



Flying over the Valles Caldera in the Pegazair

EAA Chapter 691 Newsletter

April 2024

On the Web @ eaachapter691.org

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Upcoming Events

Upcoming Events

→ Meetings Schedule (unless otherwise noted) ←

9:30am - social time

10:00am - business meeting

10:30am -
speaker/workshop/training

Check out our Chapter Website at <https://www.eaachapter691.org> for more information about upcoming activities.

Saturday April 20th @ Los Alamos Terminal Building Will Fox demonstrates how to borescope your cylinders.

Saturday May 11th @ Los Alamos Terminal Building James and Allison Shinas talk Flying and Homesteading in Alaska



This
Saturday,
April 20th

A reminder that the EAA Chapter 691 April meeting will be held this Saturday, April 20th in the Los Alamos Terminal Building. As usual we will have coffee and donuts at 9:30, a short business meeting at 10:00, and the featured presentation at 10:30.

Join EAA 691 for a How-To Tech talk On Borescoping your cylinders



President's Report

by Will Fox



Borescoping

Hi Folks, Spring has sprung and it is time to start thinking about the flying season and begin enjoying the warmer weather. We will do just that at our April 20th meeting this coming Saturday at the Los Alamos airport. Yours truly along with Skip Egdorf will be talking about how to inspect the cylinders on your engine using the Chapter's new borescope. Skip has volunteered his Taylorcraft for an inspection, so you can see a live demonstration and try it yourself. We will also have our Build & Fly project on display so you can see how our Chapter mentors are coming along with building a prototype RC model that will be used as part of the program. The meeting starts at 9:30 AM with coffee and donuts so come on out and learn about borescoping cylinders, RC aircraft model building, STEM activities, and other stuff we have planned for this summer.

Last month we had a superb presentation on Flight Simulators by Marc Bonem and Skip Egdorf. Marc talked about a flight simulator he has put together that he uses for training that has been invaluable for the instrument rating he is working on. He discussed its capabilities, how much it cost, and how he uses it for his training. Skip discussed his efforts to figure out how to network old computers together to run a sophisticated flight simulator software called FlightGear. He said that FlightGear has the potential to model the performance of different types of aircraft including the Electric Dragonfly. While doing this he decided to make the simulator more fun for kids by building a cockpit for it, complete with sliding canopy and sound. We will be using it in our upcoming Young Eagle workshops. If you missed the meeting, you can see Marc and Skip's presentation on the Chapter YouTube channel.

I look forward to seeing you all at Saturday's meeting. It will be a lot of fun.

Check out our Chapter YouTube channel at <https://www.youtube.com/@eaachapter691> for the latest videos. For upcoming events, check out the 2024 Schedule that is posted on the Chapter website at <https://www.eaachapter691.org/upcoming-events>



What is this picture telling you about the exhaust valve in your engine? Should you be worried about it? Come to the meeting on Saturday and find out:-)

SAF Pilots,

I remember hearing about [this accident](#) near Santa Fe several years ago and having disparaging thoughts about another pilot flying into icing. Interesting to hear the pilot's account. As it turns out, we're all human and seemingly small decisions—plus an unexpected source of cognitive impairment—can have major consequences.



Jg

Maj C. John Graham

New Mexico Wing Director of Safety

Civil Air Patrol, U.S. Air Force Auxiliary

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Tech Corner

by Will Fox



Borescoping Cylinders

A while back I had an exhaust valve stick during takeoff in my Pegazair. It happened when I was about 400 feet in the air over the Ohkay Owingeh airport in Espanola and nearing the departure end of runway 34. At the time I didn't know it was a stuck valve, but the engine lost power and was shaking pretty hard. I was high enough to turn back and land on the runway, so I did. As I taxied back to the tiedowns to check things out the engine started to run better. It was almost like I imagined the whole thing, except I was still a bit shaky from the adrenaline rush, and that wasn't my imagination. Long story short, I discovered with my borescope that a stuck valve had caused the problem, and that all four of my exhaust valves and guides had built up heavy deposits. Reaming the valve guides and cleaning up the valve stems solved the problem, and a few days later the engine was running as good as new. Had I been in another aircraft I would have most likely landed off airport and the outcome could have been much worse.

The moral of this story is that if I had been doing a proper job of borescoping the cylinders at the annual inspection, I could have avoided the whole engine fails on takeoff, pilot heart rate hits 200 beats per minute, and pilot changes underwear after landing, scenario. I have to admit that scoping my cylinders in the past has focused on looking for impending exhaust valve failure due to overheating. You know, looking for crescent shaped green deposits on the edge of a valve that indicates it is leaking, getting hot, and about to crack. Well, it turns out that you can look for a lot more than that when you borescope a cylinder including identifying deposits that might lead to stuck valves, abnormal cylinder wear, and indications of detonation just to mention a few.

Recently Mike Busch wrote a really good article about this topic, and he lays out a procedure for borescoping cylinders



Top: Borecope picture of an exhaust valve stem with heavy deposits that can lead to a stuck valve.
Bottom: An exhaust valve destined for failure with the dead green crescent.

which could benefit all of us that are flying piston engine aircraft. Mike calls it [Saavy's Borescope Initiative](#), and it revolves around developing a database of millions of borescope pictures of cylinders and using Artificial Intelligence (AI) to identify potential issues before they become engine busting problems. Yeah, I know, we are all getting sick of hearing AI this and AI that, and it's either going to turn our existence into a utopia or destroy us all, but I think Mike is really on to something here. Let me explain.

Just like computers can learn to recognize faces, they can also be taught to recognize an exhaust valve that is developing signs of overheating. This can be done by feeding a computer a bunch of pictures of exhaust valves and using a neural network to teach it which ones are healthy and which ones are overheating. Overtime it can learn to tell the difference between the two and more importantly, determine the early signs of overheating, so the valve can be lapped before any real damage is done. This process can also be used to identify other cylinder abnormalities. Like identifying valve and guide deposits that might lead to a valve sticking or cylinders that are wearing abnormally or even rings that are starting to stick. Imagine if you could have a mechanic that had seen millions of cylinder problems look at a few dozen pictures that you or your mechanic took of your cylinders and give you a report on the health of each cylinder and identify any issues before they become real problems. It is like oil analysis except with a lot more data to pinpoint problems.

Borescope pictures, when interpreted properly, can tell you much more about the health of your cylinders than a compression test. A compression test can't tell you the color of the deposits on your valves or pistons or their shape or depth. It can't tell you what the honing scratches on the cylinder wall look like. It can't tell you if the valve wobbles as it seats. There are so many more things that pictures of your cylinder can tell you that a compression test can't. It is like the difference between taking a patient's blood pressure versus getting an MRI to diagnose a heart problem.

I think Mike is right on track with the application of AI to this problem. The challenge is gathering the pictures to teach the computer how to recognize cylinder problems. Saavy Aviation has put together a [cylinder borescoping protocol](#) and website to do just that. If you want to contribute to this effort, or simply learn more about how to diagnose cylinder problems yourself using a borescope, just take a look at their [website](#). Way to go Mike Busch.

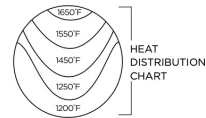


Sometimes while borescoping a cylinder you find something you don't expect, like this damage around the perimeter of a Continental engine piston. It is likely due to detonation.

ANATOMY OF A VALVE FAILURE

Burned exhaust valves have long been a leading cause of cylinder failures and power loss in piston aircraft engines. Modern borescopes allow us to look deep inside cylinders—and this guide will help you interpret what you see through the viewfinder.

OVERVIEW: Valves that fail to seat properly are subject to severe and uneven heating that can cause them to weaken and fail in predictable patterns.



* GREEN MEANS STOP

PROGRESSION OF FAILING VALVES



1 First indication: Circular color pattern is slightly uneven and nonsymmetrical.

2 Crescent-shape, discolored burn pattern developing at upper edge.

3 Burn pattern migrates inward.

4 **GREEN MEANS STOP.** The green area at the top shows this valve should be replaced immediately. (Note how the uneven burn patterns match the heat distribution chart.)

5 Green crescent progresses toward center with valve cracking and failure a serious danger.

6 Crack at 12 o'clock shows valve failure is imminent.

* BURNED PIZZAS ARE OK

COLORFUL BUT HEALTHY



Don't be alarmed by the bright color, or deposits around the edges. The symmetrical pattern shows this valve is just fine.

A symmetrical, circular pattern shows a healthy valve. Red and orange deposits are harmless.

Thick lead deposits from an overly rich mixture give this healthy valve the appearance of an overcooked pizza.

LEARN MORE:
www.airsafetyinstitute.org/valves

Special thanks to Adrian Eichhorn and Dr. Peter Wu.

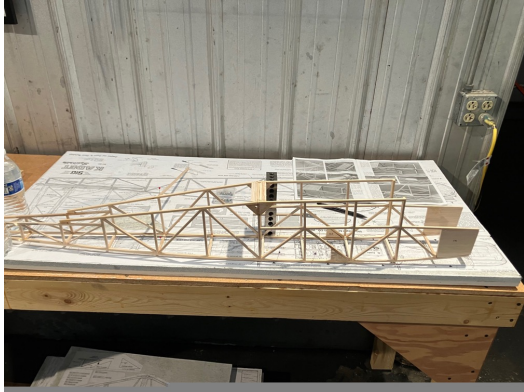
FUNDED BY GENEROUS DONATIONS TO THE AOPA FOUNDATION
AOPAFoundation.org



Member happenings



Skip had a birthday! Cheers to another circle around the sun Skip!



Señorita Build and Fly is making Progress. Chapter members have been meeting every Saturday to practice building an RC electric aircraft. The process is helping to train members as mentors for our upcoming “Build and Fly” Young Eagles RC aircraft workshop.

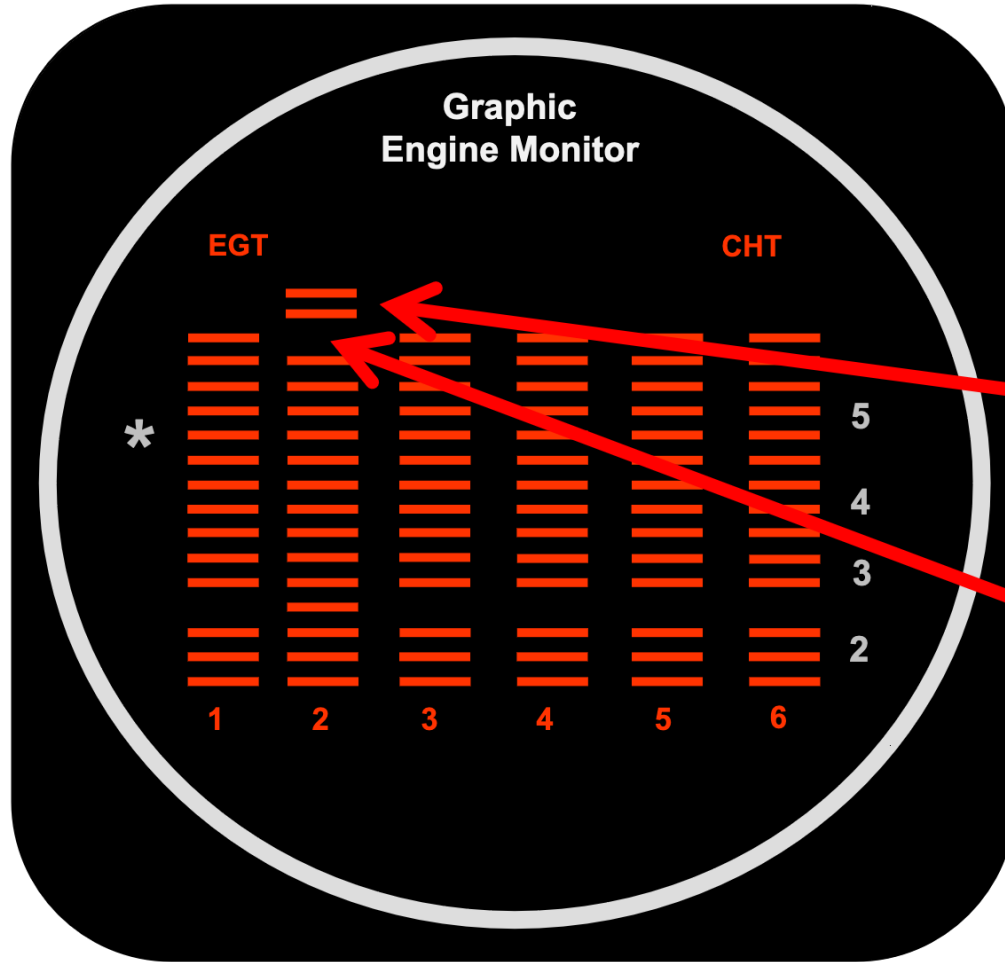
Pre-ignition and Detonation are Deadly!



Deadly!



How do I detect preignition?

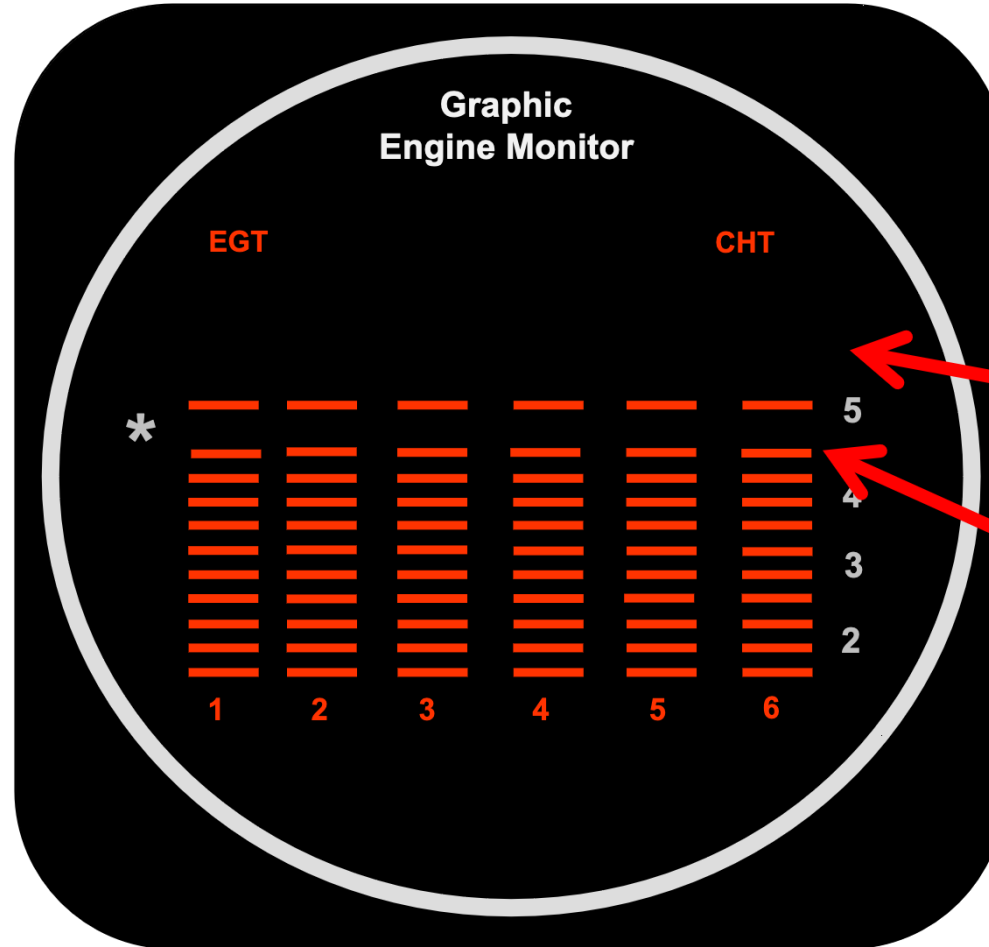


Spiked EGT

Spiked CHT

**Rough running
Engine should**

How do I detect detonation?



Low EGT

High CHT

Rough running
Engine

How do I react when it happens?

- **Cool the engine**
 - Reduce Power
 - Increase Airspeed
 - Enrich mixture
 - Open the cowl Flaps
- **Land Now!**



Clickbait

Thank you contributors!

The Klein Flying Aircar has been purchased by a Chinese firm that plans to mass produce it.

<https://www.klein-vision.com/>

Aircraft Transformation Technology

https://www.youtube.com/watch?v=JozF_CjZkD8

Building the Xenos electric motor glider

https://www.kitplanes.com/building-the-exenos-7/?MailingID=&utm_campaign=kitplanes_weekly_2024-04-09&utm_medium=newsletter&oly_enc_id=8686C1210956C2C

[NEW! Most Affordable Aircraft Engine! ZD Zongshen \[FULL INTERVIEW\] Clone Wars Rotax Vs. ZD CKD Aero \(youtube.com\)](#)

Clickbait

Thank you contributors!

Cirrus Aircraft's \$2M Private Jet is Equipped With Its Own ...

Cirrus CAPS deployment

https://www.google.com/search?client=firefox-b-1-d&sca_esv=959a59c8beda7f19&q=cirrus+parachute+deployment&tbm=vid&source=lnms&prmd=sivnbmtz&sa=X&ved=2ahUKEwix3KH67qiFAxXq4skDHR3JAgsQ0pQJegQIFRAB&biw=1480&bih=1119&dpr=2#fpstate=ive&vld=cid:b9394096,vid:2_8qCTAjsDg,st:0

Cirrus Parachute Rescue Caught on Tape

<https://www.youtube.com/watch?v=nJO6j3eP0Tk&t=30s>

For Sale

Have something to advertise for sale that is aircraft related? Please email the newsletter editor for placement in the newsletter

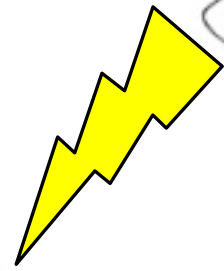
For Sale: Aircraft Building Tools



The kit also includes a 3x Rivet gun. I put the whole set into a shopping cart at Cleveland Aircraft Tools, and the total came to almost \$2,400. I am willing to sell the whole set for \$1,000.

If interested, please call Joe Pringle at 678-595-6717 or email me at joseph.pringle@gmail.com. If you are planning to build an RV, this will give you a great head start and save you a lot of money.

Hey Kids! Keep an eye out for upcoming work sessions to Electrify the Dragonfly!



Dragonfly

Illustration From CONTACT Volume 2 Issue 2
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EAA Chapter 691 Membership Application/Renewal Form



Please mail this form along with \$25 to our Chapter Treasurer, Checks can be made out to EAA Chapter 691:

David Young
819 Gonzales Rd
Santa Fe, NM 87501

Name: _____

Spouse/partner's Name: _____

EAA #: _____ Expiration Date (MM/YY) ____ / ____

Address: _____ City: _____ State: _____ ZIP: _____

E-mail: _____

Home phone: _____

Work phone: _____

Cell phone: _____

Please list your currently flying A/C and any finished or in-progress projects: