

- May 2015 -



*Geoff Royston preparing for a ride in my Highlander last year at Cam Wood's fly-in at his Largo Woods airstrip in Winterbourne Ontario. This year's fly-in is fast approaching... be there or be talked about!*

## President's Message

Thank you COPA 26 for allowing us to join them for their meeting on May 12. Dave McKee did a presentation on cross-border flights and we had a fairly good turnout of RAA members to take advantage of this opportunity. Hopefully, we can get together with them again to share another future meeting and join them in some flying adventures.

Speaking of flying... fly-in season is here again, and there are a number of great aviation events in Southern Ontario. Let's show our support by trying to get to as many as we can and talk up KW-RAA to non-members and invite other members of the chapter to join us at these events. Shared experiences always seem more memorable.

Check out the list of Fly-ins and other aviation events in this newsletter, but here are a few of

the new listings... a fly-in at Mount Brydges on June 6 held by London RAA, an open house at Tillsonburg airport on the 6<sup>th</sup> with the Harvards flying and a car and plane show sponsored by COPA 1 in Guelph on Father's Day.

In this month's issue of the Leading Edge, check out my article on electric carb heat for the Rotax 912. Lee Coulman will be using a slightly modified version of this system on his Searay and I wanted to share it with any of the other members who may be interested.

I am still looking for interesting photos and articles for future newsletters. Consider sharing an idea with the members through our monthly newsletter this summer!

2015 is going to be a great year for KWRAA!

- Dan



## See Mac Run...

This year the Pan Am Games are being held in Toronto, Canada. As part of the ceremonies, a number of Canadians were selected as torch bearers to run the pre-games torch relay.

The cross-country torch relay will stop in more than 130 Canadian communities, by travelling on-land and through the air as it winds its way to Toronto.

The full route map is available on [the Pan Am Games](#) website.

After the torch is lit in a traditional ceremony in Teotihuacan, Mexico, it will start the Canadian leg of its journey on May 30.

More than 3,000 torchbearers will venture more than 20,000 kilometres with the Pan Am torch in hand to ensure its safe arrival in Toronto by July 10.

Mac McCulloch was selected as one of the torchbearers.

Join me in congratulating Mac on making the cut... do us proud Mac!

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## Category 3 Medicals

It appears the US may be close to removing the Cat 3 medical requirement for Private Pilots. With 10 years of Sport Pilot data now in hand, there is no evidence that the Cat 3 requirement serves any useful purpose for VFR pilots.

For more info check out this short video...  
<https://ud165.infusionsoft.com/app/linkClick/2314/6f95fa3bcbb078f8/2485774/e575a379e1511037>

In spite of the video mentioning VFR only, the wording in the Bill attempts to cover IFR too. You can see the "**Pilots Bill of Rights**" here...

<https://www.congress.gov/bill/114th-congress/house-bill/1062/text>

With any luck, this amendment will pass in the US and eventually come to Canada. How many great pilots do you know that no longer fly because of the Cat 3 requirement. If this passes, all that will be required to qualify medically is a valid driver's licence.

Additionally, think of the money we will all save if this medical is not required every two years!

Keep your fingers crossed for good news regarding the Pilot's Bill of Rights from the USA in September.

## Electric Carb Heat for the Rotax 912

– by Dan Oldridge

One of the issues all amateur aircraft builders face is the issue of how to deal with the potential for carb ice formation. During the inspection process, the MDRA inspector makes it known that, as a builder it is your responsibility to have a means of dealing with carb ice formation or a means of preventing it in the first place.

Historically, hot air from a shroud around the muffler or an exhaust pipe is fed through a diverter valve to an intake air selector that is controlled from inside the cabin. In most installations this is the easiest and often the most inexpensive means of obtaining carb heat.

The Rotax 912 series engines have one distinct advantage over more conventional aircraft engines in that the Bing Carburetors are located just inches above and directly over the rear exhaust pipes. This means that in an enclosed cowl, there is very little need for added carb heat and in some cases builders have been able to convince MDRA inspectors that the Rotax 912 series engines do not require external carb heat.

However, given that the standard factory set-up for production aircraft with Rotax 912 engines do have carb heat of some sort, I explored the various options.

Of course the standard hot air fed intake manifold was available, but it was upwards of \$1100 plus taxes and misc. parts. With the current exchange rates it's likely much higher now. Like all other hot air systems, it quickly addresses the carb ice issue on demand, but sacrifices some engine power as you add warm air to the combustion mix.

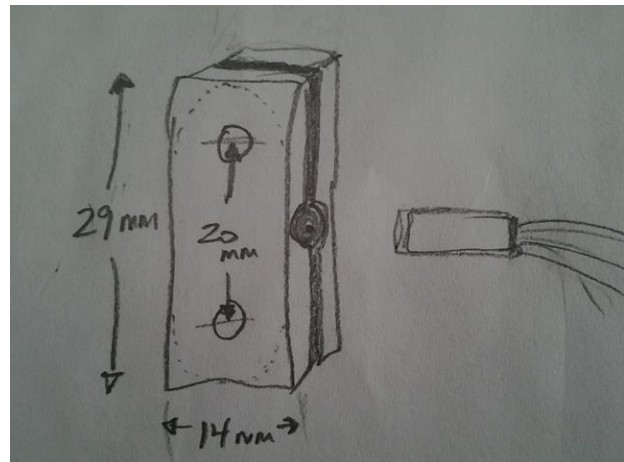
Another option was an add-on water jacket that fits between the carbs and engine. It heats the butterfly and venturi using the engine coolant. It has the advantage of not reducing the engine power since it does not significantly heat the air entering the engine. At a cost of about \$300-\$400 this was a viable option for my

Rotax 912 installation, but I didn't like the idea of tapping into the cooling lines.

The third option was a simple electrical heating element that gets bolted to the side of the carburetors and is operated by a switch on the panel. Since this was only going to be used occasionally and may not be required at all on the Rotax 912, I opted to install a home brew version of this system. Since the elements are only 40 watts, there is some hysteresis or lag in the system when it is turned on. As such, I wanted an automatic system that turned itself on and off as required to keep the carbs well above the freezing point.

I started by sourcing some small 12 volt electric heating elements on eBay. They are only ¼ inch in diameter and about ¾ inch long and have 3 ft. wire leads on them.

I shared my idea with fellow Highlander builder Jack Leroux and we came up with a simple system for mounting the heating elements onto the Bing Carburetors.



First we needed to make a couple of aluminum clamps that would hold the heating elements against the carbs.

I started by clamping two pieces of ¼ inch plate together with a piece of .025 between them and drilling a ¼ inch hole through between them as shown below. Then removed the piece of .025 from the assembly, which was only there to get the blocks to clamp onto the ¼ inch heating element.



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I originally made mine from 1/4 inch plate, but likely should have only used 3/16 inch material and a piece of .040 between to get the best fit.



The photo above is to illustrate the process, but it's a good idea to drill the hole in steps to ensure a nicely aligned hole. Start with a 1/8" drill bit then a 3/16" bit then finally the 1/4" bit to get the final size.

I then drilled holes for the #8 mounting screws that are 20 mm. apart and drilled countersink holes to set the heads into the blocks.

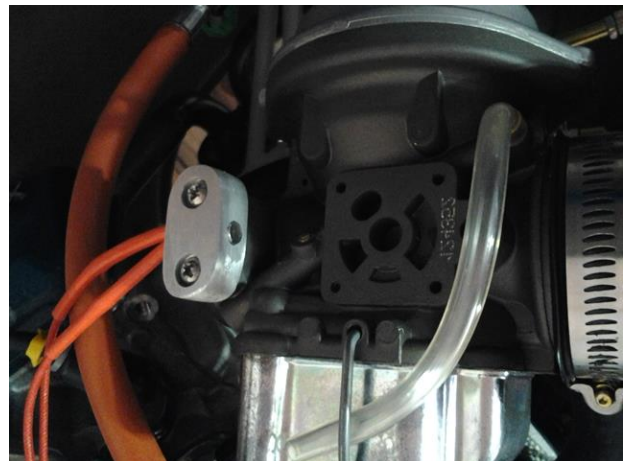


Since the Bing carbs are made for either right or left mounting, there are convenient indentations in the castings on the side opposite the butterfly that can be used to drill into the casting 7/16 inch deep and then tap for the #8 machine screws.



Be careful not to drill too deep as to go all the way through the material. Use a drill collar or drill press set to only go 7/16 inch deep. Tap the holes for a #8 machine screw.

I then rounded the edges to make a nice looking block to install on the carbs and mounted the completed assemblies to the carbs, clamping the elements in position.



I then wired the leads to a switch on the panel to provide them with 12 volts.

This installation is all that would be required to meet the need for carb heat on the Rotax 912, but as I mentioned before, I wanted a system that would automatically control carb temps.

Again, I went to eBay and sourced a couple of 12 volt DC thermostats that came with thermocouples I could mount on the carbs using simple homemade screw clamps.

## The Leading Edge



Above you can see the simple clamp holding the thermocouple to the butterfly assembly.

The thermostats come in a plastic, but fairly attractive ventilated housing. They are programmable for both heating and cooling applications, but obviously I am only using the heating function in this case.



I mounted the thermostats under my panel and the thermocouples on the opposite side of the butterfly as the heating elements. It takes about 30 to 40 seconds to see the rise in temperature on the thermostats, but I assume the butterfly begins to heat in about half that time. I set the thermostats to turn on the carb heat at 10 C and so far have found the system to work well and be trouble free.



Above you can see the thermostats mounted just below the throttle and displaying the current carb temperature.

I have had an opportunity to fly with the automatic carb heat for many hours now in varying conditions and I can report that it works well. On a few of the colder mornings, I flipped on the automatic carb heat before the engine warmed up and you could see the "heat" indicators come on to show the internal relay had switched on the heaters.

I watched as the temperature in the carbs climbed from a chilly 2 degrees Celsius that morning to a more respectable 15 C. Of course once the engine was up to temperature, they indicated between 17 and 43 Celsius depending upon whether I was climbing or descending.

Interestingly, the system allows me to see the difference in the airflow inside the engine compartment as the temperatures vary from side to side. Although one side always seems a little warmer than the other, the spread appears to change depending upon wind direction, RPM, and the phase of the moon... or some other unknown variables. I will be exploring this a bit more over the next few months, but as I said, the system is working well and I don't have to be concerned about carb ice issues.

There is certainly something to be said for a system that you can set and forget.

- Dan

# The Leading Edge

## Upcoming Events in 2015: (Highlighted lines are KWRAA Events\*)

June 6	-	London/St.Thomas RAA Fly-in Warren Field, Mt. Brydges, 10am to 3pm
June 6	-	CHAA (Harvards) Open House, Tillsonburg
June 7	-	Stratford Pancake Breakfast Fly-In, COPA Flight 69,
June 13	-	CHAA 30 <sup>th</sup> Anniversary Celebration, Tillsonburg Airport
June 20	-	KWRAA Fly-In at Largo Woods, West Montrose
June 21	-	Cars and Planes, Guelph Airpark, by COPA Flight 1
June 27	-	Brantford Fly-in and Aircraft Spruce Customer Appreciation Day
June 27	-	Waterloo-Wellington Flight Centre Funfest – COPA Flight 26
July 18	-	KWRAA Fly-In at MacPat Field, Arthur
July 20-26	-	Air Venture Oshkosh in Wisconsin
August 1	-	KWRAA Fly-In at CPR3 (New location being considered - TBA)
August 8	-	Gathering of the Classics, Edenvale
August 14-16	-	UPAC Convention, Lubitz Field, Plattsville
Aug 22	-	KWRAA Fly-In at Roth Field (Between Pike Lake and Mount Forest)
August 21 to Sept 7	-	Canadian International Air Show, CNE Grounds
September 14	-	September Meeting at 7:30 in the Cadet building at CYKF
September 19	-	Tiger Boys Fly-in, Guelph
October 19	-	October Meeting at 7:30 in the Cadet building at CYKF
November 9	-	November Meeting at 7:30 in the Cadet building at CYKF
November 27ish	-	KWRAA Christmas Party in lieu of a December meeting

\* KWRAA events are fly-in and/or drive-in (Please advise the host in advance if you plan to attend whenever possible.)

\*\*Please check the dates and times before attending any events listed above as they are for reference only.

Check out the CHAA website for more Harvard open houses and fly days at...

<http://www.harvards.com/upcoming-displays/>

**Please Note:** If you know of other fly-ins or planned fly-outs you would like to see listed here for the rest of the chapter to know about, please forward them for inclusion in the next newsletter.

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### Classifieds:

**Mustang II** plans and parts for sale... partially completed. \$6000 OBO.

I also have a number of parts I am willing to sell separately including some aluminum sheet metal in various thicknesses, rudder pedals and a number of other small parts. Please contact me for more information. John Valenta, 422 Lancaster St. W. Apt. 10, Kitchener ON (519) 745-6463

*Editor's Note: John was unable to provide the detailed list at time of publishing this newsletter*