

EAA CHAPTER 770



Welcome to the Chapter 770 newsletter. Please share your news and updates from the chapter, upcoming flying events, info and more. If you have flying stories, photos etc to include feel free to send them to ctf6911@gmail.com.

UPCOMING EVENTS

Chapter Meeting: November 17, 2022

VMC IMC Club : December 6, 2022

UPCOMING EAA WEBINARS

Past Aircraft of the Collection

Talk to the Tower-Communicating in Controlled Airspace (WINGS)

EAA Ray Aviation Scholarship-2023 Update

ForeFlight IFR Pro Tips (WINGS)

Flying the World's Fastest Airplane , The SR-71

Hosting A Young Eagles Rally-Advanced Best Practices

Rotax 912 Engines for Sonex Aircraft (WINGS)

When Data Doesn't Look Right (WINGS)

NOV 8, 7:00pm

NOV 9, 7:00pm

NOV 15, 7:00 pm

NOV 16 7:00pm

NOV 22, 7:00pm

NOV 29, 7:00pm

DEC 6, 7:00pm

DEC 7 7:00pm

Register for upcoming webinars at:

www.eaa.org/eaanews-and-publications/eaawebinars



Chapter member Parris Fromm married Jasmine Campbell on October 29, 2022. Special thanks to Mike George at the Air Combat Museum for providing his F4U-5N as a backdrop for some awesome wedding photos!

Ayden's Journey **Through Flight Training**

By Ayden Miller

My last few weeks of my training have been very interesting. I have completed my cross country flights and my written test. The solo cross country flights have been my favorite part of the training. It is a big application of everything that you have studied and practiced.

Everything from weather to actually flying is applied. I think that doing the cross countries really helped me with getting a full understanding of what was on the written test. One of the biggest things that it helped me understand was using the E6B calculator since I was actually able to visualize what I was trying to do with it instead of just following along with a video or a practice question. The cross country flights were very enjoyable.

Being able to relax a little between destinations was a nice change of pace from the short flight to some of the local airports. I also found it was very satisfying to pick out all of the checkpoints along the way, but some areas were a bit more difficult than others. Particularly the areas that didn't have many easy to spot ground reference points and a lot of forest. At the end of the day though, I did make it to where I was trying to go. The written test was not as bad as I expected it to be. The questions were not far from what was on the prepware that I was using, which definitely helped me get a few of the questions correct.

One tip from A&P school for FAA tests

is to sit down and go through every single practice question that you can get at least once so that you will have the information somewhere in your subconscious for when you take the test. Another thing to make sure to do is to bring a straight edge and E6B. They do not provide you with an E6B but questions that use it are very likely to show up on the test. Just remember though, the test isn't set up to be impossibly difficult so as long as you study and take your time, everything should go smoothly.

Ray Scholar Alumni **Update**

by Matt Shaw

Hi all! John asked me to do a little write up about my college life and the Part 141 and 147 program I am in here at Southern Illinois University, and I am also excited to share information about one of our new, amazing, registered student organizations I helped to get the ball rolling on.

As some of you may know, SIU has one of the best aviation programs in the country. There are three routes that students typically take. They are aviation management, aviation technologies, and flight. Typically, students will combine flight with either of the two programs mentioned previously.

Around this time last year, I was not sure if I wanted to stick with management or switch to technologies. Well, my friends at school and my flight instructor at the time were very persuasive, and I made the switch to join the school's aviation technology program, which is a Part 147 course. In short, it was absolutely the right decision and I love it. It is also where I met my closest friends at school. Upon completion of the program, I will have a

bachelors of science in aviation technologies and the ability to sit for the Airframe and Powerplant certificate tests.

Next, the flight program at SIU is a Part 141 course, and upon completion, provides the student with an associates degree in aviation science and, when combined with a previously listed bachelors program, a R-ATP reduction to 1000 hours. There are around 15 courses for students to complete, depending upon desired track and previous experience. For example, since I came in with my private pilot certificate, I had to complete an 8 week long transition course called AF199.

Students beginning from scratch would complete AF201A and AF201B to obtain their certificate. Students also have the option of completing their multi-engine rating or certified flight instructor certificate to finish their degree, but many will obtain both through the school and outside means. Now, some of you may be wondering what the differences between a Part 141 and Part 61 program are. Well, the answer is, a lot.

It was a very big change entering the program. Firstly, there is a rigid syllabus that must be followed to a tea, which has upsides and downsides. Another difference is, some would say, the lack of freedom. During solo flights we must do what the syllabus says and we are confined to a certain distance from Carbondale.

Also, with cross countries, we have a small list of destinations and routes to choose from. However, one of the best things about the 141 program is the modern, and often plentiful, aircraft. SIU has a fleet of several 152's, 172P's, 172R's, 172S's, Piper Arrows, and Cessna 310's. It was pretty neat going from an aircraft produced in the late 70's to a brand new G1000 equipped aircraft.

My progression through the courses

has been steady. I completed AF199 and AF203 last year, and I am currently in AF204.

203 and 204 are mainly about practicing commercial maneuvers, along with time building. Just about a month ago, I completed my long cross country required for the commercial certificate. It was a 6.5 hour flight from KMDH-KMVA-KLIT-KMDH (Carbondale-Mount Vernon-Little Rock, AR-Carbondale). Overall, I have really enjoyed the flight program here.

Now onto the exciting part of this write up! Around March of last year, several students and myself thought it would be a cool idea if we as aviation technology majors made a club to build a kit plane. Well, after discussing our idea with an instructor, we learned that such a club existed before Covid, but subsequently disbanded. However, we did have good news. One of the other instructors at school wanted to get the club going again, and he even had an aircraft mind for us!

So, around April, the Experimental Aircraft RSO was officially reborn. Our first task was to raise funds to purchase the aircraft. We did so by creating LED aircraft signs that we designed on a CAD program and then cut using a laser cutter. We sold them online as well as at Oshkosh, and we raised enough funds to buy the aircraft, from Facebook Marketplace of all places.

The aircraft we purchased was a US Light Sport Hornet, which is similar to a Challenger. Construction has progressed steadily and we currently have all of the oxidation removed and have begun to test fit the control surface. We also recently had a Rotax 912 donated to us. We are hoping to be in the air by the end of the spring semester, and our overall goal is to be able to make it to Airventure this year.

Funds, however, are our biggest

roadblock at the moment. Below, I have attached a link to our GoFundMe. Also, if you are interested in purchasing one of the LED signs (great for a mancave or office!) you can reach out to me directly and I can send you information. They are \$30 each.

[Homebuilt RSO](#)

I have also attached a link below in case anybody would like to donate to the Joseph Ermel "Strive For Your Best" Aviation Toolkit Scholarship. Joey was a Ray Aviation Scholarship recipient, Flying Salukis team member, and amazing friend of mine. Unfortunately, last October he lost his life in a motorcycle accident. This scholarship in his memory has the goal of providing funds for aviation technologies students to purchase tools for class and their later careers.

[Joe's Scholarship](#)

the technologies program.



My current instructor and I



Somewhere between Mt.Vernon and Little Rock



-My friends and I in the school's 737-200 used for



The Aircraft prior to purchase



construction begins



Joey and I at the flight team competition



NAVAID NOVEMBER

by Eric Fromm

Since November and Navaid both start with an N and a catchy title like NAVAID November can be contrived therefrom, why not pay homage to the first modern NAVAID that allowed us to fly in nearly any sky obscuration and even provided some of the first in flight entertainment!?

NDB's, or the Non Directional Beacon were still alive and well when I did my instrument training. The NDB provided stations that could be used to determine airways, navigational fixes for off airway navigation, fixes in which to hold, and marker beacons for more modern approach systems like the ILS (instrument landing system).

An NDB is a relatively simple station. Driving by a VOR station you can easily recognize the bowling pin-like building and antenna, however you've probably driven by an NDB station not realizing that it is a NAVAID. It is usually just a small shack with a relatively small antenna similar to the old TV antennas attached to homes.

Simply put, the NDB broadcasts a signal in all directions (hence the name non directional). NDB's operate (as some are still used for marker beacons on instrument approaches) in the frequency range of 190-1750kHz meaning they can be found around the AM radio range. Direction to and from the station is interpreted by the pilot through the use of "relative bearing". The relative bearing can be TO or FROM and it is simply the difference between the position of the aircraft's nose relative to the location of the

station. For instance, an aircraft flying over Springfield on a 360 heading could be tuned to an NDB roughly in the Decatur area (depending on exact station location of course, but for intents and purposes, let's say it's directly east 090), the relative bearing to the station would be 090*. As you'll see in a moment though, the instrument the pilot uses to receive the NDB signal makes it a little trickier to calculate than that if they were flying a heading other than 360*.

The aircraft receives the signal with the use of the ADF (automatic direction finder). The ADF looks a lot like your directional gyro with a big (usually) yellow arrow that points to the direction of the NDB station. The head of the arrow is TO the station, and the tail is FROM the station. Many ADF's are "fixed card" meaning the "compass face" doesn't move. Zero degrees is always at the top so flying in any other direction requires some calculation to determine the magnetic heading to fly to reach the NDB station.

The pilot would use the calculation Magnetic Heading (from the DG or compass) + Relative Bearing (from the ADF) = Magnetic heading (what you want to fly to reach the station). $MH + RB = MB$. As an example the pilot of the same aircraft over Springfield on a 050* heading would see the ADF needle pointing to about 130* on the fixed card. The pilot would calculate $050^* + 040^* = 090^*$. With a heading of 090 and the needle would become straight ahead and to the station.

Another way to do this takes some imagination although I found it easier than trying to calculate. Looking at your DG and imagining the ADF arrow in the exact same position you could get the correct Magnetic

Bearing as well, although it was not as precise as the calculation. Also one could simply turn the aircraft until the ADF needle is pointed at the nose but this calculation has importance when determining location along a route when you can't just turn the aircraft towards the NDB to see what direction it is, and also as we'll discover shortly, this is in a no wind situation, they present even more problem solving when you enter wind in the equation.

Some ADFs have a "variable card" in which a ring around the instrument allows the pilot to twist the correct magnetic heading from the compass or directional gyro making the instrument easier to read as you don't have to interpolate the magnetic heading over the bearing to or from the station. In a no wind situation you'd simply turn the aircraft so that the (usually) yellow arrow on the ADF is pointed at the nose or prop (assuming you're not flying a pusher of course) and eventually you'd fly almost directly over the NDB station.

Of course there usually wasn't distance information included with the NDB outside of some of the few that were later coupled with DME equipment, so one would have to perform time and distance calculations to determine your location along the "bearing" to the station, or as an alternative, if another reliable NDB signal could be obtained you could triangulate your location by taking the relative bearing to or from that station and comparing it to the bearing of the NDB you're flying to.

The easiest method I used was any time you make a heading correction, when wings are level, crosscheck the DG's heading with the compass to ensure it is correct and

then "twist" the card until your heading is atop the ADF instrument. I can say with 100% honesty I would shine the shoes for a year of the person who invented the variable card. This allowed you to simply look at the arrow and determine the MB without the calculation.

Taking it one step further in the evolution of automation, the RMI was developed. The RMI (Radio Magnetic Indicator) did all the work for you. The compass card moves just as a DG or compass taking the interpolation, calculation and constantly "tuning" the heading to the instrument. RMI's were/are typically found on more advanced aircraft and airliners however, most of us GA'ers aircraft were/are equipped with either fixed card or variable card faces.

Remember me talking about the wind? Yeah, I don't think I ever used an NDB on a day when the winds aloft weren't forcing me to use a wind correction angle of some sort, and since the ADF is pointing at the station and not creating a radial to fly along (like a VOR), the wind pushes the aircraft away from the intended course. This doesn't result in a getting dangerously lost situation, but it in this day and age (same goes for the heyday of NDBs too) high fuel costs and time would be the biggest issues with "homing" to the station.

If the pilot keeps the needle directly pointed at the station and winds exist, the resulting course on a map would look much like an arc. Therefore the pilot would be much better off adding in a wind correction angle. There might have been a more precise mathematical way to figure it out, but every trick I was taught still resulted in a trial and error to get the correct wind correction angle. The key was to point the nose into the wind,

and to keep the arrow from moving. Of course the nose is not facing the station, so the arrow is not going to be exactly straight up on the ADF, it's going to be a little left or right (depending on the wind direction). If the aircraft is flying with the right wind correction it's approaching the station in a straight line, and the needle will quit moving and stay in its position several degrees from straight up (again depending on the wind direction and velocity).

Even this is somewhat utopian and a perfect world scenario. In the real world, radio interference is quite common especially at night and during inclement weather, or if there were nearby NDBs or AM radio stations. Due to these forms of interference, when on instruments (IFR) you were/are required to monitor the audible station identifier constantly. Usually these are in Morse code, and sometimes voice like a VOR. Either way, lowly in the background the constant repeating of the identifier gets old after about the second repetition, but in order to ensure you are navigating to the correct station and receiving the proper signals, it is essential to monitor.

This comes in handy when there is a break in the signal, if you're flying along and all of a sudden the needle goes to 090 and you were flying right to it, it is a way to verify the signal outage and not an instrument problem.

Being in the AM radio band, the ADF receiver can pick up AM radio stations. I'd be lying if I said I've never tuned in to 1120 KMOX for a Cardinal game or two on a cross country. But listening to ball games and talk radio was just a perk to the real purpose of this function. If you look at older sectional charts, there used to be complete table of AM radio stations in the area. Believe it or not,

these were for navigation. Imagine being lost on in unfamiliar territory in an aircraft only equipped with an ADF and the pilot's trusty plotter, E6B and sectional chart. In this world (that I remember) GPS still something out of Star Trek or the Jetsons. You're flying along the landmarks aren't making any sense with where you think you are, you could check your sectional's AM radio station table and tune to a station that would guide you to that town, or triangulate from it.

Again it would be best practice to monitor the audio from that station to ensure another isn't bleeding into the signal causing an erroneous indication, but just like with a NDB, the needle would point you to the station, and if you flew to it, you could end up atop the KMOX building in downtown STL. I guess I would have to also advise reading minimum sector altitudes for the area to ensure you didn't become an unscheduled guest in the studio.

I mentioned marker beacons earlier. On ILS approaches some NDBs are still in use. They're usually located several miles from the runway on the ILS final approach course and usually right under what is called the "Final Approach Fix". In simple terms this is usually very close where you'll intercept the glideslope on the ILS and are well established and stabilized on the final approach course.

Not all marker beacons are NDBs but the ones that are can be used to navigate to as an initial approach fix to which you'd navigate to it as you would any other NDB and then fly as published to intercept the approach. Often (moreso when they were more prevalent) NDBs that doubled as marker beacons were also part of the missed approach procedure often being the fix for the hold after going missed.

All of the above quite possibly sounded as clear as the static filled broadcast of an NDB identifier signal over the speakers in a loud V tail Bonanza. Time has given us more modern user friendly forms of navigation in the VOR and the magenta brick road of GPS and even when I was doing my instrument training, NDB was a third string navigation system but back then we had to still demonstrate you could navigate with them, hold on them and fly NDB approaches, and I had some pretty upsetting, sometimes angering drives home after trying to conquer them.

It made me really appreciate the early instrument pilots. Imagine flying a DC-3 full of souls into someplace like Midway in a gale stricken November snow storm. No magenta lines to fly, no radar vectors, only the expectation from ATC when you're cleared for the approach, you fly it correctly and you're at all reporting points at the correct time, all while getting bounced around, managing two fussy radial engines and an operations department who won't expect anything less than you flying in anything.

Looking back, Ernest Gann with his always angry emotionless instructor pilot (see the book 'Fate is the Hunter'), compared to me in my foggles in my 5 year old 172SP, I had it pretty cushy flying the NDBs compared to those who flew in those days but it definitely gave me that respect to the earlier aviators.

For some reason, I'd miss the step down on that stupid NDB17 approach at Alton/ Bethalto, which if I remember was a VOR intersection shortly after completing the procedure turn inbound. I finally defeated it, but it was almost just one battle and the approach won the war. Holding over Civic Memorial NDB in what afterwards looked like

a cockeyed octagon (should've resembled a racetrack). That said, when you finally got it right it was a pretty cool feeling. Of course as with anything in aviation, it just takes practice. NDB's were definitely one of the more difficult aspects of navigation and the fact that you didn't practice them as much as VOR at that time the fledgling new RNAV/GPS systems, it was easy to get rusty on them.

Today very few NDBs still exist. While a list of NDB's I saw published in 2019 showed Civic Memorial at ALN still in operation, I cannot find an approach plate for the NDB 17 approach and looking at VFR and IFR charts it appears the NDB has been decommissioned.

They are still around, Alaska still seems to have a fair amount, and they are still more common in Europe. Equally uncommon in the US today is ADF equipment in the aircraft we fly to use NDBs. Older aircraft that once had ADFs installed have had them removed to create panel space for GPS equipment or for weight and balance considerations.

If you do get the chance to fly an ADF equipped aircraft in the vicinity of an NDB in this day though, I'd recommend giving it a try if you never have. Be it navigating to or from one, holding at an NDB, or flying an NDB approach. They are a challenge and another skill to have in your set, and it gives you a neat connection to the history of aerial navigation.

