EAA602 Log Book

Adirondack Chapter Newsletter

November 2007

From The Presidents Desk

by Tim Cowper

The Fall weather this year has been no less than spectacular. Gorgeous scenery and cool, but comfortable temps have made for some perfect flying weather. We're still tweaking the Zodiac so I haven't done much flying. But I dream. In the past year, if nothing else, I have learned this very important rule: NEVER sell a perfectly good airplane without having another one that is currently in flyable condition, in the hangar. Projects are nice. We love projects. But, I will NEVER be plane-less again, at least until the nursing home.

Our trip to Albany Airport to tour the New York State Police Aviation Unit was a great success. A few carloads of us (including a group from EAA 1070!) met for breakfast at Friendly's in Latham, and then headed to the hangar. Lt. Mark Haskell then brought us through their state of the art facility, explaining everything and allowing us close up, hands on contact with some beautiful aircraft. Incredible place – our tax dollars at work! Afterwards, he told me that this was the best tour he ever did. He really liked talking to aviation people who were not only very interested in the tour, but also very knowledgeable about aircraft, building and flying. A few of us went out for lunch afterward and continued to talk about airplanes. It was a great day.

On October 17, Tony, Rick, and I made the trek down to the EAA 1070 meeting at Ed Hammerle's house. What an incredible place – planes and plane parts, and engines all over the place, and a workshop to die for. Great time with a great bunch of guys. We need to do more with 1070. There is talk of a joint meeting with the two clubs, perhaps out at Hisert's, sometime this winter. Hopefully we can work something out.

The meeting this month is important because it's election time and we need members in attendance to voice their opinions and vote for new officers. Not sure yet exactly who is running and for what office, but I know that some changes will take place. Come out and vote! Or better yet – run for office! Since it gets a little chilly after the sun goes down (after all, it is late October!) we've decided to hold the meeting in our winter home, the Edinburg Town Hall. It will take place at 7:00PM on Monday, October 29.

See you Monday!
Tim

Ps. Don't forget the Christmas Party on December 9th!

Tim

From Our VP's Desk
by Tony Rizzio

Recently a good friend of mine(call sign) Lumberjack, you might know him as the koala pilot that won't turn right. Was working on his house when the ladder fell. He says 25 ft. I think his altimeter is broken. His house isn't that high. Well anyways he ended up in the hospital with dislocated hip and 3 broken ribs. Now he can't even move and what does he think about? He calls me up to offer his plane for me to fly.

That's someone ill call a good friend.

Last week a few of us went to the 1070 meeting we got to see one of there members super workshop along with his projects a staggerwing beechcraft that must be seen .we had a great time and met a lot of very nice people, who made us feel welcome. Ed the fellow with beechcraft will be coming to get the fuselage for the little pink cloud that we are storing in bills hanger. In payment he says he will fly the beechcraft up to one of our events when finished.

This last Saturday we were given a tour of the state police aviation facility at the Albany airport great time with some of the members of eaa1070 and many 602 members we had a great time with some good friends hope you can join us on our next outing.

Tony

The Annual EAA 602 Christmas Party will be at C&R Restaurant in Galway, on December 9th at 2pm. It will be order whatever you want off the menu, and each person pays their own bill. It worked out well last year, and C&R did a fantastic job.

See you there!

Notes From Your Editor
by Doug Sterling

Well - winters coming and everyone seems to be trying to get in their last licks before the snow flies. I was up to the airport this weekend working on Daril's Hawk and was it ever busy. Seemed like everyone wanted to take advantage of some GREAT weather ether by flying or just hanging out with a great bunch of guys. I flew a few kids and just putted around a bit enjoying the view (some colors). These kind of days you really understand why we are so addicted to flying. Looking down at what has to be the most beautiful corner of the country really makes you appreciate the freedoms we have in this country. Nowhere else in the world do pilots have the freedom of the skies that we do here. I remember taking Emma's parents up for a ride a few years ago. As we passed by Glens Falls Airport they asked if I was allowed to land there. I said "sure - why not" in my own trite way. They said that in England or anywhere in Europe for that matter I would not be allowed to land at or even go near such a large airport without prior permission. Really makes you think. We as pilots need to be sure that we can keep the freedom to fly that we have here by doing all we can to not let the bureaucrats take it away. If you get an E-mail from EAA or any other organization saying to write your congressman about the goings on in Washington - DO IT. The other way we can assure our freedoms is to not abuse them. Fly safely and correctly. Don't buzz the local communitys or do dangerous things with your steeds (I'm just as guilty as anyone of getting carried away on these beautiful days). Make sure your paperwork is up to snuff, and that your plane is as safe as it can be (that I don't skimp on). These things will show that we are responsible people who deserve the freedoms we are allowed.

Enough preaching - lets get out there an punch some holes in the sky - isn't that what these machines were meant for.

Fly Safe, Doug

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ADIRONDACK BALLOON FESTIVAL

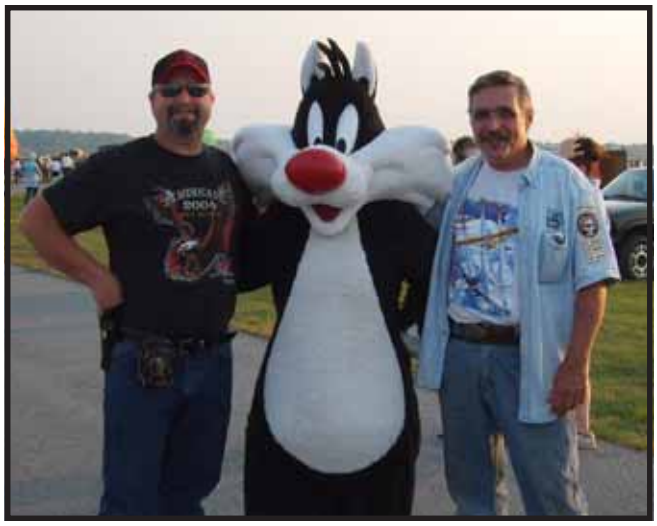
by Rick France

Towards the end of September when the leaves are starting to show the colors that make the northeast the place to be.

A wonderful thing happens at Floyd Bennett Memorial airport.

Its an air show with lots of pilots and no airplanes. How can you have an air show without planes? It's the Adirondack balloon festival. Lighter than air aircraft. My first time was last year at the beckoning of my wife. With the first launch on Friday evening I was hooked on the event. Not only do you get to be close up to the balloons but can help inflate the balloons as well. Now I thought a ride in one of these things would be cool until I watched one assembled and inflated. First off the balloon is made of rip stop nylon, the gondola or basket is made of woven wood kind of like a big picnic basket. The balloon is not fastened to the gondola by aircraft hardware but by big loops over large buttons. Then to top all this off you have a large propane tank on board and a burner that blows a very large flame up into the balloon. NOT FOR ME! But the launch is spectacular! To watch 60-80 balloons launch at once and drift across the sky is awesome. Some of the balloons go 500' up the come back down, but

some go as high as 5000' and disappear over the horizon. Each year there are thousands of people at the field to watch, Both years I have attended I seem to run into Doug and Judy, I guess great minds think alike. This year Sylvester the cat was in attendance. Sylvester was taking pictures with kids when two grown men put their arms around Sylvester for a picture. I am not so sure Sylvester was up to the task but went along with the two yahoo's for a picture. My wife and I attended all the launches and each time just stood in awe watching the balloons. There were balloons that looked like a giant beagle and balloons that were as simple as a propane tank attached to the balloon that also acted as a seat for the pilot. Next year make sure to mark your calendar for late September and join Doug, me and our wives at this spectacular event.



The Meeting This Month Will Be At:

Edinburg Community Center @ 7:00pm on Mon. Oct. 29th

Keeping your cool in the Air!

(Part I)

This is part 1, of a 4 part series dedicated to heat transfer. We continuously encounter many facets of heat transfer in our flying activities. Whether it deals with keeping our engine cool on a hot summer day, keeping our cabin warm on a cold morning or keeping airframe components from becoming excessively warm due to engine heat, (or even the sun), how we orchestrate heat management schemes has a tremendous impact on our flying experience. This series will delve into some of the basic methodology behind heat transfer mechanisms and also on practical applications and troubleshooting.

We will focus on three primary means of heat transfer; conduction - the transfer of heat through a solid object (covered in Part I), convection - the transfer of heat from a moving fluid to a solid object (covered in Part II), and radiation - the transfer of heat between objects without an intermediate medium (covered in Part III). Part IV will cover general applications and cooling system troubleshooting.

Conduction deals with heat transfer through a solid medium (or wall). (It should be noted that we do also have conduction effect in fluids [such as air or water]. This discussion will deal primarily with a 1-D solid, to aid in topic presentation). By the term heat-transfer, we mean a change in temperature of a material after it has come in contact with another material that is at a different temperature "e.g. something hot heating something cold". Envision holding a cold aluminum camp coffee cup that has just been filled with a hot liquid (such as a Bailey's and hot chocolate). You can imagine that it will only be a matter of seconds before the handle becomes too hot to hold and you have to drop the cup. Now imagine you use a traditional pottery based (ceramic) coffee cup. No doubt you could go several rounds before the handle got hot (and by then you probably wouldn't care). The reason one cup handle got hot and the other did not was a direct result of conduction, the movement of heat through the two different mediums. The aluminum has a much higher thermal conductivity rating than the ceramic, and hence will move much more heat to your hand per unit time for a given temperature difference (I.e. beverage temperature – hand temperature).

On a molecular level, temperature refers to a given atomic motion state (i.e. how fast the atom nuclei are vibrating in a given material – referred to as lattice vibrations). The higher the temperature, the faster they move. When these fast moving nuclei come in physical contact with slower moving nuclei they impact them and transfer some of this kinetic energy (the slow moving ones now speed up and the faster ones slow down). Hence the hotter medium cools a bit and the cooler is now warmer. This transfer of thermal energy will continue until a steady state situation exists. In metals, the often free electrons associated with these materials are also moved quite easily when the atomic vibrations' increase. This is one reason that materials that are good electrical conductors are often the best thermal conductors. Materials which are good electrical insulators are also typically good thermal insulators as well.

The unit used to describe heat quantities is typically the British Thermal Unit (or BTU). A BTU is defined as the amount of heat energy needed to raise 1 pound of water 1 oF. To keep this in perspective, let's consider adding heat to a gallon of water (which weighs about 8.3 pounds). If we wanted to raise its temperature 10 oF, we would need to add:

$$8.3\ lbs * \frac{1BTU}{lb\ Deg\ F} * 10\ Deg\ F = 83\ BTU$$

The ability of a material to move heat through it is known as Thermal Conductivity. Thermal conductivity is typically identified by the symbol K. Materials with higher K values can move the most amount of heat per unit time for a given temperature difference across it.

As an example let's look at four common materials; copper, carbon steel, aluminum and ceramic. A quick check of material property tables yields the following information with regard to thermal conductivity:

Material	K - Thermal Conductivity (BTU/hr-ft-°F)
Copper	232
Aluminum	137
Carbon Steel	35
Ceramic	2

It is quite apparent that the best material of this group to move heat is the copper. The 2nd best being the Aluminum etc. Materials with lower values (like ceramic) will work best for insulation needs.

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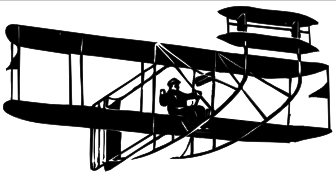
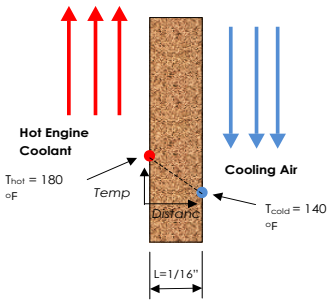


Where the actual numbers come into play, is when we need to look at how a specific system will perform when moving heat. To do this, we will invoke Fourier's Law for heat conduction. It takes the following form:

$$Q = \frac{K * A * (T_{hot} - T_{cold})}{L}$$

Where: Q = Rate of Heat Flow (Btu/hr)
K = Thermal Conductivity (BTU/hr-ft-oF)
A = Area (ft2)
Thot = Body hot side temperature
Tcold = Body cold side temperature
L = length between the hot & cold surfaces of the body.

To illustrate this, let's say we wanted to estimate the surface area needed if we were to fabricate a heat exchanger out of 1/16" (0.005208 ft) wall material. On the hot side of the material the temperature is 180 oF (from engine coolant flowing over that surface). On the cold side the temperature is 140 oF (from cooling air flowing over that surface). We have a 100 HP Rotax engine and have determined (from a heat balance around the engine) that the heat exchanger must dissipate the equivalent of 150 HP (or 381,750 BTU/hr) in order to keep the engine from overheating.



If we first look at copper as our material, we can invoke Fourier's Law to determine how much surface area we would need in order to transfer the amount of heat required. We can then look at the remaining materials to see which material (depending on cost, weight, strength etc.) will work best for our application.

We know the total heat duty, Q (381,750 BTU/hr) and the K value for copper (232 BTU/hr-ft-oF). Rearranging Fourier's Law yields the following equation for surface area:

$$Area(ft^2) = \frac{HeatDuty\left(\frac{BTU}{hr}\right) * L(ft)}{K\left(\frac{BTU}{hr\ ft\ Deg\ F}\right) * (T_{hot} - T_{cold})(Deg\ F)} = \frac{381{,}750 * 0.005208}{232 * (180 - 140)}$$

Areacopper = 0.215 ft2 = 30.85 in2

Similarly we can evaluate the remaining materials as:

Areaaluminum = 0.363 ft2 = 52.25 in2
Areacarbon steel = 1.420 ft2 = 204.51 in2
Areaceramic = 20.711 ft2 = 2,982.42 in2

The above indicates that both aluminum and copper provide for a reasonably sized heat exchanger. You would need 41% more surface area with the aluminum, than if copper was used. Copper, however, weighs 70% more (per unit volume) than aluminum. So… if weight is your primary concern (and you can spare the space) the aluminum exchanger would be your best option. If size is critical, copper may be your best choice. Other material properties (such as high impact strength) may dictate that a steel alloy is used (in which case a very large and heavy heat exchanger may result). It should be noted that these would be optimum (best case) surface area's. The designer will typically add a safety factor to account for fouling on one or both of the surfaces (such as corrosion, dirt, flow blockage etc). The above is also one of the reasons that high performance two stroke engines have gone away from the thick-steel-sleeved aluminum cylinders and now use a thin layer of chrome or NikasilTM plating on the aluminum. The cylinder now is much lighter and can also remove increased amounts of heat from the engine. (Note: The above is one thing to keep in mind when considering repairing a chrome or NikasilTM plated cylinder with a steel sleeve).

This was a very brief (1-D) introduction to conduction heat transfer. Radial heat transfer (such as across tubing) will look slightly more complex. As you might imagine, whole books have been written on the topic and are readily available. The key take-aways here are that for a given configuration, heat flow will increase for: (1) an increased temperature difference across it, (2) a decreased distance between the temperature boundaries (thickness of the material), (3) an increased value of thermal conductivity or (4) an increased surface area.

The next article will cover convection, which will provide key information on how to determine heat transfer rates from a moving fluid to a solid.

COLD WEATHER INFLIGHT HAZARDS AND TIPS

by: Technical Counselor Dave VanDenburg
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This month I would like to discuss cold weather operations by discussing some in-flight hazards and tips applicable in the winter months.

Probably the first in-flight hazard that comes to mind when we think about winter is icing. I have flown combat aircraft in a lot of areas of the world, and short of actual combat, only two things scare me in an aircraft. One is thunderstorms (which we don't see much of in the winter) and icing, which we do. If you see ice build up on your windshield or wings, change altitude or find clear air quickly. Don't be afraid to use the "E" word (emergency) to get whatever help is available from ARTCC.

If you experience a reduction in RPM (fixed pitch prop) or a reduction in manifold pressure (constant speed prop) suspect induction system icing. This could be carb ice or impact ice on your air filter. If you think you are experiencing induction system icing, apply full carb heat or select alternate air. If you have carb ice, the engine will probably run rougher (as the ice melts) but will clear up soon. I do not recommend using partial carb heat unless you have a carb air temp gauge. Partial heat may increase the carb ice problems.

If you are flying behind a constant speed prop, cycle it every 30 minutes or so to keep warm oil in the dome. A sluggish pitch change mechanism could be slow to react and result in an engine overspeed during a rapid power application. This could be real expensive (and dangerous).

Switch fuel tanks with plenty of fuel remaining in the tank. If you have a frozen valve and cannot select the full tank, you will still have enough fuel to land safely. If you wait until the engine coughs, and then find you cannot move the selector valve, you will probably call yourself a few bad names and join the ranks of those called "Glider Pilots."

Avoid power off letdowns. A high speed, idle, descent can result in very rapid cooling of your engine (shock cooling) and cracked cylinder heads. Lycoming recommends a maximum temperature change of 50 degrees F per minute. Keeping the engine leaned until you are approaching pattern altitude can also help keep your engine temps up.

After landing, run your engine at a low power setting for several minutes prior to shutdown. This also promotes slow cooling and will reduce oil cooking if you are turbo supercharged.

Lastly, I highly recommend you carry some form of survival kit. It would really stink to survive an off airport landing and then freeze to death before someone found you. Some of the things I recommend are space blankets, some duct tape, matches, an aluminum cup, knife, freeze dried coffee, tea, signaling mirror (a CD works great) and warm clothing to include a hat and gloves. Also carry a hand held radio.

These have been just a few ideas to consider when flying during the winter months. Lycoming has some cold weather tips in their book "Key Reprints." This book is available free online at www.lycoming.textron.com. Your POH is also a great source of cold weather operating tips.

Winter flying is fun and can be just as safe and enjoyable as summer, if we take a few precautions.

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