

A P R I L 2 0 1 8

EAA Chapter 25

# ON FINAL

MINNEAPOLIS/ ST PAUL, MN

## “Flight Lines”

- from Mike York  
EAA Chapter 25 President

I would like to thank everyone for sending your photos to me and stepping up to present your project at the March meeting. This really made the meeting a success. Most of us are familiar with the Pietenpol build group and the more recent Zenith 701 build group. Both groups regularly see 8 to 15 chapter members participating. It was enlightening to see the other projects under construction. Homebuilding is truly alive and well in our chapter. Keep cutting, gluing, wiring, bucking, and whatever it takes to complete your project. A heavy dose of perseverance is required.

I made my last flight on skis in late March as winter has not let go yet. I wasn't expecting ski conditions in April. It has been a long winter and I'm ready for spring



and good flying weather. I hope to do more flying this year and more group flyouts for our chapter.

This month's presenter will be Don Leedham. Don built an Avid Magnum with straight floats specifically for flying to Alaska and the Northwest Territories for hunting and fishing. Don has flown these trips many times and will discuss the planning necessary to take these trips on straight floats as well as share photos and experiences.

<i>President</i>	<i>P1</i>	<i>Minutes</i>	<i>P2</i>	<i>Young Eagles</i>	<i>P2</i>	<i>Ignition/ tachometer</i>	<i>P3</i>
<i>Trivia</i>	<i>P5</i>	<i>For sale/wanted</i>	<i>P5</i>	<i>True Love</i>	<i>P6</i>		

***EAA Chapter 25 Meeting Minutes  
21 March 2018***

The meeting was called to order by Chapter President Mike York at 7pm at BSAEC, KLVN. Craig Nelson led the Pledge of Allegiance. Treasurer: Absent.

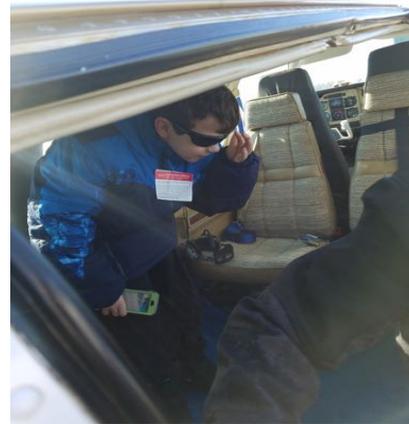
Young Eagles: Kris Olson. Flew 9 YE on Saturday. Pilots were Mark Kolesar and Alan Knutson. 20-25 scouts coming in May. Contact Kris if you can help with ground crew. Girls in Aviation Day Sept 22nd at KFCM. Aviation Explorer group is starting up again Mar 29th at Modern Avionics at KFCM. Drone Day: Kris Olson. Chapter 25 has a booth reserved at the MN Drone Day event on May 5th 11am-3pm at Black Hawk Middle School, 1540 Deerwood Dr, Eagan. Sign up to help. Log Cabin Airport: Kris Olson. Log Cabin Airport is open. Judy Ohm will be at OSH this year. The September Log Cabin Fly-in is planned.

The chapter is has a 1977 EZ Riser kit with a MAC 101 engine for sale. \$1500 obo. Contact Mike York or Jim Fischer to submit an offer. Program: Member aircraft project updates. Respectfully submitted,  
Ned Lebens - Secretary



***Young Eagles Update  
By Kris Olson***

EAA Chapter 25 flew 9 Young Eagles on Saturday, March 17th. The weather was nice, light winds and the temperature was in the 30s. Our pilots were Alan Knutson and Mark Kolesar. Our ground crew were Ron Hoyt, John Koser, David Olson, Jim Henry, and Kris Olson. We are always looking for pilots and ground crew that want to help with our events. Let me know if you are interested



**Upcoming Aviation Events**

***Some web sites to find local aviation events:***

<http://www.dot.state.mn.us/aero/events/flyins-and-events.html>

<http://wisconsin.gov/Pages/doing-bus/aeronautics/trng-evnts/flyins.aspx> ,click on a month to download the Wisconsin events calendar.

<http://www.socialflight.com/event-planner.php?id=cqlymi>

## Hall effect Tachometer Pickup for Kettering Ignitions By Ned Lebens

The standard setup for a Corvair flight motor following the William Wynne conversion ([flycorvair.com](http://flycorvair.com)) is to use a Kettering ignition system with two ignition coils and two sets of points for redundancy. Only one coil and set of points is powered at any given time via a double-throw center-off toggle switch in the cockpit. Flipping the switch one way powers coil / points set A. Flipping the switch the other way powers coil / points set B. Centering the switch turns off both ignitions. The high voltage outputs of the two coils are passed through an automatic coil selector (e.g. MSD 8210) before being passed on to the distributor.

William discourages connecting a tachometer directly to the ignition coil or points, as is standard practice on an automobile, because a problem with the tach or wiring could disable that ignition. It's a reliability issue. There is also the problem of how to connect two coils to one tachometer. He instead uses a magnetic gear tooth sensor aimed at the starter ring gear. By doing this, the tachometer signal is isolated from the ignition circuits and works no matter which ignition coil is being used. However, this requires a tachometer that can interpret approximately 130 pulses per crankshaft revolution (one pulse per tooth on the starter ring gear), verses 3 PPR (the Corvair is a six cylinder) if using the ignition coil. Some tachs designed for diesels can do this, and actually have a more appropriate RPM range for aircraft (e.g. 0-3500RPM) than most tachs meant for gas motors, but they are a bit more costly. Also, there is some complexity associated with mounting the gear tooth sensor at the front of the engine with the appropriate air gap from the ring gear, and wiring back to the cockpit.

I'm experimenting with another method. Because of the way that Kettering ignitions work, the RPM information that the tachometer needs is already "encoded" into the current that is flowing through that toggle switch in the cockpit mentioned earlier. When the points close, the current in the coil primary and switch builds from zero up towards a steady state value of 3 to 4 amps on an L/R time constant. When the points open, the primary current transitions quickly to zero as the secondary (high voltage side) takes over and makes the spark. Why not read the current through the wires leaving that switch, translate it into a string of pulses, and feed that to the tachometer? That toggle switch is going to be only a few feet at most from the tachometer, making wiring easy.

The problem now is how to read the current in the two coil primary wires without disturbing the ignition circuit by electrically tying into it. It turns out that current flow has an associated magnetic field. The strength of that field goes with the magnitude of the current. More current, more field strength. That's where the Hall effect comes in. A Hall effect sensor translates the strength of a magnetic field into a voltage. In my case, the sensor I chose outputs a voltage that is proportional to the strength of the field that it sees. Now, if I couple the field around the wires into the Hall effect sensor, filter the output signal, and compare that signal to the average value of itself, I'll get a square wave that I can feed to a tachometer (or to a tachometer input in the case of an engine monitor). Cont.

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(Continued from pg 3)

The magnetic coupling to the Hall effect sensor is done by passing the wires that leave the ignition switch (headed to the + terminals of the ignition coils) through a ferrite toroid with a slot cut in it for the hall sensor. The toroid acts as a flux concentrator, increasing the flux density (Teslas) that the sensor sees, making it more sensitive. The toroid could be any practical diameter, but I chose 22mm O.D. as I wanted one with a hole large enough to pass two 10AWG wires with ring terminals already crimped on. Since the primary wire of each coil is passed through the toroid, the unit will output a tach signal from either coil.

Following are some images of the prototype tach pickup printed circuit board. The ferrite toroid (blue) and hall sensor (black object in toroid gap) are visible in Fig 1. The opposite side of the circuit board holds the rest of the circuitry, as seen in Fig 2. The three wires exiting the board are +12V power, 0V (common), and the tachometer signal output. The circuit was designed to fit into the plastic box as shown in Fig 3, which has yet to have a hole drilled in the center for the primary wires. The remainder of the box will be filled with potting compound to seal the unit. A bracket needs to be fabricated to mount the unit on or near the instrument panel.

Fig 4 is an oscillograph of the current in a primary wire passing through the tach pickup (Channel 2, bottom trace, green) and the corresponding square wave output of the tach sensor (Channel 1, top trace, black) at 50Hz (1000 RPM). Fig 5 is the same except the frequency of the spark has been increased to 150Hz (3000 RPM). As an aside, notice how the peak coil current drops off from 2.44A in Fig 4 to 2.24A in Fig 5 as RPM picks up, since the coil current has not had time to reach steady state at the higher frequency.

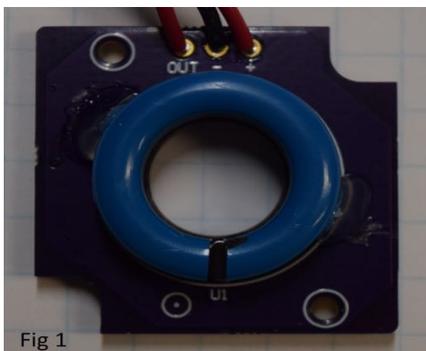


Fig 1

(Continue on pg 5)

# On Final

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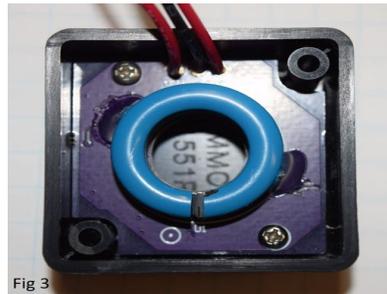
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(Continued from pg 4)

Trivia by John Schmidt



WWI Royal Flying Corps Lieutenant Charles George Gass was a multiple ace, with 39 victories, but he was not a pilot. How did Gass get his kills?

(Continued on pg. 7)

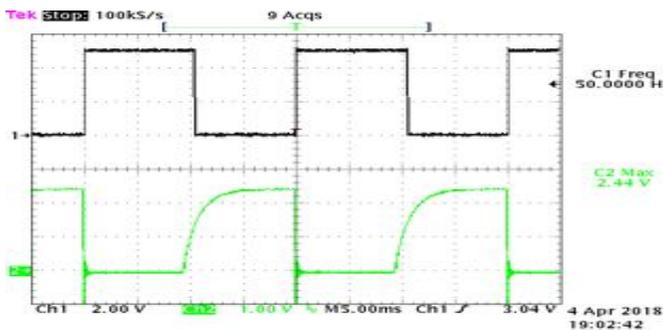


Fig 4

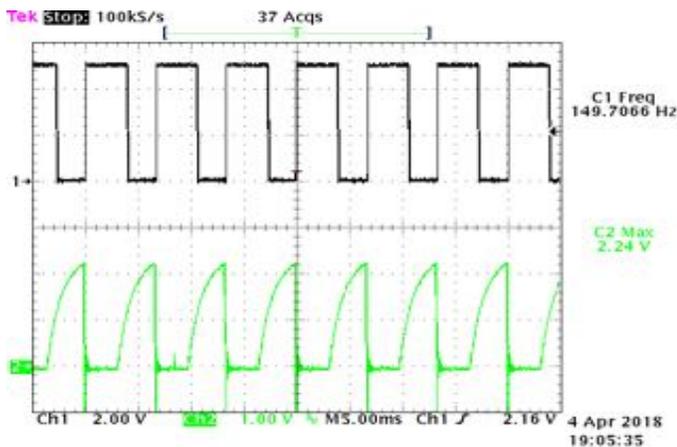


Fig 5

Stuff for Sale/Wanted

**"Wanted:** a partner in the building of a Murphy Rebel. This is a High wing, all metal plane with a gross weight capacity of 1650 lb. I can be contacted at 952-8884380 or [rrhoyt@ieee.org](mailto:rrhoyt@ieee.org)."  
 Ron

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EAA Chapter 25 has a carbon monoxide detector in our tool crib for members to borrow. Please contact Doug Anderson our Tool crib manager.

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TRUE LOVE *by Jim Fischer*

*It was a nice fall day with mostly clear skies, light winds and temperature in middle seventies. I arrived at Lakeville, MN (LVN) airport to fly a Piper cub from the famous Yellow Cub Club. The preflight was normal and after hand propping the engine to life, throttle to idle, untied the tail rope, run-up finished, my destination was St. Cloud, MN (STC) and I was on my way. This route in a car would take around 90 minutes via freeway. I was in luck because this would only be 70 minutes with the light head winds. As we all know, it's not about the time but the ride.*

*When I arrived at STC, there was a beautiful young woman waiting, we were going on a second date. The plan was to pick her up and fly around the area, then return to STC and have a light dinner before my return flight to LVN. As we walked to the plane she asked if this was safe adding that this was her first time in a small plane. I reassured her with a short sales pitch and told her not to worry. The preflight was normal and with my date strapped in, the tail tied down, an informational brief on what to do if the airplane taxied without me. I gave one swing of the prop, the motor started. The throttle left to idle and the tail rope untied, my seatbelt secured and we were off on an adventure. After a normal takeoff we flew for over 25 minutes appreciating the country side and making some small talk (no intercom) while flying in an easterly direction. I told her I would open the top half of the cub door. Again concerned, she asked if it was safe. She was given the same sales pitch on how safe it was and the top half was opened. Another 5 minutes go by when I informed her I would open the bottom half of the door. She replied firmly, "I would prefer you do not open the bottom door". Being a gentleman, I honored her wish. Then I instructed her on how to fly a plane with a stick control and then let her fly the bird while I enjoyed the view. A moment like this, with nice weather, good views and company in the front seat, could not be more perfect. A few minutes later I took control of the plane and asked if there was anywhere she would like to go. She had no where special in mind but indicated that her family farm was close to where*

*we were. When I asked for directions, she was unsure of how to get there from our position in the air. She did however know how to drive there. We flew to her small home town for proper orientation and followed the roads (IFR) to her family farm. She informed me that there was a hay field next to the family house. I quickly responded that we can land in hay fields and offered to stop by and say, hello. That was the plan and on arrival, I saw a field just east of the farm house. We flew over the power lines at one end of the field and down to within 30 feet of the ground to check out my new landing strip. It looked okay as I pulled up before the trees on the other end and flew a traffic pattern to the new place to land. When we passed the wires, I descended to land but picked up an extra 4 mph. The extra speed was not intended, but I forced the plane back to earth. I did a nice high speed three point landing. Then the entertainment began. The field was very rough and the little plane began to shake and the wing tips rolled left and right. When finally stopped I said to the lady in front, "this is the roughest hay field I have ever been on". She replied that this was the corn field. I looked down and saw corn stalks and weeds between the stalks to cover up the wind rows. She said the hay field was on the other side (west) of the house, past the garage and the second barn. When asked why she did not say something, the response was I thought you knew what you were doing and it would be safe. We did a very slow taxi over the wind rows of dirt to the family farm house and within 40 feet of the house I shut down the engine on the family lawn. We left the plane and went into the house to find only her youngest brother home and her parents were at a nearby neighbors house. We waited approximately 30 minutes for their return. My date requested we wait another 20 minutes, which we did. I informed her that we had to leave soon as there were no night lights on the plane and I would need to fly back to LVN before dark.*

*We told her brother a goodbye and returned to the*

( Continue on pg 8 )

Trivia answer By John Schmidt from pg 5

Flying with various pilots in a two-place Bristol F.2bs biplanes, equipped with two Lewis machine guns, Gass earned his victories, and was one of a handful of combatants to earn 'ace' status as a gunner/observer. He had 28 victories in one month, May, 1918. He was recalled to duty in Jan., 1940, and retired with the rank of squadron leader in 1954.



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## TRUE LOVE continued from pg 6

plane a few minutes later. She secured herself in the front seat and I proceeded with a briefing on the starting procedure of what I needed her to do until I climbed into the cub. Once again the yellow cub's engine came to life after one swing of the prop, I climbed into the plane and started a slow taxi to the end of the field by the wires. With the run-up completed and controls checked, I informed my date that if it gets to rough, I would stop the plane and let her out and return to the real hay field to pick her up. She nodded her head in agreement. The takeoff began when the power came up on the mighty 65 horse power plant. I found the direction of the wind rows and the ride was a little rough but okay. When fast enough to fly in ground effect, a pull back on the stick was performed by the ace pilot and we lifted off. We flew back to STC with a nice landing and I dropped off my date at STC airport. We had a great conversation and agreed to have date number three but without the plane. I now find out this was her VERY FIRST airplane ride (big or small) and she was frightened to get back into the plane at the farm (thus the extra 20 minute wait). We said our goodbyes and she agreed to wait until my liftoff with a salute to her in the air.

I returned to the plane, added fuel, completed a preflight and was ready to leave. The tail was tied down and again the cub started with one pull of the prop. Throttle to idle, tail untied, a taxi to the runway, run-up completed and a quick liftoff brought me back to fun and grinning ear to ear. After a circle of the airport in flight with the wings rocking to say, goodbye, I flew toward LVN. The landing occurred with about 50 minutes before sunset to spare. The tie down completed and doors closed, the adventure was done for today. When I was about 40 feet from the plane, I looked back at the yellow cub resting at sunset and thought. Yes, there is true love. The dates continued and we have been married over 35 years. It's only an adventure.

## MN State Mankato's aviation scholarship banquet

I had the pleasure of attending MN State Mankato's aviation scholarship banquet Saturday April 07, 2018. It was a very gratifying experience to hand out our Chapter 25 scholarship money to two outstanding aviation students. Sofia and Taylor are sophomores, majoring in professional flight and working on their commercial pilot certificate. They both carry a GPA over 3.5

Our chapter sponsors two matching scholarships at Mankato and two at UND. We raised \$3750 from our chapter members in 2017, for scholarships in 2018, and that money was matched dollar for dollar for a total of \$7500.

These aviation students ring up large college debt taking flying lessons and you can't believe how excited they are to be awarded a \$1500 or \$2000 scholarship. Even their parents say "thank you." The fact you give \$10, \$20 or \$50 to the scholarship fund is phenomenal. It helps us keep the scholarship program going on a sustainable path. I know a few members say, "Why don't we use the one time gifts to fund the scholarships?" The problem with that is there is not continuity. One year we would have a scholarship or two and the next year nothing. Our matching donors want consistency and with the matching dollars, we get more bang for our buck.

Years ago we had hangar debt and we used the fundraiser to help pay off the debt. Now we use it for scholarships. This way your chapter's board of directors is able to have one, two and three year plans. We aren't just flying by "the seat of our pants", pun intended.

Before handing out the scholarships last night I was able to address the audience and say a few words about our chapter. I told them we were located at the Airlake Airport and we were known as an airplane-building chapter. I told them about our build sessions on Wednesday and Thursday evening. I also told them about our Young Eagle program and our monthly meetings. It created some buzz. Folks came up to Jim Fischer and myself during dinner and afterwards, asking about the airplanes we are building and our monthly meetings, etc... It's another way to get the word out about our chapter.

You've already paid your chapter dues for the year and that money is being used to run the normal expenses like insurance, gas and electricity for the year. Shortly the fundraiser will start and I hope you continue to give whatever you feel comfortable with, so the board can continue to fund the scholarships. Don't forget to save a few bucks for the banquet next fall.

Don't be surprised if you hear talk about a possible new chapter hangar, in a few years. A hangar with running water and a flushing toilet. The airport property on the southwest side of the airport has been annexed by the city of Lakeville and they will be installing city water and sewer. MAC plans to put in a road and two alleyways in 2019.

You should feel proud that you belong to a very talented group of aviators and you are doing your part to keep general aviation alive and well in Minnesota. The chapter officers and BOD are very grateful for all your help.

Patrick Halligan

# Minnesota Aviation Day at the Capitol

Wednesday 25 April 2018

Sponsored by MATA, MBAA, & MCOA



## 7<sup>th</sup> Annual Event Schedule

1000	Kick-Off at St. Paul Airport Terminal	
1030 – 1130	Legislative Issues Update	
1130 – 1330	Luncheon with Legislators	Cost
\$25.00		
1400 – 1600	Group Meetings with Legislators	
1630 – 1800	Social with Legislators	

**Location:** Saint Paul Airport Terminal  
644 Bayfield Street, Saint Paul, MN 55107

**Contact:** Tim Cossalter 651-269-1221  
timcossalter@outlook.com

**Register on Line & schedule legislator meetings at:**

<https://mbaa-mn.org/>

Fixed Base Operators – Airport Managers – Airport Commissioners –  
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Corporate Flight Departments – Aircraft Technicians

The Great Minnesota Aviation Gathering  
Friday April 27th & Saturday April 28th, 2018  
Golden Wings Museum,  
Anoka County-Blaine Airport, Blaine, MN  
enter the gate on the SW side of the airport  
Fri. 9 am to 9 pm, Sat. 9 am to 4 pm  
<http://www.mnpilots.org/gmag/index.php>