Rob will advise of results.

Michael H. reported that there are a couple of CH-650 builders in the Collingwood area who are using Corvair engines. This could be a valuable resource for our group.

RAA Winnipeg

The Recreational Aircraft Association joins the flying community in congratulating Bert Elam for winning the prestigious Air Canada "AWARD of EXCELLENCE"! Bert's career with Air Canada began 37 years ago and includes instructing on the DC9, Line Indoctrination Instructor, AC Pilots Assoc. Rep. and especially volunteering with "Dreams Takes Flight", where AC and many employees send Sick Children to Disney World. Bert has flown many of Air Canada's planes including his current position as Captain on the 777!

Winnipeg RAA members Peter Moodie, Larry Brown, Donna Prowse, John Stiver, Bert Elam (centre), Gerry Norberg, Mike Elam, Jill Oakes and Rick Riewe were at the award ceremony, catching Bert totally by surprise! Photo credit Peter Moodie. Below, Perry Delano conducting a rivet removal demonstration on Chapter 85's Zenith project.

Bert's personal commitment to the success of every member of the team over 37 years of flying was applauded at the award ceremony. His dedication and Professionalism through the years has been notable and his work has helped many, many people.

Bert has also been a tremendous asset to the Recreational Aircraft Association in various capacities, from Flying into Lyncrest Airport as Santa, serving as Chief Pilot for the RAA Club Plane C-GNUC, serving on the Club Plane Management Committee where he promotes C-FLUG and C-GNUC, flying or mentoring Marshallers in COPA for Kids, 99s Women Fly, and EAA Young Eagle events, and serving on the Executive of RAA and SFC. Bert is building a Pietenpol and a Bearhawk when he's not helping others with tools, materials, and information.

Edmonton Homebuilt Aircraft Assn

This regular meeting of the EHAA club on June 10 will be the final get-together before the summer break, the next meeting after this one will be on September 09 and more details will be announced later. However the club executive will have a meeting on August 27 to do planning for the fall and winter program.

Your club executive has for the last few months meet and planed how to invigorate the membership.

Some of the suggestions included have project visits, have specific aviation related workshops / seminar, video or power point picture presentation.and expert presentations on construction with engines, welding, electrical stuff as well as the different methods of aircraft construction - metal, wood, composite, etc.

Chapter 85 Vancouver

Activities at Chapter 85 over the last 2 months have focussed on the Zenith 750 Cruzer building project as 2016 gets underway. Several new members have joined in order to become involved with the building project and visitors appear at the workshop on Saturdays to see what is going on. The chapter website and facebook page are capturing attention and bringing visitors out, and we have increased our membership as interest in the project has built.

The building project has also triggered discussions with RAA chapters in Midland and Hamilton who are each either starting or considering club chapter projects.

In place of a guest speaker at the January and February meetings, we had workshop sessions so that the general membership could review progress and discuss the project with the builders. Our March speaker was cancelled so Perry Delano gave demonstration on removing rivets. This procedure makes use of a spring loaded centre punch to knock the steel mandril out of the rivet which can then be removed by drilling the rivet head off and then knocking the rivet body out. This method does not touch the sheet metal or other parts and leaves the original drill hole ready for the new rivet.

The 750 Cruzer project has advanced to more detailed work with the alignment of the horizontal stabilizer. This was required before positioning the control cable pulleys for the elevator. Work continues on the firewall to get the engine mount ready for installation. The search is still underway for a suitable Continental O-200.

Top: Alignment of the horizontal stabilizer was done to in turn allow for the positioning of the elevator control cable pulleys. The stabilizer tips were positioned to give an equal distance from each tip to the centre point of the rear cabin top cross piece.

Figure 4. Peter Lenger holds the engine mount in position for a trial fit to the firewall as Hugo, José and Tim look on during the February general meeting.

The next major event is the 2016 Annual Awards Banquet to be held on Saturday, March 26th at Delta Town and Country Inn in Delta, BC. Vice-President Heidi Bekker has arranged for a grand door prize which is a complimentary return flight with Island Express from their base in Abbottsford to either Nanaimo or Victoria. The guest speaker is Bill Yearwood from Transport Canada.

More chapter news on page 18

Gyros / continued from page 27

gyroplane was fully manufactured it will go into the Limited category. Limited does allow the gyroplane to be used for flight training but all maintenance must be performed by an AME. This is not as expensive as for a fixed wing because a gyro has very open architecture, and the average annual is $1000. Alternatively you can buy or build an Amateur Built gyroplane. If you elect to build, the gyroplane will be inspected by MD-RA similar to a fixed wing. The A-B gyroplane may not be used for any commercial purpose but you would be allowed to perform your own maintenance and sign your own logs, same as for an A-B fixed wing.

INSURANCE

Gyroplanes are insurable but there can be some limitations. Marsh Silver wings is the go-to insurer for many fixed wing pilots who want third party liability and passenger coverage, but do not need inflight hull coverage. The Marsh brochure shows that they will cover third party liability and hull not-in-motion but the Silver Wings program specifically excludes passenger liability for gyroplanes.

National Aviation Insurance Brokers in Ajax Ontario has been writing gyroplane policies for years, and can provide full coverage for passengers and hull inflight. 1-800-463-0754

LICENSING

In the old Bensen days a Private Pilot License gave the automatic privilege of being PIC in a gyroplane. This did not always work out well because some encountered PIO and PPO and they had received no training to prevent these situations. In 1991 Transport changed the requirements and now there is a separate permit to fly a gyroplane. This permit requires a Cat 3 medical same as the PPL. The training requirements parallel those of the fixed wing PPL but the written exam has only fifty questions, similar to the Ultralight Permit. The flight test is conducted by your instructor and he signs you off, again like the Ultralight Permit. The big difference is that if you take your training in for example an XYZ, you get signed off to fly only

Neil Laubach is responsible for the rebirth of the gyroplane in Ontario and points west. He uses a Magni M16 912S and is currently adding new machines to his training fleet. He holds monthly seminars to introduce new pilots to the sport and is now putting together groups for joint ownership of gyroplanes, with intent to form a gyroplane club.

an XYZ. If your school has several different gyroplanes and you also train in these you can end up with those signoffs as well. The minimum hour requirement is 45 ab initio, and this is reduced to 30 for someone who holds a fixed wing PPL. The hourly rate at Gyro Ontario at CYKF is just under $200 with instructor, the same as for a Cessna 150.

What do you do if you want to buy a different type of gyroplane? If it is a name brand gyroplane your school might be willing to train you in it, but if it is some old two seat no-name that you found in a barn do not expect that they will be interested. Single seat gyroplanes are treated differently. Regulation 420.20 allows the holder of a gyroplane permit to fly solo in a single seater while under the watch of an instructor, similar to a flight school letting a student take the Cessna 150 out for solo circuits. When your instructor is satisfied that you are competent in that single seater he can sign you off for it. An alternative is to go to the USA for training because their regulations are more pilot-friendly. You must complete your training and get the US license and then Transport will rubber stamp your Canadian license. If you stop short of earning your US license the hours will not be credited to the Canadian permit.

WHERE DO I LEARN?

The rebirth of gyroplanes in Canada began in Quebec in 2008 and the province now has three schools.

Aviasport Inc operates from Lachute airport CSE4 and uses the Magni M24 Orion 914 and the M16 Trainer 912S. Contact Nicolas Horn 581-998-1460

www.magnigyro-canada.com

Air Pro Gyro, 767 rang Marigot, Saint-Apollinaire Quebec 418-580-8912

Gyro Adventure Canada, Neuville Airport, Quebec. Contact Denis Anctil 418-559-4422

In Ontario there is one school, Gyro Ontario, operated by Neil Laubach at Waterloo Regional Airport (CYKF). 519-573-0066. www.gyroontario.ca. Neil uses a Magni M16 912S and is currently adding new machines to his training fleet.

Neil holds monthly seminars to introduce new pilots to the sport and he is now putting together groups for joint ownership of gyroplanes, with intent to form a gyroplane club. R

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