



EAA602 Log Book

Adirondack Chapter Newsletter

December 2007

Page 1



HOMEBUILDERS



From The Presidents Desk

by Tim Cowper

We had a good turnout at the October 29th meeting for elections. Starting in January, we'll have two new Board members, Brian Hurst and Larry Saupe. It's nice to see enthusiastic members who want to get involved in the running of the club. Richie decided for personal reasons to not run again for Treasurer so Doug stepped up (even though he already does an enormous amount of work with the newsletter!) and ran unopposed. The rest of the elected crew including Tony, Walt, Rick, and me, will remain in our present positions. Hopefully, working together, we can continue to improve the club. Fortunately, we have a large group of really great people willing to get involved, which is why we have the biggest and most active EAA chapter in the area!

Dave Kownack and Pat Morris have volunteered to re-build our website. Since my son Zach graduated from college, got a real job, and moved to New Jersey, he hasn't had time to help me with it and it has gotten outdated. Dave and Pat are



finding new hosting and will be constructing a new site so if you have any ideas, suggestions, pictures, etc., or better yet, if you'd like to help with building and/or administering the website please contact either Dave or Pat.

Last Saturday I flew over to Argyle Airport, in Doug's new Glastar (what an awesome airplane!) and met the great bunch of guys from UL-90. It was a good time talking airplanes with a group of friendly people who obviously love sport aviation. While I was there I met CFI Dick Bovey who will be giving many of us our Sport Pilot check rides. On Saturday November 17, 2007 at Glens Falls Airport, Dick gave a presentation on what will be expected during the Sport Pilot practical test. It covered the ground portion as well as the flying part. Unfortunately, I was not able to make it, but I was told that 17 people heard a very informative and excellent presentation. Thanks Dick, and Thanks to Brian for arranging it!

The regular meeting for November will be on Monday the 26th, at the Edinburg Town Hall at 7:30PM. There will be a brief business meeting followed by a special presentation by Tony on vacuum bagging that you won't want to miss. See you there!

Tim

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

**Edinburg
Community
Center @ 7:00pm
on Mon. Nov. 26th
Tony will do a
presentation on
Vacuum Bagging**

**Merry
Christmas**



Darryl White First Solo

After my first lesson in a C152 more than 24 years ago I finally realized my dream of flying solo. That has to be some kind of record, but it's not one I'm proud of. If I had stuck with it back then and flew 1 hour a week, I would have about 1250 hours by now. But as happens with many of us, life gets in the way of flying. First there was no money and then with young kids there was no time. When I got in the club a little more than a year ago, I had about 6 hours dual in a 152 and 5 hours dual in a S-60 Raven Balloon. I am now dedicated to making flying a way of life and I am loving it. As most of you probably know, my brother-in-law, Kevin Bartholoma (also a 602 member) and I built the bright green and black CGS Hawk Arrow II that has been in the Sky Ranch hanger since we completed it in August. Once we got it completed, Doug got her flying well and I started getting lessons from Doug soon after. We worked at it in all kinds of weather, under the cloud deck, sunny, cold, calm, and windy. Doug worked me hard! It was tough, but still fun and rewarding. Whenever I was hitting my concentration limit, Doug would sense it and let me just fly around a little to relax and enjoy the fall colors.

A couple of weeks ago we went up to fly the pattern and I was having an off day. I couldn't seem to put together a good approach on 24. I was either high or low and I spent most of final trying to recover my approaches. After 3 OK landings Doug suggested we take a break and come back to it in a while. While we were on the ground, the wind clocked around to about 5-10 out of the northeast. It looked to me that 6 would be the choice and Doug concurred. This was



the first time I used 6 and it was the first time I flew a right hand pattern, since I flew the 152 at Pittsfield. I think the break helped because everything started to click. After 3 decent approaches and landings on 6, Doug said if I was ready he was ready to let me go solo. This was it! I felt ready and I taxied over to the ramp to let Doug out. We stayed in radio contact and his encouragement helped keep my nervousness in check. Well I taxied down, turned, made my last checks, put in full throttle. I was airborne at the intersection. Set airspeed to 65-70, retracted flaps and with 200 lbs less in the airplane I was climbing at over 1300FPM! Backed the throttle down a little and reached crosswind turn and pattern altitude at about the same time.

Other than the climb rate the plane felt about the same. With the Hawk tandem setup I mostly hear Doug in the headset, unless I'm looking back to check before a turn. Well everything was going great, I could still hear Doug and that was encouraging. I was on downwind getting set for my turn to base. Looked back over my right shoulder to get a last look at 6 before the turn and it sank in that the back seat was empty. No time to dwell on that, I remembered Doug's training – job 1 is to fly the airplane. Everything looked and felt good. Turn to final and put in full flaps. With the lower weight the flaps helped get a good glide-slope. Keep airspeed around 55, rounded out, flared and touched down just short of the intersection. I had finally done it! I did 2 more and I just kept feeling better and better. That afternoon I rewarded myself with a mini cross-country lap around the lower part of Sacandaga. It was a beautiful fall sunny day and I was living my dream. I could not have gotten here without the support of the members of 602. Thanks! Now lets go flying!

From Our VP's Desk

by Tony Rizzio

Now that the elections are over, it's time to get on the ball and start figuring out where we go from here. I have a few ideas but I need your help and ideas also. Let's start with a good up to date list of members, and get a copy to all paid up club members. Then if someone is not on the list we can ask them if they still want to belong to the club, maybe they forgot to pay their dues or maybe they have another reason for not rejoining.

I would like to see us have a program or speaker

at each meeting, just a business meeting is boring. We need to keep things interesting so you'll leave your comfy couch in the middle of winter

Tim, Rick and I have been talking about something at Fulco (like Airport Days), how we could be involved or start something new, we should check it out.

I would also like to see us go out to dinner more often during the winter just so we can keep in touch. If you have any thoughts please let me know I'll listen to any idea if it will make this a better club.

As of now I think I have the KitFox sold and am still looking for an Ercoupe if you hear of anything let me know.

Tony



Notes From Your Editor

by Doug Sterling



Well another month has gone by and we have some more club happenings to report. Darryl White has been flying his Hawk a lot and finally soloed the end of October. He did a beautiful job even though he had to use runway 6 which he has not been practicing on. Good show Darryl!! His son Aaron is really wound up to join him in the air as soon as possible. Aaron has flown with me in the Hawk and has flown all 4 of my planes (boy is he hooked). Now his partner & brother-in-law Kevin has gotten the bug REALLY BAD! We're flying 2-3 days a week to play catchup with Darryl. Hope the weather cooperates for a little longer.

Chris Brown has purchased another Aeronca from down south. Now he has two to make into one. He really likes to work on planes and this will give him plenty to do.

I also hear that Ken Sherwood is almost done with the rebuild on his C-120 (hope to get a report on that at the meeting).

If all goes well, Tony will have sold his KitFox by the time you read this paper. Now he will be ready to get an Aircoupe (if he can find one).

Herb & Dave Dudley have been flying the heck out of Herb's new toy (what a beauty). I think he has put more hours on it this year than he did on the 182 in the last 2 years.

Lastly, as most of you already know, I just picked up a completed GlaStar a few weeks ago (already have 15 hours on it). What a blast. I've always wanted one since I bought the kit over 10 years ago and couldn't get the time finish it. Lots of details to work on this winter, but that's the fun of experimental.

WOW!!!! Lots been going on at 602 in the last year and it seems that it hasn't even started to subside. This is GREAT!!! We have the most active chapter of EAA in the area and we have only started. See you at the meeting on the 26th.

Fly Safe, Doug

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.

Give Tim a call if your coming. See you there!

EAA602 FLY MARKET FOR SALE

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

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





Keeping your cool in the Air!

(Part II)

by Larry Saupe

This is part 2, 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 investigate the flow of heat between a solid (such as a heat exchanger tube or fin) and a moving fluid (such as air or water). This mode of heat transfer is termed *convection*. 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.

Convection deals with heat transfer between a solid medium (or wall) and a moving fluid adjacent to (and in contact with) that wall. A good example of this would be the convection heat transfer from hot water to one side of a cooler copper plate. If you then have conduction heat transfer through the copper plate, followed by convection heat transfer from the copper plate to cooling air (convection – conduction – convection) you would have a system similar to the physical operation your engine radiator. *Note: These devices are often called a “radiators”, but they really are “convectors”. Next month we will look at radiation heat transfer and see that significant temperatures (much above cooling water temperatures) are required for any noticeable heat transfer from radiation.*

Let's assume that we wanted to cool 200 °F water with a copper heat exchanger. For heat transfer to take place, intuition tells us that the copper surface must be colder than the water, but... how much colder? And, how many BTU's will be exchanged between them for a given surface area?

A sketch of the problem is provided in Figure 1. I have drawn the length of the red arrows to represent velocity vectors (to represent a velocity boundary layer). When a flow of heat is involved, we also have a

“thermal” boundary layer. The thermal boundary layer looks very much like the velocity boundary layer. As the velocity boundary layer depicts the change of velocity from the fast free stream to the no slip condition (zero velocity) at the wall, the thermal boundary layer depicts the temperature distribution from the free stream (T_{water}) to the temperature at the copper surface (T_{copper}). The closer we get to the wall the cooler the fluid will be, until it equals the copper temperature when it touches the wall. There is a rather simple equation that explains this process, and it looks very similar to the heat conduction equation:

$$Q = h * A * (T_{\text{hot}} - T_{\text{cold}})$$

Where:

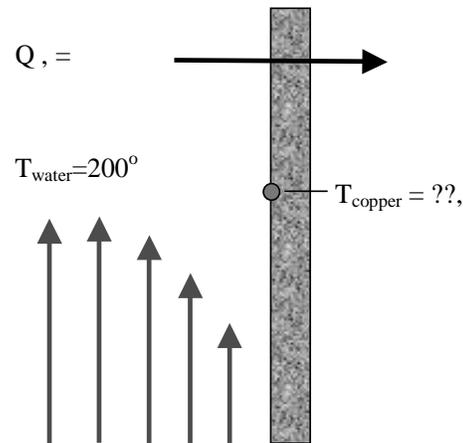
Q = Amount of heat transfer per unit of time (BTU/hr)

A = Area of the contact surface (ft²)

T_{hot} = Temperature of hot fluid (°F) T_{cold} =

Temperature of surface (°F)

h = Convective Heat Transfer Coefficient (BTU/hr-ft²-°F)



The key to this process lies in trying to determine what value to use for *h*, the convective heat transfer coefficient. One might imagine that with cold fluid at the wall and hot fluid outside the thermal boundary layer, mechanisms which increase velocity and turbulence near the wall would aid in the mixing and transport of hot fluid to the wall. This is where our old friend the Reynold's number comes into play. Higher Reynolds numbers mean thinner boundary layers and improved mixing (exchanging low momentum with high momentum fluid and also exchanging lower temperature fluid with high temperature fluid). We also need to look at the thermal properties of the fluid (such



as specific heat, viscosity and thermal conductivity). To do this we introduce another dimensionless group known as the Prandtl number. The Prandtl number (Pr) is the ratio of the viscous diffusion rate to thermal diffusion rate ($Pr = C_p * \mu / k$). C_p is the fluid specific heat (BTU/lb-°F), μ the fluid viscosity (lb/ft-hr), and k thermal conductivity (BTU/hr-ft-°F). Heat transfer fluids must have *both* good hydraulic characteristics and good thermal properties to be effective. As it turns out, water is one of the best heat transfer fluids known to man. It has very impressive heat transfer capabilities in convection (high values of h). Gases, such as air, have inherently very poor heat transfer properties in convection (very low values of h). Values of h can be calculated directly if the properties of the fluid are known (or you can simply cheat and use one of the readily available tables for convective heat transfer). The h equation generally takes the form:

$$h = C * k * Re^x * Pr^y$$

Where:

C = Geometry Constant (usually a defined length used to evaluate the Reynolds number)

k = Thermal Conductivity of the fluid (BTU/hr-ft-°F)

Re = Reynolds Number ($\rho VL/\mu$)

Pr = Prandtl Number ($C_p \mu / k$)

x = Exponent for Reynolds #

y = Exponent for Prandtl #

Note: x and y can be determined experimentally or by solving the boundary layer equations for the flow of interest. x is typically larger than y .

Luckily we don't have to actually solve the equations to get a feel for what will affect this type of heat transfer ($Q=h*A*(T_{hot}-T_{cold})$). We know that we can increase the rate of heat transfer (BTU/hr-ft²-°F) by increasing the temperature difference between the hot fluid and cold surface (or between a hot surface and cold fluid). By looking at the equation for h , we also see we can increase the heat flow by increasing the fluid velocity (which increases the Reynolds number). If neither of these provide the heat flow needed we could change to a fluid with better thermal properties (such as higher thermal conductivity or larger Prandtl number etc.). Extra measures to enhance mixing (such as adding vortex generators) can also aid significantly in

enhancing heat transfer. We often see a 50/50 mix of glycol with water in our engine cooling systems. If you work through the numbers you will see that our heat transfer capability is degraded by adding the glycol. Unfortunately we need it for freeze protection, corrosion control and lubrication.

Some typical ballpark numbers for h at moderate velocities:

Water: 200-1000 (BTU/hr-ft²-°F)

Air: 5-40 (BTU/hr-ft²-°F)

We see that air is many times worse at transferring heat than water. Because h is so low for air, we must employ a much larger surface area (than used for water) to move a given amount of heat. This is the primary reason you see much larger surface areas on the air side of an engine cooling system radiator than on the water side (typically 10 to 20 times more area).

Armed with the above, if we determined that our water side system had an h value of 800, we can readily arrive at a wall temperature for the copper (for a known surface area of our exchanger), or determine the surface area required for a given heat load if we know the temperature.

As an example: If we had a heat load of 381,750 BTU/hr and an inside surface area of 10 ft², then our copper surface temperature can be calculated using:

$$Q = h * A * (T_{water} - T_{copper})$$

$$381,750 \text{ BTU/hr} = (800 \text{ Btu/hr-ft}^2\text{-°F}) (10 \text{ ft}^2) (200 \text{ °F} - T_{copper})$$

$$T_{copper} = 200 \text{ °F} - 47.7 \text{ °F} = 152.3 \text{ °F}$$

With the hot side temperature of the copper now known we can march forward and determine the cold side of the copper temperature (using the conduction equation from Part I). Once the cold side temperature is known we can then march forward to determine the cooling air temperature required to make the system work. If the result indicated that we needed; say 20 °F air to reject the heat (and we need to actually reject this heat in say 80 °F air), we would then need to look at ways to allow the heat to be rejected at the higher temperature (such as increasing surface area, increasing the air and/or water side h values or finding options to decrease the heat load). This will be important information when design and troubleshooting is covered in Part IV.



GOTTA GET TO OSHKOSH! EAA AIR VENTURE 2008 COMING JULY 28-AUG. 3, 2008

*The World's Greatest Aviation Celebration
brings together entire flight community*

EAA AVIATION CENTER, OSHKOSH, Wis. - (Nov. 13, 2007) - There is just one event that embodies all the spirit, enthusiasm and innovation within aviation. Preparations for that event, EAA AirVenture Oshkosh - The World's Greatest Aviation Celebration - are under way once again as EAA's 56th annual fly-in convention will be held at Wittman Regional Airport in Oshkosh on July 28-August 3, 2008.

Each year, more than 10,000 airplanes migrate to the Oshkosh area to participate in the event. Whether these aviation enthusiasts fly their own airplanes and camp along the flight line, or pitch a tent in the adjacent Camp Scholler, or find their own accommodations in area hotels, dormitories or private housing, they come to AirVenture to share the pure joy and excitement of flight unmatched anywhere in the world.

"At EAA AirVenture, we often see and hear about the big events, such as the one-of-a-kind aircraft or the new innovations in flying," said Tom Poberezny, EAA president and AirVenture chairman. "But more important, in one week this is where the whole, true spirit of aviation comes together to celebrate the world of flight. That means the heritage, the pride and the vision of aviation. Each person who attends has an individual flying story. Oshkosh is the one place where all those stories come together to create a celebration

that is unmatched anywhere around the world."

In 2007, EAA AirVenture included more than 2,600 showplanes, 780 exhibitors, and nearly 1,000 forums and seminars. It also featured the introduction of dozens of new aviation products, including several new aircraft. Oshkosh is also a one-of-a-kind locale for government aviation officials to meet and hear their constituents, whose input at Oshkosh helps shape national aviation policy.

Just like EAA AirVenture, the event's website, www.airventure.org, will continue to grow as the excitement for the 2008 fly-in builds. Over the next nine months, look for added features to the already extensive video and audio presentations and interactive sections. The website also includes essential updates such as admission rates, housing, forum presenters, special attractions, and more that will help make AirVenture 2008 an unforgettable visitor experience.

"EAA AirVenture is one of aviation's most important events for business, government and education," Poberezny said. "What makes this event unique, however, is the fact that it is also aviation's annual family reunion. If you're asked to explain what EAA AirVenture is, there's only one good answer - 'You've gotta be there!'"

The schedule of events and confirmed lineup of aircraft will be announced as those items are finalized. EAA members enjoy the lowest AirVenture admission rates for themselves, their families and their guests, as well as access to camping in aircraft areas and in Camp Scholler adjacent to the flight line.

EAA AIRVENTURE OSHKOSH is The World's Greatest Aviation Celebration and EAA's yearly convention that embodies the membership's spirit of aviation. For more information on EAA and its programs, call 1-800-JOIN-EAA (1-800-564-6322) or www.eaa.org. EAA AirVenture information is also available through the World Wide Web at www.airventure.org.

EAA602

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