



# EEA CHAPTER 32 NEWS

Jim Bower, Editor



**April, 2009**

## **Don't Forget the New Meeting Day and Time!**

**We are now meeting on the THIRD SATURDAY at 10:00 am. We'll see you on the 18th!**



**Lurking in garages and basements all over the land are partially completed airplane projects. Read more in this issue.**

# March Meeting Minutes

by Dave Deweese, Chapter Secretary

The meeting began with the Pledge. Karsten presided, in addition to myself officers Steve Morse and Gary Kasten were also in attendance. Due to tarmac work a Sonex, Ridge Runner, two powered parachutes, plus a pedal-powered Gee Bee were also in the ARC.

Regarding food for the new meeting time we've reached a consensus on breakfast at Kilroy's. We'll brew coffee in the ARC for a suggested 25 cents per cup donation.

Karsten is anticipating work on the SkyCoupe, starting with sandblasting. He requested \$220 for sandblasting cabinet, we voted and approved the expenditure. Later we'll be doing a 4130 workshop which will prepare us to address repairs if necessary. Further down the line our friend from DuPont will help us with painting.

Gary gave the Treasurer's report. He is planning to deposit dues checks on Monday following the meeting. Steve asked if we're through with past payments and penalties. Gary, Jim, nor Gale have received further correspondence on this matter, though Gale has backup paperwork for Accountant, address, money order, etc. Note that Gary will be stepping down as Treasurer at the end of his current term (ending 12/2009.) Keep this in mind if you're interested in serving as a chapter officer.

Looking ahead to Young Eagles season Rick asked about our PA system. The existing system works, so we discussed mounting some weatherproof speakers on the ARC for YE events. A bullhorn is another low cost possibility. Steve will investigate cost of outdoor

speakers, not to exceed \$150/speaker.

Steve Morse spoke regarding upcoming workshops. The first one in April will cover fabricating 4130 parts in a garage with a minimum of tools, including some gas welding. Steve's looking for folks with experience in bending, drilling, and welding to come and share knowledge. This workshop will take place after the April 18 meeting. Steve is familiar with metal work from his years at Mac working on the F-15, and can address such topics as sheet metal forming, flat patterns, finishing, edge distance between fasteners, minimum

bend radius, and blueprint reading. Please feel free to invite non-32 members you may know who have an interest in this.

Ron Burnett has Dierbergs and Shop and Save coupons. We briefly discussed the stand the IRS takes on food coupons. For one thing, food coupons are not aviation related. Further, our gross revenue from this source (much higher than the net

profit,) is high enough to be visible on the government's radar. This is why we file a form, which comes with a fee of approximately \$79. Food Coupons are the most efficient way of making money for the chapter, far outweighing this minor chore.

Meeting adjourned, followed by speaker Greg Smith. Greg addressed us back in 2007 regarding his new design and retirement project, an evolution of the Pulsar. George asks if building airplanes is better than working for a living. "Yes, but it doesn't pay any better."



# Workshop Announcement

Dear Members

There will be a hands on open forum workshop including lecture and lecture material hand outs immediately following the April chapter meeting on the subject described below. If you have interest to learn or have knowledge to share please clear a few extra hours from your schedule and plan to attend. We will be making a few parts for Dave Deweese's Double Eagle and also some practice parts. All members and non-members are welcome. Invite your friends. As always though, if you have little ones in attendance, you are responsible for their supervision away from the workshop area for their safety.

4130 (Chrome Moly)

Design, Fabrication, Welding and Finish

Simple techniques for the garage craftsman

Design considerations

Fabrication Techniques for Sheet

Bending Sheet

Shaping tube

Gas Welding

Part Finish

Minimum Tools Required

References

See you all there

*Steve Morse VP*



**Spring has sprung, and now Ben is cleaning the mower**

# What Airplane to Build

by Bud Cole

Wing configuration is probably the most important feature of any airplane. There are three or four basic types: straight, elliptical, tapered and the combination straight inboard with tapered and twisted outboard wing and variations of each. Some may have flat tips, 1/2 airfoil, round, elliptical or even upward winglets, bent down Hoerner type wing tips or end-plates. Wings may be swept forward, straight leading edges, straight quarter-chord, straight trailing edge or swept back or anything in between. They may have downward cathedral or upward dihedral or polyhedral. They may be internally braced cantilevered or externally braced with wires or struts. They can be monoplanes, biplanes, sesqui-planes, tri-planes or quadri-planes, even rotary wings on autogyros, helicopters and gyro-copters and more. There are a great many more variables that have been built in roughly 100 years of designing, building and flying.

Over my almost 69 years since graduating from one of the best aeronautical engineering design schools of the pre WWII era, many people, especially EAAers have asked me, "with all this plethora of designs just what is the best type and design to buy, build or fly?" Years ago when I was younger and inexperienced I probably would have egotistically responded with a description of whatever my latest light plane design that came to my head but today I'm a little older and I hope wiser. The picture that immediately springs to my mind is not an airplane but a map of a Peter Potter world. Over on one side of the map are printed the warning words "HERE BE DRAGONS"

Over a million people have joined the EAA and for probably as many single and multiple differing reasons as there are members. Nonetheless, the intent of the original club and its founders was to organize a group of like-minded people who wanted to design, build, fly, and display their own aircraft and help each other with a yearly fly-in and exchange of ideas and experience. IT WORKED. Those who joined later from similar interests deserve some sort of an answer as to what is the best aircraft for them to buy, build and fly.

STRAIGHT WING airplanes, high winged and externally braced with struts have since before WWII included most of the cheapest, simplest and easiest to buy, build and fly designs available in both kits and finished aircraft. This is in spite of higher drag and poorer flying performance. Many have glide ratios under 10 and are used mostly for training and more local flying. Most very low performance ultralites fall in this category. For equal loads and speeds they generally have at least 10% more drag and weight than cantilevered low taper wing aircraft. In spite of poor air visibility due to the high wing they generally have a

good safety record and a lot of new pilots and passengers feel safer when boxed in underneath the wing. Most biplanes and sesqui-planes have straight wings and are either wire or strut braced to save weight. Straight wings rarely have adequate twist and very few have sweepback and they generally represent the lower performance portion of available designs.

The COMBINATION straight and taper wing aircraft are often updated versions of older straight wings. The high strutted wing is kept straight out to the end of the struts and flaps, (if used), then tapered and twisted to gain better performance. A few are cantilevered low wing aircraft. Cessnas are the best known strutted high wing combinations today and the Piper Warrior is an excellent low wing cantilever combination. These are very popular aircraft and many EAA designers more or less follow their successful format.

The ELLIPTICAL wing is generally made in either of two configurations. The planform is made with a straight quarter-chord, also locating the front spar. They have a narrower semi ellipse forward, with a larger semi ellipse forming the aft 3/4 of the wing. The second type makes an equal front and back ellipse centered on the straight line center of the wing. Books and articles give the elliptical wing the highest aerodynamic ratings in almost every chart using it as the standard from which all others are rated. The elliptical wing has very low induced drag. In addition, elliptical wing aircraft are usually the prettiest and slickest looking aircraft at any fly-in. A serious consideration since showing your aircraft at a fly-in is somewhat of an EAA ego trip. With modern tooling available they are usually not difficult to build yet they are not as popular as straight and tapered wing aircraft. With the right planform, thickness and twist taper wings can almost equal the elliptical.

The TAPERED wing is frequently chosen because it is normally perceived as the higher performance wing. It generally does have several performance advantages. Properly twisted it generally has lower drag, induced, parasite, profile and interference than high wing aircraft. Structural loads more or less taper from root to tip better matching cantilevered loads and space required for structure. The thicker inboard sections on a tapered low wing aircraft offer excellent inboard space for fuel tanks, flaps and controls, retracting landing gear and so on close to the center of gravity.

Because the center of pressure is located closer to the center of gravity the aircraft has better roll control and the tapering thickness in the choice of inboard and outboard airfoils makes proper twist almost automatic in wing design. If a proper low moment series of low wing airfoils has been selected the aircraft may need as

much as 10% less horizontal stabilizer and elevator area. If the low wing aircraft uses a bubble canopy or well rounded aft fuselage top there is little danger of blanking out the vertical stabilizer and rudder preventing or delaying spin recovery as on high wing aircraft with rectangular fuselages. The tapered low wing aircraft with a bubble canopy, where you can see in all directions takes away that boxed in partly blind and mild claustrophobic feeling some of us get in high wing airplanes. Having the heavy wing between you and the ground also gives a much more protected feeling if a crash ever does occur. It is somewhat more difficult to build a tapered wing but with modern tools available, not a great deal more so. It is more a matter of more time than more difficulty.

Now as to the question of what an individual EAAer should choose to build. The only person qualified to tell you what to design or build is you. Don't build something just because it's popular, or because your neighbor or best friend is. Think about how much time, treasure and talent you have available. How much experience do you have available in designing, building and flying. What facilities and tooling are available to you and where are you going to store and use the finished plane. In general the incidental costs, maintenance, inspections, repairs, insurance etc. will at least double the cost of fuel. If you plan to go to fly-ins, flight camping trips and stay in motels while eating out the cost goes up even more. Many EAAers have found

ways to scrounge materials, tow to fly-ins and camp out for a fraction of the cost. More than anything else, what kind and style of airplane do you want to have when your finished.

To answer the question of "what would I build if funds and facilities were available to me?" I'm a grounded 1500 +/- hr. pilot, an Aeronautical Engineer & licenced A & E mechanic with much experience with most tooling and. materials and designing my own small ones and big ones for others, I would naturally build my own plane and engine designs. I have no plans to suit others, I would build mine with light weight metal trusses and fabric, plus my own engines.

1st I would build my 60/80 HP STOL "Angelcoupe" LSA safety-plane, a light weight Ercoupe replacement designed for EAAers, including a very light "Flycar" 100 mpg sportscar to carry underneath for commuting.

2<sup>nd</sup> a very simple 3 0/40 HP STOL Ultralite for me to fly with no licence and minimum regulation.

3<sup>rd</sup> my 60/80 HP STOL "Angelfish" amphibian complete with fabric blow-up fishing boat and motor.

4<sup>th</sup> my 90/120 HP "Wildfire" beautiful double gulled acrobatic sesqui-plane.

5<sup>th</sup> Some form of my very low drag stable flying wing design of 1938.

## President's Corner

Dear Friends,

It's April and snowing as I write this. Through anticipation of Spring, the mower has been cleaned and started after the winter. The ramp in front of the EAA hangars is completed ahead of schedule, thanks to cooperative weather and the availability of the contractor. Unless unforeseen circumstances prevent it, we will have all aircraft that have found refuge in the ARC back in their hangars at the time of the meeting.

Chapter 64 is planning to visit us at our meeting. My suggestion is to meet around 9AM at Kilroys for a coffee and chat.

Bud Cole has loaned a metal band saw to us, it is in need of a new blade and will then enable us to make straight cuts on tubing and other metal items that the (wood) vertical saw is not designed for.

The blasting equipment is almost ready to use. Ventilation still has to be set up for it. Any task, from polishing to very aggressive abrasion can be achieved with this cabinet. I would like to ask any member planning on using the blasting equipment to familiarize themselves with safety necessities and purchase their own

respirator and media. Blasting media, if used inside the cabinet will recycle, keeping the cost down. It will be contaminated with whatever you are blasting though. Therefor the necessity to buy your own material.

After use, please empty the cabinet and store the media in a labeled container indicating what the media is and what came into contact with it. Imagine if you polish an aluminum carb, only to see it rust at the first sign of humidity because the polishing medium had been used previously for something ferrous.

This months speaker is Steve Morse, who will give us an introduction to working with 4130 (Chrome Moly) steel covering design, fabrication, welding and finish.

A few months ago, Dave Deweese showed us some wing ribs of his project. This month we hope to manufacture some 4130 parts with him in this workshop, bringing the Double Eagle one step closer to flight.

Looking forward to see you at the meeting

Karsten

# Learning As We Go

## The Aircraft Builder or “What’s In Your Project Room?”

mr. bill

With trying to place a skunk works picture on the cover of our newsletter each month this year I have run into some very interesting people and their projects. It is always great to see an airplane in some assembled state shoehorned into various parts of the garage, back room, or basement. The question of “Why this machine?” brings out all kinds of answers: “It looked like it was flying just sitting there on its landing gear.” “It had two seats.” “It had a Volkswagen engine.” “I could build it in the basement.” “It was wood.” “It was composite.” “Something totally new for the homebuilder.” “I wanted to do aerobatics.” “I wanted speed.” “I wanted to feel like Snoopy and the Red Baron.” “I wanted to go Low and Slow.” “I wanted a retirement project!”

History shows that the 1970s were the wood and chrome-moly 4130 steel projects years. Wood projects which are fairly easy material to work with. Chrome-moly 4130 steel tubing and WELDING, which is the subject of the EAA 32 meeting presentation this April, were the main materials of the time.

From what I know of this chapter and its history, the early builders of EAA 32 dabbled in the wood working projects in the 1970s with such airplanes as the Cavalier (which is shown in the pictures here). It looks quite like the project that is being stored in the EAA 32 Aviation Resource Center (ARC) now.

In the 1980s the EAA 32 gang and several of its members had grouped together to tackle Burt Rutan’s Vari-eze plans. Several members had (and probably still do) have Vari-eze fuselages in their project rooms. Mr. Joe Rosa is flying his Vari-eze with the EAA 32 wings that were the project of its chapter members.

With good ole Van’s Aircraft marketing a great RV-3 and then expanding the aircraft line up to the RV-12, life for sheet metal aluminum aircraft has never been the same.

The Quick Build Kit (QB) projects that has the builder doing 51% of the project themselves to finish (which means that 49% is already done!) the project completion rate has really soared. The Quick Build kit has really allowed the aircraft builder to finish their chosen flying machine!

So, for whatever reason they had in their mind when choosing the airplane project of their dreams and with having WICKS AIRCRAFT just 60 minutes east of us

for most of the supplies for the builder and the project, this is a great area and time to be building an airplane.

Next month we will dabble in the building process of constructing an aircraft and talk about the EAA TECHNICAL COUNSELOR program which helps those daring souls hiding in the bowels of their humble abode,

building a beautiful project to get the needed help, so that some day, hopefully soon, they will strap on to their bodies, their aero machine (that will be discussed in THE FLIGHT ADVISOR program talk) and slip the surly bonds of this earth.

Q? With every one pound removed from a jet liner xx gallons are saved each year?

20 gallons of fuel

Q? The new winglets on the 767-300 allow an increase of how much payload?

12,000 pounds.



# Go Fly A... You Know

by Dave Deweese

Sorry about the lack of an article last month, March blew past too quickly. Some beautiful weekends inspired the author to spend most of his time and effort outdoors, then suffer during the work week while his body reminded him that he had done little strenuous work over the winter. April showers, however, have made for soggy conditions that limit yardwork, so there is time for keyboard work.

Warm air brings open cockpit planes out of nearby Creve Couer, a fine looking Stearman rumbled over the subdivision a few weekends ago, re-energizing me as I attacked the dead limbs on my big birch. Come to think of it there haven't been any kites over the neighborhood. Do kids play with such things anymore, or have they become passe' in the face of a wave of ready-to-fly R/C planes? Granted, I would have loved such gadgets as a boy, though a cheap and simple kite could occupy me for hours.

A company named "Gayla" produced a line of delta-winged kites that looked like undersized hang glider wings. Though our yard was not gigantic and had its share of obstacles, it didn't take too many tries to get one of these things into the sky where it would dip and turn in the gusting Spring breeze. One of mine had long streamers attached to the wing tips that traced the kite's maneuvers. Another was all black with two stickers suggesting eyes. I constructed a miniature aerial observatory of cardboard and clear plastic, tied it to the string near the kite, then held the tether looking up and imagining myself up in the sky looking down.

A book about balsa airplanes described how one might construct small gliders with paper clip hooks on their noses, loft them on a kite string, then turn them loose. After all my work they would have landed several blocks way, probably, where some less industrious kid would get his dirty mitts on them, so I never tried them out. I felt that way a few years later when finally old enough to buy some big rockets for the Fourth of July. The spent ammunition would have looked so good on my dresser.

Grandma had a better area for such endeavors: the farmer's field behind her home in Brookston, Indiana. I picked up a kite and balsa glider at the corner drugstore, modified the plane with a hook on the nose, then sent it up into the ether. A couple of jerks on the line and it was free to descend for several minutes. It was far enough away from the kite when a passerby noticed it that he could not imagine how I got the thing so high up. There were a few more good test flights, then a towering oak grabbed the plane and held it in a high branch, where it stayed as a testament to my cleverness.

I might have spent quite a bit more money that day on a more elaborate kite and plane, but would not have had any more fun. It's good to remember such tales when embarking on the kind of hobby that tempts you to spend as much money as you can earn. KISS: "keep it simple, stupid," and you can fit cheap in there as well, as long as you do not skimp on safety. Let's say "keep it cheap, kiddo, and simple, stupid."

You can work out the abbreviation for yourself, I'm not sure you can print that in a G-rated newsletter.

Until next time, Happy Contrails!

(Do335)Dave



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