

Winds Aloft



P.O. Box 1206 Barrington, IL 60011

www.eaa790.org



My EAA Air Academy Experience...and a "Thank You"

by Bryant Gruenwald

To all the EAA 790 members, thank you for giving me the opportunity to go to the Air Academy. The week that I spent in Oshkosh will truly be a memory for the rest of my life. I learned a lot and had a lot of fun. I owe it all to you. I'd like to share with you what I experienced.

Overall, the Air Academy program has four areas: a challenge course, a workshop, flight simulators, and a section devoted to history. Upon arrival, we went to the museum where we met each other. My class had a total of 46 people that were divided into three teams – Alpha, Charlie and Bravo. These individuals were from all over the country and Canada. I was in a room with 3 other individual, including the one person from Canada. We became good friends. After the introductions, we had dinner (roast beef, mashed potatoes...all very good!)...which was typical of the excellent food we had all week.

Every night, lights were to be out by 10pm because we arose early in the morning: 6:00am. After taking showers and straightening our rooms, we had breakfast and then it would be off to classes.

The classes covered the basics of aeronautics including: instrument panels (standard 6-pack); airfoil design;

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AUGUST 2004

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AirVenture 2004 Remembered...

Next month Winds Aloft will be publishing your photos from AirVenture. So make the September 2004 issue very special for all of us by submitting your photos of people, airplanes, or anything you felt was special. Space is limited, so give us your best. Submit them electronically to Mike Perkins at michael.perkins@rauland.com or mail printed photos to Mike Perkins, 17787 Sherwood Forest Rd, Havana, IL 62644 where they will be gently scanned and returned to you. Please put post-it notes on them with your name and address so he can give you credit for the photo and return them to you. Or simply give them to Mike at the August 24th meeting with post-it-notes attached. We look forward to your pictures in September and all year long. Also, if you have any special stories you'd like to share, submit them to Mike in the same way. We're always looking for human-interest or your personal aviation stories.

EAA Chapter 790 Newsletter





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A Brief History of Aerodynamics Part II

The Early History of Aerodynamics: Archimedes to Da Vinci

by James Cooper



In the first article in this series (Winds Aloft, March '04), we discussed that the ancient Greeks originated some scientific concepts that are used in aerodynamics today. Aristotle (384-322 B.C.) and Archimedes (287-212 B.C.) developed concepts such as the continuum (used to model airflow), air resistance (aerodynamic drag), and static pressure. However, another seventeen centuries passed before further contributions to the science of aerodynamics were made. The next significant contributor was the great Italian Renaissance artist and intellectual, Leonardo da Vinci. Not only did he develop aerodynamic concepts that were advanced for his time, but he was also the first person to attempt to design machines for the purpose of manned flight. It is these contributions of da Vinci that will be the subject of this month's article.

But first, what happened between the life of Archimedes (3rd century B.C.) and Leonardo da Vinci (15th century A.D.) for seventeen centuries to pass without further advancement in the science of aerodynamics? During this period, the Roman Empire rose and fell, and Europe passed through the Dark Ages and into the Renaissance. The Romans excelled in creating civil, political, and military organizations, and in constructing large engineering projects, but contributed little to the advancement of scientific theory. The Dark Ages was characterized by a distinct lack of intellectual progress, while the Renaissance saw a surge of new intellectual enquiry. And it was during the Renaissance that da Vinci made the next important contributions to aerodynamics.



Leonardo da Vinci (1452-1519) was one of the most powerful intellects and creative geniuses of his time. Throughout his career he served some of the most important families in Italy - Sforza, Borgia, and Medici - designing military machines and weapons, in addition to painting, sculpting, and practicing architecture. He also had an enduring interest in the flight of birds and flying machines, which reached its peak during his most creative period (1488-1514) at the Sforza court.

Da Vinci's Flying Machines and Aerodynamics

In one particular compilation of his work, the Codex on the Flight of Birds, da Vinci stated that,

A bird is an instrument working according to mathematical law, an instrument which is within the capacity of man to reproduce with all its movements... [and] we may therefore say that such an instrument constructed by man is lacking in nothing except the life of the bird, and this life must be supplied from that of man.

The flying machine sketch (fig. 2) is one of more than 500 sketches concerning flight that survive from the notebooks of da Vinci. The design dates from 1486-90, showing a device to be powered by a man lying prone, with wings (uncovered in this figure) flapped up and down to provide lift and thrust simultaneously via a series of pulleys and levers. This design, known as an orinthopter, is a seminal development in the history of aerodynamics, not so much for its aerodynamic value, but rather because it was the first serious design for a manned flying machine.

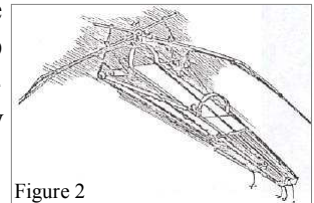


Figure 2

As well as designing flying machines, da Vinci had an interest in the characteristics of basic fluid flow. From his observations of the flow of water in rivers, da Vinci noted that the velocity of water increased in those locations where a river became constricted. He quantified his observations in the following state-

(Continued on page 5)

(Air Academy Experience continued from page 1)

making an instrument panel holder; making gliders of various designs to see which design would travel the longest. We also made rockets. It was interesting to see the various designs that the class came up with. It was fun to watch some of these rockets come back down and shatter. Some of them didn't even make it off the launch pad. I built my rocket like a missile...with various stages. I didn't want it to come back down in one piece but it did. We had to put an egg inside each of our rockets and the goal was to have it land and not be shattered. I'm sorry to report, I did not succeed on that objective...but it was not totally smashed!

On a more positive note, when we built gliders, mine was one of the best in the class...that is until I suffered an unforeseen jolt from a fellow classmate and the wing fell off. I did the best I could under the circumstances to glue it back on...and it flew, but not as well as I knew it would have had the accident not occurred.

My favorite part of the week was the flight simulators because it challenged us to fly in adverse conditions, including fog. I did excellently on the simulators. They had us learn takeoff and landing patterns. Then they had us land in dense fog. We also had to do an operation as a group. Mine had to go to Chino, California to drop off supplies because the city had just suffered a huge earthquake and much of the town was destroyed. I was the navigator and I did alright except for telling the pilot specific altitudes. All I said was, "fly at any level just make it over the mountains when the time comes."

Of all the physical activities we did, I liked the challenge course the best. On these exercises, we had to work as a team as we climbed up an obstacle course that consisted of a series of ropes suspended in the air between two phone poles located right behind Compass Hill. It was fun to do, but the harnesses hurt a lot when we had to come back down. And just in case you are wondering, believe it or not, I did make it to the top...and I have the pictures to prove it!

The history section was, of course, very interesting because we spent time at the museum. When we got to the Voyager exhibit, one of the pilots came up to me and asked me if I wanted to go flying. Therefore, I had the opportunity to leave the class and go flying. To my dismay, the flight was eventually canceled due to bad weather, but, I did get to go flying later in the week in an RV6 and I sat in the left seat.

So, that is a quick overview of what I experienced. The entire week was wonderful. The leaders and especially the counselors were extremely helpful and very knowledgeable. I had a great time there and it was a great learning experience for me. Again, I would like to thank you from the bottom of my heart for sending me to the Air Academy.

Bryant

Next Meeting

Doug Doers from DeltaHawk will be giving us a presentation on their diesel engine. Dean May, our resident Velocity builder, has invited them to give us an update. Doug is the chief engineer for Del-



taHawk. You might recall Doug gave us a presentation when we were back in the South Barrington village hall, but this was some years ago. The DeltaHawk project, like many other projects which started as a clean-sheet research venture, has taken much longer to get finished than originally planned. But it's important to keep in mind that they are actually certifying this engine with the FAA, something that has not been done with a new piston engine design in many years. This should prove to be a very lively meeting since the engine is getting much closer to delivery to Dean and a select few other builders.

The meeting will be at the Barrington Public Library on August 24, with the doors open at 6:30pm. There are five Tuesdays this month, and our meetings are on the fourth, so be there August 24!

(History Of Aerodynamics continued from page 3)

ment, and used an accompanying illustration (fig. 3):

Each movement of the water of equal surface width will run the swifter the smaller the depth... and this motion will be of this equality: I say that in mn the water has more rapid movement than in ab, and as many times more as mn enters into ab; it enters 4 times, the motion will be therefore be 4 times as rapid as mn as in ab.

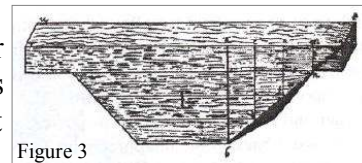


Figure 3

In other words, the cross sectional area of a river A , multiplied by water velocity V , remains constant: $AV = \text{constant}$. In modern fluid mechanics, this relationship is known as the continuity equation, which in this form

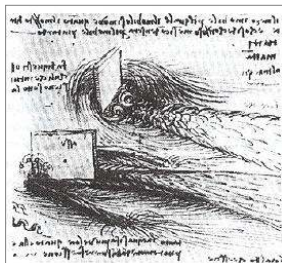


Figure 4

holds for low-speed, incompressible flow. Here we have for the first time in history, a quantitative statement for this special form of the continuity equation. In addition to this quantitative contribution, da Vinci was also an acute observer of nature, and he made detailed observations of flow fields that are virtually identical to photographs taken in modern fluid-dynamics laboratories. In one particularly graphic example from the Codex Atlanticus (fig. 4), we see the vortex structure of the flow around a plate in both perpendicular and parallel positions to the direction of flow, clearly demonstrating the detail to which da Vinci observed various flow patterns.

Da Vinci's contributions to basic fluid dynamics were complemented by his thoughts on the applied aerodynamics associated with flying machines. In his notes, entries can be found relating to lift, drag, and general flow characteristics. He tried incorrectly to quantify lift and drag by stating, without proof, that they were proportional to the velocity. (As we now know, they are proportional to the square of the velocity: $F \propto V^2$.) However, toward the end of his life, da Vinci recorded an observation on the flow field over a lifting object (in this case a bird) that is quantitatively much closer to identifying the actual source of lift:

What quality of air surrounds birds in flying? The air surrounding birds is above thinner than the usual thinness of the other air, as below it is thicker than the same, and it is thinner behind than above in proportion to the velocity of the bird in its motion forwards, in comparison with the motion of its wings towards the ground; and in the same way the thickness of the air is thicker in front of the bird than below, in proportion to the said thickness of the two said airs.

(Codex E, 1513)

In 1513, using the technical language of the day, da Vinci gave the first valid description of the pressure distribution that causes lift and pressure drag on an aerodynamic body. Da Vinci was also the first person to understand that the flapping wings of birds generates mostly forward propulsion not lift, and that lift is produced by the flow of air over the wings. And late in his life, da Vinci deduced that a flying machine would have fixed wings, with a separate mechanism for propulsion. Da Vinci was well ahead of his time in his understanding of the mechanics of flight, but his papers were not widely known to the world for three hundred years, so it would take until 1809 for the correct cause of lift to become known to the world through the independent experiments of George Cayley.

Other contributions made by da Vinci included the correct postulation that air resistance is proportional to the surface area of a body, and that streamlined profiles are important in the reduction of drag. He also made the first statement of the 'wind tunnel principle', namely that the aerodynamic results are the same

Event Report: Velocity Workshop

Dean May reports there were about 15 people at his Velocity workshop on Saturday, July 10. He is still in need of engine delivery of the long-awaited DeltaHawk diesel engine. Dean could be seen under Delta Hawk's tent at AirVenture. We speculate he offered his support to the fine Delta Hawk folks in order to keep the factory engineers on task so they could ship his engine sooner.

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Surviving a Ramp Check

Some good advice comes from the EAA on surviving an FAA ramp check. Here are your “checklists” for that. Keeping a copy of this in your flight bag might keep you one small step ahead of the FAA power curve:

First and foremost, you should request a business card from the inspector or at the minimum, request the FAA Safety Inspectors name, FSDO name, FSDO manager’s name, and phone number for future point of contact information. It is also important when handing the FAA Safety Inspector your pilot, medical and aircraft certificates that you tell him or her, “I am not surrendering these documents to you.” EAA recommends you contact the EAA Legal Advisory Council for clarity (<http://members.eaa.org/home/govt/help/legal.html>).

Pilot check - The FAA will be checking for:

1. Airman Certificate – It must be the original certificate (not a copy) and must contain the appropriate rating for the type of aircraft you are operating.
2. Airman Medical Certificate – It must be the original certificate (not a copy) and be current (Class I, II, II) for the type of flying (Commercial, Private, etc.) you are doing. If the FAA has issued you a Statement of Demonstrated Ability (SODA), you must have it with you.
3. Pilots logbook - Pilots are not required to produce or carry their logbook(s). If the FAA Safety Inspector requests specific information, e.g., currency for carrying passengers, night flight, IFR flight, and the appropriate endorsements for specific flying - e.g., tail wheel, glider aerotow, complex aircraft operation, etc., you can copy those specific pages at a later time and mail them.

Aircraft check - The FAA will be checking for:

1. Registration Certificate - "N" number on the certificate must match the "N" number on the aircraft. Temporary registration (pink copy of application form) is only valid for 120 days.
2. Airworthiness Certificate - "N" number on the certificate must match the "N" number on the aircraft. This is the same for the aircraft data plate. An experimental, limited, or restricted certificate must be accompanied by the aircraft operating limitations (original document - not a copy).

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Member News

Herb Gottelt had surgery July 15 to remove a benign tumor pressing on his optic nerve. All went well and he is on his way to recovery. During his recovery, keep **Herb and Heidi** in your thoughts and prayers.

With the board meeting not having been held until August 10 due to AirVenture, there are no minutes to print at time of newsletter publication.

Your Chapter 790 newsletter won fourth-place for Winds Aloft in the EAA Chapter Newsletter Awards presented at Oshkosh during AirVenture. Your editors, **Tom LeGates and Mike Perkins**, accepted the award on behalf of Chapter 790. Following the chapter award presentations were the past and present Young Eagle’s chairmen Cliff Robertson, Chuck Yeager, and Harrison Ford. The editors would like to thank Jay and Abbie Friddell plus Alex and Carol Von Bosse for the standards they set during the years spent honing and editing your newsletter.

Judy Meyer has requested on behalf of the **99’s** your old copies of Sport Aviation. Nancy Heraldson of the 99’s **Air Bear program** would like to collect them so they may be given out to the children that the program touches. Judy will be giving our chapter information on how to get your magazines to Nancy at a later meeting, but in the mean time, save them if you wish to participate.

(History Of Aerodynamics continued from page 5)

whether the body moves through a medium at a given velocity (the case of free flight through air) or the medium flows past a stationary body at the same velocity (the case of a mounted object in a wind tunnel).

Given that lack of scientific knowledge that existed before da Vinci, it seems clear that he made significant advances in the state of art of aerodynamics. However, his work was not available to others during his lifetime and for long afterward, and his work on aerodynamics only really came to light in the nineteenth and twentieth centuries. As a result, this information lay dormant, and it would not be until after the seventeenth century, when the elements of classical mechanics were investigated by Galileo Galilei and Isaac Newton, that the next breakthroughs in aerodynamics would occur. In the next article, we will discuss the important developments in classical mechanics and the dawn of aerodynamic thought with George Cayley and the concept of the modern-configuration airplane.

Further reading: J. D. Anderson, JR. "A History of Aerodynamics". Cambridge University Press, 1997.

James

(Ramp Check continued from page 6)

3. Aircraft Flight Manual (AFM) - Required for type certificated aircraft. For other types of certificated aircraft check your operating limitations for requirements. The AFM must be current.

4. Minimum equipment list (MEL) - If the aircraft has an MEL, all required equipment must be installed and operational.

5. Aircraft markings – The aircraft must be marked and placarded per the appropriate FAR.

6. Weight & Balance - For type certificated aircraft this is usually found in the AFM. For other types of certificated aircraft check your operating limitations for requirements.

7. Aircraft Exterior - The FAA Safety Inspector may check the general airworthiness of the aircraft's exterior - inspection would be similar to a preflight.

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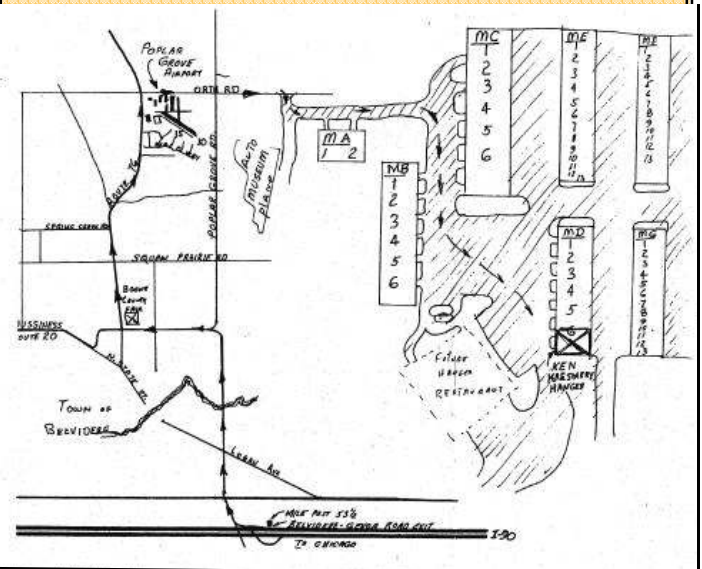
Upcoming Events

Barb and Jeff Wilson's Cozy Workshop Visit - Saturday, August 21 from 2pm to 5pm. They are at 6103 Dunroven Lakes Court, Carpentersville, IL 60110, 847-426-7206, jeffw@jwilco.com
From I-90:

- Take Randall-Road North Exit (west of the Fox River).
- Follow to Miller Road and turn right. (Menards on NW Corner of Intersection).
- Go Straight-through Light at Huntley Road
- Turn left onto Dunroven Lakes Road
- Make an immediate right onto Dunroven Lakes Court.

Chapter 790's Rose Fly-In and Drive-In – Saturday, September 11 (tentative date) at Rose's estate and airport in South Barrington. Coals will be hot at 11:30am. Bring your own meat and a dish to pass.

Ken and Frank's Annual Day at the Hanger!! Popular Grove Airport, Saturday, August 28 – Bar opens at High Noon, lunch begins serving at 2pm. They're serving up Italian sausage and sweet corn, folks! And Ken Kresmary and Frank Herdzina have a whole host of things for us and our families to do, from driving a 1979 Rolls Royce and a 1931 Model T with a rumble seat, betting on a Model T race, sign up for a parachute jump (?!?!), and ride in or fly an airplane. Bring a blanket for the grass if you wish, a side dish to pass or hog all to yourself, and something to sit on. The party will move inside the hanger in case of rain, so this is the rain date, too! Call Ken at 847-742-0000 or Frank at 815-544-6727 for more information.



(Ramp Check continued from page 7)

He/she can visually look at the interior of the aircraft. If applicable, the ELT and the batteries expiration date will be inspected.

8. Aircraft Interior - The FAA Safety Inspector must get the aircraft owner's or operator's permission to enter the aircraft's interior for an in-depth "preflight" type of inspection. He/she will be checking for the general condition of the interior and the installed equipment.

You should note that in 1996, the FCC eliminated the requirement for aircraft operating VHF radios to have an FCC radio station license while flying in the US. At the same time they also eliminated the requirement that pilots carry a radiotelephone operator's license. However, both of these are still required in many foreign countries, so check ICAO requirements for the country you will be flying into.

After the inspection, the FAA Safety Inspector will note any discrepancies and inform the owner and/or operator of the aircraft prior to his or her departure. Make sure you take good notes. The FSDO usually follows up with a letter to ensure you have corrected the discrepancies.

FAA Wings Program



Abbie Friddell, Master CFI, CFII is offering an EAA Chapter 790 special discount. 3 hours Wings Program Instruction for \$75.

Phone: 847-382-4180

Email: abbienair@cs.com

Flight Reviews

BFR Special: Ole Sindberg is offering a Biennial Flight Review for any Chapter 790 member for \$50.00. Also available are flight instruction in single and multi-engine aircraft, helicopters, as well as high performance and complex airplane checkouts. Phone: 847-426-7206.

Email: oleeva@mc.net

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Calendar of Events

August 21 (Sat) .. Home Workshop, Jeff & Barb Wilson

Aug 28 (Sat)..... Young Eagles, Poplar Grove

Aug 28 (Sat)..... Herdzina/Kresmery Picnic, Poplar Grove

Sept 11 (Sat) Rose Fly-In/Picnic (Tentative Date) *

Oct 2 (Sat)..... Young Eagles, Lake In the Hills

Oct 30 (Sat)..... Young Eagles, Lake In the Hills

* Chapter 790's runway-side Rose Fly-In is tentatively set for September 11 in South Barrington. This is a loose affair, generally running from 11 AM to about 3 PM. Fly in or drive in, and if you can buckle it in, bring a dish to pass along with your own meat to grill up. Ron Liebmann promises the charcoal grill will be red hot in plenty of time. Ron will let us know if this is a firm date as soon as he knows.

Overheard

A DC-10 had come in a little hot and thus had an exceedingly long rollout after touching down.

San Jose Tower: American 751, make a hard right turn at the end of the runway, if you are able. If unable, take the Guadalupe exit off Highway 101, make a right at the lights and return to the airport.

Recently while flying over central Missouri, I overheard a controller responding to a request for VFR Flight Following...

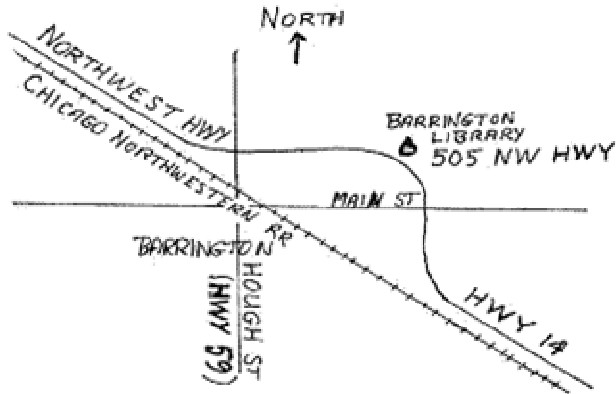
Controller: ...And your type aircraft?

Pilot: Beech Dutchess, Low wing, twin-engine, white and blue.

Controller: You're all a quarter-inch long and green to me.

DIRECTIONS, ETC

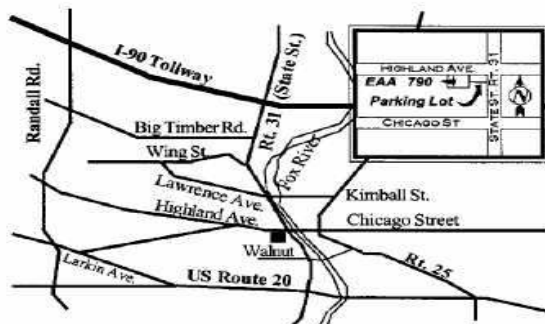
Regular Chapter meetings are held on the fourth Tuesday evening of each month (except July) at the Barrington Public Library. Meetings begin at 7:30, with a social "hour" preceding. The Library is located on Highway 14 between Main St./Lake Cook Rd, and Highway 59 (Hough St.) in Barrington, Illinois



EAA Chapter 790 Workshop

The Taylorcraft restoration is well under way. The fuselage is almost ready to fabric. Now that flying weather has returned, the shop will no longer be open every Tuesday, Thursday and Saturday. Ron Liebmann intends to be at the shop at least once a week to keep things moving, so be sure to check with him if you are interested in working on the T'craft. Ron's home number is 847-352-8282, or try the workshop at 847-608-0001. The workshop will return to a 3 day per week schedule in the fall.

**219 W Highland Ave
Elgin, IL 60123
847-608-0001**



Buy, Sell or Trade. . . .

Classified ads may be submitted by any Chapter member free of charge. They will run for about 3 months unless canceled or renewed. Non-Chapter members and sponsors may purchase a business card size ad for \$100 per year. Ads for shorter periods are \$10 per month

For Sale: K35 Bonanza (1/3 share) IO-470-C 250 hp, IFR GPS, dual NAV/COM/GS, A/P with altitude hold, Stormscope, Graphic Engine Monitor, Tip Tanks for bladder-busting range. Cruises serenely at 150+ knots while sipping 12 gph. Based Poplar Grove (C77). \$25K **Call: Mike Mulcahy @ 847-515-3585**

For Sale RV-6A SLIDER - 468 HRS. TT, LYC IO-320BIA-160 HP, Hartzel C/S, King avionics (KLN89B IFR GPS input to Navaid A/P, KX155-54 transceivers, KMA-24 MB, KI 206/209 CDI W/GS, KA134 audio), htd pitot, i'com, noise can h'sets, Electronics Int'l engine inst, prof'l upholstery, strobes, Slick mags, oil clr, NDH. Hangared Kenosha WI. \$67,500. **Call: Gale Lyle @ (847) 296 1736, (941) 408 0043.**



Contact John Vlasic for information, or to make suggestions for activities, i.e.: picnics, fly-outs, museum visits, etc.

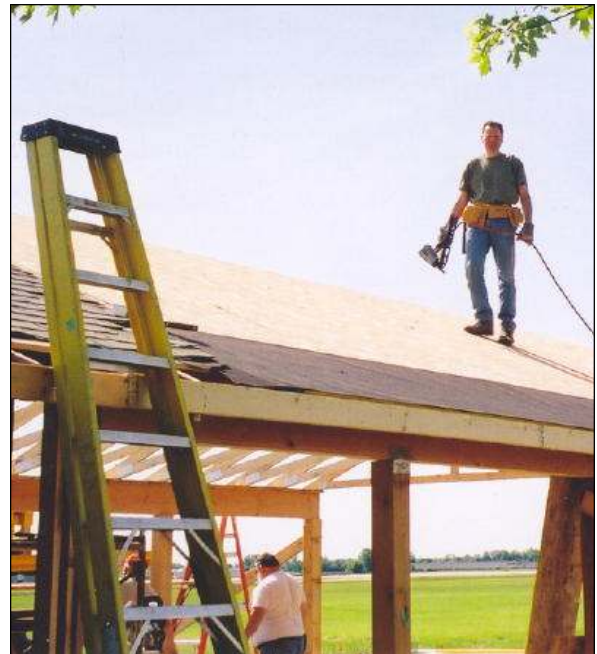
Phone: (847) 524-1857
Email: jvlasic@lunt.com

Contact Dwight Zeller for information or suggestions regarding Young Eagle Rallies.

Phone: (847) 524-3973
Email: zellerd@worldnet.att.net

Photo Gallery

These photos were taken during the 790 work weekend at Oshkosh in June, when some of our folks pitched in to help in the rebuilding of Homebuilders Headquarters



Pre-meeting Checklist

Name Tags

Chapter Videos to return to meeting

Chapter Tools to return to Ole

The Newsletter is always looking for interesting articles and pictures by our chapter members. If you have written anything or would like to write something or have pictures that you believe would be of interest to the chapter members, please submit what you have. The newsletter staff prefer that you e-mail your articles to michael.perkins@rauland.com or trlegates@comcast.net. We prefer text written in Microsoft Word, however, you may submit the material any way that is easiest for YOU! We also accept hand-written copy, floppy disks (IBM format), Zip disks (IBM format), and CD's. Bring your article to the meeting or mail it to Mike Perkins at 17787 Sherwood Forest Rd, Havana, IL 62644.

Come fly Young Eagles on August 28th at Poplar Grove,
then picnic at Ken and Frank's Day At The Hanger

EAA Chapter
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