Runway 15

The Monthly Newsletter for EAA Chapter 1541, Lincoln, California

March 2017

Briefing Strip

• **Chapter dues** of $20 (per calendar year) are now well past due for 2017. Members can pay using PayPal, with check or with cash. Dues are tax deductible since we are a 501[c]3. See Jim Hughes to pay your dues, or go to the chapter website to pay via PayPal.

• Set aside the date for the March chapter meeting, to be held on **Wednesday, March 15**. The presenter will be Brian Shul, USAF combat and SR-71 pilot, and author. Meeting will start at 18:00 at Cattlemens Restaurant in Roseville.

• EAA Chapter 1541 will be providing volunteer support for the Lincoln AirFest to be held **Friday-Sunday, June 9-11**. Jim Hughes is coordinating our chapter volunteers. Ramp support volunteers will be needed. The chapter will organize pancake breakfasts on Saturday and Sunday also.

• Head's up that the **Rancho Murietta airport** (KRIU) is now charging a $25 landing fee for all piston singles, and it goes up from there. Only full-stop landings are allowed, and each landing will be billed to the pilot directly or, if that is not possible, to the registered owner. Transient parking is $10, waivable if 15 gallons of fuel is purchased. Might thin out the aircraft at display days a bit.

• **B-17 Fan?** (Isn't everyone?) Two B-17s are touring in the area, selling Flight Experience rides. The Liberty Foundation B-17 *Madras Maiden* will be at Mather Airport (MHR) over the weekend of March 18-19. During the same weekend, the EAA B-17 *Aluminum Overcast* will be operating from the Nut Tree Airport (VCB).

Calendar

Wednesday, March 15: Lincoln Airport Committee Meeting, 09:30 am in the First Floor Meeting Room at Lincoln City Hall.

Wednesday, March 15: EAA Chapter 1541 Member Meeting at Cattlemens Restaurant, Roseville; 18:00.

Saturday, March 18: Lincoln Airport Aircraft Display Day, 08:00-12:00.

Saturday, March 25: LRAA will host a special DART Safety and Awareness program to introduce DART. Starts at 10:30; location to be announced.

Sunday, March 26: Rancho Murietta (RIU) Historic Aircraft Display Day, 09:00-13:00

Saturday, April 1 : EAA Chapter 1541 Pancake Breakfast and a Movie, 08:00-10:00.

Saturday, April 1: Sutter County Airport (O52) Open Hangar Day.

Wednesday, April 5: Chapter 1541 Board of Directors meeting, Beermann's Beerwerks, 645 5th St., Lincoln. Dinner at 18:00; meeting at 18:30.

Saturday, April 15: Lincoln Airport Aircraft Display Day, 08:00-12:00.

Wednesday, April 19: EAA Chapter 1541 Member Meeting, KLHM Hangar S-12.

Friday-Sunday, June 9-11: Lincoln AirFest at Lincoln Airport

For the most up-to-date information, go to the website

http://eaa1541.org/

Newsletter Contributions

Please help make this newsletter better by contributing stories and photos that might be of interest to other chapter members. Perhaps where you flew, what you are building, or what you know about something. A few short paragraphs and a photo or two of your project or travels would be a great contribution. I'll take care of the rest. Please email me (Scott Thompson) at sthompson@aerovintage.com or call me at 916-716-3442.

Tidbit from the AIM

2−1−2. Visual Glideslope Indicators

b. Precision Approach Path Indicator (PAPI). The precision approach path indicator (PAPI) uses light units similar to the VASI but are installed in a single row of either two or four light units. These lights are visible from about 5 miles during the day and up to 20 miles at night. The visual glide path of the PAPI typically provides safe obstruction clearance within plus or minus 10 degrees of the extended runway centerline and to 4 SM from the runway threshold. Descent, using the PAPI, should not be initiated until the aircraft is visually aligned with the runway. The row of light units is normally installed on the left side of the runway and the glide path indications are as depicted. Lateral course guidance is provided by the runway or runway lights. In certain circumstances, the safe obstruction clearance area may be reduced by narrowing the beam width or shortening the usable distance due to local limitations, or the PAPI may be offset from the extended runway centerline. This will be noted in the Chart Supplement U.S. and/or applicable NOTAMs.

Chapter Information

Meetings:

Usually the third Wednesday of each month held at KLHM Hangar S-12. Details available at the website.

E-mail:

lincolneaa@hotmail.com

Website:

http://eaa1541.org/

Mailing address:

EAA Chapter 1541, PO Box 1126, Lincoln, CA 95648

Chapter Hangar:

Hangar S-12, Lincoln Airport

Chapter Officers

President:
Ron Wright (ronpw@hotmail.com)
Vice President:
Tony Kasabasich (tonykasabasich@yahoo.com)
Secretary/Treasurer:
Jim Hughes (jim.hughes1@att.net)

Chapter Board of Directors:

Bruce Estes
Tom Lieb
Bob Miller
Byron Maynard
Bruce Robinson
Dug Smith
Bill Wootton

Webmaster:

Dug Smith

Newsletter:

Scott Thompson (916-716-3442)
(sthompson@aerovintage.com)

Membership:

Open to all. Chapter dues: $20 per year.

President's Corner

by Ron Wright
Chapter President

It's like "fighting city hall;" we've all heard that expression. Its meaning implies slow decision making with layers upon layers of rules that must be followed for reasons that we just don't understand. As an example, if you've ever pulled a building permit to do a home improvement, it always seems to take twice as long because of never ending rules and review of government. Then, finally, lo and behold, the permit is issued and the project is completed and we quickly forget how long the task took.

If you're wondering where I am going with this, I want everyone to understand that the process of purchasing our chapter hangar can feel like fighting city hall. The back and forth by the City of Lincoln trying to decide how they want to move forward seems to be taking a very long time. The Inside scoop, so to speak, is that the final negotiations are done and we are a few weeks (or less) from knowing what our ultimate ownership expenses will be. If you are a Gold Member please keep the faith. We will have ownership of our club hangar soon! If you are a general member, it is very important that you renew your membership now. We need strength in numbers and your membership really is important. If you haven't renewed your membership we need your help right now. Please renew or join the chapter at your first opportunity. Please don't doubt Chapter 1541's commitment. We just happen to be "fighting city hall".

A Great Way to Start A Saturday

Text and Photo by Bruce Estes

The first Saturday of every month is "Breakfast and a Movie," put on by EAA 1541 at the EAA hangar. The menu is pancakes, eggs cooked to your preference, and sausage, coffee, and orange juice. Plus, a LOT of good fellowship. This is a great opportunity to chat informally with other chapter members, and have a generally good time. In addition to regular cooks Dug Smith and Jack White, this month Ken Schwartz helped out with the cooking. Ken is threatening to spend a lot more time in Lincoln. Ken, come on back. We miss you. The breakfast events are becoming so popular that we are thinking of doing them twice a month. So, come on out, buy a breakfast, and enjoy what your EAA Chapter has to offer. You won't be disappointed.

The February Chapter Meeting

The February chapter meeting was held on Wednesday, February 15, at the Cattleman's Restaurant in Roseville. After a short business meeting, a program was presented by Sonya from CalStar, an air medical ambulance company. Calstar recently merged with Reach and others to become AirMedCare. They now serve 32 states . The chapter is still offered a group discount for membership with the cost of $55 per household. For more information about taking advantage of the group discount, Sonya can be contacted at sonja.conklin@airmedcarenetwork.com or phone at 530-648-6455. The chapter also has forms available for subscribing to the service.

March Chapter Meeting

Wednesday, March 15 at 18:00
Cattlemens Restaurant, Roseville

The March chapter meeting will present USAF pilot and author **Brian Shul** as a special guest and speaker. Brian was a USAF pilot who flew 212 close air support missions in Vietnam in the North American AT-28. On what turned out to be his last mission, he was shot down near the Cambodian jungle, and received critical injuries and burns in the process. Though badly injured, he was able to evade nearby enemy forces and was eventually extracted by a USAF pararescue team. His injures and burns meant a long and arduous recovery, but he fought his way back to return to duty as an active USAF pilot, flying the LTV A-7 Corsair II and, later, the Republic A-10 Thunderbolt II. He was then selected to fly the Lockheed SR-71 Blackbird, which he flew operationally until his 1990 retirement. He has since written a total of seven books including his first two, a pair of well received books on the SR-71, *Sled Driver* and *The Untouchables*. He is based at Marysville near Beale AFB, the last operational base for the SR-71.

The March chapter meeting will start at 18:00 for dinner, which is optional for anyone attending. In arrangement with Cattlemens, the menu for those who want to have dinner will be steak, or chicken, or ravioli, or salmon, plus a soft drink or ice tea, for $22, which includes tax and tip complete. The chapter is also asking a $5 donation from attendees to help support bringing Brian to the chapter meeting. Brian's presentation will start at 19:00.

What About Those PAPIs?

by Scott Thompson

The Lincoln airport has a set of four box PAPIs on each end of the runway. PAPIs are the four alternately red and/or white lights arranged in a light bar installed on the left side of both Runways 15 and 33 about 700 feet from the threshold. For many, it might be of interest to get a bit more information about these PAPIs. As a start, PAPI stands for Precision Approach Path Indicator, and it is one of several Visual Glide Slope Indicator (VGSI) systems that are available. Another common VGSI system is the Visual Approach Slope Indicator (VASI), an older design and one being supplanted by PAPIs at many airports. There is a whole section in the Aeronautical Information Manual (Chapter 2, Section 1) about VGSI systems that should prove interesting reading to any pilot, VFR or IFR qualified.

PAPIs are either two box or four box systems; Lincoln has four box systems. The design of PAPIs is such as to give a pilot visual guidance for the desired glidepath which, for Lincoln and most other installations, is a 3.00 degree angle. This angle and the resulting threshold crossing height should match any ILS glideslope and/or an RNAV glidepath for that runway.

The boxes are numbered starting at the runway; the closest box is Box 1 and the furthest box is Box 4. Each of the four boxes is aimed at pre-determined angles that illuminate a red indication while below that angle, and a white indication when above that angle. Thus, an on-path indication is below the angle for two of the boxes (boxes 1 and 2) and above the angle of the other two boxes (boxes 3 and 4), so the PAPIs will display two red lamps and two white lamps to the pilot on the desired approach path. Three red and one white lamp indicate below path, and four red lamps indicate well below path; the opposite is true for above path indications. The two box PAPI systems are simpler and have just two lamps for guidance. They do not provide as much information but are useful for shorter, non-instrument approach runways.

Information for installed PAPI systems is found in the FAA Chart Supplement (ex A/FD) and other airport information sources like AIRNAV. For example, the Supplement entry for KLHM for RWY 15 is **PAPI(P4L) GA 3.0 degrees, TCH 44'** which informs that the PAPIs are a 4 box system installed on the left side of the runway, has a glidepath angle of 3.00 degrees, and the threshold crossing height is 44 feet. A lighting note adds that they can be activated on the CTAF frequency at night.

Installation criteria for VGSI systems is contained in an FAA Order, JO 6850.2, and there are also several FAA Advisory Circulars that assist in the siting and technical details. One of the requirements for installation is that there should be no obstacles, whether terrain, trees, or man-made, that penetrate an imaginary surface that is established one degree below the angle of the number 3 PAPI box. For a 3.00 degree PAPI angle, Box number 3 is set at 2.83 degrees, so there should be an obstacle clear surface that extends at 1.83 degrees from 300 feet in front of the PAPIs out to four statute miles within 10 degrees each side of runway centerline. This ensures is that a pilot approaching the runway will be clear of obstacles while flying on path (two white, two red indication) or slightly below path (three red, one white indication). For a two-box PAPI system, that obstacle clear surface extends only to two miles.

After the installation is completed, the FAA will usually conduct a flight inspection of the PAPIs to verify the performance of the system. This inspection checks the actual PAPI angle, the lateral coverage (which should extend to 10 degrees each side of centerline), and performs an obstacle check that could extend out to eight miles or more (depending upon the installation) to verify that a solid below path indication will clear all obstacles wherever the lights are visible. The angle check requires that the actual PAPI angle be within plus or minus 0.20 degrees of the desired angle and that the PAPI path be coincident with any electronic or RNAV glidepath (with exceptions allowed under some circumstances).

A word to the wise, though: not all PAPIs have been installed under standard requirements and those systems may have not have been inspected. Depending upon who is paying for the installation (Airport Improvement Program grants, the FAA itself, local airport owners, or Billy Bob (who built up a system in his garage) will usually determine if the PAPIs are a standard installation or not. Most airports with PAPIs have followed the guidance and are set up properly, but not all. Specific to our Lincoln PAPIs, the two systems are owned by the city of Lincoln and were installed and flight inspected according to the standard criteria.

PAPIs are ideal for aircraft flying stable straight in approaches and are especially useful for night flying into unfamiliar airports or to support instrument approaches. PAPIs at many airports are set up with air-to-ground lighting control, so pilots can turn them on for use, and they automatically dim from 100% brightness for daytime use to 10% brightness for nighttime use.

For aircraft in the local traffic pattern, PAPIs may not be as useful since flying tight patterns will put an airplane well above a normal 3.00 degree glidepath while on base leg and turning final. But, regardless, if you are flying the final approach and you see yourself transitioning from all white PAPIs to all red PAPIs, it should be one additional (though obvious) clue that your landing approach is not going well.

Member Spotlight

Text and Photo by Bruce Estes

Richard Ryan took his first airplane ride when he was 10 years old. This was in an Aeronca Champ that operated out of the backyard of a family friend. The backyard was off of Old Auburn Road. Yes, this was a long time ago. Richard's mom didn't know about this flight. Richard was hooked on flying.

In 1967, during Richard's first year of college, he was recruited to go to work for the Lawrence Livermore Lab. Richard was paid $2.40 per hour. He took his first pay check and went to the Livermore Airport and started flying lessons. Richard obtained his Private, Commercial, and CFI. ratings at Livermore. He did a lot of instructing at Livermore Airport during the 1970's and 80's. Today, Richard has about 2,500 hours to his credit.

About two years ago, Richard got the opportunity to purchase a 2/3 size Jenny replica. He has always wanted to fly an older, classic airplane and this was his chance. The Jenny had been badly damaged in a taxi accident. Richard purchased the Jenny, brought it home, and started the repairs that included a full recover of the airframe. This Jenny is powered by a 65 hp AMW 2 stroke engine, it weighs about 450 lbs empty and has a 28' wing span. The Jenny qualifies as a light sport aircraft. The frame is all metal, is covered by Ceconite, and painted with the Stewart System. Richard estimates that he is at the 90% completion stage, which means he still has a lot of little details to complete. So, come on Richard, get it flying. Summer is coming and you will look good in the open cockpit of the Jenny.

The panel on the two-thirds scale Curtiss Jenny is about as simple as you could find: airspeed, altimeter, ball (no needle), and a very basic but prominent fuel 'gauge.' The cutout on the right? Probably not for an EFIS.

The two-thirds scale Curtiss Jenny resides in a hangar on the south side of the airport. The Jenny was damaged in an taxi accident by a prior owner and Richard Ryan has been bringing it back to life. The project is nearly complete, which means it still has a long way to go, but we look forward to see it flying again. It is a unique and distinctive addition to the aviation community at the Lincoln Airport.

Coming Soon to an Airport Near You

Lincoln AirFest

June 9-11, 2017

Mark your calendars for the weekend of June 9-11 for the Lincoln AirFest. Expanding on the success of the event held in 2016, the 2017 AirFest include an airshow on Saturday that will feature numerous noted aerobatic performers and formation teams. Hot air balloons, powered parachute demonstrations, a USAF parachute team, and military aircraft flybys are scheduled. Also on the agenda is a STOL demonstration event to be held on Sunday (only) and dinner-dance to be held on Friday evening at an airport hangar.

The AirFest is being organized by the Lincoln Regional Airport Foundation in cooperation with the city of Lincoln. A growing group of corporate and community sponsors have signed on to make the AirFest happen.

Besides the airshow, there will be a large static display of aircraft, food and drink vendors, and a variety of programs. This will be another opportunity to feature the Lincoln airport to the local community and the region at large. EAA Chapter 1541 will be supporting the event, as it did last year, with AirFest volunteer teams and pancake breakfasts to be held both Saturday and Sunday mornings. A great website is already up and running and can be found at http://lincolnairfest.com

A Brief History of the People Who Created the Light Aircraft Industry in the U.S.

by Martin Maisel
(photos used with appropriate permission)

Jean Alfred Roché, 1958 (George Ficke, http://www.earlyaviators.com/eroche.htm)

Part 5
Aeronca

"Unlike other light plane makers, Aeronca was not so much the product of a single formative aviator or family, but the product of many…." *(Aeronca/Champion History – Beyond the Bathtub, by Richard Harris)*

The beginnings of Aeronca can be traced to French-born Jean Alfred Roché (1894-1977). Roché received a Master's Degree in Engineering, with honors, from Columbia University and worked as an airplane designer throughout his career. While still a teenager, Roché, showing an early interest in aviation, made several successful flights in a glider.

After college Roché worked for a short time as a Designer at the Huffington Aircraft Company, Garden City, New York, and as an Assistant Chief Engineer at the Standard Airplane Company, in Plainfield, New Jersey. In 1917 he accepted a position of Chief Engineer with the Materiel Division of the U.S. Army Air Corps at McCook Field (later Wright-Patterson Air Force Base). McCook Field was the site of the first United States military aviation research center. Roché would spend the remainder of his career in the service of the government, becoming the Head Aeronautical Engineer of the U.S. Army, and later U.S. Air Force Material Command and Technical Advisor to the N.A.C.A. Langley Research Center. He retired in1960.

Aviation was not only Roché's vocation, it was his passion. On his own time, in the early 1920s, he worked on designing a small light plane that would make flying practical and safe for the average person. His goals for this airplane included a low initial cost, low operating costs, and inherent stability. In 1925, with his friend John Quentin Dohse, the Roché-Dohse Company was formed to develop and market his "Flying Flivver". However, without adequate funding they made little progress.

In 1927 Charles Lindbergh's successful trans-Atlantic solo flight stirred up a national aviation craze. The exploding interest in aviation drew the attention of businessmen and investors nationwide. Robert A. Taft, the son of former U.S. President William Howard Taft and later to become a U.S. Senator, invested in a venture being promoted by the Lunken family who owned and operated an airport in Cincinnati, Ohio. Incorporated in 1928, the Aeronautical Corporation of America was founded, with the intention of building and selling light airplanes – but they had absolutely nothing "aeronautical" to sell.

In their search for an "aeronautical" product, the Lunkens were introduced to Roché who had an airplane design, but no way to bring it to market. Roché's credentials as chief civilian engineer at the Army's McCook Field gave him credibility and, coupled with the simplicity of his airplane design, it appeared to be just what the Lunkens were looking for.

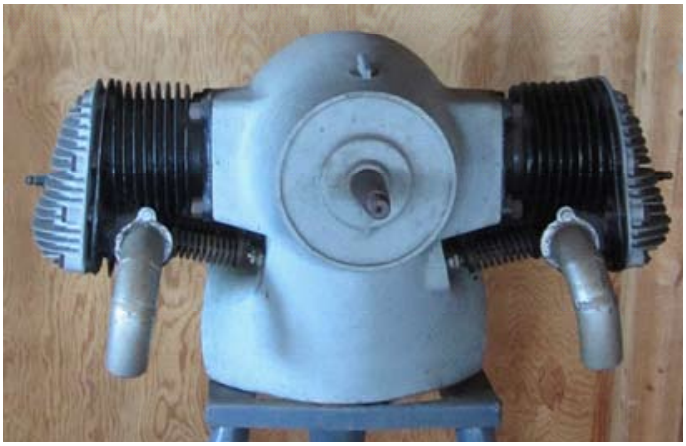
With a simple triangular fuselage structure and fabric-covered wire-braced wings, the single-place Flying Flivver was among the first to use the versatile Clark*-Y airfoil. Designed by Roché and his McCook Field colleague John Q. Dohse, the tiny single-seat airplane, powered with a 26 horsepower Morehouse** O-80 engine, was a gentle, well-mannered craft, stable and easily mastered, landing at 30-35 mph, and cruising at 50-60mph.

John Dohse, Jean Roche and Harold Morehouse with their Roche Flying Flivver (Craig Macveigh)

In exchange for the sale of his design to the Aeronautical Corporation of America (later shortened to Aeronca) Roché received shares of company stock and seat on the board of directors, along side of Robert Taft and other major investors.

The original configuration of the flying Flivver was not suitable for mass production, so Aeronca hired Roger Schlemmer, a recent graduate of the University of Cincinnati's aeronautical school, to re-design the airframe while McCook Field engineers Roy Poole and Robert Galloway crafted a production version of the engine.

The revised engine, labeled the E-107, was quite reliable for its time, having a 400 hour TBO (Time Between Overhauls). With that engine Aeronca had the distinction of being, perhaps, the only light aircraft manufacturer that also produce the aircraft's powerplant. The resulting first product of Aeronca was designated the C-2 Scout and arrived on the scene in 1929 – just as the stock market collapsed.



Aeronca E-107 engine, 26 Horsepower, 114 lb – the first horizontally opposed cylinder engine used on a production airplane (Image is in the Public Domain in accordance with https://commons.wikimedia.org/wiki/Category:Aeronca_E-107#/media/File:Aeronca_E107.jpg)

Aeronca C-2 (NASA, NACA L-11763)

While the economic depression hit most airplane manufacturers hard, the cheap homely little Aeronca, jokingly known as the "Flying Bathtub", flourished. In just two and one-half years over 160 were sold – becoming America's first successful "personal" airplane.

When sales of the C-2 began to fade, Aeronca recognized that its customers wanted a two-place airplane. Sport pilots wanted to carry a passenger and financially-strapped flight schools needed a cheap (to buy and operate) trainer. The response was the C-3 Collegian.

The general configuration of the C-2 was retained, but to accommodate the two seats the fuselage was widened. The additional loading also required the engine power to be increased. The modified two-cylinder, single-ignition engine was now rated at 40 hp and was designated the E-113.

Aeronca E-113A engine developed from the E-107 engine, 40 Horsepower, 118 lb (Image is in the Public Domain in accordance with https://commons.wikimedia.org/wiki/Category:Aeronca_E-113#/media/File:JAPJ99.JPG)

Aeronca C-3 at Stormville Airport, NY, 1956 (Marty Maisel)

Over 430 C-3 aircraft were sold, firmly establishing Aeronca as a key player in the light aircraft business. But competition (from the Piper Cub, for example) and changes in Government regulations would bring an end to the production of the C-3 in 1937. It was clear that the C-3 lacked certain amenities, like comfort, good visibility, and dual controls. Superior competitors were appearing.

By the mid-1930s the U.S. Civil Aeronautics Administration (the CAA, predecessor of the FAA) introduced new regulations concerning the design of certificated aircraft. Among other stipulations, these rules prohibited the use of wire bracing as the only supports for the wings and required that engines be equipped with dual ignition systems. The C-3 was no longer a viable product.

New aircraft designs would have to be different, but the original designers had wandered away and, after a 1937 flood wiped out the contents of the Aeronca factory at Lunken airport, Aeronca's aging owners decided to sell the company to Walter Friedlander, an Ohio real estate tycoon. Friedlander bought the company to set up his sons in the airplane business.

Under the new management, with Roger Schlemmer now as Aeronca's chief engineer, they took on the challenge of modernization. Based on the need to meet new regulations and on known issues with the earlier design, Schlemmer switched to a strut-braced wing, a wider landing gear with oleo struts, and provided a more comfortable cabin with better visibility.

AERONCA

America's BIGGEST

Light Airplane -

Now Available With Either
Famous Aeronca E-113C Engine
Or Continental A-40 Engine

FEATURE for feature, dollar for dollar, the Aeronca is America's biggest VALUE in the light plane field.

• The Aeronca is a Big Ship in more than Size . . . It is Big in Performance . . . Big in Stability and Security . . . Big in Economy.

• The completely enclosed, upholstered cabin is generously comfortable for two big people. Visibility is excellent in all directions. Large windows can be raised or lowered at will. Floor is clean, uncluttered. Features include: Side by side seating, Dual wheel controls, Oleo landing gear, Elevator trim tab control from cabin, Baggage compartment.

• You can land on and take off from a back pasture in safety. You can cruise 250 miles without refueling . . . at 80 to 85 miles per hour. You can speed to 93 m.p.h. All at an average operating cost of a little more than one cent per mile!

Buy on time, if you like. Pay only $530 down, balance over a period of months. Nominal interest charged only on unpaid balance. Double coverage insurance. See your Aeronca distributor or dealer. Or write direct for catalog and details.

$530 DOWN

AERONAUTICAL CORPORATION OF AMERICA

Lunken Airport
Cincinnati, O.

103

Aeronca Advertisement (Magellan Aerospace)

When production started in 1937 Aeronca K's were powered by the single ignition two-cylinder Aeronca E-113 engine. To meet the 1938 CAA mandate, a dual ignition version of the E-113 engine was introduced but it had reached the limit of its growth capability. Aeronca also offered the K with the four-cylinder Continental A-40 engine. Before ceasing production in 1938, 357 K models were built.

With the development of suitable four cylinder engines from manufacturers like Continental, Franklin and Lycoming, Aeronca decided to get out of the engine manufacturing business.

Aeronca K on floats with an E-113 engine (Image is in the Public Domain in accordance with https://upload.wikimedia.org/wikipedia/commons/2/27/Aeronca_K-45_%28NC19784%29_%284588197774%29.jpg)

As higher horsepower versions of four-cylinder engines became available, Aeronca continued to modernize and improve their products. The next major model developed in 1938 was the Aeronca 65C Chief, powered by the Continental A-65 (65 hp) engine. That design evolved into the military O-58/L-3 Grasshopper used in WWII. Over 650 civilian models and nearly 1500 military versions were produced.

During the war Aeronca was tasked by the government to build other planes, such as the Fairchild PT-19 trainer. While this work brought in more money, it also kept Aeronca confined to tube-and-fabric planes with wood-spar wings. That technology was rapidly becoming obsolete and the company was left behind other manufacturers who were proficient in aluminum aircraft construction by the end of the war.

Postwar production included the tandem 7AC Champion and the side-by-side 11AC Chief. Between 1945 and 1951 nearly 8,000 Champions were manufactured.

Aeronca 7AC Champion (Image is in the Public Domain in accordance with https://commons.wikimedia.org/wiki/File:Champ_7AC-1759.jpg)

Aeronca 11AC Chief (https://commons.wikimedia.org/wiki/File:Aeronca_11AC_Chief_Vabre.jpg used in accordance with: https://commons.wikimedia.org/wiki/Commons:GNU_Free_Documentation_License,_version_1.2)

As many other light airplane manufacturers experienced, the winds of fortune changed for Aeronca. Light aircraft production ceased in 1951 and the company changed hands several times, remaining in the aviation business, and occasionally producing aircraft or aircraft components. Aeronca Inc. is currently a division of Magellan Aerospace.

In its time, Aeronca was one of the giants of the light aircraft industry.

Disclaimer: The biographical information presented in this series was obtained primarily from multiple internet sources. As may be expected, the data provided by these sources were, in a few instances, inconsistent. In spite of the possibility that some minor points in these stories might not prove to be historically accurate, the biographies are believed to be substantially true. In any case it is clear that the individuals described in these biographical notes played important roles in the development of the light aircraft industry in the United States and their contributions should not be forgotten.

A comprehensive listing of American aircraft manufacturers can be seen at: http://www.aerofiles.com/aircraft.html

Maintenance Corner

More on Batteries

text and photos by Jim Hughes

Since my area of expertise is electrical stuff, the articles I write will be on some of what I've found keeping our 1962 Cessna 175B flying, and what I've found helping others fix electrical problems.

The 30+ years that I've worked as an electrical engineer helps me analyze and deductively identify and fix electrical problems without 'shotgunning', saving a lot of money and time.

First, from last year, a review on maintaining your battery.

Have You Preflighted Your Battery ?

With pilots flying with more electronics, full MFD and PFD, and relying on them more, we are depending on the electrical system to keep all of this stuff alive. The 'heart' of the electrical system is the battery. Since most of us fly with a 12 volt, lead-acid battery, that's what this will cover.

Quick notes – an aircraft battery usually has a life of 3-5 years. If yours is older than that, it's probably lost much of its amp-hr capacity, and may not be airworthy.!

BTW -The lead acid battery was invented in 1859 by French physicist Gaston Planté . So it's 158 year old technology and still works well.!

There are 2 main tests for a battery – state of charge, and reserve capacity.

State of charge is the percent of its stated amp-hour capacity, and is easily measured as it's voltage.

A fully charged '12 volt' battery will measure 13.0 volts at 100% state of charge . A battery that has '0' charge, will measure 12.0 volts or less.

A 'rule of thumb is to use the 'tenths' part of the voltage to indicate the charge. So, at 12.7 volts, a battery is at about 70% state of charge. 12.4 volts is 40%, and so on.

Measuring the battery voltage must be done with an 'open circuit', that is, with no load on the battery and after 2-3 hours of being charged. You can't just switch on the master and read the voltage on your panel, assuming that you have a voltmeter. The master contactor and panel instruments will put a few amps of load on the battery, and you'll get an inaccurate, lower voltage reading.

You'll need to use a digital multimeter. Inexpensive meters are available on Amazon. Use the DC volts, 20 volt setting. Get access to the battery and touch the meter probes to each battery terminal. If you get a reading of 12.7 volts or more, you're good-to-go.

If the voltage is less than 12.7, the battery need a recharge. Connect a charger with 2 amp capacity and charge it until the voltage reaches 14.5 volts, and then for 4-8 hours more .

OK, now you're ready for engine start. After engine start, monitoring the battery/bus voltage is important to see that the battery is being recharged properly and that your alternator is supplying the loads ok. But, most certified aircraft don't have a volt meter. Most aircraft have an ammeter, or load meter, as on a Piper. If you don't have a voltmeter, you can buy a small digital meter that plugs into the 'cigar' lighter socket. If you don't have a 12 volt socket, you can easily install one, and plug in one of these small digital meters. I use one like this.

So, after engine start, you should see a positive charge rate on the ammeter, and the voltage climbing to 14.2-14.5 volts within a few seconds. We'll look at diagnosing the problem if it's not showing a positive charge and/or the voltage is not rising to 14+ volts quickly, in a future article.

Do an easy charging system 'Health Check.' During your run-up , when your engine is warm enough to idle, run this test.

You'll need that digital voltmeter plugged in first.

1. Turn on all loads; landing light, pitot heat, position, nav lights If you have 'all led' lights, you may not have a large load of 20-30 amps

2. note the voltage. It should be less than 14.0, and more likely it's less than 13
3. Slowly increase rpm until volts reach 14 or your set regulator point, and the ammeter just starts to show a charge.
4. Note the rpm when you get 14 volts. It should be in the 700-800 rpm range. Write this rpm down. This is your baseline for future tests.
5. If on subsequent tests, the rpm is higher, your charging system is losing capability.

A check of all the parts and connections is needed. Diagnosing this will also be part of a future article.

Voltage regulator

The key to a fully charged battery is the voltage regulator, which controls the alternator output voltage and limits the maximum current. It should

be set to 14.2 to 14.5 volts, with the engine running at about 1,000 rpm and normal loads.

Most external voltage regulators are adjustable and it only takes a few minutes to make the adjustment. But it takes 2 people to safely do this safely.

If yours is not adjustable, or it's internal to the alternator, and you're not getting at least 14.0 volts, there may be other problems; the wiring, connections, alternator, belt, or the battery itself. A shorted cell will cause a loss of 2.2 volts, and the battery will not charge above 12 volts. More on the rest of the electrical system in future articles.

Reserve capacity is how many amp-hours your battery is capable of supplying to the loads before the voltage drops to 10.0 volts.

This test should be done during your annual inspection, to see that your battery capacity is at least 80% of rated capacity. The mechanic doing the annual can do the test.

What kills a battery ?

- A low state of charge. If a battery is left for weeks, with a voltage of less than 12.5 volts, it will sulfate and permanently lose capacity.
- Leaving the master on, or other load that discharges the battery below 12.5 volts.

Note - never jump start a dead battery, or hand prop the engine to start with a dead battery, unless it's an emergency .

If you do a jumpstart a dead battery, bad things can happen:

- Once the engine is running, the alternator will recharge the battery at its max capacity , 50-80 amps, which will overheat the battery and can cause the plates to warp and short a cell.
- The alternator is working at max load, trying to recharge the dead battery and supply all the loads too, so it can overheat and damage the diodes, or bearings
- If you do fly with a dead battery and the alternator fails, the battery is at a very low state of charge and may only supply power for a few minutes.
- If you're flying a retractable gear aircraft, when you select the 'gear up', the battery has no capacity to supply the high current and the alternator won't either, so it may trip off, leaving you with a total loss of power, of your doing.

What to do instead? Connect a battery charger designed for aircraft batteries, or one that will limit the charge to 10% of the rated capacity [2 amps for a 20 amp-hour battery], and let it recharge for 10 hours. Be sure that the charger will limit the voltage to 14.5 volts. Most cheap chargers can kill a battery with excessive voltage, over 15 volts. But if you monitor the voltage and keep it below 14.5 it'll be ok.

Battery amp-hour capacity vs starter cranking amps loads.

This has become my most recent frustration on experimental aircraft..!!

All certified aircraft have a specified battery; the only one allowed to be used. The starter motors are also specified. The combination guarantees that the battery will almost always be able to crank the engine, even if it is only ½ charged.

Experimental aircraft do not have these parts specified, so there's no guarantee that the battery has the amp-hour capacity to supply the amps needed by the starter motor to crank the engine.

- No matching of battery to starter needs.
- No consideration for high compression engines, high current starters, or too small wiring.
- Also, after market alternators have been shown to have a much shorter life than the certified units; some as short as 500 hours, vs 3,000 hrs with a certified alternator.
- A low amp-hr battery with low reserve capacity, may not provide much time operating a full

electronic panel for very long, as low as a few minutes…..the result; flying in the 'dark'.

Some examples;

A number of RV's use the 15.4 lb. Odyessy PC680 battery, rated at 16 amp-hours and 170 amp cold cranking current. (See http://www.odysseybattery.com/extreme_battery_specs.aspx)

This battery is barely okay for the stock starter that came with your Lycoming 320 or 360 or a TCM 360. The stock starters draw about 150-175 amps, with their slow cranking rpm.

A problem arises when the builder wants to save about 10 pounds and installs a light-weight starter, like the various SkyTec models (see. http://www.skytecair.com/Lycoming.htm).

These starters crank the engine faster than stock units, but also require up to 285 amps!!

OOPS !….trying to use a 170 amp cranking current battery to supply 285 amps to a starter is not reliable.

A similar issue occurs with the Carbon Cub and it's replacement 15 A-H battery 'upgrade'.

The Power Safe battery manufacturer does not list a CCA rating, since the original use was as a telecom backup battery. Aircraft Spruce adds a CCA rating, but I don't know where they got it.

If you use a light weight, high current starter, to save 8-9 lb., I'd recommend a Concorde RG series battery. The 24 amp-hour, RG25XC has a CCA of 350 amps! (see http://www.concordebattery.com/flyer.php?id=36)

It does weigh 23 lbs, so it's 8 lb heavier than the Odyessy or PowerSafe….about the equivalent of 1.5 gallons of fuel.

The light weight starter requires a minimum of 9 volts to spin. The voltage drop during cranking, in a low capacity battery, may not meet that requirement.

Also, electronic ignition systems have a minimum voltage to fire the ignition system.

So, carefully select and take care of your battery and you'll get a full, useful life from it, and it won't let you down when you need to rely on it, beyond cranking your engine to life.!!

Also, carefully review your starter needs vs battery and alternator capacity.

(BTW, there is a safer and healther way of reducing the gross takeoff weight…..pilot exercise and diet)

I'd be happy to answer any questions that you have on electrical issues and will help troubleshoot problems that you may have. Email me! That would be: jim.hughes1@att.net

(For more info, references.

http://www.avweb.com/news/features/Batteries-Dying-Young-223129-1.html)

photo by Scott Thompson