



EAA602 Log Book

Adirondack Chapter Newsletter

Jan/Feb 2008

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HOMEBUILDERS



From The Presidents Desk

by Tim Cowper

The Annual EAA602 Christmas Party was a great time with a good turnout despite the threatening weather. Once again C&R's made it all very simple, with inexpensive good food and great service. But, the holidays are over, and it's time to start thinking about flying. Fortunately, those club members who needed to get their E-LSA airworthiness certificates got them...yes, even Richie, and well before the January 31st deadline! Now the Challenger doesn't have to be a lawn ornament! And Julius may have the only E-LSA PPC in the area, so I can't wait until he gets his Sport Pilot license. I'm looking forward to a ride!

We have a bunch of members, with flying aircraft, so let's make 2008 the year of flying! With that being said, many of us need to actually get our licenses and stop flying as students. Let's face it, I'm a professional procrastinator. I learned from the Grand Guru of Procrastination, Aeronca Pete (student pilot since 1955!), but I'm making a commitment now to actually get a license this year. Hopefully, those of us that have been putting it off can get it done, so that we can concentrate on having fun.



The meeting this month will be on January 28 @ 7:00PM, at Mark Murphy's hangar, where Mark will be giving a presentation on his trip out to the Gathering of Mustangs in Ohio last year. Unless you've got skis on your bird, January is a tough month, so this should be just the thing to brighten up the spirit and get us dreaming about airplanes. Mark tells me that the heat in his hangar isn't exactly "toasty" so dress appropriately for whatever conditions are at the time.

We need ideas from members on what we, as a club, want to do this year. Last year was awesome, and 2008 can be even better, but we'll need to work together to make it happen. Come to the meeting and voice your opinion on what you'd like to see the club do. And, as always, we need your newsletter articles! Write one today!

Tim

From Our VP's Desk

by Tony Rizzio

What was I thinking? If I didn't run for VP again I wouldn't have to write this column.

I could just wait and read the newsletter. I could wait for the lumberjack to tell more stories. But no I had to be smart. *(You didn't run - you were drafted)*

So - Now on to my story. As some of you know I sold my kitfox. And went on a search for an ercoupe since some of them fall into light sport, I thought it would be a good choice. With the tri gear and low wing and very stable but one of the

main reasons I thought it would have much better visibility. Since sport pilot and light sport has come to pass those ercoupes that qualify have gone crazy in price along with my second choice the champ. Thank goodness for the internet it makes research so much easier. I did find one in Virginia and should have it home by the first of the month (February). Looking forward to the meeting, and if nothing else is going on maybe we will do a demonstration of vacuum forming since there was so much interest in it at the last meeting when we were talking about vacuum bagging. See you there.

Tony



Some Thoughts

by Tim Devine

Its a little before 4:00 PM on Sunday December 16 and I'm looking out my window at a mixture of sleet and freezing rain that is falling on about six inches of fresh snow. I am reluctantly coming to grips with the fact that it looks like the flying season at 1F2 is over for 2007. Its amazing how quickly things change this time of year.

It was only a month ago that on a beautiful late fall day the airport was a beehive of activity. Darryl was sitting in a lawn chair enjoying the mid day sun waiting for Kevin and Doug to return from Kevin's lesson, so he could get in some more flight time. Tom Kravis was making low passes in Terry Wade's recently purchased Kitfox. Tony Rizzio was checking on his Kitfox as he was expecting a buyer to look at it in the coming week. Brian and Chris were making their downwind leg calls as they approached the field and I was launching for a pleasant flight to Sharon Springs.

In the span of four short weeks we have had our Christmas party, Tony sold the Kitfox, Doug has folded up the flight star and moved it to the back of the hanger, he also has moved the Pulsar home to get it ready for its new paint job. Brian got his N Number, and the weather has changed drastically.

The reality finally set in yesterday when I got up and checked the weather and knew that Darryl and Kevin would be at the airport taking Darryl's plane into storage for the Winter. So I loaded up my snowshoes and my dog Kody and headed up to 1F2 to give them a hand and if on the off hand they weren't there I would take the dog for a good run. As it worked out we did disassemble the aircraft and they even pulled the motor for shipment back to Ohio. The dog got a good run and slept well last night and I had another good day of participating in the sport of aviation even if it doesn't mean flying.

Some wishes for 2008:

That all our 2008 flying events are as successful and safe as 2007.

That all the guys working on their sport Pilot Certificates this winter are successful.

That Tim Cowper gets his airplane done.

That we get more people flying next year.

That Walt flies his Champ to one of our events.

That Fred conquers landings.

That Tony finds an Ercoupe that's LSA.

That Doug doesn't get declared a small regional air carrier by the FAA.

That the crows find somewhere else to feed other than runway 24.

That our wives and girl friends continue to understand the addiction to flying.

Merry Christmas and Happy New Year!

PS Now that I am grounded for the Winter anyone who is working on a project that needs an extra hand please keep me in mind. I'm available most weekends and I have my own tools. I'm hoping to keep cabin fever at bay and avoid a long list of home improvement projects that my recently retired wife has been compiling. HELPPPP!!!!

EAA602 FLY MARKET

WANTED

Skis for 1946 Champ.

Contact Tim Devine 584-2045

FOR SALE

**2002 Fib Polaris - w/Trailer - Lockwood
Fresh 582 - Wheel kit for land operations
Call Gary Rudolph 875-6445**

**2000 FlightStar - 55 hours on 582/E-box
drive Custom paint ~ All the options ~
Asking \$14,900**

Call Doug Sterling 863-2409

**Gauges & Other - All brand new left over
Gauges for sale. Tach, Dual CHT, Dual
EGT, Water Temperature (All Westach 2
1/4" with probes) Combo EGT-CHT, Turn
Coordinator. Tapered air filters for 447-
582. 5" Matco wheels & disc brakes.**

All half price

Call Doug 863-2409



Pilots !!

One fine hot summer afternoon there was a Cessna 150 flying in the pattern at a quiet country airfield. The Instructor was getting quite bothered with the student's inability to maintain altitude in the thermals and was getting impatient at sometimes having to take over the controls. Just then he saw a twin engine Cessna 402 5,000 ft. above him and thought, "Another 1,000 hrs of this and I qualify for that twin charter job! Aaahh.. to be a real pilot going somewhere!"

The 402 was already late and the boss told him this charter was for one of the Company's premier clients. He'd already set MCT and the cylinders didn't like it in the heat of this summer's day. He was at 6,000 ft. and the winds were now a 20kt headwind. Today was the 6th day straight and he was pretty dang tired of fighting these engines. Maybe if he got 10,000 ft. out of them the wind might die off... geez those cylinder temps! He looked out momentarily and saw a B737 leaving a contrail at 33,000 ft. in the serene blue sky. "Oh man," he thought, "My interview is next month. I hope I just don't blow it! Outta G/A, nice jet job, above the weather... no snotty passengers to wait for ..."

The 737 bucked and weaved in the heavy CAT at FL330 and ATC advised that lower levels were not available due to traffic. The Captain, who was only recently advised that his destination was below RVR minimums, had slowed to LRC to try and hold off a possible in-flight diversion, and arrange an ETA that would helpfully ensure the fog had lifted to CAT II minima. The Company negotiations broke down yesterday and looked as if everyone was going to take a dang pay cut. The F/O's will be particularly hard hit as their pay wasn't anything to speak of anyway. Finally deciding on a speed compromise between LRC and turbulence penetration, the Captain looked up and saw Concorde at Mach 2+. Tapping his F/O's shoulder as the 737 took another bashing, he said "Now THAT'S what we should be on... huge pay ... super fast... not too many routes...not too many legs... above the CAT... yep! What a life...!"

FL590 was not what he wanted anyway and he considered FL570. Already the TAT was creeping up again and either they would have to descend or slow down.. That dang rear fuel transfer pump was becoming unreliable and the F/E had said moments ago that the radiation meter was not reading numbers that he'd like to see. Concorde descended to

FL570 but the radiation was still quite high even though the Notam indicated hunky dory below FL610. Fuel flow was up and the transfer pump was intermittent. Evening turned into night as they passed over the Atlantic. Looking up, the F/O could see a tiny white dot moving against the backdrop of a myriad of stars. "Hey Captain" he called as he pointed. "Must be the Shuttle. "The Captain looked for a moment and agreed. Quietly he thought how a Shuttle mission, while complicated, must be the-be-all-and-end-all in aviation. Above the crap, no radiation problems, no dang fuel transfer problems...aaah. Must be a great way to earn a buck."

Discovery was into its 27th orbit and perigee was 200ft out from nominated rendezvous altitude with the commsat. The robot arm was virtually U/S and a walk may become necessary. The 200ft predicted error would necessitate a corrective burn and Discovery needed that fuel if a walk was to be required. Houston continually asked what the Commander wanted to do but the advice they proffered wasn't much help. The Commander had already been 12 hours on station sorting out the problem and just wanted 10 minutes to himself to take a leak. Just then a mission specialist, who had tilted the telescope down to the surface for a minute or two, called the Commander to the scope. "Have a look at this Sir, isn't this the kinda flying you said you wanted to do after you finish up with NASA?" The Commander peered through the telescope and cried Oooooohhhhhh yeah! Now THAT'S flying! Man, that's what its all about! Geez I'd give my left arm just to be doing THAT down there!"

What the Discovery Commander was looking at was a Cessna 150 in the pattern at a quiet country airfield on a nice bright sunny afternoon.

Moral: pilots are never happy unless they are drinking beer and looking for a better job.

AIRVENTURE
O S H K O S H
EAA

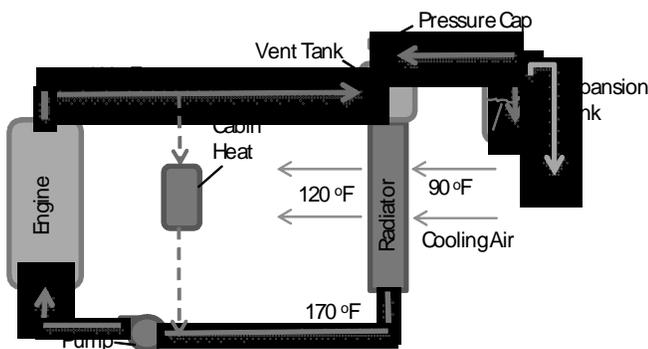
July 28 - August 3, 2008



Keeping your cool in the Air! (Part IV)

This is part 4 of a 4 part series dedicated to heat transfer. In part 1 we discussed the flow of heat through a solid surface (conduction). In part 2, we investigated the flow of heat between a solid (such as a heat exchanger tube or fin) and a moving fluid (convection). Part 3 was dedicated heat transfer without the presence of an intermediate medium (radiation). This section will focus on a generalized system design for a liquid cooled engine. A follow-on article will cover troubleshooting of such systems. A liquid cooled engine typically consists of a few basic components: 1) a coolant jacket surrounding the hot sections of the engine, 2) a working fluid (or coolant) such as water or more often a water/glycol mix, 3) a pump to move the fluid, 4) a heat exchanger to reject the heat to a secondary fluid (typically air), and 5) interconnecting piping and ducting to tie it all together. How these components are sized and assembled can have a dramatic effect of the overall performance of the system. Figure 1 shows a depiction of a typical system.

Figure 1: Typical System Arrangement



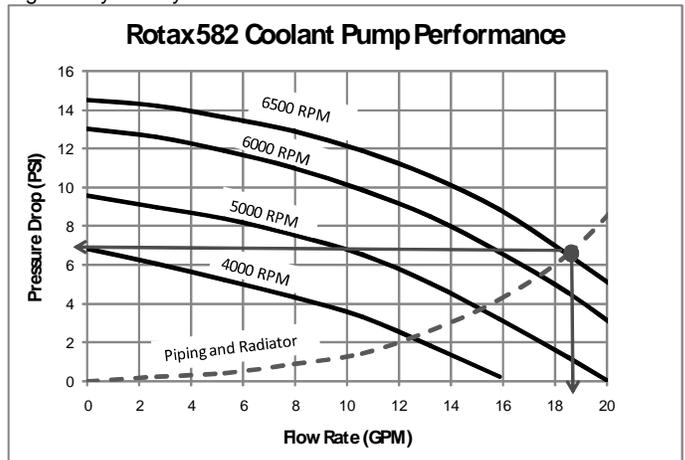
One of the first things that needs to be determined is just how much heat do we need to remove from the engine and transfer to the cooling air. This information will allow us to properly size the radiator. Typically your engine provider (or OEM) can provide this information. If this information is not obtainable, a general rule of thumb can be used to calculate the heat duty based upon rated engine HP. Assuming a typical 25% thermally efficient 4 cycle engine, heat rejected to the coolant can be estimated as $\text{Btu/hr} = \text{HP} \times 3800$. For a similar 2 stroke engine, heat rejection may actually be much less, due to less complete combustion and internal cooling provided by the fuel. Once the duty is known, we next need to determine what the flow rate of coolant should be. Once again, your OEM installation guide should have the value

handy. If information is not available, a first estimate would be to assume some maximum allowable temperature change of the coolant through the radiator (which is also the same as the temperature increase in the engine jacket). 10 °F is a typical value. If using a 50/50 mix of water and glycol in your system, this can readily be calculated as $\text{GPM} = \text{Btu/hr} \times 0.000191$.

Now we know the duty (Btu/hr) and the flow rate (GPM). We next need to determine what our hottest (worst case) outside air temperature could be and then estimate the velocity of the air to the radiator during ground or flight conditions. Once we obtain/estimate this information, we can then contact radiator vendors and size a heat exchanger. Heat exchangers will come with a Manufacturers Data Sheet which outlines the thermal and hydraulic performance of your specific unit. One important piece of information on this document will be a reference to the hydraulic resistance (pressure drop) at the rated/requested coolant flow rate.

A radiator has been selected with a known flow rate of coolant and pressure drop. We next need to look at our coolant pump capacity. Of prime importance is the flow available at the maximum rated engine RPM (which also corresponds to the highest heat load). Coolant pump capacity curves should be available for all pumps on liquid cooling engines. The curve for the 582 Rotax is provided in Figure 2.

Figure 2: System Hydraulic Assessment



What we see in the plot are actually several curves, one curve for a different value of engine RPM. Each curve provides the amount of flow (GPM) it will produce for a given amount of back pressure, or pressure drop due to friction (resistance to flow) in your piping and radiator. The Rotax 582 installation guide requires a minimum flow of 18.5 GPM when the engine is operating at 6,500 RPM. This will correspond to a maximum allowable pressure drop in the



coolant system of 7 PSI (as depicted by the red arrows in the plot). Pressure drops higher than this (too much restriction) will not allow enough coolant to flow through the radiator and engine to cool the engine properly.

In this case, we know that our radiator and associated piping will need to be able to flow at least 18.5 GPM with a pressure drop of 7 PSI or less. Our radiator will have a known value of pressure loss for this flow rate (hopefully less than 7 PSI). We must also estimate (or measure) the losses in the remaining portion of our piping. This estimation can readily be accomplished using guidelines from plumbing and/or hydraulic engineering resources. The brown dotted line in Figure 2 depicts a sample calculation for the pressure drop of hoses and piping as a function of coolant flow rate. If the combined total of the piping losses plus radiator loss is less than (in this case) 7 PSI, we will have a usable system. If it is higher than this value, changes must be made to the piping to lower the resistance (such as removing 90 degree elbows, shortening the length of pipe/hose or increasing the pipe/hose diameter). If all else fails, higher capacity pumps are often available, though they will require more HP from your engine to operate them.

Once things have been appropriately sized, there exist some supporting items on the liquid side that are needed to allow the system to operate smoothly and efficiently. The first is a need to vent unwanted air pockets and bubbles from the system (failure to do this would result in low coolant flow rates and hot spots). A vent tank is needed to accomplish this and is located at the highest physical point in the system. The vent tank consists of a large open section which allows the fluid to slow and release any trapped air into the upper portion of the tank (see Figure 1). Often times this tank is integral with a radiator, but if it is used in this manner the tank must be located at the highest point in the system. At the very top of this tank sits a pressure relief check valve (often called a radiator cap). This valve allows flow both into and out of the cooling system. It will allow flow out of the top of the vent tank once pressure in the system has increased to a certain value (typically 14 PSIG or so). As pressure in the system builds due to thermal expansion, any air that is residing in the vent tank is forced overboard into the expansion tank (which is open to atmosphere and under a level of water). When the system cools, the pressure decreases and will try to pull a vacuum (relative to atmospheric pressure). This will then cause water to be sucked from the expansion tank back into the system (through the radiator cap). The in and out movement of water through the radiator cap will effectively pump out any trapped air after a few cycles. The

expansion tank exists to allow water, which expands in the coolant system, to overflow into this location and keep the pressure from becoming excessive. It also serves as a one way check valve to allow air to exit the system and only water to return (provided the water level in the expansion tank stays about the drain tube inside the tank).

When operating the system it is important to keep in mind what we are really trying to accomplish. We wish to cool the engine but also wish to heat the radiator as much as possible (so it can effectively give heat to the air). So... anything on the coolant side that can create an overall hotter radiator will be of great benefit. Occasionally you may hear something along the lines "The coolant should not move too fast through the radiator, so that the radiator has enough time to cool the fluid". If we look back to our convection equations we know the faster a fluid moves, the more effective it is at transferring heat. Also, from a glance at the conduction equations we know that the greater the temperature difference across a solid material (hot to cold) the more heat we will transfer through the radiator. If we were to slow the fluid down, it may in fact become colder before it leaves the radiator, but... the radiator will also become colder and ultimately reject less heat. Along these lines, the Rotax 582 installation guide lists the normal temperature drop through the radiator as 6-9 oF. It also indicates a maximum allowable temperature drop of 11 oF! Temperature drops higher than this would cause higher thermal stresses on the engine and may also be indicative of a low coolant flow rate. So... the faster a coolant flow rate the better. Having a slow coolant flow rate will decrease heat transfer and could ultimately cause an overheat condition.

The air side installation of the radiator is much simpler at first glance, but just as important. Ultimately we wish to move as much air as possible through the radiator fins. The exit air stream of the radiator is just as important as the inlet, if not more so. It is usually an intuitive process to place the radiator in a position to effectively grab incoming air (either through a scoop or ducting). What often is overlooked however is what happens downstream of the radiator. If the air has no place to go, a well placed inlet will have little benefit. It is best to exhaust the air into a low pressure region of the outside air flow if possible. Exhausting into a high pressure region should be done with caution. If possible try to envision an air particle making its complete trip from the inlet of the airframe to the point where it exits the airframe to see if any possibilities exist to better streamline the flow.

A follow on article will look at troubleshooting an overheating cooling system.

Notes From Your Editor

*by Doug
Sterling*



Here we are in the beginning of the cold season. The snow is starting to pile up and the flying is coming to an end for we who are on unplowed airports. O-well - now is the time to do some much needed work on our steeds. Got my little Pulsar home for paint prep. Hope to get it done for the spring so that I won't have to get the abuse about my "Camo Colored" paint or lack of paint. The cold season is also the time to crack the books.

All of our "Ultralight Trainers" are now legally registered aircraft (thanks to Al Miller), and it's time for our new aircraft owners (as opposed to vehicles owners) to start work on their pilots licences. I'm going to set up a ground school for any interested students to start in February. Anyone who is interested in attending please contact me at:

edinburgnews@frontiernet.net

or phone at 863-2409. We are going to work



hard on the things needed for your practical (oral & flight) test.

Lately I've been thinking about Oshkosh. Just sent in a reservation for a car rental (if you do it early it's a lot cheaper). If there's anyone who wants to go this year, let me know. If we get together it's a lot more fun. I hope to fly if the weather isn't too bad or drive if it's lousy.

Now is also the time to write some articles for your newsletter. There are a wealth of great stories out there that everyone would like to read. Remember - this is YOUR newsletter and should be filled with great stories written by YOU. I have had a lot of positive comments about the great stories that some of you have written, but I want more articles from others to show the diversity of our membership. LET'S GET WRITING!!

Fly Safe, Doug

**The Meeting This
Month Will Be At:**

**Mark Murphy's
Hangar @ 7:00pm
on Mon. Jan. 28th**

EAA602

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Jan/Feb 2008

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