Pittsburgh-Butler Region Experimental Aircraft Association - Chapter 857

EAA 857 NEWSLETTER

HOPEFULLY THINKING!

THE LAST INTERNATIONAL YOUNG EAGLES DAY WE HELD,
TOO LONG AGO, JUNE 2018.
HERE IS HOPING WE CAN DO SO AGAIN IN 2021!

PRESIDENTS MESSAGE

EAA 857 Members,

We will be conducting the January meeting at KBTP in the conference room. We will conduct this via a virtual Google Meet live stream for those of you who may not wish to attend in person at the airport and Frank Szczerba or I will give you the meeting link to use prior to the meeting. Please plan to mask and distance if you attend the meeting in person on Tuesday due to Covid-19 mitigations.

A Thank You to Bob Santolla for submitting a follow on article about his hydroplane project this month!

The 2021 Chapter Officers and a new Board Member were elected to their positions at the November chapter meeting by a majority of the chapter membership present and via proxy. Current Board Members Bob Santolla and Dan Hood will continue to serve the balance of their 3 year terms. The elected individuals are:

President	Ted Merklin
Vice President	Phil Kriley
Treasurer	Frank Szczerba
Secretary	Rick Schubert
3 year Board Member	Mark Beighey

In its first meeting of 2021 on Tuesday the 12th of January, the Board of Directors affirmed its intention to award Captain Larry Schaefer with an honorary membership in EAA Chapter 857. Larry has been a long serving member and a prolific Young Eagles Pilot for the Chapter over the last 20 years. Thank you Larry and congratulations.

The Board of Directors also made a decision to cancel the annual Super Bowl Chili Cook Off that would have normally been held the week after the Super Bowl. This is due to the mitigations for the Covid-19 pandemic and the limited space available in the pilots lounge.

I recently sent out a copy of our membership roster seeking your feedback on the listed personal information. If there are corrections necessary, particularly for contact information, but also for pilot ratings, projects in work, aircraft owned etc. please let me know by return email. Thank you!

Finally, chapter dues **became due and payable on January 1, 2021**. Please bring your dues to the meeting or mail them to Frank Szczerba at his address listed in our roster.

Try to fly when you can! Please everyone take care of yourselves and your families! See you Tuesday!

Ted Merklin,
President, EAA Chapter 857

MINUTES OF NOVEMBER 17, 2020 MEETING

Opening: President Ted Merklin called the meeting to order at 19:00 and led the members in saying the Pledge of Allegiance.

Meeting Attendees: 16 members and 1 guest were present or viewing a live stream on Google Meet. This is a quorum for our business.

Previous Meeting Minutes: Membership reviewed and approved the minutes of the October 20, 2020 meeting.

Treasurer's Report: Membership reviewed and approved the current bank balances.

Newsletter: The newsletter was distributed November 15, 2020 and was uploaded also to the chapter website.

Website: Enter https://chapters.eaa.org/eaa857 in your browser to view the site.

Tech Advisor: No Report

Young Eagles: See Event Dates Below

Business:

- **Membership status:** We have 34 paid members. Alyson Collins is inactive at this time.
- **Young Eagle events:** The Board of Directors established these dates for 2021: Saturday, June 12,, Sunday, August 15,, and September 12.
- **Air Academy:** Candidate Zach Jordan is reserved 2021 Basic camp although eligible for the Advanced camp and is on a waitlist. $220 in 2019 YE Credits can apply in 2021.
- **Chapter room:** In May 2021 before the first fly-in we will need rolling carts for the transport of tables and chairs. Dan Hood suggested and offered to build them from scratch, rather than purchasing manufactured items.
- **Service Pins:** 2020 service pins were distributed to those in attendance (Merklin, Kriley, Schubert, Szczerba, Neuman, Hood, Santolla, Potts).
- **Chapter Leadership Training:** 6 evening online classes will be conducted by EAA, one each week beginning 2/11/2021. Ted Merklin has been attending the fall session this month.
- **2021 Dues:** Chapter Dues are due on January 1st.
- **Chapter Renewal:** EAA renewal dues and insurance fees are due 12/31/2020.
- **Elections for Chapter Officers:** The following officers were elected by the members present and online and via 12 proxy votes submitted prior to the meeting.

President	Ted Merklin
Vice President	Phil Kriley
Secretary	Richard Schubert
Treasurer	Frank Szczerba
B.O.D.	Mark Beighey (3 year term)

- **Adjournment:** A motion to adjourn at 20:15 was made by Phil Kriley, and seconded by Dan Hood.

Respectfully submitted,

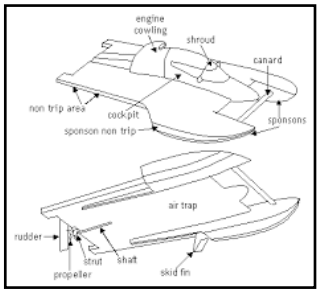
Theodore Merklin
President

FLYING OVER THE WATER

by Bob Santolla

As the winter months continue in sunny St. Augustine, FL (sorry about that Pittsburghers), I have been in my shop working on my hydroplane project and making progress. As I explained in my last article, my Pitts Special project is on hold until I return in the spring, I decided to build a hydroplane racing boat.

Hydroplanes and airplanes are very similar in their operation and many terms and concepts are shared by both. When you look at floatplanes and how the floats operate on the water you are seeing how hydroplanes work. Hydroplanes literally "fly" over the water and I would like to explain to the best of my knowledge how it works.

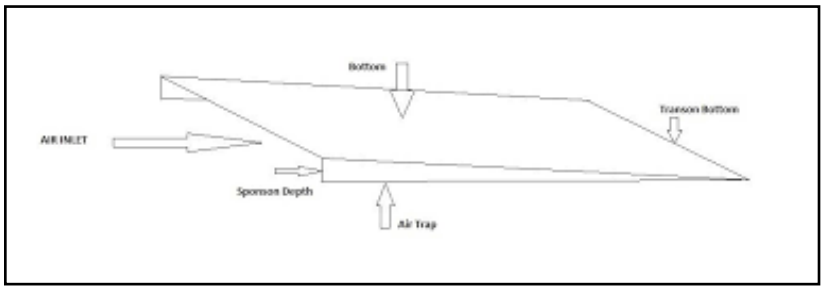


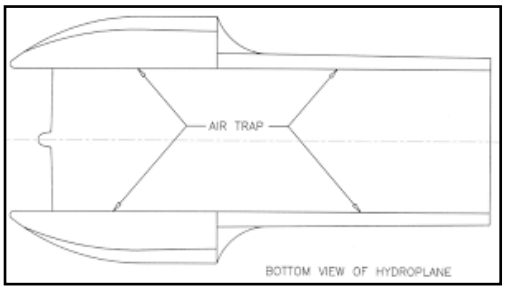
Hydroplanes are race boats designed to float partly on a cushion of air that is trapped under the hull as it moves swiftly over the water. A typical side view of an outboard hydroplane is shown. You will see outboard hydros in all sizes and shapes, but underneath they all have a basically flat center section with air-traps on either side starting at the back of the sponson and going to the transom. Sometimes the air-traps disappear at the transom, sometimes they terminate before, and sometimes they still have some depth at the transom.

Notice the front where air enters the space under the bottom and is confined by the air-traps. They are called air-traps because as the hydro moves forward, air goes into this space and gets trapped there, causing a lift on the boat. I will explain how this works and what happens to the air trapped next.

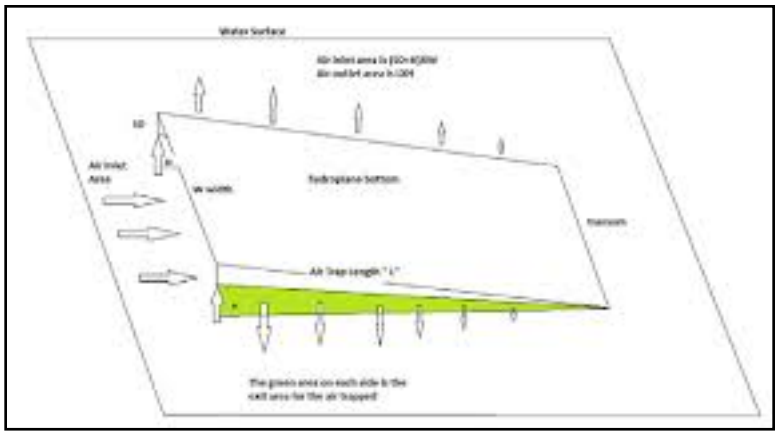
When a hydro moves fast enough the sponsons lift off the water. How high will they lift and why? This is a question every boat designer and hydro racer wants to know. If it lifts too high, it is easy to understand that it may not be too good. In the best case the boat will just be acting as a sail, pushing too much air around and in the worst case it may act as a wing... unfortunately an unstable wing. The result is the familiar "blow over" and the driver goes for a swim.

Note the air intake section and the air outlet sections. The air comes into the trap area between the sponsons and spills out under the air-traps to the sides. If the sponsons were flat on the water, the air-traps as shown here would not allow a way for the air to exit. At some speeds the air pressure trapped in this space lifts the boat, causing the sponsons and air-traps to rise off the water to a height "H". As the boat rises the exit area for the air increases until the inlet area and the exit area are the same size. The boat will then ride at this stable point, "H" inches off the water.





Air inlet size is the Width X (S.D. + H) so for a 35 inch wide bottom with 2 inch deep sponsons (S.D.), riding 1 inch high(H), the total intake area will be 105 square inches. The exit area will be the length of the afterplane (or air-trap length) times H. Say the afterplane is 65 inches, then the total exit area is 65 square inches when H is 1 inch (the exit area is 1⁄2 of 65 square inches on each side).



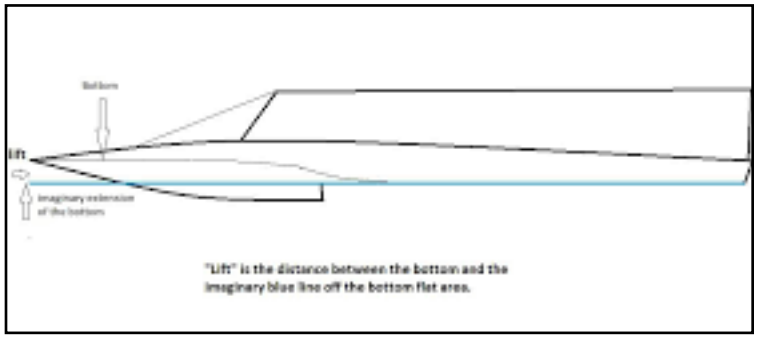
In this example, the exit area is smaller than the intake area, the hydro will continue to rise, in fact to a height of 2.33 inches. Below 2.33 inches the intake area is bigger than the exit area, so the boat rises. Above 2.33 inches the exit area is bigger than the intake area, so the boat comes down. In this example, then, the hydro rides at the stable spot with 2.33 inches of air under the sponson. At this height the intake area is equal to the exit area. Here's the equation you can play with to determine the height "H".

"H"= SDxWidth/(L-Width)

How much lifting force is created by the air trapped? Not as much as you would guess, but still a real force is generated lifting the boat. The pressure under the boat will be variable but we can estimate the maximum pressure. And by applying that number to the size of the bottom, we can get an approximate number for the lifting force of the air trapped. The maximum pressure will depend on the speed. See the table below for air pressure at different speeds. Because the actual air pressure created depends on air density, it will vary somewhat from this table with altitude and temperature. But this chart gives some good general numbers for air pressure at various speeds.

So with this information, let me get some order of magnitude of the lifting force on the air-trap area of my theoretical boat with a 35-inch wide bottom and 65-inch afterplane. This boat has 2,275 square inches of area under this air-trap section (36x65). This is a surprisingly large area, so you can see that a tiny increase in air pressure (psi= pounds per square inch) will create a real lifting force and that is what happens.

At 60 mph there could be as much as 143 lbs. of lift on that area of the boat (0.063 psi X 2275 sq inches)! The same boat going 70 mph could have 195 lbs. of lift force from this area. You can see from the chart that the faster the boat goes the more lifting force we get from the air in the air-trap space. The actual lift will be less because air is spilling out under the air-traps, but there is enough lift to at least raise the front of the boat.



Such a race boat would have a required weight of about 350 lbs, so the air under the boat is not doing all the lifting! Something else is providing about 200 lbs. of lift to keep this boat on a plane (skimming on the water surface). Some lift comes from the top of the hydro as well because it has a wing shape, but it is generally accepted to be a small number at these speeds. The rest of the lift comes from the wetted planing surface of the boat.

Speed	Air-pressure
50 mph	0.044 psi
60 mph	0.063 psi
70 mph	0.086 psi
80 mph	0.112 psi

Look closely at most hydro photos and you will see the last 12-18 inches firmly planted in the water. This part of the hull is planing and thus lifting the remaining weight of the boat up so it rides on top of the water. The speed and water at the wetted surface is providing between 1/3 to 1⁄2 psi of lift on the rear of the boat in our example. The wet area 630 sq. inches (18x35) at 1/3 psi water pressure can generate 207 lbs. of lift. So the forces lifting the hydro are shared by the air and the water. Hydros will find a balance point depending on their size, weight and speed. The higher it rides (bigger "H") more lift will be from air and less from the water.

What about the term “Lift”? Lift is a measurement from an imaginary straight line from the bottom at the transom to the front of the boat center. Lift measurement is between the imaginary line (blue line) and the bow of the boat, usually a couple inches. High- powered fast boats have very low lift while slower, lower-powered boats may have 1-3 inches. High lift tends to raise the bow sooner as the speed increases. A boat with too much lift will fly high in the front and be difficult to lower by moving your weight forward. Cutting out air-trap area usually helps this problem. Many boats have an S shape in the bottom, usually starting near the rear of the sponson. As the S shape is moved further back, a hydro will be more sensitive to driver position — and some say, more like balancing on a “teeter totter”.

Angle of attack is the angle the flat part of your boat makes with the flat water surface. There is an optimum angle where the drag is the lowest. Drag is a measure of the force it takes to move through the water. The motor generates a force to move you forward and drag generates the resistance to that force. If the drag is low, that is good and your motor will make you go faster. For example, the worst case drag is a flat surface at 90 degrees with the water. This is like pushing a flat board or paddle through the water and we all know that is not easy.

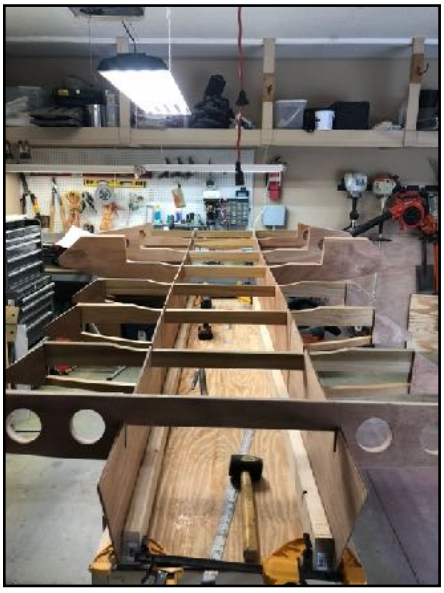
Surprising is the fact that a flat surface at 0 degrees (level or even with the water) sliding over it is not the lowest drag! This is probably due to the large surface area dragging in the water. It turns out that the lowest drag is at 3-4 degrees angle of attack.

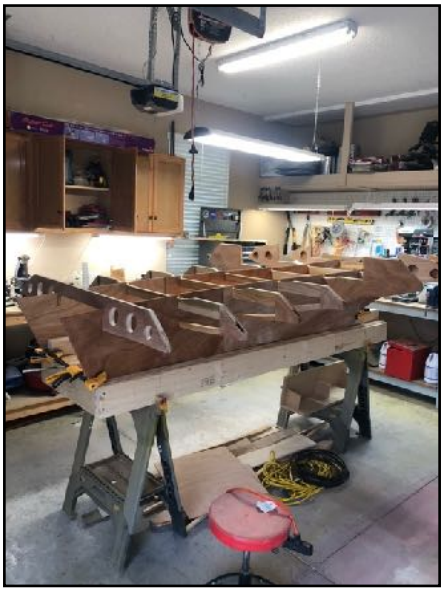
So when you see a hydro with the bow real high, packing 12-18 inches of air, you know it is not going as fast as it could. Actually, for two reasons—the angle of attack against the water is greater than 4 degrees so the drag with the water is high, and it is pushing a huge amount of air out of its path as well. So a large portion of the force generated by the motor is spent pushing air and water aside instead of making you go faster. Ideally, you want the amount of air being displaced to be as small as possible and to have your angle of attack with the water to be at 3-4 degrees.

Drag has another interesting aspect for boats and airplanes. It goes up dramatically with speed; the drag force increases with speed squared. This means the drag will increase 4 times if you double the speed. So a 7 hp motor can make a boat go about 30 mph, but in order to go 60 mph it takes a lot more than double the power. It has been said in aircraft design that if you want to double the speed you must quadruple the horsepower!

I didn’t mean for this article to be a study on boat design but to bring comparisons between aircraft and boats and the study of the dynamics which airplane designers and boat designers both share.

These are pictures of the different stages of building of my hydroplane.










The genesis of the EAA of course started with those who wished to build and fly their own aircraft (*or perhaps hydroplanes!*).

I suspect that nearly all of you should have received in your email, notice of the upcoming Homebuilders Week from EAA Headquarters in Oshkosh. There are multiple webinar sessions for you to choose from: getting started and selecting your project or kit, metal and wood working, composites, fabric covering, welding, avionics and engines, inspections and testing as well as overviews of several popular kit manufacturers. The various subject matter are presented Tuesday through Saturday 1/26-30/2021. So if you are in the midst of a project or considering beginning one, these presentations will be worth your while.

Check out the banner at the EAA Spirit of Aviation homepage: https://www.eaa.org/eaa

HOMEBUILDERS WEEK – ONLINE EVENT STARTS JANUARY 26

An online opportunity to learn about all aspects of building your own aircraft

By Charlie Becker, EAA Homebuilt Community Manager

EAA is launching a new online learning event for aircraft builders: (www.EAA.org/HomebuildersWeek). It will be five straight days of educational forums covering a broad spectrum of aircraft building topics. It will launch on Tuesday, January 26, 2021, and run until Saturday, January 30, 2021. The live online presentations will be open to everyone interested in building their own aircraft. Sessions will start at 1 p.m. CST and run until 8:30 p.m. CST daily.

This event is an opportunity for a new person to jump in with both feet and learn a lot about the wonderful world of homebuilding. We will cover areas like getting started successfully and techniques when building with sheet metal, composites, steel, and wood. But it won't be just for the newbie; we are offering in-depth talks on panel planning, engine selection, FAA certification, flight testing, and selling a homebuilt aircraft. There will be something for every builder, whether you are just starting out, knee deep in a project, or just received your airworthiness certificate — it is going to be a great learning opportunity.

EAA is working with industry experts, kit manufacturers, and other subject matter experts to provide top-notch material for builders. The sessions will be live and allow plenty of time for attendee questions. Recordings will be archived and available to EAA members for review.
The launch of EAA Homebuilders Week coincides with the 68th anniversary of the founding of the Experimental Aircraft Association in 1953. Those founding members of EAA lit the fuse on the homebuilt movement that provides affordable access to aircraft ownership and today has spread worldwide.

EAA Homebuilders Week is possible through the generous sponsorships of Aircraft Spruce & Specialty Co., Dynon, Scheme Designers, Inc., and Van's Aircraft, Inc.

Visit EAA.org/HomebuildersWeek to review the schedule and sign up for a session.

EAA 857 - Chapter Meetings and Events for 2021

Meetings are held on the third Tuesday of the month at 7:00 PM
in the Conference Room at the Pittsburgh-Butler Regional Airport.

Chapter Meetings	Tuesdays	January 19
		February 16
		March 16
		April 20
		May 18
		June 15
		July 20
		August 17
		September 21
		October 19
		November 16
IMC Club -		3rd Wednesdays, Cancelled until further notice.
EAA 857 Chili Cook Off -		Cancelled
International Young Eagles Day -		Saturday, June 12
EAA 857 Fly-In and YE -		Sunday, August 15
EAA 857 Fly-In and YE -		Saturday, September 12

2020 National Events

Sun 'n Fun -	TBD??
Sentimental Journey -	June 22 - 26
AirVenture Oshkosh 2020 -	July 26 - August 1

EAA 857 Chapter Officers for 2020

Use contact@eaa857.org to email the Chapter President.
Your request will be forwarded to the appropriate individual.

President	**Ted Merklin**	
Vice President	**Phil Kriley**	
Treasurer	**Frank Szczerba**	
Secretary	**Rick Schubert**	
Board Members	**Bob Santolla**	**2021**
	Dan Hood	**2021-2022**
	Mark Beighey	**2021-2023**
Newsletter	**Ted Merklin**	
Website	**Ted Merklin**	