Greater Savannah Chapter 1514
EAA, Inc.
Newsletter
Volume 9, Issue 8
September 2015

"To promote, encourage, and facilitate in a harmonious and inclusive manner all recreational aviation activities with an emphasis on education, safety and fellowship".

Message from the President

By Keith Gay

Hello, my fellow aviation buffs and buffettes!! I trust that you have been getting in your deserved blue sky time, or the extra time you need to work on "the Projects'" that will take you there.

My apologies for missing the last meeting; my parental duties were in full swing and the family needed me to be present. How is that for a little drama? I hear that Gary did a fantastic job facilitating the meeting and that our long lost friend Avril made it out, and on top of that it was an incredible presentation. It is truly a blessing to have good people on this team to keep things running smoothly, and keep it interesting for the group.

We will meet in our usual resting place, Lovezzola's Pizza, at 6:00 pm and if all goes well, we will start the presentation at 6:30pm. Don't forget to bring your cash to the table for the new "EAA Chapter 1514" logoed t-shirt and maybe even a logo decal to proudly display on the back window of your favorite ride. I look forward to seeing you all there, and don't forget to bring a "Sim Buddy" along for the adventure.

Below: Chapter Secretary, Doug McKissack, modeled the new Chapter 1514 shirt at the August meeting.

Upcoming Programs and Events

Gary Arms, Program Chairman

September 1, 2015: Will White will be making a presentation about the Design Group, beginning with a brief recap of the Jet project, then focusing on the current VW-powered project. Topics discussed will include the aerodynamics, the structure, and the performance of the two airplanes and flying their simulations in X-Plane.

October 6, 2015: Florida resident Jeff Guy will be with us to discuss powered parasailing. He will bring his gear and some videos to show.

November 3, 2015: Ed Wischmeyer will give a presentation on Airventure 2015, including Grand Champion aircraft winners.

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EAA Chapter 1514 meets the first Tuesday of every month at 6:30 PM at Lovezzola's Pizza, (328 US Highway 80, Pooler. 912-748-6414) or at an offsite location as dictated by that month's program. The meeting will take place at Lovezzola's.

The September 1 speaker will be: Willard White
See **Upcoming Programs** for details.

The deadline for the October 6, 2015 newsletter is: Close of Business, September 25, 2015.

Design Group Minutes

By Will White

August 11, 2015

Attendees:

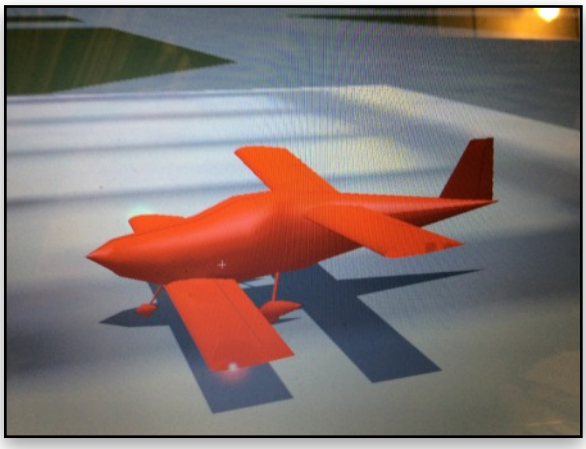
Doug McKissack
Ed Wischmeyer
Esteban Villa
Willard White

We didn't feel like we had a quorum, so we talked in general terms about three alternative projects, with finishing our present project being alternative number one. Alternative number two is an 84 cubic inch Continental-powered two-place airplane. Alternative #3 is entering the EAA's Loss-of-Control prevention contest. The discussion became one about estimated cruise performance, so we went through the methods I used to estimate cruise performance for the three alternatives. Here is the Reader's Digest version:

(The Equivalent Flat Plate area is a way of comparing the total drag of various airplanes; it includes induced drag, parasite drag, landing gear drag, cooling drag etc.)

1. Estimate the EFP area of an RV-9 by estimating the thrust at 75% power at 8,000 feet.
2. Adjust the result for differences in configuration and construction.
3. Then adjust the results for size.

1. We estimated that the 118 HP version of the RV-9 makes 88.5 HP at 8,000 feet; the brochure says it will cruise 167 smph. With 82% prop efficiency, thrust worked out to be 163 pounds. Dynamic pressure (Q) is 57.0 pounds per square foot. Dividing 163/57 returns a pretty good estimate of the RV-9's



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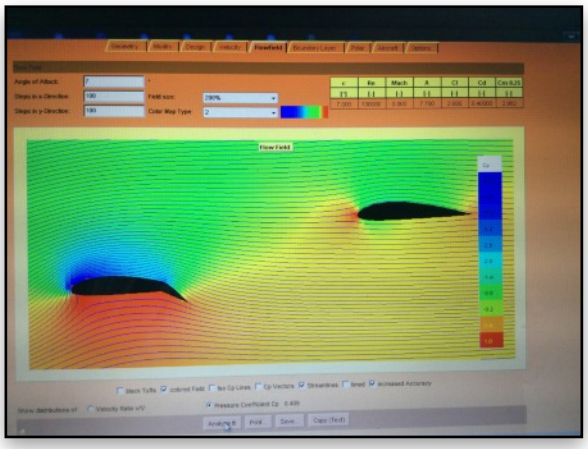


EAP: 2.9 sq. ft. We passed around a list of well known (and some not so well known) airplanes and the EAPs for comparison purposes and 2.9 seems reasonable. The Coefficient of total drag per sq. foot of skin works out to be .0063.

2. The RV-9 is built with flush solid rivets which are slightly more aerodynamic than our flush pulled rivet construction, and, though our cockpit at 40" wide is about the size of the RV-9 cockpit, when scaled down (RV wing is 124 sq. ft., our VW project wing is 66 sq. ft.) our cockpit/fuselage is proportionally much larger. Bottom line: We increased the total drag Coefficient by 10% to .007 to account for these differences.

3. Applying .007 * 251 square feet of skin returns an estimated EFP of 1.75.

Starting with 65 continuous HP at sea level, we estimate 93.5 pounds of thrust at 160 smph at 8,000 feet. Drag at that speed and altitude and 1.75 EFP works out to be 92 pounds.

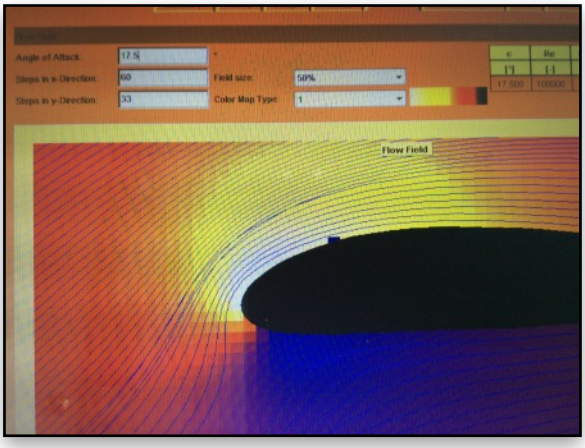
We applied the same logic to the Continental 84 airplane (72 sq. foot of wing) and came up with 122 smph cruise. The No Stall/No Spin tandem wing airplane (with 85 square feet of wing) came out at 155 smph.

We discussed the challenge of getting the BEW of the Continental 84 airplane down to 400 lbs. (Firewall forward weighs just over 150 pounds, leaving less than 250 lbs. for structure.) Also, designing and then welding up an engine mount, and creating a cowling from scratch for the airplane are pretty big tasks.

The Loss-of-Control contest entry is an opportunity for us. I presented a sheet-metal and tricycle gear tandem wing option for discussion. A properly loaded normal category tandem wing airplane cannot be stalled and spun. Ed reminded us that the original Ercoupe could not be stalled - it was elevator limited.

We discussed using a microcontroller to generate a horizontal light line across the cockpit to help a pilot who flies into unintentional IMC conditions maintain control. This isn't a new invention, it may well be patented, but in an airplane which will not stall, the pilot can concentrate on maintaining wings level without having to worry about speed control.

We concluded the evening by trooping across the airport to inspect Ed's RV-9A. What a beautiful airplane! Ed showed us a cockpit worthy of a Gulfstream with dual flat screens which present vertical and horizontal information along with EGT, CHT, etc... The system records all of the results once per second for later evaluation and troubleshooting if required. While Ed was justifiably proud of the instrument panel, Doug, Esteban and I were measuring the width of the cockpit and trying to understand how the mail landing gear loads were transferred to the main spar. It is an elegant airplane; it is quite apparent why the RV airplanes are so popular.



August 25, 2015

Attendees:
Doug McKissack
Patrick Lloyd
Arman Metamedi
Esteban Villa
Willard White

We're delighted to have Patrick Lloyd join us. Patrick is an Electrical Engineer who understands micro-controllers and their potential.

The first topic was the EAA no-loss-of-control contest.

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Ideas included:
Developing a device to force coordinated control, thereby preventing a spin during a stall.
Better handling qualities; insuring that a stall begins at the root of the wing.
Electrically modify the stall warning system to give an earlier warning of high angle of attack; this would be a higher pitched and intermittent warning which would be distinguishable from the constant sound of the actual stall warning.
Heads Up Display which keeps information like airspeed in front of the pilot even as he is looking around for traffic. Google glasses could be adapted for this purpose.
Inexpensive AHRS using a micro-controller, three-axis accelerometers and a cheap 3x5 display.
Wolfgang Languische's silver chain or any other simple device to limit up elevator travel.

The device with the most potential, we think, was an Angle Of Attack system which begins to audibly call out AOA when it gets to perhaps 12 degrees. This turned out to be more difficult than we thought. Discussion began with the weather vane with a wiper attached to the leading edge of the wing, sending information to an on-board micro-controller. We considered pressure sensors fastened above and below the leading edge of the wing and a micro-controller programmed to compare the pressures. The problem is accuracy. The system needs to know the flap position. Between providing power to the sensor, and the need for information about the wing configuration complicates this project beyond our initial assessment. I'll do some further Javafoil research into airfoils and flaps and bring some illustrations to our next meeting. This issue isn't dead, but it's badly wounded.

There wasn't much enthusiasm for designing a sheet metal tandem wing airplane which would not stall or spin. One surprising aspect that occurred was the extra bulkheads and frames required to carry wing spar loads, engine mount loads and landing gear loads. When the spars were aligned with the firewall and the seat-back bulkhead, the cg was too far aft. Doug suggested we sweep the wings aft 5, 10 or perhaps even 15 degrees in order to align the spars with handy bulkheads. This is a whole new world aerodynamically and structurally. I'll do some research and bring it back. This project also is pretty much tabled.

The consensus was that we want to continue to develop our VW two place airplane, the one we've been working on for twenty months or so. Even though it is four or five times more expensive, the VW has more universal appeal than the Continental 84. We'll get back to work by reviewing the airplane specifications with an eye on practical manufacture. We began that process and decided to remove the Continental O-200 engine from the specification. That engine weighs about 249 pounds installed and filled with oil, which makes it very difficult to accommodate the 171 lb. VW on the same airframe. On line two of our specifications specifies Utility category. Utility category requires 4.4 g positive loading. We decided to redesign the wing for Normal category; 3.8 positive and 1.9 negative gs. Limited VW power will also have the benefit (?) of reducing cruise speed so that gust loads won't be an issue. We expect the wing to be significantly lighter as a result.

As a group, we still have the same limitations: No draftsman and no place to work. As we proceed, I'll try to improve my Turbocad skills – patience will be required. On a more uplifting note, Esteban said he might soon have some space we could use for assembly. We discussed space at MavenMakers at length. It seems expensive at perhaps $50/month each, but it is air conditioned, well lighted and (mostly woodworking) tools are available. The space is available 12 'til 9 weekdays and 9 'til 9 on Saturday. MavenMakers expect to have a 4' x 8' CNC router available (in Statesboro) in about a year. We agreed to have our next meeting at MavenMakers so we can all have a look at it.

We wrapped up at 9 pm. Thanks for all the participation. We'll see you in two weeks at MavenMakers that is at 415 W. Boundary St. at the back end of the building.

Photos and graphics courtesy of Will White.

VW Engines

By Bob McDonald

"I just got through polishing my plane. It was a LOT of work but it looks so much better now that I'm thinking of rolling the designation from S-22 to MacDonald S-CW. What do you think?"

Since it appears that VW engines are the subject-du-jour, this may be a good time for me to jump in.

I've had some issues with my Great Plains VW conversion, some of which I have solved and one which is still in work. I'll run them past you in case you are interested (and in case you have some advice).

The GP engine doesn't have either an oil filter or an air-oil separator.

The filter is very desirable, I am told by the VW expert who got me back into the air for good after my loss of oil episode, and there are several after-market ones available. I chose one that bolts to the case at the oil pump so I wouldn't have to have any hoses that might cause problems. I did have to make a small bulge in my cowling to accommodate it. It uses an automotive filter element.

(The VW expert, Norman Sherrod, Tillman, SC, 843-726-5744, also fixed me up with a larger oil cooler than the original GP one, and I was glad I had it several weeks ago, flying in 100 degree weather.)

The bottom of my plane was always covered in oil from the breather line which I had routed out at the bottom of the firewall. The homemade separator (which I made using a Nevr Dull polish can) fixed that problem completely.

My loss of oil event was caused by my inability to consistently seat the valve cover gaskets. The best result that I was ever able to achieve was a slow drip on either side. The worst was having a segment of seal become displaced in flight and losing oil pressure. I cured this by tack-welding a strip of sheet metal that supports the inside edge of the gasket in the same manner that the flange on the valve cover supports the outer edge.

What with the air-oil separator, the dry valve covers, and the vast experience gained with case sealing compounds as I assembled and disassembled my engine many times (the best is Permatex 518 anaerobic gasket maker), I now have a completely drip-free engine.

I found that 100LL avgas with its lead fouls the combustion chambers and causes valve sticking to begin at about 100 hours. This requires that the heads be removed and cleaned up, a process that I've done twice. In both cases the sticking lasted for no more than a minute or two, but as it was in flight and as it produces a lot of shaking, I had no choice but to ground the engine and take it apart.

In my opinion, Steve Bennett should warn his customers against using 100LL.

My current solution to this problem is to use mogas (auto gas without ethanol) which is hard to find and which must be schlepped from the filling station to the airport in my car in 5 gallon cans. It's actually working out pretty well now that I have the routine down pat, but of course on cross-countries, I still have to use 100LL. I've started a column in my engine log book that keeps track of gallons of avgas used. Let's see: 100 hours at 3 gallons per hour - I should start worrying at 300 gallons. That's a long time off . . .

My hangar mates use mogas in their RV-12 with its Honda Viking car engine.

I must say that it's only now after putting over 200 hours on the engine and having overcome the above problems that I am beginning to feel confident about it. Hence, as I told you earlier, Will, I'm now up for some longer trips over some fairly rugged terrain.

What is the moral to this story? I'm not sure, but if pressed, I might say something like: "The engine is the last place that you ought to try to save money", or maybe, on a more optimistic note, "The more you know about your engine build-up and operating procedures the better off you are."

Right: Bob recently flew his S-22 over the Grand Coulee Dam.