

March **2023** Volume 1, Issue 6

CAVU Chronicles

BYE AEROSPACE and the All Electric eFLYER

On Saturday, May 13 we will be hosting a presentation on the "Future of Electric Aircraft." This will be facilitated by Mr. Roderick Zastro who is the Director at **Bye Aerospace**. This company is the designer and manufacturer of an all-electric airplane, the eFLYER. Leading up to our May meeting, I thought this month's newsletter would be a good platform to provide some background information about this evolving technology and the company behind this endeavor. In this two-part series, I will address the following.

1. What do we know about Electric Aircraft?

2. Who is Bye Aerospace and what is the eFLYER

Since our chapter members are more closely aligned to general, experimental and sport aviation, this will be the focus for the first topic. Information about tilt rotor, eVTOL pilotless aircraft and the commercial passenger, freight/air cargo transportation and military markets will be excluded here.

A LOT has been published about using electric motors as a means of propulsion. A plethora of articles can be found in the AOPA journal.¹ One in particular dates back to 2014 when a familiar name...Pipistrel, and their Alpha Electro program, introduced their new 2-seat concept design electric trainer, the WATTsUP.² Seriously...I am not kidding you. It reported an 85 kW (approx. 113 horsepower) electric motor. The battery pack could be charged in an hour which produced enough energy to "fly one hour with a 30-minute power reserve."

In 2020, Pipistrel became the "first in the world to certify its Velis Electro, an all-electric aircraft," under European Union aviation regulations.³ Two years later, Pipistrel became the centerpiece of Textron's new electric aviation division. Textron is the parent company for Cessna, Beechcraft and Bell. The Velis Electro does fly in the US, but only under an Experimental Airworthiness certificate.

Other company names in this niche include Rolls-Royce, Tecnam, Zenith, Flight Design, Diamond Aircraft, Sonex Aircraft, and Bye Aerospace.

(Continued on Page 2)





In this issue:

- Electrification of Aircraft
- Aviation History in Brainerd, MN
- Longster Project
 Update
- Carbon Monoxide
 Poisoning
- The 'LightAir' Side
- Mark Your Calendar

So...why electric aviation? There are those who contend...if it ain't broke, don't fix it.



One primary reason cited; RELIABILITY. Electric motors have fewer moving parts, and therefore...fewer failure modes and lower chance of mechanical failure. This lends to maintainability. The time-between-overhaul is...unlimited. There are no hoses to leak, & no oil to check, drain and change. There are no fuel pumps, fuel filters, concerns with the right grade of fuel, carburation, air filters, lean or rich mixtures, need for carburetor heat or the risk of fuel contamination.⁴

The debate of changing from low-lead to no-lead gasoline goes away.

And it is not just fuel delivery that makes the internal combustion engine work. In addition to duel fuel pumps, you also need dual spark plugs and dual magnetos.

Electric motors provide consistent power independent of altitude and air temperature. The weight of "electric fuel" is always the same, so the useful load of the aircraft does not change.

Electric motors are quieter and generate fewer emissions. In fact, emissions reduction is a major driver of implementing electric aviation worldwide, particularly in the regional travel markets.⁵

The efficiency of electric motors, when converting their fuel to energy, is reported to be up to 95% efficient compared to 18-23% efficiency for regular plane engines. Much of this difference is attributed to the amount of energy generated by internal combustion engines in the form of heat. This means cowling designs do not need to manage airflow for keeping the engine cooler. Therefore, more aerodynamically efficient cowlings can be employed.⁶ There are challenges, of course; the biggest in electric propulsion is energy storage. The "energy density" of liquid aviation fuels is approximately 80 times greater than that of a battery. Despite improvements in battery technology, they are heavy. Those used in airplanes are even heavier.

This currently lends to the range of electric airplanes to be comparatively low...about 100 to 250 miles, which is quite impractical for most crosscountry flights.

Another consideration is weight & balance. During pre-flight, the amount of liquid fuel to take aboard can be metered to compensate for density altitude situations. While enroute, as a plane's liquid fuel is consumed over the duration of a flight, the aircraft becomes lighter, and therefore "more efficient" to fly. This can be an advantage when the destination is at a higher density altitude airport. The electricfueled aircraft, on the other hand, will be the same weight from start to finish.

And then there is the issue of Recharging.

From what we have learned about e-vehicles, this will create a variety of infrastructure challenges, particularly the availability and efficiency of recharging stations, at airports & FBO's, which are currently not prepared to support refueling electric airplanes.⁷



Recharging (refueling) times are longer. Even if there were electric charging stations every 100 NM along your intended route, you would need 1-3 hours to recharge before you can take off again to the next recharging station.

As of today, the FAA rules prohibit electric motors in light sport aircraft. (Continued on Page 3) References for the article on Pages 1, 2 & 3:

- 1. See https://www.aopa.org/ news-and-media/news-bytopic/power-and-fuel/ electric
- 2. Horne TA. "Pipistrel Introduces Electric Trainer." *AOPA*. August 27, 2014.
- 3. "Future Flight: Electric Trainer Certified. *AOPA*. October 1, 2020. See https://www.aopa.org/ news-and-media/allnews/2020/september/ flight-training-magazine/ future-flight-pipistrel-velis
- 4. Berman E. "Technology: Current Affairs. The Future is Bright for Electric Aviation." *AOPA Pilot*. May 1, 2021.
- Schwab A, Thomas A, Bennett J, et.al. "Electrification of Aircraft: Challenges, Barriers, and Potential Impacts." *National Renewable Energy Laboratory, US Department of Energy.* October 2021.
- 6. Ibid.
- 7. "The Good, the Bad and the Ugly about Electric Aviation. *EcoFriend*. *June 27*, *2020*.
- Moore J. "Electric Aircraft Stretch Solar Legs, Training Delayed. California Fleet of Four Awaits FAA SLSA Approval." AOPA. August 12, 2021.
- 9. Johnson D. "Proposed changes to LSA delayed." *General Aviation News*. August 7, 2022.

Aircraft like the Pipistrel Alpha Electro are currently being used by instructors in Europe and Australia for teaching students to fly. It is believed the roadblock to FAA approval in a Light Sport category comes down to the word, "reciprocating." That is an unescapable part of what defines a light sport aircraft in the FARs; having a reciprocating engine."

In February 2021, Joby Aviation, a well-funded start-up seeking to bring electric Vertical Take-Off & Landing aircraft to market announced that the FAA has agreed to modify the Part 23 certification process to allow for eV-TOL certification.

According to Joseph Oldham, "Approving an electric LSA may take a little longer. [He] said the FAA Modernization of Special Airworthiness Certificates (MOSAIC) project, a major overhaul of LSA regulations, might include striking 'reciprocating' from the definition—perhaps sometime in 2023."⁸

However, it was learned during AirVenture 2022 that the MOSAIC project was "restructured" by separating their charter between crewed and uncrewed (Drone) aircraft. Because of this organizational change, it will take another year before the FAA is ready with MOSAIC for only crewed aircraft."⁹

Part Two, on Bye Aerospace, will appear in the April newsletter.



Don't forget...ICEPORT 2023 is SATURDAY, March 4.



...and the SKI PLANE and WHEELS FLY-IN March 18th from 10 am—2 pm, for a no-charge chili feed and hot dogs sponsored by AITKIN EAA CHAPTER 965. Contact Trudi Amundson at trudiamundson@yahoo.com

THE BEST AND THE WORST OF TIMES

By Mike Petersen

The "Roaring 20's" continued to be the best of times economically and for the growth of aviation. Dozens of aircraft manufacturers sprang up and began building and selling aircraft. Every day new records were set and provide several the house to broken for distance flown,



broken for distance flown, endurance and speed. With the proliferation of aircraft both private and for passenger transportation, the calls for Brainerd to have a full fledged airport were getting stronger and stronger. Adding fuel to the fire was the fact that other communities in the area were either planning or building an airport. On top of that pressure, the government was in the process of laying out a network of Air Mail routes

and communities everywhere were applying to have their airports on the routes. Brainerd was falling behind. Already in 1926 the Brainerd Dispatch was sounding the alarm: "A new airmail route is being planned from Minneapolis to Winnepeg and with characteristic vigor, Bemidji is seeking to be a point on the route...What, may we ask has been done in Brainerd about being placed on this airmail route?"

Another editorial suggests "The time is coming when Brainerd Lake Region visitors will fly here from Chicago, New York, St. Louis, Miami and other large cities. They want decent accommodations. They want air service. Little Falls is busy in this regard and many other Minnesota towns that have not as large a population as Brainerd."

In May of 1929 Brainerd city leaders attended the grand opening of the St. Cloud airport, meeting with representatives of Northwest Airways. They were told that Brainerd was under consideration as a stop on the Minneapolis to Fargo route. The selection of Brainerd would be contingent on the safety and usability of their airport. And so, the push was on to improve Rosko field and procure for Brainerd an airmail route and a stop on passenger routes.



Intended to raise public awareness of the need for an airport, as well as increase pressure on city leaders the idea of an "Airmeet," was planned. Mr. J.O. Engel of the Northwestern Aeronautical Promotion Association was put in charge of the event. A rather sponsor unusual stepped forward in the persona of the Brainerd Ladies Band. This group was well known and was,

Brainerd Ladies Band Mn. Historical Society

as they were called, "air minded," very supportive of a new airport. The first mention of an Airmeet in the Brainerd Dispatch was on June 27, 1929, less than a month before the event was to take place on July 20th and 21st. The businesses and the citizens of Brainerd would rally to be a part of the event and it grew rapidly. THE BRAINERD DAILY DISPATCH

AIR MEET KEEPS ON GROWING IN INTEREST

Within days assurances were pouring in from people wanting to fly into Brainerd to be a part of the show. Northwest Airways committed to bringing in a Super Tri-Motor for display and to provide rides for the crowd. Piloting the Tri-Motor would be a long time Brainerd pilot, Walter Bullock. Northwest Airways also promised a show from famous stunt pilot Charles "Speed" Holman. Holman was famous for his world record of 1,433 consecutive loops in 1928 and was also Northwest Airways first pilot hired in 1926. The Brainerd Dispatch reported "Speed Holman, outside of Col. Charles A. Lindbergh, has the greatest drawing power of any aviator. His acceptance of the invitation to be at the air meet in Brainerd starts off preparations with a bang." Well know parachutist George Babcock, famous for his "Delayed Opening" parachute jumps would be jumping at the event.

In a novel twist, Miss Brainerd, Margaret Anderson would be delivered by a Northwest Airways Trimotor to the airmeet. Miss Brainerd was selected by the State Fair Association as Miss Minnesota 1929 shortly before the event. This was recreated in 2013 when the EAA Ford Trimotor visited Brainerd as 2013 was only the second time that Miss Brainerd was selected Miss Minnesota.

Leading up to the airmeet there were almost daily updates as to who was coming to the show and what kind of aircraft would be attending.

The Dispatch jumped on the opportunity to sell advertising with the "Air Minded" message. The newspaper even crafted what they called a "popularity contest" which actually was an Airmeet ticket pre sale contest. First prize was a round trip flight on a Northwest Airways Tri-Motor from Minneapolis to Chicago. The first prize was claimed by H. A. Phillips of Brainerd with 657 tickets sold. Second prize was won by a Ladies Band member, Miss Florence Butcher, and she will bus to Minneapolis, climb aboard the Tri-Motor and return to Brainerd during the airmeet. Advance tickets to the airmeet were 25 cents each.

Preparations were nearly complete. Even the roof of the watertower was painted with six foot letters BRAINERD and an arrow pointing to Rosko field two miles to the south. One of the states largest merry go rounds was assembled at Rosko, the mayor and others will be speaking with a microphone and amplifier system, very rare in 1929. Kids will have a kite flying contest, Howard Melany, the "Singing Fireman" of the Northern

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Pacific will perform, and of course the Brainerd Ladies Band will be playing much of the two days. Clearly the airmeet had grown in proportion!

All preparations done, the show was ready to start!



some 24 airplanes had assembled for the airmeet and as promised did not disappoint the nearly 18,000 people that attended. Imagine a crowd of that size in the community of Brainerd with a population of slightly less than 10,000! It seems that the event had grown beyond anyones expectations. The cross section of airplane types and brands must have been wonderful to see. Planes

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attending were a DeHavilland Moth, two American Eagles, two Travelairs, two Navy and two Army planes, four Waco's, a Velle Monocoupe, an Eaglerock, a Curtiss Robin, a Curtiss Jenny, a Fairchild Cabin Monoplane (on floats), a Command Aire, and the Waco Taperwing of Speed Holman. While most aircraft were from Minnesota, aircraft came from as far away as Kansas City and Winnipeg, Canada. Balloon busting winners were pilots from Wahpeton ND, St. Paul, and Baudette. Northwest Airways generously gave Tri-Motor rides to

Northwest Airways generously gave Tri-Motor rides to the winners of the kite flying contest, and all of the ladies from the Brainerd Ladies Band, sponsors of the event. They also gave rides to all the Boy Scouts helping out for the event, the Mayor, Chief of Police, Sheriff, and other dignitaries, as well as bringing Miss Minnesota to the program. While all of the other entertainment made for a fun day, the highlight of the day was stunt flying, and the headliner was Speed Holman. Making the flight from Minneapolis to Brainerd in 40 minutes flying his gold and black Waco Taperwing, Holman arrived Saturday early evening. He approached Rosko field at about 100 feet, rolled upside down and flew that way for about two miles. Returning to Rosko, the Dispatch reported, "Various planes stunted, but the chief attraction was Speed Holman who went through his whole category of air tricks, flying upside down hanging by his belt, made inverted spins, loop, glide etc. "With the success of such an event, Brainerd was introduced to aviation.

But do you remember the stated purpose of the Airmeet was to demonstrate the need for an airport in Brainerd. While the event was a success beyond expectations in entertaining the citizens, other roadblocks to an airport loomed on the horizon. The stock marked collapse in the fall of 1929 and the looming war in Europe dramatically affected the aircraft industry as well as everyday life. Support for building an airport continued, however it would be nearly two decades before the City of Brainerd and Crow Wing County collaborated to build a suitable airport for the Lakes Area.

The Roaring 20's came in with the best of times and left with what may have been considered the worst of times.



Ford Trimotor - N.W. Airlines History Center

EAA CHAPTER 1610 LONGSTER PROJECT: STATUS REPORT

You have three guesses as to what the Longster Crew worked on in February. Time's up!! If one of your answers was 'reinforcement tape' then you know the process. Our attention was put towards the curved edges of the tail structures using the biased bias-woven tape. I am optimistic that we will have these components done before the end of March. Customization of the engine and the engine cowling resumed, as well. The photo to the right shows where we are starting from. This most recent image in the lower left shows our progress to date. Since it will become a static display in the Brainerd Airport Terminal building, it does not have to run. However, it still needs to look authentic.

There IS one other progress report to boast about. The fabric covering for the fuselage has been completed! You may recall the first piece of fabric was applied on Wednesday August 4th, shown in the photo below. We're making progress!!

Next: The wings.





Begin with the end in mind.





For those who wish to help with this project, we meet at Paul's the first and third Thursdays of every month, starting at 6:00 pm. Paul's shop is very spacious and well-equipped to accommodate this endeavor. Please feel free to join us for the camaraderie and educational opportunity to learn new skills.



This photo of a 1930 Long Longster III (N10115) was taken at the Western Antique & Automobile Museum (WAAAM) in Hood River, Oregon by Terry Fletcher. (Photo ID: AC775058)

https://www.waaamuseum.org/

A SHORT PRIMER ON CARBON MONOXIDE POISONING

Aviation fuel contains carbon and is a ready source of carbon monoxide when burned. Expect carbon monoxide whenever an internal combustion engine is operating. Even though piston engines produce the highest concentrations of carbon monoxide, exhaust from turbine engines could also cause carbon monoxide poisoning.

Carbon Monoxide (CO) is a colorless odorless tasteless gas that is deadly. To understand why, here are some terms used in this short article.

Hypoxemia: This means reduced oxygen in the blood. **Hypoxia**: This means reduced oxygen in the tissues.

Hemoglobin: This is a protein in our red blood cells. It is the primary means in which the blood transports oxygen to the tissues. When oxygen becomes "combined" with hemoglobin, it causes the blood to turn "cherry" red.

Dissolved Oxygen: Oxygen molecules are also transported in the blood in a dissolved state. It is similar to how oxygen is dissolved in water; it is where fish get their oxygen. However, the amount of dissolved oxygen in blood is miniscule compared to oxygen carried on hemoglobin.

Cyanosis: This is the bluish discoloration of the skin that occurs when a person suffers hypoxia. It can also be detected in our nailbeds and our lips.



Carbon Monoxide can be deadly for the following reasons. First...hemoglobin has an affinity (or attraction) for CO that is 210 times greater than for oxygen. This causes the victim to begin experiencing hypoxemia, which quickly leads to tissue hypoxia. Second...despite having hypoxia, the victim does NOT exhibit cyanosis!

This is because the CO-Hemoglobin complex produces an even brighter cherry-red color in the blood. Their skin, lips and nailbeds will be very red. The person suffering from CO exposure can be fooled into thinking they are getting plenty of oxygen. But they are not.

What are other symptoms? Low levels of CO in the blood causes headaches, nausea, confusion and fatigue. Prolonged exposure causes symptoms to worsen. If the level of CO continues to increase in the blood, the victim will lose consciousness.

What is the treatment? It depends on the severity of the symptoms. The thing to remember is the hemoglobin is all "bound-up" with CO; it does not go away quickly. Therefore oxygen therapy is focused on getting greater amounts of DISSOLVED oxygen in the plasma. This can be accomplished with the patient breathing 100% oxygen. If the degree of CO poisoning is more pronounced, hyperbaric oxygen therapy is recommended.



There are numerous reasons why a pilot might experience a headache, or confusion, even nausea while flying.

I have been noticing articles about pilots experiencing these symptoms and discovering it was due to exposure to Carbon Monoxide. I have also noticed ads and promotions for aircraft cockpit CO detectors.

I hope this short primer was helpful in understanding their importance.



For additional information on Carbon Monoxide Poisoning, go to the following resource from the Mayo Clinic. See

https://www.mayoclinic.org/ diseases-conditions/carbonmonoxide/diagnosis-treatment/ drc-20370646

ON THE 'LIGHTAIR' SIDE: 🛛 🍋

Some German ground controllers at Frankfurt Airport can be shorttempered. They not only expect one to know one's gate parking location but how to get there without any assistance from them. So it was with some amusement that we (a PanAm 747) listened to the following exchange between Frankfurt ground control and a British Airways 747

(call sign "Speedbird206") after landing:

Speedbird 206: "Top of the morning Frankfurt, Speedbird 206 clear of the active runway."

Ground: "Guten morgen! You will taxi to your gate!"

The big British Airways 747 pulled onto the main taxi way and slowed to a stop. **Ground:** "Speedbird, do you not know where you are going?"

Speedbird 206: "Stand by a moment ground, I'm looking up our gate location now."

Ground (with some arrogant impatience): "Speedbird 206, have you never flown to Frankfurt before?!?"

Speedbird 206 (coolly): "Yes, I have, in 1944. In another type of Boeing. I didn't stop."





Did you know...



A rubber band is an extremely capable engine for an aircraft, and the science of torsion motors for model airplanes has progressed at the same amazing pace as gasoline and jet engines in real airplanes.

In 1909, as Wilbur and Orville Wright were coming home from a triumphant tour of Europe, the American record for distance flown with a rubber bandpowered airplane was just over 200 feet.

In 1916, as World War 1 was at its height, Thomas Hall if the Illinois Model Aero Club flew a model 5337 feet — over a mile!

In 1924, just a few years before Lindbergh flew the Atlantic, Robert V. Jaros (also from the Illinois Model Aero Club) flew a model 7920 feet in 10 minutes and 14 seconds.

Today, model airplanes in the competitive F1D class can fly for more than 40 minutes.



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The F1D is a class of delicate, lightweight, slow-flying, longduration (over 30 minutes) rubber-powered aircraft designed to be flown in a large indoor space.



Example of an F1D



DID YOU KNOW ...?

An easy and convenient way to keep up-to-date on scheduled Chapter 1610 meetings, events, and other aviationrelated programs is our Website.

First, open your web browser and type in **#eaa 1610**.

Once you open the website, select the tab **Event Calendar.**

The rest is easy.



EDIT YOUR CALENDAR

See the highlights below in **RED** for what has been added or rescheduled for Chapter 1610 meetings and events.

March 11: Regular Meeting

April 15: Regular Meeting & **Presentation on "Medical Issues & Updates" by Dr. Walt Roberts**

May 6: BREEZY POINT FLY-IN

May 13: Regular Meeting & **Presentation: The Future of Electric Aircraft, by Roderick Zastro, Bye Aerospace.**

May 20: YOUNG EAGLES FLIGHTS, Brainerd Airport

May 27: BRAT STAND FUNDRAISER at Crosslake Ace Hardware

May 28: BRAT STAND FUNDRAISER at Crosslake Ace Hardware

June 3: EAGLES FLIGHTS for Adults, Brainerd Airport

June 10: Regular Meeting and CPR/AED REFRESHER TRAINING

July 8: PINE RIVER AIRPORT OPEN HOUSE

July 19: HANGER 60 PARTY

September 9: POKER RUN No regular meeting this Saturday September 16: YOUNG EAGLES FLIGHTS at Breezy Point



CLOSING REMARKS

A special THANK YOU goes out to Trudi Amundson for facilitating her WINGS-Certified presentation "Take-Offs & Landings" at our February meeting. A summary can be found on the website under the EDUCATION tab.

I am still interested in hearing your suggestions for future topics in the Newsletter. I also encourage budding authors to submit content. Please contact Mark Bearss

- email to <u>mgbearss@gmail.com</u>
- Text to 952-818-9986

And finally, the contact information for Chapter 1610 has changed.

- The new email address is eaachapter1610@gmail.com
- The new phone number is (320) 232-5122