



EAA Chapter 1541 Newsletter February 2016



Volume 1, Issue 2

Wings & Words

Editors Corner

Well, we made it through Volume 1, Issue 1 and we hope that you liked the result. The Newsletter is still a work in progress, so your comments and suggestions are certainly welcome. We're also looking for members to step forward and contribute to the effort. We'll be doing monthly columns on member profiles, maintenance, builder's experiences, general aeronautics, and of course words from our club president; if you have an idea for columns or articles of interest, please step forward and let's build on those ideas. We'll also be stealing (oops, I mean borrowing, with appropriate recognition) from other club's newsletters.

Something that always enlivens any communication is pictures. When you're out and about, snap a few: aircraft, members hanging out or at functions, aerial shots, etc. Reasonable pixel quality is sufficient.

The February General Membership meeting (Cattleman's Restaurant – TUESDAY February 15th) will include a poignant, and eminently useful to we pilots, presentation by area pilot Brian Brown. An excerpt from his introduction to another group: *"It was Memorial Day 2012 when fire captain Brian Brown, his wife, and daughter gathered together to fly his private plane from Lodi, California to Idaho to visit his eldest daughter. But what was planned to be a wonderful family gathering turned into a nightmare when Brown encountered turbulent weather and the plane crashed into an isolated Idaho mountainside."*

Brian Brown articulates in great detail the fateful events that led to his plane crash and the unforgettable 15 hours of danger, rescue efforts, and miracles that ultimately ensured their survival. Brian does all pilots a great service by sharing his story.

Richard Pearl
Chapter 1541 Secretary & Newsletter Editor
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President's Corner

Why I believe Pilots are very special people.

Here is an interesting conversation starter for you to try some day. When you are seated at a table with several people ask "What did you love to do, or dream of doing when you were 10 to 14 years old? The answers you get might surprise you.

Several years ago I was seated at a table of about 10 people when someone asked that question. The question is unique because when we were that age we didn't think about how to make a living and other "necessary" duties of life. Back then, first and foremost, we were pursuing our dreams and followed our heart. For most of us our passion was well known.

As those of us at the table thought about and described what we loved back then, one person at the table couldn't answer the question and she was obviously upset that she didn't know. About the time that everyone answered the question she suddenly remembered and shouted out "I KNOW, I KNOW I REMEMBER!!" Everyone was shocked by her response. She said "I wanted to throw pots!" What just occurred was a simple reconnection she had with herself in front of us all. She went on to say "I am going to sign up for pottery classes!" She was holding back tears. The rest of us at the table witnessed something rare, she discovered a missing part of herself and we all felt her joy.

I have found that, more often than not, if that question is asked of a pilot the answer is immediate and predictable. You see, we as pilots never lost the passion we first felt as far back as grade school. As for myself, building model airplanes was one of those passions. I even built a giant wing (in the 8th grade) and jumped off the roof of my house! Yes, I experienced my first crash (without injury other than a bruised ego), it would be 6 years later that I had my 2nd crash. This time it was in a hang glider (and a broken arm). But the Passion for flight remained. My point here is that my love for flight never changed. I'm 62 years old in February and I am fully aware that there is a 12 year old boy that is very much alive and well in me as much today as back then in 1966. My belief is that I am not at all unique among us in our EAA family. I feel that same passionate spirit in everyone in our group and what is fun to see is no matter what age we may be, we seem to have the same youthful spirit for flight, and that is just about as good as it gets.

Happy landings,

Ron Wright
President



1541 Event Calendar – 2016



February:

- February 3 (Wednesday) – EAA 1541 Board of Directors meeting, Pizza Roundup, 6:00pm
- February 16 (Note: Tuesday) Cattlemen's Restaurant; bring your partner. Speaker – Brian Brown
- February 20 (Saturday) – KLHM Historical Aircraft Display Day (also cheap fuel)

March:

- March 2 (Wednesday) – EAA 1541 Board of Directors meeting, Pizza Roundup, 6:00pm
- March 16 (Note: Wednesday) - Richard Bristow's hangar; bring your partner. Speaker – Richard Bristow. General meeting starts at 6:00pm, dinner at 6:30, presentation at 7:00. Richard will talk on his flying for Scientific Aviation collecting air samples from 200ft AGL to FL250. More on this in next month's newsletter, but plan on attending this great presentation.
- March 19 (Saturday) – KLHM Historical Aircraft Display Day (also cheap fuel)

Upcoming Major Club Events:

- May 14, EAA 1541 Poker Run, originating from KLHM
- June 11, Lincoln Regional Airport AirFest 2016

Ongoing (non-Lincoln) Events (note – this section will be building as we go forward; if you know of an event that should be added, please advise).

- 4th Saturday of each month – Rancho Murietta Airport (KRIU) Chapter 1476 Historic Aircraft and \$5 Lunch, 9:00am – 1pm, and 11:00am – 1:00pm respectively

Club Executive Roster



Officers:

- President – Ron Wright (ronpw@hotmail.com; 916 240 5980)
Vice President – Ken Schwartz (ken.schwartz@att.net; 916 355 1101)
Secretary – Richard Pearl (pennyrich@aol.com; 916 715 9666)
Treasurer – Jim Hughes (jim.hughes@att.net; 530 432 6608)

Board Members:

- Bruce Estes (brucee7837@aol.com 650 504 4464)
Tony Kasabasich (tonykasabasich@yahoo.com 916 806 8575)
Tom Lieb (tlieb1@earthlink.com 530 432 6608)
Bob Miller (bmillerpharmdmba@gmail.com 916 253 2667)
John Perry (john.perry@tqhaviation.com 530 320 2247)
Richard Ryan (k6hnc@yahoo.com)
Dug Smith (dug@dugbert.com 916 850 0309)

Members Spotlight

This month's spotlight is on Ken Schwartz.

Ken is not the man he once was...but more on that later. Ken, one of the founding members and first president of EAA 1541, is currently our Vice President. Ken is always doing something to help our chapter, and is a source of good financial advice to keep our chapter going in the correct direction, financially. If EAA 1541 has an event, Ken always seems to be involved. (Ken, can we clone you)?

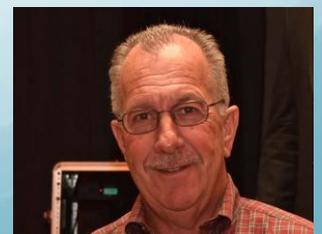


Ken started flying in 1989 and took his first solo flight with only 3.9 hours of instruction. He currently holds a Private Pilot License, Land, with an add-on rating of Powered Parachute, Land. Ken has approximately 550 hours to his credit. He has owned several ultralights, powered parachutes, powered para-gliders, 6 certificated aircraft, 6 experimental aircraft, and is currently building an RV-6A at Lincoln. Ken's first airplane was a Mooney M20E. Ken is now a new owner of a Flight Design CTSW Light Sport and will soon hold a Light Sport Repairman's certificate and be a Rotax factory certified Technician.

Ken worked for many years in law enforcement, including Solano County Dept of Corrections (where he retired), Yuba City Police Dept, and Sutter County Sheriff's Dept. Ken currently works for ATT Wireless as an I.T. Tech supporting their wireless stores. From law enforcement to tech, plus having a pilot's license. What a great, full life. And, Ken is only 54 years old so he's not even close to being done.

Earlier I wrote that Ken is "not the man he once was". Ken has embarked on an aggressive weight loss program, losing 70 lbs in 7 months. This will definitely affect Ken's weight and balance calcs for airplanes. Way to go Ken.

Bruce Estes



Builder's Corner - Marty Maisel and the Cavalier SA102.5 Project

I started flying shortly after I graduated from college, got married and got a job. As with many private pilots flying was a passion, but expensive, and it had to get in line behind family, mortgage, car payments, etc. In 1970, after working 10 years in the aviation industry (first Hamilton Standard (propellers) and then Boeing Helicopters (VTOL aircraft)) I moved to California when the opportunity arose to work at the NASA Ames Research Center for an Army aviation research organization.

While living in San Jose I initially flew out of Reid Hillview Airport, renting tail draggers from Amelia Reid. Hoping to reduce the cost of flying and accumulate more flight time, I bought a share in a Piper Cherokee 140 based at SJC. Things went well for a while -- until I encountered some maintenance issues. I realized that this relatively large group of owners was not the perfect arrangement for a safe airplane – so I sold my share.

It was clear to me then that to fully control the maintenance of the aircraft, I would need to be the sole owner. But, oh yes, I remember now - I couldn't afford to buy a flying certificated airplane. What to do? No problem – I'll just build one. Good idea, yes?

It's somewhat embarrassing to report that my bright idea to build an airplane happened in the late 1970s. At the time composite homebuilts were the latest rage (the "kit" revolution hadn't occurred yet). Reports of builders having to give up their projects because of allergies to the epoxy adhesives scared me away from that material because of my history with allergies (the usual stuff). I had no welding experience and the sharp edges of aluminum sheets looked dangerous (I hate the sight of my blood) so I didn't choose to build a metal project. With years of balsa model building behind me, I thought my natural choice would be a wood airplane. After all, it was good enough for the Wright brothers, wasn't it?

I selected a conventional-looking (engine in the front, tail in the back) two-place design called the Cavalier SA-102.5. This aircraft was based on the Minicab which was developed shortly after WWII by French designer Yves Gardan. The Minicab structure was strengthened for higher power engines and the resulting higher speed and modernized with a swept-back rudder and tip tanks by Canadian Stan McLeod. I bought my plans from Stan (and, amazingly, we are still in touch). I've included a picture of a completed Cavalier, for members who may not be familiar with this aircraft.



Since this was my first airplane project, I spent some time researching material sources (including a visit to Flo Irwin at the start-up Aircraft Spruce when they were in Fullerton, CA) and studying wood adhesives. In the good tradition of an “engineer” I selected FPL-16A (a two-part epoxy adhesive developed by the Forest Products Laboratory, a research entity of the U.S. Department of Agriculture) based on available comparative stress/performance data. As with all epoxies I use protective gloves during gluing and, to date, I have not had any allergy problems from this product.

I finished the empennage and fuselage structure in the early 1980s. That was when the FAA GADO (General Aviation District Office) would send inspectors to the site where the airplane was being built. I got my tail surface structures signed off in my garage by the GADO inspector before skinning. (I figured, since I was an “aircraft builder”, that if the FAA goes to Boeing, they should come to my house as well). Later, the huge growth of homebuilt aircraft starts caused the FAA to abandon interim inspections, resulting in the EAA Tech Counselor program.

Well, I learned a few things about building an airplane since then – including “life gets in the way”. My work (as in how I got paid) involved lots of travel and lots of time away from home – not good for making progress on my project. While still involved with a busy work schedule and the usually family commitments, the Cavalier project became dormant for the better part of two decades.

But, there is always hope. I retired in 2002 and the dusty airplane parts came with me when I moved to Lincoln (my wife liked the house, I liked the three-car garage). After taking some time to get settled, I restarted my building effort.

The first big challenge in my resurrected project was the fabrication of the wing forward spar – a 24.5 ft one-piece box structure employing caps made of multiple laminations of spruce and plywood webs. The gluing of the laminates in one operation required a coordinated effort by several people. One of the great gifts that EAA Chapter members have is the wonderful assistance of fellow members. My spar was fabricated during several sessions with the skilled help of EAA friends and a neighbor. Another “truism” I learned at that time is “you can never have too many clamps”.



Cavalier forward spar, prior to application of web plywood

While working on “real” aircraft projects I learned that engineers never seem to be content with the current design. That’s why they have management who force the design to be “frozen” at some point. I don’t have anyone telling me to freeze the design, so I seem to continue to find things that “need” to be changed. Among the changes from the original drawings are: elevator and aileron push-pull tube activation instead of cables, electric pitch and roll trim tabs, flap torque tube linkage instead of cables, dual control sticks instead of a center stick with “Y” handles, slotted flaps instead of split flaps, “gull wing” cabin doors, a modified rudder control linkage, and provisions for mass balance weights on the ailerons. Another deviation from plans is the use of a tail wheel instead of the nose gear. This change was prompted by reports of several Cavalier nose gear problems (ranging from shimmy to structural failure), although many Cavalier owners feel their nose gear has performed very well. The main landing gear brackets, made of thick 4130 steel, were bent (with considerable effort) on Ken Ledwith’s heavy-duty bending break – thanks Ken.

A valuable benefit available to EAA members is the Technical Counselor program. Several Tech counselors from Chapter 526 inspected my airframe structure during the building process.

After the wing was built up behind the forward spar, I assembled the wing, stabilizer and elevator to the fuselage to align all components, drill mounting bolt holes, verify proper control range of motion and to detect and clear any control component/structure interferences.



“Fit-check” assembly. Does it look like an airplane yet?

The next task was “skinning” the wing. With all control, fuel and electrical components installed the partially skinned wing is shown below.



All plywood joints had to be “scarfed”, that is the intersecting skins are cut at a 12 to 1 slope (or better) to achieve a structurally adequate joint.

One of the unusual features of the Cavalier design is that all of the fuel is contained in wingtip tanks. I like not sharing the fuselage with a fuel tank. The fiberglass tip tanks are fabricated on a male mold in two main sections with internal bulkheads.

The next photo shows a partially completed tip tank. The upper and lower sections of the tank are joined at the overlapping horizontal seam. Fuel is contained between the first and fourth bulkhead seen as the vertical lines (dark due to the use of a different epoxy).



The interior of the tanks was coated with Jeffco 9700 fuel tank sealer to avoid deterioration of the epoxy in the event that fuel containing alcohol is used.

The completed tip tanks were supported in a frame attached to the wing tip to establish its proper orientation while the fairing connecting the tank to the wing was fabricated. It is estimated that the tip tanks will hold about 16 gallons of fuel, so that results in about 100 pounds hanging off the end of each wing.



Tip Tank Positioning Frame



Tip Tank Fairing

After I moved the project to Lincoln airport the aircraft was covered with Dacron, using the Stewart System adhesive. I switched to Polyfiber products for UV protection and the base color coat.

I decided to use polycarbonate (Lexan) material for the windshield because of its shatter-resistance and ability to be cold-formed. The downside of polycarbonate windshields is that they are easily scratched. The windshield is not permanently installed yet but the next photo illustrates the windshield/fuselage contour.



The instrument panel is set up for primarily day, VFR operations (but I do have position lights and a strobe).



On the main panel, basic flight instruments are clustered on the left and the radio, transponder and circuit breakers are on the right. The lower center panel contains the fuel gauges (with the associated electrical fuel pump switches) and the engine CHT and EGT gauges.

I acquired a Lycoming O-290D2 engine from a fellow Cavalier builder in Minnesota. It had been recently overhauled and has a Lightspeed electronic ignition in place of the left mag. I will be using a 74" Sensenich propeller with a 57 pitch. That prop/engine combination has flown on several certificated aircraft.



That's Jack Parks under the hood welding my engine mount.

After the engine was mounted I made a fiberglass cowl over a foam form applied around the engine. To my surprise the cowl turned out to be a labor-intensive task, but after many moons, I think I finally got it right. My philosophy is "don't let the inanimate object win".

Recent work has focused on firewall forward stuff – electrical, fuel lines, baffles, ducting, instrumentation, etc.

Here's a general view of how the airplane is looking these days:



Well I may not be setting the record for the longest time to build an airplane, but I'll bet I'm a competitor in that field.

I have been fortunate to have had the counsel, guidance and encouragement of a number of fellow builders at KLHM. Among them I owe a special thank you to Dick Rupe, Lee Graybill, Ken Ledwith and Jack Parks.

Years ago when I mentioned to someone that I was building an airplane, he asked: "Isn't that a big job?" My answer was "No, it's not a big jobit's an infinite amount of little jobs." It's also great fun.

Marty Maisel

Maintenance Corner Feb.'16 – Jim Hughes



My intention with this series of articles, is to give you pilots/ aircraft owners some useful, practical information that you can use to test critical components and systems and keep your aircraft reliable and airworthy.

So, from last month, did you preflight your battery ?

Get a multimeter ? install a voltmeter ?

(if not, we'll have 3-4 of these at the Poker Run raffle)



So now you should know how to use these, run the tests, and are sure your battery is good-to-go!

This month we'll move on to... **Regulating Your Voltage**, and keeping your avionics alive and working well.

Before all the nitty-gritty, let's look at how the 2 important parts work together; the **alternator** and **voltage regulator**.



These 2 parts form a 'closed loop control system' that maintains the buss voltage at the set point, which should be 14.2-14.4 volts, over the range of minimum to maximum loads. If it's not at these voltages, adjust the voltage regulator.

The alternator is an electro-mechanical amplifier. The output voltage and current depend on the engine rpm and the voltage applied to the field winding by the voltage regulator. The Voltage regulator monitors the voltage on the main buss and adjusts it by controlling the average voltage applied to the alternator field winding. The rpm determines the 'amplifier multiplier' -the ratio of the field current to the output current. (3 amps into the field will yield 60 amps from the armature, at the critical rpm of about 1,000 rpm, which we'll test next.)

Engine running, alternator/ voltage regulator check

This is a very important test to run to check the ability of your alternator system to supply your maximum loads !

This test is valid for all aircraft with an alternator or generator, whether it's certified, experimental, using pma or non-pma parts...!! Running this test on DC generator equipped aircraft will probably show the 'cut-in' rpm will be in the 1,500 rpm range, or higher.

- Start your engine and note the buss voltage, (14.2 -14.5V). It should rise to a stable voltage once the ammeter is close to '0' charge, 1-2 minutes.
- run the engine until it will idle, 500-600 rpm.
- Verify voltage is still close to the voltage above.,
- Turn on max loads – landing light, pitot heat, position, beacon lights, to get about 20 amps or more discharge.
- The alternator will not be able to supply the loads at this rpm. So, the voltage should drop to about 13 volts, or less.
- Note the voltage. If it's in the 13 volts range , the ammeter should be showing a discharge.
- Now, slowly increase the engine rpm until the voltage rises to 14.0 volts , and the ammeter is showing a charge, or is at least at '0'. [positive = needle right of the center '0' marking]. You can repeat this step a few times to get an accurate rpm.
- This rpm should be less than 1,000 rpm. Write this rpm down for future tests and the loads applied.
- If it is much above 1,000 rpm, 1,500 or more, turn off a load – pitot heat or landing light.
- If the voltage is still below 14 volts, or the set point, there is an issue with the charging system and trouble shooting is needed to determine the cause.
(my Cessna with a 50 amp alternator; 900 rpm =14V with beacon, LL, pos lts , radios, transponder, pitot heat. Without the pitot heat, 750 rpm = 14V.)

If it's not right – troubleshooting (we'll cover this next month)

Inspections and tests;

- Belt tension and condition [Lycoming]
- all connections - alt, Vreg, alt contactor, current shunt, alt sw, ckt brkr, buss
- tests; chk voltages, at alt fld term. Alt sw, contactor [if installed],

Answers next month...

What to do if you have an electrical failure ?

- cycle the alt switch
 - check that the field and alt. breakers are 'IN'.
 - If no joy, turn off big loads – lights (LL, pos lts, beacon, transponder)
Leave the radios on. They only pull ½ amp each on 'receive'. Your battery can run these for 8 hours or more. Transmit as briefly as possible ; 5+ amps in 'transmit'.
- Next month we'll diagnose what's failed and determine whether to *repair vs rebuild vs replace* (which is A&P work), and which of those 3 'words' you use matters!

Why you should use an alternator vs that old generator

Note: most aftermarket alternators are less reliable than the 3 original equipment alternators; Ford type, Chrysler and Prestolite. The OEM alternators will run 3,000 hours, while many of the aftermarket units are failing at 200 to 900 hours..!!

The advantages of using an alternator;

- Capacity of 50 to 100+ amps at 14 volts



Note: select an alternator so that you only run it at less than 60% of it's rated capacity. (30 amps for a 50 amp unit). excessive heating will kill an alt and it's diodes.

- Reliability (after market alt are less reliable that OE alts.)
- Life – alternator, about 3,000 hrs., vs a generator, about 1,000 hrs.
(repairs usually means only replacing the brushes)
- low rpm output – full output at 1,000 rpm or less. Most generators require 1,500 rpm or more.
- Noise – switching a 5 amp field circuit vs 30-50 amps of generator armature current.
- Weight – a few pounds less for an alternator.

Extra credit... What 4 things are wrong with the wiring in this picture ?

