EAA 430 Flyer

Experimental Aircraft Association Chapter 430 Serving Sequim, Port Angeles and the Northern Olympic Peninsula.

## A Little Hangar Flying: If It Flies, and First Potluck of the Season!


*Flying Queen Honey Bees to customers all over Puget Sound to replace the dead ones.*

Spring has sprung. Guys and gals are getting out and flying their air machines. The local balloon will be making morning flights over the farm land soon. Why do they only go up in the morning?

EAA 430 has some fly outs planned. Check into those flights, listed on the Events page.

I would like to get some orders on record together for hats, T-shirts with pockets, maybe a jacket for the club. They will have our logo embroidered on them. Let's get that done at the next meeting. 25 of each would get the program going. All proceeds would go to what ever we vote on. For suggestions, maybe the scholarship fund.

It's time to really look over your airplane before flight. Don't get in a hurry. Spring fever gets everyone. Take a look at the tire pressure, the inside of the cowling and all the holes a nesting bird can get into. If the plane isn't and you're not in top condition for the flight take a few moments and think… should I really be going up in the air?

If you have the itch to go over to the islands, make sure you go high enough to glide to the return point of the other side. Please don't think your going to land in the water by a boat. (No one has that kind of luck). Have you practiced a glide in your airplane lately? I was showing a fellow pilot how just by pulling my prop control all the way out what it felt like when you have less drag by coursing up the pitch of the propeller. The glide is really extended. Note: you can't accomplish that if there is no oil pressure.

We had a big day on Saturday, May 20th – first Young Eagle Flights of 2017.

Then there are the fly outs we are planning. Not to mention all the airshows going on this summer.

I'm going to Alaska. Either in my airplane or on Alaska Airlines big jet. Depends if my friend's float plane is working. He rebuilt the engine. So, since he doesn't fly, I get to break that in.

Sure is fun to go to all the old haunts around the Great State of Alaska. I told my son Tyler, we can take Lisa and Sophia to see the bears at Katmai. He said, no let's go fishing-- we can watch the bears where we fish. He's right! Dang bears everywhere.

There have been some great clam tides down south this last month. The way I see it… 15

razor clams per person gets real expensive. But!!! if you take a couple kids its all worth the gas. Gary Winnope goes all the time and the smile on his face when he comes back says it all.

Go over to the Goose for lunch or down to Bremerton for Halibut and Chips. Head down to Chehalis for dinner at the golf course or to Tacoma Narrows for dinner. Go over to Boeing, park at Kenmore Aero, (get some fuel – it's cheap). Ask for the crew car then go to 13 coins' restaurant for dinner.

I thought hard about going to Alaska and flying for Branch River Air this summer for a couple of months. But then I took two Aspirin, laid down until the thought went away. It seems fun but I've done that dream.

*Hunter the Red Tail Hawk before release back into the wild.*

I trained a Red Tail Hawk last winter. Only caught a mouse. I let him go back to the wild; will train another this fall. It was a life long dream to become a Falconer. I'm an Apprentice right now. We will be training for a rabbit kill. Boy, what a learning curve. So the moral to that story is if you want to do something, do it!

If you're reading this and want to fly across the USA in your homebuilt there are a million reasons why not to. But if you don't do it, you WILL regret it later. Some reasons why not to…cost of gas, weather, what about the chickens, the dog, what will my wife think? Lots of reasons. But get in the airplane, go to one airport at a time, buy gas then move on. If your tired, stop for the day. If the weather is bad, for crying out loud… land! Go to Oshkosh. It is not very hard. Go back home if you're not from here and see old friends. I loaded my girls up in the 180 and flew all the way across the country to my class reunion a few years ago. Then came back the southern route. Yes, I had to stop for weather and darkness. But I will hear about it for years from my girls.

Come on out to the First pot luck at hangar 10 next Saturday, May 27th at 10:00 AM. It's going to be a good one.

Mike Radford

## In This Issue



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## On the Horizon: Calendar of Events

EAA Chapter 430 meets on the last Saturday of the month, in Hangar 10 at Sequim Valley Airport at 10:00 a.m. For directions and additional information about chapter programs, see the chapter website: http://www.eaa430.org

| Date | Topic |
|---|---|
| Saturday, May 27, 2017 10:00 am Hangar 10 Sequim Valley airport | Chapter meeting and potluck luncheon. Program: "All for a Spark: from Magnetos to Electronic Ignition" by EAA 430 tech counselor Dan Masys. |
| Saturday June 10, 2017 0830-1500 | Chapter Fly-Out to Skagit/Bayview (KBVS) and Heritage Flight<br><br>Museum. See February 2017 chapter meeting minutes for details. |
| Saturday, June 17, 2017 10:00 am – 2:00 pm | Second 2017 Young Eagle Rally, at Fairchild Int'l Airport, Port Angeles |
| Wed.-Fri. June 21-23, 2017 | Collings Foundation Wings of Freedom event at Fairchild International Airport |
| Saturday, June 24, 2017 Hangar 10 Sequim Valley airport | Chapter meeting and potluck luncheon. Program: Peter Morton, retired Boeing Vice President, will talk about the history of the Boeing two-pilot 757/767 cockpit. |
| August 21, 2017 Madras, OR airport | Total Solar Eclipse viewing. Details below |
| August 26-27, 2017 0900-1600 Sequim Valley airport | Olympic Peninsula Air Affaire. EAA 430 members are encouraged to participate in ground display of experimental aircraft. Volunteers are always needed to man the chapter information booth. |
| September 9-10, 2017 Hood River, OR (4S2) | Fly-out to Western Antique Aeroplane and Automobile Museum show and Fly-in |

## Wings of Freedom B-17 and B-24 Coming to Port Angeles, June 21-23

The Collings Foundation B-17and B-24 will visit Port Angeles from Wednesday, June 21 to Friday

June 23. This will be the biggest aviation activity at Wm. R. Fairchild airport in two years and this year will now be even larger with the addition of vintage cars, an AA Fuel dragster on site, a Coast Guard helicopter, catered BBQ and Band, all on the Wednesday they arrive. Volunteers are needed for this event; please contact Alan Barnard: abarnard@olypen.com

## Charlie King's Miter Saw

EAA 430 member Charlie King was being his usual generous self and lent his miter saw to somebody, but now Charlie can't recall who it was. If you have Charlie's saw, please e-mail him: chask1@wavecable.com

## Fly to the Total Solar Eclipse

On August 21st Madras, OR will be in the path of the total solar eclipse. The eclipse event starts 0900 local, and ends at 1140. There will be a two-minute period of totality that starts at 1019. Madras airport (S33) is very close to the centerline of the path of the eclipse, for maximum totality time. All of the hotels in the path of the eclipse have been booked for two years, but the Madras airport is permitting camping on the airport by your plane. They are expecting several hundred visiting aircraft for the event, and will likely have to close the airport sometime before the eclipse. The FBO Berg Air is taking reservations by mail for parking spots. Check their web site:
https://www.bergair.com/solareclipse
for the reservation form and instructions for mailing. Several parking options are available, including $175 for a spot in the grass Thurs 8/17 through Tues 8/22.

## Savvy Maintenance: Borescope Ascendancy Time to topple the venerable compression test?

*By Mike Busch*
*AOPA Pilot magazine, May 1, 2017*

The differential compression check has been a mainstay of piston aircraft engine maintenance for 80 years. Like anything else in aviation that's been around for a long time, various old wives' tales have evolved about the procedure, passed on from journeyman mechanic to apprentice, and later taught in A&P schools and documented in various textbooks and advisory circulars. Ask your mechanic why he performs a compression check a certain way or interprets the test results as he does—and, if he's honest, he'll probably answer, "That's the way I was taught to do it, and that's the way I've always done it."

One pervasive old wives' tale has it that compression readings in the high 70s are excellent, in the low 70s are good, in the high 60s are marginal, in the low 60s are poor, and anything below 60/80 is unairworthy. Another widely accepted old wives' tale is that an engine with compressions in the low 60s is a "tired engine" that will not put out full rated horsepower. Both are dead wrong.

More than three decades ago, Continental Motors issued a service bulletin (M84-15) debunking the first of these superstitions by establishing a new go/no-go criterion for compression tests: the master orifice tool. Mechanics who followed this guidance were astonished to find that compression readings in the low- to mid-40s were deemed acceptable by Continental.

This 1984 guidance was based on a series of engineering studies performed using an IO-550 engine mounted in the dynamometer test cell at the Continental factory in Mobile, Alabama.

Those studies revealed that when the compression ring gaps on the IO-550's pistons were filed oversize intentionally to reduce the compression of all six cylinders to 40/80, there was no measurable loss of horsepower output (although there was an increase in oil consumption). This effectively debunked the "tired engine" old wives' tale.

**Enter the borescope**

Nineteen years later, Continental threw mechanics another curveball by issuing Service Bulletin SB03-3 (which superseded M84-15), directing that a borescope inspection of each cylinder be performed at each annual and 100-hour inspection, and any other time that a compression test is done. It further made it clear that the borescope, not the compression tester, was to be the gold standard for assessing the airworthiness of a cylinder. It directed that if a cylinder flunks a compression test but the borescope reveals no obvious cause for the low compression, then the engine is to be flown for at least 45 minutes and the compression test be redone. Only if a cylinder flunks its compression test twice in a row (with at least 45 minutes of flying in between) is it deemed unairworthy.

Continental's SB03-3 was pretty shocking to mechanics when it was first published in March 2003. In those days, few GA maintenance shops owned a borescope (unless they did a lot of turbine work), and there was no training available to mechanics on how to use one to inspect a piston aircraft engine cylinder. Most A&P schools still don't teach anything about how to use borescopes in piston engine maintenance.

The service bulletin recommended using a low-cost rigid optical borescope—the Lenox Autoscope, which was so named because it was designed for automotive use, and at more than $2,000 was one-tenth the cost of the fiber-optic borescopes being used for turbine engine hot-section inspections. Still, lots of mechanics and small GA maintenance shops were not amused by being told that they had to shell out two large to buy one of these instruments. Fourteen years later, some A&Ps still don't own a borescope.

**Eyeballing the combustion chamber**

I was an early adopter of borescopy. Having gone through the painful experience of pulling cylinders because of low compression readings, only to find nothing physically wrong with them, I was anxious to adopt this more enlightened way of evaluating cylinder condition. I borrowed a Lenox Autoscope from a shop on my field and began inspecting the 12 cylinders on my Cessna 310. It was an eye-opening experience, almost as if I could climb inside each combustion chamber—or at least stuff one eyeball inside.

**Visual diagnosis**

By inserting the scope through the top spark plug hole and twisting and turning it, I could get a decent view of the intake and exhaust valves, the cylinder walls, and the piston crown. I found it spellbinding. Direct inspection of the combustion chamber provided a much better picture and deeper understanding of the true condition of the cylinder, compared with the crude, indirect assessment provided by the differential compression test.

These images were captured with a ViVidia Ablescope VA-400 (below). The quality is pretty spectacular for a $200 scope.

*Lycoming O-320 exhaust valve. Note the symmetrical "bullseye" appearance indicating a healthy valve.*

*This is a very sick exhaust valve on the verge of failing catastrophically. Note the asymmetrical appearance: That's bad!*

*Closeup of the healthy O-320 exhaust valve, with a good view of the seat and valve-sealing surface.*

*O-320 cylinder barrel and piston. This jug is very worn: Note the vertical scoring and lack of crosshatch.*

A compression test could tell you that air was leaking past the exhaust valve, but with the borescope you could tell whether it was because of a benign glob of lead on the seat that would quickly resolve itself the next time the engine ran—or a malignant, warped or eroded valve likely to fail catastrophically in the next 10 hours. How cool was that?

Over the years, the compression test has proved untrustworthy and prone to false positives, resulting in tens of thousands of cylinders being removed unnecessarily (including a few of mine). That's why the SB03-3 guidance calls for any disqualifying compression test that is not corroborated by borescope evidence be retested after flying for at least 45 minutes. That's excellent advice. I've seen many cases where a cylinder that flunked the first compression test easily passed the second one. In one notable case involving a Cirrus SR22, a cylinder that tested at 38/80 (and that the shop doing the annual wanted to yank) wound up measuring 72/80 on the retest after a one-hour flight.

SB03-3 did not go so far as to recommend that borescope inspections should replace the venerable compression test. Continental couldn't do that, because the requirement to perform a compression test is written into the FARs (Part 43, Appendix D). But SB03-3 did all it could to convey that Continental is no big fan of the compression test for determining cylinder airworthiness. (A senior Continental executive once confessed to me that if they could've dropped the compression test altogether, they would have.)

Continental's guidance on borescope inspections has saved owners millions of dollars in maintenance costs. I consider SB03-3 to be the best thing ever written on the subject of how to decide whether a cylinder needs to come off. It has saved owners of Continental engines millions of dollars in maintenance costs. In my view, it's high time that Lycoming followed suit and revised its archaic guidance on the subject. (Last year, Continental incorporated the contents of SB03-3 into its new Standard Practice Maintenance Manual M-0, so it no longer exists as a separate service bulletin.)

**Today's scopes: wow!**

In the computer industry, Moore's Law (named after Intel co-founder Gordon Moore) states that the number of transistors packed on an integrated circuit will double every two years. Something similar has taken place in borescope technology in the 14 years since SB03-3 was published. Today's borescopes use tiny, cheap, solid-state CCD cameras to replace the costly optics that were previously required. The result is the current crop of scopes is both vastly better and an order of magnitude cheaper than the benchmark Lenox Autoscope.

My current favorite is the ViVidia Ablescope VA-400 scope from Oasis Scientific (see page 86), which you can purchase on Amazon.com for less than $200. It comes with a USB cable that can be plugged into any notebook PC or Android tablet, and with software for both Windows and Android that can capture both still photos and videos. In addition to its impressive image quality and excellent lighting, the ViVidia scope has the unique ability to adjust its viewing angle from zero degrees (looking straight down at the piston) to 180 degrees (looking backwards at the valves), or anything in between. (By contrast, the $2,300 Lenox Autoscope has a fixed 90-degree viewing angle and no capability for capturing images.)

*The ViVidia Ablescope VA-400 viewing angle can be adjusted from 0 degrees to 180 degrees by pressing the plunger on the handgrip.*

With scopes of this quality available for $200, there's no excuse for any A&P not to own one and to use it as his primary means of assessing cylinder condition. In fact, anyone who does owner-performed maintenance should consider buying one.

Compression testers lie all the time. Borescopes never do.

Mike Busch is an A&P/IA.

**Available from our Members**

**Aircraft hangars for sale** at the Port Angeles Airport. Newer, well built. Now just $31,000 each. Call for brochure or more information. Alan Barnard, Windermere 360-461-0175

**Large T Hangar for rent** at Diamond Point Airport. $200.00/month.
George Llewellyn 360-477-8180

## EAA Chapter 430 Membership Meeting Minutes

Date: April 29, 2017. Meeting started at 1003. Location: W28 hangar. Followed by the Pledge of Allegiance.

- Introduction of Guests. We had 6 guests introduced by members.
- Minutes Approved as Corrected.
- Reports
    - Membership: Bob Hicks reported 63 paid members and 79 on the roster. He is requesting EAA numbers for all members. Also only National EAA (family) members

are eligible for chapter family membership. The word (family) inserted following "National EAA" since it was omitted.

- Young Eagles: John Meyer. May 20th will be the first event of 2017. Ground crew and pilots need to have background checks completed prior to the event. Copies of certificates to John.
- Activities:
  - Potlucks May to September
  - Bayview fly-out June 10
  - Possibilities are McMinnville and Hood River.
- Project Reports: Many members talked about their current projects and updates. We have a very busy chapter.
- Old business: None.
- New Business: None from the board or membership

Comments from the Membership:

- Tools. It is very important to have all tools signed out for accountability. Has anyone seen the ramps for the scales? They are not in our inventory. If you know where they are please contact Dan Masys or Mike Radford.

Close of the business meeting at 1040.

- Break for raffle / coffee.

Social Meeting

Programs introduction by Paul Kuntz of Mike Lavelle, who spoke about the National Air Races from 1920 – 1940. Fantastic program.

35 members signed in.

Next Chapter meeting is May 27 at 1000 at W28 and the beginning of the Pot Luck season. FOOD is always a good draw.

Respectfully submitted / Ken Brown Secretary /

Note: General Membership meeting minutes are now included in the monthly Newsletter. Minutes of the monthly Board meeting are also available to chapter members via login at the *Members only* page of the chapter website: http://www.eaa430.org

If you are a chapter member and do not yet have a login to the Members page, you can register with your email address to create a login at the website.