Runway 15

The Monthly Newsletter for Experimental Aircraft Association Chapter 1541, Lincoln, California

In This Issue

On the Horizon: Calendar of Events

For the most up-to-date information, go to the chapter website: http://eaa1541.org/

Date	Topic
Wednesday January 19, 2022	Online January member meeting: **Electric Aircraft** Presenter: Darren Coomler Hangar chat at 6:40 pm Member meeting at 7 pm
Thursday, Feb. 3, 2022 7-8 pm	Online **IMC/VMC Club meeting** with FAA Wings credit. All are invited to participate.
Saturday, Feb. 5, 8 – 10 am	Outdoor **pancake breakfast** at the EAA hangar at KLHM, weather permitting.

EAA CHAPTER 1541 INFORMATION

Meetings	Usually the third Wednesday of each month held at KLHM Hangar S-12. Details available on the website
E-mail	eaa1541@gmail.com
Website	http://eaa1541.org
Mailing Address	EAA chapter 1541, PO Box 1126, Lincoln, CA 95648
Chapter Hangar	Hangar S-12, Lincoln Airport
President	Darren Coomler
Vice President	Jim Hughes
Secretary	Darren Coomler (acting)
Treasurer	Scott Whelan
Chapter Board of Directors	Paul Darbo Christina Duran Michael Lagomarsino Dan Masys Ray McNaught Mary Wick
Webmaster	Dug Smith dug@dugbert.com
Newsletter and Tech Counselor	Dan Masys dmasys2@gmail.com
Membership	Chapter dues: $20 per year for individuals; $30 for families; $300 for gold

President's Corner

Welcome Chapter 1541 Members and Friends,

Happy New year to all of you, I hope you had a great holiday season. Your EAA 1541 chapter is looking forward to another year of quality programs, education, food and fellowship. Unfortunately, we start the year not able to meet in person. Stay tuned and we will notify you when we have a warm day so we can hold the in-person meetings outdoors.

The chapter will continue with the virtual member meeting and IMC/VMC meeting. If you didn't get a chance to attend the last IMC/VMC meeting you missed another lively educational gathering with over 40 attendees. Scott Thompson provided a tutorial on how the FAA intends to maintain a "Minimum Operational Network" (MON) of VORs in case of GPS outages, combined with designated airports that will be used by the MON; all were surprised that KLHM is one of those preferred airports! Then attendees had to figure out what they would do if they inadvertently flew into a snowstorm at night and then their comm radios stopped working!

Other things the chapter will continue with whenever we can are our Young Eagles program, breakfasts, scholarships, and possible a Airport Fun Day. The chapter Board will be working to create programs and activities related to the younger members, and this will include more use of social media to keep these members informed.

New for this year, each month is going to have a theme. This month's theme is "What's New". February's theme will be "Airport Safety", I'm sure many of you could share a story related to this topic.

What's New? Let's start with existing members renewing their membership, please renew this month. If you're considering becoming a new member, please sign up online at the chapter's website (eaa1541.org) click on the Join Us tab on the home page. This month's member meeting program will be "Electric Aircraft", I'm looking forward to be presenting this program as I see this a big new upcoming change in aviation.

Something new to me that you may enjoy is a pod cast from AOPA called "Ask the A&P", there are 18 episodes that Mike Busch, Paul New, and Colleen Sterling host. The hosts answer pilot's questions related to aircraft mechanical systems.

This year we will continue with our hangar purchase fundraising activities. Last year we got off to a great start and we plan to continue the momentum to our goal. Lastly, I've noticed a lot on new faces at our Saturday breakfasts, so when we able to meet again please reach out and introduce yourself to these new attendees.

Until we meet again, continue to follow the chapter e-mails and eaa1541.org website for notification on events, and again have a Happy New Year.

Sincerely
Darren

Scholarship Update

CFI Mary Wick sends this update on her student:
Progress on young **Hayden Meads**, One of our $500 youth scholarship recipients. Hayden has his student pilot certificate, his second class medical, and he is nearing solo! Go get 'em Hayden!

Project Corner

All chapter members are invited and encouraged to take a few minutes and send us a photo and description of whatever project you are working on now or have recently completed. Send your text and photo(s) to eaa1541@gmail.com. Fun and education for everyone!

Brent Smith writes about his one-of-a-kind Molt Taylor Mini-Imp project:

After finally getting the nose gear doors to retract acceptably with the help of some new wing jacks I built, I turned to a couple of other small challenges.

Up on wing jacks

I reinforced the side rails that support the top of the fuselage fairing ("pod") and tried my hand at polishing aluminum.

Left side rail supports above pilot seat

With the expert instruction of Kurt Von Salzen of local polished Swift fame, I've become confident that I'll be able to polish all the exposed aluminum parts of my airplane. I'm an advocate of the old saying "If aluminum had been meant to be painted, it wouldn't look so pretty when it's polished"! Brent

Jay Schumacher writes:

I'm looking for a partner in my Sonex. If anyone is interested please contact me at jskydvr@gmail.com

Jay Schumacher
916-677-9817

2009 SONEX WAIEX $30,000 AVAILABLE FOR ½ Partnership N78YX

The engine is a Jabiru 2200 with 485 hrs TT. Complete logs included. Avionics: MGL Stratomaster Ultra Horizon XL, Becker Mode C Transponder, com radio, Garmin 296, dual stick and rudder. Last Condition Inspection, April 2021. Always hangared.

What's Shakin?

By Matthew Dock, RPX Technologies

The worst thing about complacency is that you don't know it is happening. We are conditioned to ignore what is normal and only worry about things that change. As a pilot that has flown a 1963 Cessna 150 from the Bahamas on the east coast to the Channel Islands on the west coast, I know that I am relaxed as long as the sound and feel of the engine doesn't change. However, any variation in RPM or vibration will immediately cause me to jump.

Unfortunately we are tuned for change, not the constant drone of engine and propeller; even though most damage is related to fatigue, the constant vibration of people and metal. Pilots and passengers are very susceptible to fatigue from aircraft vibration. It happens frequently that after measuring excessive vibration on an engine, I ask the pilot about their feet becoming numb or if they have eye fatigue due to monitoring a shaking instrument panel.

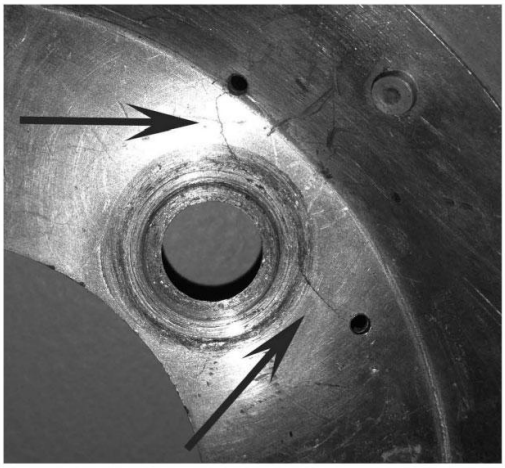
The military has done numerous studies on the impact of vibration on the human body. The whole body vibration frequency is approximately 4-8Hz, or 240-480 RPM. This is one reason that helicopter pilots often complain about back problems; the whole-body vibration matches closely with the main-rotor blade rotation frequency. For small piston engine aircraft operating at 2400 RPM, this causes a 40Hz vibration. That 40Hz vibration causes fatigue in the lighter portions of the body; the hands, feet, and eyes. The vibration often causes numbness or tingling, usually in the feet due to the proximity to the firewall.

While pilot and passenger vibration is tiring, airframe vibration can be dangerous. Excessive engine vibration can lead to a broad series of failures that often appear unrelated. Exhaust cracks are one case in point. An engine vibration near the FAA limit of 1.2 Inches per second (AC 20-37E) can easily generate displacements of 0.060 per inch. That doesn't seem like much, but imagine something like an exhaust pipe that is held at one end and then shaken at 0.060" at 40Hz for hundreds of hours. All the

weld joints and sharp bends will experience high stresses as the unsupported weight of the exhaust works against the vibration. This high stress causes fatigue cracks that lead to failure of the exhaust system, spilling exhaust air into the cowling and possibly the passenger compartment. This is one reason that high-end exhaust manufacturers require dynamic balancing for their warranty. At best you need a new exhaust, at worst you experience hypoxia due to the fresh air inlet being positioned directly behind the cracked exhaust pipe; like I did, in my Cessna 150.

Vibration Costs Money

That cracked muffler on a simple Cessna 150 can cost hundreds of dollars to repair or replace, plus the cost of disassembly and assembly. Other vibration induced failures can be equally expensive. The panels of older aircraft contain numerous electrical- and vacuum-operated gyros that operate on small bearings. Bearing life is reduced by the third power of acceleration. Meaning that for every l0X increase in vibration, there is a 1000X reduction in bearing life. Just the directional gyro or artificial horizon in a Cessna 150 can cost thousands if purchased new. In addition to exhaust and panel issues, there are engine mount and firewall cracks, leading to costly repairs. The spinner and spinner back-plate take a lot of abuse as well. All these components add up to significant repair bills over the life of the aircraft.



A cracked spinner backplate.

The life of all these components can be improved by vibration reduction.

Top 10 Vibration Causes

Here is a list of the top 10 things to check when experiencing vibration:

1. Spinner Imbalance
Run the engine with the spinner off and see if the vibration changes. A lot of spinners are out of balance and will cause damage to the spinner back-plate.

2. Blade Track
Pull the sparkplugs so the engine will freely rotate. Use a fixed object on the floor to check that all the blades are within 1/16 of an inch.

3. Blade Pitch
There are inexpensive digital protractors that will allow you to measure the pitch of the blade; usually best done at multiple locations along the blade.

4. Compression
Check the differential cylinder compressions for any weak or leaking cylinders.

5. Intake Leaks
Check for intake leaks that may cause one cylinder to run lean and misfrre.

6. Ignition System
An old magneto or fouled plugs may provide a weak spark, causing poor ignition.

7. Engine Mounts
Damaged or compressed motor mounts can transmit additional vibration. Also verity the installation of the motor mounts. Different engine/airframe combinations may require a very specific installation.

8. Wheel Pants
May sound odd, but sometimes the wheel pants or other loose accessories can start to vibrate in-flight, causing airframe vibration.

9. Engine / Cowling Contact
The engine, exhaust, intake, and all other components mounted to the engine should be free and clear of contact on the cowling. Look for rub marks on the inside of the cowling.

10. Check the Dynamic Balance
Even a statically balanced propeller can generate significant vibration, just from the installation variations. Dynamic balancing should be done often to insure smooth flying.

How to Reduce Vibration

The best way to reduce airframe vibration is to have the airplane dynamically balanced. Good dynamic balancing will have multiple steps provide the owner/operator with a smooth aircraft. Any dynamic balancing service will start with a good pre-balance inspection that addresses the items previously listed. After inspection, the mechanic will install an accelerometer and a phototach to measure the vibration and the position of the propeller. The mechanic will run the engine three or more times to add weight and reduce the vibration. Dynamic balancing is typically a simple, straightforward process. If difficulties are encountered it can be due to loose equipment or damaged components, something that should be addressed immediately.

Dynamic balancing kit used to reduce vibration.

Editor's note: See the article that follows for how EAA 1541 chapter members can get their aircraft's prop balanced using the equipment pictured.

FAQ

FAA Advisory Circular 20-37e, Aircraft Propeller Maintenance, is a great resource for information. It discusses dynamic balancing and general maintenance procedures for aircraft.

Who can perform dynamic balancing?

For certified aircraft, when following FAA approved procedures, dynamic balancing is performed by an "appropriately rated mechanic", a power plant mechanic.

Is dynamic balancing a major repair?
Dynamic balancing is a not a major repair when using FAA approved procedures.

What's Shakin, Part Two

By Ray McNaught, EAA chapter 1541 Board member

Now that you know how an out of balance propeller/rotating assembly causes wear and tear on every system in your airplane I wanted to let you know EAA Chapter 1541 members have a solution for a smoother running engine. We now have access to a DynaVibe GX3 state of the art, top of the line balancer made by RPX technologies.

Whether you take advantage of this balancer or go to your favorite mechanic and pay him $250 to balance your prop you should get it done for the long term health of your airplane and your enhanced personal comfort while flying.

First, if you own an experimental aircraft you can balance your prop yourself and make your own logbook entry with my help running the balancer and showing you where and how to add the correct amount of weight. We will dynamically balance your propeller following guidelines found in the ACES Systems Guide to Propeller Balancing as spelled out in FAA ADVISORY CIRCULAR, AIRCRAFT PROPELLER MAINTENANCE- AC 20-37E.

Second, If you own a certified aircraft we can still get it balanced with the supervision of a local A&P.

What does it cost? You ask. For your experimental I'm asking for a $150.00 donation. Of which $100.00 will go toward the cost of the balancer and it's annual "NIST" traceable calibration certification and $50.00 will go into the EAA chapter 1541 "Permanent Home" Hangar Fund. Should your aircraft be Certified I am trying to get one of our local AP/IA's to supervise the process for an additional $50.00 ($200.00 total).

I anticipate that on a rare occasion there will be an aircraft that will already be in balance and in that case I would ask for a minimum of the Hangar fund donation of $50.00.

I recently balanced an RV-9A and the owner asked that I check the balance first because it had previously been dynamically balanced a few years before. The result was a .35 ips vibration (ips= inches per second, the value used for vibration amplitude). .25 ips - 1.0 ips is considered a rough vibration (or in the red zone!) After removing the previous balance weights the balance had improved to .20 ips and the analyzer had a solution to reduce the prop vibration. The balance weight asked for was added and another run revealed another solution for further vibration reduction. The next and last run showed we had reduced vibration to .04ips which is in the excellent to perfect range!

After accepting the final balance the analyzer generates a report along with a spectral analysis

of all vibrations that it senses. The spectral analysis revealed that there was a vibration that occurred between one fourth to one half the frequency of the rotating mass of the propeller/engine assembly. This typically indicates something loose like motor mounts being loose or worn. Since the owner of the aircraft was already aware that the spinner of his RV was sagging about a half inch below the cowling he decided he would put in new lord motor mounts. After the new mounts were installed we performed another balance run (just to see!) This time the prop came in at .02 ips at 2,100 rpm, and the lower frequency vibration from the worn mounts was reduced way down into the normal range.

If you would like to have a smoother running airplane or even just verify your propellers dynamic balance is in an acceptable range or just get more information please send a text message to Ray McNaught at 916-768-5630 or send an email to ray@pipsac.com

Sightings